Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA (FLIP) U OF WI
SNF ID #: 1035
Fuel Units & Descr: 9 - ELEMENT
Heavy Metal Mass: BOL=1.573kg EOL=1.573kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-FLIP (LW/U-Zrx SST, 60 to 100%, U)
[2]Template Burnup(MWd): 66.52
Template BOL Heavy Metal Mass (MT): 0.000196
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' = 0.08

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2.8488E-10	59.32	118.64	0.00E+00	1.69E-08	3.38E-08
Am-241	7.5767E-03	59.32	118.64	0.00E+00	4.49E-01	8.99E-01
Am-242m	2.4459E-05	59.32	118.64	0.00E+00	1.45E-03	2.90E-03
Am-243	3.0983E-05	59.32	118.64	0.00E+00	1.84E-03	3.68E-03
C-14	1.2590E-04	59.32	118.64	0.00E+00	7.47E-03	1.49E-02
Cl-36	2.6624E-06	59.32	118.64	0.00E+00	1.58E-04	3.16E-04
Cm-243	3.8244E-05	59.32	118.64	0.00E+00	2.27E-03	4.54E-03
Cm-244	4.1010E-03	59.32	118.64	0.00E+00	2.43E-01	4.87E-01
Co-60	1.2410E+00	59.32	118.64	0.00E+00	7.36E+01	1.47E+02
Cs-134	6.5454E-01	59.32	118.64	0.00E+00	3.88E+01	7.77E+01
Cs-135	1.9753E-05	59.32	118.64	0.00E+00	1.17E-03	2.34E-03
Cs-137	2.7375E+00	59.32	118.64	0.00E+00	1.62E+02	3.25E+02
Eu-154	1.2324E-01	59.32	118.64	0.00E+00	7.31E+00	1.46E+01
Eu-155	5.3037E-02	59.32	118.64	0.00E+00	3.15E+00	6.29E+00
Fe-55	7.9555E-01	59.32	118.64	0.00E+00	4.72E+01	9.44E+01
H-3	1.0531E-02	59.32	118.64	0.00E+00	6.25E-01	1.25E+00
I-129	7.1287E-07	59.32	118.64	0.00E+00	4.23E-05	8.46E-05
Kr-85	2.4955E-01	59.32	118.64	0.00E+00	1.48E+01	2.96E+01
Np-237	1.2121E-05	59.32	118.64	0.00E+00	7.19E-04	1.44E-03
Pa-231	1.1230E-09	59.32	118.64	0.00E+00	6.66E-08	1.33E-07
Pb-210	6.1636E-14	59.32	118.64	0.00E+00	3.66E-12	7.31E-12
Pm-147	1.1302E+00	59.32	118.64	0.00E+00	6.70E+01	1.34E+02
Pu-238	5.4826E-02	59.32	118.64	0.00E+00	3.25E+00	6.50E+00
Pu-239	1.4056E-03	59.32	118.64	0.00E+00	8.34E-02	1.67E-01
Pu-240	1.1536E-03	59.32	118.64	0.00E+00	6.84E-02	1.37E-01
Pu-241	4.2995E-01	59.32	118.64	0.00E+00	2.55E+01	5.10E+01
Pu-242	4.9910E-06	59.32	118.64	0.00E+00	2.96E-04	5.92E-04
Ra-226	2.4008E-13	59.32	118.64	0.00E+00	1.42E-11	2.85E-11
Ra-228	1.8220E-11	59.32	118.64	0.00E+00	1.08E-09	2.16E-09
Ru-106	1.0343E-01	59.32	118.64	0.00E+00	6.14E+00	1.23E+01
Se-79	1.2832E-05	59.32	118.64	0.00E+00	7.61E-04	1.52E-03
Sn-126	1.2090E-05	59.32	118.64	0.00E+00	7.17E-04	1.43E-03
Sr-90	2.5646E+00	59.32	118.64	0.00E+00	1.52E+02	3.04E+02
Tc-99	4.0319E-04	59.32	118.64	0.00E+00	2.39E-02	4.78E-02
Th-229	7.7375E-11	59.32	118.64	0.00E+00	4.59E-09	9.18E-09
Th-230	1.2211E-10	59.32	118.64	0.00E+00	7.24E-09	1.45E-08
Th-232	2.3842E-11	59.32	118.64	0.00E+00	1.41E-09	2.83E-09
Tl-208	1.4313E-07	59.32	118.64	0.00E+00	8.49E-06	1.70E-05
U-232	4.1927E-07	59.32	118.64	0.00E+00	2.49E-05	4.97E-05
U-233	6.8491E-08	59.32	118.64	0.00E+00	4.06E-06	8.13E-06
U-234	2.0189E-06	59.32	118.64	0.00E+00	1.20E-04	2.40E-04
U-235	-2.6572E-06	59.32	0.00	2.38E-03	2.22E-03	2.38E-03
U-236	1.3575E-05	59.32	118.64	0.00E+00	8.05E-04	1.61E-03
U-238	-2.2698E-08	59.32	0.00	1.59E-04	1.58E-04	1.59E-04
Y-90	2.5646E+00	59.32	118.64	0.00E+00	1.52E+02	3.04E+02
Other Radionuclides					2.11E+02	4.23E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	1.914E+13
0.0250	4.201E+12
0.0375	3.716E+12
0.0575	3.709E+12
0.0850	2.308E+12
0.1250	1.853E+12
0.2250	1.961E+12
0.3750	9.786E+11
0.5750	1.620E+13
0.8500	2.971E+12
1.2500	1.141E+13
1.7500	1.526E+10
2.2500	1.196E+10
2.7500	1.085E+08
3.5000	1.277E+07
5.0000	3.059E+03
7.0000	3.520E+02
11.0000	4.039E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.89E+00	7.78E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	69.93004832	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	59.32	
Bounding		118.64

Basis for burnup used in estimate:
Nominal burnup taken directly from SFD (converted to MWd)
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.11	0.00
Bounding	0.22	

Estimated EOL HM/Given EOL HM: 0.96

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA (FLIP) UNIV OF WISCONSIN
SNF ID #: 242
Fuel Units & Descr: 92 - ELEMENT
Heavy Metal Mass: BOL=18 032kg; EOL=15 53kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
[2]Template Burnup(MWd): 66 52
Template BOL Heavy Metal Mass (MT): 0 000196
Template Decay Time: 5 years

Estimated Canister usage
18"x10'
0 83

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2 8488E-10	2,378 33	4,756 66	0 00E+00	6 78E-07	1 36E-06
Am-241	7 5767E-03	2,378 33	4,756 66	0 00E+00	1 80E+01	3 60E+01
Am-242m	2 4459E-05	2,378 33	4,756 66	0 00E+00	5 82E-02	1 16E-01
Am-243	3 0983E-05	2,378 33	4,756 66	0 00E+00	7 37E-02	1 47E-01
C-14	1 2590E-04	2,378 33	4,756 66	0 00E+00	2 99E-01	5 99E-01
Cl-36	2 6624E-06	2,378 33	4,756 66	0 00E+00	6 33E-03	1 27E-02
Cm-243	3 8244E-05	2,378 33	4,756 66	0 00E+00	9 10E-02	1 82E-01
Cm-244	4 1010E-03	2,378 33	4,756 66	0 00E+00	9 75E+00	1 95E+01
Co-60	1 2410E+00	2,378 33	4,756 66	0 00E+00	2 95E+03	5 90E+03
Cs-134	6 5454E-01	2,378 33	4,756 66	0 00E+00	1 56E+03	3 11E+03
Cs-135	1 9753E-05	2,378 33	4,756 66	0 00E+00	4 70E-02	9 40E-02
Cs-137	2 7375E+00	2,378 33	4,756 66	0 00E+00	6 51E+03	1 30E+04
Eu-154	1 2324E-01	2,378 33	4,756 66	0 00E+00	2 93E+02	5 86E+02
Eu-155	5 3037E-02	2,378 33	4,756 66	0 00E+00	1 26E+02	2 52E+02
Fe-55	7 9555E-01	2,378 33	4,756 66	0 00E+00	1 89E+03	3 78E+03
H-3	1 0531E-02	2,378.33	4,756 66	0 00E+00	2 50E+01	5 01E+01
I-129	7 1287E-07	2,378 33	4,756 66	0 00E+00	1 70E-03	3 39E-03
Kr-85	2 4955E-01	2,378.33	4,756.66	0 00E+00	5 94E+02	1 19E+03
Np-237	1 2121E-05	2,378.33	4,756 66	0 00E+00	2 88E-02	5 77E-02
Pa-231	1 1230E-09	2,378.33	4,756 66	0 00E+00	2 67E-06	5 34E-06
Pb-210	6 1636E-14	2,378.33	4,756 66	0 00E+00	1 47E-10	2 93E-10
Pm-147	1 1302E+00	2,378 33	4,756.66	0 00E+00	2 69E+03	5 38E+03
Pu-238	5 4826E-02	2,378.33	4,756 66	0 00E+00	1 30E+02	2 61E+02
Pu-239	1 4056E-03	2,378.33	4,756 66	0 00E+00	3 34E+00	6 69E+00
Pu-240	1 1536E-03	2,378.33	4,756.66	0 00E+00	2 74E+00	5 49E+00
Pu-241	4 2995E-01	2,378.33	4,756 66	0 00E+00	1 02E+03	2 05E+03
Pu-242	4 9910E-06	2,378.33	4,756 66	0 00E+00	1 19E-02	2 37E-02
Ra-226	2 4008E-13	2,378.33	4,756 66	0 00E+00	5 71E-10	1 14E-09
Ra-228	1 8220E-11	2,378.33	4,756 66	0 00E+00	4 33E-08	8 67E-08
Ru-106	1 0343E-01	2,378.33	4,756 66	0.00E+00	2 46E+02	4 92E+02
Se-79	1 2832E-05	2,378.33	4,756 66	0 00E+00	3 05E-02	6.10E-02
Sn-126	1 2090E-05	2,378.33	4,756 66	0 00E+00	2 88E-02	5 75E-02
Sr-90	2 5646E+00	2,378.33	4,756 66	0.00E+00	6 10E+03	1 22E+04
Tc-99	4 0319E-04	2,378.33	4,756 66	0 00E+00	9 59E-01	1 92E+00
Th-229	7 7375E-11	2,378.33	4,756 66	0 00E+00	1 84E-07	3 68E-07
Th-230	1.2211E-10	2,378.33	4,756 66	0 00E+00	2 90E-07	5 81E-07
Th-232	2 3842E-11	2,378.33	4,756 66	0 00E+00	5 67E-08	1 13E-07
Tl-208	1 4313E-07	2,378.33	4,756 66	0 00E+00	3 40E-04	6 81E-04
U-232	4 1927E-07	2,378.33	4,756 66	0 00E+00	9 97E-04	1 99E-03
U-233	6 8491E-08	2,378.33	4,756 66	0 00E+00	1 63E-04	3.26E-04
U-234	2 0189E-06	2,378.33	4,756 66	0 00E+00	4 80E-03	9 60E-03
U-235	-2 6572E-06	2,378.33	0 00	2.72E-02	2 09E-02	2.72E-02
U-236	1 3575E-05	2,378.33	4,756 66	0 00E+00	3.23E-02	6 46E-02
U-238	-2 2698E-08	2,378.33	0 00	1.82E-03	1 77E-03	1 82E-03
Y-90	2.5646E+00	2,378.33	4,756 66	0 00E+00	6 10E+03	1.22E+04
Other Radionuclides					8 47E+03	1 69E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7 675E+14
0 0250	1 684E+14
0 0375	1 490E+14
0 0575	1 487E+14
0 0850	9.252E+13
0 1250	7 429E+13
0 2250	7 863E+13
0 3750	3 923E+13
0 5750	6 493E+14
0 8500	1 191E+14
1.2500	4 575E+14
1 7500	6 120E+11
2.2500	4 797E+11
2.7500	4 349E+09
3 5000	5 118E+08
5 0000	1.226E+05
7 0000	1 411E+04
11 0000	1 619E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 56E+02	3 12E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	69 89795918	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	509 96	2,378.33
Bounding		4 756 66

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 39	4 66
Bounding	0 78	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA (FLIP) WSU
SNF ID #: 243
Fuel Units & Descr: 78 - ELEMENT
Heavy Metal Mass: BOL=15.288kg EOL=13.291kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100% U)
[2]Template Burnup(MWd): 66.52
Template BOL Heavy Metal Mass (MT): 0.000196
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' = 0.70

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2.8488E-10	1,897.80	3,795.60	0.00E+00	5.41E-07	1.08E-06
Am-241	7.5767E-03	1,897.80	3,795.60	0.00E+00	1.44E+01	2.88E+01
Am-242m	2.4459E-05	1,897.80	3,795.60	0.00E+00	4.64E-02	9.28E-02
Am-243	3.0983E-05	1,897.80	3,795.60	0.00E+00	5.88E-02	1.18E-01
C-14	1.2590E-04	1,897.80	3,795.60	0.00E+00	2.39E-01	4.78E-01
Cl-36	2.6624E-06	1,897.80	3,795.60	0.00E+00	5.05E-03	1.01E-02
Cm-243	3.8244E-05	1,897.80	3,795.60	0.00E+00	7.26E-02	1.45E-01
Cm-244	4.1010E-03	1,897.80	3,795.60	0.00E+00	7.78E+00	1.56E+01
Co-60	1.2410E+00	1,897.80	3,795.60	0.00E+00	2.36E+03	4.71E+03
Cs-134	6.5454E-01	1,897.80	3,795.60	0.00E+00	1.24E+03	2.48E+03
Cs-135	1.9753E-05	1,897.80	3,795.60	0.00E+00	3.75E-02	7.50E-02
Cs-137	2.7375E+00	1,897.80	3,795.60	0.00E+00	5.20E+03	1.04E+04
Eu-154	1.2324E-01	1,897.80	3,795.60	0.00E+00	2.34E+02	4.68E+02
Eu-155	5.3037E-02	1,897.80	3,795.60	0.00E+00	1.01E+02	2.01E+02
Fe-55	7.9555E-01	1,897.80	3,795.60	0.00E+00	1.51E+03	3.02E+03
H-3	1.0531E-02	1,897.80	3,795.60	0.00E+00	2.00E+01	4.00E+01
I-129	7.1287E-07	1,897.80	3,795.60	0.00E+00	1.35E-03	2.71E-03
Kr-85	2.4955E-01	1,897.80	3,795.60	0.00E+00	4.74E+02	9.47E+02
Np-237	1.2121E-05	1,897.80	3,795.60	0.00E+00	2.30E-02	4.60E-02
Pa-231	1.1230E-09	1,897.80	3,795.60	0.00E+00	2.13E-06	4.26E-06
Pb-210	6.1636E-14	1,897.80	3,795.60	0.00E+00	1.17E-10	2.34E-10
Pm-147	1.1302E+00	1,897.80	3,795.60	0.00E+00	2.14E+03	4.29E+03
Pu-238	5.4826E-02	1,897.80	3,795.60	0.00E+00	1.04E+02	2.08E+02
Pu-239	1.4056E-03	1,897.80	3,795.60	0.00E+00	2.67E+00	5.34E+00
Pu-240	1.1536E-03	1,897.80	3,795.60	0.00E+00	2.19E+00	4.38E+00
Pu-241	4.2995E-01	1,897.80	3,795.60	0.00E+00	8.16E+02	1.63E+03
Pu-242	4.9910E-06	1,897.80	3,795.60	0.00E+00	9.47E-03	1.89E-02
Ra-226	2.4008E-13	1,897.80	3,795.60	0.00E+00	4.56E-10	9.11E-10
Ra-228	1.8220E-11	1,897.80	3,795.60	0.00E+00	3.46E-08	6.92E-08
Ru-106	1.0343E-01	1,897.80	3,795.60	0.00E+00	1.96E+02	3.93E+02
Se-79	1.2832E-05	1,897.80	3,795.60	0.00E+00	2.44E-02	4.87E-02
Sn-126	1.2090E-05	1,897.80	3,795.60	0.00E+00	2.29E-02	4.59E-02
Sr-90	2.5646E+00	1,897.80	3,795.60	0.00E+00	4.87E+03	9.73E+03
Tc-99	4.0319E-04	1,897.80	3,795.60	0.00E+00	7.65E-01	1.53E+00
Th-229	7.7375E-11	1,897.80	3,795.60	0.00E+00	1.47E-07	2.94E-07
Th-230	1.2211E-10	1,897.80	3,795.60	0.00E+00	2.32E-07	4.63E-07
Th-232	2.3842E-11	1,897.80	3,795.60	0.00E+00	4.52E-08	9.05E-08
Tl-208	1.4313E-07	1,897.80	3,795.60	0.00E+00	2.72E-04	5.43E-04
U-232	4.1927E-07	1,897.80	3,795.60	0.00E+00	7.96E-04	1.59E-03
U-233	6.8491E-08	1,897.80	3,795.60	0.00E+00	1.30E-04	2.60E-04
U-234	2.0189E-06	1,897.80	3,795.60	0.00E+00	3.83E-03	7.66E-03
U-235	-2.6572E-06	1,897.80	0.00	2.31E-02	1.81E-02	2.31E-02
U-236	1.3575E-05	1,897.80	3,795.60	0.00E+00	2.58E-02	5.15E-02
U-238	-2.2698E-08	1,897.80	0.00	1.54E-03	1.50E-03	1.54E-03
Y-90	2.5646E+00	1,897.80	3,795.60	0.00E+00	4.87E+03	9.73E+03
Other Radionuclides					6.76E+03	1.35E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	6.124E+14
0.0250	1.344E+14
0.0375	1.189E+14
0.0575	1.186E+14
0.0850	7.383E+13
0.1250	5.928E+13
0.2250	6.274E+13
0.3750	3.131E+13
0.5750	5.181E+14
0.8500	9.505E+13
1.2500	3.651E+14
1.7500	4.883E+11
2.2500	3.828E+11
2.7500	3.470E+09
3.5000	4.084E+08
5.0000	9.784E+04
7.0000	1.126E+04
11.0000	1.292E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.24E+02	2.49E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	70	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	432.36	1,897.80	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		3,795.60	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0.37	4.39	1.00
Bounding	0.73		

[1]Reactor shutdown core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA (HIGH POWER) (HEU)
SNF ID #: 998
Fuel Units & Descr: 4 - ELEMENT
Heavy Metal Mass: BOL=0 117kg; EOL=0 117kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1970
Estimates as of: 2030
Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
[2]Template Burnup(MWd): 66 52
Template BOL Heavy Metal Mass (MT): 0 000196
Template Decay Time: 50 years

Estimated Canister usage

18"x10'
0 05

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2 0776E-09	2 22	4 44	0 00E+00	4 61E-09	9 23E-09	Avg MeV	
Am-241	1 6777E-02	2 22	4 44	0 00E+00	3 72E-02	7 45E-02	0 0150	2 150E+11
Am-242m	1 9919E-05	2 22	4 44	0 00E+00	4 42E-05	8 84E-05	0 0250	4 441E+10
Am-243	3 0848E-05	2 22	4 44	0 00E+00	6 85E-05	1 37E-04	0 0375	3 879E+10
C-14	1 2521E-04	2 22	4 44	0 00E+00	2 78E-04	5 56E-04	0 0575	4.239E+10
Cl-36	2 6624E-06	2 22	4 44	0 00E+00	5 91E-06	1 18E-05	0 0850	2 498E+10
Cm-243	1 2813E-05	2 22	4 44	0 00E+00	2 84E-05	5 69E-05	0 1250	1 640E+10
Cm-244	7.3361E-04	2 22	4 44	0 00E+00	1 63E-03	3 26E-03	0.2250	2.155E+10
Co-60	3 3494E-03	2 22	4 44	0 00E+00	7.44E-03	1 49E-02	0 3750	9.379E+09
Cs-134	1 7799E-07	2 22	4 44	0 00E+00	3 95E-07	7 90E-07	0 5750	1 600E+11
Cs-135	1 9738E-05	2 22	4 44	0 00E+00	4.38E-05	8 76E-05	0 8500	1 779E+09
Cs-137	9 6843E-01	2 22	4 44	0 00E+00	2.15E+00	4.30E+00	1 2500	1 889E+09
Eu-154	3 2877E-03	2 22	4 44	0 00E+00	7 30E-03	1 46E-02	1 7500	4 770E+07
Eu-155	9 8812E-05	2.22	4 44	0 00E+00	2 19E-04	4.39E-04	2 2500	1 025E+04
Fe-55	4 9444E-06	2.22	4 44	0 00E+00	1 10E-05	2.20E-05	2 7500	1 727E+04
H-3	8 4381E-04	2.22	4 44	0.00E+00	1 87E-03	3.75E-03	3 5000	5 549E+01
I-129	7 1287E-07	2.22	4 44	0 00E+00	1 58E-06	3.17E-06	5 0000	2 353E+01
Kr-85	1.3624E-02	2.22	4 44	0 00E+00	3 02E-02	6 05E-02	7 0000	2 688E+00
Np-237	1.2375E-05	2.22	4 44	0 00E+00	2 75E-05	5 50E-05	11 0000	3 073E-01
Pa-231	3 2066E-09	2.22	4 44	0 00E+00	7.12E-09	1 42E-08		
Pb-210	1 0925E-11	2.22	4 44	0 00E+00	2 43E-11	4 85E-11		
Pm-147	7 8187E-06	2.22	4 44	0 00E+00	1 74E-05	3 47E-05		
Pu-238	3 8440E-02	2 22	4 44	0 00E+00	8 53E-02	1 71E-01		
Pu-239	1 4038E-03	2.22	4 44	0 00E+00	3 12E-03	6.23E-03		
Pu-240	1 1560E-03	2 22	4 44	0 00E+00	2 57E-03	5 13E-03		
Pu-241	4 9354E-02	2.22	4 44	0 00E+00	1 10E-01	2 19E-01		
Pu-242	4 9910E-06	2 22	4 44	0 00E+00	1 11E-05	2 22E-05		
Ra-226	2 9330E-11	2 22	4 44	0 00E+00	6 51E-11	1 30E-10		
Ra-228	2 3857E-11	2 22	4 44	0 00E+00	5.30E-11	1 06E-10		
Ru-106	3 8455E-15	2 22	4 44	0 00E+00	8 54E-15	1 71E-14		
Se-79	1 2826E-05	2 22	4 44	0 00E+00	2 85E-05	5 70E-05		
Sn-126	1 2087E-05	2 22	4 44	0 00E+00	2 68E-05	5 37E-05		
Sr-90	8 7913E-01	2 22	4 44	0 00E+00	1 95E+00	3 90E+00		
Tc-99	4 0304E-04	2 22	4 44	0 00E+00	8 95E-04	1 79E-03		
Th-229	4 3912E-10	2 22	4 44	0 00E+00	9.75E-10	1 95E-09		
Th-230	2 8879E-09	2 22	4.44	0 00E+00	6 41E-09	1.28E-08		
Th-232	2.3888E-11	2 22	4 44	0 00E+00	5 30E-11	1 06E-10		
Tl-208	1.1027E-07	2 22	4 44	0 00E+00	2 45E-07	4 90E-07		
U-232	2.9871E-07	2.22	4 44	0 00E+00	6 63E-07	1 33E-06		
U-233	7.1407E-08	2.22	4 44	0 00E+00	1 59E-07	3 17E-07		
U-234	8 6801E-06	2 22	4 44	0 00E+00	1 93E-05	3 85E-05		
U-235	-2 6572E-06	2.22	0 00	2 35E-04	2 29E-04	2.35E-04		
U-236	1 3576E-05	2.22	4 44	0 00E+00	3 01E-05	6 03E-05		
U-238	-2 2698E-08	2.22	0 00	2 69E-06	2 64E-06	2 69E-06		
Y-90	8 7928E-01	2.22	4 44	0 00E+00	1 95E+00	3 90E+00		
Other Radionuclides					2 15E+00	4 30E+00		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.80E-02	5 61E-02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	INCOLOY	SST
BOL HM Constituents	U	U
BOL Enrichment %	93 152	60 to 100

Basis for Parameter Drfferences:
This Template was used for the following reasons
This fuel matches on all parameters except cladding (SST is conservative).

