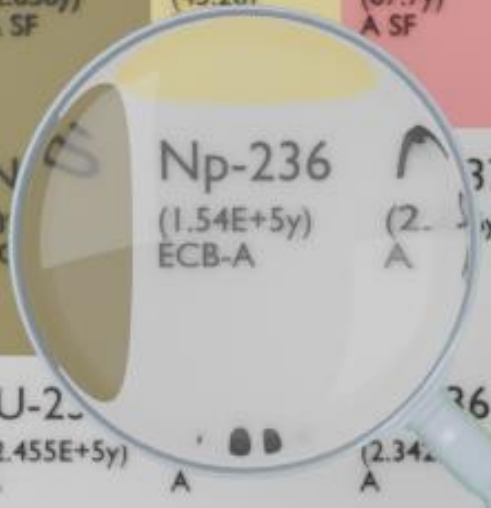




	Pu-234 (8.8h) ECA	Pu-235 (25.3m) ECA	Pu-236 (2.858y) A SF	Pu-237 (45.2d)	Pu-238 (87.7y) A SF	Pu-239 (2.411E+4y) A	Pu-240 (6564y) A SF	Pu-241 (14.35y) B-A
Np-232 (14.7m) CB+	Np-233 (36.2m) ECA	Np-234 (4.4d) ECB+	Np-235 (3.38y) EC	Np-236 (1.54E+5y) ECB-A	Np-237 (2.14y) A	Np-238 (2.117d) B-	Np-239 (2.3565d) B-	Np-240 (61.9m) B-
U-231 (4.2d) CA	U-232 (68.9y) A	U-233 (1.592E+5y) A	U-234 (2.455E+5y) A	U-235 (7.04E+8y) A	U-236 (2.342E+7y) A	U-237 (6.75d) B-	U-238 (4.468E+9y) A SF	U-239 (23.45m) B-

NEPTUNIUM-236

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Np-236
Atomic number (Z): 93
Mass number (A): 236
Neutron number (N): 143

RADIOACTIVE DECAY

Decay modes: α , β^- , Electron capture
Half-life: 154000.0 [y]
Decay constant: $1.4263\text{e-}13$ [1/s]
Daughters: U-236 (87.3%), Pu-236 (12.5%), Pa-232 (0.16%)
Radioactive daughters: U-236, Pu-236, Pa-232

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0073 [MeV]
Mean electron energy: 0.23718 [MeV]
Mean photon energy: 0.15936 [MeV]
Air kerma rate constant, Γ_{10} : $3.589\text{e-}17$ [Gy·m²/Bq·s]
Air kerma coefficient, K_{air} : $3.589\text{e-}17$ [Gy·m²/Bq·s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : $3.917\text{e-}14$ [Gy·kg/Bq·s]
Equilibrium dose constant for alphas, Δ_{α} : $1.170\text{e-}15$ [Gy·kg/Bq·s]

Equilibrium dose constant for betas/electrons, $\Delta_{\beta,\beta+,e-}$: $3.800\text{e-}14$ [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : $2.553\text{e-}14$ [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

