TABLE 44-D

MAXIMUM PERMISSIBLE FLUX FOR OCCUPATIONAL EXPOSURE TO VARIOUS TYPES OF IONIZING RADIATIONS*

Type of Radiation	*QF***	*Average Exposure Rate† (mrad/wk)*	*Approximate Flux to Give a Maximum Permissible Exposure in an 8-hr Day‡*
X and gamma rays	1	100	$\frac{1,400}{E}$ photons/sq cm/sec in free air at 0 deg C (error < 13 per cent for E = 0 07 to 2 Mev)
Beta rays and electrons	1	100	$\frac{4\,3 \times 10^7}{(QF)P}$ electrons or beta rays/sq cm/sec incident on tissue (≃ 23 electrons or 15 β/sq cm/sec of 1 Mev energy)
Thermal neutrons	2 5	40	700 thermal neutrons/sq cm/sec incident on tissue
Fast neutrons	10	10	19 neutrons of 2-Mev energy/sq cm/sec incident on tissue
Alpha particles	10	10	$\frac{4\,3 \times 10^7}{(QF)P}$ alpha particles/sq cm/sec incident on tissue (≃ 0 005 alpha of 5 Mev/sq cm/sec)
Protons	10	10	$\frac{4\,3 \times 10^7}{(QF)P}$ protons/sq cm/sec incident on tissue (≃ 0 06 protons of 5 Mev/sq cm/sec)
Heavy ions	20	5	$\frac{4\,3 \times 10^7}{(QF)P}$ heavy ions/sq cm/sec (≃ 0 0002 oxygen ions of 5 Mev/sq cm/sec)

NOTES

*Values of flux corresponding to dose values as recommended in 1959 by the National Committee on Radiation Protection and by the International Commission on Radiological Protection

**Quality factor formerly relative biological effectiveness (RBE)

†Average occupational exposure rate permissible to blood-forming organs (essentially total body exposure), gonads, and eyes of persons of age 18 or over These values may be averaged over a year, provided the dose equivalent in any thirteen weeks does not exceed 3 rem (rem = QF × rad) All values in columns 3 and 4 may be increased by a factor of 3 if the exposure is limited to organs other than blood-forming organs, gonads, or eyes

‡Maximum permissible exposure rate based on a 20-mrem dose equivalent delivered to tissue in an 8-hr day (= 2 5/QF mrad/hr) and assuming $W = 35$ for alpha and 34 for beta and secondary electrons The rad in soft tissue is considered to correspond to an energy absorption of 100 ergs/gm The P is the stopping power in units of electron volts/gm/sq cm of soft tissue

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exposures of nonemployees in uncontrolled areas be regulated so as to make it improbable that any individual will receive a whole body dose of more than 0 5 rem (500 millirems) during any one year

Internal emitters Guide levels of dosage from internal emitters are calculated with care and should be applied as a guide for evaluating operations They are essentially opinions (based on the best available information at the time of publication) or interpretations of experimental animal data together with some human data relating exposure dose to biological effects which are likely to occur within the lifetime of the human being The