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		2.22
Bounding		4 44

Basis for burnup used in estimate:
Nominal burnup assumed to be 2% of BOL heavy metal mass
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 06	
Bounding	0 11	

Estimated EOL HM/Given EOL HM: 0 98

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA (HIGH POWER) ROMANIA
SNF ID #: 302
Fuel Units & Descr: 611 - ELEMENT
Heavy Metal Mass: BOL=27.067kg EOL=13.992kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1978
Estimates as of: 2030
Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
[2]Template Burnup(MWd): 66.52
Template BOL Heavy Metal Mass (MT): 0.000196
Template Decay Time: 50 years

Estimated Canister usage: 18"x10': 5.50

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2.0776E-09	12,427.12	24,854.25	0.00E+00	2.58E-05	5.16E-05
Am-241	1.6777E-02	12,427.12	24,854.25	0.00E+00	2.08E+02	4.17E+02
Am-242m	1.9919E-05	12,427.12	24,854.25	0.00E+00	2.48E-01	4.95E-01
Am-243	3.0848E-05	12,427.12	24,854.25	0.00E+00	3.83E-01	7.67E-01
C-14	1.2521E-04	12,427.12	24,854.25	0.00E+00	1.56E+00	3.11E+00
Cl-36	2.6624E-06	12,427.12	24,854.25	0.00E+00	3.31E-02	6.62E-02
Cm-243	1.2813E-05	12,427.12	24,854.25	0.00E+00	1.59E-01	3.18E-01
Cm-244	7.3361E-04	12,427.12	24,854.25	0.00E+00	9.12E+00	1.82E+01
Co-60	3.3494E-03	12,427.12	24,854.25	0.00E+00	4.16E+01	8.32E+01
Cs-134	1.7799E-07	12,427.12	24,854.25	0.00E+00	2.21E-03	4.42E-03
Cs-135	1.9738E-05	12,427.12	24,854.25	0.00E+00	2.45E-01	4.91E-01
Cs-137	9.6843E-01	12,427.12	24,854.25	0.00E+00	1.20E+04	2.41E+04
Eu-154	3.2877E-03	12,427.12	24,854.25	0.00E+00	4.09E+01	8.17E+01
Eu-155	9.8812E-05	12,427.12	24,854.25	0.00E+00	1.23E+00	2.46E+00
Fe-55	4.9444E-06	12,427.12	24,854.25	0.00E+00	6.14E-02	1.23E-01
H-3	8.4381E-04	12,427.12	24,854.25	0.00E+00	1.05E+01	2.10E+01
I-129	7.1287E-07	12,427.12	24,854.25	0.00E+00	8.86E-03	1.77E-02
Kr-85	1.3624E-02	12,427.12	24,854.25	0.00E+00	1.69E+02	3.39E+02
Np-237	1.2375E-05	12,427.12	24,854.25	0.00E+00	1.54E-01	3.08E-01
Pa-231	3.2066E-09	12,427.12	24,854.25	0.00E+00	3.98E-05	7.97E-05
Pb-210	1.0925E-11	12,427.12	24,854.25	0.00E+00	1.36E-07	2.72E-07
Pm-147	7.8187E-06	12,427.12	24,854.25	0.00E+00	9.72E-02	1.94E-01
Pu-238	3.8440E-02	12,427.12	24,854.25	0.00E+00	4.78E+02	9.55E+02
Pu-239	1.4038E-03	12,427.12	24,854.25	0.00E+00	1.74E+01	3.49E+01
Pu-240	1.1560E-03	12,427.12	24,854.25	0.00E+00	1.44E+01	2.87E+01
Pu-241	4.9354E-02	12,427.12	24,854.25	0.00E+00	6.13E+02	1.23E+03
Pu-242	4.9910E-06	12,427.12	24,854.25	0.00E+00	6.20E-02	1.24E-01
Ra-226	2.9330E-11	12,427.12	24,854.25	0.00E+00	3.64E-07	7.29E-07
Ra-228	2.3857E-11	12,427.12	24,854.25	0.00E+00	2.96E-07	5.93E-07
Ru-106	3.8455E-15	12,427.12	24,854.25	0.00E+00	4.78E-11	9.56E-11
Se-79	1.2826E-05	12,427.12	24,854.25	0.00E+00	1.59E-01	3.19E-01
Sn-126	1.2087E-05	12,427.12	24,854.25	0.00E+00	1.50E-01	3.00E-01
Sr-90	8.7913E-01	12,427.12	24,854.25	0.00E+00	1.09E+04	2.19E+04
Tc-99	4.0304E-04	12,427.12	24,854.25	0.00E+00	5.01E+00	1.00E+01
Th-229	4.3912E-10	12,427.12	24,854.25	0.00E+00	5.46E-06	1.09E-05
Th-230	2.8879E-09	12,427.12	24,854.25	0.00E+00	3.59E-05	7.18E-05
Th-232	2.3888E-11	12,427.12	24,854.25	0.00E+00	2.97E-07	5.94E-07
Tl-208	1.1027E-07	12,427.12	24,854.25	0.00E+00	1.37E-03	2.74E-03
U-232	2.9871E-07	12,427.12	24,854.25	0.00E+00	3.71E-03	7.42E-03
U-233	7.1407E-08	12,427.12	24,854.25	0.00E+00	8.87E-04	1.77E-03
U-234	8.6801E-06	12,427.12	24,854.25	0.00E+00	1.08E-01	2.16E-01
U-235	-2.6572E-06	12,427.12	0.00	5.45E-02	2.15E-02	5.45E-02
U-236	1.3576E-05	12,427.12	24,854.25	0.00E+00	1.69E-01	3.37E-01
U-238	-2.2698E-08	12,427.12	0.00	6.24E-04	3.42E-04	6.24E-04
Y-90	8.7928E-01	12,427.12	24,854.25	0.00E+00	1.09E+04	2.19E+04
Other Radionuclides					1.20E+04	2.40E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	1.203E+15
0.0250	2.486E+14
0.0375	2.171E+14
0.0575	2.373E+14
0.0850	1.398E+14
0.1250	9.179E+13
0.2250	1.206E+14
0.3750	5.250E+13
0.5750	8.955E+14
0.8500	9.957E+12
1.2500	1.057E+13
1.7500	2.670E+11
2.2500	5.735E+07
2.7500	9.668E+07
3.5000	3.105E+05
5.0000	1.317E+05
7.0000	1.504E+04
11.0000	1.719E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.57E+02	3.14E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	INCOLOY	SST
BOL HM Constituents	U	U
BOL Enrichment %:	93.14	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons
This fuel matches on all parameters except cladding (SST is conservative)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		12,427.12
Bounding		24,854.25

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.35	
Bounding	2.71	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA (HIGH POWER) ROMANIA
SNF ID #: 930
Fuel Units & Descr: 267 - ELEMENT
Heavy Metal Mass: BOL=11 828kg; EOL=5.58kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1999
Estimates as of 2030
Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
[2]Template Burnup(MWd): 66 52
Template BOL Heavy Metal Mass (MT): 0 000196
Template Decay Time: 25 years

Estimated Canister usage 18"x10': 2 41

II. Estimates

Radionuclide	m Ci/MWd From Template	x_a Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_a Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	1 0386E-09	5,938 04	11,241 67	0 00E+00	6.17E-06	1 17E-05
Am-241	1 4973E-02	5,938 04	11,241.67	0 00E+00	8 89E+01	1 68E+02
Am-242m	2 2324E-05	5,938 04	11,241 67	0 00E+00	1.33E-01	2 51E-01
Am-243	3 0923E-05	5,938 04	11,241 67	0 00E+00	1 84E-01	3 48E-01
C-14	1 2559E-04	5,938 04	11,241.67	0 00E+00	7.46E-01	1 41E+00
Cl-36	2 6624E-06	5,938 04	11,241.67	0 00E+00	1.58E-02	2 99E-02
Cm-243	2 3527E-05	5,938 04	11,241 67	0 00E+00	1 40E-01	2 64E-01
Cm-244	1 9092E-03	5,938 04	11,241.67	0 00E+00	1 13E+01	2 15E+01
Co-60	8 9552E-02	5,938 04	11,241.67	0 00E+00	5 32E+02	1 01E+03
Cs-134	7 9074E-04	5,938 04	11,241 67	0 00E+00	4 70E+00	8 89E+00
Cs-135	1 9753E-05	5,938 04	11,241 67	0.00E+00	1.17E-01	2 22E-01
Cs-137	1 7243E+00	5,938 04	11,241 67	0 00E+00	1 02E+04	1 94E+04
Eu-154	2 4609E-02	5,938 04	11,241.67	0 00E+00	1 46E+02	2 77E+02
Eu-155	3 2456E-03	5,938 04	11,241 67	0 00E+00	1 93E+01	3 65E+01
Fe-55	3 8605E-03	5,938 04	11,241.67	0 00E+00	2.29E+01	4 34E+01
H-3	3 4305E-03	5,938 04	11,241.67	0 00E+00	2 04E+01	3 86E+01
I-129	7 1287E-07	5,938 04	11,241.67	0 00E+00	4.23E-03	8 01E-03
Kr-85	6 8536E-02	5,938 04	11,241.67	0 00E+00	4 07E+02	7 70E+02
Np-237	1 2219E-05	5,938 04	11,241.67	0 00E+00	7.26E-02	1 37E-01
Pa-231	2 0701E-09	5,938 04	11,241.67	0 00E+00	1.23E-05	2 33E-05
Pb-210	1 3279E-12	5,938 04	11,241.67	0 00E+00	7 88E-09	1 49E-08
Pm-147	5 7517E-03	5,938 04	11,241 67	0 00E+00	3.42E+01	6 47E+01
Pu-238	4 6828E-02	5,938 04	11,241 67	0 00E+00	2.78E+02	5 26E+02
Pu-239	1 4048E-03	5,938 04	11,241.67	0 00E+00	8.34E+00	1 58E+01
Pu-240	1 1563E-03	5,938 04	11,241.67	0.00E+00	6.87E+00	1 30E+01
Pu-241	1 6431E-01	5,938 04	11,241 67	0 00E+00	9 76E+02	1 85E+03
Pu-242	4 9910E-06	5,938 04	11,241.67	0 00E+00	2.96E-02	5 61E-02
Ra-226	5 4390E-12	5,938 04	11,241 67	0 00E+00	3.23E-08	6 11E-08
Ra-228	2 3437E-11	5,938 04	11,241 67	0 00E+00	1.39E-07	2 63E-07
Ru-106	1 1115E-07	5,938 04	11,241 67	0 00E+00	6 60E-04	1 25E-03
Se-79	1 2829E-05	5,938 04	11,241 67	0 00E+00	7 62E-02	1 44E-01
Sn-126	1 2088E-05	5,938 04	11,241 67	0 00E+00	7.18E-02	1 36E-01
Sr-90	1 5935E+00	5,938 04	11,241 67	0 00E+00	9 46E+03	1 79E+04
Tc-99	4 0319E-04	5,938 04	11,241.67	0 00E+00	2 39E+00	4 53E+00
Th-229	2 4023E-10	5,938 04	11,241 67	0 00E+00	1 43E-06	2 70E-06
Th-230	9 6948E-10	5,938 04	11,241.67	0.00E+00	5 76E-06	1 09E-05
Th-232	2 3857E-11	5,938 04	11,241 67	0 00E+00	1.42E-07	2 68E-07
Tl-208	1 3982E-07	5,938 04	11,241.67	0.00E+00	8.30E-04	1 57E-03
U-232	3 7943E-07	5,938 04	11,241.67	0.00E+00	2.25E-03	4.27E-03
U-233	6 9814E-08	5,938 04	11,241 67	0.00E+00	4.15E-04	7 85E-04
U-234	5 4059E-06	5,938 04	11,241 67	0 00E+00	3.21E-02	6 08E-02
U-235	-2 6572E-06	5,938 04	0 00	2.38E-02	8 03E-03	2 38E-02
U-236	1 3576E-05	5,938 04	11,241 67	0 00E+00	8 06E-02	1 53E-01
U-238	-2.2698E-08	5,938 04	0 00	2 72E-04	1.38E-04	2 72E-04
Y-90	1 5935E+00	5,938 04	11,241 67	0 00E+00	9 46E+03	1 79E+04
Other Radionuclides					1 01E+04	1 90E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	9 881E+14
0 0250	2 046E+14
0 0375	1 798E+14
0 0575	1 932E+14
0 0850	1 153E+14
0 1250	7 874E+13
0 2250	9 962E+13
0 3750	4 324E+13
0 5750	7 229E+14
0 8500	1.215E+13
1.2500	8 223E+13
1 7500	3 414E+11
2.2500	4 153E+08
2.7500	5 679E+07
3 5000	3 303E+05
5 0000	1 402E+05
7 0000	1 610E+04
11 0000	1 845E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.36E+02	2.58E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	INCOLOY	SST
BOL HM Constituents	U	U
BOL Enrichment %	93 14636964	60 to 100

Basis for Parameter Drfferences:
This Template was used for the following reasons.
This fuel matches on all parameters except cladding (SST is conservative)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		5,938 04
Bounding		11,241 67

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup calculated assuming all BOL heavy metal burned

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 48	
Bounding	2.80	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA 20/20 FFCR MNRC
SNF ID #: 737
Fuel Units & Descr: 6 - ELEMENT
Heavy Metal Mass: BOL=2.462kg EOL=2.462kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage 18"x10": 0 08

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	0 00	0 00	0 00E+00	0.00E+00	0 00E+00
Am-241	1 8331E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-242m	1 4129E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-243	1 4774E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
C-14	1.2871E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cl-36	2 8120E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cm-243	1.7940E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cm-244	1 6962E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Co-60	1.2839E+00	0 00	0.00	0 00E+00	0 00E+00	0 00E+00
Cs-134	9 0541E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-135	3.2195E-05	0 00	0.00	0 00E+00	0 00E+00	0 00E+00
Cs-137	2.7564E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Eu-154	1.5368E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Eu-155	2 9293E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Fe-55	7 7158E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
H-3	1 1111E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
I-129	7.3684E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Kr-85	2 5263E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Np-237	1 2427E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pa-231	3 8511E-09	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pb-210	7 3880E-15	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pm-147	2 1023E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-238	1 0383E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-239	5 5293E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-240	2 1278E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-241	1 0195E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-242	2 3128E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-226	5 2782E-14	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-228	1 9338E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ru-106	9 1684E-02	0 00	0 00	0 00E+00	0.00E+00	0 00E+00
Se-79	1.3018E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sn-126	1.2167E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sr-90	2 6045E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Tc-99	4 4241E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-229	1.3713E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-230	1 8090E-11	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-232	2 5278E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Tl-208	1 6947E-08	0 00	0 00	0.00E+00	0 00E+00	0 00E+00
U-232	4 8737E-08	0 00	0.00	0 00E+00	0 00E+00	0 00E+00
U-233	1.2203E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-234	1.5925E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-235	-2 6194E-06	0 00	0 00	1 05E-03	1 05E-03	1 05E-03
U-236	1.2693E-05	0 00	0 00	0 00E+00	0 00E+00	0.00E+00
U-238	-3 6331E-08	0 00	0 00	6 64E-04	6 64E-04	6 64E-04
Y-90	2 6060E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Other Radionuclides					0 00E+00	0 00E+00

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 607E+07
0 0250	0 000E+00
0 0375	3.553E+04
0 0575	2 174E+04
0 0850	3 036E+06
0 1250	5 994E+06
0.2250	2 121E+07
0 3750	5.293E+04
0 5750	2 604E+03
0 8500	4 065E+02
1.2500	2 427E+01
1 7500	1 188E+01
2 2500	6 879E+00
2.7500	3 997E+00
3.5000	3 573E+00
5 0000	1.535E+00
7 0000	1 767E-01
11 0000	2 032E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.44E-05	4 44E-05
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 76779631	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	0 00	
Bounding		

Basis for burnup used in estimate:
Nominal burnup taken directly from SFD (converted to MWd)
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 00	
Bounding	0 00	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA 30/20 FFCR MNRC
SNF ID #: 1055
Fuel Units & Descr: 1 - ELEMENT
Heavy Metal Mass: BOL=0.675kg, EOL=0 675kg
ROD Storage Site INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' = 0 01

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8.5173E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-241	1 8331E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-242m	1 4129E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-243	1 4774E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
C-14	1.2871E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cl-36	2 8120E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cm-243	1.7940E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cm-244	1 6962E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Co-60	1.2839E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-134	9 0541E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-135	3.2195E-05	0 00	0 00	0.00E+00	0 00E+00	0 00E+00
Cs-137	2 7564E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Eu-154	1 5368E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Eu-155	2 9293E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Fe-55	7.7158E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
H-3	1 1111E-02	0 00	0 00	0.00E+00	0 00E+00	0 00E+00
I-129	7.3684E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Kr-85	2 5263E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Np-237	1 2427E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pa-231	3 8511E-09	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pb-210	7 3880E-15	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pm-147	2.1023E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-238	1 0383E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-239	5 5293E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-240	2 1278E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-241	1 0195E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-242	2 3128E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-226	5.2782E-14	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-228	1 9338E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ru-106	9 1684E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Se-79	1 3018E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sn-126	1 2167E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sr-90	2 6045E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Tc-99	4 4241E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-229	1 3713E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-230	1 8090E-11	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-232	2 5278E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Tl-208	1 6947E-08	0 00	0 00	0 00E+00	0.00E+00	0 00E+00
U-232	4 8737E-08	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-233	1 2203E-07	0 00	0 00	0 00E+00	0.00E+00	0 00E+00
U-234	1 5925E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-235	-2 6194E-06	0 00	0 00	2 88E-04	2 88E-04	2 88E-04
U-236	1 2693E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-238	-3 6331E-08	0 00	0 00	1 82E-04	1 82E-04	1 82E-04
Y-90	2 6060E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Other Radionuclides					0 00E+00	0 00E+00

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	7 138E+06
0 0250	0 000E+00
0 0375	9 726E+03
0 0575	5 957E+03
0 0850	8 309E+05
0 1250	1 641E+06
0.2250	5.806E+06
0 3750	1 449E+04
0 5750	7 127E+02
0 8500	1 113E+02
1.2500	6 652E+00
1 7500	3.255E+00
2.2500	1 885E+00
2 7500	1 095E+00
3 5000	9 793E-01
5 0000	4.207E-01
7 0000	4 843E-02
11 0000	5 568E-03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.22E-05	1.22E-05
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 74748006	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	0 00	
Bounding		

Basis for burnup used in estimate:
Nominal burnup taken directly from SFD (converted to MWd)
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 00	
Bounding	0 00	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA 8 5/20 FFCR	[1]Fuel decay start date	2035		
SNF ID #.	1003	Estimates as of	2030		
Fuel Units & Descr	10 - ELEMENT	Template	TRIGA-SS (LW/U-Zrx SST, 10 to 20% U)		
Heavy Metal Mass	BOL=1 604kg EOL=1.541kg	[2]Template Burnup(MWd):	6 65		
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 000195		
		Template Decay Time	5 years		

Estimated Canister usage: 18"x10' = 0 14

II. Estimates	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	60 14	120.28	0 00E+00	5 12E-08	1 02E-07
Am-241	1 8331E-03	60 14	120 28	0 00E+00	1 10E-01	2 20E-01
Am-242m	1 4129E-06	60 14	120.28	0 00E+00	8 50E-05	1 70E-04
Am-243	1 4774E-07	60 14	120 28	0 00E+00	8 89E-06	1 78E-05
C-14	1.2871E-04	60 14	120.28	0 00E+00	7 74E-03	1 55E-02
Cl-36	2.8120E-06	60 14	120.28	0 00E+00	1 69E-04	3 38E-04
Cm-243	1 7940E-07	60 14	120 28	0 00E+00	1 08E-05	2 16E-05
Cm-244	1 6962E-06	60 14	120 28	0 00E+00	1 02E-04	2 04E-04
Co-60	1.2839E+00	60 14	120 28	0 00E+00	7 72E+01	1 54E+02
Cs-134	9 0541E-02	60 14	120 28	0 00E+00	5 45E+00	1 09E+01
Cs-135	3.2195E-05	60 14	120 28	0 00E+00	1.94E-03	3 87E-03
Cs-137	2 7564E+00	60 14	120 28	0 00E+00	1 66E+02	3 32E+02
Eu-154	1.5368E-02	60 14	120 28	0 00E+00	9.24E-01	1 85E+00
Eu-155	2 9293E-02	60 14	120 28	0 00E+00	1 76E+00	3 52E+00
Fe-55	7 7158E-01	60.14	120 28	0 00E+00	4 64E+01	9.28E+01
H-3	1.1111E-02	60.14	120 28	0 00E+00	6 68E-01	1.34E+00
I-129	7.3684E-07	60.14	120 28	0 00E+00	4 43E-05	8 86E-05
Kr-85	2 5263E-01	60 14	120 28	0 00E+00	1.52E+01	3 04E+01
Np-237	1 2427E-06	60 14	120.28	0 00E+00	7 47E-05	1 49E-04
Pa-231	3 8511E-09	60 14	120.28	0 00E+00	2.32E-07	4 63E-07
Pb-210	7 3880E-15	60 14	120.28	0 00E+00	4 44E-13	8 89E-13
Pm-147	2 1023E+00	60 14	120.28	0 00E+00	1.26E+02	2 53E+02
Pu-238	1 0383E-03	60 14	120.28	0 00E+00	6 24E-02	1 25E-01
Pu-239	5 5293E-03	60 14	120.28	0 00E+00	3 33E-01	6 65E-01
Pu-240	2 1278E-03	60 14	120.28	0 00E+00	1.28E-01	2 56E-01
Pu-241	1 0195E-01	60 14	120.28	0 00E+00	6 13E+00	1.23E+01
Pu-242	2.3128E-07	60 14	120.28	0 00E+00	1 39E-05	2 78E-05
Ra-226	5.2782E-14	60 14	120.28	0 00E+00	3 17E-12	6 35E-12
Ra-228	1.9338E-10	60 14	120.28	0 00E+00	1 16E-08	2 33E-08
Ru-106	9 1684E-02	60 14	120.28	0.00E+00	5 51E+00	1 10E+01
Se-79	1.3018E-05	60 14	120.28	0.00E+00	7 83E-04	1.57E-03
Sn-126	1.2167E-05	60 14	120 28	0 00E+00	7 32E-04	1 46E-03
Sr-90	2 6045E+00	60 14	120 28	0 00E+00	1 57E+02	3 13E+02
Tc-99	4 4241E-04	60 14	120.28	0 00E+00	2 66E-02	5 32E-02
Th-229	1.3713E-10	60 14	120.28	0 00E+00	8.25E-09	1.65E-08
Th-230	1.8090E-11	60 14	120.28	0 00E+00	1.09E-09	2.18E-09
Th-232	2 5278E-10	60 14	120 28	0 00E+00	1.52E-08	3 04E-08
Tl-208	1 6947E-08	60 14	120 28	0 00E+00	1.02E-06	2 04E-06
U-232	4 8737E-08	60 14	120 28	0 00E+00	2.93E-06	5 86E-06
U-233	1.2203E-07	60.14	120 28	0 00E+00	7.34E-06	1 47E-05
U-234	1.5925E-07	60.14	120 28	0 00E+00	9 58E-06	1 92E-05
U-235	-2 6194E-06	60 14	0 00	6 68E-04	5 10E-04	6 68E-04
U-236	1 2693E-05	60.14	120.28	0 00E+00	7 63E-04	1 53E-03
U-238	-3 6331E-08	60 14	0.00	4 35E-04	4.33E-04	4 35E-04
Y-90	2 6060E+00	60 14	120 28	0 00E+00	1.57E+02	3 13E+02
Other Radionuclides					2 17E+02	4 34E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.944E+13
0 0250	4.278E+12
0 0375	3 643E+12
0 0575	3 739E+12
0 0850	2.316E+12
0 1250	1.682E+12
0.2250	1.965E+12
0.3750	9.972E+11
0 5750	1.326E+13
0 8500	5 690E+11
1.2500	1 155E+13
1 7500	7 702E+09
2.2500	1.241E+10
2 7500	9 852E+07
3 5000	1 147E+07
5 0000	6 404E+01
7 0000	7.250E+00
11 0000	8.259E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.50E+00	7 00E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19.26433915	10 to 20 1

Basis for Parameter Drfferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	54 71	60 14	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		120 28	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	1 10	1 10	1 00
Bounding	2.20		

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA 8.5/20 FFCR AFRRI
SNF ID #: 969
Fuel Units & Descr: 3 - ELEMENT
Heavy Metal Mass: BOL= , EOL=0.26kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2019
Estimates as of: 2030
Template: TRIGA SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT) 0 000195
Template Decay Time: 10 years

