# TEST PROCEDURE FOR DIAGNOSTIC X-RAY UNITS – SHIELDING EVALUATION

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Name of licence Holder (user) | | | | | | | | | |
| Make | | Model | | | | | Serial no. | | |
| Inspector no | Name of person that perform Test | | | | | | User Licence No | | |
| ROOM NO[1] | TYPE OF INSTALLATION[2] | | | | | | Date | | |
| **POSITION** | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **RADIATION[3]** | | | | | | | | | |
| **P[4]** | | | | | | | | | |
| **T[5]** | | | | | | | | | |
| | **P/T** | | | | | | | | |
| **W[6]** | Patients/week (**$W_p$**) | | | | | | | | |
| **$W_A$[7]** mA-min/patient (excluding CT) | | | | | | | | | |
| **Ws[7]** – slices per patient CT - Axial | | | | | | | | | |
| **Ws[7]** – scan length per patient CT - Helical | | | | | | | | | |
| SETTINGS | **kV[8]** | | | | | | | | |
| | mA-min (**$M_A$**[9]) | | | | | | | | |
| **Scl[10]** | Scan length - CT | | | | | | | | |
| **$W_{AS}$** for CT = **Ws** divided by **Scl** | | | | | | | | | |
| SHIELDED MEASUREMENT in mSv (**$D_S$[11]**) | | | | | | | | | |
| **CALCULATED VALUE[12] mSv/w** | | | | | | | | | |
| SHIELDING | ✓ or **X[13]** | | | | | | | | |

## SHIELDING WORKLOAD – Table 1

| ROOM TYPE | | WORKLOAD PER PATIENT (mA min/pat) | NUMBER OF PATIENTS PER WEEK | | NOTES |
|---|---|---|---|---|---|
| | | | **Average** | **Busy** | |
| **Gen Radiography** | Chess wall | 0.6 | 120 | 160 | |
| | Table ⇒ floor | 1.69 | 120 | 160 | |
| | Cross table (1) | 0.17 | 120 | 160 | |
| | Other wall (2) | 0.038 | 120 | 160 | |
| | Tot floor and walls (1 + 2) | 1.9 | 120 | 160 | Workload for scatter measurements on table |
| | Rad total | 2.5 | 120 | 160 | |
| **Chest Room** | | 0.22 | 200 | 400 | |
| **Fluoru Tube (R&F room)** | | 13 | 20 | 30 | |
| **Rad Tube (R&F room)** | | 1.5 | 25 | 40 | |
| **Mammo room** | | 6.7 | 80 | 160 | |
| **Cardiac Angiography** | | 160 | 20 | 30 | |
| **Peripheral Angiography** | | 64 | 20 | 30 | |
| **CT -** Axial – single slice | | 40 slices per patient | 60 | 150 | Use 10 mm single and one rotation for measurement |
| **CT -** Helical – Multi-slice | | 400 to 600 mm per patient | 100 | 200 | Single rotation and use total width (sum of all slices e.g. 16 slices of 2 mm each = 32 mm |

## RECOMMENDED OCCUPANCY FACTORS, T, Table 2

| | |
|---|---|
| **Controlled areas** | 1 |
| **Uncontrolled areas** | |
| Secretarial office, shops, living quarters, kids' play area, laundry, dark room, attended waiting room | 1 |
| Nurses' station, patient examination & treatment rooms, kitchens, cafeterias | 1/2 |
| Corridors, patient rooms, employee lounge | 1/8 |
| Toilets, vending areas, storage rooms, outdoor area with seating | 1/20 |
| Outdoor areas with only transient pedestrian or vehicular traffic: Minimal occupancy areas; transient traffic, attics, stairways, patient holding areas<br>Unattended: Waiting & dressing rooms, parking lots, elevators, etc | 1/40 |

1 Attached a drawing

2 Diagnostic room; Dedicated chest unit; CT room; etc. – column 1 of Table 1

3 Primary (P) or Secondary (S)

4 P = Design dose; Controlled area = 0.1 mSv per week, Uncontrolled area = 0.02 mSv per week, Darkroom = 0.025 mSv per week and loaded cassettes must be protected to receive not more than 0.5 μSv (e.g. hatch) – see page 81 - 82

5 T = Occupancy - see table 2 (page 31 table 4.1).

6 $\mathbf{W_P}$ = Workload (number of patients per week) – see Table 1. May use higher patient numbers

7 For $\mathbf{W_A}$ and $\mathbf{W_S}$ see Table 1 (mA min/pat)

8 See table 4.2, page 35 – 36 of NCRP 147)

For Gen rad and for table work use 90 kV and 120 kV for vertical bucky (chest) and for Chest room use 120 kV.

For all Fluoroscopy procedures use 100 kV

OR if the highest setting is lower use it.

Use 30 kV for Mammo.

For CT use average kV (120-140) used

9 For $\mathbf{M_A}$ please remember that mAs/60 = mA-min.

10 **Scl** see Table 1

11 Please remember that:

a. Primary measurement must be performed without a patient/scatter material in the beam.

b. For general radiography, an area that must be protected from primary will also receive secondary (scatter), therefore perform measurement also for secondary. Workload for secondary ($\mathbf{W_A}$) = Total workload (2.5 mA min/patient) **minus** Primary mA min/patient

12 Short cut: $\mathbf{D_s \times W_p \times W_A / M_A}$ = mSv per week and if this is ≤ P/T, acceptable. If 11b is applicable, add secondary to primary first.

For CT: $\mathbf{D_s \times W_p \times W_{AS}}$ = mSv per week and if this is ≤ P/T, acceptable.

13 ✓ = Shielding sufficient or **X** = Shielding insufficient.

If shielding is insufficient (just not enough, be careful) it could be that more sophisticated procedures are required!