**Section 360.APPENDIX A Medical Radiographic Entrance Exposure Measurement Protocol**

The following protocol shall be used for measuring and calculating entrance skin exposures (ESE) for routine diagnostic examinations. Radiation measurements shall be performed with a calibrated radiation measuring device that is sufficiently sensitive to determine compliance with the criteria specified in Section 360.60(e) of this Part. The instrument shall have been calibrated within the previous 12 months with devices which have no more than a three-step (tertiary) calibration, traceable to the National Institute of Standards and Technology. Patients are not involved in the measurement protocol.

a) Position the x-ray tube at the source-image receptor distance (SID) routinely used and adjust the collimation to the active portion of a radiation measuring device.

b) Measure the distance from the x-ray source to the source against which the patient rests. Subtract the thickness of the patient to obtain the source-skin distance (SSD). The standard patient thickness for each projection to be measured shall be the following:

|  |  |
| --- | --- |
| Projection | Thickness (cm) |
|  |  |
| Chest (PA), Grid | 23 |
| Chest (PA), Non-Grid | 23 |
| Abdomen (KUB) | 23 |
| Lumbo-Sacral Spine (AP) | 23 |
| Cervical Spine (AP) | 13 |
| Skull (lateral) | 15 |
| Foot (D/P) | 8 |

c) Place a radiation measuring device in the center of the useful beam, measure and record the distance from the source to the device (SDD). Use of a test stand to position the device away from the table will reduce backscatter contribution. Placing the radiation measuring device at the actual source-skin distance (SSD) will accomplish this and allow direct reading of the ESE.

d) Set the exposure technique as follows:

1) For non-phototimed x-ray systems, set the controls to the exposure technique used by the x-ray operator for the standard patient thickness specified in subsection (b) of this Section.

2) For phototimed x-ray systems, set the controls to the exposure technique used by the x-ray operator for the standard patient thickness specified in subsection (b) of this Section, and use one of the two methods below:

A) Place an appropriate phantom (simulating body attenuation) in the useful beam between the radiation measuring device and the radiographic tabletop; or

B) Set an appropriate exposure technique in the manual mode (without activation of the phototimer).

AGENCY NOTE: Specifications for appropriate phantoms are included in the American Association of Physicists in Medicine (AAPM) Report No. 31, entitled "Standardized Methods for Measuring Diagnostic X-Ray Exposures" (July 1990). A copy of this report is available for public inspection at the Illinois Emergency Management Agency, 1035 Outer Park Drive, Springfield, IL. Copies of this report may also be obtained from the AAPM, One Physics Ellipse, College Park MD 20740-3846.

e) Make a radiographic exposure (without patient) and record the reading obtained from the radiation measuring device

f) Calculate the entrance skin exposure for the specific examination, using the radiation exposure reading from subsection (e) of this Section and the equation in this subsection (f) below (if a direct result was not obtained with the dosimeter at the SSD). The entrance skin exposure equals the product of the radiation exposure reading from subsection (e) of this Section multiplied by the square of the ratio of the SDD, to the SSD. This expression is mathematically represented by the equation below (if a direct result was not obtained with the dosimeter at the SSD):

ESE = (Dosimeter Reading) x 

where:

SDD = source-radiation measuring device distance

SSD = source to skin distance

g) Compare the results of the calculation from subsection (f) of this Section with the criteria specified in Section 360.60(e) of this Part to determine compliance.

AGENCY NOTE: There are many different techniques for measuring ESE that may result in significant differences in measured values. Factors that can cause variations include instrument calibration, backscatter, collimation, estimation of focal spot location, choice of phantom, location of dosimeter in the primary beam, etc. Because of these variations, the procedure for determining the ESE should be performed with strict attention to each detail noted above.

(Source: Amended at 32 Ill. Reg. 3693, effective February 29, 2008)