Estimated Canister usage

18"x10'
0 04

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 3731E-09	9 20	18 40	0 00E+00	1 26E-08	2 53E-08
Am-241	2 3865E-03	9 20	18 40	0 00E+00	2 20E-02	4 39E-02
Am-242m	1 3812E-06	9 20	18 40	0 00E+00	1.27E-05	2 54E-05
Am-243	1 4767E-07	9 20	18 40	0 00E+00	1 36E-06	2 72E-06
C-14	1.2863E-04	9 20	18 40	0 00E+00	1 18E-03	2 37E-03
Cl-36	2 8120E-06	9 20	18 40	0 00E+00	2 59E-05	5 17E-05
Cm-243	1 5895E-07	9 20	18 40	0 00E+00	1 46E-06	2 92E-06
Cm-244	1 4008E-06	9 20	18 40	0 00E+00	1.29E-05	2 58E-05
Co-60	6 6541E-01	9 20	18 40	0 00E+00	6 12E+00	1 22E+01
Cs-134	1 6887E-02	9 20	18 40	0 00E+00	1 55E-01	3 11E-01
Cs-135	3.2195E-05	9 20	18 40	0 00E+00	2 96E-04	5 92E-04
Cs-137	2 4556E+00	9.20	18 40	0 00E+00	2 26E+01	4 52E+01
Eu-154	1.0268E-02	9 20	18 40	0 00E+00	9 45E-02	1 89E-01
Eu-155	1.4570E-02	9 20	18 40	0 00E+00	1 34E-01	2 68E-01
Fe-55	2 0361E-01	9.20	18 40	0 00E+00	1 87E+00	3 75E+00
H-3	8.3940E-03	9 20	18 40	0 00E+00	7.72E-02	1 54E-01
I-129	7.3684E-07	9 20	18 40	0 00E+00	6.78E-06	1.36E-05
Kr-85	1 8286E-01	9 20	18 40	0 00E+00	1 68E+00	3 36E+00
Np-237	1.2462E-06	9.20	18 40	0 00E+00	1.15E-05	2.29E-05
Pa-231	4 9143E-09	9.20	18 40	0 00E+00	4 52E-08	9 04E-08
Pb-210	1 7173E-14	9.20	18 40	0 00E+00	1 58E-13	3 16E-13
Pm-147	5 6165E-01	9.20	18 40	0 00E+00	5 17E+00	1 03E+01
Pu-238	9 9820E-04	9.20	18 40	0 00E+00	9.18E-03	1.84E-02
Pu-239	5 5293E-03	9.20	18 40	0 00E+00	5 09E-02	1.02E-01
Pu-240	2.1263E-03	9 20	18 40	0 00E+00	1.96E-02	3 91E-02
Pu-241	8 0165E-02	9.20	18 40	0 00E+00	7.38E-01	1 48E+00
Pu-242	2 3128E-07	9.20	18 40	0 00E+00	2.13E-06	4.26E-06
Ra-226	9 9774E-14	9.20	18 40	0 00E+00	9.18E-13	1.84E-12
Ra-228	2 1729E-10	9.20	18 40	0 00E+00	2.00E-09	4 00E-09
Ru-106	2 9519E-03	9.20	18 40	0 00E+00	2.72E-02	5 43E-02
Se-79	1 3017E-05	9.20	18 40	0 00E+00	1.20E-04	2 40E-04
Sn-126	1 2167E-05	9.20	18 40	0 00E+00	1.12E-04	2.24E-04
Sr-90	2 3128E+00	9.20	18 40	0 00E+00	2.13E+01	4.26E+01
Tc-99	4 4241E-04	9.20	18 40	0 00E+00	4 07E-03	8 14E-03
Th-229	1 9459E-10	9.20	18 40	0 00E+00	1.79E-09	3 58E-09
Th-230	2 5564E-11	9.20	18 40	0 00E+00	2.35E-10	4 70E-10
Th-232	2 5278E-10	9 20	18 40	0 00E+00	2.33E-09	4 65E-09
Tl-208	1 6947E-08	9 20	18 40	0 00E+00	1.56E-07	3 12E-07
U-232	4 6812E-08	9.20	18 40	0 00E+00	4.31E-07	8 61E-07
U-233	1 2206E-07	9.20	18 40	0 00E+00	1.12E-06	2.25E-06
U-234	1 7323E-07	9.20	18 40	0 00E+00	1.59E-06	3 19E-06
U-235	-2 6194E-06	9.20	0 00	1.17E-04	9.25E-05	1 17E-04
U-236	1 2693E-05	9.20	18 40	0 00E+00	1.17E-04	2 34E-04
U-238	-3 6331E-08	9 20	0 00	7.25E-05	7.22E-05	7.25E-05
Y-90	2 3128E+00	9.20	18 40	0.00E+00	2.13E+01	4.26E+01
Other Radionuclides					2.26E+01	4 51E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2.377E+12
0 0250	5 036E+11
0 0375	4.302E+11
0 0575	4 585E+11
0 0850	2.782E+11
0 1250	1.829E+11
0.2250	2.372E+11
0.3750	1 090E+11
0 5750	1 707E+12
0 8500	3 048E+10
1.2500	9 164E+11
1 7500	5 515E+08
2.2500	2.880E+07
2 7500	4 768E+05
3 5000	5 650E+04
5 0000	9 771E+00
7 0000	1 105E+00
11 0000	1.258E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.60E-01	7.21E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	SST	SST
BOL HM Constituents:	U	U
BOL Enrichment %:		10 to 20 1

Basis for Parameter Differences:
This Template was used for the following reasons:
This fuel matches on all parameters except enrichment (unknown)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		9.20
Bounding		18 40

Basis for burnup used in estimate:
Nominal burnup taken from SFD and converted to MWd using BOL=0.27kg
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 00	
Bounding	2 00	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA 8 5/20 FFCR ENGLAND
SNF ID #: 987
Fuel Units & Descr: 4 - ELEMENT
Heavy Metal Mass: BOL=0 641kg EOL=0 624kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 0 04

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	18 75	37 49	0 00E+00	4 96E-08	9 91E-08
Am-241	3 1429E-03	18 75	37 49	0 00E+00	5 89E-02	1.18E-01
Am-242m	1 3195E-06	18 75	37 49	0 00E+00	2 47E-05	4 95E-05
Am-243	1 4753E-07	18 75	37 49	0 00E+00	2 77E-06	5.53E-06
C-14	1.2847E-04	18 75	37 49	0 00E+00	2 41E-03	4.82E-03
Cl-36	2 8120E-06	18 75	37 49	0 00E+00	5.27E-05	1.05E-04
Cm-243	1 2465E-07	18 75	37 49	0 00E+00	2.34E-06	4 67E-06
Cm-244	9 5564E-07	18 75	37.49	0 00E+00	1.79E-05	3 58E-05
Co-60	1 7880E-01	18 75	37.49	0 00E+00	3 35E+00	6.70E+00
Cs-134	5 8692E-04	18 75	37.49	0 00E+00	1.10E-02	2.20E-02
Cs-135	3 2195E-05	18 75	37.49	0 00E+00	6 04E-04	1.21E-03
Cs-137	1 9489E+00	18 75	37 49	0 00E+00	3 65E+01	7.31E+01
Eu-154	4 5895E-03	18 75	37.49	0 00E+00	8 60E-02	1 72E-01
Eu-155	3 6045E-03	18 75	37 49	0 00E+00	6 76E-02	1 35E-01
Fe-55	1.4185E-02	18 75	37 49	0 00E+00	2 66E-01	5 32E-01
H-3	4 7895E-03	18 75	37 49	0 00E+00	8 98E-02	1 80E-01
I-129	7.3684E-07	18 75	37 49	0 00E+00	1 38E-05	2 76E-05
Kr-85	9.5820E-02	18 75	37 49	0 00E+00	1 80E+00	3 59E+00
Np-237	1.2552E-06	18 75	37 49	0 00E+00	2 35E-05	4 71E-05
Pa-231	7 0406E-09	18.75	37 49	0 00E+00	1 32E-07	2 64E-07
Pb-210	5 8000E-14	18 75	37 49	0 00E+00	1 09E-12	2.17E-12
Pm-147	4 0075E-02	18 75	37 49	0 00E+00	7 51E-01	1 50E+00
Pu-238	9 2256E-04	18 75	37 49	0 00E+00	1 73E-02	3.46E-02
Pu-239	5 5278E-03	18 75	37 49	0 00E+00	1 04E-01	2.07E-01
Pu-240	2 1248E-03	18 75	37 49	0 00E+00	3 98E-02	7.97E-02
Pu-241	4 9549E-02	18 75	37 49	0 00E+00	9.29E-01	1.86E+00
Pu-242	2 3128E-07	18 75	37 49	0 00E+00	4.34E-06	8 67E-06
Ra-226	2 4526E-13	18 75	37 49	0 00E+00	4 60E-12	9.20E-12
Ra-228	2 4015E-10	18 75	37 49	0 00E+00	4.50E-09	9 00E-09
Ru-106	3 0602E-06	18 75	37 49	0 00E+00	5 74E-05	1.15E-04
Se-79	1 3015E-05	18 75	37 49	0 00E+00	2.44E-04	4 88E-04
Sn-126	1 2165E-05	18 75	37 49	0 00E+00	2.28E-04	4 56E-04
Sr-90	1 8226E+00	18 75	37 49	0 00E+00	3 42E+01	6 83E+01
Tc-99	4 4241E-04	18 75	37 49	0 00E+00	8.29E-03	1 66E-02
Th-229	3 0962E-10	18 75	37.49	0 00E+00	5 80E-09	1 16E-08
Th-230	4 2346E-11	18 75	37.49	0 00E+00	7 94E-10	1.59E-09
Th-232	2 5278E-10	18 75	37.49	0 00E+00	4 74E-09	9 48E-09
Tl-208	1.5820E-08	18 75	37 49	0 00E+00	2 97E-07	5 93E-07
U-232	4.2647E-08	18 75	37 49	0 00E+00	8 00E-07	1 60E-06
U-233	1.2211E-07	18 75	37.49	0 00E+00	2 29E-06	4.58E-06
U-234	1.9955E-07	18 75	37 49	0 00E+00	3 74E-06	7.48E-06
U-235	-2 6194E-06	18 75	0 00	2 77E-04	2 28E-04	2.77E-04
U-236	1.2693E-05	18 75	37 49	0 00E+00	2 38E-04	4 76E-04
U-238	-3 6331E-08	18 75	0 00	1 72E-04	1.72E-04	1 72E-04
Y-90	1 8241E+00	18.75	37 49	0 00E+00	3 42E+01	6 84E+01
Other Radionuclides					3 61E+01	7.22E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 757E+12
0 0250	7 822E+11
0 0375	6 776E+11
0 0575	7.290E+11
0 0850	4 401E+11
0 1250	2.876E+11
0.2250	3 779E+11
0 3750	1 656E+11
0 5750	2 724E+12
0.8500	3 070E+10
1.2500	5 088E+11
1 7500	7.888E+08
2.2500	2 717E+06
2 7500	2 993E+04
3 5000	1 664E+02
5 0000	1 988E+01
7 0000	2 246E+00
11 0000	2 555E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 69E-01	9.38E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 96879875	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	18 75	16.80	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		37 49	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 86	0 90
Bounding	1 71	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA 8 5/20 FFCR HEIDELBERG	[1]Fuel decay start date:	2010
SNF ID #.	1045	Estimates as of.	2030
Fuel Units & Descr.	5 - ELEMENT	Template:	TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
Heavy Metal Mass	BOL=0 801kg EOL=0 79kg	[2]Template Burnup(MWd):	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT):	0 000195
		Template Decay Time	20 years

Estimated Canister usage: 18"x10' = 0 05

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2 6436E-09	15 61	31 23	0 00E+00	4 13E-08	8 25E-08	Avg MeV	
Am-241	3.1429E-03	15 61	31 23	0 00E+00	4 91E-02	9 81E-02	0 0150	3 129E+12
Am-242m	1 3195E-06	15 61	31 23	0 00E+00	2 06E-05	4 12E-05	0 0250	6 514E+11
Am-243	1 4753E-07	15 61	31 23	0 00E+00	2 30E-06	4 61E-06	0 0375	5 643E+11
C-14	1 2847E-04	15 61	31 23	0 00E+00	2 01E-03	4 01E-03	0 0575	6 071E+11
Cl-36	2 8120E-06	15 61	31 23	0 00E+00	4 39E-05	8 78E-05	0 0850	3 665E+11
Cm-243	1.2465E-07	15 61	31 23	0 00E+00	1 95E-06	3 89E-06	0 1250	2 395E+11
Cm-244	9 5564E-07	15 61	31 23	0 00E+00	1 49E-05	2 98E-05	0 2250	3 147E+11
Co-60	1 7880E-01	15 61	31 23	0 00E+00	2.79E+00	5.58E+00	0 3750	1 379E+11
Cs-134	5 8692E-04	15 61	31 23	0 00E+00	9 16E-03	1 83E-02	0 5750	2.268E+12
Cs-135	3.2195E-05	15 61	31 23	0 00E+00	5 03E-04	1 01E-03	0 8500	2.557E+10
Cs-137	1 9489E+00	15 61	31 23	0 00E+00	3 04E+01	6 09E+01	1 2500	4.237E+11
Eu-154	4 5895E-03	15.61	31.23	0 00E+00	7.17E-02	1 43E-01	1 7500	6.569E+08
Eu-155	3 6045E-03	15 61	31 23	0 00E+00	5 63E-02	1.13E-01	2.2500	2.263E+06
Fe-55	1 4185E-02	15 61	31.23	0 00E+00	2.21E-01	4 43E-01	2 7500	2 493E+04
H-3	4 7895E-03	15 61	31.23	0 00E+00	7 48E-02	1 50E-01	3 5000	1 390E+02
I-129	7 3684E-07	15 61	31.23	0 00E+00	1.15E-05	2.30E-05	5 0000	1 672E+01
Kr-85	9 5820E-02	15 61	31.23	0 00E+00	1 50E+00	2.99E+00	7 0000	1 889E+00
Np-237	1 2552E-06	15 61	31.23	0 00E+00	1 96E-05	3 92E-05	11 0000	2 150E-01
Pa-231	7 0406E-09	15 61	31.23	0 00E+00	1.10E-07	2.20E-07		
Pb-210	5 8000E-14	15.61	31.23	0 00E+00	9 06E-13	1 81E-12		
Pm-147	4 0075E-02	15 61	31.23	0 00E+00	6.26E-01	1.25E+00		
Pu-238	9 2256E-04	15 61	31.23	0 00E+00	1 44E-02	2 88E-02		
Pu-239	5 5278E-03	15 61	31.23	0 00E+00	8 63E-02	1 73E-01		
Pu-240	2 1248E-03	15 61	31.23	0 00E+00	3.32E-02	6 63E-02		
Pu-241	4 9549E-02	15 61	31.23	0 00E+00	7.74E-01	1 55E+00		
Pu-242	2 3128E-07	15 61	31.23	0 00E+00	3 61E-06	7.22E-06		
Ra-226	2 4526E-13	15 61	31.23	0 00E+00	3 83E-12	7.66E-12		
Ra-228	2 4015E-10	15 61	31.23	0 00E+00	3 75E-09	7.50E-09		
Ru-106	3 0602E-06	15 61	31.23	0 00E+00	4 78E-05	9 56E-05		
Se-79	1 3015E-05	15 61	31.23	0 00E+00	2 03E-04	4 06E-04		
Sn-126	1 2165E-05	15 61	31.23	0 00E+00	1 90E-04	3 80E-04		
Sr-90	1 8226E+00	15 61	31.23	0 00E+00	2 85E+01	5 69E+01		
Tc-99	4 4241E-04	15 61	31.23	0 00E+00	6 91E-03	1.38E-02		
Th-229	3 0962E-10	15 61	31.23	0 00E+00	4 83E-09	9 67E-09		
Th-230	4 2346E-11	15 61	31.23	0 00E+00	6 61E-10	1.32E-09		
Th-232	2 5278E-10	15 61	31.23	0 00E+00	3 95E-09	7.89E-09		
Tl-208	1 5820E-08	15 61	31.23	0 00E+00	2 47E-07	4.94E-07		
U-232	4 2647E-08	15 61	31.23	0 00E+00	6 66E-07	1.33E-06		
U-233	1 2211E-07	15 61	31.23	0 00E+00	1 91E-06	3 81E-06		
U-234	1 9955E-07	15 61	31.23	0 00E+00	3 12E-06	6.23E-06		
U-235	-2 6194E-06	15 61	0 00	3 44E-04	3 03E-04	3.44E-04		
U-236	1 2693E-05	15 61	31 23	0 00E+00	1 98E-04	3.96E-04		
U-238	-3 6331E-08	15 61	0 00	2.16E-04	2 15E-04	2.16E-04		
Y-90	1 8241E+00	15 61	31 23	0.00E+00	2 85E+01	5 70E+01		
Other Radionuclides					3 01E+01	6 01E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 91E-01	7.81E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences:
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST	SST	
BOL HM Constituents	U	U	
BOL Enrichment %	19 85018727	10 to 20 1	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal:	15 61	10 02	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		31.23	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0.57	0 64	0 99
Bounding	1 14		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA 8.5/20 FFCR ITALY	[1]Fuel decay start date	1959
SNF ID #	730	Estimates as of	2030
Fuel Units & Descr	3 - ELEMENT	Template	TRIGA-SS (LW/U-Zrx SST, 10 to 20%, U)
Heavy Metal Mass	BOL=0 484kg EOL=0 458kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 000195
		Template Decay Time	65 years

Estimated Canister usage: 18"x10' = 0 04

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	1.2442E-08	24.34	48 68	0 00E+00	3 03E-07	6 06E-07
Am-241	4 0120E-03	24.34	48 68	0 00E+00	9 77E-02	1 95E-01
Am-242m	1.0749E-06	24.34	48 68	0 00E+00	2 62E-05	5 23E-05
Am-243	1.4692E-07	24.34	48 68	0 00E+00	3 58E-06	7 15E-06
C-14	1.2777E-04	24.34	48 68	0 00E+00	3.11E-03	6 22E-03
Cl-36	2.8120E-06	24.34	48 68	0 00E+00	6 85E-05	1 37E-04
Cm-243	4 1759E-08	24.34	48 68	0 00E+00	1.02E-06	2 03E-06
Cm-244	1.7098E-07	24.34	48 68	0 00E+00	4.16E-06	8.32E-06
Co-60	4 8241E-04	24.34	48 68	0 00E+00	1.17E-02	2 35E-02
Cs-134	1.5970E-10	24.34	48 68	0 00E+00	3.89E-09	7 77E-09
Cs-135	3.2195E-05	24.34	48 68	0 00E+00	7.84E-04	1.57E-03
Cs-137	6 8977E-01	24.34	48 68	0 00E+00	1.68E+01	3 36E+01
Eu-154	1.2238E-04	24.34	48 68	0 00E+00	2.98E-03	5 96E-03
Eu-155	6 7158E-06	24 34	48 68	0 00E+00	1 63E-04	3.27E-04
Fe-55	8 8165E-08	24 34	48 68	0 00E+00	2 15E-06	4.29E-06
H-3	3 8376E-04	24 34	48 68	0 00E+00	9.34E-03	1.87E-02
I-129	7.3684E-07	24.34	48 68	0 00E+00	1 79E-05	3.59E-05
Kr-85	5 2316E-03	24 34	48 68	0 00E+00	1.27E-01	2.55E-01
Np-237	1 3232E-06	24 34	48 68	0 00E+00	3.22E-05	6 44E-05
Pa-231	1 8722E-08	24.34	48 68	0 00E+00	4 56E-07	9 11E-07
Pb-210	1 2620E-12	24 34	48 68	0.00E+00	3 07E-11	6 14E-11
Pm-147	2 7714E-07	24 34	48 68	0.00E+00	6 75E-06	1.35E-05
Pu-238	6 4707E-04	24 34	48 68	0 00E+00	1 58E-02	3 15E-02
Pu-239	5 5203E-03	24.34	48 68	0 00E+00	1 34E-01	2 69E-01
Pu-240	2 1143E-03	24 34	48 68	0 00E+00	5 15E-02	1 03E-01
Pu-241	5 6872E-03	24 34	48 68	0 00E+00	1 38E-01	2 77E-01
Pu-242	2 3128E-07	24 34	48.68	0 00E+00	5 63E-06	1 13E-05
Ra-226	2 6466E-12	24 34	48 68	0 00E+00	6 44E-11	1 29E-10
Ra-228	2 5278E-10	24 34	48.68	0 00E+00	6 15E-09	1 23E-08
Ru-106	1 1377E-19	24 34	48 68	0 00E+00	2 77E-18	5 54E-18
Se-79	1 3009E-05	24 34	48.68	0 00E+00	3 17E-04	6 33E-04
Sn-126	1.2162E-05	24 34	48.68	0 00E+00	2 96E-04	5 92E-04
Sr-90	6 2511E-01	24 34	48.68	0 00E+00	1 52E+01	3 04E+01
Tc-99	4 4241E-04	24 34	48.68	0 00E+00	1 08E-02	2 15E-02
Th-229	9 4105E-10	24 34	48.68	0 00E+00	2.29E-08	4 58E-08
Th-230	1 7098E-10	24 34	48.68	0 00E+00	4 16E-09	8 32E-09
Th-232	2 5278E-10	24 34	48.68	0 00E+00	6 15E-09	1.23E-08
Tl-208	1 0305E-08	24 34	48 68	0 00E+00	2.51E-07	5 02E-07
U-232	2 7669E-08	24 34	48 68	0 00E+00	6 74E-07	1.35E-06
U-233	1.2239E-07	24 34	48 68	0 00E+00	2 98E-06	5 96E-06
U-234	3 1278E-07	24 34	48 68	0 00E+00	7 61E-06	1.52E-05
U-235	-2 6179E-06	24 34	0 00	2 10E-04	1 46E-04	2.10E-04
U-236	1.2696E-05	24 34	48 68	0 00E+00	3.09E-04	6 18E-04
U-238	-3 6331E-08	24 34	0 00	1 30E-04	1.29E-04	1.30E-04
Y-90	6.2541E-01	24 34	48 68	0 00E+00	1.52E+01	3 04E+01
Other Radionuclides					1 73E+01	3 45E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 665E+12
0 0250	3 456E+11
0 0375	3 015E+11
0 0575	3.248E+11
0 0850	1 946E+11
0 1250	1.262E+11
0 2250	1 676E+11
0 3750	7 311E+10
0 5750	1.249E+12
0 8500	1.201E+10
1.2500	5 826E+09
1 7500	3 091E+08
2.2500	4 290E+04
2 7500	1 771E+04
3 5000	5 983E+01
5.0000	2 519E+01
7 0000	2.842E+00
11.0000	3.231E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.93E-01	3.87E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences*
Reactor Moderator*	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding	SST	SST	
BOL HM Constituents	U	U	
BOL Enrichment %:	20 04130579	10 to 20 1	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate*
Nominal	16.51	24.34	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		48.68	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.48	1 47
Bounding	2.95	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA 8.5/20 FFCR MNRC
SNF ID # 703
Fuel Units & Descr: 5 - ELEMENT
Heavy Metal Mass: BOL=0.801kg EOL=0 761kg
ROD Storage Site INEEL

[1]Fuel decay start date 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10" 0 07

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8.5173E-10	39 14	78.28	0 00E+00	3.33E-08	6 67E-08
Am-241	1 8331E-03	39 14	78 28	0 00E+00	7.17E-02	1.43E-01
Am-242m	1 4129E-06	39 14	78.28	0 00E+00	5.53E-05	1.11E-04
Am-243	1 4774E-07	39 14	78.28	0 00E+00	5 78E-06	1.16E-05
C-14	1.2871E-04	39 14	78.28	0 00E+00	5 04E-03	1 01E-02
Cl-36	2 8120E-06	39 14	78.28	0 00E+00	1.10E-04	2.20E-04
Cm-243	1 7940E-07	39 14	78.28	0 00E+00	7.02E-06	1 40E-05
Cm-244	1 6962E-06	39 14	78.28	0 00E+00	6 64E-05	1.33E-04
Co-60	1.2839E+00	39 14	78.28	0 00E+00	5 03E+01	1.01E+02
Cs-134	9 0541E-02	39 14	78.28	0 00E+00	3.54E+00	7 09E+00
Cs-135	3.2195E-05	39 14	78.28	0 00E+00	1.26E-03	2 52E-03
Cs-137	2 7564E+00	39 14	78 28	0 00E+00	1.08E+02	2 16E+02
Eu-154	1 5368E-02	39 14	78 28	0 00E+00	6 02E-01	1.20E+00
Eu-155	2 9293E-02	39.14	78.28	0 00E+00	1.15E+00	2 29E+00
Fe-55	7 7158E-01	39.14	78.28	0 00E+00	3 02E+01	6 04E+01
H-3	1 1111E-02	39 14	78.28	0 00E+00	4 35E-01	8 70E-01
I-129	7 3684E-07	39.14	78 28	0 00E+00	2 88E-05	5 77E-05
Kr-85	2 5263E-01	39.14	78 28	0 00E+00	9 89E+00	1 98E+01
Np-237	1 2427E-06	39 14	78 28	0 00E+00	4 86E-05	9 73E-05
Pa-231	3 8511E-09	39 14	78 28	0 00E+00	1 51E-07	3 01E-07
Pb-210	7 3880E-15	39 14	78 28	0 00E+00	2 89E-13	5 78E-13
Pm-147	2 1023E+00	39 14	78 28	0 00E+00	8 23E+01	1 65E+02
Pu-238	1 0383E-03	39 14	78 28	0 00E+00	4 06E-02	8 13E-02
Pu-239	5 5293E-03	39 14	78 28	0 00E+00	2 16E-01	4 33E-01
Pu-240	2 1278E-03	39 14	78 28	0 00E+00	8 33E-02	1 67E-01
Pu-241	1 0195E-01	39 14	78 28	0 00E+00	3 99E+00	7 98E+00
Pu-242	2 3128E-07	39 14	78 28	0 00E+00	9 05E-06	1 81E-05
Ra-226	5 2782E-14	39 14	78 28	0 00E+00	2 07E-12	4.13E-12
Ra-228	1 9338E-10	39 14	78 28	0.00E+00	7 57E-09	1.51E-08
Ru-106	9 1684E-02	39 14	78 28	0 00E+00	3 59E+00	7 18E+00
Se-79	1 3018E-05	39 14	78 28	0.00E+00	5 10E-04	1.02E-03
Sn-126	1.2167E-05	39 14	78 28	0 00E+00	4 76E-04	9 52E-04
Sr-90	2 6045E+00	39 14	78 28	0.00E+00	1 02E+02	2 04E+02
Tc-99	4 4241E-04	39 14	78.28	0 00E+00	1 73E-02	3 46E-02
Th-229	1 3713E-10	39 14	78.28	0 00E+00	5 37E-09	1 07E-08
Th-230	1 8090E-11	39 14	78.28	0 00E+00	7 08E-10	1 42E-09
Th-232	2 5278E-10	39 14	78 28	0 00E+00	9 89E-09	1 98E-08
Tl-208	1 6947E-08	39 14	78.28	0 00E+00	6 63E-07	1 33E-06
U-232	4 8737E-08	39 14	78 28	0 00E+00	1 91E-06	3 82E-06
U-233	1.2203E-07	39 14	78.28	0 00E+00	4.78E-06	9 55E-06
U-234	1 5925E-07	39 14	78.28	0 00E+00	6.23E-06	1 25E-05
U-235	-2 6194E-06	39 14	0 00	3 35E-04	2.32E-04	3 35E-04
U-236	1.2693E-05	39 14	78.28	0 00E+00	4 97E-04	9 94E-04
U-238	-3 6331E-08	39 14	0 00	2 17E-04	2.16E-04	2 17E-04
Y-90	2 6060E+00	39 14	78.28	0 00E+00	1 02E+02	2 04E+02
Other Radionuclides					1 41E+02	2 82E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.265E+13
0 0250	2 784E+12
0 0375	2 371E+12
0 0575	2 433E+12
0 0850	1 508E+12
0 1250	1 095E+12
0 2250	1 279E+12
0 3750	6 490E+11
0 5750	8 628E+12
0 8500	3.703E+11
1.2500	7 520E+12
1 7500	5 013E+09
2.2500	8 080E+09
2.7500	6 412E+07
3 5000	7 462E+06
5.0000	4 153E+01
7 0000	4 701E+00
11.0000	5.355E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.28E+00	4.56E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 34235977	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	27.34	39 14	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		78.28	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 43	1 43
Bounding	2.86	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA 8.5/20 FFCR OSU	[1]Fuel decay start date	2025
SNF ID #	1041	Estimates as of	2030
Fuel Units & Descr	2 - ELEMENT	Template	TRIGA-FLIP (LW/U-Zrx, SST 60 to 100%, U)
Heavy Metal Mass	BOL=0 392kg, EOL=0 37kg	[2]Template Burnup(MWd)	66 52
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 000196
		Template Decay Time	5 years

