

An Overview of NCRP Report 151: Structural Shielding Design and Evaluation Report for Megavoltage X- and Gamma-Ray Radiotherapy Facilities

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The new NCRP Report No. 151 presents recommendations and technical information pertaining to the structural shielding design and its implementation for megavoltage X- and gamma-ray medical facilities. The recommendations in this report supercede those of NCRP Report No. 49, and also address photon energies higher than 10 MV, and the resulting photo-neutron production. In addition to conventional therapy, total-body irradiation, intensity modulated radiation therapy, stereotactic radiotherapy and intraoperative radiotherapy are also discussed.

Suggested Occupancy Factors differ from those found in NCRP 49. Primary and secondary barrier Tenth Value Layers (TVLs) for concrete, lead and steel are included for Co-60 and photon energies ranging from 4 to 30 MV. Patient scatter factors for energies ranging from 6 to 24 MV, and the corresponding TVLs for various scatter angles (15 to 135 degrees) are also provided. Differential dose albedos for concrete, lead and iron are also included. Neutron yields for various energies and manufacturer types are provided. An entire section is devoted to examples of detailed calculations.

Recommendations are made for shielding evaluation, radiation surveys and construction inspection. An appendix on neutron monitoring is also included. This report though mainly intended for individuals specializing in radiation protection and shielding design, will also be of use to architects and other professionals involved with the planning of new radiation therapy facilities.