AE07-1 001

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 3, 1994

MEMORANDUM FOR: Donald H. Lanham
Office of Information Resources Management

FROM: Mary L. Thomas
Radiation Protectio.. and
Health Effects Branch
Division of Regulatory Application
Office of Nuclear Regulatory Research

SUBJECT: REGULATORY HISTORY: PROPOSED RULE, "LICENSES FOR RADIOGRAPHY AND RADIATION SAFETY REQUIREMENTS FOR RADIOGRAPHIC OPERATIONS (10 CFR PARTS 34 AND 150) (59 FR 9429, February 28, 1994)

Enclosed is an index of 44 documents which are of central relevance to the above proposed rule which has been forwarded to NUDOCS for incorporation in their computer data files. All documents have been identified in the upper right hand corner with the designator "AE07-1." In addition, each of the documents enclosed has been marked "PDR" in the upper right hand corner to indicate that it can be made available to the public.

A copy of the index has been forwarded to the Rules Review and Directives Branch, ADM. Should you require any additional information, please call me on extension 23886.

Mary L. Thomas
Radiation Protection and
Health Effects Branch
Division of Regulatory Application
Office of Nuclear Regulatory Research

Enclosures:
1. Index
2. Relevant Documents

Regulatory History

for

Proposed 10 CFR Part 34 and 150

Nbr	Type of Document	From/To	Subject	Date
1	Memo	Bernero to Beckjord	Request for Rule Change to 10 CFR Part 34	Jan 3, 1991
2	Staff Requirements Memo	Chilk to Taylor	SECY-91-020 Proposed civil penalty	Feb 15, 1991
3	Memo	Taylor to Commissioners	Clarfication of Requirments to 10 CFR 34.27	Mar 29, 1991
4	Memo	Bellamy to Regions and State Programs	Revision of 10 CFR Part 34	Apr 5, 1991
5	Modified Staff Requirements Memo	Chilk to Taylor	COMSECY-91-003 Clarification of requirement	Apr 25, 1991
6	Memo	Corley to Cool	Comptroller Comments of Draft Memo to Commission - Revision of 10 CFR Part 34	Jun 17, 1991
7	Memo	Beckjord to Taylor	RES Response to SRM of Apr 25, 1991	Jul 25, 1991
8	Memo	Heltemes to Arlotto and Kammerer	Reporting Requirements on Issues Paper and Enclosures	Apr 27, 1992
9	Memo	Arlotto to Heltemes	NMSS Response to Apr 27 Memo on Issues Paper	May 19, 1992
10	Memo	Nellis to Files	Meeting to Discuss 10 CFR Part 34 Revision	Jun 6, 1992
11	Letter	W. Russell to Senator Arlen Spector	Petition for rulemaking	Sep 29, 1992

Nbr	Type of Document	From/To	Subject	Date
12	Memo	Norry to Beckjord	Petition for Rulemaking (PRM-34-4)	Oct 26, 1992
13	Memo	Beckjord to Norry	Response to Oct 26, 1992 Memo	Nov 5, 1992
14	Letter	Senator Arlen Specter to Dennis Rathbun	Requests due consideration	Dec 17, 1992
15	Letter	Beckjord to W. Russell	Response to petition	Jan 8, 1993
16	Memo	Cool to Glenn	Request for review of draft revision of P 34	Jan 25, 1993
17	Memo	Shelton to Au	Review of draft revision of 10 CFR Part 34 in regard to OMB Statement concerning information collection requirements	Mar 5, 1993
18	Memo	Lesar to Thomas	Review of Draft Proposed Rule on Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations	Mar 19, 1993
19	Memo	Au to Shelton	10 CFR 34, Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations, Proposed Rule	Apr 28, 1993
20	Memo	Lesar to Thomas	Review of Proposed Rule Entitled "Licenses for Radiography Radiation Safety Requirements for Radiographic Operations"	May 12, 1993

Nbr	Type of Document	From/To	Subject	Date
21	Memo	Heltemes to Bernero, Malsch, Kammerer, Lieberman, Fouchard, Norry, and Cranford	Requests Office Concurrence on Part 34 (Radiography) Rulemaking	May 24, 1993
22	Memo	Shelton to Au	10 CFR 34, Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations, Proposed Rule	May 25, 1993
23	Memo	Ingram to Heltemes	Office Concurrence on Part 34 (Radiography) Rulemaking	May 25, 1993
24	Letter	W.Golini,(Grinnell Corp) to Nellis	Two Man Crew Requirements	Jun 4, 1993
25	Memo	Cain (Rg IV) to Nellis and Thomas through Callan	Comments on Part 34 Rulemaking	Jun 8, 1993
26	Memo	Lieberman to Heltemes	Comments on Part 34 Rulemaking	Jun 11, 1993
27	Memo	Shelton to Lesar cc: Au, Nellis and Thomas	Request for Comment Concurrence on the Proposed Rule, 10 CFR 34, Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations	Jun 14, 1993
28	Letter	Nellis to Golini (Grinnell)	Two Man Rule	Jun 15, 1993
29	Memo	Cranford to Heltemes	Office Concurrence on Part 34 (Radiography) Rulemaking	Jun 16, 1993

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30	Memo	Kammerer to Heltemes	Office Concurrence on Part 34 (Radiography) Rulemaking	Jun 24, 1993
31	Memo	Lesar to Thomas	Review of Proposed Rule Entitled "Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations"	Jun 25, 1993
32	Memo	Cranford to Beckjord and Bernero	10 CFR 34, Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations	Jun 30, 1993
33	Note	St. Mary to Thomas	10 CFR Part 34 Rulemaking and Associated OMB Clearnace Package	Jul 14, 1993
34	Memo	Surmeier to Morris	Proposed Rulemaking - Revision for Radiography and Radiation Safety Requirements for Radiographic Operations	Sep , 1993
35	Letter	Grinnell to Wellis	Two Man Rule	Sep 14, 1993
36	Letter	Grinnell to USNRC Secretary	Proposed Changes to Part 34	Oct 19, 1993
37	Memo	Lesar to Trottier	Concerns Review of Proposed Rule Entitled "Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations"	Oct 21, 1993

Nbr	Type of Document	From/To	Subject	Date
38	Memo	Shelton to Cool	Comments on 10 CFR 34, Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations	Nov 1, 1993
39	Letter	CIS-US, Inc. to Nellis	Requests copy of Radiography and Radiation Safety Requirements for Radiographic Operations	Nov 8, 1993
40	Ruelmaking Issue (Notation Vote) SECY-93-317	Taylor to Commissioners	Proposed Rulemaking - Revision to Part 34, Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations	Nov 23, 1993
41	Memo	Cool to Shelton	10 CFR 34, Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations	Dec 3, 1993
42	Memo	Shelton to Cool	10 CFR 34, Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations	Dec 28, 1993
43	Memo	Chilk to Commissioners	Staff Requirements Memorandum	Dec 30, 1993
44	Memo	Cool to Shelton	10 CFR 34, Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations	Jan 7, 1994

1978
Rationale for Revisions

Part E
Radiation Safety Requirements for Industrial Radiographic Operations

This rationale report documents the reasons for those significant changes made to the 1970 Edition of Part E which was included virtually unchanged in the 1974 Edition of the Suggested State Regulations for Control of Radiation (SSRCR).

General. Appropriate sentences were added throughout Part E concerning the preservation of records to be consistent with the U.S. Nuclear Regulatory Commission's (NRC) final regulations as published in the Federal Register on May 3, 1976 (41 FR 18300).

E.2 Scope. The phrase concerning the use of sources of radiation in the healing arts was deleted from this section as Part E applies only to industrial radiographic operations. The addition of the last sentence regarding applicability of provisions in this Part to both radiation machines and sealed radioactive sources is self-explanatory.

E.3 Definitions

(a) The general definition for "Enclosed radiography" was added so that definitions for "Cabinet radiography", "Cabinet x-ray system", "Certified cabinet x-ray system", and "Shielded room radiography" could be grouped together for convenience and added clarity. The definitions for "Cabinet radiography" and "Shielded room radiography" were modified such that the definitions would be applicable to both sealed radioactive sources and radiation machines. The defintions for "Cabinet x-ray system" and "Certified cabinet x-ray system" were added to incorporate the provisions of the Cabinet X-Ray Systems standard (21 CFR 1020.40).

(c) The definition for "Personal supervision" was added to eliminate the ambiguity which exists on the supervision required for assistant radiographers.

(d) The definition for "Radiographer" was modified to accommodate inclusion of the definition for "Personal supervision" and to eliminate duplication of phraseology.

(g) The definition for "Shielded position" was added as a result of a comment that the phrase "shielded position" was used throughout Part E without being defined.

E.102 Locking of Sources of Radiation.

(b) This paragraph was added to specify a requirement for locking exposure devices between radiographic operations which require movement of the source container. Investigations of incidents reveal that failure to lock exposure devices prior to being

moved from one location to another is a common source of overexposure that may be eliminated simply without undue restrictions.

E.104 Radiation Survey Instruments. This section was changed as a result of the recommendations made by two Federal agencies to incorporate two additional requirements related to calibration of radiation survey instruments used in industrial radiographic operations, namely, Subparagraphs E.104(b)(2) and (3). The requirement that calibration records be maintained for inspection by the Agency was added to aid in determining that properly calibrated instruments were available.

E.108 Inspection and Maintenance of Radiographic Exposure Devices and Storage Containers. The word "quarterly" was added to this section so that radiographic exposure devices would be inspected at regular intervals to insure their proper and safe function and their removal from service should the inspection indicate an unsafe condition. A sentence was added in Paragraph E.108(a) to require that records be maintained of these inspections and maintenance actions to aid the Agency in conducting its compliance program. Paragraph E.108(b) was added to prevent the continued use of damaged radiographic exposure devices until appropriate repairs or replacements have been made.

E.109 Inspection and Maintenance of High Radiation Area Control Devices or Alarm Systems. This section was added as a minimum requirement for the testing of control devices or alarm systems is essential to insure that they continue to function properly.

E.203 Personnel Monitoring Control. This section was changed to conform with the NRC amendment to 10 CFR 34.33 as published in the Federal Register on May 6, 1976 (41 FR 18645). This final rule allows the use of either thermoluminescent dosimeters or film badges by radiographers and their assistants. The amendment requires that a direct-reading pocket dosimeter be used, instead of allowing the use of a pocket chamber that is indirect reading, in addition to the film badge or thermoluminescent dosimeter. The Part E Working Group believes that the NRC amendment is appropriate and timely and that such provisions should be included in the Part E revision at this time.

E.303 Radiation Surveys and Survey Records. The word "condition" in lines 283 and 285 of the 1974 edition of the SSRCR was changed to "position" in the revised Paragraphs E.303(b) and (c) as a result of the establishment of the definition for "Shielded position".

E.304 Records Required at Temporary Job Sites. This section was added to delineate, to the licensee or registrant, the specific records which must be available at the industrial radiographic job site to provide the means for the Agency to effectively inspect and evaluate the radiographic operation.

E.305 Special Requirements and Exemptions for Enclosed Radiography. The Section E.304 designation was changed to Section E.305 due to the addition of a new Section E.304 as discussed above. The text and title were changed to include the Cabinet X-Ray Systems standard (21 CFR 1020.40). The requirement that certified cabinet x-ray systems shall be

maintained in conformance with the provisions of 21 CFR 1020.40 is necessary to provide the means for insuring that the owner of such a system maintains it in a safe condition. The registrant is required to conduct an evaluation of the system at least annually to determine conformance with 21 CFR 1020.40. This, however, would not preclude a state agency from providing an exemption to an owner registrant (but not to a person engaged in the business of manufacturing, assembling or modifying cabinet x-ray systems) under Paragraph A.3(a) of the SSRCR, from the requirement that the cabinet x-ray system be maintained in conformance with 21 CFR 1020.40. As those cabinet x-ray systems which can be entered by personnel pose radiation safety problems similar to those encountered in shielded room radiography, the Part E Working Group believes that all such systems, whether certified or not, should comply with the applicable provisions of Part E.

Appendix A

Part I.C. was changed to more clearly indicate that discussions of radiation protection standards and the biological effects (both acute and chronic) of radiation dose are to be included in the training courses for radiographers.

Part II.C. was changed by deleting "pocket chambers" and adding "thermoluminescent dosimeters" for reasons stated in the rationale for changes to Section E.203.

Matters for Future Consideration

1. Consideration should be given to establishing specific regulations for governing the use of radiation sources in oil and gas well logging. Also, the question of whether such regulations should be included in Part E, which would need to be retitled, or whether a separate part of the SSRCR should be established for well logging operations.

2. Other industrial uses of radiation sources such as fluoroscopes and industrial gauges should be considered for inclusion in future revisions of the SSRCR.

3. Consideration should be given to establishing more meaningful and descriptive language in Subparagraph E.104(b)(3) than the phrase "widely separated points".

4. Acting on a request from the NRC, the Technical Review Committee of the SSRCR elected to delete the following Paragraph E.105(f) requirement that was proposed by the Part E Working Group:

   (f) Each radiographic exposure device shall have permanently attached to it a durable label which has, as a minimum, the instruction: "Danger - Radioactive Material - Do Not Handle - Notify Civil Authorities if Found."