Estimated Canister usage: 18"x10' = 0 02

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_a: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_a: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 8488E-10	20 91	41 82	0 00E+00	5.96E-09	1 19E-08
Am-241	7.5767E-03	20 91	41 82	0 00E+00	1.58E-01	3 17E-01
Am-242m	2.4459E-05	20 91	41 82	0 00E+00	5 11E-04	1 02E-03
Am-243	3 0983E-05	20 91	41 82	0 00E+00	6 48E-04	1.30E-03
C-14	1.2590E-04	20 91	41 82	0 00E+00	2.63E-03	5.27E-03
Cl-36	2 6624E-06	20 91	41 82	0 00E+00	5.57E-05	1.11E-04
Cm-243	3 8244E-05	20 91	41 82	0 00E+00	8 00E-04	1 60E-03
Cm-244	4 1010E-03	20 91	41 82	0 00E+00	8.57E-02	1.71E-01
Co-60	1.2410E+00	20 91	41 82	0 00E+00	2 59E+01	5 19E+01
Cs-134	6 5454E-01	20 91	41 82	0 00E+00	1.37E+01	2 74E+01
Cs-135	1 9753E-05	20 91	41 82	0 00E+00	4 13E-04	8.26E-04
Cs-137	2 7375E+00	20 91	41 82	0 00E+00	5.72E+01	1.14E+02
Eu-154	1.2324E-01	20 91	41 82	0 00E+00	2.58E+00	5 15E+00
Eu-155	5.3037E-02	20 91	41 82	0 00E+00	1.11E+00	2.22E+00
Fe-55	7 9555E-01	20 91	41 82	0 00E+00	1.66E+01	3 33E+01
H-3	1 0531E-02	20 91	41 82	0 00E+00	2.20E-01	4 40E-01
I-129	7 1287E-07	20 91	41 82	0 00E+00	1.49E-05	2 98E-05
Kr-85	2 4955E-01	20 91	41 82	0 00E+00	5.22E+00	1.04E+01
Np-237	1.2121E-05	20 91	41 82	0 00E+00	2 53E-04	5 07E-04
Pa-231	1 1230E-09	20 91	41 82	0 00E+00	2.35E-08	4 70E-08
Pb-210	6 1636E-14	20 91	41 82	0 00E+00	1.29E-12	2.58E-12
Pm-147	1 1302E+00	20 91	41 82	0 00E+00	2.36E+01	4 73E+01
Pu-238	5 4826E-02	20 91	41 82	0 00E+00	1.15E+00	2.29E+00
Pu-239	1 4056E-03	20 91	41.82	0 00E+00	2 94E-02	5 88E-02
Pu-240	1 1536E-03	20 91	41 82	0 00E+00	2 41E-02	4 82E-02
Pu-241	4 2995E-01	20 91	41 82	0 00E+00	8 99E+00	1 80E+01
Pu-242	4 9910E-06	20 91	41 82	0 00E+00	1 04E-04	2 09E-04
Ra-226	2 4008E-13	20 91	41 82	0 00E+00	5 02E-12	1 00E-11
Ra-228	1 8220E-11	20 91	41 82	0 00E+00	3 81E-10	7 62E-10
Ru-106	1 0343E-01	20 91	41 82	0 00E+00	2.16E+00	4 33E+00
Se-79	1.2832E-05	20 91	41 82	0 00E+00	2 68E-04	5 37E-04
Sn-126	1.2090E-05	20.91	41 82	0 00E+00	2 53E-04	5 06E-04
Sr-90	2 5646E+00	20 91	41 82	0 00E+00	5 36E+01	1 07E+02
Tc-99	4 0319E-04	20 91	41 82	0 00E+00	8 43E-03	1 69E-02
Th-229	7 7375E-11	20 91	41 82	0 00E+00	1 62E-09	3 24E-09
Th-230	1 2211E-10	20 91	41.82	0 00E+00	2 55E-09	5 11E-09
Th-232	2 3842E-11	20 91	41 82	0 00E+00	4 99E-10	9 97E-10
Tl-208	1 4313E-07	20.91	41 82	0 00E+00	2 99E-06	5 99E-06
U-232	4 1927E-07	20.91	41.82	0 00E+00	8 77E-06	1 75E-05
U-233	6 8491E-08	20.91	41.82	0 00E+00	1 43E-06	2 86E-06
U-234	2 0189E-06	20.91	41.82	0 00E+00	4 22E-05	8 44E-05
U-235	-2 6572E-06	20.91	0 00	5 92E-04	5 37E-04	5 92E-04
U-236	1 3575E-05	20.91	41.82	0 00E+00	2 84E-04	5 68E-04
U-238	-2.2698E-08	20.91	0 00	3 97E-05	3 92E-05	3 97E-05
Y-90	2 5646E+00	20.91	41.82	0 00E+00	5 36E+01	1 07E+02
Other Radionuclides					7 45E+01	1 49E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6 747E+12
0 0250	1 481E+12
0 0375	1 310E+12
0 0575	1 307E+12
0 0850	8 134E+11
0 1250	6 531E+11
0.2250	6 913E+11
0 3750	3 449E+11
0 5750	5 709E+12
0 8500	1 047E+12
1.2500	4 023E+12
1 7500	5 380E+09
2.2500	4 217E+09
2.7500	3 823E+07
3.5000	4 499E+06
5 0000	1 078E+03
7 0000	1.241E+02
11.0000	1 424E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.37E+00	2.74E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	69 89795918	60 to 100

Basis for Parameter Drfferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	5 73	20 91	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		41.82	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 16	3 65	1 00
Bounding	0 31		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA 8.5/20 FFCR PENN STATE UNIV
SNF ID #: 815
Fuel Units & Descr: 7 - ELEMENT
Heavy Metal Mass: BOL=1 379kg; EOL=1.316kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage:

18"x10'
0 09

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8.5173E-10	60 14	120.28	0 00E+00	5 12E-08	1 02E-07
Am-241	1 8331E-03	60 14	120 28	0 00E+00	1 10E-01	2 20E-01
Am-242m	1 4129E-06	60 14	120 28	0 00E+00	8 50E-05	1 70E-04
Am-243	1 4774E-07	60 14	120 28	0 00E+00	8 89E-06	1 78E-05
C-14	1.2871E-04	60 14	120 28	0 00E+00	7 74E-03	1 55E-02
Cl-36	2 8120E-06	60 14	120 28	0 00E+00	1 69E-04	3 38E-04
Cm-243	1 7940E-07	60 14	120 28	0 00E+00	1 08E-05	2 16E-05
Cm-244	1 6962E-06	60 14	120.28	0 00E+00	1 02E-04	2 04E-04
Co-60	1 2839E+00	60 14	120 28	0 00E+00	7 72E+01	1 54E+02
Cs-134	9 0541E-02	60 14	120.28	0 00E+00	5 45E+00	1 09E+01
Cs-135	3 2195E-05	60 14	120 28	0 00E+00	1 94E-03	3 87E-03
Cs-137	2 7564E+00	60 14	120.28	0 00E+00	1 66E+02	3 32E+02
Eu-154	1 5368E-02	60 14	120 28	0 00E+00	9 24E-01	1 85E+00
Eu-155	2 9293E-02	60 14	120.28	0 00E+00	1 76E+00	3 52E+00
Fe-55	7 7158E-01	60 14	120 28	0 00E+00	4 64E+01	9.28E+01
H-3	1 1111E-02	60 14	120 28	0 00E+00	6 68E-01	1 34E+00
I-129	7 3684E-07	60 14	120.28	0 00E+00	4 43E-05	8 86E-05
Kr-85	2 5263E-01	60.14	120 28	0 00E+00	1 52E+01	3 04E+01
Np-237	1 2427E-06	60.14	120 28	0 00E+00	7 47E-05	1.49E-04
Pa-231	3 8511E-09	60 14	120 28	0 00E+00	2 32E-07	4 63E-07
Pb-210	7 3880E-15	60.14	120 28	0 00E+00	4 44E-13	8 89E-13
Pm-147	2 1023E+00	60.14	120.28	0 00E+00	1 26E+02	2 53E+02
Pu-238	1 0383E-03	60.14	120 28	0 00E+00	6 24E-02	1.25E-01
Pu-239	5 5293E-03	60.14	120 28	0 00E+00	3 33E-01	6 65E-01
Pu-240	2 1278E-03	60 14	120 28	0 00E+00	1.28E-01	2 56E-01
Pu-241	1 0195E-01	60 14	120 28	0 00E+00	6 13E+00	1 23E+01
Pu-242	2 3128E-07	60 14	120 28	0 00E+00	1 39E-05	2 78E-05
Ra-226	5.2782E-14	60 14	120 28	0 00E+00	3.17E-12	6 35E-12
Ra-228	1 9338E-10	60 14	120 28	0 00E+00	1.16E-08	2 33E-08
Ru-106	9 1684E-02	60 14	120 28	0 00E+00	5 51E+00	1 10E+01
Se-79	1 3018E-05	60 14	120 28	0 00E+00	7.83E-04	1 57E-03
Sn-126	1.2167E-05	60 14	120 28	0 00E+00	7.32E-04	1 46E-03
Sr-90	2 6045E+00	60 14	120 28	0 00E+00	1.57E+02	3 13E+02
Tc-99	4 4241E-04	60 14	120 28	0 00E+00	2 66E-02	5 32E-02
Th-229	1 3713E-10	60 14	120 28	0 00E+00	8.25E-09	1 65E-08
Th-230	1 8090E-11	60 14	120.28	0 00E+00	1 09E-09	2 18E-09
Th-232	2 5278E-10	60 14	120 28	0 00E+00	1 52E-08	3 04E-08
Tl-208	1 6947E-08	60 14	120 28	0 00E+00	1 02E-06	2 04E-06
U-232	4 8737E-08	60 14	120.28	0 00E+00	2.93E-06	5 86E-06
U-233	1.2203E-07	60 14	120.28	0 00E+00	7.34E-06	1 47E-05
U-234	1 5925E-07	60 14	120.28	0 00E+00	9 58E-06	1 92E-05
U-235	-2 6194E-06	60 14	0 00	5.90E-04	4 32E-04	5 90E-04
U-236	1 2693E-05	60 14	120.28	0 00E+00	7 63E-04	1.53E-03
U-238	-3 6331E-08	60 14	0 00	3.72E-04	3 70E-04	3.72E-04
Y-90	2 6060E+00	60 14	120.28	0 00E+00	1 57E+02	3 13E+02
Other Radionuclides					2 17E+02	4 34E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 944E+13
0 0250	4.278E+12
0 0375	3 643E+12
0 0575	3 739E+12
0 0850	2 316E+12
0 1250	1 682E+12
0.2250	1 965E+12
0 3750	9 972E+11
0 5750	1 326E+13
0 8500	5 690E+11
1.2500	1 155E+13
1 7500	7 702E+09
2.2500	1 241E+10
2.7500	9 852E+07
3.5000	1 147E+07
5 0000	6 389E+01
7 0000	7.233E+00
11 0000	8.239E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.50E+00	7 00E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 79695431	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	40 32	60 14	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		120.28	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.28	1 49
Bounding	2 56	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA 8 5/20 FFCR SLOVENIA	[1]Fuel decay start date	1959	Estimated Canister usage:	
SNF ID #	941	Estimates as of	2030	18"x10"	
Fuel Units & Descr	3 - ELEMENT	Template	TRIGA-SS (LW/U-Zrx, SST, 10 to 20% U)	0 04	
Heavy Metal Mass	BOL=0 473kg EOL=0 457kg	[2]Template Burnup(MWd)	6 65		
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0.000195		
		Template Decay Time	65 years		

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1 2442E-08	16 14	32 28	0 00E+00	2.01E-07	4 02E-07	Avg MeV	
Am-241	4 0120E-03	16 14	32 28	0 00E+00	6.47E-02	1.29E-01	0 0150	1 104E+12
Am-242m	1 0749E-06	16 14	32 28	0 00E+00	1.73E-05	3 47E-05	0 0250	2.291E+11
Am-243	1 4692E-07	16 14	32.28	0 00E+00	2.37E-06	4 74E-06	0 0375	1 999E+11
C-14	1 2777E-04	16 14	32.28	0 00E+00	2.06E-03	4 12E-03	0 0575	2 153E+11
Cl-36	2 8120E-06	16 14	32.28	0 00E+00	4.54E-05	9 08E-05	0 0850	1.290E+11
Cm-243	4 1759E-08	16 14	32.28	0 00E+00	6 74E-07	1 35E-06	0 1250	8 366E+10
Cm-244	1 7098E-07	16.14	32.28	0 00E+00	2 76E-06	5 52E-06	0.2250	1 111E+11
Co-60	4 8241E-04	16 14	32.28	0 00E+00	7 79E-03	1 56E-02	0 3750	4 847E+10
Cs-134	1 5970E-10	16 14	32.28	0 00E+00	2 58E-09	5 15E-09	0 5750	8 280E+11
Cs-135	3.2195E-05	16 14	32.28	0 00E+00	5.20E-04	1 04E-03	0 8500	7 964E+09
Cs-137	6 8977E-01	16.14	32.28	0 00E+00	1 11E+01	2 23E+01	1.2500	3 863E+09
Eu-154	1.2238E-04	16 14	32.28	0 00E+00	1 97E-03	3 95E-03	1 7500	2 049E+08
Eu-155	6 7158E-06	16 14	32.28	0 00E+00	1 08E-04	2 17E-04	2.2500	2.844E+04
Fe-55	8 8165E-08	16 14	32.28	0 00E+00	1 42E-06	2 85E-06	2 7500	1 174E+04
H-3	3 8376E-04	16 14	32.28	0 00E+00	6 19E-03	1 24E-02	3 5000	3 988E+01
I-129	7.3684E-07	16 14	32.28	0 00E+00	1 19E-05	2 38E-05	5 0000	1 679E+01
Kr-85	5.2316E-03	16 14	32.28	0 00E+00	8 44E-02	1 69E-01	7 0000	1 895E+00
Np-237	1.3232E-06	16 14	32.28	0 00E+00	2 14E-05	4 27E-05	11 0000	2 154E-01
Pa-231	1.8722E-08	16 14	32.28	0 00E+00	3 02E-07	6 04E-07		
Pb-210	1.2620E-12	16 14	32.28	0 00E+00	2 04E-11	4 07E-11		
Pm-147	2.7714E-07	16 14	32.28	0 00E+00	4 47E-06	8 95E-06		
Pu-238	6 4707E-04	16 14	32.28	0 00E+00	1 04E-02	2 09E-02		
Pu-239	5.5203E-03	16 14	32 28	0 00E+00	8 91E-02	1 78E-01		
Pu-240	2 1143E-03	16 14	32 28	0 00E+00	3 41E-02	6 82E-02		
Pu-241	5 6872E-03	16 14	32 28	0 00E+00	9 18E-02	1 84E-01		
Pu-242	2 3128E-07	16 14	32.28	0 00E+00	3 73E-06	7 46E-06		
Ra-226	2 6466E-12	16 14	32 28	0 00E+00	4 27E-11	8 54E-11		
Ra-228	2 5278E-10	16 14	32 28	0 00E+00	4 08E-09	8 16E-09		
Ru-106	1 1377E-19	16 14	32 28	0 00E+00	1 84E-18	3 67E-18		
Se-79	1 3009E-05	16 14	32 28	0 00E+00	2 10E-04	4.20E-04		
Sn-126	1 2162E-05	16 14	32 28	0 00E+00	1 96E-04	3 93E-04		
Sr-90	6 2511E-01	16 14	32 28	0 00E+00	1 01E+01	2 02E+01		
Tc-99	4 4241E-04	16 14	32 28	0 00E+00	7.14E-03	1 43E-02		
Th-229	9 4105E-10	16 14	32 28	0 00E+00	1.52E-08	3 04E-08		
Th-230	1 7098E-10	16 14	32.28	0 00E+00	2 76E-09	5.52E-09		
Th-232	2 5278E-10	16 14	32.28	0 00E+00	4 08E-09	8 16E-09		
Tl-208	1 0305E-08	16 14	32.28	0 00E+00	1 66E-07	3.33E-07		
U-232	2 7669E-08	16.14	32.28	0 00E+00	4 47E-07	8.93E-07	Thermal Power	
U-233	1.2239E-07	16 14	32.28	0 00E+00	1 98E-06	3 95E-06	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-234	3 1278E-07	16 14	32.28	0 00E+00	5 05E-06	1.01E-05	1.28E-01	2.56E-01
U-235	-2 6179E-06	16 14	0 00	2 03E-04	1 61E-04	2.03E-04	Total	Total
U-236	1.2696E-05	16 14	32.28	0 00E+00	2.05E-04	4.10E-04		
U-238	-3 6331E-08	16 14	0 00	1.27E-04	1.27E-04	1.27E-04		
Y-90	6 2541E-01	16 14	32.28	0 00E+00	1 01E+01	2 02E+01		
Other Radionuclides					1 14E+01	2.29E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding	SST	SST	
BOL HM Constituents	U	U	
BOL Enrichment %	19 87312476	10 to 20 1	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	16 14	15 46	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		32.28	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	1 00	0 96	1 00
Bounding	2.00		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA 8.5/20 FFCR SO. KOREA
SNF ID #: 734
Fuel Units & Descr: 3 - ELEMENT
Heavy Metal Mass: BOL=0 48kg; EOL=0 472kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1996
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 25 years

Estimated Canister usage	
18"x10'	
0 04	

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	4 1459E-09	11.70	23 39	0 00E+00	4 85E-08	9 70E-08
Am-241	3 5850E-03	11 70	23 39	0 00E+00	4 19E-02	8 39E-02
Am-242m	1.2899E-06	11.70	23 39	0 00E+00	1 51E-05	3 02E-05
Am-243	1 4747E-07	11.70	23 39	0 00E+00	1 72E-06	3 45E-06
C-14	1.2839E-04	11.70	23 39	0 00E+00	1 50E-03	3 00E-03
Cl-36	2 8120E-06	11.70	23 39	0 00E+00	3 29E-05	6 58E-05
Cm-243	1.1038E-07	11.70	23 39	0 00E+00	1 29E-06	2 58E-06
Cm-244	7.8917E-07	11 70	23 39	0 00E+00	9 23E-06	1 85E-05
Co-60	9 2647E-02	11 70	23 39	0 00E+00	1 08E+00	2 17E+00
Cs-134	1 0940E-04	11 70	23 39	0 00E+00	1 28E-03	2 56E-03
Cs-135	3 2195E-05	11 70	23 39	0 00E+00	3 77E-04	7 53E-04
Cs-137	1 7368E+00	11 70	23 39	0 00E+00	2 03E+01	4 06E+01
Eu-154	3 0677E-03	11 70	23 39	0 00E+00	3 59E-02	7 18E-02
Eu-155	1 7925E-03	11 70	23 39	0 00E+00	2 10E-02	4 19E-02
Fe-55	3 7444E-03	11 70	23 39	0 00E+00	4 38E-02	8.76E-02
H-3	3 6180E-03	11 70	23.39	0 00E+00	4.23E-02	8.46E-02
I-129	7 3684E-07	11 70	23 39	0 00E+00	8 62E-06	1.72E-05
Kr-85	6 9368E-02	11 70	23.39	0 00E+00	8.11E-01	1 62E+00
Np-237	1 2662E-06	11 70	23.39	0.00E+00	1 48E-05	2 96E-05
Pa-231	9 1654E-09	11 70	23.39	0 00E+00	1.07E-07	2.14E-07
Pb-210	1 3728E-13	11 70	23.39	0 00E+00	1 61E-12	3 21E-12
Pm-147	1 0702E-02	11 70	23.39	0 00E+00	1.25E-01	2 50E-01
Pu-238	8 8692E-04	11 70	23.39	0 00E+00	1 04E-02	2 07E-02
Pu-239	5 5263E-03	11 70	23 39	0.00E+00	6 46E-02	1 29E-01
Pu-240	2 1233E-03	11 70	23.39	0 00E+00	2.48E-02	4 97E-02
Pu-241	3 8962E-02	11 70	23 39	0 00E+00	4 56E-01	9 11E-01
Pu-242	2.3128E-07	11 70	23 39	0 00E+00	2 70E-06	5 41E-06
Ra-226	4 6752E-13	11 70	23 39	0 00E+00	5 47E-12	1 09E-11
Ra-228	2 4827E-10	11 70	23 39	0 00E+00	2.90E-09	5 81E-09
Ru-106	9 8526E-08	11.70	23 39	0 00E+00	1 15E-06	2 30E-06
Se-79	1 3015E-05	11.70	23 39	0 00E+00	1 52E-04	3 04E-04
Sn-126	1.2165E-05	11.70	23.39	0 00E+00	1 42E-04	2 85E-04
Sr-90	1 6195E+00	11.70	23 39	0 00E+00	1 89E+01	3 79E+01
Tc-99	4 4241E-04	11.70	23 39	0 00E+00	5 17E-03	1 03E-02
Th-229	4.2451E-10	11.70	23 39	0 00E+00	4 96E-09	9 93E-09
Th-230	6 1398E-11	11.70	23 39	0 00E+00	7 18E-10	1 44E-09
Th-232	2 5278E-10	11.70	23 39	0 00E+00	2 96E-09	5 91E-09
Tl-208	1 5098E-08	11.70	23 39	0 00E+00	1 77E-07	3 53E-07
U-232	4 0662E-08	11.70	23 39	0 00E+00	4 76E-07	9.51E-07
U-233	1 2217E-07	11.70	23 39	0 00E+00	1 43E-06	2 86E-06
U-234	2.2391E-07	11 70	23 39	0 00E+00	2 62E-06	5 24E-06
U-235	-2 6194E-06	11.70	0 00	2 07E-04	1 77E-04	2.07E-04
U-236	1 2695E-05	11.70	23 39	0 00E+00	1.48E-04	2.97E-04
U-238	-3 6331E-08	11.70	0 00	1 29E-04	1.29E-04	1.29E-04
Y-90	1 6195E+00	11 70	23 39	0 00E+00	1 89E+01	3 79E+01
Other Radionuclides					2 01E+01	4 02E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.076E+12
0 0250	4.316E+11
0 0375	3 745E+11
0 0575	4 033E+11
0 0850	2 431E+11
0.1250	1.586E+11
0.2250	2 091E+11
0.3750	9 130E+10
0 5750	1.514E+12
0.8500	1 625E+10
1.2500	1 669E+11
1 7500	4.230E+08
2.2500	8 919E+05
2 7500	1 508E+04
3.5000	3 190E+01
5 0000	1.243E+01
7 0000	1 403E+00
11 0000	1 596E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.48E-01	4.96E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	11 70	7 45
Bounding		23 39

Basis for burnup used in estimate:
Nominal burnup taken directly from SFD (converted to MWd).
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 71	0 64
Bounding	1 43	

Estimated EOL HM/Given EOL HM: 0 99

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA 8.5/20 FFCR U OF AZ
SNF ID #: 974
Fuel Units & Descr: 2 - ELEMENT
Heavy Metal Mass: BOL=0.32kg EOL=0.319kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6.65
Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' = 0.03

