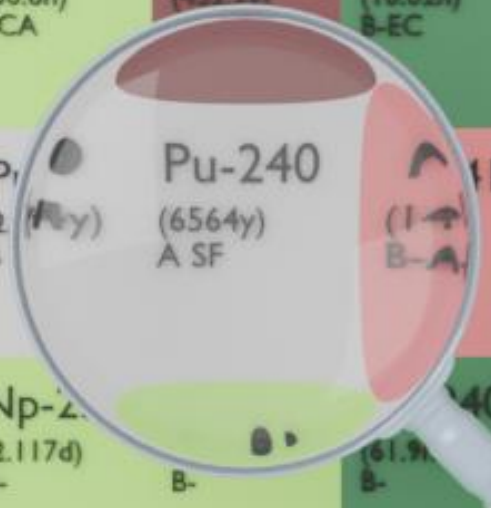




Am-237 (73.0m) CA	Am-238 (98m) ECB+A	Am-239 (11.9h) ECA	Am-240 (50.8h) ECA	Am-241 (432.2m) A	Am-242 (16.02h) B-EC	Am-243 (7.37E+3y) A	Am-244 (10.1h) B-	Am-245 (2.05h) B-
Pu-236 (2.858y) A SF	Pu-237 (45.2d) ECA	Pu-238 (87.7y) A SF	Pu-239 (2.41E+4y) A	Pu-240 (6564y) A SF	Pu-241 (1.1E+5y) B-A	Pu-242 (3.75E+5y) A SF	Pu-243 (4.956h) B-	Pu-244 (8.00E+7y) A SF
Np-235 (9.61d) CA	Np-236 (1.54E+5y) ECB-A	Np-237 (2.144E+6y) A	Np-238 (2.117d) B-	Np-239 (2.35E+6y) B-	Np-240 (61.9m) B-	Np-241 (13.9m) B-	Np-242 (2.2m) B-	Np-243 (3.7E+5y) A

PLUTONIUM-240

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Pu-240
Atomic number (Z): 94
Mass number (A): 240
Neutron number (N): 146

RADIOACTIVE DECAY

Decay modes: α , Spontaneous fission
Half-life: 6564.0 [y]
Decay constant: $3.3463\text{e-}12$ [1/s]
Daughters: U-236 (100.0%), SF (5.75e-06%)
Radioactive daughters: U-236

DOSIMETRIC CONSTANTS

Mean alpha energy: 5.2434 [MeV]
Mean electron energy: 0.01051 [MeV]
Mean photon energy: 0.00193 [MeV]
Air kerma rate constant, Γ_{10} : $2.476\text{e-}18$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Air kerma coefficient, K_{air} : $2.476\text{e-}18$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : $8.418\text{e-}13$ [$\text{Gy} \cdot \text{kg}/\text{Bq} \cdot \text{s}$]
Equilibrium dose constant for alphas, Δ_{α} : $8.401\text{e-}13$ [$\text{Gy} \cdot \text{kg}/\text{Bq} \cdot \text{s}$]