The Technical Review Committee believes, however, that this requirement is necessary and that the Conference of Radiation Control Program Directors, Inc., should forward this proposal to the NRC for reconsideration.

PART E

RADIATION SAFETY REQUIREMENTS FOR INDUSTRIAL RADIOGRAPHIC OPERATIONS

Sec. E.1 Purpose. The regulations in this Part establish radiation safety requirements for 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 these regulations.

Sec. E.2 Scope. The regulations in this Part apply to all licensees or registrants who use sources of radiation for industrial radiography. Except for those regulations of this Part clearly applicable only to sealed radioactive sources, both radiation machines and sealed radioactive sources are covered by this Part.

Sec. E.3 Definitions. As used in this Part, the following definitions apply:

"Cabinet radiography" means industrial radiography conducted in an enclosure or cabinet shielded so that radiation levels at every location on the exterior meet the limitations specified in Section D.105 of these regulations.

"Cabinet x-ray system" means an x-ray system with the x-ray tube installed in an enclosure independent of existing architectural structures except the floor on which it may be placed. The cabinet x-ray system 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 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.

"Certified cabinet x-ray system" means an x-ray system which has been certified in accordance with 21 CFR 1010.2 as being manufactured and assembled pursuant to the provisions of 21 CFR 1020.40.

"Collimator" means a device used to limit the size, shape, and direction of the primary radiation beam.

"Industrial radiography" means the examination of the macroscopic structure of materials by nondestructive methods using sources of ionizing radiation to produce radiographic images.

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

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

"Personal supervision" means guidance and instruction provided to a radiographer trainee by a radiographer instructor who is present at the site, in visual contact with the trainee while the trainee is using sources of radiation, and in such proximity that immediate assistance can be given if required.

"Radiographer" means any individual who performs or personally supervises industrial radiographic operations and who is responsible to the licensee or registrant for assuring compliance with the requirements of these regulations and all license and/or certificate of registration conditions.

"Radiographer instructor" means any radiographer who has been authorized by the Agency to provide on-the-job training to radiographer trainees in accordance with Subparagraph E.201b.ii.

"Radiographer trainee" means any individual who, under the personal supervision of a radiographer instructor, uses sources of radiation, related handling tools, or radiation survey instruments during the course of his instruction.

"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 unshielded position for purposes of making a radiographic exposure.

"Radiographic personnel" means any radiographer, radiographer instructor, or radiographer trainee.

"Residential location" means any area where structures in which people lodge or live are located, and the grounds on which such structures are located including, but not limited to, houses, apartments, condominiums, and garages.

"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 shielded so that radiation levels at every location on the exterior meet the limitations specified in Section D.105 of these regulations.

"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 area" means any location, facility, or vehicle which is used to store, to transport, or to secure a radiographic exposure device, a storage container, or a sealed source when it is not in use and which is locked or has a physical barrier to prevent accidental exposure,

tampering with, or unauthorized removal of the device, container, or source.

"Storage container" means a shielded device in which sealed sources are secured and stored.

"Temporary job site" means any location where industrial radiography is performed other than the location(s) listed in a specific license or certificate of registration.

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

Sec. E.4 Exemptions

a. Except for the requirements of Paragraph E.306b. and c., certified cabinet x-ray systems designed to exclude individuals from the interior of the cabinet are exempt from the requirements of this Part.

b. Industrial uses of lixiscopes are exempt from the requirements in this Part.

Equipment Control

Sec. E.101 Limits on Levels of Radiation for Radiographic Exposure Devices and Storage Containers. Radiographic exposure devices measuring less than 4 inches (10 cm) from the sealed source storage position to any exterior surface of the device shall have no radiation level in excess of 50 milliroentgens (1.29×10^{-5} C/kg) per hour at 6 inches (15 cm) from any exterior surface of the device. Radiographic exposure devices measuring a minimum of 4 inches (10 cm) from the sealed source storage position to any exterior surface of the device, and all storage containers for sealed sources or outer containers for radiographic exposure devices, shall have no radiation level in excess of 200 milliroentgens (5.16×10^{-5} C/kg) per hour at any exterior surface, and 10 milliroentgens (2.58×10^{-6} C/kg) per hour at 39.4 inches (1 m) from any exterior surface. The radiation levels specified are with the sealed source in the shielded position.

Sec. E.102 Locking of Sources of Radiation

a. Each source of radiation shall be provided with a lock or lockable outer container designed to prevent unauthorized or accidental production of radiation or removal or exposure of a sealed source and shall be kept locked at all times except when under the direct surveillance of a radiographer or radiographer trainee, or as may be otherwise authorized pursuant to Section E.301. Each storage container and source changer likewise shall be provided with a lock and shall be kept locked when containing sealed sources except when the container is under the direct surveillance of a radiographer or radiographer trainee.

b. Radiographic exposure devices, source changers, and storage containers, prior to being moved from one location to another and also prior to being secured at a given location, shall be locked and surveyed to assure that the sealed source is in the shielded position.

c. The sealed source shall be secured in its shielded position by locking the exposure device or securing the remote control each time the sealed source is returned to its shielded position. Then a survey shall be performed to determine that the sealed source is in the shielded position pursuant to Paragraph E.303b.

Sec. E.103 Storage Precautions

a. Locked radiographic exposure devices, source changers, storage containers, and radiation machines shall be physically secured to prevent tampering or removal by unauthorized personnel.

b. Radiographic exposure devices, source changers, or transport containers that contain radioactive material shall not be stored in residential locations. This requirement does not apply to storage of radioactive material in a vehicle in transit for use at temporary job sites, if the licensee complies with Paragraph E.103c., and if the vehicle does not constitute a permanent storage location as described in Paragraph E.103d.

c. 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 transport to ensure that radiation levels do not exceed the limits specified in Paragraph D.105a. of these regulations at the exterior surface of the vehicle.

d. A storage or use location is permanent if radioactive material is stored at the location for more than 90 days and any one or more of the following applies to the location:

i. Telephone service is established by the licensee;

ii. Industrial radiographic services are advertised for or from the location;

iii. Industrial radiographic operations are conducted at other sites due to arrangements made from the location.

Sec. E.104 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 Section D.201 of these regulations. Instrumentation required by this Section shall have a range such that 2 milliroentgens (5.16×10^{-7} C/kg) per hour through 1 roentgen (2.58×10^{-4} C/kg) per hour can be measured.

b. Each radiation survey instrument shall be calibrated:

i. at energies appropriate for use and at intervals not to exceed 3 months and after each instrument servicing;

ii. such that accuracy within plus or minus 20 percent can be demonstrated; and

iii. at 2 points located approximately ⅓ and ⅔ of full-scale on each scale for linear scale instruments; at midrange of each decade, and at 2 points of at least 1 decade for logarithmic scale instruments; and at appropriate points for digital instruments.

c. Records of these calibrations shall be maintained for 2 years after the calibration date for inspection by the Agency.

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

Sec. E.105 Leak Testing, Repair, Tagging, Opening, Modification, and Replacement of Sealed Sources

a. The replacement of any sealed source fastened to or contained in a radiographic exposure device and leak testing, repair, tagging, opening, or any other modification of any sealed source shall be performed only by persons specifically authorized to do so by the Agency, the U.S. Nuclear Regulatory Commission (NRC), or an Agreement State.

b. Each sealed source shall be tested for leakage at intervals not to exceed 6 months. 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.

c. The leak test shall be capable of detecting the presence of 0.005 microcurie (185 Bq) of removable contamination on the sealed source. 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 to be approved pursuant to Subparagraph C.26e.v. of these regulations. Records of leak test results shall be kept in units of microcuries (becquerels) and maintained for inspection by the Agency for 6 months after the next required leak test is performed or until the sealed source is transferred or disposed.

d. Any test conducted pursuant to Paragraphs E.105b. and c. which reveals the presence of 0.005 microcurie (185 Bq) or more of removable radioactive material shall be considered evidence that the sealed source is leaking. 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 regulations of the Agency. Within 5 days after obtaining results of the test, the licensee shall file a report with the Agency describing the equipment involved, the test results, and the corrective action taken.

e. Each radiographic exposure device shall have permanently attached to it a durable label which has, as a minimum, the instruction: "Danger - Radioactive Material - Do Not Handle - Notify Civil Authorities if Found."

Sec. E.106 Quarterly Inventory. Each licensee shall conduct a quarterly physical inventory to account for all sealed sources and radiography exposure devices received or possessed by him. The records of the inventories shall be maintained for 2 years from the date of the inventory for inspection by the Agency and shall include the quantities and kinds of radioactive material, the location of sealed sources, the date of the inventory, the name of the individual making the inventory, the manufacturer, the model number, and the serial number.

Sec. E.107 Utilization Logs. Each licensee or registrant shall maintain current logs which shall be kept available for inspection by the Agency for 2 years from the date of the recorded event, showing for each source of radiation the following information:

a. a unique identification, such as a serial number, of each radiation machine, each radiographic exposure device in which a sealed source is located, and each sealed source;

b. the identity of the radiographer to whom assigned;

c. locations where used and dates of use; and

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

Sec. E.108 Inspection and Maintenance

a. Each licensee or registrant shall ensure that checks for obvious defects in radiation machines, radiographic exposure devices, storage containers, and source changers are performed prior to each day or shift of use.

b. Each licensee or registrant shall conduct a program of at least quarterly inspection and maintenance of radiation machines, radiographic exposure devices, storage containers, and source changers to assure proper functioning of components important to safety. 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 2 years from the date of the recorded event.

c. If any inspection conducted pursuant to Paragraphs E.108a. or b. reveals damage to components critical to radiation safety, the device shall be removed from service and labeled as defective until repairs have been made.

Sec. E.109 Permanent Radiographic Installations. Permanent radiographic installations having high radiation area entrance controls of the type described in Subdivisions D.203c.ii.(2) and (3) of these regulations 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 control device or alarm system shall be tested for proper operation at the beginning of each day of equipment use. If a control device or alarm system is operating improperly, it shall be immediately labeled as defective and repaired before industrial radiographic operations are resumed. Records of these tests shall be maintained for inspection by the Agency for 2 years from the date of the event.

Personal Radiation Safety Requirements for Radiographic Personnel

Sec. E.201 Training and Testing

a. No licensee or registrant shall permit any individual to act as a radiographer trainee unless such individual has received copies of, instructions in, and has demonstrated an understanding of:

i. the subjects outlined in Appendix A of this Part;

ii. the regulations contained in this Part and the applicable Sections of Parts D, J, and T of these regulations;

iii. the appropriate license or certificate of registration; and

iv. the licensee's or registrant's operating and emergency procedures.

b. No licensee or registrant shall permit any individual to act as a radiographer, as defined in this Part, until such individual:

i. has met the requirements of Paragraph E.201a.;

ii. has provided the Agency with documentation on Agency Form R or equivalent showing completion of at least 30 days of on-the-job training by a radiographer

instructor as a radiographer trainee following completion of the requirements of Paragraph E.201a.;*

iii. has demonstrated competence in the use of sources of radiation, radiographic exposure devices, related handling tools, and radiation survey instruments which may be employed in industrial radiographic assignments; and

iv. has demonstrated an understanding of the instructions in Paragraph E.201a. by successful completion of a written test and a field examination on the subjects covered.

[v. has successfully completed an examination administered by the Agency or its agent.*]

c. Records of the above training, including copies of written tests and dates of oral tests and field examinations, shall be maintained by the licensee or registrant for inspection by the Agency for 3 years following termination of employment.

d. 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. These internal audits shall be performed at least quarterly, and each radiographer shall be audited at least quarterly. Records of internal audits shall be maintained for inspection by the Agency for 2 years from the date of the audit.

Sec. E.202 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 Part D of these regulations;

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 personnel monitoring equipment, including steps that must be taken immediately by radiography personnel in the event a pocket dosimeter is found to be off-scale;

*This requirement does not apply to individuals designated as radiographers prior to [insert date].

f. transportation to field locations, including packing of sources of radiation in the vehicles, posting of vehicles, and control of sources of radiation during transportation;

g. minimizing exposure of individuals in the event of an accident;

h. the procedure for notifying proper personnel in the event of an accident;

i. maintenance of records; and

j. the inspection and maintenance of radiographic exposure devices, source changers, storage containers, and radiation machines.

Sec. E.203 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 such individual wears a direct reading pocket dosimeter and either a film badge or a thermoluminescent dosimeter (TLD). Pocket dosimeters shall have a range from zero to 200 milliroentgens (5.16×10^{-5} C/kg) and shall be recharged daily or at the start of each shift. Each film badge or TLD shall be assigned to and worn by only one individual.

b. Pocket dosimeters shall be read and exposures recorded at least once daily.

c. Pocket dosimeters shall be checked for correct response to radiation at periods not to exceed 1 year. Acceptable dosimeters shall read within plus or minus 30 percent of the true radiation exposure. Records of this check shall be maintained for inspection by the Agency for 2 years from the date of the event.

d. If an individual's pocket dosimeter is discharged beyond its range, industrial radiographic operations by that individual shall cease and the individual's film badge or TLD shall be processed immediately. The individual shall not return to work with sources of radiation until a determination of the radiation exposure has been made.

e. Reports received from the film badge or TLD processor and records of daily pocket dosimeter readings shall be kept for inspection by the Agency until the Agency authorizes disposition.