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8.5173E-10	0.95	1.91	0.00E+00	8.13E-10	1.63E-09
Am-241	1.8331E-03	0.95	1.91	0.00E+00	1.75E-03	3.50E-03
Am-242m	1.4129E-06	0.95	1.91	0.00E+00	1.35E-06	2.70E-06
Am-243	1.4774E-07	0.95	1.91	0.00E+00	1.41E-07	2.82E-07
C-14	1.2871E-04	0.95	1.91	0.00E+00	1.23E-04	2.46E-04
Cl-36	2.8120E-06	0.95	1.91	0.00E+00	2.68E-06	5.37E-06
Cm-243	1.7940E-07	0.95	1.91	0.00E+00	1.71E-07	3.43E-07
Cm-244	1.6962E-06	0.95	1.91	0.00E+00	1.62E-06	3.24E-06
Co-60	1.2839E+00	0.95	1.91	0.00E+00	1.23E+00	2.45E+00
Cs-134	9.0541E-02	0.95	1.91	0.00E+00	8.64E-02	1.73E-01
Cs-135	3.2195E-05	0.95	1.91	0.00E+00	3.07E-05	6.15E-05
Cs-137	2.7564E+00	0.95	1.91	0.00E+00	2.63E+00	5.26E+00
Eu-154	1.5368E-02	0.95	1.91	0.00E+00	1.47E-02	2.93E-02
Eu-155	2.9293E-02	0.95	1.91	0.00E+00	2.80E-02	5.59E-02
Fe-55	7.7158E-01	0.95	1.91	0.00E+00	7.37E-01	1.47E+00
H-3	1.1111E-02	0.95	1.91	0.00E+00	1.06E-02	2.12E-02
I-129	7.3684E-07	0.95	1.91	0.00E+00	7.03E-07	1.41E-06
Kr-85	2.5263E-01	0.95	1.91	0.00E+00	2.41E-01	4.82E-01
Np-237	1.2427E-06	0.95	1.91	0.00E+00	1.19E-06	2.37E-06
Pa-231	3.8511E-09	0.95	1.91	0.00E+00	3.68E-09	7.35E-09
Pb-210	7.3880E-15	0.95	1.91	0.00E+00	7.05E-15	1.41E-14
Pm-147	2.1023E+00	0.95	1.91	0.00E+00	2.01E+00	4.01E+00
Pu-238	1.0383E-03	0.95	1.91	0.00E+00	9.91E-04	1.98E-03
Pu-239	5.5293E-03	0.95	1.91	0.00E+00	5.28E-03	1.06E-02
Pu-240	2.1278E-03	0.95	1.91	0.00E+00	2.03E-03	4.06E-03
Pu-241	1.0195E-01	0.95	1.91	0.00E+00	9.73E-02	1.95E-01
Pu-242	2.3128E-07	0.95	1.91	0.00E+00	2.21E-07	4.42E-07
Ra-226	5.2782E-14	0.95	1.91	0.00E+00	5.04E-14	1.01E-13
Ra-228	1.9338E-10	0.95	1.91	0.00E+00	1.85E-10	3.69E-10
Ru-106	9.1684E-02	0.95	1.91	0.00E+00	8.75E-02	1.75E-01
Se-79	1.3018E-05	0.95	1.91	0.00E+00	1.24E-05	2.49E-05
Sn-126	1.2167E-05	0.95	1.91	0.00E+00	1.16E-05	2.32E-05
Sr-90	2.6045E+00	0.95	1.91	0.00E+00	2.49E+00	4.97E+00
Tc-99	4.4241E-04	0.95	1.91	0.00E+00	4.22E-04	8.45E-04
Th-229	1.3713E-10	0.95	1.91	0.00E+00	1.31E-10	2.62E-10
Th-230	1.8090E-11	0.95	1.91	0.00E+00	1.73E-11	3.45E-11
Th-232	2.5278E-10	0.95	1.91	0.00E+00	2.41E-10	4.83E-10
Tl-208	1.6947E-08	0.95	1.91	0.00E+00	1.62E-08	3.24E-08
U-232	4.8737E-08	0.95	1.91	0.00E+00	4.65E-08	9.30E-08
U-233	1.2203E-07	0.95	1.91	0.00E+00	1.16E-07	2.33E-07
U-234	1.5925E-07	0.95	1.91	0.00E+00	1.52E-07	3.04E-07
U-235	-2.6194E-06	0.95	0.00	1.37E-04	1.35E-04	1.37E-04
U-236	1.2693E-05	0.95	1.91	0.00E+00	1.21E-05	2.42E-05
U-238	-3.6331E-08	0.95	0.00	8.62E-05	8.61E-05	8.62E-05
Y-90	2.6060E+00	0.95	1.91	0.00E+00	2.49E+00	4.98E+00
Other Radionuclides					3.44E+00	6.88E+00

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	3.086E+11
0.0250	6.790E+10
0.0375	5.782E+10
0.0575	5.935E+10
0.0850	3.677E+10
0.1250	2.670E+10
0.2250	3.119E+10
0.3750	1.583E+10
0.5750	2.104E+11
0.8500	9.031E+09
1.2500	1.834E+11
1.7500	1.223E+08
2.2500	1.971E+08
2.7500	1.564E+06
3.5000	1.820E+05
5.0000	1.200E+00
7.0000	1.362E-01
11.0000	1.553E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.56E-02	1.11E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19.875	10 to 20.1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	0.78	0.95	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		1.91	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.09	1.22
Bounding	0.17	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA 8.5/20 FFCR U OF fL
SNF ID #: 448
Fuel Units & Descr: 4 - ELEMENT
Heavy Metal Mass: BOL=0 8kg; EOL=0 751kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage 18"x10": 0 05

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	46 58	93 17	0 00E+00	3 97E-08	7 94E-08
Am-241	1 8331E-03	46 58	93 17	0 00E+00	8 54E-02	1 71E-01
Am-242m	1 4129E-06	46 58	93 17	0 00E+00	6 58E-05	1 32E-04
Am-243	1 4774E-07	46 58	93 17	0 00E+00	6 88E-06	1 38E-05
C-14	1 2871E-04	46 58	93 17	0 00E+00	6 00E-03	1.20E-02
Cl-36	2 8120E-06	46 58	93 17	0 00E+00	1 31E-04	2 62E-04
Cm-243	1 7940E-07	46 58	93 17	0 00E+00	8 36E-06	1 67E-05
Cm-244	1 6962E-06	46 58	93 17	0 00E+00	7 90E-05	1 58E-04
Co-60	1 2839E+00	46 58	93 17	0 00E+00	5 98E+01	1.20E+02
Cs-134	9 0541E-02	46 58	93 17	0 00E+00	4 22E+00	8.44E+00
Cs-135	3 2195E-05	46 58	93 17	0 00E+00	1 50E-03	3 00E-03
Cs-137	2 7564E+00	46 58	93 17	0 00E+00	1 28E+02	2.57E+02
Eu-154	1 5368E-02	46 58	93 17	0 00E+00	7 16E-01	1.43E+00
Eu-155	2 9293E-02	46 58	93 17	0 00E+00	1 36E+00	2.73E+00
Fe-55	7 7158E-01	46 58	93 17	0 00E+00	3 59E+01	7.19E+01
H-3	1 1111E-02	46 58	93 17	0 00E+00	5 18E-01	1.04E+00
I-129	7 3684E-07	46 58	93 17	0 00E+00	3 43E-05	6 87E-05
Kr-85	2 5263E-01	46 58	93 17	0 00E+00	1 18E+01	2 35E+01
Np-237	1 2427E-06	46 58	93 17	0 00E+00	5 79E-05	1 16E-04
Pa-231	3 8511E-09	46 58	93 17	0 00E+00	1 79E-07	3 59E-07
Pb-210	7 3880E-15	46 58	93 17	0 00E+00	3 44E-13	6 88E-13
Pm-147	2 1023E+00	46 58	93 17	0 00E+00	9 79E+01	1.96E+02
Pu-238	1 0383E-03	46 58	93 17	0 00E+00	4 84E-02	9 67E-02
Pu-239	5 5293E-03	46 58	93 17	0 00E+00	2 58E-01	5 15E-01
Pu-240	2 1278E-03	46 58	93 17	0 00E+00	9 91E-02	1 98E-01
Pu-241	1 0195E-01	46 58	93.17	0 00E+00	4 75E+00	9 50E+00
Pu-242	2 3128E-07	46 58	93.17	0 00E+00	1 08E-05	2.15E-05
Ra-226	5 2782E-14	46 58	93 17	0 00E+00	2 46E-12	4 92E-12
Ra-228	1 9338E-10	46 58	93.17	0 00E+00	9 01E-09	1 80E-08
Ru-106	9 1684E-02	46 58	93.17	0 00E+00	4.27E+00	8 54E+00
Se-79	1 3018E-05	46 58	93.17	0 00E+00	6 06E-04	1.21E-03
Sn-126	1 2167E-05	46 58	93.17	0 00E+00	5 67E-04	1 13E-03
Sr-90	2 6045E+00	46 58	93.17	0 00E+00	1 21E+02	2 43E+02
Tc-99	4 4241E-04	46 58	93.17	0 00E+00	2 06E-02	4 12E-02
Th-229	1 3713E-10	46 58	93.17	0 00E+00	6 39E-09	1 28E-08
Th-230	1 8090E-11	46 58	93.17	0 00E+00	8 43E-10	1 69E-09
Th-232	2 5278E-10	46.58	93 17	0 00E+00	1 18E-08	2 36E-08
Tl-208	1 6947E-08	46.58	93.17	0 00E+00	7 89E-07	1 58E-06
U-232	4 8737E-08	46 58	93 17	0 00E+00	2 27E-06	4 54E-06
U-233	1.2203E-07	46 58	93.17	0 00E+00	5 68E-06	1 14E-05
U-234	1.5925E-07	46 58	93.17	0 00E+00	7 42E-06	1 48E-05
U-235	-2 6194E-06	46 58	0 00	3 46E-04	2 24E-04	3 46E-04
U-236	1.2693E-05	46 58	93 17	0 00E+00	5 91E-04	1.18E-03
U-238	-3 6331E-08	46.58	0 00	2 15E-04	2.13E-04	2.15E-04
Y-90	2 6060E+00	46.58	93 17	0 00E+00	1 21E+02	2 43E+02
Other Radionuclides					1 68E+02	3.36E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.506E+13
0 0250	3.313E+12
0 0375	2.822E+12
0 0575	2.896E+12
0 0850	1 794E+12
0 1250	1.303E+12
0.2250	1.522E+12
0.3750	7 724E+11
0.5750	1 027E+13
0.8500	4 407E+11
1.2500	8 950E+12
1 7500	5 966E+09
2.2500	9 617E+09
2 7500	7 631E+07
3.5000	8.881E+06
5.0000	4 932E+01
7 0000	5.583E+00
11 0000	6.360E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.71E+00	5 42E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 00000115	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	19 49	46 58	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		93 17	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multipler	Estimated Burnup/ Given Burnup
Nominal	1 71	2 39
Bounding	3 42	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA 8 5/20 FFCR U OF TX AUSTIN	[1]Fuel decay start date	2035
SNF ID #	825	Estimates as of	2030
Fuel Units & Descr	3 - ELEMENT	Template	TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
Heavy Metal Mass	BOL=0 48kg EOL=0 48kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 000195
		Template Decay Time	5 years

Estimated Canister usage 18"x10': 0 04

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	9 16	18 33	0 00E+00	7.81E-09	1.56E-08
Am-241	1 8331E-03	9 16	18 33	0 00E+00	1.68E-02	3 36E-02
Am-242m	1.4129E-06	9 16	18 33	0 00E+00	1.29E-05	2 59E-05
Am-243	1 4774E-07	9 16	18 33	0 00E+00	1.35E-06	2 71E-06
C-14	1 2871E-04	9 16	18 33	0 00E+00	1 18E-03	2.36E-03
Cl-36	2 8120E-06	9 16	18 33	0 00E+00	2 58E-05	5.15E-05
Cm-243	1 7940E-07	9 16	18 33	0 00E+00	1 64E-06	3.29E-06
Cm-244	1 6962E-06	9.16	18 33	0 00E+00	1 55E-05	3 11E-05
Co-60	1 2839E+00	9 16	18 33	0 00E+00	1 18E+01	2.35E+01
Cs-134	9 0541E-02	9 16	18 33	0 00E+00	8.30E-01	1 66E+00
Cs-135	3.2195E-05	9 16	18 33	0 00E+00	2 95E-04	5 90E-04
Cs-137	2 7564E+00	9 16	18.33	0 00E+00	2 53E+01	5.05E+01
Eu-154	1 5368E-02	9 16	18.33	0.00E+00	1 41E-01	2 82E-01
Eu-155	2 9293E-02	9 16	18.33	0 00E+00	2 68E-01	5 37E-01
Fe-55	7.7158E-01	9 16	18.33	0 00E+00	7 07E+00	1 41E+01
H-3	1.1111E-02	9 16	18.33	0 00E+00	1 02E-01	2 04E-01
I-129	7.3684E-07	9 16	18.33	0 00E+00	6 75E-06	1 35E-05
Kr-85	2.5263E-01	9 16	18.33	0 00E+00	2 32E+00	4 63E+00
Np-237	1.2427E-06	9 16	18.33	0 00E+00	1 14E-05	2 28E-05
Pa-231	3 8511E-09	9 16	18 33	0 00E+00	3 53E-08	7 06E-08
Pb-210	7.3880E-15	9 16	18 33	0 00E+00	6 77E-14	1.35E-13
Pm-147	2.1023E+00	9 16	18 33	0 00E+00	1 93E+01	3 85E+01
Pu-238	1 0383E-03	9 16	18 33	0 00E+00	9 52E-03	1 90E-02
Pu-239	5 5293E-03	9 16	18 33	0 00E+00	5 07E-02	1 01E-01
Pu-240	2 1278E-03	9 16	18.33	0 00E+00	1.95E-02	3 90E-02
Pu-241	1 0195E-01	9 16	18 33	0 00E+00	9.34E-01	1 87E+00
Pu-242	2 3128E-07	9 16	18 33	0 00E+00	2 12E-06	4.24E-06
Ra-226	5.2782E-14	9 16	18 33	0 00E+00	4 84E-13	9 67E-13
Ra-228	1 9338E-10	9 16	18 33	0 00E+00	1 77E-09	3.54E-09
Ru-106	9 1684E-02	9 16	18 33	0 00E+00	8 40E-01	1 68E+00
Se-79	1.3018E-05	9 16	18 33	0 00E+00	1 19E-04	2.39E-04
Sn-126	1.2167E-05	9 16	18 33	0 00E+00	1 12E-04	2.23E-04
Sr-90	2 6045E+00	9 16	18 33	0 00E+00	2 39E+01	4 77E+01
Tc-99	4 4241E-04	9 16	18 33	0 00E+00	4 05E-03	8 11E-03
Th-229	1 3713E-10	9 16	18 33	0 00E+00	1 26E-09	2 51E-09
Th-230	1 8090E-11	9 16	18 33	0 00E+00	1 66E-10	3 32E-10
Th-232	2 5278E-10	9 16	18 33	0 00E+00	2 32E-09	4 63E-09
Tl-208	1 6947E-08	9 16	18 33	0 00E+00	1 55E-07	3 11E-07
U-232	4 8737E-08	9 16	18 33	0.00E+00	4 47E-07	8 93E-07
U-233	1 2203E-07	9 16	18 33	0.00E+00	1 12E-06	2 24E-06
U-234	1 5925E-07	9 16	18 33	0 00E+00	1 46E-06	2 92E-06
U-235	-2.6194E-06	9 16	0 00	2 05E-04	1 81E-04	2 05E-04
U-236	1.2693E-05	9 16	18 33	0 00E+00	1.16E-04	2.33E-04
U-238	-3 6331E-08	9 16	0 00	1.29E-04	1.29E-04	1.29E-04
Y-90	2 6060E+00	9.16	18 33	0 00E+00	2 39E+01	4 78E+01
Other Radionuclides					3 30E+01	6 61E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.962E+12
0 0250	6 518E+11
0 0375	5.551E+11
0 0575	5 698E+11
0 0850	3 530E+11
0 1250	2.563E+11
0.2250	2.994E+11
0.3750	1.520E+11
0.5750	2.020E+12
0.8500	8.670E+10
1.2500	1 761E+12
1 7500	1 174E+09
2.2500	1.892E+09
2 7500	1.501E+07
3.5000	1 747E+06
5 0000	9 905E+00
7 0000	1 122E+00
11 0000	1.278E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.33E-01	1 07E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 7916875	10 to 20 1

Basis for Parameter Differences

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		9 16
Bounding		18 33

Basis for burnup used in estimate

Nominal burnup assumed to be 2% of BOL heavy metal mass

Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.56	
Bounding	1 12	

Estimated EOL HM/Given EOL HM: 0 98

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA 8 5/20 FFCR ZAIRE
SNF ID #: 735
Fuel Units & Descr: 4 - ELEMENT
Heavy Metal Mass: BOL=0 638kg, EOL=0 638kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' 0 04

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_a: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_a: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	6 22	12 44	0 00E+00	1 64E-08	3 29E-08
Am-241	3 1429E-03	6 22	12 44	0 00E+00	1 95E-02	3 91E-02
Am-242m	1 3195E-06	6 22	12 44	0 00E+00	8 20E-06	1 64E-05
Am-243	1 4753E-07	6 22	12 44	0 00E+00	9 17E-07	1 83E-06
C-14	1 2847E-04	6.22	12 44	0 00E+00	7 99E-04	1 60E-03
Cl-36	2 8120E-06	6 22	12 44	0 00E+00	1 75E-05	3 50E-05
Cm-243	1 2465E-07	6.22	12 44	0 00E+00	7 75E-07	1.55E-06
Cm-244	9 5564E-07	6.22	12 44	0 00E+00	5 94E-06	1 19E-05
Co-60	1 7880E-01	6.22	12 44	0 00E+00	1 11E+00	2.22E+00
Cs-134	5 8692E-04	6.22	12 44	0 00E+00	3 65E-03	7.30E-03
Cs-135	3 2195E-05	6.22	12 44	0 00E+00	2 00E-04	4 00E-04
Cs-137	1 9489E+00	6.22	12 44	0 00E+00	1 21E+01	2 42E+01
Eu-154	4.5895E-03	6 22	12 44	0 00E+00	2 85E-02	5 71E-02
Eu-155	3 6045E-03	6.22	12 44	0 00E+00	2.24E-02	4 48E-02
Fe-55	1 4185E-02	6.22	12 44	0 00E+00	8 82E-02	1 76E-01
H-3	4 7895E-03	6 22	12 44	0 00E+00	2 98E-02	5 96E-02
I-129	7.3684E-07	6 22	12 44	0 00E+00	4.58E-06	9 16E-06
Kr-85	9 5820E-02	6 22	12 44	0 00E+00	5 96E-01	1 19E+00
Np-237	1.2552E-06	6 22	12.44	0 00E+00	7.80E-06	1 56E-05
Pa-231	7 0406E-09	6 22	12.44	0 00E+00	4 38E-08	8 76E-08
Pb-210	5 8000E-14	6 22	12 44	0 00E+00	3 61E-13	7 21E-13
Pm-147	4 0075E-02	6 22	12 44	0 00E+00	2 49E-01	4 98E-01
Pu-238	9 2256E-04	6 22	12 44	0 00E+00	5 74E-03	1 15E-02
Pu-239	5 5278E-03	6 22	12 44	0 00E+00	3 44E-02	6 87E-02
Pu-240	2 1248E-03	6.22	12 44	0 00E+00	1 32E-02	2 64E-02
Pu-241	4 9549E-02	6 22	12 44	0 00E+00	3 08E-01	6 16E-01
Pu-242	2 3128E-07	6.22	12 44	0 00E+00	1 44E-06	2 88E-06
Ra-226	2 4526E-13	6.22	12 44	0 00E+00	1 53E-12	3 05E-12
Ra-228	2 4015E-10	6.22	12 44	0.00E+00	1 49E-09	2 99E-09
Ru-106	3 0602E-06	6.22	12 44	0 00E+00	1 90E-05	3.81E-05
Se-79	1 3015E-05	6.22	12 44	0 00E+00	8 09E-05	1 62E-04
Sn-126	1 2165E-05	6.22	12 44	0 00E+00	7 56E-05	1.51E-04
Sr-90	1 8226E+00	6.22	12 44	0 00E+00	1 13E+01	2 27E+01
Tc-99	4 4241E-04	6.22	12 44	0 00E+00	2 75E-03	5 50E-03
Th-229	3.0962E-10	6.22	12 44	0 00E+00	1 93E-09	3 85E-09
Th-230	4.2346E-11	6 22	12 44	0 00E+00	2 63E-10	5.27E-10
Th-232	2 5278E-10	6 22	12 44	0 00E+00	1 57E-09	3 14E-09
Tl-208	1.5820E-08	6 22	12 44	0 00E+00	9 84E-08	1 97E-07
U-232	4.2647E-08	6.22	12 44	0 00E+00	2 65E-07	5 30E-07
U-233	1.2211E-07	6 22	12 44	0 00E+00	7 59E-07	1 52E-06
U-234	1 9955E-07	6 22	12 44	0 00E+00	1.24E-06	2 48E-06
U-235	-2 6194E-06	6 22	0 00	2 76E-04	2 59E-04	2 76E-04
U-236	1.2693E-05	6 22	12.44	0 00E+00	7 89E-05	1 58E-04
U-238	-3 6331E-08	6 22	0 00	1 72E-04	1 71E-04	1 72E-04
Y-90	1 8241E+00	6 22	12 44	0 00E+00	1 13E+01	2 27E+01
Other Radionuclides					1.20E+01	2 39E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.246E+12
0 0250	2 594E+11
0 0375	2.247E+11
0 0575	2 418E+11
0 0850	1 460E+11
0 1250	9 540E+10
0.2250	1.253E+11
0.3750	5 493E+10
0 5750	9 034E+11
0.8500	1 018E+10
1.2500	1 687E+11
1 7500	2.616E+08
2.2500	9 011E+05
2 7500	9 929E+03
3.5000	5.582E+01
5 0000	6.857E+00
7 0000	7 753E-01
11 0000	8.825E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 56E-01	3.11E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20.00000041	10 to 20 1

Basis for Parameter Drfferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate.
Nominal	6.22		Nominal burnup taken directly from SFD (converted to MWd)
Bounding		12.44	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.29	0 00
Bounding	0.57	

Estimated EOL HM/Given EOL HM: 0 99

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD (ACPR)	[1]Fuel decay start date	2035
SNF ID #	895	Estimates as of	2030
Fuel Units & Descr	182 - ELEMENT	Template	TRIGA-SS (LW/U Zrx, SST, 10 to 20%, U)
Heavy Metal Mass	BOL=48 357kg EOL=48 357kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0.000195
		Template Decay Time	5 years

Estimated Canister usage: 18"x10' = 1 64

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-241	1 8331E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-242m	1 4129E-06	0 00	0 00	0 00E+00	0 00E+00	0.00E+00
Am-243	1 4774E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
C-14	1.2871E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cl-36	2 8120E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cm-243	1.7940E-07	0 00	0 00	0.00E+00	0 00E+00	0 00E+00
Cm-244	1 6962E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Co-60	1.2839E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-134	9 0541E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-135	3.2195E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-137	2 7564E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Eu-154	1 5368E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Eu-155	2 9293E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Fe-55	7 7158E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
H-3	1 1111E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
I-129	7.3684E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Kr-85	2 5263E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Np-237	1 2427E-06	0 00	0 00	0 00E+00	0.00E+00	0 00E+00
Pa-231	3 8511E-09	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pb-210	7.3880E-15	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pm-147	2 1023E+00	0 00	0.00	0 00E+00	0 00E+00	0 00E+00
Pu-238	1 0383E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-239	5 5293E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-240	2 1278E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-241	1 0195E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-242	2 3128E-07	0.00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-226	5.2782E-14	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-228	1 9338E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ru-106	9 1684E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Se-79	1.3018E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sn-126	1.2167E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sr-90	2 6045E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Tc-99	4 4241E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-229	1.3713E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-230	1 8090E-11	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-232	2 5278E-10	0 00	0 00	0.00E+00	0 00E+00	0 00E+00
Tl-208	1 6947E-08	0 00	0 00	0.00E+00	0 00E+00	0 00E+00
U-232	4 8737E-08	0 00	0 00	0.00E+00	0 00E+00	0 00E+00
U-233	1.2203E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-234	1 5925E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-235	-2 6194E-06	0 00	0 00	2 08E-02	2 08E-02	2 08E-02
U-236	1 2693E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-238	-3 6331E-08	0 00	0 00	1.30E-02	1.30E-02	1 30E-02
Y-90	2 6060E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Other Radionuclides					0 00E+00	0 00E+00

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5 162E+08
0 0250	0 000E+00
0 0375	7.043E+05
0 0575	4.276E+05
0 0850	6 017E+07
0 1250	1 188E+08
0.2250	4.204E+08
0.3750	1 049E+06
0 5750	5 161E+04
0.8500	8 046E+03
1.2500	4 756E+02
1 7500	2 327E+02
2.2500	1 348E+02
2 7500	7 832E+01
3 5000	7 002E+01
5 0000	3 008E+01
7 0000	3.463E+00
11 0000	3 981E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 76E-04	8.76E-04
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 95031243	10 to 20 1

Basis for Parameter Differences

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	0 00	
Bounding		

Basis for burnup used in estimate:

Nominal burnup taken directly from SFD (converted to MWd)

Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 00	
Bounding	0 00	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) ARRR
SNF ID #: 238
Fuel Units & Descr: 71 - ELEMENT
Heavy Metal Mass: BOL=13.376kg EOL=9 322kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of 2030
Template. TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT) 0 00018
Template Decay Time: 5 years

