

CHECKLIST FOR SOURCE (Gamma) RADIOGRAPHY

CHECK ONE in each category

Date:

1. Valid License issued by:

- U.S. Nuclear Regulatory Commission.
- Agreement State and filed NRC Form 241 to appropriate Regional Office 3 days prior to commencement of work.
- Host country equivalency to NRC.

2. Individuals qualified designated by:

- Specifically named on license.
- Licensee as a qualified radiographer
- Certificate for qualified radiographer on file

3. Security

Yes	No	(A NO requires immediate corrective action)
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- | | | |
|--------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | Exposure devices and storage containers are kept locked when not under direct surveillance of radiographer. |
| <input type="checkbox"/> | <input type="checkbox"/> | Locked radiographic exposure devices are physically secured when not under direct surveillance of radiographer to prevent tampering or removal by unauthorized personnel. |
| <input type="checkbox"/> | <input type="checkbox"/> | Direct surveillance by radiographer of operation to protect against unauthorized entry into a high radiation area. |

4. Radiological Surveys

- Radiation survey instruments are calibrated within 3 months and are operable.
- Surveys are performed by radiographer to confirm source is in shielded position after each exposure. Survey includes entire circumference of device and source guide tube.

Unrestricted (unshielded) area calculations: [$\Gamma = 0.48 \text{ R/hr @ 1 meter/Curie (for } ^{192}\text{Ir)}$]

2 mrem/hr boundary:

$$\text{feet.} = \left(\frac{0.48 \text{ R / hr} - 1\text{m} / \text{Ci} \times A \text{ Ci}}{0.002 \text{ R / hr}} \right)^{\frac{1}{2}} \times 3.2808 \text{ feet / m}$$

Simplified
feet. = $\sqrt{A} \times 50.83$

Where: A = Activity of source being used.

2 mrem in any one hour boundary:

$$\text{feet.} = \left(\frac{0.48\text{R} / \text{hr} - 1\text{m} / \text{Ci} \times A \text{ Ci} \times E \text{ min}}{0.002 \text{ R / hr} \times 60 \text{ min / hr}} \right)^{\frac{1}{2}} \times 3.2808 \text{ feet / m}$$

Simplified
feet = $\sqrt{A \times E} \times 6.56$

Where E = maximum number of minutes source will be exposed during a specific hour.

5. Posting

- Areas are conspicuously posted with "Caution, Radiation Area".
- Areas are conspicuously posted with "Caution, High Radiation Area".
- Storage areas are posted with "Caution, Radioactive Material".

6. Checks

- The radiographer performs a check for obvious defects in radiographic exposure. devices, storage container, and source changers prior to use each day the equipment is used.
- The source has been leak tested within the last six months.

SPECIFIC RADIOLOGICAL MEASUREMENTS

Radiographer: Name: _____ Company: _____

1. Camera Used: ¹⁹²Ir or ⁶⁰Co
Manufacture: _____ Model: _____ S/N: _____ Current Activity _____ Ci
Date Leak Tested: _____ Exposure Measurement @ Guide Tube Connector: _____ mrem/hr

2. Exposures:
Exposure Time: _____ Number of Exposures: _____ Collimator Half Value: _____
Number of Exposures per hour: _____