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

Sec. E.204 Supervision of Radiographer Trainee. Whenever a radiographer trainee uses radiographic exposure devices, sealed sources or related source handling tools, or conducts radiation surveys required by Paragraphs E.303b. and c. to determine that the sealed source

has returned to the shielded position after an exposure, the radiographer trainee shall be under the personal supervision of a radiographer instructor.

Precautionary Procedures in Radiographic Operations

Sec. E.301 Security. During each radiographic operation, the radiographer, radiographer instructor or radiographer trainee shall maintain a direct surveillance of the operation to protect against unauthorized entry into a high radiation area, as defined in Part A of these regulations, except:

a. where the high radiation area is equipped with a control device or alarm system as described in Subparagraph D.203c.ii. of these regulations, or

b. where the high radiation area is locked to protect against unauthorized or accidental entry.

Sec. E.302 Posting. Notwithstanding any provisions in Paragraph D.204c. of these regulations, areas in which radiography is being performed shall be conspicuously posted as required by Paragraph D.203b. and Subparagraph c.i. of these regulations.

Sec. E.303 Radiation Surveys and Survey Records

a. No radiographic operation shall be conducted unless calibrated and operable radiation survey instrumentation, as described in Section E.104, 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 radiographic exposure to determine that the sealed source has been returned to its shielded position. The entire circumference of the radiographic exposure device shall be surveyed. If the radiographic exposure device has a source guide tube, the survey shall also include the entire length of the guide tube.

c. A survey shall be made of the storage area as defined in Section E.3 whenever a radiographic exposure device is being placed in storage.

d. A physical radiation survey, as specified in Section E.102, shall be made to determine that each sealed source is in its shielded position prior to securing the radiographic exposure device, storage container, or source changer in a storage area as defined in Section E.3.

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

f. Records shall be kept of the surveys required by Paragraphs E.303c. and d. Such records shall be maintained for inspection by the Agency for 2 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 Agency authorizes their disposition.

Sec. E.304 Documents and Records Required at Temporary Jobsites. Each licensee or registrant conducting industrial radiography at a temporary jobsite shall have the following records available at that site for inspection by the Agency:

a. appropriate license or certificate of registration or equivalent document;

b. operating and emergency procedures;

c. applicable regulations;

d. survey records required pursuant to Section E.303 and area survey records required pursuant to Paragraph D.401b. of these regulations for the period of operation at the site;

e. daily pocket dosimeter records for the period of operation at the site; and

f. the latest instrument calibration and leak test records for specific devices and sealed sources in use at the site. Acceptable records include tags or labels which are affixed to the device or survey meter.

Sec. E.305 Specific Requirements for Radiographic Personnel Performing Industrial Radiography

a. At a jobsite, the following shall be supplied by the licensee or registrant:

i. at least one operable, calibrated survey instrument;

ii. a current whole body personnel monitor (TLD or film badge) for each individual;

iii. an operable, calibrated pocket dosimeter with a range of 0 to 200 milliroentgens (5.16×10^{-5} C/kg) for each worker; and

iv. the appropriate barrier ropes and signs.

b. Industrial radiographic operations shall not be performed if any of the items in Paragraph E.305a. are not available at the jobsite or are inoperable.

c. Each licensee or registrant shall provide as a minimum two radiographic personnel when sources of radiation are used at temporary jobsites. If one of the personnel is a radiographer trainee, the other shall be a radiographer instructor.

d. No individual other than a radiographer or a radiographer trainee who is under the personal supervision of a radiographer instructor shall manipulate controls or operate equipment used in industrial radiographic operations.

e. No individual shall act as a radiographer instructor unless such individual:

i. has met the requirements of Paragraph E.201b.;

ii. has 1 year of documented experience as a radiographer; and

iii. has been named as a radiographer instructor on the license or registration certificate issued by the Agency.

[f. During an inspection by the Agency, the Agency inspector may terminate an operation if any of the items in Paragraph E.305a. are not available and operable or if the required number of radiographic personnel are not present. Operations shall not be resumed until such conditions are met.]

Sec. E.306 Special Requirements and Exemptions for Cabinet Radiography

a. Systems for cabinet radiography designed to allow admittance of individuals shall:

i. Comply with all applicable requirements of this Part and Section D.105 of these regulations. If such a system is a certified cabinet x-ray system, it shall comply with all applicable requirements of this Part and 21 CFR 1020.40.

ii. Be evaluated at intervals not to exceed 1 year to assure compliance with the applicable requirements as specified in Subparagraph E.305a.i. Records of these evaluations shall be maintained for inspection by the Agency for a period of 2 years after the evaluation.

b. Certified cabinet x-ray systems designed to exclude individuals from the interior of the cabinet are exempt from the requirements of this Part except that:

i. Operating personnel must be provided with either a film badge or a thermoluminescent dosimeter, and reports of the results shall be maintained for inspection by the Agency.

ii. No registrant shall permit any individual to operate a cabinet x-ray system until such individual has received a copy of and instruction in the operating procedures for the unit and has demonstrated competence in its use. Records

which demonstrate compliance with this subparagraph shall be maintained for inspection by the Agency until disposition is authorized by the Agency.

iii. Tests for proper operation of high radiation area control devices or alarm systems, where applicable, shall be conducted, recorded, and maintained in accordance with Section E.109.

iv. The registrant shall perform an evaluation, at intervals not to exceed 1 year, to determine conformance with Section D.105 of these regulations. If such a system is a certified cabinet x-ray system, it shall be evaluated at intervals not to exceed 1 year to determine conformance with 21 CFR 1020.40. Records of these evaluations shall be maintained for inspection by the Agency for a period of 2 years after the evaluation.

c. Certified cabinet x-ray systems shall be maintained in compliance with 21 CFR 1020.40 unless prior approval has been granted by the Agency pursuant to Paragraph A.3a. of these regulations.

Sec. E.307 Prohibitions. Industrial radiography performed with a sealed source which is not fastened to or contained in a radiographic exposure device, known as fishpole radiography, is prohibited unless specifically authorized in a license issued by the Agency.

Part E

APPENDIX A

SUBJECTS FOR INSTRUCTION OF RADIOGRAPHER TRAINEES

Training provided to qualify individuals as radiographer trainees in compliance with Paragraph E.201a. shall be presented on a formal basis. The training shall include the following subjects:

I. Fundamentals of Radiation Safety
   - A. Characteristics of radiation
   - B. Units of radiation dose and quantity of radioactivity
   - C. Significance of radiation dose
     1. Radiation protection standards
     2. Biological effects of radiation
     3. Case histories of radiography accidents
   - D. Levels of radiation from sources of radiation
   - 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
     2. Thermoluminescent dosimeters (TLD's)
     3. Pocket dosimeters

III. The Requirements of Pertinent Federal and State Regulations

IV. The Licensee's or Registrant's Written Operating and Emergency Procedures

V. Radiographic Equipment to be Used
   - A. Remote handling equipment
   - B. Operation and control of radiographic exposure devices and sealed sources, including pictures or models of source assemblies (pigtails)
   - C. Storage and transport containers, source changers
   - D. Operation and control of x-ray equipment
   - E. Collimators

1988
Rationale for Revisions

Part E
Radiation Safety Requirements for Industrial Radiographic Operations

Introduction

The changes to Part E in this revision of the Suggested State Regulations for Control of Radiation (SSRCR) were based upon changes to Louisiana and Texas industrial radiography regulations since the last revision of the SSRCR. Significant features relevant to improved radiation safety include the "two-man" rule (Paragraph E.305(c)) and the optional requirement for state or third party testing of radiographers (Subparagraph E.201(b)(5)). The U.S. Nuclear Regulatory Commission (NRC) is currently reevaluating its position with regard to licensing of industrial radiographic operations. Nothing in these suggested regulations should be interpreted as reflecting current or future NRC policy with regard to industrial radiographic operations.

Specific Provisions

E.3 Definitions

"Cabinet x-ray system" (rev.). The definition of "cabinet x-ray system" was made into several sentences for easier reading.

"Collimator" (new). The definition of "collimator" was added, with wording identical to the American National Standard definition. The definition was added because of the use of "collimator" in Appendix A.

"Enclosed radiography" (deleted). The definition of "enclosed radiography" was deleted as the term is not used in this edition of the SSRCR. The terms identified in the sub-definitions were retained and, in some cases, modified for clarity.

"Industrial radiography" (rev.). The definition of "industrial radiography" was changed to specifically indicate the use of ionizing radiation to produce radiographic images. This was necessary so that non-destructive testing using nonionizing radiation would be excluded and non-destructive testing not producing an image such as pipe wall thickness gauges would be excluded.

"Lixiscope" (new). The definition of "lixiscope" was added because this term is used in Section E.4.

"Personal supervision" (rev.). The definition of "personal supervision" was changed to incorporate the ideas of guidance and instruction and to remove reference to the

radiographer's assistant.

"Radiographer's assistant" (deleted). The definition of "radiographer's assistant" was deleted as the term was misleading. An assistant is someone who helps you accomplish a task not someone you are training to be a radiographer.

"Radiographer instructor" (new). The definition of "radiographer instructor" was added to specifically require that individuals providing training be radiographers who have been authorized by the Agency.

"Radiographer trainee" (new). The definition of "radiographer trainee" was added to more accurately define the training phase for a radiographer.

"Radiographic personnel" (new). The definition of "radiographic personnel" was added as this term is used in Section E.305.

"Residential location" (new). A definition for "residential location" was added because this term is used in Section E.103.

"Shielded-room radiography" (moved). The definition of "shielded-room radiography" was moved to place it in alphabetical order.

"Storage area" (new). A definition for "storage area" was added for consistency with 10 CFR 34.2.

"Storage container" (rev.). The definition of "storage container" was changed to remove reference to transportation and the word "shielded" was added to modify the word "device". This is a more accurate definition of the term as used in industrial radiography.

"Transport container" (new). A definition for "transport container" was added as reference to transportation was removed from the definition of "storage container".

E.4 Exemptions. Section E.4 was added to insure that the requirements of Part E were not applied to lixiscopes.

E.102 Locking of Sources of Radiation. A requirement for securing the sealed source in its shielded position after each exposure was added. This requirement is imposed upon the licensee through their operating and emergency procedures at this time; therefore, this action is placing the requirement into the regulations. There have been many overexposures because the source was not secured in the shielded position and was inadvertently moved to an unshielded position while moving the exposure device from one location to another.

E.103 Storage Precautions. Paragraphs E.103(b), (c) and (d) were added to prevent the permanent storage of radioactive material, in the large quantities used by radiographers, in residential areas. The potential risk to the public from such storage is believed to outweigh

any benefit. Temporary storage at residential locations such as a motel during transportation is allowed.

E.104 Radiation Survey Instruments. Subparagrpah E.104(b)(3) was expanded to give better instructions for calibration as "two or more widely separated points" is vague. Wording essentially identical to 10 CFR 39.33 was used. Paragraph E.104(d) was added to require an operational check of survey instruments prior to use. This requirement was added because of the importance of an operating survey instrument in industrial radiography.

E.105 Leak Testing, Repair, Tagging, Opening, Modification and Replacement of Sealed Sources. Paragraph E.105(e) was deleted as it refers to "fishpole radiography" which is no longer done. Section E.307 was added to specifically prohibit "fishpole radiography". A new Paragraph E.105(e) was added as requested by the SSRCR Technical Review Committee in the 1982 Rationale for Part E.

E.106 Quarterly Inventory. Section E.106 was changed to better identify the individual making the inventory and the sealed sources. An inventory of radiography exposure devices was also added as requested in the comments to the 1986 draft.

E.107 Utilization Logs. Paragraph E.107(a) was changed to require a unique identification instead of just a description as the same description could fit almost all devices. Also, Paragraph E.107(d) was added to require the dates each source is removed and returned to storage.

E.108 Inspection and Maintenance. Paragraph E.108(a) was changed to require inspections at the beginning of each shift or day of use. Paragraph E.108(b) was changed to require a 2 year record retention. Paragraph E.108(c) was changed to require a label on defective equipment to insure that it is not used until repaired.

E.109 Permanent Radiographic Installations. A requirement was added in Paragraph E.109(b) to label a defective control device or alarm system to insure that radiography is not conducted until repairs are made. A 2 year record retention was used to be consistent with other sections.

E.201 Training and Testing. Section E.201 was changed to improve the training that an individual receives prior to use of sources of radiation. The requirements for a radiographer's assistant have been deleted, and requirements for a radiographer trainee are being substituted. The radiographer's assistant was usually an individual who has received minimum training and then, typically, allowed to use sealed sources and/or x-ray machines under the supervision of a radiographer. However, experience has revealed that the radiographer actually provided very little personal supervision to these individuals during their day-to-day operations. The radiographer used the radiographer's assistant as an assistant. Usually, the radiographer's assistant actually manipulated the exposure device and made surveys while the radiographer is in the darkroom developing and interpreting film. The radiographer's assistant only sought help from the radiographer after he had a serious

problem. It seems reasonable that the individual who is responsible for the manipulation of the sealed source should have the benefit of complete training in radiation safety as outlined in Appendix A of Part E. The radiographer trainee is required to use sources of radiation, related handling tools or survey instruments under the direct, personal supervision of a radiographer instructor.