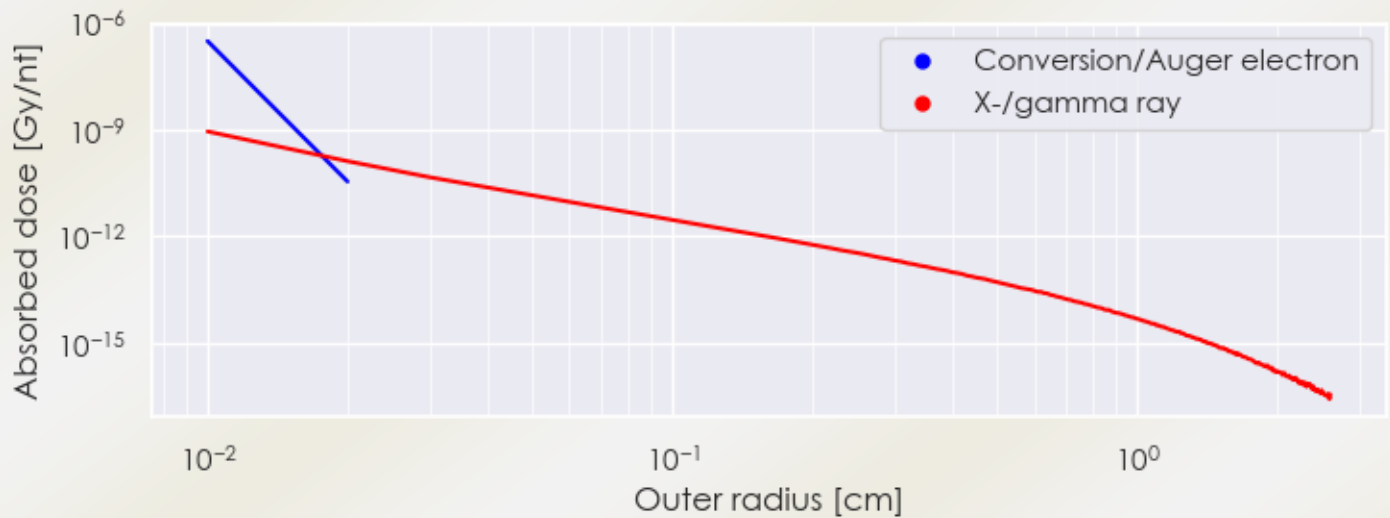
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta^+, e^-}$: 1.684×10^{-15} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 3.092×10^{-16} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

Dose point kernel source: **Graves, et al. Medical Physics. 2019 Nov.; 46(11):5284-5293.**

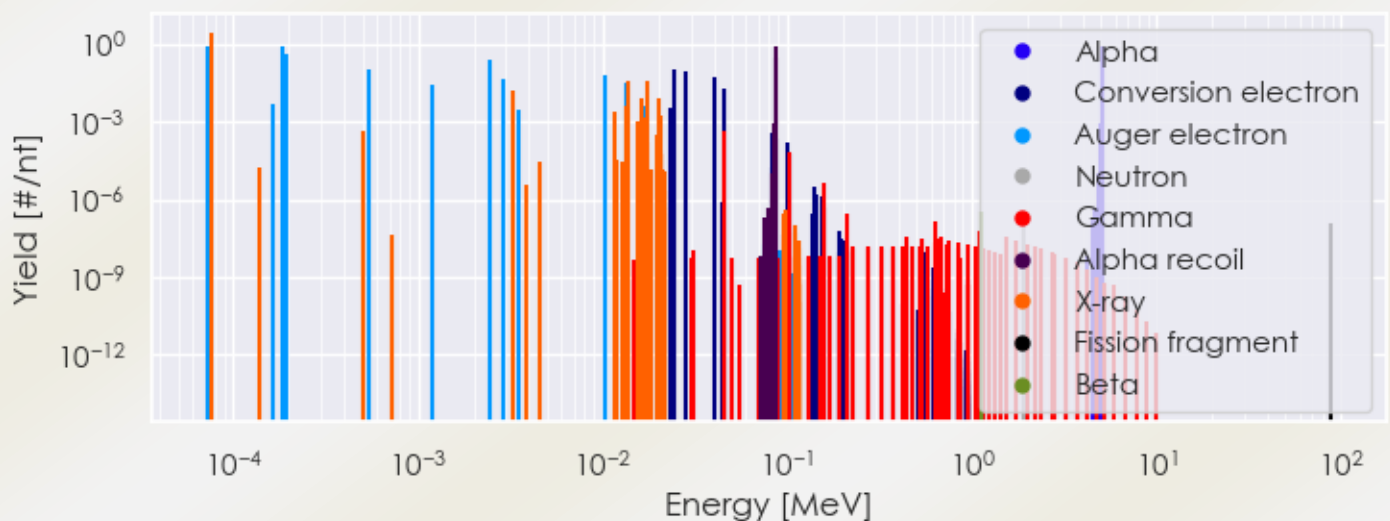
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Pu-240 DPK.csv

SUMMARY SPECTRA (PLOT)