Estimated Canister usage
18"x10'
0 64

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	8 0632E-10	3,869 71	7,739 43	0 00E+00	3 12E-06	6 24E-06
Am-241	2.2586E-03	3,869 71	7,739 43	0 00E+00	8.74E+00	1.75E+01
Am-242m	1 9925E-06	3,869 71	7,739 43	0 00E+00	7.71E-03	1 54E-02
Am-243	2 3323E-07	3,869 71	7,739 43	0 00E+00	9 03E-04	1 81E-03
C-14	4.3308E-05	3,869 71	7,739 43	0 00E+00	1 68E-01	3 35E-01
Cl-36	4 3023E-08	3,869 71	7,739 43	0 00E+00	1 66E-04	3 33E-04
Cm-243	2 7429E-07	3,869 71	7,739 43	0 00E+00	1 06E-03	2 12E-03
Cm-244	3 1504E-06	3,869 71	7,739 43	0 00E+00	1.22E-02	2 44E-02
Co-60	3 1008E-02	3,869 71	7,739 43	0 00E+00	1 20E+02	2 40E+02
Cs-134	1 0367E-01	3,869 71	7,739 43	0 00E+00	4 01E+02	8 02E+02
Cs-135	3 1549E-05	3,869 71	7,739 43	0 00E+00	1 22E-01	2 44E-01
Cs-137	2 7564E+00	3,869 71	7,739 43	0 00E+00	1 07E+04	2.13E+04
Eu-154	1.3490E+00	3,869 71	7,739 43	0 00E+00	5.22E+03	1 04E+04
Eu-155	4.3880E-01	3,869 71	7,739 43	0 00E+00	1.70E+03	3.40E+03
Fe-55	8 6782E-03	3,869 71	7,739 43	0 00E+00	3.36E+01	6 72E+01
H-3	1 0805E-02	3,869 71	7,739 43	0 00E+00	4.18E+01	8 36E+01
I-129	7.3805E-07	3,869 71	7,739 43	0 00E+00	2 86E-03	5 71E-03
Kr-85	2 5218E-01	3,869 71	7,739 43	0 00E+00	9 76E+02	1 95E+03
Np-237	1 4463E-06	3,869 71	7,739 43	0 00E+00	5 60E-03	1 12E-02
Pa-231	3 5970E-09	3,869 71	7,739 43	0 00E+00	1 39E-05	2 78E-05
Pb-210	8.2511E-15	3,869 71	7,739 43	0 00E+00	3 19E-11	6 39E-11
Pm-147	2 0767E+00	3,869 71	7,739 43	0 00E+00	8 04E+03	1 61E+04
Pu-238	1 3514E-03	3,869 71	7,739 43	0 00E+00	5.23E+00	1 05E+01
Pu-239	5 6947E-03	3,869 71	7,739 43	0 00E+00	2.20E+01	4 41E+01
Pu-240	2.2647E-03	3,869 71	7,739 43	0 00E+00	8 76E+00	1 75E+01
Pu-241	1.2574E-01	3,869 71	7,739 43	0 00E+00	4 87E+02	9 73E+02
Pu-242	3 0602E-07	3,869 71	7,739 43	0 00E+00	1 18E-03	2 37E-03
Ra-226	5 7353E-14	3,869 71	7,739 43	0 00E+00	2 22E-10	4 44E-10
Ra-228	1 8150E-10	3,869 71	7,739 43	0 00E+00	7 02E-07	1 40E-06
Ru-106	9 3744E-02	3,869 71	7,739 43	0 00E+00	3 63E+02	7 26E+02
Se-79	1.2938E-05	3,869 71	7,739 43	0 00E+00	5 01E-02	1 00E-01
Sn-126	1.2239E-05	3,869 71	7,739 43	0 00E+00	4 74E-02	9 47E-02
Sr-90	2 6000E+00	3,869 71	7,739 43	0 00E+00	1 01E+04	2 01E+04
Tc-99	4 4120E-04	3,869 71	7,739 43	0 00E+00	1.71E+00	3 41E+00
Th-229	1 4749E-10	3,869 71	7,739 43	0 00E+00	5 71E-07	1 14E-06
Th-230	1 9549E-11	3,869 71	7,739 43	0 00E+00	7 56E-08	1 51E-07
Th-232	2.3744E-10	3,869 71	7,739 43	0 00E+00	9 19E-07	1 84E-06
Tl-208	1 9459E-08	3,869 71	7,739 43	0 00E+00	7 53E-05	1 51E-04
U-232	5 6015E-08	3,869 71	7,739 43	0 00E+00	2 17E-04	4 34E-04
U-233	1.3132E-07	3,869 71	7,739 43	0 00E+00	5 08E-04	1 02E-03
U-234	1 7323E-07	3,869 71	7,739 43	0 00E+00	6 70E-04	1 34E-03
U-235	-2 6159E-06	3,869 71	0 00	5 67E-03	0 00E+00	5 67E-03
U-236	1.2717E-05	3,869 71	7,739 43	0 00E+00	4 92E-02	9 84E-02
U-238	-3 8857E-08	3,869 71	0 00	3 61E-03	3 46E-03	3 61E-03
Y-90	2 6015E+00	3,869 71	7,739 43	0 00E+00	1 01E+04	2 01E+04
Other Radionuclides					1 47E+04	2 94E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	1 310E+15
0 0250	2 843E+14
0 0375	3 541E+14
0 0575	2 715E+14
0 0850	1 900E+14
0 1250	2 842E+14
0.2250	1 586E+14
0.3750	7 061E+13
0.5750	8 952E+14
0.8500	2 204E+14
1.2500	2 284E+14
1 7500	6 537E+12
2.2500	7 946E+11
2.7500	6 454E+09
3.5000	7 543E+08
5 0000	4 423E+03
7 0000	5 006E+02
11 0000	5 701E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 94E+02	3 89E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19 62614987	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	494 30	3 869 71	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		7 739 43	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	7 83	7 83	1 23
Bounding	15 66		

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) AUSTRIA
SNF ID #: 462
Fuel Units & Descr: 66 - ELEMENT
Heavy Metal Mass BOL=11.88kg EOL=11.814kg
ROD Storage Site INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 20 years

Estimated Canister usage 18"x10": 0 59

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 4556E-09	63 00	126 00	0 00E+00	1 55E-07	3 09E-07
Am-241	3 8752E-03	63 00	126 00	0 00E+00	2 44E-01	4 88E-01
Am-242m	1 8617E-06	63 00	126 00	0 00E+00	1 17E-04	2.35E-04
Am-243	2 3293E-07	63 00	126 00	0 00E+00	1 47E-05	2 93E-05
C-14	4.3233E-05	63 00	126 00	0 00E+00	2 72E-03	5 45E-03
Cl-36	4 3023E-08	63 00	126 00	0 00E+00	2 71E-06	5 42E-06
Cm-243	1 9053E-07	63 00	126 00	0 00E+00	1.20E-05	2 40E-05
Cm-244	1 7744E-06	63 00	126 00	0 00E+00	1 12E-04	2.24E-04
Co-60	4.3188E-03	63 00	126 00	0 00E+00	2 72E-01	5 44E-01
Cs-134	6 7188E-04	63 00	126 00	0 00E+00	4.23E-02	8 47E-02
Cs-135	3 1549E-05	63 00	126 00	0 00E+00	1 99E-03	3 98E-03
Cs-137	1 9489E+00	63 00	126 00	0 00E+00	1.23E+02	2 46E+02
Eu-154	4 0301E-01	63 00	126 00	0 00E+00	2.54E+01	5 08E+01
Eu-155	5 4000E-02	63 00	126 00	0 00E+00	3 40E+00	6 80E+00
Fe-55	1.5955E-04	63 00	126 00	0 00E+00	1 01E-02	2.01E-02
H-3	4 6571E-03	63 00	126 00	0 00E+00	2 93E-01	5 87E-01
I-129	7.3805E-07	63 00	126 00	0 00E+00	4 65E-05	9.30E-05
Kr-85	9 5684E-02	63 00	126 00	0 00E+00	6 03E+00	1.21E+01
Np-237	1.4618E-06	63 00	126 00	0 00E+00	9.21E-05	1.84E-04
Pa-231	6 4782E-09	63 00	126 00	0 00E+00	4 08E-07	8 16E-07
Pb-210	6 3158E-14	63 00	126 00	0 00E+00	3 98E-12	7.96E-12
Pm-147	3 9564E-02	63 00	126 00	0 00E+00	2 49E+00	4 98E+00
Pu-238	1.2008E-03	63 00	126 00	0 00E+00	7.56E-02	1.51E-01
Pu-239	5 6917E-03	63 00	126 00	0 00E+00	3 59E-01	7.17E-01
Pu-240	2 2617E-03	63 00	126 00	0 00E+00	1 42E-01	2 85E-01
Pu-241	6 1113E-02	63 00	126 00	0 00E+00	3 85E+00	7 70E+00
Pu-242	3 0602E-07	63 00	126 00	0 00E+00	1 93E-05	3 86E-05
Ra-226	2 6707E-13	63 00	126.00	0 00E+00	1 68E-11	3.36E-11
Ra-228	2.2556E-10	63 00	126 00	0 00E+00	1 42E-08	2 84E-08
Ru-106	3 1293E-06	63 00	126 00	0 00E+00	1 97E-04	3 94E-04
Se-79	1.2935E-05	63 00	126 00	0 00E+00	8 15E-04	1.63E-03
Sn-126	1.2238E-05	63 00	126 00	0 00E+00	7 71E-04	1.54E-03
Sr-90	1 8195E+00	63 00	126.00	0 00E+00	1 15E+02	2.29E+02
Tc-99	4 4120E-04	63 00	126 00	0 00E+00	2 78E-02	5.56E-02
Th-229	3 3308E-10	63 00	126.00	0 00E+00	2 10E-08	4.20E-08
Th-230	4 6526E-11	63 00	126 00	0 00E+00	2 93E-09	5 86E-09
Th-232	2 3744E-10	63 00	126 00	0 00E+00	1.50E-08	2.99E-08
Tl-208	1 8195E-08	63 00	126 00	0 00E+00	1.15E-06	2.29E-06
U-232	4 9098E-08	63 00	126 00	0 00E+00	3 09E-06	6 19E-06
U-233	1 3140E-07	63 00	126 00	0 00E+00	8 28E-06	1 66E-05
U-234	2 2571E-07	63 00	126 00	0 00E+00	1 42E-05	2 84E-05
U-235	-2 6159E-06	63 00	0 00	5 13E-03	4 97E-03	5 13E-03
U-236	1.2719E-05	63 00	126 00	0 00E+00	8 01E-04	1 60E-03
U-238	-3 8857E-08	63 00	0 00	3 19E-03	3 19E-03	3 19E-03
Y-90	1 8211E+00	63 00	126 00	0 00E+00	1 15E+02	2.29E+02
Other Radionuclides					1.32E+02	2 64E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.293E+13
0 0250	2 670E+12
0 0375	2 795E+12
0 0575	2 583E+12
0 0850	1 573E+12
0 1250	1 765E+12
0.2250	1 425E+12
0 3750	5 856E+11
0 5750	9 330E+12
0 8500	9 926E+11
1.2500	1 069E+12
1 7500	3 203E+10
2.2500	5 078E+05
2.7500	8 452E+04
3.5000	5 953E+02
5.0000	7 820E+01
7 0000	8 843E+00
11.0000	1 007E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 64E+00	3.27E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	57.89	63.00	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		126.00	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 14	1.09	1 00
Bounding	0 29		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) BRAZIL
SNF ID #: 471
Fuel Units & Descr: 59 - ELEMENT
Heavy Metal Mass: BOL=11 086kg, EOL=10 585kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2006
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrc, Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 20 years

Estimated Canister usage
18"x10'
0 53

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2 4556E-09	478 69	957 38	0 00E+00	1 18E-06	2 35E-06
Am-241	3 8752E-03	478 69	957 38	0 00E+00	1.86E+00	3 71E+00
Am-242m	1 8617E-06	478 69	957 38	0 00E+00	8 91E-04	1 78E-03
Am-243	2 3293E-07	478 69	957 38	0 00E+00	1 12E-04	2 23E-04
C-14	4 3233E-05	478 69	957 38	0 00E+00	2 07E-02	4 14E-02
Cl-36	4 3023E-08	478 69	957 38	0 00E+00	2 06E-05	4 12E-05
Cm-243	1 9053E-07	478 69	957 38	0 00E+00	9 12E-05	1 82E-04
Cm-244	1 7744E-06	478 69	957 38	0 00E+00	8 49E-04	1 70E-03
Co-60	4 3188E-03	478 69	957 38	0 00E+00	2 07E+00	4 13E+00
Cs-134	6 7188E-04	478 69	957 38	0 00E+00	3.22E-01	6 43E-01
Cs-135	3 1549E-05	478 69	957 38	0 00E+00	1 51E-02	3 02E-02
Cs-137	1 9489E+00	478 69	957 38	0 00E+00	9.33E+02	1 87E+03
Eu-154	4 0301E-01	478 69	957 38	0 00E+00	1.93E+02	3 86E+02
Eu-155	5 4000E-02	478 69	957 38	0 00E+00	2.58E+01	5 17E+01
Fe-55	1 5955E-04	478 69	957 38	0 00E+00	7 64E-02	1 53E-01
H-3	4 6571E-03	478 69	957.38	0 00E+00	2.23E+00	4 46E+00
I-129	7 3805E-07	478 69	957.38	0 00E+00	3 53E-04	7 07E-04
Kr-85	9 5684E-02	478 69	957 38	0 00E+00	4 58E+01	9 16E+01
Np-237	1 4618E-06	478 69	957 38	0 00E+00	7 00E-04	1 40E-03
Pa-231	6 4782E-09	478 69	957 38	0 00E+00	3 10E-06	6.20E-06
Pb-210	6 3158E-14	478 69	957 38	0 00E+00	3 02E-11	6 05E-11
Pm-147	3 9564E-02	478 69	957 38	0 00E+00	1 89E+01	3 79E+01
Pu-238	1 2008E-03	478 69	957 38	0 00E+00	5 75E-01	1 15E+00
Pu-239	5 6917E-03	478 69	957 38	0 00E+00	2.72E+00	5 45E+00
Pu-240	2 2617E-03	478 69	957 38	0 00E+00	1 08E+00	2 17E+00
Pu-241	6 1113E-02	478 69	957 38	0 00E+00	2.93E+01	5 85E+01
Pu-242	3 0602E-07	478.69	957 38	0 00E+00	1 46E-04	2 93E-04
Ra-226	2 6707E-13	478 69	957 38	0 00E+00	1 28E-10	2 56E-10
Ra-228	2 2556E-10	478 69	957 38	0 00E+00	1 08E-07	2.16E-07
Ru-106	3 1293E-06	478 69	957 38	0 00E+00	1.50E-03	3 00E-03
Se-79	1 2935E-05	478 69	957 38	0 00E+00	6 19E-03	1.24E-02
Sn-126	1 2238E-05	478 69	957.38	0 00E+00	5 86E-03	1.17E-02
Sr-90	1 8195E+00	478 69	957.38	0 00E+00	8 71E+02	1 74E+03
Tc-99	4 4120E-04	478 69	957 38	0 00E+00	2 11E-01	4 22E-01
Th-229	3 3308E-10	478 69	957 38	0 00E+00	1 59E-07	3.19E-07
Th-230	4 6526E-11	478 69	957 38	0 00E+00	2 23E-08	4 45E-08
Th-232	2 3744E-10	478 69	957 38	0 00E+00	1 14E-07	2.27E-07
Tl-208	1 8195E-08	478 69	957 38	0 00E+00	8 71E-06	1 74E-05
U-232	4 9098E-08	478 69	957.38	0 00E+00	2 35E-05	4.70E-05
U-233	1 3140E-07	478 69	957.38	0 00E+00	6 29E-05	1.26E-04
U-234	2 2571E-07	478.69	957 38	0 00E+00	1 08E-04	2.16E-04
U-235	-2 6159E-06	478.69	0 00	4 75E-03	3 49E-03	4.75E-03
U-236	1 2719E-05	478 69	957 38	0 00E+00	6 09E-03	1.22E-02
U-238	-3 8857E-08	478 69	0 00	2 99E-03	2 97E-03	2.99E-03
Y-90	1 8211E+00	478 69	957 38	0 00E+00	8 72E+02	1 74E+03
Other Radionuclides					1 00E+03	2 00E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	9 825E+13
0 0250	2.029E+13
0 0375	2.123E+13
0 0575	1 963E+13
0 0850	1 195E+13
0 1250	1.341E+13
0.2250	1 083E+13
0 3750	4 450E+12
0 5750	7 089E+13
0 8500	7 543E+12
1.2500	8 125E+12
1 7500	2 434E+11
2.2500	3.858E+06
2 7500	6 421E+05
3.5000	4 408E+03
5 0000	5 450E+02
7 0000	6 153E+01
11 0000	6 998E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.24E+01	2 49E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	ALUM	ALUM
BOL HM Constituents:	U	U
BOL Enrichment %	19 81	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	108.05	478 69
Bounding		957 38

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 17	4 43
Bounding	2.34	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) CORNELL
SNF ID #: 1047
Fuel Units & Descr: 7 - ELEMENT
Heavy Metal Mass: BOL=1.295kg, EOL=1.263kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2002
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx Alum , 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 25 years

Estimated Canister usage

18"x10'
0 06

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	3 8271E-09	30 07	60 13	0 00E+00	1.15E-07	2 30E-07
Am-241	4 4195E-03	30 07	60 13	0 00E+00	1.33E-01	2.66E-01
Am-242m	1 8195E-06	30 07	60 13	0 00E+00	5 47E-05	1.09E-04
Am-243	2 3278E-07	30 07	60 13	0 00E+00	7.00E-06	1.40E-05
C-14	4 3203E-05	30 07	60 13	0 00E+00	1.30E-03	2 60E-03
Cl-36	4 3023E-08	30 07	60 13	0 00E+00	1.29E-06	2 59E-06
Cm-243	1 6872E-07	30 07	60 13	0 00E+00	5 07E-06	1 01E-05
Cm-244	1 4660E-06	30 07	60 13	0 00E+00	4 41E-05	8 82E-05
Co-60	2.2376E-03	30 07	60 13	0 00E+00	6 73E-02	1 35E-01
Cs-134	1.2525E-04	30 07	60 13	0 00E+00	3 77E-03	7 53E-03
Cs-135	3 1549E-05	30 07	60 13	0 00E+00	9 49E-04	1 90E-03
Cs-137	1.7368E+00	30 07	60.13	0.00E+00	5 22E+01	1 04E+02
Eu-154	2 6947E-01	30 07	60.13	0 00E+00	8 10E+00	1 62E+01
Eu-155	2 6857E-02	30 07	60.13	0 00E+00	8 08E-01	1 62E+00
Fe-55	4 2105E-05	30 07	60 13	0 00E+00	1.27E-03	2.53E-03
H-3	3 5173E-03	30 07	60 13	0 00E+00	1.06E-01	2.12E-01
I-129	7 3805E-07	30 07	60 13	0 00E+00	2.22E-05	4 44E-05
Kr-85	6 9263E-02	30 07	60 13	0 00E+00	2 08E+00	4.17E+00
Np-237	1 4752E-06	30 07	60 13	0 00E+00	4 44E-05	8 87E-05
Pa-231	8 3970E-09	30 07	60 13	0 00E+00	2 52E-07	5 05E-07
Pb-210	1.4995E-13	30.07	60 13	0 00E+00	4 51E-12	9 02E-12
Pm-147	1.0567E-02	30.07	60 13	0 00E+00	3 18E-01	6 35E-01
Pu-238	1.1543E-03	30.07	60 13	0 00E+00	3 47E-02	6 94E-02
Pu-239	5 6917E-03	30 07	60 13	0 00E+00	1 71E-01	3 42E-01
Pu-240	2.2602E-03	30 07	60 13	0 00E+00	6 80E-02	1.36E-01
Pu-241	4 8045E-02	30 07	60 13	0 00E+00	1 44E+00	2 89E+00
Pu-242	3 0602E-07	30 07	60 13	0 00E+00	9 20E-06	1 84E-05
Ra-226	5 1293E-13	30 07	60 13	0 00E+00	1 54E-11	3 08E-11
Ra-228	2 3323E-10	30 07	60 13	0.00E+00	7 01E-09	1.40E-08
Ru-106	1 0075E-07	30 07	60 13	0 00E+00	3 03E-06	6 06E-06
Se-79	1.2935E-05	30 07	60 13	0 00E+00	3 89E-04	7.78E-04
Sn-126	1 2238E-05	30 07	60 13	0 00E+00	3.68E-04	7.36E-04
Sr-90	1 6165E+00	30 07	60 13	0 00E+00	4 86E+01	9 72E+01
Tc-99	4 4120E-04	30 07	60 13	0 00E+00	1.33E-02	2 65E-02
Th-229	4 5684E-10	30 07	60 13	0 00E+00	1.37E-08	2 75E-08
Th-230	6 8271E-11	30 07	60 13	0 00E+00	2 05E-09	4 11E-09
Th-232	2.3744E-10	30 07	60 13	0 00E+00	7 14E-09	1 43E-08
Tl-208	1.7368E-08	30 07	60 13	0 00E+00	5 22E-07	1 04E-06
U-232	4 6797E-08	30.07	60 13	0 00E+00	1 41E-06	2 81E-06
U-233	1.3146E-07	30 07	60 13	0 00E+00	3 95E-06	7.91E-06
U-234	2.5729E-07	30 07	60 13	0 00E+00	7 74E-06	1.55E-05
U-235	-2 6159E-06	30 07	0 00	5 60E-04	4 81E-04	5.60E-04
U-236	1.2719E-05	30 07	60 13	0 00E+00	3 82E-04	7.65E-04
U-238	-3 8857E-08	30 07	0 00	3.48E-04	3 47E-04	3 48E-04
Y-90	1 6165E+00	30 07	60 13	0 00E+00	4 86E+01	9 72E+01
Other Radionuclides					5 66E+01	1 13E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5 435E+12
0 0250	1 123E+12
0 0375	1 124E+12
0 0575	1.078E+12
0 0850	6.486E+11
0 1250	6.594E+11
0.2250	5.868E+11
0 3750	2 441E+11
0 5750	3 947E+12
0 8500	3.258E+11
1.2500	3 419E+11
1 7500	1 047E+10
2.2500	1 606E+05
2 7500	3 698E+04
3.5000	8.825E+01
5 0000	3 451E+01
7 0000	3.893E+00
11 0000	4 427E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6 70E-01	1.34E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	6 31	30 07	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		60 13	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 63	4 76
Bounding	1.26	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) CORNELL UNIV
SNF ID #: 235
Fuel Units & Descr: 65 - ELEMENT
Heavy Metal Mass: BOL=12 025kg, EOL=11 94kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1973
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum., 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 50 years

Estimated Canister usage: 18"x10' 0 59

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	8 6842E-09	80 66	161.31	0 00E+00	7 00E-07	1.40E-06
Am-241	4 9459E-03	80 66	161.31	0 00E+00	3 99E-01	7 98E-01
Am-242m	1 6241E-06	80 66	161.31	0 00E+00	1 31E-04	2.62E-04
Am-243	2 3233E-07	80 66	161.31	0 00E+00	1 87E-05	3.75E-05
C-14	4 3083E-05	80 66	161.31	0 00E+00	3 47E-03	6.95E-03
Cl-36	4 3023E-08	80 66	161.31	0 00E+00	3 47E-06	6 94E-06
Cm-243	9 1880E-08	80 66	161.31	0 00E+00	7 41E-06	1.48E-05
Cm-244	5 6346E-07	80 66	161.31	0 00E+00	4 54E-05	9 09E-05
Co-60	8 3699E-05	80 66	161.31	0 00E+00	6 75E-03	1.35E-02
Cs-134	2 8211E-08	80 66	161.31	0 00E+00	2.28E-06	4.55E-06
Cs-135	3 1549E-05	80 66	161.31	0 00E+00	2 54E-03	5.09E-03
Cs-137	9 7519E-01	80 66	161.31	0 00E+00	7 87E+01	1 57E+02
Eu-154	3 5970E-02	80 66	161.31	0 00E+00	2 90E+00	5 80E+00
Eu-155	8 1774E-04	80 66	161.31	0 00E+00	6 60E-02	1.32E-01
Fe-55	5 3940E-08	80 66	161 31	0 00E+00	4 35E-06	8.70E-06
H-3	8 6571E-04	80 66	161.31	0 00E+00	6 98E-02	1.40E-01
I-129	7 3805E-07	80 66	161.31	0 00E+00	5 95E-05	1.19E-04
Kr-85	1 3771E-02	80 66	161 31	0 00E+00	1 11E+00	2.22E+00
Np-237	1 5218E-06	80 66	161.31	0 00E+00	1.23E-04	2 45E-04
Pa-231	1 4152E-08	80 66	161.31	0 00E+00	1.14E-06	2.28E-06
Pb-210	7 9774E-13	80 66	161 31	0 00E+00	6 43E-11	1.29E-10
Pm-147	1 4362E-05	80 66	161.31	0 00E+00	1.16E-03	2 32E-03
Pu-238	9 4782E-04	80 66	161.31	0 00E+00	7 64E-02	1 53E-01
Pu-239	5 6872E-03	80 66	161 31	0 00E+00	4 59E-01	9 17E-01
Pu-240	2 2541E-03	80 66	161.31	0 00E+00	1 82E-01	3 64E-01
Pu-241	1 4433E-02	80 66	161 31	0 00E+00	1 16E+00	2.33E+00
Pu-242	3 0602E-07	80 66	161 31	0 00E+00	2 47E-05	4 94E-05
Ra-226	1 8857E-12	80 66	161.31	0 00E+00	1 52E-10	3 04E-10
Ra-228	2 3729E-10	80 66	161 31	0 00E+00	1 91E-08	3 83E-08
Ru-106	3 4857E-15	80 66	161.31	0 00E+00	2 81E-13	5 62E-13
Se-79	1 2931E-05	80 66	161 31	0 00E+00	1 04E-03	2 09E-03
Sn-126	1 2235E-05	80 66	161.31	0 00E+00	9 87E-04	1 97E-03
Sr-90	8 9173E-01	80 66	161 31	0 00E+00	7.19E+01	1.44E+02
Tc-99	4 4120E-04	80 66	161 31	0 00E+00	3 56E-02	7.12E-02
Th-229	8 2752E-10	80 66	161.31	0 00E+00	6 67E-08	1 33E-07
Th-230	1 4908E-10	80 66	161 31	0 00E+00	1.20E-08	2 40E-08
Th-232	2 3744E-10	80 66	161.31	0 00E+00	1.92E-08	3 83E-08
Tl-208	1 3668E-08	80 66	161 31	0 00E+00	1.10E-06	2.20E-06
U-232	3 6797E-08	80 66	161.31	0 00E+00	2.97E-06	5 94E-06
U-233	1 3164E-07	80 66	161 31	0 00E+00	1.06E-05	2 12E-05
U-234	3 3865E-07	80 66	161 31	0 00E+00	2.73E-05	5 46E-05
U-235	-2 6144E-06	80 66	0 00	5.20E-03	4.99E-03	5 20E-03
U-236	1 2722E-05	80 66	161 31	0 00E+00	1.03E-03	2 05E-03
U-238	-3 8857E-08	80 66	0 00	3 23E-03	3.23E-03	3 23E-03
Y-90	8 9203E-01	80 66	161 31	0 00E+00	7.19E+01	1 44E+02
Other Radionuclides					9 01E+01	1 80E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7 910E+12
0 0250	1 640E+12
0 0375	1 480E+12
0 0575	1 549E+12
0 0850	9 239E+11
0 1250	6 856E+11
0.2250	8 108E+11
0 3750	3 498E+11
0 5750	5 873E+12
0 8500	1 599E+11
1.2500	1 352E+11
1 7500	4 848E+09
2.2500	1 644E+05
2.7500	7 769E+04
3.5000	2.293E+02
5.0000	9 660E+01
7 0000	1 090E+01
11 0000	1.240E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.27E-01	1 85E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	58 60	80 66	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		161.31	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 18	1 38	1 00
Bounding	0 36		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD (ALUM) DOW	[1]Fuel decay start date	2035
SNF ID #	970	Estimates as of	2030
Fuel Units & Descr	1 - ELEMENT	Template	TRIGA-Al (LW/U-Zrx, Alum , 10 to 20% U)
Heavy Metal Mass	BOL=0 19kg EOL=0 18kg	[2]Template Burnup(MWd):	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 00018
		Template Decay Time	5 years