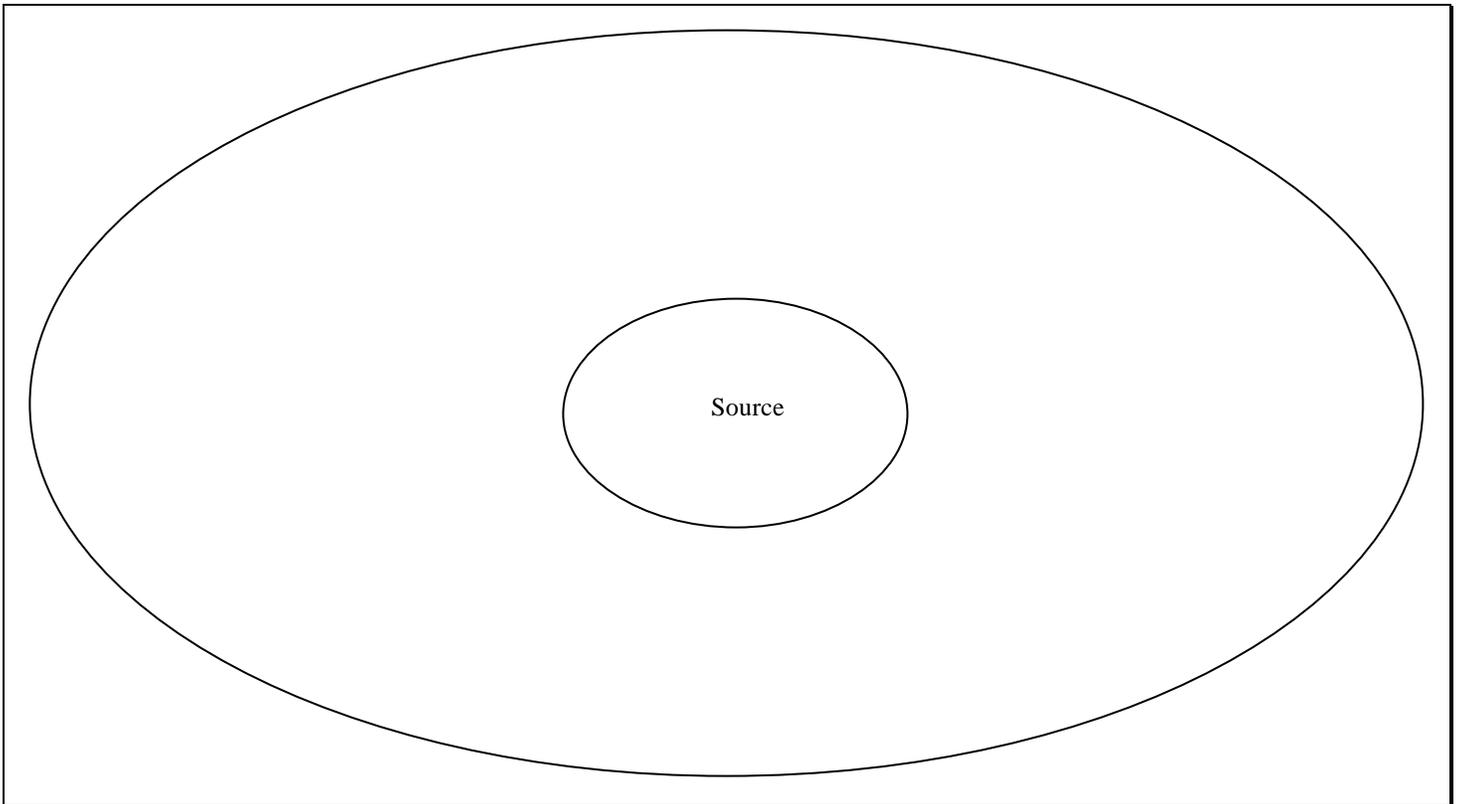
3. Area Boundaries:
Radiation Area Distance: _____ High Radiation Area Distance: _____
Measured Exposure: _____ mrem/hr

WPAFB RSO:

1. Instrumentation Used:
Manufacture: _____ Model: _____ S/N: _____ Cal: _____

2. Area Boundaries:
Highest Measured Exposure Rate at Radiation Area Boundary: _____ mrem/hr

3. Area Diagram (Not To Scale)



Person Performed Survey: _____ Date: _____

DEFINITIONS:

Agreement State - a state that has signed an agreement with the Nuclear Regulatory Commission allowing the state regulate certain activities using radioactive material.

Camera - refer to radiographic exposure device.

Drive cable - a cable used to push a source out of a camera.

High Radiation Area - any area, accessible to personnel, in which there exists radiation originating in whole or in part within licensed material at such levels that a major portion of the body could receive in any one hour a dose in excess of 100 millirem.

Pigtail - the part of a radiograph source assemble that includes the short cable and connector.

Radiation Area - any area, accessible to personnel, in which there exists radiation, originating in whole or in part within licensed material, at such levels that a major portion of the body could receive in any one hour a dose in excess of 5 millirem, or in any 5 consecutive days a dose in excess of 100 millirems.

Radiographic exposure device (camera) - 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.

Restricted Area - any area access to which is controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.

Source guide tube - a hollow tube through which the radiograph source travels when it is cranked out of its shielded position in the camera.

Storage Area - 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.

Unrestricted area - any area access to which is not controlled by the licensee for purposes of protection of individuals form exposure to radiation and radioactive material. Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of two millirems in any one hour. Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of 100 millirems in nay seven consecutive days.

RECOMMENDATIONS and COMMENTS

1. An ionization chamber survey instrument is used to confirm licensee's measurements of restricted areas.
2. Exposures be conducted in open areas rather than a hanger since the restricted area may exceed the physical barriers of the hanger and direct surveillance can be easier accomplished.
3. The Base Radiation Safety Officer concerns are primarily radiographic operations that have a potential for exposures to AF personnel.
4. Additional information on radiography requirements may be found in 10 CFR Part 34 and T.O. 33B-1-1.