

Radioactive Materials Proposed for the Mega-Dump

PREAMBLE

Most atoms are not radioactive, meaning that they are stable and do not disintegrate. Elements like silver, tin, chlorine and iodine are normally made up of stable atoms, but nuclear reactors create radioactive varieties (radioisotopes) of these atoms. Nuclear reactors also create “man-made” elements such as americium, neptunium and plutonium that only exist as radioactive atoms. All radioactive atoms are dangerous to living things.

A radioactive atom is unstable. It will disintegrate suddenly, violently and unpredictably; emitting atomic radiation that is damaging to living cells. The unit of radioactivity is the becquerel -- one becquerel is the amount of a radioisotope such that there is (on average) one radioactive disintegration every second.

The “half-life” of a radioisotope is the time needed for half of its atoms to disintegrate. If you multiply the half-life by ten, that’s how long it takes so that just 0.1 percent of the original number of radioactive atoms remain.

Here is a partial list of radioactive materials created inside a nuclear reactor that would be placed in the Chalk River Mega-Dump, together with a measure of their radioactivity (in becquerels) and their half-life (in years).

Note: the radioactive form of hydrogen, listed as “hydrogen-3” in the table below, is known as tritium and is often designated by the letter T.

***In North America, 1 billion = 1000 millions;
 1 trillion = 1000 billions;
 1 quadrillion = 1000 trillions.***

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<u>Radioactive Material</u>	<u>Chemical Symbol</u>	<u>Total Activity in becquerels</u>	<u>Half-Life in years</u>
Americium-241	Am-241	51.9 trillion	432
Americium-243	Am-243	19.7 billion	7.4 thousand
Carbon-14	C-14	44.1 trillion	7 thousand
Chlorine-36	Cl-36	193 billion	301 thousand
Cobalt-60	Co-60	4.4 quadrillion	5.3
Cesium-135	Cs-135	6.6 billion	2.3 million
Cesium-137	Cs-137	531 quadrillion	30.1
Hydrogen-3	H-3 (T)	4.8 quadrillion	12.3
Iodine-129	I-129	1.48 trillion	15.7 million
Molybdenum-93	Mo-93	35.1 million	4 thousand
Niobium-94	Nb-94	29.7 trillion	20.3 thousand
Nickel-59	Ni-59	66.8 billion	76 thousand
Nickel-63	Ni-63	25.3 trillion	101
Neptunium-237	Np-237	3.57 billion	2.1 million
Plutonium-239	Pu-239	2.01 trillion	24 thousand
Plutonium-240	Pu-240	3.13 trillion	6.6 thousand
Plutonium-241	Pu-241	102 billion	14.3
Plutonium-242	Pu-242	9.37 billion	375 thousand
Radium-226	Ra-226	579 billion	1.6 thousand
Selenium-79	Se-79	2.16 billion	295 thousand
Silver-108m	Ag-108m	203 billion	438
Strontium-90	Sr-90	1.66 quadrillion	28.9
Technetium-99	Tc-99	6.88 trillion	216 thousand
Tin-126	Sn-126	3.16 billion	223 thousand
Uranium-233	U-233	18.8 billion	159 thousand
Uranium-234	U-234	3.86 trillion	245.5 thousand
Uranium-235	U-235	249 billion	704 million
Uranium-238	U-238	12.4 trillion	4.5 billion
Zirconium-93	Zr-93	11.8 trillion	1.5 million

Reference: NSDF EIS, Table 5.7.6-1, "Bounding NSDF Project Waste Radionuclide Inventory to be placed in the ECM"