Estimated Canister usage

18"x10'
0 01

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 0632E-10	9 55	19 09	0 00E+00	7 70E-09	1.54E-08
Am-241	2.2586E-03	9 55	19 09	0 00E+00	2 16E-02	4 31E-02
Am-242m	1 9925E-06	9 55	19 09	0 00E+00	1 90E-05	3 80E-05
Am-243	2 3323E-07	9 55	19 09	0 00E+00	2.23E-06	4 45E-06
C-14	4 3308E-05	9 55	19 09	0 00E+00	4 13E-04	8 27E-04
Cl-36	4 3023E-08	9 55	19 09	0 00E+00	4 11E-07	8.21E-07
Cm-243	2 7429E-07	9 55	19 09	0 00E+00	2 62E-06	5 24E-06
Cm-244	3 1504E-06	9 55	19 09	0 00E+00	3 01E-05	6 01E-05
Co-60	3 1008E-02	9 55	19 09	0 00E+00	2 96E-01	5 92E-01
Cs-134	1 0367E-01	9 55	19 09	0 00E+00	9 90E-01	1.98E+00
Cs-135	3 1549E-05	9 55	19 09	0 00E+00	3 01E-04	6 02E-04
Cs-137	2 7564E+00	9 55	19 09	0 00E+00	2 63E+01	5.26E+01
Eu-154	1 3490E+00	9 55	19 09	0 00E+00	1.29E+01	2 58E+01
Eu-155	4 3880E-01	9 55	19 09	0 00E+00	4 19E+00	8 38E+00
Fe-55	8 6782E-03	9 55	19 09	0 00E+00	8.28E-02	1 66E-01
H-3	1 0805E-02	9 55	19 09	0 00E+00	1.03E-01	2 06E-01
I-129	7 3805E-07	9 55	19 09	0 00E+00	7.04E-06	1 41E-05
Kr-85	2 5218E-01	9 55	19 09	0 00E+00	2 41E+00	4 81E+00
Np-237	1 4463E-06	9 55	19 09	0 00E+00	1.38E-05	2 76E-05
Pa-231	3 5970E-09	9 55	19 09	0 00E+00	3 43E-08	6 87E-08
Pb-210	8 2511E-15	9 55	19 09	0 00E+00	7 88E-14	1 58E-13
Pm-147	2 0767E+00	9 55	19 09	0 00E+00	1.98E+01	3 96E+01
Pu-238	1 3514E-03	9 55	19 09	0 00E+00	1.29E-02	2 58E-02
Pu-239	5 6947E-03	9 55	19 09	0 00E+00	5 44E-02	1 09E-01
Pu-240	2 2647E-03	9 55	19 09	0 00E+00	2 16E-02	4 32E-02
Pu-241	1 2574E-01	9 55	19 09	0 00E+00	1.20E+00	2 40E+00
Pu-242	3 0602E-07	9 55	19 09	0 00E+00	2 92E-06	5 84E-06
Ra-226	5 7353E-14	9 55	19 09	0 00E+00	5 47E-13	1 09E-12
Ra-228	1 8150E-10	9 55	19 09	0.00E+00	1 73E-09	3 46E-09
Ru-106	9 3744E-02	9 55	19 09	0 00E+00	8 95E-01	1 79E+00
Se-79	1.2938E-05	9 55	19 09	0.00E+00	1.23E-04	2 47E-04
Sn-126	1.2239E-05	9 55	19 09	0 00E+00	1 17E-04	2 34E-04
Sr-90	2 6000E+00	9 55	19 09	0 00E+00	2.48E+01	4 96E+01
Tc-99	4 4120E-04	9 55	19 09	0 00E+00	4.21E-03	8 42E-03
Th-229	1 4749E-10	9 55	19 09	0.00E+00	1 41E-09	2 82E-09
Th-230	1 9549E-11	9 55	19 09	0 00E+00	1 87E-10	3 73E-10
Th-232	2.3744E-10	9 55	19 09	0 00E+00	2.27E-09	4.53E-09
Tl-208	1 9459E-08	9 55	19 09	0 00E+00	1 86E-07	3.71E-07
U-232	5 6015E-08	9 55	19 09	0 00E+00	5 35E-07	1.07E-06
U-233	1.3132E-07	9 55	19 09	0 00E+00	1 25E-06	2.51E-06
U-234	1.7323E-07	9 55	19 09	0 00E+00	1 65E-06	3.31E-06
U-235	-2 6159E-06	9 55	0 00	8.21E-05	5 71E-05	8.21E-05
U-236	1.2717E-05	9 55	19 09	0 00E+00	1 21E-04	2.43E-04
U-238	-3 8857E-08	9 55	0 00	5 11E-05	5 07E-05	5.11E-05
Y-90	2 6015E+00	9 55	19 09	0 00E+00	2 48E+01	4 97E+01
Other Radionuclides					3 63E+01	7.26E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3.230E+12
0 0250	7.013E+11
0 0375	8 735E+11
0 0575	6 697E+11
0 0850	4 687E+11
0 1250	7 011E+11
0.2250	3 913E+11
0 3750	1 742E+11
0.5750	2.208E+12
0 8500	5 435E+11
1.2500	5 634E+11
1 7500	1 612E+10
2.2500	1.960E+09
2.7500	1.592E+07
3.5000	1.861E+06
5.0000	1 101E+01
7.0000	1.246E+00
11.0000	1.419E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.80E-01	9.59E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding	ALUM	ALUM	
BOL HM Constituents:	U	U	
BOL Enrichment %.	20	10 to 20 1	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	1 85	9 55	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		19 09	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	1 36	5 15	1 00
Bounding	2.72	-	

[1]Reactor shutdown, core removal storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) FINLAND
SNF ID #: 463
Fuel Units & Descr: 69 - ELEMENT
Heavy Metal Mass: BOL=12.42kg; EOL=12.344kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum., 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 20 years

Estimated Canister usage
18"x10'
0 62

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 4556E-09	72 45	144 90	0 00E+00	1 78E-07	3 56E-07
Am-241	3 8752E-03	72 45	144 90	0 00E+00	2 81E-01	5 61E-01
Am-242m	1 8617E-06	72 45	144 90	0 00E+00	1 35E-04	2 70E-04
Am-243	2 3293E-07	72 45	144 90	0 00E+00	1 69E-05	3 38E-05
C-14	4 3233E-05	72 45	144 90	0 00E+00	3 13E-03	6.26E-03
Cl-36	4 3023E-08	72 45	144 90	0 00E+00	3 12E-06	6.23E-06
Cm-243	1 9053E-07	72 45	144 90	0 00E+00	1 38E-05	2 76E-05
Cm-244	1 7744E-06	72 45	144 90	0 00E+00	1.29E-04	2 57E-04
Co-60	4 3188E-03	72 45	144 90	0 00E+00	3 13E-01	6.26E-01
Cs-134	6 7188E-04	72 45	144 90	0 00E+00	4 87E-02	9 74E-02
Cs-135	3 1549E-05	72 45	144 90	0 00E+00	2.29E-03	4 57E-03
Cs-137	1 9489E+00	72 45	144 90	0 00E+00	1 41E+02	2 82E+02
Eu-154	4 0301E-01	72 45	144 90	0 00E+00	2 92E+01	5 84E+01
Eu-155	5 4000E-02	72 45	144 90	0 00E+00	3 91E+00	7 82E+00
Fe-55	1 5955E-04	72 45	144 90	0 00E+00	1 16E-02	2 31E-02
H-3	4 6571E-03	72 45	144 90	0 00E+00	3 37E-01	6 75E-01
I-129	7 3805E-07	72 45	144 90	0 00E+00	5 35E-05	1 07E-04
Kr-85	9 5684E-02	72 45	144 90	0 00E+00	6 93E+00	1 39E+01
Np-237	1 4618E-06	72 45	144 90	0 00E+00	1 06E-04	2 12E-04
Pa-231	6 4782E-09	72 45	144 90	0 00E+00	4 69E-07	9 39E-07
Pb-210	6 3158E-14	72 45	144 90	0 00E+00	4 58E-12	9 15E-12
Pm-147	3 9564E-02	72 45	144 90	0 00E+00	2 87E+00	5 73E+00
Pu-238	1 2008E-03	72 45	144 90	0 00E+00	8 70E-02	1 74E-01
Pu-239	5 6917E-03	72 45	144 90	0 00E+00	4 12E-01	8 25E-01
Pu-240	2 2617E-03	72 45	144 90	0 00E+00	1 64E-01	3 28E-01
Pu-241	6 1113E-02	72 45	144 90	0 00E+00	4 43E+00	8 85E+00
Pu-242	3 0602E-07	72 45	144 90	0 00E+00	2 22E-05	4 43E-05
Ra-226	2 6707E-13	72 45	144 90	0 00E+00	1 93E-11	3 87E-11
Ra-228	2.2556E-10	72 45	144 90	0 00E+00	1 63E-08	3 27E-08
Ru-106	3 1293E-06	72 45	144 90	0 00E+00	2 27E-04	4 53E-04
Se-79	1.2935E-05	72 45	144 90	0 00E+00	9 37E-04	1 87E-03
Sn-126	1.2238E-05	72 45	144 90	0 00E+00	8 87E-04	1 77E-03
Sr-90	1 8195E+00	72 45	144 90	0 00E+00	1.32E+02	2 64E+02
Tc-99	4 4120E-04	72 45	144 90	0 00E+00	3 20E-02	6 39E-02
Th-229	3 3308E-10	72 45	144 90	0 00E+00	2 41E-08	4 83E-08
Th-230	4 6526E-11	72 45	144 90	0 00E+00	3 37E-09	6 74E-09
Th-232	2.3744E-10	72 45	144 90	0 00E+00	1 72E-08	3 44E-08
Tl-208	1 8195E-08	72 45	144 90	0 00E+00	1 32E-06	2 64E-06
U-232	4 9098E-08	72 45	144 90	0 00E+00	3 56E-06	7 11E-06
U-233	1.3140E-07	72 45	144 90	0 00E+00	9 52E-06	1 90E-05
U-234	2.2571E-07	72 45	144 90	0 00E+00	1 64E-05	3 27E-05
U-235	-2 6159E-06	72 45	0 00	5 37E-03	5.18E-03	5 37E-03
U-236	1.2719E-05	72.45	144 90	0 00E+00	9.21E-04	1 84E-03
U-238	-3 8857E-08	72 45	0 00	3 34E-03	3.34E-03	3 34E-03
Y-90	1 8211E+00	72.45	144 90	0 00E+00	1.32E+02	2.64E+02
Other Radionuclides					1.52E+02	3 03E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 487E+13
0.0250	3.070E+12
0 0375	3.214E+12
0 0575	2 971E+12
0 0850	1 809E+12
0 1250	2.030E+12
0.2250	1 639E+12
0.3750	6.735E+11
0 5750	1 073E+13
0 8500	1 142E+12
1.2500	1.230E+12
1 7500	3 684E+10
2.2500	5 840E+05
2.7500	9 720E+04
3.5000	6 827E+02
5 0000	8 916E+01
7 0000	1 008E+01
11 0000	1 147E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.88E+00	3 76E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[1]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	60 52	72.45	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		144 90	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.16	1.20
Bounding	0 32	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) GA
SNF ID #: 728
Fuel Units & Descr: 52 - ELEMENT
Heavy Metal Mass: BOL=9 412kg EOL=9.329kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum , 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 5 years

Estimated Canister usage

18"x10'
0 47

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8 0632E-10	91 73	183 46	0 00E+00	7 40E-08	1 48E-07	Avg MeV	
Am-241	2 2586E-03	91 73	183 46	0 00E+00	2 07E-01	4 14E-01	0 0150	3 104E+13
Am-242m	1 9925E-06	91 73	183 46	0 00E+00	1 83E-04	3 66E-04	0 0250	6 739E+12
Am-243	2.3323E-07	91 73	183 46	0 00E+00	2.14E-05	4 28E-05	0 0375	8 395E+12
C-14	4.3308E-05	91 73	183.46	0 00E+00	3 97E-03	7 95E-03	0 0575	6 435E+12
Cl-36	4.3023E-08	91 73	183 46	0 00E+00	3 95E-06	7 89E-06	0 0850	4 505E+12
Cm-243	2.7429E-07	91 73	183 46	0 00E+00	2 52E-05	5 03E-05	0 1250	6 737E+12
Cm-244	3 1504E-06	91 73	183 46	0 00E+00	2 89E-04	5 78E-04	0.2250	3 761E+12
Co-60	3 1008E-02	91 73	183 46	0 00E+00	2 84E+00	5 69E+00	0.3750	1 674E+12
Cs-134	1 0367E-01	91 73	183 46	0 00E+00	9 51E+00	1 90E+01	0.5750	2.122E+13
Cs-135	3 1549E-05	91 73	183 46	0 00E+00	2 89E-03	5 79E-03	0.8500	5.223E+12
Cs-137	2 7564E+00	91 73	183 46	0 00E+00	2 53E+02	5.06E+02	1.2500	5.414E+12
Eu-154	1 3490E+00	91 73	183 46	0 00E+00	1.24E+02	2.47E+02	1 7500	1.550E+11
Eu-155	4 3880E-01	91 73	183 46	0 00E+00	4 03E+01	8 05E+01	2.2500	1.884E+10
Fe-55	8 6782E-03	91 73	183 46	0 00E+00	7 96E-01	1 59E+00	2 7500	1.530E+08
H-3	1 0805E-02	91.73	183 46	0 00E+00	9 91E-01	1 98E+00	3 5000	1 788E+07
I-129	7.3805E-07	91.73	183 46	0 00E+00	6 77E-05	1 35E-04	5 0000	1 105E+02
Kr-85	2 5218E-01	91.73	183 46	0 00E+00	2 31E+01	4 63E+01	7 0000	1.252E+01
Np-237	1 4463E-06	91.73	183 46	0 00E+00	1.33E-04	2 65E-04	11 0000	1 426E+00
Pa-231	3.5970E-09	91.73	183 46	0 00E+00	3.30E-07	6 60E-07		
Pb-210	8.2511E-15	91 73	183 46	0 00E+00	7 57E-13	1.51E-12		
Pm-147	2.0767E+00	91 73	183 46	0 00E+00	1.90E+02	3 81E+02		
Pu-238	1.3514E-03	91 73	183 46	0.00E+00	1.24E-01	2.48E-01		
Pu-239	5 6947E-03	91 73	183 46	0.00E+00	5.22E-01	1 04E+00		
Pu-240	2.2647E-03	91 73	183.46	0 00E+00	2 08E-01	4 15E-01		
Pu-241	1 2574E-01	91 73	183 46	0 00E+00	1 15E+01	2.31E+01		
Pu-242	3 0602E-07	91 73	183 46	0 00E+00	2 81E-05	5 61E-05		
Ra-226	5 7353E-14	91 73	183 46	0 00E+00	5 26E-12	1 05E-11		
Ra-228	1 8150E-10	91 73	183 46	0 00E+00	1 66E-08	3 33E-08		
Ru-106	9 3744E-02	91 73	183 46	0 00E+00	8 60E+00	1 72E+01		
Se-79	1.2938E-05	91 73	183 46	0 00E+00	1 19E-03	2 37E-03		
Sn-126	1.2239E-05	91 73	183 46	0 00E+00	1.12E-03	2 25E-03		
Sr-90	2 6000E+00	91 73	183 46	0 00E+00	2 38E+02	4 77E+02		
Tc-99	4 4120E-04	91.73	183 46	0 00E+00	4 05E-02	8 09E-02		
Th-229	1.4749E-10	91.73	183 46	0 00E+00	1.35E-08	2.71E-08		
Th-230	1.9549E-11	91.73	183 46	0 00E+00	1.79E-09	3 59E-09		
Th-232	2.3744E-10	91.73	183 46	0 00E+00	2.18E-08	4.36E-08		
Tl-208	1.9459E-08	91.73	183 46	0 00E+00	1 78E-06	3 57E-06		
U-232	5 6015E-08	91.73	183 46	0 00E+00	5 14E-06	1 03E-05		
U-233	1.3132E-07	91 73	183 46	0 00E+00	1.20E-05	2 41E-05		
U-234	1 7323E-07	91 73	183 46	0 00E+00	1 59E-05	3 18E-05		
U-235	-2 6159E-06	91 73	0 00	4 03E-03	3 79E-03	4 03E-03		
U-236	1 2717E-05	91 73	183 46	0.00E+00	1 17E-03	2 33E-03		
U-238	-3 8857E-08	91 73	0 00	2 54E-03	2 53E-03	2 54E-03		
Y-90	2 6015E+00	91 73	183.46	0 00E+00	2 39E+02	4 77E+02		
Other Radionuclides					3 49E+02	6 97E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 61E+00	9.22E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19 8109242	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	91 73	79 42	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		183.46	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.26	0 87
Bounding	0 53	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) GA
SNF ID #: 870
Fuel Units & Descr: 246 - ELEMENT
Heavy Metal Mass: BOL=46.74kg, EOL=45 19kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1973
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum , 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 50 years

Estimated Canister usage: 18"x10' = 2 22

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8.6842E-09	1,479.31	2,958 63	0 00E+00	1.28E-05	2 57E-05
Am-241	4 9459E-03	1,479.31	2,958 63	0 00E+00	7 32E+00	1 46E+01
Am-242m	1 6241E-06	1,479.31	2,958 63	0 00E+00	2 40E-03	4 80E-03
Am-243	2.3233E-07	1,479.31	2,958 63	0 00E+00	3 44E-04	6 87E-04
C-14	4.3083E-05	1,479 31	2,958 63	0 00E+00	6.37E-02	1 27E-01
Cl-36	4.3023E-08	1,479 31	2,958 63	0 00E+00	6.36E-05	1 27E-04
Cm-243	9 1880E-08	1,479 31	2,958 63	0 00E+00	1.36E-04	2 72E-04
Cm-244	5 6346E-07	1,479 31	2,958 63	0 00E+00	8.34E-04	1 67E-03
Co-60	8 3699E-05	1,479 31	2,958 63	0 00E+00	1.24E-01	2 48E-01
Cs-134	2 8211E-08	1,479 31	2,958 63	0 00E+00	4.17E-05	8 35E-05
Cs-135	3.1549E-05	1,479 31	2,958 63	0 00E+00	4 67E-02	9 33E-02
Cs-137	9 7519E-01	1,479 31	2,958 63	0 00E+00	1 44E+03	2 89E+03
Eu-154	3 5970E-02	1,479 31	2,958 63	0 00E+00	5 32E+01	1 06E+02
Eu-155	8 1774E-04	1,479 31	2,958 63	0 00E+00	1.21E+00	2 42E+00
Fe-55	5 3940E-08	1,479 31	2,958 63	0 00E+00	7 98E-05	1.60E-04
H-3	8 6571E-04	1,479 31	2,958 63	0 00E+00	1.28E+00	2 56E+00
I-129	7 3805E-07	1,479 31	2,958 63	0 00E+00	1 09E-03	2.18E-03
Kr-85	1 3771E-02	1,479 31	2,958 63	0 00E+00	2 04E+01	4 07E+01
Np-237	1 5218E-06	1,479 31	2,958 63	0 00E+00	2 25E-03	4 50E-03
Pa-231	1 4152E-08	1,479 31	2,958 63	0 00E+00	2 09E-05	4 19E-05
Pb-210	7 9774E-13	1,479 31	2,958 63	0 00E+00	1.18E-09	2 36E-09
Pm-147	1 4362E-05	1,479 31	2,958 63	0 00E+00	2 12E-02	4 25E-02
Pu-238	9 4782E-04	1,479 31	2,958 63	0 00E+00	1 40E+00	2 80E+00
Pu-239	5 6872E-03	1,479 31	2,958 63	0 00E+00	8 41E+00	1 68E+01
Pu-240	2.2541E-03	1,479 31	2,958 63	0 00E+00	3 33E+00	6 67E+00
Pu-241	1 4433E-02	1,479 31	2,958 63	0 00E+00	2 14E+01	4.27E+01
Pu-242	3 0602E-07	1,479 31	2,958 63	0 00E+00	4 53E-04	9 05E-04
Ra-226	1 8857E-12	1,479 31	2,958 63	0 00E+00	2 79E-09	5 58E-09
Ra-228	2 3729E-10	1,479 31	2,958 63	0 00E+00	3 51E-07	7 02E-07
Ru-106	3 4857E-15	1,479.31	2,958 63	0 00E+00	5 16E-12	1 03E-11
Se-79	1.2931E-05	1,479.31	2,958 63	0 00E+00	1 91E-02	3 83E-02
Sn-126	1.2235E-05	1,479.31	2,958 63	0 00E+00	1 81E-02	3 62E-02
Sr-90	8 9173E-01	1,479.31	2,958 63	0 00E+00	1 32E+03	2 64E+03
Tc-99	4 4120E-04	1,479.31	2,958 63	0 00E+00	6 53E-01	1 31E+00
Th-229	8.2752E-10	1,479.31	2,958 63	0 00E+00	1.22E-06	2 45E-06
Th-230	1 4908E-10	1,479.31	2,958 63	0 00E+00	2.21E-07	4 41E-07
Th-232	2 3744E-10	1,479 31	2,958 63	0 00E+00	3.51E-07	7 03E-07
Tl-208	1 3668E-08	1,479 31	2,958 63	0 00E+00	2.02E-05	4 04E-05
U-232	3 6797E-08	1,479 31	2,958 63	0 00E+00	5.44E-05	1 09E-04
U-233	1 3164E-07	1,479 31	2,958 63	0 00E+00	1.95E-04	3 89E-04
U-234	3 3865E-07	1,479 31	2,958 63	0 00E+00	5 01E-04	1.00E-03
U-235	-2 6144E-06	1,479 31	0 00	2 01E-02	1 62E-02	2.01E-02
U-236	1 2722E-05	1,479 31	2,958 63	0 00E+00	1 88E-02	3.76E-02
U-238	-3 8857E-08	1,479 31	0 00	1.26E-02	1.25E-02	1.26E-02
Y-90	8 9203E-01	1,479 31	2,958 63	0 00E+00	1.32E+03	2 64E+03
Other Radionuclides					1 65E+03	3.30E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 451E+14
0 0250	3.008E+13
0 0375	2.714E+13
0 0575	2.840E+13
0 0850	1.694E+13
0 1250	1.257E+13
0 2250	1 487E+13
0 3750	6 416E+12
0 5750	1 077E+14
0 8500	2 934E+12
1 2500	2.480E+12
1 7500	8.892E+10
2.2500	3 015E+06
2.7500	1 425E+06
3 5000	3 954E+03
5.0000	1 664E+03
7 0000	1 875E+02
11 0000	2.131E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.70E+01	3 40E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19 9	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	455 53	1,479.31	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		2 958 63	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 86	3.25
Bounding	1 71	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) GERMANY
SNF ID #: 465
Fuel Units & Descr: 65 - ELEMENT
Heavy Metal Mass: BOL=11 7kg EOL=11 635kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 0 59

