Example on Radiation Protection ~~of~~ Dose Calculation

Calculate the gamma ray flux that yields an external dose of 0.1 rem in on year with continuous exposure. Suppose that the gamma rays have an energy of 1 Mev and that the ~~energy~~ effective attenuation coefficient (μ_{eff}) = 0.03074 cm^{-1} for a soft tissue of a density of 1.0 g/cm^3. The quality factor for this photon is 1

Sln

The dose $D = \frac{H}{\text{Quality factor}} = \frac{H}{QF}$

since QF = 1, the numerical values of the absorbed dose D and the equivalent dose H ~~is~~ are the same

$\therefore \quad D = (0.1\ rad)(1 \times 10^{-5}\ J/g \cdot rad) = 1 \times 10^{-6}\ J/g$

Energy = 1 Mev = 1.6×10^{-13} J. Note that for constant dose over time $D = \dot{D}t$

$\dot{D} = FE\mu_{eff}/\rho$

solve for F and not that $\dot{D} = \frac{D}{t}$

$$F = \frac{D\rho}{\mu_{eff} * Energy * t} = \frac{(1 \times 10^{-6}\ \frac{J}{s})(1\ \frac{g}{cm^3})}{(0.03074\ cm^{-1})(1.6 \times 10^{-13}\ J)(3.1558 \times 10^{7}\ s)}$$

↑ # of seconds in a year

$F = 6.43\ cm^{-2}\ s^{-1}$