Appendix
3701:1-67-08

Appendix

Required Facility Design Information

~~In accordance with paragraph (B) of rule 3701:1-67-08 of the Administrative Code, the~~The following facility design requirements shall be met.

I. For all therapy equipment, the facility design plan shall include the following basic information registration name and number, telephone number, and the name of the individual responsible for preparation of the shielding plan; name and telephone number of the facility supervisor; and the street address and room number of the therapy equipment facility. The plan should also indicate whether this is a new structure or a modification to existing structure.

II. Therapy equipment operating at 150 kV or below (photons only).

In addition to the requirements listed in Section I above, therapy equipment which produce only photons with a maximum energy at or below 150 kV shall submit facility design information which contains, as a minimum, the following:

A. Equipment specifications, including the manufacturer and model number of the therapy equipment, as well as the maximum technique factors;

B. Maximum design workload for the facility including total weekly radiation output at the nominal treatment distance, the total beam-on time per day or week, the average treatment time per patient, along with the anticipated number of patients to be treated per day or week;

C. A facility blueprint/drawing indicating: scale [0.25 inch equals 1 foot is typical]; direction of North; normal location of the therapeutic radiation machine's radiation port(s); the port's travel and traverse limits; general direction(s) of the useful beam; locations of any windows and doors; and the location of the therapeutic radiation machine control panel. If the control panel is located inside the therapy equipment treatment room, the location of the operator's booth shall be noted on the plan and the operator's station at the control panel shall be behind a protective barrier sufficient to ensure compliance with rules 3701:1-38-12 and 3701:1-38-13 of the Administrative Code;

D. The structural composition and thickness or lead/concrete equivalent of all walls, doors, partitions, floor, and ceiling of the room(s) concerned;

E. The type of occupancy of all adjacent areas inclusive of space above and below the room(s) concerned. If there is an exterior wall, show distance to the closest area(s) where it is likely that individuals may be present; and

F. At least one example calculation which shows the methodology used to determine the amount of shielding required for each physical condition [i.e.: primary and secondary/leakage barriers, restricted and unrestricted areas, entry door(s)] and shielding material in the facility:

1. If commercial software is used to generate shielding requirements, identify the software used and the version/ revision date.

2. If the software used to generate shielding requirements is not in the open literature, please also submit quality control sample calculations to verify the result obtained with the software.

III. Therapy equipment operating above 150 kV.

In addition to the requirements listed in Section I above, therapy equipment that produce photons with a maximum energy above 150 kV or electrons shall submit facility design information which contains, as a minimum, the following:

A. Equipment specifications including the manufacturer and model number of the therapy equipment, and gray (rad) at the isocenter and the energy(s) and type(s) of radiation produced;

B. Maximum design workload for the facility including total weekly radiation output [expressed in gray (rad) at 1 meter], total beam-on time per day or week, the average treatment time per patient, along with the anticipated number of patients to be treated per day or week;

C. Facility blueprint/drawing [including both floor plan and elevation views] indicating relative orientation of the therapeutic radiation machine, scale [0.25 inch = 1 foot is typical], type(s), thickness and minimum density of shielding material(s), direction of North, the locations and size of all penetrations through each shielding barrier [ceiling, walls and floor], as well as details of the door(s) and maze;

D. The structural composition and thickness or concrete equivalent of all walls, doors, partitions, floor, and ceiling of the room(s) concerned;

E. The type of occupancy of all adjacent areas inclusive of space above and below the room(s) concerned. If there is an exterior wall, show distance to the closest area(s) where it is likely that individuals may be present;

F. Description of all assumptions that were in shielding calculations including, but not limited to, design energy, source to isocenter distance, work-load, presence of integral beam-stop in unit, occupancy and use(s) of adjacent areas, fraction of time that useful beam will intercept each permanent barrier [walls, floor and ceiling] and "allowed" radiation exposure in both restricted and unrestricted areas; and

G. At least one example calculation which shows the methodology used to determine the amount of shielding required for each physical condition [i.e.: primary and secondary/leakage barriers, restricted and unrestricted areas, small angle scatter, entry door(s) and maze] and shielding material in the facility:

1. If commercial software is used to generate shielding requirements, also identify the software used and the version/revision date; and

2. If the software used to generate shielding requirements is not in the open literature, also submit quality control sample calculations to verify the result obtained with the software.

I V. Neutron Shielding

In addition to the requirements listed in Sections I and III above, therapy equipment that are capable of operating above 10 MV shall submit facility design information which contain, as a minimum, the following:

A. The structural composition, thickness, minimum density and location of all neutron shielding material;

B. Description of all assumptions that were used in neutron shielding calculations including, but not limited to, the combined photon and neutron contributions, total neutron absorbed dose and total neutron dose equivalent in both restricted and unrestricted areas, using the “National Council of Radiation Protection (NCRP) report 151, Structural Shielding Design and Evaluation for Megavoltage X- and Gamma-Ray Radiotherapy Facilities” or equivalent acceptable to the department as a basis;

C. At least one example calculation which shows the methodology used to determine the amount of neutron shielding required for each physical condition [i.e.: restricted and unrestricted areas, entry door(s) and maze] and neutron shielding material utilized in the facility:

1. If commercial software is used to generate shielding requirements, also identify the software used and the version/revision date; and

2. If the software used to generate shielding requirements is not in the open literature, also submit quality control sample calculations to verify the result obtained with the software.

D. The method(s) and instrumentation that will be used to verify the adequacy of all neutron shielding installed in the facility.

VI . References

A. NCRP Report 49, "Structural Shielding Design and Evaluation for Medical Use of X Rays and Gamma Rays of Energies Up to 10 MeV" (1976).

B. NCRP Report 79, " Neutron Contamination from Medical Electron Accelerators" (1984).

C. NCRP Report 144, " Radiation Protection for Particle Accelerator Facilities" (2003).

D. NCRP Report 151, “ Structural Shielding Design and Evaluation for Megavoltage X and Gamma-Ray Radiotherapy Facilities” (2006).