

COREINV4.XLS

08/24/2000
Millstone 1

Nuclide	half-life	half-life (days)	RV(0)	RV(30)	B11(30)	[30 days] RV(30)-B11(30)	[90 days]	[1 year]	Inventory in spent fuel pool (11 batches)			Inventory in spent fuel pool (11 batches plus rest of last core)		
			Inventory in reactor vessel just before discharge of Batch 11 (Ci)	Inventory in reactor vessel 30 days after Batch 11 discharged (assuming Batch 11 not discharged) (Ci)	Inventory in Batch 11 30 days after Batch 11 discharged (Ci)	Inventory in reactor vessel 30 days after Batch 11 discharged (assuming Batch 11 discharged) (Ci)	Inventory in reactor vessel 90 days after Batch 11 discharged (assuming Batch 11 discharged) (Ci)	Inventory in reactor vessel 1 year after Batch 11 discharged (assuming Batch 11 discharged) (Ci)	30 days after last batch put in pool (Ci)	90 days after last batch put in pool (Ci)	1 year after last batch put in pool (Ci)	30 days after last batch put in pool (Ci)	90 days after last batch put in pool (Ci)	1 year after last batch put in pool (Ci)
Co-58	70.9d	70.9	8.81E+04	6.57E+04	2.28E+04	4.29E+04	2.39E+04	1.62E+03	2.29E+04	1.26E+04	8.54E+02	6.58E+04	3.65E+04	2.48E+03
Co-60	5.3y	1934.5	1.64E+05	1.62E+05	7.64E+04	8.58E+04	8.40E+04	7.61E+04	3.72E+05	3.15E+05	2.85E+05	4.58E+05	3.99E+05	3.61E+05
Kr-85	10.8y	3942.0	5.35E+05	5.32E+05	2.39E+05	2.93E+05	2.90E+05	2.76E+05	1.41E+06	1.39E+06	1.33E+06	1.70E+06	1.68E+06	1.61E+06
Rb-86	18.7d	18.7	6.22E+04	2.05E+04	1.01E+04	1.04E+04	1.12E+03	4.21E-02	1.01E+04	1.05E+03	3.84E-02	2.05E+04	2.17E+03	8.05E-02
Sr-89	50.5d	50.5	4.71E+07	3.12E+07	8.39E+06	2.28E+07	1.00E+07	2.30E+05	8.39E+06	3.63E+06	8.33E+04	3.12E+07	1.36E+07	3.13E+05
Sr-90	28.8y	10512.0	4.25E+06	4.24E+06	1.93E+06	2.31E+06	2.30E+06	2.26E+06	1.42E+07	1.42E+07	1.39E+07	1.65E+07	1.65E+07	1.62E+07
Y-90	28.8y	10512.0	4.37E+06	4.36E+06	1.93E+06	2.43E+06	2.42E+06	2.38E+06	1.43E+07	1.42E+07	1.39E+07	1.67E+07	1.66E+07	1.63E+07
Y-91	58.5d	58.5	6.06E+07	4.25E+07	1.18E+07	3.07E+07	1.51E+07	5.80E+05	1.18E+07	5.75E+06	2.21E+05	4.25E+07	2.08E+07	8.01E+05