The radiographer trainee requirements were made Paragraph (a) under Section E.201 as this seemed to be a more logical progression making the trainee requirments come before the radiographer requirements. In Paragraph E.201(b), a requirement for providing the Agency with documentation of training for all radiographers was added. Subparagraph E.201(b)(5) was provided for those states that might want to institute a third party testing program for radiographers. Most of the training requirements are consistent with those currently in place. The major change has been moving the basic training requirements from the radiographer to the radiographer trainee.

E.203 Personnel Monitoring Control. Reference to the radiographer's assistant in Paragraph (a) of Section E.203 was changed to radiographer trainee as the radiographer's assistant is no longer used. In Paragraph (c), a requirement for records of the pocket dosimeter check was added with a 2 year retention time. It is believed that if the pocket dosimeter check is to be required there should be some way of inspecting against the requirement and a record seemed to be the most logical solution. Paragraph (d) was expanded to give more detailed instruction as to the action required in the case of an "off-scale" pocket dosimeter. The primary change was the instruction that radiographic operations shall cease and that the individual shall not return to work until a determination of his radiation exposure has been made. This was done so that the regulations would specifically state the action that is currently expected in the case of an "off-scale" pocket dosimeter. Paragraph (f) was added to give instructions concerning the loss of a TLD or film badge. This action was also taken to give specific instructions as to the action that is currently expected.

E.204 Supervision of Radiographer Trainee. The reference to radiographer's assistant was changed to radiographer trainee and radiographer was changed to radiographer instructor.

E.301 Security. The reference to radiographer's assistant was changed to radiographer instructor or radiographer trainee.

E.303 Radiation Surveys and Survey Records. Paragraphs (b) and (c) of Section E.303 were changed by adding a requirement for survey of the storage area to be consistent with 10 CFR 34.43.

E.304 Documents and Records Required at Temporary Jobsites. Paragraph (d) of Section E.304 was changed to also require a copy of the area survey record.

E.305 Specific Requirements for Radiographic Personnel Performing Industrial Radiography. Paragraph E.305(a) was added to provide a concise listing of safety equipment necessary before industrial radiography can be performed. Paragraph E.305(b) was added to make

certain that everyone involved understands that radiography shall not be performed if any of the necessary safety items are not available. Paragraph E.305(c) requires a two-person crew at each temporary jobsite where sources of radiation are used. It is expected that the two-person crew will provide better surveillance of the operation to protect against unauthorized entry into a radiation area or high radiation area, as required in Section E.301. This requirement is also intended to provide at least one knowledgable person at a temporary jobsite in case of an accident which might incapacitate an individual. Paragraph E.305(d) was added to insure that everyone involved understands who can operate and who cannot operate industrial radiographic equipment. Paragraph E.305(e) was added to specifically give the regulatory agency authorization to terminate an operation if the necessary safety equipment or personnel are not available. Paragraph E.305(f) was added to give specific requirements for an individual acting as a radiographer instructor. It requires that the instructor meet the minimum requirements for a radiographer as specified in Paragraph E.201(d) and should have had at least 1 year of experience as a radiographer. In addition, it is believed that the licensing agency should be notified of each individual that will be providing training.

E.306 Special Requirements and Exemptions for Cabinet Radiography. This section was renumbered from Sections E.305 to E.306 and the title was changed from "Special Requirements and Exemptions for Enclosed Radiography" to "Special Requirements and Exemptions for Cabinet Radiography". The word "enclosed" in paragraph (a) was also replaced with the word "cabinet". The move was made to allow insertion of a new Section E.305, "Specific Requirements for Radiographic Personnel Performing Industrial Radiography". The content of this new section, which among other things, specifies the items necessary at a temporary jobsite, and the necessity for a two-person crew at temporary jobsites, seem to logically follow Section E.304 which specifies records required at a temporary jobsite.

E.307 Prohibitions. Section E.307 was added to specifically prohibit "fishpole radiography" as Paragraph E.105(e) from the previous edition of the SSRCR was deleted.

Matters for Future Consideration

1. Equipment standards contained in the American National Standard N432, "Radiological Safety for the Design and Construction of Apparatus for Gamma Radiography" (ANSI N432-1980), should be incorporated into Part E of the SSRCR.

2. In the definition of "Residential location" in Section E.3, what about multi-tenant office buildings? The definition appears to need some refinement, particularly regarding the use of the words "area" (as in "area where structures. . .") and "grounds" (as in "grounds on which such. . .").

3. Paragraph (e) of Section E.105 (Leak Testing, Repair, Tagging, Opening, Modification, and Replacement of Sealed Sources) only applies to radiographic exposure devices. Unlike 10 CFR 34.25(e), the SSRCR Paragraph E.105(e) does not require sealed sources which are not fastened to or contained in a radiographic exposure device to be labeled.

4. Under Section E.201 on Training and Testing, consideration should be given to revising Subparagraph E.201(b)(2) to provide for a minimum of 90 days on-the-job training in order to be in line with NRC policy.

5. Under Section E.203 on Personnel Monitoring Control, consideration should be given to amending Paragraph E.203(b) to include a requirement for the retention of exposure records similar to the requirement in 10 CFR 34.33(b).

1982
Rationale for Revisions

Part E
Radiation Safety Requirements for Industrial Radiographic Operations

Introduction

The changes made to Part E in this revision of the Suggested State Regulations for Control of Radiation (SSRCR) were based on amendments to 10 CFR Part 34 (final rule: 44 FR 50805, August 30, 1979 - proposed rule: 43 FR 12715, March 27, 1978), and recommendations concerning the inclusion of SI units. An effort has also been made to make the regulations more readable and easier to enforce.

Specific Provisions

E.3 Definitions

A definition for "Permanent radiographic installation" was added for consistency with 10 CFR 34.2(h).

The definition for "Personal supervision" was changed to be more compatible with the new 10 CFR 34.44 requirement pertaining to supervision of radiographer's assistants.

A definition for "Source changer" was added with wording essentially identical to 10 CFR 34.2(g).

A definition for "Temporary job site" was added to this revision of Part E.

E.102(a) Locking of Sources of Radiation. The phrase "and source changer" was added following the phrase "each storage container" so that Paragraph E.102(a) is compatible with 10 CFR 34.22(b).

E.102(b) Locking of Sources of Radiation. The phrase "source changers" was added following the phrase "Radiographic exposure devices" so that Paragraph E.102(b) is compatible with 10 CFR 34.22(b).

E.103 Storage Precautions. The phrase "source changers" was added following the phrase "radiographic exposure devices" so that Section E.103 is compatible with 10 CFR 34.22(b).

E.108 Inspection and Maintenance. Since the paragraphs in Section E.108 deal with inspection and maintenance, the title was shortened to "Inspection and Maintenance" rather than adding "source changers" to the previous title (Inspection and Maintenance of Radiographic Exposure Devices and Storage Containers) and making the title excessively

long.

E.108(a) Inspection and Maintenance. A new Paragraph E.108(a) was added to be consistent with 10 CFR 34.28(a) except that management is allowed to delegate daily checks of equipment through the use of more permissive language.

E.108(b) Inspection and Maintenance. This provision was moved from Paragraph E.108(a) and changed by adding the phrases "radiation machines" and "source changers" to provide compatibility with the new Paragraph E.108(a) and 10 CFR 34.28(b). (The previous Paragraph E.108(b) provision was moved to Paragraph E.108(c)).

E.109 Permanent Radiographic Installations. The title was changed from "Inspection and Maintenance of High Radiation Area Control Devices or Alarm Systems" as the provisions that follow include requirements other than inspection and maintenance. In addition, the text of Section E.109 was rewritten to provide better organization and to incorporate the provisions of 10 CFR 34.29. The working group elected to require the testing of control devices and alarm systems "at the beginning of each period of use" rather than "at intervals not to exceed 3 months" as specified in 10 CFR 34.29(c). Testing at the beginning of each period of use appeared to be more appropriate from an operational standpoint since failure could occur anytime and if tested only every 3 months could go unnoticed for some time.

E.201 Training and Testing. The title was changed from "Limitations" to "Training and Testing" as the provisions that follow concern training and testing. In addition, the text was reorganized somewhat to better conform with the provisions of 10 CFR 34.31. Finally, a new Paragraph E.201(d) was added by the working group that requires the licensee or registrant to conduct a program of internal audit to ensure that license conditions and emergency procedures are followed.

E.202(e) Operating and Emergency Procedures. This provision was revised to be consistent with 10 CFR 34.32(e) and (k).

E.203(b)-(e) Personnel Monitoring Control. Paragraph E.203(b) was split into three separate provisions, Paragraphs E.203(b), (d), and (e), and a new Paragraph E.203(c) was added requiring that dosimeters, to be acceptable, read within plus or minus 30 percent of the true radiation exposure. These changes were made so that Section E.203 is compatible with 10 CFR 34.33.

E.204 Supervision of Radiographer's Assistants. This is a new section, added to be compatible with 10 CFR 34.44.

E.303(b) Radiation Surveys and Survey Records. This provision was changed to be consistent with 10 CFR 34.43(b).

E.303(d)-(e) Radiation Surveys and Survey Records. Paragraph E.303(d) was changed to Paragraph E.303(e) and a new Paragraph E.303(d) was added requiring that a physical

survey be made after each radiographic exposure using radiation machines.

Appendix A. A new item VI, "Case Histories of Radiography Accidents", was added to be consistent with Appendix A of 10 CFR 34.

Matters for Future Consideration

1. Other industrial uses of radiation sources, such as fluoroscopes and industrial gauges, should be considered for inclusion in future revisions of the SSRCR.

2. Consideration should be given to establishing more meaningful and descriptive language in Subparagraph E.104(b)(3) than the phrase "widely separated points".

3. Acting on a request from the U.S. Nuclear Regulatory Commission (NRC), the Technical Review Committee (TRC) of the SSRCR elected to delete the following Paragraph E.105(f) requirement that was proposed by the Part E Working Group for the 1978 revision of Part E.

   (f) Each radiographic exposure device shall have permanently attached to it a durable label which has, as a minimum, the instruction: "Danger - Radioactive Material - Do Not Handle - Notify Civil Authorities if Found."

   The TRC believed, however, that this requirement was necessary and that the Conference of Radiation Control Program Directors, Inc. (CRCPD) should forward this proposal to the NRC for reconsideration.

4. The National Bureau of Standards expressed concern that the 1978 Edition of the SSRCR treated the matter of instrument and source calibration for absorbed doses and exposure in inconsistent terminology and recommended that the CRCPD develop a single viewpoint concerning this issue. The related matter of "traceability to national standards" has been referred to the Part A working group for coordination.

5. In Section E.103 the phrase "physically secured to prevent tampering or removal by unauthorized personnel" has been determined to be vague by a state. New language is needed.

6. Paragraph E.105(e) should be deleted as it refers to "fishpole radiography" only, and this type of radiography is not being done any more.

maintained in conformance with the provisions of 21 CFR 1020.40 is necessary to provide the means for insuring that the owner of such a system maintains it in a safe condition. The registrant is required to conduct an evaluation of the system at least annually to determine conformance with 21 CFR 1020.40. This, however, would not preclude a state agency from providing an exemption to an owner registrant (but not to a person engaged in the business of manufacturing, assembling or modifying cabinet x-ray systems) under Paragraph A.3(a) of the SSRCR, from the requirement that the cabinet x-ray system be maintained in conformance with 21 CFR 1020.40. As those cabinet x-ray systems which can be entered by personnel pose radiation safety problems similar to those encountered in shielded room radiography, the Part E Working Group believes that all such systems, whether certified or not, should comply with the applicable provisions of Part E.

Appendix A

Part I.C. was changed to more clearly indicate that discussions of radiation protection standards and the biological effects (both acute and chronic) of radiation dose are to be included in the training courses for radiographers.

Part II.C. was changed by deleting "pocket chambers" and adding "thermoluminescent dosimeters" for reasons stated in the rationale for changes to Section E.203.

Matters for Future Consideration

1. Consideration should be given to establishing specific regulations for governing the use of radiation sources in oil and gas well logging. Also, the question of whether such regulations should be included in Part E, which would need to be retitled, or whether a separate part of the SSRCR should be established for well logging operations.

2. Other industrial uses of radiation sources such as fluoroscopes and industrial gauges should be considered for inclusion in future revisions of the SSRCR.

3. Consideration should be given to establishing more meaningful and descriptive language in Subparagraph E.104(b)(3) than the phrase "widely separated points".

4. Acting on a request from the NRC, the Technical Review Committee of the SSRCR elected to delete the following Paragraph E.105(f) requirement that was proposed by the Part E Working Group:

   (f) Each radiographic exposure device shall have permanently attached to it a durable label which has, as a minimum, the instruction: "Danger - Radioactive Material - Do Not Handle - Notify Civil Authorities if Found."

The Technical Review Committee believes, however, that this requirement is necessary and that the Conference of Radiation Control Program Directors, Inc., should forward this proposal to the NRC for reconsideration.

Part 31

"Radiation Safety Requirements and Licensing and Registration Procedures for Industrial Radiography"

TRCR Part 31 is entirely reformatted and contains several changes to the current rule. We include this note to inform you of the changes rather than underlining the extensive revisions, so the rule is more easily readable.

