DOCUMENT 1

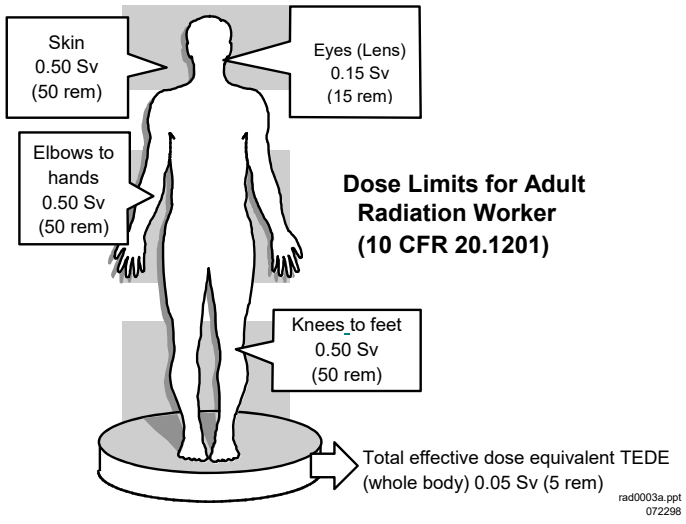
Supplemental Guidance for NUREG-1556, Volume 2, Revision 1, Consolidated Guidance About Materials Licenses: Program-Specific Guidance About Industrial Radiography Licenses

8.10.6 Occupational Dose

Regulations: 10 CFR 20.1201, 10 CFR 20.1207, 10 CFR 20.1208, 10 CFR 20.1501, 10 CFR 20.1502, 10 CFR 34.47

Criteria: Licensees must evaluate the potential occupational exposure of all workers and monitor occupational exposure. ~~Provide to employees film, thermoluminescent dosimeters (TLDs), or other personal dosimetry processing that has been accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) operated by the National Institute of Standards and Technology (NIST).~~

Discussion: The licensee may not permit any individual to act as a radiographer or a radiographer's assistant unless, at all times during radiographic operations, each individual wears, on the trunk of the body, a combination of a direct-reading dosimeter (pocket dosimeter or electronic personal dosimeter); an operating alarm ratemeter; and a film badge, TLD, or other personnel ~~personal~~ dosimetry device. At permanent radiographic installations where other appropriate alarming or warning devices are in routine use, wearing an alarming ratemeter is not required. The pocket dosimeters must have a range from zero to 2 mSv [200 mrem], must be recharged at the start of each work shift, and must be checked for correct response to radiation at intervals not to exceed 12 months. Electronic personal dosimeters may only be used in place of ion-chamber pocket dosimeters and require special means to change the preset alarm function. Alarm ratemeters must be preset to give an alarm signal at a dose rate of 5 millisievert per hour (mSv/h) [500 millirem per hour (mrem/h)] and must be calibrated for correct response at intervals not to exceed 12 months.



TOTAL EFFECTIVE DOSE EQUIVALENT (TEDE) = SUM OF THE EFFECTIVE DOSE EQUIVALENT (FOR EXTERNAL EXPOSURES) + THE COMMITTED DOSE EQUIVALENT (FOR INTERNAL EXPOSURES).

Figure 8-5. Annual Dose Limits for Occupationally Exposed Adults

Film badges must be replaced at intervals not to exceed 1 month~~,~~; ~~and TLDs or~~ other personnel~~personal~~ dosimetry devices that ~~are evaluated using an accredited NVLAP processor~~ require replacement must be replaced at least quarterly~~intervals not to exceed 3 months~~. Personnel dosimeters that do not require processing must be evaluated at least quarterly.

Response from Applicant: Provide the following:

- ~~A statement that film, TLD or other personal dosimetry devices are processed and evaluated by an NVLAP-accredited processor.~~

- A statement that film, TLD, or other personnel~~personal~~ dosimetry devices will be ~~exchanged at the required frequency and will be~~ assigned to and worn by radiography personnel and be evaluated at the required frequency.

- A statement that the required personnel monitoring equipment, including 0-2 mSv [0-200 mrem] dosimeters or electronic personal dosimeters, will be worn by radiography personnel.

- A statement that alarming ratemeters will be worn by all radiography personnel, except those at permanent radiography installations where other appropriate alarming or warning devices are in use and are operational.