Zr-95	64.0d	64.0	8.70E+07	6.29E+07	1.94E+07	4.35E+07	2.27E+07	1.16E+06	1.94E+07	1.00E+07	5.10E+05	6.29E+07	3.27E+07	1.67E+06
Nb-95	64.0d	64.0	8.91E+07	6.44E+07	2.53E+07	3.91E+07	2.04E+07	1.04E+06	2.54E+07	1.70E+07	1.11E+06	6.45E+07	3.74E+07	2.15E+06
Mo-99	2.7d	2.7	8.78E+07	3.98E+04	1.49E+04	2.49E+04	5.10E-03	1.13E-33	1.49E+04	3.12E-03	0	3.98E+04	8.22E-03	1.13E-33
Tc-99m	2.7d	2.7	7.69E+07	3.48E+04	1.43E+04	2.05E+04	4.21E-03	9.34E-34	1.43E+04	3.01E-03	0	3.48E+04	7.22E-03	9.34E-34
Ru-103	37.3d	37.3	7.23E+07	4.14E+07	1.53E+07	2.61E+07	8.56E+06	5.17E+04	1.53E+07	5.21E+06	4.07E+04	4.14E+07	1.38E+07	9.24E+04
Ru-106	1.0y	365.0	2.48E+07	2.34E+07	1.12E+07	1.22E+07	1.09E+07	1.72E+07	1.72E+07	1.53E+07	9.13E+06	2.94E+07	2.62E+07	1.56E+07
Sb-127	3.8d	3.8	4.97E+06	2.09E+04	8.21E+03	1.27E+04	2.25E-01	3.73E-23	8.21E+03	1.39E-01	0	2.09E+04	3.64E-01	3.73E-23
Te-127	109d(9h)	109.0	4.92E+06	5.46E+05	2.14E+05	3.32E+05	2.27E+05	3.95E+04	2.21E+05	1.45E+05	2.52E+04	5.53E+05	3.72E+05	6.47E+04
Te-127m	109d	109.0	6.61E+05	5.46E+05	2.10E+05	3.36E+05	2.30E+05	4.00E+04	2.18E+05	1.48E+05	2.57E+04	5.54E+05	3.78E+05	6.57E+04
Te-129	33.6d(69m)	33.6	1.49E+07	1.21E+06	2.74E+05	9.36E+05	2.72E+05	9.34E+02	2.74E+05	7.79E+04	2.68E+02	1.21E+06	3.49E+05	1.20E+03
Te-129m	33.6d	33.6	2.24E+06	1.21E+06	4.21E+05	7.86E+05	2.28E+05	7.84E+02	4.21E+05	1.20E+05	4.12E+02	1.21E+06	3.48E+05	1.20E+03
Te-132	3.2d	3.2	6.72E+07	1.01E+05	3.74E+04	6.39E+04	1.45E-01	1.99E-27	3.74E+04	8.64E-02	0	1.01E+05	2.32E-01	1.99E-27
I-131	8.0d	8.0	4.74E+07	3.52E+06	1.22E+06	2.30E+06	1.27E+04	5.75E-07	1.22E+06	6.35E+03	0	3.52E+06	1.91E+04	5.75E-07
I-132	3.2d	3.2	6.83E+07	1.03E+05	3.85E+04	6.45E+04	1.47E-01	2.01E-27	3.85E+04	8.90E-02	0	1.03E+05	2.36E-01	2.01E-27
Xe-133	5.2d	5.2	9.72E+07	1.78E+06	7.29E+05	1.05E+06	3.55E+02	4.30E-14	7.29E+05	2.30E+02	0	1.78E+06	5.85E-02	4.30E-14
Cs-134	2.1y	768.5	6.10E+06	5.94E+06	3.53E+06	2.41E+06	2.28E+06	1.78E+06	7.90E+06	7.47E+06	5.80E+06	1.03E+07	9.75E+06	7.58E+06