PART 31

RADIATION SAFETY REQUIREMENTS AND LICENSING AND REGISTRATION PROCEDURES FOR INDUSTRIAL RADIOGRAPHY

Subpart A
General Radiation Requirements

31.1 Purpose and Scope

The rules in this part establish radiation safety requirements and licensing and registration procedures for using sources of radiation for industrial radiography. The rules in this part apply to licensees and registrants who possess sources of radiation for industrial radiography, including radiation machines, accelerators, and sealed radioactive sources. Each licensee and registrant is responsible for ensuring compliance with these rules, license and registration conditions, and orders of the Agency. Each licensee and registrant is also responsible for ensuring that persons performing activities under a license or registration comply with these rules, license and registration conditions, and orders of the Agency.

The requirements of this part are in addition to and not in substitution for other applicable requirements of these rules. The provisions of Part 41 of these rules apply to licensees subject to this part; the provisions of Part 42 of these rules apply to registrants subject to this part; and the provisions of Part 35 of these rules apply to certain persons using accelerators subject to this part. Parts 11, 12, 13, 21, and 22 of these rules apply to all licensed and registered industrial radiographic operations.

31.2 Definitions

As used in this part, the following definitions apply:

"Additional authorized use/storage site" means authorized use/storage locations specifically named on a license or certificate of registration other than the main site specified on a license or certificate of registration or other than temporary job sites.

"ALARA" means as low as is reasonably achievable as defined in 21.1(b).

"ANSI" means American National Standards Institute.

"Cabinet radiography" means industrial radiography conducted in an enclosure or cabinet shielded so that radiation levels at every location on the exterior meet the limitations specified in 21.105.

"Cabinet x-ray system" means an x-ray system with the x-ray tube installed in an enclosure independent of existing architectural structures except the floor on which it may be placed. The cabinet x-ray system is intended to:

(a) contain at least that portion of a material being irradiated;
(b) provide radiation attenuation; and
(c) exclude personnel from its interior during generation of radiation.

An x-ray tube used within a shielded part of a building, or x-ray equipment that may temporarily or occasionally incorporate portable shielding, is not considered a cabinet x-ray system.

"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 1020.40

"Certified cabinet x-ray system" means an x-ray system that has been certified in accordance with 21 CFR 1010.2 as being manufactured and assembled on or after April 10, 1975, according to the provisions of 21 CFR 1020.40.

"Collimator" means a small radiation shield that is placed on the end of a guide tube or directly onto a radiographic exposure device to restrict the size of the radiation beam when the sealed source is cranked into position to make a radiographic exposure.

"Crank-out device" means the cable, protective sheath, and handcrank used to move the sealed source to and from the shielded position to make an industrial radiographic exposure.

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

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

"GED" means general educational development.

"I.D. card" means the document issued by the Agency to individuals who have completed the requirements stated in 31.16(b)(1) and (2).

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

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

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

"Minimal threat" means that during the operation of electronic devices capable of generating or emitting fields of radiation:

(1) no deliberate exposure of an individual occurs;
(2) the radiation is not emitted in an open beam configuration; and
(3) no known physical injury to an individual has occurred.

"Offshore" means within the territorial waters of the state of Texas. The territorial waters of Texas extend to the three marine league line or nine nautical miles from the Texas coast.

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

"Permanent storage site" means any location that is specifically named on a license or certificate of registration and that is used only for storage of sources of radiation.

"Personal supervision" means guidance and instruction provided to a radiographer trainee by a radiographer trainer who is present at the site, in visual contact with the trainee while the trainee is using sources of radiation, and in such proximity that immediate assistance can be given if required.

"Platform radiography" means industrial radiography performed on an off-shore platform or other structure.

"Radiation machine" means any device capable of producing ionizing radiation except those that produce radiation only from radioactive material.

"Radiation safety officer" means an individual named by the licensee or registrant who has a knowledge of, responsibility for, and authority to enforce appropriate radiation protection rules, standards, and practices on behalf of the licensee and/or registrant and who meets the requirements of 31.18.

"Radiographer" means any individual who has successfully completed the training, testing, and documentation requirements of 31.16(b).

"Radiographer trainee" means any individual who has successfully completed the training and documentation requirements of 31.16(a) and who must use sources of radiation and related handling tools or radiation survey instruments under the personal supervision of a radiographer trainer.

"Radiographer trainer" means a radiographer who instructs and supervises radiographer trainees during on-the-job training and who meets the requirements of 31.17.

"Radiographic exposure device" means any instrument containing a sealed source that is used to make a radiograph (e.g., camera).

"Radiographic personnel" means any radiographer or radiographer trainee.

"Residential location" means any area where structures in which people lodge or live are located, and the grounds on which these structures are located including, but not limited to, houses, apartments, condominiums, and garages.

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

"Shielded-room radiography" means industrial radiography conducted in a room shielded so radiation levels at every location on the exterior meet the limitations specified in 21.105 (bay, bunker).

"Sealed source" means radioactive material that is permanently bonded or fixed in a capsule or matrix designed to prevent release and dispersal of the radioactive material under the most severe conditions likely to be encountered in normal use and handling (pill).

"Source assembly" means a component to which the sealed source is affixed or in which the sealed source is contained. The source assembly includes the sealed source (pigtail).

"Source changer" means a device designed and used to replace sealed sources in radiographic exposure devices, including source changers used to transport and store sealed sources.

"Storage container" means the package in which sealed sources are secured and stored at a permanent storage site.

"Storage facility" means a structure designed to house one or more sources of radiation to provide security and shielding at a permanent storage site.

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

"Trainee status card" means the document issued by the Agency following completion of the requirements of 31.16(a)(1).

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

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

31.3 Exemptions

(a) Uses of certified and certifiable cabinet x-ray systems are exempt from the requirements of this part except for the requirements of 31.46(c) and (d).

(b) Industrial uses of hand-held light intensified imaging devices are exempt from the rules in this part if the exposure level 18 inches from the source of radiation to any individual does not exceed 2 millirem per hour. Devices with exposure levels that exceed the 2 millirem per hour level shall meet the applicable requirements of this part and Part 41 or Part 42 of these rules, as applicable.

(c) Radiation machines determined by the Agency to constitute a minimal threat to human health and safety in accordance with Part 11, Appendix 11-D, are exempt from the rules in this part except for the requirements of 31.3(a).

31.10 Receipt, Transfer, and Disposal of Sources of Radiation

Each licensee and 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, number of curies, and make, model, and serial number of each source of radiation and device, as appropriate. Records shall be maintained for Agency inspection until disposal is authorized by the Agency.

31.11 Radiation Survey Instruments

(a) Each licensee and registrant shall have a sufficient number of calibrated, appropriate, and operable radiation survey instruments to make the radiation surveys required by this part and 21.201. These radiation survey instruments shall be able to measure from 2 milliroentgens per hour through 1 roentgen per hour.

(b) Each radiation survey instrument shall be calibrated:

(1) by a person licensed or registered by the Agency, another Agreement State, or the U. S. Nuclear Regulatory Commission to perform such service;

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

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

(4) to demonstrate an accuracy within plus or minus 20 percent; and

(5) at two or more widely separated points, other than zero or full-scale, on each scale. For instruments without multiple scales, calibration shall be performed at six points equally spaced across the range of 2 milliroentgens per hour to 1 roentgen per hour.

(c) Records of the calibrations required by 31.11(b) shall be maintained for Agency inspection for two years after the calibration date.

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

31.12 Inventory

Each licensee and registrant shall conduct a physical inventory at intervals not to exceed three months to account for all sources of radiation received or possessed. Sources of radiation include radiographic exposure devices containing depleted uranium. The inventory records shall be maintained for Agency inspection for two years from the date of the inventory. Records shall include the manufacturer, model number, serial number, radionuclide, number of curies (except for depleted uranium), and location of each source of radiation, the date of the inventory, and name of the individual making the inventory.

31.13 Utilization Logs

Each licensee and registrant shall maintain current logs of the use, removal, and return to storage of each source of radiation. The logs shall include:

(a) a unique identification (e.g., serial number) of each radiation machine, each radiographic exposure device containing a sealed source, and each sealed source;

(b) the name of the radiographer using the source of radiation;

(c) the location(s) where each source of radiation is used;

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

(e) for permanent radiographic installations, the date(s) each radiation machine is energized.

Utilization logs may be kept on TRC Form 31-2, Utilization Log, or on clear, legible records containing all the information required by 31.13. Copies of utilization logs shall be maintained for Agency inspection until disposal is authorized by the Agency.

31.14 Inspection and Maintenance

(a) Each radiographer shall ensure that checks for obvious defects in radiation machines, radiographic exposure devices, transport containers, source changers, source guide tubes, and crank-out devices are made and documented at the beginning of each day of equipment use.

(b) At intervals not to exceed three months, each licensee and registrant shall inspect and repair components affecting safety associated with radiation machines, radiographic exposure devices, transport containers, and source changers. All appropriate components shall be maintained in accordance with manufacturers' specifications. Radiation machines, radiographic exposure devices, transport containers, and source changers being stored are exempted from this requirement provided that each radiation machine, radiographic exposure device, transport container, or source changer is inspected and repaired prior to being returned to service.

(c) Records of inspection and maintenance shall be maintained for Agency inspection for two years from the date of the inspection. This program shall cover, as a minimum, the items listed in Appendix 31-B.

(d) If any inspection conducted pursuant to 31.14(a) or (b) reveals damage to components affecting radiation safety, the device shall not be used and shall be labeled as defective until repaired.

31.15 Permanent Radiographic Installations

(a) Permanent radiographic installations shall have high radiation area entrance controls as described in 21.203(c)(1) through (5) or 35.8 and 35.9.

(b) The entrance controls shall be tested for proper operation at the beginning of each day of equipment use. If an entrance control is operating improperly, it shall be immediately labeled as defective and repaired before industrial radiographic operations are resumed. Records of these tests and repairs shall be maintained for Agency inspection until disposal is authorized by the Agency.

31.16 Training and Testing

(a) Radiographer Trainee Requirements. No licensee or registrant shall permit any individual to act as a radiographer trainee until:

(1) the licensee or registrant has documented to the Agency on TRC Form 31-1E or equivalent that such individual has successfully completed a course of at least 40 hours on the subjects outlined in Appendix 31-A. The course must be one accepted by the Agency, another Agreement State, or the United States Nuclear Regulatory Commission.

(2) the individual possesses a current Agency-issued trainee status card issued after completion of the requirements of 31.16(a)(1). In the interim period after submitting documentation and receiving a trainee status card, the trainee must possess a copy of the completed TRC Form 31-1E. The copy of the completed TRC Form 31-1E that was submitted to the Agency may be used in lieu of the trainee status card for a period of 30 days after the date of completion of the course.

(b) Radiographer Requirements. No licensee or registrant shall permit any individual to act as a radiographer until:

(1) the licensee or registrant has documented to the Agency on TRC Form 31-1R or equivalent that such individual:

(i) has completed the requirements of 31.16(a)(1);

(ii) has completed on-the-job training as a radiographer trainee supervised by one or more radiographer trainers authorized on a license or certificate of registration. The on-the-job training shall include at least 200 hours of active participation in radioactive materials industrial radiography operations and/or 120 hours of active participation in x-ray industrial radiography operations. Individuals performing industrial radiography utilizing radioactive materials and x-ray must complete both segments (320 hours) of on-the-job training. The hours of on-the-job training do not include safety meetings or classroom training; *

(iii) has demonstrated competence in the use of sources of radiation, radiographic exposure devices, related handling tools, and radiation survey instruments that may be employed in industrial radiographic assignments;

(2) the individual has successfully completed within the last five years the appropriate Agency-administered examination prescribed in 31.19(b); and

(3) the individual possesses a current I.D. card issued pursuant to 31.19(c).

* One year of documented experience as a fully qualified radiographer as authorized by an Agreement State, or the United States Nuclear Regulatory Commission may be substituted.

(c) No licensee or registrant shall permit any individual to act as a radiographer until such individual has received copies of and demonstrated an understanding of:

(1) the rules contained in this part and the applicable sections of Parts 11, 21 and 22:

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

(3) the licensee's or registrant's operating and emergency procedures;

(d) Training and Testing Records. Each licensee and registrant shall maintain, for Agency inspection, training and testing records that demonstrate that the applicable requirements of 31.16(a), (b), and (c) are met for all industrial radiographic personnel. Records shall be kept on TRC Form 31-E and 31-1R or on clear, legible records containing all the information required by these forms. Records shall be maintained until disposal is authorized by the Agency.

31.17 Radiographer Trainer

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

(a) it has been documented to the Agency on TRC Form 31-1T or equivalent that such individual:

(1) has met the requirements of 31.16(b);

(2) has one year of documented experience as an industrial radiographer; and

(b) such individual is named on the specific license or certificate of registration issued by the Agency and under which the individual is acting as a radiographer trainer.

31.18 Radiation Safety Officer

(a) A radiation safety officer (RSO) shall be designated on every industrial radiography license and certificate of registration issued by the Agency.