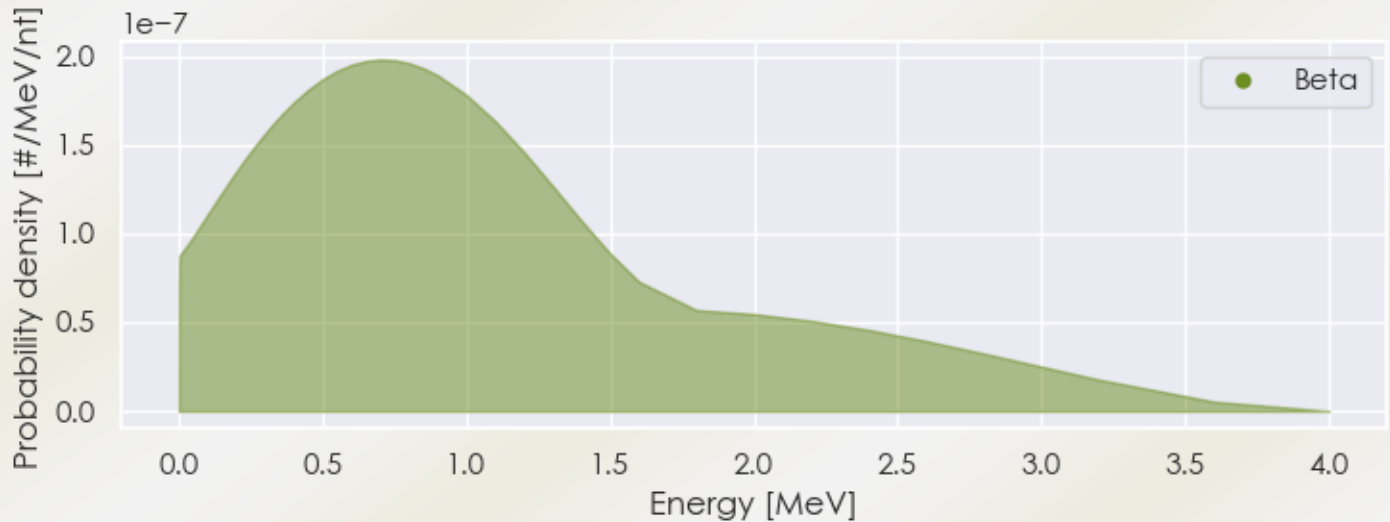
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Pu-240 Summary Spectrum.csv

BETA SPECTRA (PLOT)

Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated beta spectra file here: www.mirdsoft.org/products/MIRDspecs/Pu-240 Beta Spectrum.csv

TABULATED DATA

SUMMARY SPECTRA (TABLE)

Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**

Note: Radiations with yield < 0.01 are excluded from the table, but are available in the linked *.csv data.

Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Pu-240 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
7.55204e-05	2.769e+00	X-ray
3.25952e-03	1.691e-02	X-ray
1.36268e-02	3.609e-02	X-ray
1.73072e-02	3.723e-02	X-ray
7.21886e-05	7.454e-01	Auger electron
1.86273e-04	7.303e-01	Auger electron
1.92426e-04	4.195e-01	Auger electron
5.38625e-04	1.073e-01	Auger electron
1.19196e-03	2.614e-02	Auger electron
2.44333e-03	2.410e-01	Auger electron

2.91589e-03	4.532e-02	Auger electron
1.02618e-02	6.067e-02	Auger electron
1.35918e-02	3.087e-02	Auger electron
2.42000e-02	1.032e-01	Conversion electron
2.80620e-02	9.095e-02	Conversion electron
4.09544e-02	5.467e-02	Conversion electron
4.52440e-02	1.923e-02	Conversion electron
5.12368e+00	2.710e-01	Alpha
5.16817e+00	7.281e-01	Alpha
8.68985e-02	2.710e-01	Alpha recoil
8.76530e-02	7.281e-01	Alpha recoil

USEFUL LINKS

Isotope decay characteristics are periodically updated as better measurements can be made - changes that may not be reflected on this page. Please see useful links:

National Nuclear Data Center (NNDC): <https://www.nndc.bnl.gov/nudat3/mird/>

International Atomic Energy Agency (IAEA) Livechart: <https://www-nds.iaea.org/relnsd/vcharthtml/VChartHTML.html>

REFERENCE LINKS

ICRP Report 107: <https://www.icrp.org/publication.asp?id=ICRP%20Publication%20107>

Graves et al. Dose Point Kernels: <https://doi.org/10.1002/mp.13789>

MIRD Decay Schemes 2nd Edition: https://sites.snmmi.org/SNMML-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6