Cs-136	13.2d	13.2	2.10E+06	4.35E+05	2.05E+05	2.30E+05	9.84E+03	5.28E-03	2.05E+05	8.13E+03	3.91E-03	4.35E+05	1.80E+04	9.19E-03
Cs-137	30.0y	10950.0	5.84E+06	5.83E+06	2.83E+06	3.00E+06	2.99E+06	2.94E+06	2.02E+07	2.01E+07	1.97E+07	2.32E+07	2.31E+07	2.26E+07
Ba-140	12.8d	12.8	8.36E+07	1.65E+07	5.19E+06	1.13E+07	4.38E+05	1.50E-01	5.19E+06	1.90E+05	6.41E-02	1.65E+07	8.28E+05	2.14E-01
La-140	12.8d	12.8	8.54E+07	1.68E+07	5.97E+06	1.09E+07	4.22E+05	1.44E-01	5.97E+06	2.19E+05	7.37E-02	1.68E+07	6.41E+05	2.18E-01
Ce-141	32.5d	32.5	7.94E+07	4.19E+07	1.32E+07	2.87E+07	7.98E+06	2.27E+04	1.32E+07	3.61E+06	1.03E+04	4.19E+07	1.16E+07	3.30E+04
Ce-144	284.6d	284.6	6.05E+07	5.62E+07	1.91E+07	3.71E+07	3.21E+07	1.64E+07	2.64E+07	2.27E+07	1.16E+07	6.35E+07	5.48E+07	2.80E+07
Pr-143	13.6d	13.6	7.37E+07	1.80E+07	5.44E+06	1.05E+07	4.95E+05	4.07E-01	5.44E+06	2.41E+05	1.90E-01	1.80E+07	7.36E+05	5.97E-01
Nd-147	11.0d	11.0	3.16E+07	4.77E+06	1.54E+06	3.23E+06	7.38E+04	2.21E-03	5.44E+06	3.36E+04	1.10E-03	4.77E+06	1.07E+05	3.31E-03
Np-239	2.4d	2.4	9.98E+08	1.73E+05	5.36E+04	1.19E+05	3.56E-03	1.16E-37	5.59E+04	2.88E+03	2.88E+03	1.75E+05	2.88E+03	2.88E+03
Pu-238	87.7y	32010.5	9.33E+04	9.32E+04	6.73E+04	2.59E+04	2.59E+04	2.58E+04	4.51E+05	4.53E+05	4.54E+05	4.77E+05	4.79E+05	4.80E+05
Pu-239	24100y	8796500.0	2.49E+04	2.49E+04	9.28E+03	1.56E+04	1.56E+04	1.56E+04	8.89E+04	8.89E+04	1.05E+05	1.05E+05	1.05E+05	1.05E+05
Pu-240	6560y	2394400.0	3.14E+04	3.14E+04	1.55E+04	1.59E+04	1.59E+04	1.59E+04	1.30E+05	1.30E+05	1.30E+05	1.46E+05	1.46E+05	1.46E+05
Pu-241	14.4y	5256.0	7.19E+06	7.16E+06	3.73E+06	3.43E+06	3.40E+06	3.28E+06	2.29E+07	2.27E+07	2.19E+07	2.63E+07	2.61E+07	2.52E+07
Am-241	432.7y	157935.5	8.86E+03	8.86E+03	6.01E+03	2.85E+03	2.85E+03	2.84E+03	2.88E+05	2.94E+05	3.21E+05	2.91E+05	2.97E+05	3.24E+05
Cm-242	162.8d	162.8	2.09E+06	1.84E+06	1.31E+06	5.29E+05	4.10E+05	1.27E+05	1.45E+06	1.12E+06	3.50E+05	1.98E+06	1.53E+06	4.77E+05
Cm-244	18.1y	6806.5	6.72E+04	6.70E+04	5.88E+04	8.18E+03	8.14E+03	7.91E+03	2.27E+05	2.25E+05	2.19E+05	2.35E+05	2.33E+05	2.27E+05