(b) The RSO's qualifications shall be submitted to the Agency and shall include:

(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 31.16(a)(1) and 31.16(b)(1)(iii), and (2);

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

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

(1) to establish and oversee operating, emergency, and ALARA procedures, and to review them regularly to ensure that the procedures are current and conform with these rules;

(2) to oversee and approve all phases of the training program for radiographic personnel so that appropriate and effective radiation protection practices are taught;

(3) to ensure that required radiation surveys and leak tests are performed and documented in accordance with these rules, including any corrective measures when levels of radiation exceed established limits;

(4) to ensure that personnel monitoring devices are calibrated and used properly by occupationally-exposed personnel, that records are kept of the monitoring results, and that timely notifications are made as required by Part 22 of these rules;

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

(6) to investigate and report to the Agency each known or suspected case of radiation exposure to an individual or radiation level detected in excess of limits established by these rules and each theft or loss of source(s) of radiation, to determine the cause, and to take steps to prevent its recurrence;

(7) to have a thorough knowledge of management policies and administrative procedures of the licensee or registrant;

(8) to assume control and have the authority to institute corrective actions including shutdown of operations when necessary in emergency situations or unsafe conditions;

(9) to maintain records as required by these rules (see Appendix 31-C);

(10) to ensure the proper storing, labeling, transport, and use of exposure devices and sources of radiation;

(11) to ensure that inventory and inspection and maintenance programs are performed in accordance with 31.12, 31.14, 31.44(a) and 31.54(a); and

(12) to ensure that personnel are complying with these rules, the conditions of the license or the registration, and the operating and emergency procedures of the licensee or registrant.

31.19 Applications and Examinations

(a) Application

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

(2) A non-refundable fee of $50.00 to cover the cost of the examination shall be submitted with the application.

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

(4) An individual whose I.D. card has been suspended or revoked shall obtain written approval from the Agency to apply to retake the examination.

(b) Examination

The examination shall be given for the purpose of determining the qualifications of applicants.

(1) A written examination shall be held at times and places determined by the Agency. The scope of the examination and the methods of procedure, including determination of the passing score, shall be prescribed by the Agency. The examination will emphasize the applicant's knowledge to safely use sources of radiation and related equipment and the applicant's knowledge of Parts 21 and 31 of these rules.

(2) A candidate failing an examination may apply for re-examination in accordance with 31.19(a) and will be re-examined. A candidate shall not retake the same version of the Agency-administered examination.

(3) The examination will be held in Austin and other locations designated by the Agency. The examination shall normally be offered once each month. Dates, times, and locations of the examination will be furnished by the Agency.

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

(5) To take the examination, an individual shall have a picture identification card (such as a Texas driver's license) at the time of the examination.

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

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

(8) Any individual observed by an Agency proctor to be compromising the integrity of the examination shall be required to surrender the examination, the answer sheet, and any work paper. Such individual will not be allowed to complete the examination, will forfeit the examination fee, and will leave the examination site to avoid disturbing other examinees. Such individual may resubmit a new application and an additional $50.00 examination fee and must wait 90 days before taking a new examination.

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

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

(c) I.D. Card

(1) An I.D. card shall be issued to each person who successfully completes the requirements of 31.16(b)(1) and the examination prescribed in 31.19(b).

(2) Each person's I.D. card shall contain his/her photograph. The Agency will take the photograph at the time the examination is administered.

(3) The I.D. card remains the property of the state of Texas and may be revoked or suspended under the provisions of 31.20.

(4) Any individual who wishes to replace his/her I.D. card shall submit to the Agency a written request for a replacement I.D. card, stating the reason a replacement I.D. card is needed. A non-refundable fee of $15.00 shall be paid to the Agency for each replacement of an I.D. card. The prescribed fee shall be submitted with the written request for a replacement I.D. card. The individual shall maintain a copy of the request in his/her possession while performing industrial radiographic operations until a replacement I.D. card is received from the Agency.

(d) Expiration of I.D. Card

Each I.D. card is valid for a period of five years, unless revoked or suspended in accordance with 31.20. Each I.D. card expires at the end of the day, in the month and year stated on the I.D. card.

(e) Renewal of I.D. Card

(1) Applications for examination to renew an I.D. card shall be filed in accordance with 31.19(a).

(2) The examination for renewal of an I.D. card shall be administered in accordance with 31.19(b).

(3) A renewal I.D. card shall be issued in accordance with 31.19(c).

31.20 Revocation or Suspension of an I.D. Card

(a) Any radiographer who violates these rules may be required to show cause at a formal hearing why his/her I.D. card should not be revoked or suspended in accordance with Part 13 of these rules.

(b) When an Agency order has been issued for an industrial radiographer to cease and desist from the use of sources of radiation or the Agency revokes or suspends his/her I.D. card, the industrial radiographer shall surrender the I.D. card to the Agency until the order is changed or the suspension expires.

31.21 Personnel Monitoring Control

(a) The personnel monitoring program shall meet the applicable requirements of Part 21 of these rules.

(b) When performing industrial radiographic operations:

(1) No licensee or registrant shall permit an individual to act as a radiographer, radiographer trainer, or radiographer trainee unless the individual wears a direct-reading pocket dosimeter, an alarming ratemeter, and either a film badge or a thermoluminescent dosimeter (TLD) at all times during radiographic operations. For permanent radiographic installations where other appropriate alarming or warning devices are in routine use, the wearing of an alarming ratemeter is not required.*

(2) Pocket dosimeters shall meet the criteria in ANSI 13.5 - 1972 at the time of manufacture and shall have a range of zero to 200 milliroentgens.

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

(4) As a minimum, pocket dosimeters shall be recharged, and "start" readings recorded:

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

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

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

(6) If an individual's pocket dosimeter is discharged beyond its range (i.e., goes "off-scale"), industrial radiographic operations by that individual shall cease and the individual's film badge or TLD shall be processed immediately. The individual shall not return to work with sources of radiation until a determination of his/her radiation exposure has been made.

(7) Each film badge or TLD shall be assigned to and worn by only one individual.

(8) Film badges and TLDs must be replaced at least monthly. After replacement, each film badge or TLD must be returned to the supplier for processing within 14 calendar days of the exchange date specified by the personnel monitoring supplier or as soon as practicable. In circumstances which make it impossible to return each film badge or TLD within 14 calendar days, such circumstances must be documented and available for review by the Agency.

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

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* Requirements for use of alarming ratemeters are effective [one year from the effective date of these rules].

(c) Records of film badge or TLD personnel monitoring shall be kept until disposal is authorized by the Agency.

(d) Records of pocket dosimeter readings of personnel exposures shall be maintained for two years by the licensee or registrant for Agency inspection. If the dosimeter readings were used to determine external radiation dose (i.e., no TLD or film badge exposure records exist), the records shall be maintained until the Agency authorizes disposal.

(e) Pocket dosimeters shall be checked for correct response to radiation at periods not to exceed one year. Acceptable dosimeters shall read within plus or minus 30 percent of the true radiation exposure. Records of pocket dosimeter response shall be maintained for two years by the licensee or registrant for Agency inspection.

(f) Each alarming ratemeter shall:

(1) have a function test to ensure that the audible alarm is functioning properly prior to use at the start of each work shift without being exposed to radiation.

(2) give an alarm at a preset dose rate of 500 mR/hr;

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

(4) be calibrated at intervals not to exceed one year for correct response to radiation. Acceptable ratemeters must alarm within plus or minus 20 percent of the true radiation dose rate. Records of alarming ratemeter calibrations shall be maintained for two years by the licensee or registrant for Agency inspection.

31.28 Access Control

(a) During each industrial radiographic operation, a radiographer shall maintain visual surveillance of the operation to protect against unauthorized entry into a radiation area or high radiation area, except where the high radiation area is equipped with a control device or alarm system as described in 21.203(c)(2).

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

31.29 Posting

Areas in which industrial radiography is being performed shall be posted conspicuously in accordance with Part 21 of these rules including:

(a) Radiation Areas. Each radiation area shall be posted conspicuously with a sign or signs displaying the radiation caution symbol and the words:

CAUTION *

RADIATION AREA

* Or "DANGER"

"Radiation area" means any area, accessible to individuals, in which radiation exists at such levels that a major portion of the body could receive a dose in excess of 5 millirems in any one hour or a dose in excess of 100 millirems in any five consecutive days.

(b) High Radiation Area. Each high radiation area shall be posted conspicuously with a sign or signs displaying the radiation caution symbol and the words:

CAUTION *

HIGH RADIATION AREA

"High radiation area" means any area, accessible to individuals, in which radiation exists at such levels that a major portion of the body could receive a dose in excess of 100 millirems in any one hour.

(c) Whenever practicable, ropes and/or barriers shall be used in addition to appropriate signs to designate areas in accordance with 21.105(b) and to help prevent unauthorized entry.

(d) During pipeline industrial radiographic operations, sufficient radiation signs and other barriers shall be posted to prevent unmonitored individuals from entering the area in accordance with 21.105(b).

(e) Notwithstanding the requirements of 31.29(a) and (b), an area may be established in accordance with 21.105(b) and be posted in accordance with 31.29 (a) and (b), i.e., both signs may be posted at the same location at the boundary of such area.

31.30 Records and Documents Required at Additional Authorized Use/Storage Sites

(a) Each licensee or registrant maintaining additional authorized use/storage sites where industrial radiography operations are conducted shall have copies of the following records and documents specific to that site available at each site for inspection by the Agency:

(1) a copy of the appropriate license or certificate of registration;

(2) operating and emergency procedures;

(3) applicable rules as listed in the license or certificate of registration;

(4) records of receipt, transfer and disposal of sources of radiation at the additional site in accordance with 31.10;

(5) records of survey instrument calibrations in accordance with 31.11;

* Or "DANGER"

(6) inventories in accordance with 31.12;

(7) utilization records in accordance with 31.13;

(8) records of inspection and maintenance in accordance with 31.14;

(9) records of entrance control operations in accordance with 31.15;

(10) training records in accordance with 31.16(d);

(11) records of personnel monitoring in accordance with 31.21;

(12) audits in accordance with 31.44(a) and 31.54(a);

(13) radiation survey records in accordance with 31.45(d) and 31.55(h);

(14) records of interlock testing in accordance with 31.46(c)(2) and 31.56(c);

(15) records of annual evaluation of cabinet x-ray systems in accordance with 31.46(c)(3).

(16) records of leak tests for specific devices and sources at the additional site in accordance with 31.53(c); and

(17) shipping papers for the transportation of sources of radiation.

(b) records required pursuant to 31.30(a)(1) through (17) shall be maintained in compliance with Appendix 31-C.

(c) records required pursuant to 31.30(a)(1) through (17) shall also be maintained at the main authorized site.

31.31 Records Required at Temporary Job Sites

Each licensee and registrant conducting industrial radiography at a temporary job site shall have the following records available at that site for Agency inspection:

(a) the appropriate license or certificate of registration or equivalent document;

(b) the appropriate operating and emergency procedures;

(c) the applicable Agency rules;

(d) the survey records required pursuant to 31.45(d) and 31.55(h) for the period of operation at the site;

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

(f) the daily alarming ratemeter records for the period of operation at the site; and

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

31.32 Specific Requirements For Radiographic Personnel Performing Industrial Radiography

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

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

(2) a current whole body personnel monitor (TLD or film badge) for each worker;

(3) an operable, calibrated pocket dosimeter with a range of zero to 200 milliroentgens for each worker;

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

(5) the appropriate barrier ropes and signs.

(b) Each radiographer at a job site shall have on his/her person a valid I.D. card issued by the Agency.

(c) Each radiographer trainee at a job site shall have on his/her person a valid trainee status card issued by the Agency or equivalent documentation in accordance with 31.16(a)(2).

(d) Industrial radiographic operations shall not be performed if any of the items in 31.32(a), (b), and (c) are not available at the job site or are inoperable.

(e) During an inspection by the Agency, an Agency inspector may terminate an operation if any of the items in 31.32(a), (b), and (c) are not available and operable or if the required number of radiographic personnel are not present. Operations shall not be resumed until all required conditions are met.

31.33 Notification of Incidents

(a) The Agency shall be notified of the loss or theft of sources of radiation, overexposures, and excessive levels in accordance with 21.402, 21.403, and 21.405.

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

(2) the source assembly becomes unintentionally disconnected from the drive cable;

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

(4) an indicator on a radiation-producing machine fails to show that radiation is being produced, an exposure switch fails to terminate production of radiation when turned to the off position, or a safety interlock fails to terminate x-ray production.

(c) The licensee or registrant shall include the following information in each report submitted in accordance with 31.33(b):

(1) a description of the equipment problem;

(2) cause of each incident, if known;

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

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

(5) actions taken to establish normal operations;

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

(7) names of personnel involved in the incident.

31.35 Reciprocity

(a) All reciprocal recognition of licenses and certificates of registration by the Agency will be granted in accordance with 41.90 and 42.10.

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

(1) the individual holds a valid certification in the appropriate category and class issued by another state or jurisdiction;

(2) the requirements and procedures for certification in the state or jurisdiction which issued the certification afford the same or comparable certification standards as those afforded by 31.16(b); and

(3) the applicant presents the certification to the Agency prior to entry into Texas.

(c) Certified individuals who are granted reciprocity by the Agency shall maintain the certification upon which the reciprocal recognition was granted; or prior to the expiration of such certification, shall meet the requirements of 31.16(b).