- A statement that pocket dosimeters and alarm ratemeters will be checked for correct response to radiation at intervals not to exceed 12 months. If adjustment is necessary, state either that the devices will be returned to the manufacturer or persons licensed by Agreement State or NRC to calibrate such devices or provide in-house procedures if adjustments are made in-house.

***Note**:* The NIST maintains a directory of laboratories that are NVLAP-approved at http://ts.nist.gov/standards/scopes/dosim.htm.

8.10.9.5 Operating and Emergency Procedures: Personnel Monitoring and the Use of Personnel Monitoring Equipment

Regulations: 10 CFR 34.45(a)(5), 10 CFR 34.47

Criteria: Provide procedures for appropriate use of personnel monitoring equipment.

Discussion: As shown in Figure 8-9, all radiographers or radiographer's assistants are required to wear:

- direct-reading dosimeters and either film badges, TLDs, or other personnel~~personal~~ dosimetry devices

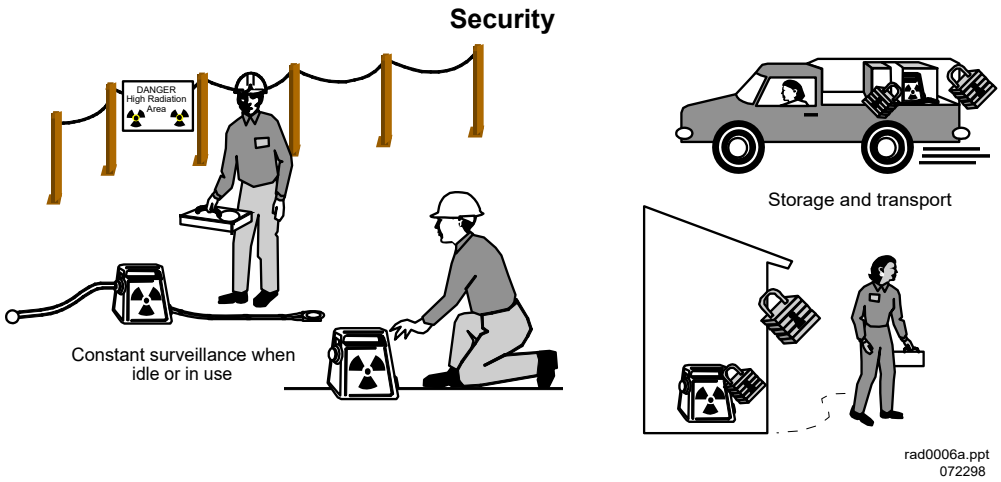


Figure 8-8. Security. To Avoid Lost or Stolen Devices, Licensees Must Keep the Radiographic Exposure Devices Under Constant Surveillance or Secured Against Unauthorized Use or Removal.

Alarm ratemeters when they are engaged in radiographic operations, except for a permanent radiographic installation. Film badges, TLDs, or other personnel~~personal~~ dosimetry devices must be assigned to and worn by only one individual. To ensure full-scale reading capability, direct-reading dosimeters, such as pencil (pocket) dosimeters or electronic personal dosimeters, must be recharged or reset at the start of each work shift so that the dosimeters will be capable of reading the full scale. Personnel should be instructed that direct-reading dosimeters must be read and recorded at the beginning and end of each work shift. Proper operation of alarm ratemeters must be checked each day before use to ensure that the alarm functions properly. The manufacturer's recommended procedures should be followed.

Include instructions about how and where dosimetry devices are to be stored when not in use. The storage place should be dry, with a low-radiation background area, and cool so that the devices will not be affected by adverse environmental conditions.

It is good practice to check the direct reading dosimeter reading after each exposure and during the work shift; however, there is no regulatory requirement for the direct reading dosimeter to be read during the work shift.

All radiographers or radiographer's assistants are required to wear alarm ratemeters, except at permanent radiographic facilities where other appropriate alarm or warning devices (e.g., visible and audible alarms) are in routine use and are operable.

Response from Applicant: The operating procedures must include instructions for proper use of personnel monitoring equipment.