Millstone 1

Nuclide	Inventory in spent fuel pool (11 batches plus rest of last core)					
	30 days after last batch put in pool (Bq)	90 days after last batch put in pool (Bq)	1 year after last batch put in pool (Bq)	2 years after last batch put in pool (Bq)	5 years after last batch put in pool (Bq)	10 years after last batch put in pool (Bq)
Co-58	2.43E+15	1.35E+15	9.17E+13	2.59E+12	5.82E+07	1.04E+00
Co-60	1.69E+16	1.48E+16	1.34E+16	1.17E+16	7.92E+15	4.12E+15
Kr-85	6.30E+16	6.22E+16	5.94E+16	5.57E+16	4.60E+16	3.34E+16
Rb-86	7.57E+14	8.03E+13	2.88E+09	3.97E+03	9.46E-15	4.01E-44
Sr-89	1.15E+18	5.05E+17	1.16E+16	7.74E+13	2.31E+07	3.07E-04
Sr-90	6.11E+17	6.11E+17	5.98E+17	5.84E+17	5.43E+17	4.82E+17
Y-90	6.19E+17	6.15E+17	6.02E+17	5.88E+17	5.47E+17	4.85E+17
Y-91	1.57E+18	7.70E+17	2.96E+16	3.83E+14	9.13E+08	3.73E-01
Zr-95	2.33E+18	1.21E+18	6.16E+16	1.18E+15	8.39E+09	2.20E+01
Nb-95	2.39E+18	1.38E+18	7.95E+16	1.53E+15	1.08E+10	2.83E+01
Mo-99	1.47E+15	3.04E+08	4.18E-23	8.62E-64	7.53E-186	0.00E+00
Tc-99m	1.29E+15	2.67E+08	3.45E-23	7.12E-64	6.22E-186	0.00E+00
Ru-103	1.53E+18	5.10E+17	3.42E+15	3.88E+12	5.67E+03	1.07E-11
Ru-106	1.09E+18	9.70E+17	5.77E+17	2.89E+17	3.61E+16	1.13E+15
Sb-127	7.74E+14	1.35E+10	1.38E-12	1.70E-41	3.20E-128	9.17E-273
Te-127	2.05E+16	1.38E+16	2.39E+15	2.35E+14	2.23E+11	2.03E+06
Te-127m	2.05E+16	1.40E+16	2.43E+15	2.39E+14	2.26E+11	2.07E+06
Te-129	4.48E+16	1.29E+16	4.45E+13	2.39E+10	3.72E+00	1.67E-16
Te-129m	4.46E+16	1.29E+16	4.43E+13	2.38E+10	3.70E+00	1.66E-16
Te-132	3.75E+15	8.58E+09	7.36E-17	3.45E-51	3.56E-154	0.00E+00
I-131	1.30E+17	7.07E+14	2.13E+04	3.95E-10	2.52E-51	5.54E-120
I-132	3.81E+15	8.72E+09	7.42E-17	3.48E-51	3.59E-154	0.00E+00
Xe-133	6.80E+16	2.17E+13	1.59E-03	1.19E-24	5.01E-88	1.18E-193
Cs-134	3.81E+17	3.61E+17	2.80E+17	2.02E+17	7.49E+16	1.44E+16
Cs-136	1.61E+16	6.65E+14	3.40E+08	1.62E+00	1.75E-25	4.29E-67
Cs-137	8.58E+17	8.54E+17	8.38E+17	8.18E+17	7.64E+17	6.80E+17
Ba-140	6.10E+17	2.32E+16	7.92E+09	2.07E+01	3.71E-25	4.55E-68
La-140	6.23E+17	2.37E+16	8.06E+09	2.11E+01	3.78E-25	4.64E-68
Ce-141	1.55E+18	4.29E+17	1.22E+15	5.08E+11	3.68E+01	4.63E-16
Ce-144	2.35E+18	2.03E+18	1.04E+18	4.28E+17	2.96E+16	3.48E+14
Pr-143	5.91E+17	2.73E+16	2.21E+10	1.85E+02	1.08E-22	4.44E-63
Nd-147	1.77E+17	3.97E+15	1.22E+08	1.26E-02	1.38E-32	1.62E-82
Np-239	6.47E+15	1.07E+14	1.07E+14	1.80E-32	8.71E-170	0.00E+00
Pu-238	1.76E+16	1.77E+16	1.78E+16	1.76E+16	1.72E+16	1.65E+16
Pu-239	3.87E+15	3.87E+15	3.87E+15	3.87E+15	3.87E+15	3.87E+15
Pu-240	5.40E+15	5.40E+15	5.40E+15	5.40E+15	5.40E+15	5.39E+15
Pu-241	9.74E+17	9.66E+17	9.32E+17	8.88E+17	7.69E+17	6.04E+17
Am-241	1.08E+16	1.10E+16	1.20E+16	1.20E+16	1.19E+16	1.18E+16
Cm-242	7.32E+16	5.66E+16	1.77E+16	3.73E+15	3.53E+13	1.49E+10
Cm-244	8.70E+15	8.63E+15	8.40E+15	8.08E+15	7.20E+15	5.95E+15

Check against Ru-106 :

$$\begin{aligned}
 2\text{yr} : & 5.77 \times 10^{17} \cdot e^{-\left(\frac{0.693}{1\text{yr}}\right)(1\text{yr})} = 2.89 \times 10^{17} \text{ Bq} \quad \checkmark \\
 5\text{yr} : & (4\text{yr}) = 3.61 \times 10^{16} \text{ Bq} \quad \checkmark \\
 10\text{yr} : & (9\text{yr}) = 1.13 \times 10^{15} \text{ Bq} \quad \checkmark
 \end{aligned}$$