Subpart B
Radiation Safety Requirements and Registration Procedures for Use of Radiation Machines

31.41 Locking Sources of Radiation

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

31.42 Permanent Storage Precautions

Radiation machines shall be secured while in storage to prevent tampering or removal by unauthorized individuals.

31.43 Requirements for Radiation Machines Used in Industrial Radiographic Operations

(a) Equipment used in industrial radiographic operations involving radiation machines manufactured after October 1, 1987, shall be certified at the time of manufacture to meet the criteria set forth by ANSI N537-1976, except accelerators used in industrial radiography.

(b) The registrant's name and city or town where the main business office is located shall be prominently displayed with a durable, legible, clearly visible label(s) on both sides of all vehicles used to transport radiation machines for temporary job site use.

31.44 Operating Requirements

(a) Each registrant shall conduct an internal audit program to ensure that these rules, the conditions of the certificate(s) of registration, and the registrant's operating and emergency procedures are followed by radiographic personnel. Each radiographer's and radiographer trainee's performance during an actual radiographic operation shall be audited and documented at intervals not to exceed three months. If a radiographer or a radiographer trainee has not participated in a radiographic operation during the three months since the last audit, that individual's performance shall be observed and recorded the next time the individual participates in a radiographic operation. Records of audits shall be maintained by the registrant for Agency inspection for two years from the date of the audit.

(b) No individual other than a radiographer or a radiographer trainee who is under the personal supervision of a radiographer trainer shall manipulate controls or operate radiation machines used in industrial radiographic operations.*

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

31.45 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 31.11, is available and used for each radiation machine energized.

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

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* As of [the effective date of these rules], only one radiographer is required to operate radiation machines during industrial radiography.

(c) All potential radiation areas where industrial radiographic operations are to be performed shall be posted in accordance with 31.29, based on calculated dose rates, before industrial radiographic operations begin. An area survey shall be performed during the first radiographic exposure to confirm that 31.29 requirements have been met and that unrestricted areas do not have radiation levels in excess of the limits specified in 21.105(a).

(d) Records shall be kept of the surveys required by 31.45(c). These records shall be maintained for Agency inspection for two years after completion of the survey. If a survey was used to determine an individual's exposure due to loss of personnel monitoring data, the records of the survey shall be maintained until the Agency authorizes disposal.

31.46 Requirements and Exemptions for Enclosed Radiography

(a) Systems for enclosed radiography, including shielded-room radiography and cabinet x-ray systems not otherwise exempted, shall comply with all applicable requirements of this part.

(b) Systems for enclosed radiography designed to allow admittance of individuals and systems not otherwise exempted shall be evaluated at intervals not to exceed one year to ensure compliance with the applicable requirements of this part and 21.105. Records of these evaluations shall be maintained for Agency inspection for two years after the evaluation.

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

(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. Records that demonstrate compliance with this subparagraph shall be maintained for Agency inspection until disposal is authorized by the Agency.

(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 Agency inspection until disposal is authorized by the Agency.

(3) The registrant shall perform an evaluation to determine compliance with 21.105 and 21 CFR 1020.40 at intervals not to exceed one year. Records of these evaluations shall be maintained for Agency inspection for two years after the evaluation.

(d) Certified cabinet x-ray systems shall be maintained in compliance with 21 CFR 1020.40 and no modification shall be made to the system unless prior Agency approval has been granted pursuant to 11.3(a).

31.47 Registration Requirements for Industrial Radiographic Operations

(a) Radiation machines used in industrial radiographic operations shall be registered in accordance with Part 42 of these rules.

(b) In addition to the registration requirements in 42.3, an application for a certificate of registration shall include the following information:

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

(i) initial training,

(ii) periodic training,

(iii) on-the-job training, and

(iv) methods to be used by the registrant to determine the knowledge, understanding, and ability of radiographic personnel to comply with Agency rules, registration requirements, and the operating and emergency procedures of the applicant;

(2) Written operating and emergency procedures, including all items listed in Appendix 31-D.

(3) A description of the internal inspection system or other management control to ensure that radiographic personnel follow registration provisions, rules of the Agency, and the applicant's operating and emergency procedures.

(4) A list of permanent radiographic installations and descriptions of permanent storage and use sites. If records are to be maintained at a headquarters office in Texas and no storage is authorized for the site, this site will be designated as the main site. Radiographic equipment shall not be used at a permanent site unless such site is specifically authorized by the certificate of registration. A use site is permanent if any one or more of the following applies:

(i) radiation machines are used at the site for more than 90 days;

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

(iii) industrial radiographic services are advertised for or from the site; and/or

(iv) industrial radiographic operations are conducted at other sites due to arrangements made from the site.

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

(c) A certificate of registration will be issued if the requirements of 42.3 and 31.47 are met.

Subpart C
Radiation Safety Requirements and Licensing Procedures for Use of Sealed Sources

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

(a) Radiographic exposure devices, source changers, and transport containers manufactured before October 1, 1987, shall meet the following minimum criteria:

(1) Radiographic exposure devices and source changers measuring less than four inches (ten centimeters) from the sealed source storage position to any exterior surface of the device shall have no radiation level in excess of 50 milliroentgens per hour at six inches from any exterior surface of the device.

(2) Radiographic exposure devices and source changers measuring a minimum of four inches (ten centimeters) from the sealed source storage position to any exterior surface of the device, and transport containers for sealed sources or outer containers for radiographic exposure devices shall have no radiation level exceeding 200 milliroentgens per hour at any exterior surface and 10 milliroentgens per hour at one meter from any exterior surface.

(3) The radiation levels specified are with the sealed source in the shielded (i.e., "off") position.

(b) Radiographic exposure devices, source changers, and transport containers manufactured after October 1, 1987, shall meet the limits on radiation levels specified in ANSI N432-1980.

31.51 Locking Sources of Radiation

(a) Each radiographic exposure device and source changer shall have a lock to prevent unauthorized or accidental removal or exposure of a sealed source. Each exposure device and source changer shall be kept locked and, if a keyed lock, the key removed at all times except when under the direct visual surveillance of a radiographer.

(b) The 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.

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

31.52 Permanent Storage Precautions

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

(b) Radiographic exposure devices, source changers, or transport containers that contain radioactive material may not be stored in residential locations. This rule does not apply to storage of radioactive material in a vehicle in transit for use at temporary job sites, if the licensee complies with 31.55(e) and if the vehicle does not constitute a permanent storage location as described in 31.59(b)(4).

31.53 Requirements for Radiographic Exposure Devices Used in Industrial Radiographic Operations

(a) Radiographic exposure devices and associated equipment shall meet the criteria set forth by ANSI N432-1980.

(1) All newly manufactured radiographic exposure devices and associated equipment acquired by licensees after the effective date of these rules shall comply with the requirements of this part.

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

(b) Radiographic exposure devices that allow the source to move outside the device shall meet the following criteria:

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

(2) The drive cable must be positively connected to the source assembly before the source assembly can be driven out of the fully shielded position in a radiographic exposure device.

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

(4) The outlet nipple and drive cable fittings of each radiographic exposure device shall be equipped with safety plugs or covers that will protect the source assembly from damage and from foreign matter during storage and transportation.

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

(6) Guide tubes shall have passed the kinking and crushing tests for control units as specified in ANSI N432-1980.

(7) 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.

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

(c) Leak testing, repair, labeling, opening, modification, and replacement of sealed sources and devices shall be performed according to the following criteria:

(1) Leak testing of sealed sources shall be done in accordance with 11.7, except records of leak tests shall be maintained for Agency inspection for two years from the date of the leak test.

(2) The replacement, leak testing analysis, repair, labeling, opening, or any modification of a sealed source shall be performed only by persons specifically authorized to do so by the Agency, the U. S. Nuclear Regulatory Commission, or another Agreement State.

(3) Modification by the licensee of any radiographic exposure device and associated equipment is prohibited, unless specifically authorized on the license.

(4) The label(s) shall not interfere with the safe operation of the radiographic exposure device and associated equipment.

(i) Each sealed source or source assembly shall have permanently attached to it or engraved in it a durable, legible, visible label that has, as a minimum, the following wording:

DANGER

RADIOACTIVE

(ii) Each sealed source or source assembly shall be permanently labeled with a unique serial number. For radiographic exposure devices that allow the source to move outside the device, the source assembly shall be permanently labeled with a unique serial number on the connector end of the source assembly and shall be labeled in accordance with 31.53(c)(4)(i).

(iii) Each radiographic exposure device shall bear a permanent, durable, legible, clearly visible marking or label(s) that has, as a minimum, the standard radiation caution symbol as defined in 21.203, and the following wording:

CAUTION *

RADIOACTIVE MATERIAL--DO NOT HANDLE

NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)

---

* Or "DANGER"

(iv) Each transport container shall have permanently attached to it a durable, legible, clearly visible label(s) that has, as a minimum, the standard radiation caution symbol and the following wording:

CAUTION *

RADIOACTIVE MATERIAL

NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)

In addition, transport containers shall meet applicable requirements of the U. S. Department of Transportation.

(v) Each radiographic exposure device shall have attached to it a durable, legible, clearly visible label(s) that has, as a minimum:

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

(2) the chemical symbol and mass number of the radionuclide;

(3) the activity of the radionuclide and the assay date; and

(4) the model number and serial number of the sealed source; and the manufacturer of the sealed source.

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

(d) The licensee's name and city or town where the main business office is located shall be prominently displayed with a durable, clearly visible label(s) on both sides of all vehicles used to transport radioactive material for temporary job site use.

31.54 Operating Requirements

(a) Each licensee shall conduct an internal audit program to ensure that these rules, the conditions of the license(s), and the licensee's operating and emergency procedures are followed by radiographic personnel. Each radiographer's and radiographer trainee's performance during an actual radiographic operation shall be audited and documented at intervals not to exceed three months. If a radiographer or a radiographer trainee has not participated in a radiographic operation during the three months since the last audit, that individual's performance shall be observed and recorded the next time the individual participates in a radiographic operation. Records of audits shall be maintained by the licensee or for Agency inspection for two years from the date of the audit.

(b) Each licensee shall provide, as a minimum, two radiographic personnel for each exposure device in use for any industrial radiography conducted at a location other than at a permanent radiographic installation (shielded room, bay, or bunker) meeting the requirements of 31.15(a). If one of the personnel is a radiographer trainee, the other shall be a radiographer trainer authorized by the license.

* Or "DANGER"

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

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

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

31.55 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 31.11, is available for each exposure device in use at each site where radiographic exposures are made.

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

(c) (1) All potential radiation areas where industrial radiographic operations are to be performed shall be posted in accordance with 31.29, based on calculated dose rates, before industrial radiographic operations begin. An area survey shall be performed during the first radiographic exposure (i.e., with the sealed source in the exposed position) to confirm that 31.29 requirements have been met.

(2) Each time the exposure device is relocated and/or the exposed position of the sealed source is changed, the requirements of 31.55(c)(1) shall be met.

(3) The requirements of 31.55(c)(2) do not apply to pipeline industrial radiographic operations when the conditions of exposure including, but not limited to, the radiographic exposure device, duration of exposure, source strength, pipe size, and pipe thickness remain constant.

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

(e) When a vehicle is to be used for storage of radioactive material, a vehicle survey shall be performed after securing radioactive material in the vehicle to ensure that radiation levels do not exceed the limits specified in 21.105(b) at the exterior surface of the vehicle.

(f) Surveys shall be performed on storage containers to ensure that radiation levels do not exceed the limits specified in 21.105(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.

(g) A survey meeting the requirements of 31.55(b) shall be performed on the radiographic exposure device and the source changer after every sealed source exchange.

(h) Records shall be kept of the surveys required by 31.55(c), (d), (e), (f), and (g). These records shall be maintained for Agency inspection for two years after completion of the survey. If a survey was used to determine an individual's exposure due to loss of personnel monitoring data, the records of the survey shall be maintained until the Agency authorizes disposal.

31.56 Requirements for Enclosed Radiography

(a) Systems for enclosed radiography, including shielded-room radiography not otherwise exempted, shall comply with all applicable requirements of this part.

(b) Systems for enclosed radiography designed to allow admittance of individuals and systems not otherwise exempted shall be evaluated at intervals not to exceed one year to ensure compliance with the applicable requirements of this part and 21.105. Records of these evaluations shall be maintained for Agency inspection for two years after the evaluation.

(c) Tests for proper operation of interlocks must be conducted and recorded in accordance with 31.15. Records of these tests shall be maintained for inspection until disposal is authorized by the Agency.

31.57 Underwater, Offshore Platform, and Lay-Barge Radiography

(a) Underwater, offshore platform, and/or lay-barge radiography shall not be performed unless specifically authorized in a license issued by the Agency in accordance with 31.59.

(b) In addition to the other rules of this part, the following rules apply to the performance of lay-barge or offshore platform radiography:

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

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

31.58 Prohibitions

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

(b) Retrieval of disconnected sources or sources that cannot be returned by normal means to a fully shielded position or properly secured shall not be performed unless specifically authorized by a license condition.

31.59 Licensing Requirements for Industrial Radiographic Operations

(a) Sealed sources used in industrial radiographic operations shall be licensed in accordance with Part 41 of these rules.