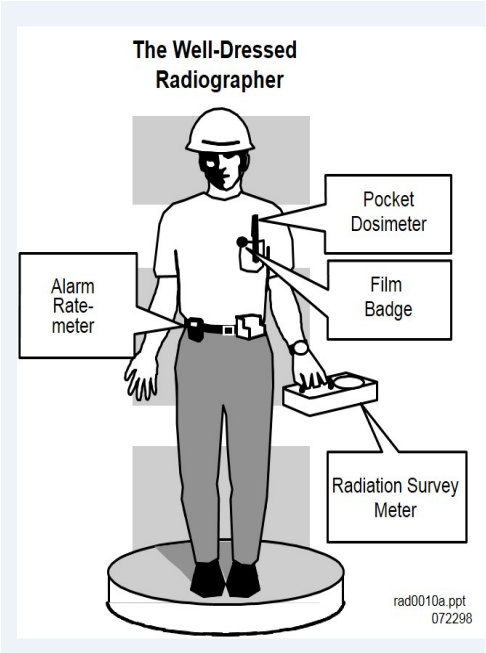


Figure 8-9. The Well-Dressed Radiographer. The Radiographer Is Equipped With the Required Personnel Monitoring Devices and Radiation Survey Instrument.

8.10.9.8 Operating and Emergency Procedures: Ratemeter Alarms or Off-Scale Dosimeter Readings

Regulations: 10 CFR 34.43(b)(2), 10 CFR 34.45(a)(8), 10 CFR 34.47(d)

Criteria: Licensees must instruct personnel in the following:

- appropriate handling and use of sealed radionuclide sources and radiographic exposure devices
- methods and occasions for conducting radiation surveys; controlling access to radiation areas; and locking, securing, and transporting storage containers, radiographic exposure devices, and sealed radionuclide sources
- the licensee's license and operating and emergency procedures
- actions to be taken if a dosimeter shows an off-scale reading or an alarm ratemeter alarms (e.g., sounds) unexpectedly
- procedures to be followed if a personnel~~personal~~ dosimeter ~~(processed by an NVLAP processor)~~ is lost or damaged
- procedures for notifying the proper persons in the event of an accident

Discussion: If an individual's self-reading pocket dosimeter is found to be off scale, an individual's electronic personal dosimeter reads above 2 mSv [200 mrem], or an alarm ratemeter alarms (e.g., sounds) unexpectedly, the RSO or designee must be notified immediately. If the RSO or designee cannot rule out radiation exposure to the individual as the root cause, the individual's personnel ~~personal~~ dosimetry device must be sent for processing within 24 hours, for dosimeters that require processing. For personnel dosimeters that do not require processing, evaluation of the individual's personnel dosimetry device must be started within 24 hours. The affected individual may not resume work with licensed radioactive material until the RSO or designee has determined the individual's radiation exposure. There are no exceptions to this requirement.

If any of the events described above should occur, personnel should be instructed to do the following, at a minimum:

- Stop work immediately and ensure that the sealed source is in the safe storage position in the radiographic exposure device, and vacate the radiation area.
- If the alarm ratemeter alarms (e.g., sounds), evaluate pocket dosimeter reading.
- Notify the individual specified in the emergency procedures.
- Notify the RSO or designee of the problem.

- If pocket dosimeter is off scale, do not resume operations until authorized by the RSO or designee.

- If the RSO or designee cannot rule out radiation exposure to the individual, then ~~process the personal dosimetry device within 24 hours~~, within 24 hours, start evaluation of the personnel ~~personal~~ dosimetry device or send it for processing and evaluation.

Response from Applicant: Submit operating and emergency procedures to address ratemeter alarms or off-scale dosimeters.

10	**RADIATION SAFETY PROGRAM** **6. Occupational Dosimetry** Radiography personnel will wear film, thermoluminescent dosimeter, or other personnel ~~personal~~ dosimetry,~~ processed and evaluated by a processor accredited by the National Voluntary Laboratory Accreditation Program and exchanged~~ and the personnel dosimetry device will be evaluated at the required frequency. Radiographic personnel will wear the required personnel monitoring equipment, including 0–200 mrem [0–2 mSv] dosimeters or electronic personal dosimeters. All radiography personnel will wear alarming ratemeters, except those personnel at permanent radiography installations where other appropriate alarming or warning devices are in use and are operational. Pocket dosimeters and alarm ratemeters will be checked for correct response to radiation at intervals not to exceed 12 months. • If adjustment is necessary, the devices will be returned to the manufacturer. • If adjustment is necessary, in-house procedures for adjustments are described. **7. Public Dose** The applicant is not required to, and should not, submit a response to the public dose section during the licensing phase. Public dose will be reviewed during inspections to determine compliance with NRC regulations. Appendix J provides additional information for determining that radiation doses for other licensee personnel and members of the public will not exceed allowable limits.	[ ] [ ] [ ] [ ] [ ]	[ ] Need Not Be Submitted With Application