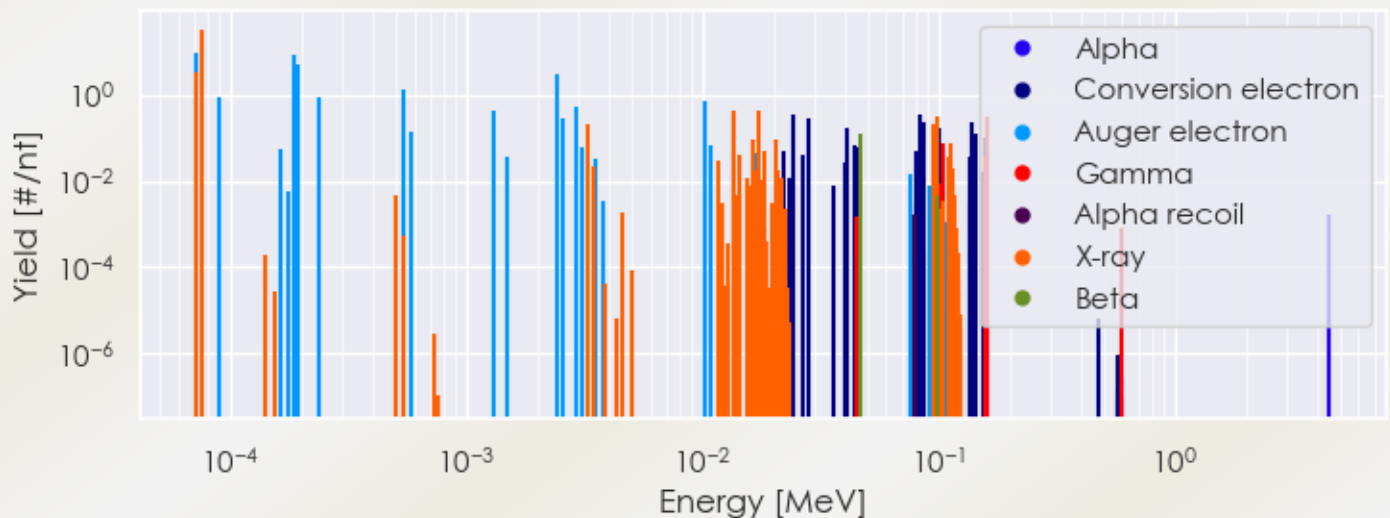
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Np-236 DPK.csv

SUMMARY SPECTRA (PLOT)

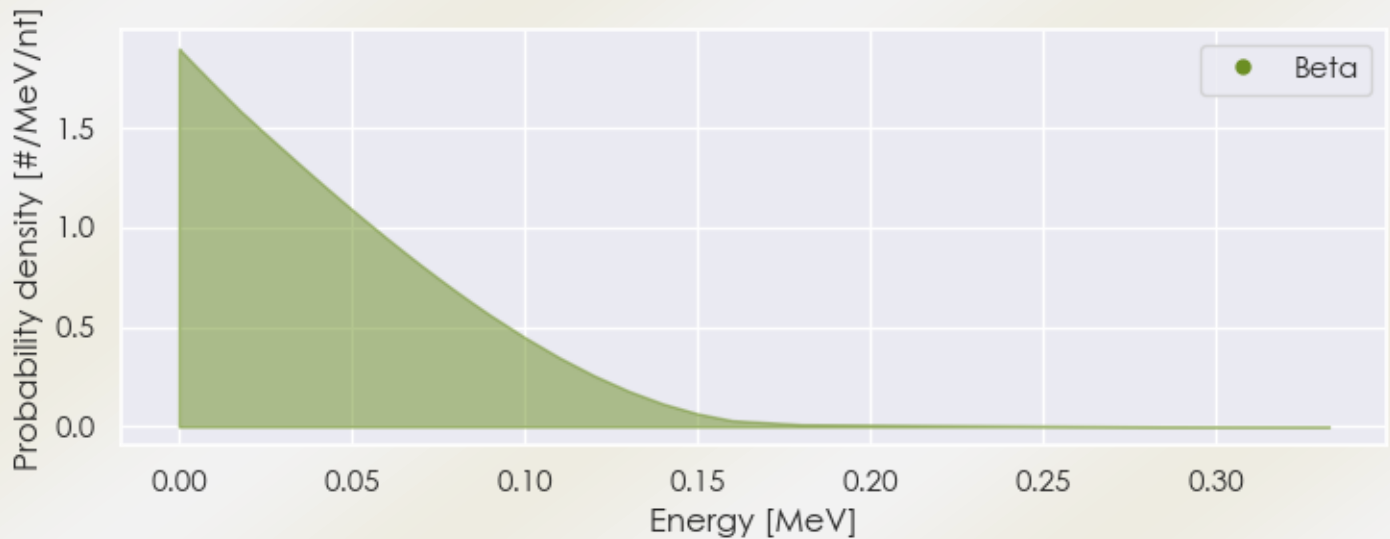
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Np-236 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/Np-236 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/Np-236 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
7.20537e-05	3.344e+00	X-ray
7.55077e-05	3.299e+01	X-ray
3.25821e-03	2.011e-01	X-ray
3.45969e-03	2.201e-02	X-ray
1.16607e-02	2.979e-02	X-ray
1.34452e-02	4.855e-02	X-ray
1.36268e-02	4.266e-01	X-ray
1.42941e-02	4.213e-02	X-ray
1.55227e-02	1.147e-02	X-ray
1.64468e-02	8.947e-02	X-ray