(b) In addition to the licensing requirements in Part 41 of these rules, an application for a license shall include the following information:

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

(i) initial training,

(ii) periodic training,

(iii) on-the-job training, and

(iv) methods to be used by the licensee to determine the knowledge, understanding, and ability of radiographic personnel to comply with Agency rules, licensing requirements, and the operating and emergency procedures of the applicant;

(2) Written operating and emergency procedures, including all items listed in Appendix 31-D.

(3) A description of the internal inspection system or other management control to ensure that radiographic personnel follow license provisions, rules of the Agency, and the applicant's operating and emergency procedures.

(4) A list of permanent radiographic installations and descriptions of permanent storage and use sites. If records are to be maintained at a headquarters office in Texas and no use or storage is authorized for the site, this site will be designated as the main site. Radioactive material shall not be stored at a permanent storage site or used at a permanent use site unless such storage or use site is specifically authorized by the license. A storage site is permanent if radioactive material is stored at the site for more than 90 days. A use site is permanent if any one or more of the following applies:

(i) radioactive material is used at the site for more than 90 days;

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

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

(iv) industrial radiographic operations are conducted at other sites due to arrangements made from the site.

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

(6) A description of the program for inspection and maintenance of radiographic exposure devices and transport and storage containers (including applicable items in 31.14 and Appendix 31-B).

(7) If a license application includes underwater radiography, a description of:

(i) radiation safety procedures and radiographer responsibilites unique to the performance of underwater radiography;

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

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

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

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

(ii) storage facilities for radioactive material; and

(iii) methods for restricting access to radiation areas.

(c) A license will be issued if the requirements of 31.59 and Part 41 of these rules are met.

Appendix 31-A

SUBJECTS TO BE INCLUDED IN TRAINING COURSES FOR RADIOGRAPHER TRAINEES

Training provided to qualify individuals as radiographer trainees in compliance with 31.16(a)(1) shall be presented on a formal basis. The training shall include the following subjects:

I. Fundamentals Of Radiation Safety

- A. Characteristics of radiation
- B. Units of radiation dose (rem) and quantity of radioactivity (curie)
- C. Significance of radiation dose
  - 1. Radiation protection standards
  - 2. Biological effects of radiation dose
  - 3. Case histories of radiography accidents
- D. Levels of radiation from sources of radiation
- 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
  - 2. Thermoluminescent dosimeters (TLDs)
  - 3. Pocket dosimeters
  - 4. Alarming ratemeters

III. The Requirements Of Pertinent Federal And State Regulations

IV. Generic Written Operating And Emergency Procedures (Appendix 31-D)

V. Radiographic Equipment To Be Used

- A. Remote handling equipment
- B. Operation and control of radiographic exposure devices and sealed sources, including pictures or models of source assemblies (pigtails)
- C. Storage and transport containers, source changers
- D. Operation and control of x-ray equipment
- E. Collimators

Appendix 31-B

GENERAL REQUIREMENTS FOR INSPECTION OF INDUSTRIAL RADIOGRAPHIC EQUIPMENT

I. Panoramic devices (devices in which the sealed source is physically removed from the shielded container during exposure) shall be inspected for:

A. Radiographic exposure unit

1. Abnormal surface radiation levels anywhere on camera, collimator, or guide tube
2. Condition of safety plugs
3. Proper operation of locking mechanism
4. Condition of pigtail connector
5. Condition of carrying device (straps, handle, etc.)
6. Proper labeling

B. Source tube

1. Rust, dirt, or sludge buildup inside the source tube
2. Condition of source tube connector
3. Condition of source stop
4. Kinks or damage that could prevent proper operation
5. Presence of radioactive contamination

C. Control cables and drive mechanism

1. Proper drive mechanism with camera, as appropriate
2. Changes in general operating characteristics
3. Condition of connector on drive cable
4. Drive cable flexibility, wear, and rust
5. Excessive wear or damage to crank assembly parts
6. Damage to drive cable conduit that could prevent the cable from moving freely
7. Connection of the control cable connector with the pigtail connector for proper mating
8. Proper operation of source position indicator, if applicable
9. Presence of radioactive contamination

II. Directional beam devices shall be inspected for:

A. Abnormal surface radiation
B. Changes in the general operating characteristics of the unit
C. Proper operation of shutter mechanism
D. Chafing or binding of shutter mechanism
E. Damage to the device that might impair its operation
F. Proper operation of locking mechanism
G. Proper drive mechanism with camera, as appropriate
H. Condition of carrying device (strap, handle, etc.)
I. Proper labeling

GENERAL REQUIREMENTS FOR INSPECTION OF INDUSTRIAL RADIOGRAPHIC EQUIPMENT

III. X-ray equipment shall be inspected for:

A. Change in the general operating characteristics of the unit
B. Wear of electrical cables and connectors
C. Proper labeling of console
D. Proper console with machine, as appropriate
E. Proper operation of locking mechanism
F. Timer run-down cutoff
G. Damage to tube head housing that might result in excessive radiation levels

Appendix 31-C

TIME REQUIREMENTS FOR RECORD KEEPING

Specific Section	Name of Record	Time Interval Required for Record Keeping
31.10	Receipt, Transfer and Disposal	Until disposal is authorized by the Agency
31.11(c)	Survey Instrument Calibrations	2 years
31.12	Inventory	2 years
31.13	Utilization Logs	Until disposal is authorized by the Agency
31.14	Quarterly Inspection and Maintenance	2 years
31.15	High Radiation Area Control Devices or Alarm Systems	Until disposal is authorized by the Agency
31.16	Training and Testing Records	Until disposal is authorized by the Agency
31.21	Personnel Monitoring	Until disposal is authorized by the Agency
	Pocket Dosimeter Readings	2 years or until disposal is authorized by the Agency if dosimeters were used to determine external radiation dose
	Pocket Dosimeter Calibrations	2 years
	Alarming Ratemeter Calibrations	2 years
	Alarming Ratemeter Functions	2 years
31.53	Leak Tests	2 years

TIME REQUIREMENTS FOR RECORD KEEPING

Specific Section	Name of Record	Time Interval Required for Record Keeping
31.44(a) and 31.54(a)	Internal Audit Program	2 years
	Radiographer Audits	2 years
31.45 and 31.55	Radiation Surveys	2 years or until disposal is authorized by the Agency if a survey was used to determine an individual's exposure
31.31	Records at Temporary Job Sites	During temporary job site operations
31.46(b) and 31.56(b)	Annual Evaluation of Enclosed X-Ray Systems	2 years
31.46(c)(1)	Instructions In Operating Cabinet x-ray Systems	Until disposal is authorized by the Agency
31.46(c)(2)	Tests of Interlocks	Until disposal is authorized by the Agency
31.46(c)(3)	Evaluation of Certified Cabinet X-Ray Systems	2 years

Appendix 31-D

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 for industrial radiography such that no individual is likely to be exposed to radiation doses that exceed the limits established in Part 21 of these rules;

B. Methods and occasions for conducting radiation surveys, including lock-out survey requirements;

C. Methods for controlling access to industrial radiography areas;

D. Methods and occasions for locking and securing sources of radiation;

E. Personnel monitoring and the use of personnel monitoring equipment, including steps to be taken immediately by industrial radiographic personnel in the event a pocket dosimeter is found to be off-scale [31.21(b)(6)];

F. Methods of transporting equipment to field locations, including packing of sources of radiation in the vehicles, placarding of vehicles, and controlling of sources of radiation during transportation (including applicable U.S. Department of Transportation requirements);

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

H. Procedures for notifying proper personnel in the event of an accident;

I. Specific posting requirements;

J. Maintenance of records (Appendix 31-C); and

K. Inspection and maintenance of radiographic exposure devices, source changers, storage containers, transport containers, source guide tubes, crank-out devices, and radiation machines.

AE07-1
PDR 002

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JAN 03 1991

MEMORANDUM FOR: Eric S. Beckjord, Director
Office of Nuclear Regulatory Research

FROM: Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards

SUBJECT: REQUEST FOR RULE CHANGE TO 10 CFR PART 34

Recently, one of our regional offices proposed an enforcement action against a radiography licensee that, in part, involved the licensee conducting radiography operations within one of its facilities that regional personnel believed was a "permanent radiographic installation," as defined in 10 CFR Part 34, but which did not have entrance control warning devices installed, as is specified in 10 CFR 34.29(b). In an earlier inspection, the licensee was informed of the region's position that the facility constituted a permanent radiographic installation and, in a pending license renewal application, the licensee described appropriate entry control devices. Nevertheless, in the inspection that prompted the enforcement action, the region found that the licensee had continued to periodically conduct radiography in the facility without having the devices installed and operable.

In responding to the violation, the licensee argued it did not have to install and use the devices until its license was renewed, and that, in the interim, it was conducting its operations in the facility as a temporary field site, in accordance with procedures described in its license. The licensee also argued that it considered the facility a storage facility rather than an area designed for radiographic operations, and that it conducted radiography in the facility very infrequently. Several Nuclear Regulatory Commission (NRC) offices agreed that the definition for radiographic installations was vague and that enforcement action on this item should not be pursued. The Commission, by way of negative consent, did not object to the final Notice of Violation (which did not include the forementioned as a violation), but the Chairman requested that the staff clarify the regulations pertaining to permanent radiographic installations.

It has long been Nuclear Material Safety and Safeguards' (NMSS's) licensing policy and intent that licensees would identify and describe, in their license applications, any fixed radiography cells (permanent radiography installations) constructed and operated at their places of business, and that these cells would have the control devices specified in 10 CFR 34.29 in place and operable. Shielded cells at a radiographer's place of business would logically always be "designed or intended for radiography." The frequency with which the cell is used should not be the principal issue because there is no particular numerical value for frequency of use at which the safety of operations involving permanent versus temporary facilities could be differentiated. Instead, it should be more useful to have our requirements based on the physical characteristics of the cell and a determination that the cell is used repeatedly for radiography. We believe the control devices should be installed if the cell is used repeatedly for radiography.

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We believe this position is in keeping with the most recent amendment to Part 34, which will require radiography personnel to wear alarm ratemeters when performing radiography operations. This provision implies that NRC's experience with "field site" radiography operations, where most overexposure incidents occur, is unacceptable, and that additional safety devices, which operate "independently" of the user, should be used whenever individuals perform industrial radiography.

We also recognize that there may be situations where a licensee is conducting its operations in a fixed radiography cell outside the licensee's place of business. For example, a licensee may be conducting extended operations at a customer's location (a temporary job site) such as a power plant, where the customer has requested that radiography be performed in a cell in order to minimize access control problems. In these situations, we should expect that alarm devices be installed and conform with regulatory requirements.

On the other hand, the licensee may sometimes find itself conducting radiography operations at a temporary job site, for a short period of time, within a shielded facility not intended for radiography, such as a hot cell or an irradiation facility. In these cases, we do not believe that it is necessary for the alarm devices to be installed. Although, we note the Statements of Consideration for the 1980 amendment to Part 34 that introduced the definition for "permanent radiographic installation" was silent on this point, we believe this was the reason for the language used in the definition. The Office of Nuclear Regulatory Research (RES) project manager for this rule change also indicated this to be the case.

In addition to the forementioned problem, there appear to be a number of other provisions in Part 34, where the requirements are frequently misinterpreted or misunderstood by licensees and NRC staff. Confusion about certain license conditions has also been a problem. For example, there have been continuing discussions on what should be considered a temporary job site, and when a location should be considered a "permanent" storage location. A licensee may be conducting radiography on a daily basis for years at a temporary job site, such as during construction of a power plant. In an enforcement action a few years ago, NRC found that the licensee was operating an office at a temporary job site and dispatching workers to other job sites. NMSS believes it is important that NRC be informed when a licensee sets up satellite offices of long duration. "Security," 10 CFR 34.41, is another provision we believe needs to be modified. We would like to see the regulations make it clear that licensees must maintain continuous direct surveillance of all access points to a restricted area boundary. As we indicated previously, there are a number of areas where we believe Part 34 can be modified to clarify regulatory requirements or better reflect licensing policies. We can discuss these additional areas more when we meet in the future.

To resolve these problems, we request that a rulemaking be initiated to revise 10 CFR Part 34. We recommend that RES consider revising Part 34 to be more compatible, as appropriate, with Part E of the Conference of Radiation Control Program Directors, Inc., "Suggested State Regulations for Control of Radiation," and Part 31 of the Texas radiation regulations. Copies of these documents are enclosed. (Please note that the copy of Texas' Part 31 may not be the most recent version.) Those sections in Part E and Texas' Part 31 addressing "two-man crews" and requirements for an agency-administered examination, should not be included in the revision. This revision would also help to ensure that similarly worded regulations for industrial radiography are in use throughout the United States.

For "permanent radiographic installations," we suggest a new definition be developed along the lines of the definition for "shielded-room radiography" in Part E. However, the definition should be based on use of the room or cell for controlling access to the radiography area, rather than the radiation levels outside the cell. The regulations should also explicitly state that the control alarms must be installed and used. An exception could be provided when conducting operations at temporary job sites, provided the cell is normally used for other purposes.

My staff is available to meet with yours to discuss our request. Please contact Bruce Carrico (X20634) to make arrangements for a meeting.

Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards

Enclosures: As stated

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(Signed) Robe[illegible]

Robert M. Bernero, Director
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