

METHODOLOGY FOR THE EVALUATION OF PRE EXISTING SHIELDING IN A RADIOLOGICAL ROOM

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Introduction: Protective barriers in radiography rooms play an important role in avoiding staff and general public unwanted absorbed dose. In 2004, the report No.147 proposed new guidelines for shielding design in radiography rooms. Although many radiography departments use this report, some shielding calculations are lost over time. This presents a difficulty to know precisely how much shielding is necessary when new equipment replace the older one. In this work we propose a method to evaluate the shielding in a radiologic room permitting to utilize the existing barriers before new equipment installation.

Material and method: It was used a mobile x ray unit Siemens Mobilett XP (Siemens®, Germany) as a source of x-rays. The source irradiated a primary beam at the shielding before and after the barrier. To measure the incident x-rays it was used a 10x5-6cc (Radcal Co®, Monrovia, CA, USA) ionization chamber from the barrier, the post barrier dose was measured with a 10x5-1800cc (Radcal Co®, Monrovia, CA, USA) both placed 30 cm from the barrier and connected with a 9015 electrometer (Radcal Co®, Monrovia, CA, USA).

Each measurement were performed three times using a 105 kVp and 5 mAs as radiological technique.

The attenuation of the barrier was estimated taking the ratio between the mean of the measurements pre and post barrier corrected by the inverse square law. The estimated attenuation was then compared with the attenuation presented by a Rad Room (chest bucky) curve presented in NCRP 147 shown in Figure 1

Results: Table 1 explicit the measures, the attenuation and the estimated equivalence in lead for the chest wall, the plate glass in the control wall, the public and the staff door.

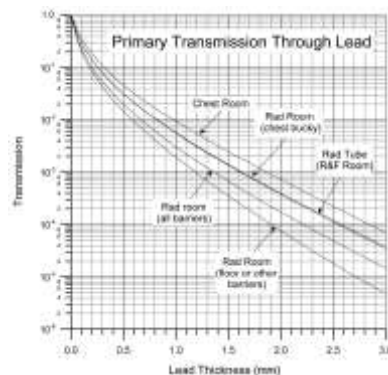


Figure 1. Primary broad-beam transmission through lead calculated for clinical workload distributions (NCRP 147).

Table 1. Mean measures and existing attenuation for the chest wall, the plate glass in the control wall, the public and the staff door.

Description	Mean Kpre (uGy)	Mean Kpos (uGy)	Ratio Kpre/Kpos	Estim. mmPb
Chest Wall	144,7	0,001	6,91E-06	3,0
Staff Door	296,2	0,125	4,22E-04	2,1
Control Plate Glass	66,3	0,189	2,85E-03	1,2
Internal Corridor Door	22,2	0,12	5,40E-03	1,1

Conclusions: This work propose a method to evaluate the existing shielding in a radiologic room making possible to utilize the existing barriers before installing new X ray equipments. Shielded barriers showed a range of attenuation between 1,1 mmPb and 3,0 mmPb in the evaluated room.

References:

1. NCRP, *Structural Shielding Design for Medical X structural Shielding Design for Medical X-Ray Imaging Facilities Imaging Facilities*, NCRP Report #147 (2005)
2. M. P. Brown and K. Austin, *Appl. Phys. Letters* **85**, 2503-2504 (2004).