1.65865e-02	1.221e-02	X-ray
1.70780e-02	1.693e-02	X-ray
1.73072e-02	4.077e-01	X-ray
1.74784e-02	1.062e-02	X-ray
1.83932e-02	5.147e-02	X-ray
2.02658e-02	9.233e-02	X-ray
2.09317e-02	1.788e-02	X-ray
2.15284e-02	1.188e-02	X-ray
9.50660e-02	2.016e-01	X-ray
9.89281e-02	3.226e-01	X-ray
1.04230e-01	7.249e-02	Gamma
1.10929e-01	3.720e-02	X-ray
1.11820e-01	7.275e-02	X-ray
1.15080e-01	1.882e-02	X-ray
1.58350e-01	3.959e-02	Gamma
1.60330e-01	3.152e-01	Gamma
4.63896e-02	1.202e-01	Beta
7.21761e-05	8.889e+00	Auger electron
8.91092e-05	9.157e-01	Auger electron
1.63106e-04	5.671e-02	Auger electron
1.86366e-04	8.702e+00	Auger electron
1.91873e-04	5.227e-01	Auger electron
1.92556e-04	4.982e+00	Auger electron
2.37649e-04	8.774e-01	Auger electron
5.44307e-04	1.293e+00	Auger electron
5.83820e-04	1.367e-01	Auger electron
1.31184e-03	4.175e-01	Auger electron
1.49849e-03	3.516e-02	Auger electron
2.44130e-03	2.867e+00	Auger electron
2.56864e-03	2.862e-01	Auger electron
2.91339e-03	5.388e-01	Auger electron
3.10290e-03	5.879e-02	Auger electron
3.53253e-03	3.171e-02	Auger electron
1.02684e-02	7.167e-01	Auger electron
1.08905e-02	6.979e-02	Auger electron
1.36009e-02	3.646e-01	Auger electron
1.44465e-02	3.626e-02	Auger electron
1.69699e-02	4.370e-02	Auger electron

2.22290e-02	4.878e-02	Conversion electron
2.34620e-02	1.136e-02	Conversion electron
2.41860e-02	3.312e-01	Conversion electron
2.65290e-02	4.175e-02	Conversion electron
2.80480e-02	2.919e-01	Conversion electron
4.00501e-02	2.579e-02	Conversion electron
4.09404e-02	1.754e-01	Conversion electron
4.42200e-02	6.564e-02	Conversion electron
4.52300e-02	6.170e-02	Conversion electron
7.54320e-02	1.390e-02	Auger electron
8.04490e-02	5.114e-02	Conversion electron
8.24620e-02	1.794e-02	Conversion electron
8.31860e-02	3.436e-01	Conversion electron
8.47490e-02	3.336e-02	Conversion electron
8.70480e-02	2.304e-01	Conversion electron
9.82701e-02	2.455e-02	Conversion electron
9.99404e-02	1.653e-01	Conversion electron
1.04230e-01	5.810e-02	Conversion electron
1.35979e-01	3.500e-02	Conversion electron
1.38562e-01	2.167e-02	Conversion electron
1.39286e-01	2.198e-01	Conversion electron
1.40279e-01	1.870e-02	Conversion electron
1.43148e-01	1.215e-01	Conversion electron
1.53800e-01	1.596e-02	Conversion electron
1.56040e-01	1.007e-01	Conversion electron
1.60330e-01	3.562e-02	Conversion electron

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