The red-line, strike-out noted above is on Page C-10 in Appendix C of NUREG-1556, Volume 2, Revision 1

The red-line, strike-out noted below is on Page F-1 in Appendix F of NUREG-1556, Volume 2, Revision 1

Six-Month Radiographer/Radiographer's Assistant Inspection Checklist

Date: _____ Time: _____

Radiographic Location: _____

Radiographer/Radiographer Assistant: _____

Last Six-Month Performance Observation: Date: _____ By:

Device Model No.: _____ Serial No.: _____

Radiation Survey Meter Functionality: Yes _____ No _____

Calibrated: Yes ____ No _____ Daily/Source Check for Operation: Yes _____ No_____

Dosimetry: TLD/Film Badge/Other Personnel~~Personal~~ dosimetry device and Pocket Dosimeter:

Yes _____ No _____

Calibrated: Yes _____ No _____

Alarming Ratemeter: Yes _____ No _____ Calibrated: Yes _____ No _____

- □ Were other individuals working within the restricted area wearing film badges/TLDs, dosimeters, and alarming ratemeters?
- □ Was the restricted area posted with a "CAUTION (or DANGER) RADIATION AREA" sign(s)?
- □ Was the restricted area properly controlled to prevent unauthorized entry?
- □ Was the high-radiation area posted with a "CAUTION (OR DANGER) HIGH-RADIATION AREA" sign(s)?
- □ Was the utilization log properly filled out?
- □ Did the radiographer/radiographer's assistant have sufficient knowledge of safety rules? (Ascertained by oral questions)
- □ Was the radiographer working with properly inspected and operable equipment?
- □ Did the radiographer/radiographer's assistant properly survey the radiographic camera?
- □ Did the radiographer properly supervise the radiographer's assistant?
- □ Was the radiographic camera properly locked and secured to prevent unauthorized removal (two independent barriers)?

The red-line, strike-out noted below is on Page G-5 in Appendix G of NUREG-1556, Volume 2, Revision 1

Personnel Radiation Protection

A. Dosimetry

1. Workers monitored as required [20.1502; 34.47(a); L/C]
2. Exchange Frequency _____ Supplier _____

   Type of Dosimeter
3. Verify supplier is approved by the National Voluntary Laboratory Accreditation Program, if personnel dosimetry requires processing [20.1501(c)~~, 34.47(a)~~]
4. Dosimeters exchanged at required frequency [34.47(a)(3); L/C]
5. Dosimetry records maintained [20.2106; 34.83(c)]

B. Pocket Dosimeters and Electronic Personal Dosimeters

1. Model No. _____ Range _____

   Model No. _____ Range _____
2. Read and recorded at start of each shift [34.47(b)]
3. Daily readings recorded [34.47(b)]
4. Dosimeters checked for response (±20 percent) at intervals not to exceed 12 months [34.47(c)]
5. Off-scale dosimeter procedure and records [34.47; 34.83(d)]
6. Dosimetry records maintained [20.2106; 34.83(a)]

C. Alarm Ratemeters

1. Model No. _____ Range _____
2. Checked that alarm functions properly at start of each shift [34.47(g)(1)]
3. Preset at 5 mSv [500 mrem]/h with an accuracy of ±20 percent of the true radiation dose rate [34.47(g))(2)]
4. Calibrated at intervals not to exceed 12 months [34.47(g)(4)]
5. Records maintained [34.83(b)]

D. Dosimetry Reports

1. Reviewed by _____ Frequency _____.
2. Reviewed personnel monitoring records for interval (from _____ to _____)
3. Maximum exposures: TEDE _____ extremity _____

   other _____
4. NRC Forms (or equivalent) [20.2104(d); 20.2106(c)]
   a. NRC Form 4—occupational exposure history
   b. NRC Form 5—current occupational exposure