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventones(Ci)
Ac-227	2 4556E-09	62 04	124 09	0 00E+00	1.52E-07	3 05E-07
Am-241	3 8752E-03	62 04	124 09	0 00E+00	2 40E-01	4 81E-01
Am-242m	1 8617E-06	62 04	124 09	0 00E+00	1.16E-04	2 31E-04
Am-243	2.3293E-07	62 04	124 09	0 00E+00	1 45E-05	2 89E-05
C-14	4.3233E-05	62 04	124 09	0 00E+00	2 68E-03	5 36E-03
Cl-36	4.3023E-08	62 04	124 09	0 00E+00	2 67E-06	5 34E-06
Cm-243	1 9053E-07	62 04	124 09	0 00E+00	1 18E-05	2 36E-05
Cm-244	1 7744E-06	62 04	124 09	0 00E+00	1 10E-04	2 20E-04
Co-60	4.3188E-03	62 04	124 09	0 00E+00	2 68E-01	5 36E-01
Cs-134	6 7188E-04	62 04	124 09	0 00E+00	4 17E-02	8 34E-02
Cs-135	3 1549E-05	62 04	124 09	0 00E+00	1 96E-03	3 91E-03
Cs-137	1 9489E+00	62 04	124 09	0 00E+00	1.21E+02	2 42E+02
Eu-154	4 0301E-01	62 04	124 09	0 00E+00	2.50E+01	5 00E+01
Eu-155	5 4000E-02	62 04	124 09	0 00E+00	3 35E+00	6 70E+00
Fe-55	1.5955E-04	62 04	124 09	0 00E+00	9 90E-03	1 98E-02
H-3	4 6571E-03	62 04	124 09	0 00E+00	2 89E-01	5 78E-01
I-129	7.3805E-07	62 04	124 09	0 00E+00	4 58E-05	9 16E-05
Kr-85	9 5684E-02	62 04	124 09	0 00E+00	5 94E+00	1 19E+01
Np-237	1 4618E-06	62 04	124 09	0 00E+00	9 07E-05	1 81E-04
Pa-231	6 4782E-09	62 04	124 09	0 00E+00	4 02E-07	8 04E-07
Pb-210	6 3158E-14	62 04	124 09	0 00E+00	3 92E-12	7 84E-12
Pm-147	3 9564E-02	62 04	124 09	0 00E+00	2 45E+00	4 91E+00
Pu-238	1 2008E-03	62 04	124 09	0 00E+00	7 45E-02	1 49E-01
Pu-239	5 6917E-03	62 04	124 09	0 00E+00	3 53E-01	7 06E-01
Pu-240	2 2617E-03	62 04	124 09	0 00E+00	1 40E-01	2 81E-01
Pu-241	6 1113E-02	62 04	124 09	0 00E+00	3 79E+00	7.58E+00
Pu-242	3 0602E-07	62 04	124 09	0 00E+00	1 90E-05	3 80E-05
Ra-226	2 6707E-13	62 04	124 09	0 00E+00	1 66E-11	3 31E-11
Ra-228	2 2556E-10	62 04	124 09	0 00E+00	1 40E-08	2 80E-08
Ru-106	3 1293E-06	62 04	124 09	0 00E+00	1 94E-04	3 88E-04
Se-79	1 2935E-05	62 04	124 09	0 00E+00	8 03E-04	1.61E-03
Sn-126	1 2238E-05	62 04	124 09	0 00E+00	7 59E-04	1.52E-03
Sr-90	1 8195E+00	62 04	124 09	0 00E+00	1.13E+02	2.26E+02
Tc-99	4 4120E-04	62 04	124 09	0 00E+00	2 74E-02	5.47E-02
Th-229	3 3308E-10	62 04	124 09	0 00E+00	2 07E-08	4 13E-08
Th-230	4 6526E-11	62 04	124 09	0 00E+00	2 89E-09	5 77E-09
Th-232	2 3744E-10	62 04	124 09	0 00E+00	1.47E-08	2 95E-08
Tl-208	1 8195E-08	62 04	124 09	0 00E+00	1.13E-06	2.26E-06
U-232	4 9098E-08	62 04	124 09	0 00E+00	3 05E-06	6 09E-06
U-233	1.3140E-07	62 04	124 09	0 00E+00	8 15E-06	1 63E-05
U-234	2.2571E-07	62 04	124 09	0 00E+00	1.40E-05	2 80E-05
U-235	-2.6159E-06	62 04	0 00	5.06E-03	4 89E-03	5 06E-03
U-236	1.2719E-05	62 04	124 09	0.00E+00	7.89E-04	1 58E-03
U-238	-3.8857E-08	62 04	0 00	3 15E-03	3 14E-03	3 15E-03
Y-90	1 8211E+00	62 04	124 09	0 00E+00	1 13E+02	2.26E+02
Other Radionuclides					1 30E+02	2 60E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.273E+13
0 0250	2 630E+12
0 0375	2 752E+12
0 0575	2 544E+12
0 0850	1.549E+12
0 1250	1 739E+12
0.2250	1 404E+12
0.3750	5 768E+11
0 5750	9 188E+12
0 8500	9 776E+11
1.2500	1 053E+12
1 7500	3 155E+10
2.2500	5 001E+05
2 7500	8 324E+04
3.5000	5 862E+02
5 0000	7 701E+01
7 0000	8 709E+00
11 0000	9 914E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 61E+00	3.22E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	- Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	57 01	62.04	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		124.09	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 14	1.09	1.00
Bounding	0 29		

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) HANFORD
SNF ID #: 876
Fuel Units & Descr: 59 - ELEMENT
Heavy Metal Mass: BOL=10 915kg, EOL=10 838kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1973
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 6.65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 50 years

Estimated Canister usage 18"x10': 0 53

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 6842E-09	73 21	146 42	0 00E+00	6 36E-07	1 27E-06
Am-241	4 9459E-03	73 21	146 42	0 00E+00	3 62E-01	7 24E-01
Am-242m	1 6241E-06	73 21	146 42	0 00E+00	1 19E-04	2 38E-04
Am-243	2 3233E-07	73 21	146 42	0 00E+00	1 70E-05	3 40E-05
C-14	4 3083E-05	73 21	146 42	0 00E+00	3.15E-03	6 31E-03
Cl-36	4 3023E-08	73 21	146 42	0 00E+00	3.15E-06	6 30E-06
Cm-243	9 1880E-08	73 21	146 42	0 00E+00	6.73E-06	1 35E-05
Cm-244	5 6346E-07	73 21	146 42	0 00E+00	4 13E-05	8.25E-05
Co-60	8 3699E-05	73 21	146 42	0 00E+00	6 13E-03	1.23E-02
Cs-134	2 8211E-08	73 21	146 42	0 00E+00	2 07E-06	4 13E-06
Cs-135	3 1549E-05	73.21	146 42	0 00E+00	2.31E-03	4 62E-03
Cs-137	9 7519E-01	73.21	146 42	0 00E+00	7.14E+01	1 43E+02
Eu-154	3 5970E-02	73 21	146 42	0 00E+00	2 63E+00	5.27E+00
Eu-155	8 1774E-04	73.21	146 42	0 00E+00	5 99E-02	1.20E-01
Fe-55	5 3940E-08	73.21	146 42	0 00E+00	3 95E-06	7 90E-06
H-3	8 6571E-04	73.21	146 42	0 00E+00	6 34E-02	1.27E-01
I-129	7 3805E-07	73.21	146 42	0 00E+00	5 40E-05	1 08E-04
Kr-85	1.3771E-02	73.21	146 42	0 00E+00	1 01E+00	2 02E+00
Np-237	1.5218E-06	73.21	146 42	0 00E+00	1.11E-04	2 23E-04
Pa-231	1 4152E-08	73.21	146.42	0 00E+00	1 04E-06	2 07E-06
Pb-210	7 9774E-13	73.21	146 42	0 00E+00	5 84E-11	1 17E-10
Pm-147	1 4362E-05	73.21	146 42	0 00E+00	1 05E-03	2 10E-03
Pu-238	9 4782E-04	73.21	146.42	0 00E+00	6 94E-02	1 39E-01
Pu-239	5 6872E-03	73 21	146.42	0 00E+00	4 16E-01	8 33E-01
Pu-240	2.2541E-03	73 21	146.42	0 00E+00	1 65E-01	3 30E-01
Pu-241	1 4433E-02	73 21	146 42	0 00E+00	1 06E+00	2 11E+00
Pu-242	3 0602E-07	73 21	146 42	0 00E+00	2.24E-05	4 48E-05
Ra-226	1 8857E-12	73 21	146 42	0 00E+00	1 38E-10	2 76E-10
Ra-228	2 3729E-10	73 21	146 42	0 00E+00	1 74E-08	3 47E-08
Ru-106	3 4857E-15	73 21	146 42	0 00E+00	2.55E-13	5 10E-13
Se-79	1 2931E-05	73 21	146 42	0 00E+00	9 47E-04	1 89E-03
Sn-126	1 2235E-05	73 21	146 42	0 00E+00	8 96E-04	1 79E-03
Sr-90	8 9173E-01	73 21	146 42	0 00E+00	6 53E+01	1 31E+02
Tc-99	4 4120E-04	73 21	146 42	0 00E+00	3.23E-02	6 46E-02
Th-229	8 2752E-10	73 21	146 42	0 00E+00	6 06E-08	1.21E-07
Th-230	1 4908E-10	73.21	146 42	0 00E+00	1 09E-08	2.18E-08
Th-232	2 3744E-10	73.21	146 42	0 00E+00	1 74E-08	3 48E-08
Tl-208	1 3668E-08	73 21	146 42	0 00E+00	1 00E-06	2.00E-06
U-232	3 6797E-08	73.21	146 42	0 00E+00	2 69E-06	5 39E-06
U-233	1 3164E-07	73.21	146 42	0 00E+00	9 64E-06	1 93E-05
U-234	3 3865E-07	73.21	146 42	0 00E+00	2 48E-05	4 96E-05
U-235	-2 6144E-06	73.21	0 00	4.72E-03	4 53E-03	4 72E-03
U-236	1.2722E-05	73.21	146 42	0 00E+00	9 31E-04	1 86E-03
U-238	-3 8857E-08	73.21	0 00	2.93E-03	2 93E-03	2 93E-03
Y-90	8 9203E-01	73.21	146 42	0 00E+00	6 53E+01	1 31E+02
Other Radionuclides					8 17E+01	1 63E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7 180E+12
0 0250	1 488E+12
0 0375	1 343E+12
0 0575	1 406E+12
0 0850	8 386E+11
0 1250	6.223E+11
0.2250	7 360E+11
0 3750	3 175E+11
0 5750	5.331E+12
0.8500	1 452E+11
1.2500	1.227E+11
1 7500	4 401E+09
2.2500	1 492E+05
2 7500	7 052E+04
3.5000	2.081E+02
5 0000	8 768E+01
7 0000	9 897E+00
11 0000	1 125E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 42E-01	1 68E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	53.19	73 21	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		146 42	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 18	1.38
Bounding	0.36	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD (ALUM) HANNOVER	[1]Fuel decay start date	1996
SNF ID #	303	Estimates as of	2030
Fuel Units & Descr	71 - ELEMENT	Template	TRIGA-Al (LW/U-Zrx, Alum , 10 to 20% U)
Heavy Metal Mass	BOL=13.561kg EOL=13 419kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 00018
		Template Decay Time	25 years

Estimated Canister usage 18"x10'
0 64

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	3 8271E-09	135.54	271.08	0 00E+00	5 19E-07	1 04E-06
Am-241	4 4195E-03	135 54	271.08	0 00E+00	5 99E-01	1.20E+00
Am-242m	1.8195E-06	135 54	271.08	0 00E+00	2 47E-04	4 93E-04
Am-243	2.3278E-07	135 54	271 08	0 00E+00	3 16E-05	6 31E-05
C-14	4.3203E-05	135.54	271.08	0 00E+00	5 86E-03	1 17E-02
Cl-36	4.3023E-08	135.54	271.08	0.00E+00	5 83E-06	1 17E-05
Cm-243	1 6872E-07	135 54	271.08	0 00E+00	2 29E-05	4 57E-05
Cm-244	1 4660E-06	135 54	271.08	0 00E+00	1 99E-04	3 97E-04
Co-60	2.2376E-03	135 54	271 08	0 00E+00	3 03E-01	6 07E-01
Cs-134	1.2525E-04	135 54	271.08	0.00E+00	1 70E-02	3 40E-02
Cs-135	3 1549E-05	135 54	271 08	0 00E+00	4 28E-03	8 55E-03
Cs-137	1 7368E+00	135 54	271 08	0 00E+00	2 35E+02	4 71E+02
Eu-154	2 6947E-01	135 54	271 08	0 00E+00	3 65E+01	7 30E+01
Eu-155	2 6857E-02	135 54	271 08	0 00E+00	3 64E+00	7 28E+00
Fe-55	4.2105E-05	135 54	271 08	0 00E+00	5 71E-03	1 14E-02
H-3	3 5173E-03	135 54	271 08	0 00E+00	4 77E-01	9 53E-01
I-129	7.3805E-07	135 54	271 08	0 00E+00	1 00E-04	2 00E-04
Kr-85	6 9263E-02	135 54	271 08	0 00E+00	9 39E+00	1 88E+01
Np-237	1 4752E-06	135 54	271 08	0 00E+00	2 00E-04	4 00E-04
Pa-231	8 3970E-09	135 54	271 08	0 00E+00	1.14E-06	2.28E-06
Pb-210	1 4995E-13	135 54	271 08	0 00E+00	2.03E-11	4 07E-11
Pm-147	1 0567E-02	135 54	271 08	0 00E+00	1 43E+00	2 86E+00
Pu-238	1 1543E-03	135 54	271 08	0 00E+00	1.56E-01	3 13E-01
Pu-239	5 6917E-03	135 54	271 08	0 00E+00	7.71E-01	1 54E+00
Pu-240	2 2602E-03	135 54	271 08	0 00E+00	3 06E-01	6 13E-01
Pu-241	4 8045E-02	135 54	271 08	0 00E+00	6 51E+00	1.30E+01
Pu-242	3 0602E-07	135 54	271 08	0 00E+00	4 15E-05	8.30E-05
Ra-226	5 1293E-13	135 54	271 08	0 00E+00	6 95E-11	1.39E-10
Ra-228	2 3323E-10	135 54	271 08	0 00E+00	3 16E-08	6.32E-08
Ru-106	1 0075E-07	135 54	271 08	0 00E+00	1.37E-05	2 73E-05
Se-79	1.2935E-05	135 54	271 08	0 00E+00	1 75E-03	3 51E-03
Sn-126	1.2238E-05	135 54	271 08	0 00E+00	1 66E-03	3 32E-03
Sr-90	1 6165E+00	135 54	271 08	0 00E+00	2 19E+02	4.38E+02
Tc-99	4 4120E-04	135 54	271 08	0 00E+00	5 98E-02	1.20E-01
Th-229	4 5684E-10	135 54	271 08	0 00E+00	6 19E-08	1 24E-07
Th-230	6 8271E-11	135 54	271 08	0 00E+00	9 25E-09	1 85E-08
Th-232	2.3744E-10	135 54	271 08	0 00E+00	3 22E-08	6 44E-08
Tl-208	1.7368E-08	135 54	271 08	0 00E+00	2 35E-06	4 71E-06
U-232	4.6797E-08	135 54	271 08	0 00E+00	6 34E-06	1.27E-05
U-233	1.3146E-07	135 54	271 08	0 00E+00	1 78E-05	3 56E-05
U-234	2.5729E-07	135 54	271 08	0 00E+00	3 49E-05	6 97E-05
U-235	-2 6159E-06	135 54	0 00	5 86E-03	5 51E-03	5 86E-03
U-236	1.2719E-05	135.54	271 08	0 00E+00	1 72E-03	3 45E-03
U-238	-3 8857E-08	135.54	0 00	3 65E-03	3 64E-03	3 65E-03
Y-90	1 6165E+00	135 54	271 08	0 00E+00	2 19E+02	4 38E+02
Other Radionuclides					2 55E+02	5 10E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 450E+13
0 0250	5 061E+12
0 0375	5 069E+12
0 0575	4 861E+12
0 0850	2.924E+12
0 1250	2.972E+12
0.2250	2 645E+12
0 3750	1 100E+12
0 5750	1 779E+13
0 8500	1 469E+12
1 2500	1.541E+12
1 7500	4 718E+10
2.2500	7.238E+05
2 7500	1 667E+05
3 5000	4 090E+02
5 0000	1 603E+02
7 0000	1.810E+01
11 0000	2.059E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 02E+00	6 04E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20 00391594	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate*
Nominal	132.17	135.54	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		271 08	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.27	1 03
Bounding	0 54	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) HEIDELBERG
SNF ID #: 464
Fuel Units & Descr: 65 - ELEMENT
Heavy Metal Mass: BOL=11 648kg, EOL=11 401kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 20 years

Estimated Canister usage: 18"x10" = 0 59

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2 4556E-09	283 80	567 61	0 00E+00	6 97E-07	1.39E-06
Am-241	3 8752E-03	283 80	567 61	0 00E+00	1 10E+00	2.20E+00
Am-242m	1 8617E-06	283 80	567 61	0 00E+00	5 28E-04	1 06E-03
Am-243	2.3293E-07	283 80	567 61	0 00E+00	6 61E-05	1.32E-04
C-14	4.3233E-05	283 80	567 61	0 00E+00	1.23E-02	2 45E-02
Cl-36	4.3023E-08	283 80	567 61	0 00E+00	1 22E-05	2.44E-05
Cm-243	1.9053E-07	283 80	567 61	0 00E+00	5 41E-05	1 08E-04
Cm-244	1.7744E-06	283 80	567 61	0 00E+00	5 04E-04	1.01E-03
Co-60	4.3188E-03	283 80	567 61	0 00E+00	1 23E+00	2 45E+00
Cs-134	6.7188E-04	283 80	567 61	0 00E+00	1 91E-01	3 81E-01
Cs-135	3 1549E-05	283 80	567 61	0 00E+00	8 95E-03	1.79E-02
Cs-137	1 9489E+00	283 80	567 61	0 00E+00	5 53E+02	1 11E+03
Eu-154	4 0301E-01	283 80	567 61	0 00E+00	1 14E+02	2.29E+02
Eu-155	5 4000E-02	283 80	567 61	0 00E+00	1 53E+01	3 07E+01
Fe-55	1 5955E-04	283 80	567 61	0 00E+00	4 53E-02	9 06E-02
H-3	4 6571E-03	283 80	567 61	0 00E+00	1 32E+00	2 64E+00
I-129	7.3805E-07	283 80	567 61	0 00E+00	2 09E-04	4.19E-04
Kr-85	9 5684E-02	283 80	567 61	0 00E+00	2 72E+01	5 43E+01
Np-237	1 4618E-06	283 80	567 61	0 00E+00	4 15E-04	8.30E-04
Pa-231	6 4782E-09	283 80	567 61	0 00E+00	1 84E-06	3 68E-06
Pb-210	6 3158E-14	283 80	567 61	0 00E+00	1 79E-11	3 58E-11
Pm-147	3 9564E-02	283 80	567 61	0 00E+00	1 12E+01	2.25E+01
Pu-238	1 2008E-03	283 80	567 61	0 00E+00	3 41E-01	6 82E-01
Pu-239	5 6917E-03	283 80	567 61	0 00E+00	1 62E+00	3.23E+00
Pu-240	2.2617E-03	283 80	567 61	0 00E+00	6 42E-01	1.28E+00
Pu-241	6 1113E-02	283 80	567 61	0 00E+00	1 73E+01	3.47E+01
Pu-242	3 0602E-07	283 80	567 61	0 00E+00	8 68E-05	1.74E-04
Ra-226	2.6707E-13	283 80	567 61	0 00E+00	7 58E-11	1 52E-10
Ra-228	2.2556E-10	283 80	567 61	0 00E+00	6 40E-08	1.28E-07
Ru-106	3.1293E-06	283 80	567 61	0 00E+00	8 88E-04	1.78E-03
Se-79	1.2935E-05	283 80	567 61	0 00E+00	3 67E-03	7.34E-03
Sn-126	1.2238E-05	283 80	567 61	0 00E+00	3 47E-03	6 95E-03
Sr-90	1 8195E+00	283 80	567 61	0 00E+00	5 16E+02	1 03E+03
Tc-99	4 4120E-04	283 80	567 61	0 00E+00	1 25E-01	2.50E-01
Th-229	3 3308E-10	283 80	567 61	0 00E+00	9 45E-08	1 89E-07
Th-230	4 6526E-11	283 80	567 61	0 00E+00	1 32E-08	2 64E-08
Th-232	2 3744E-10	283 80	567 61	0 00E+00	6 74E-08	1 35E-07
Tl-208	1.8195E-08	283 80	567 61	0 00E+00	5 16E-06	1 03E-05
U-232	4 9098E-08	283 80	567 61	0 00E+00	1 39E-05	2.79E-05
U-233	1.3140E-07	283 80	567 61	0 00E+00	3.73E-05	7.46E-05
U-234	2.2571E-07	283 80	567 61	0 00E+00	6 41E-05	1.28E-04
U-235	-2 6159E-06	283 80	0.00	5 06E-03	4 31E-03	5 06E-03
U-236	1.2719E-05	283 80	567 61	0 00E+00	3 61E-03	7.22E-03
U-238	-3 8857E-08	283 80	0.00	3 13E-03	3.12E-03	3.13E-03
Y-90	1 8211E+00	283 80	567 61	0 00E+00	5 17E+02	1.03E+03
Other Radionuclides					5 94E+02	1.19E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	5 825E+13
0 0250	1.203E+13
0 0375	1.259E+13
0 0575	1 164E+13
0 0850	7 085E+12
0 1250	7 953E+12
0.2250	6 420E+12
0 3750	2 638E+12
0 5750	4.203E+13
0 8500	4 472E+12
1.2500	4.817E+12
1 7500	1 443E+11
2.2500	2.287E+06
2 7500	3.807E+05
3.5000	2 621E+03
5 0000	3.262E+02
7 0000	3 684E+01
11 0000	4 191E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.37E+00	1.47E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20 08410778	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	283 80	235.77	Nominal burnup taken directly from SFD (converted to MWd).
Bounding		567 61	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 66	0 83
Bounding	1 32	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD (ALUM) ITALY	[1]Fuel decay start date	2010
SNF ID #	466	Estimates as of	2030
Fuel Units & Descr	60 - ELEMENT	Template	TRIGA-Al (LW/U-Zrx Alum , 10 to 20%, U)
Heavy Metal Mass	BOL=10 8kg, EOL=10 74kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 00018
		Template Decay Time	20 years

Estimated Canister usage

18"x10'
0 54

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Actvity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2 4556E-09	57.27	114 54	0 00E+00	1 41E-07	2 81E-07
Am-241	3 8752E-03	57.27	114 54	0 00E+00	2.22E-01	4 44E-01
Am-242m	1 8617E-06	57.27	114 54	0 00E+00	1 07E-04	2 13E-04
Am-243	2 3293E-07	57.27	114 54	0 00E+00	1.33E-05	2 67E-05
C-14	4.3233E-05	57.27	114 54	0 00E+00	2 48E-03	4 95E-03
Cl-36	4.3023E-08	57.27	114 54	0 00E+00	2 46E-06	4 93E-06
Cm-243	1 9053E-07	57.27	114 54	0 00E+00	1 09E-05	2 18E-05
Cm-244	1 7744E-06	57.27	114 54	0 00E+00	1 02E-04	2 03E-04
Co-60	4.3188E-03	57.27	114 54	0 00E+00	2 47E-01	4 95E-01
Cs-134	6 7188E-04	57.27	114 54	0 00E+00	3 85E-02	7 70E-02
Cs-135	3 1549E-05	57.27	114 54	0 00E+00	1 81E-03	3 61E-03
Cs-137	1 9489E+00	57.27	114 54	0 00E+00	1 12E+02	2.23E+02
Eu-154	4 0301E-01	57.27	114 54	0 00E+00	2.31E+01	4 62E+01
Eu-155	5 4000E-02	57.27	114 54	0 00E+00	3 09E+00	6 19E+00
Fe-55	1 5955E-04	57.27	114 54	0 00E+00	9 14E-03	1 83E-02
H-3	4 6571E-03	57.27	114 54	0 00E+00	2 67E-01	5.33E-01
I-129	7.3805E-07	57.27	114 54	0 00E+00	4.23E-05	8 45E-05
Kr-85	9 5684E-02	57.27	114 54	0 00E+00	5 48E+00	1.10E+01
Np-237	1 4618E-06	57.27	114 54	0 00E+00	8 37E-05	1 67E-04
Pa-231	6 4782E-09	57.27	114 54	0 00E+00	3 71E-07	7 42E-07
Pb-210	6.3158E-14	57.27	114 54	0 00E+00	3 62E-12	7.23E-12
Pm-147	3 9564E-02	57.27	114 54	0 00E+00	2.27E+00	4.53E+00
Pu-238	1.2008E-03	57.27	114 54	0 00E+00	6 88E-02	1 38E-01
Pu-239	5 6917E-03	57.27	114 54	0 00E+00	3 26E-01	6 52E-01
Pu-240	2.2617E-03	57.27	114 54	0 00E+00	1 30E-01	2 59E-01
Pu-241	6 1113E-02	57.27	114 54	0 00E+00	3 50E+00	7 00E+00
Pu-242	3.0602E-07	57.27	114 54	0 00E+00	1 75E-05	3 51E-05
Ra-226	2 6707E-13	57.27	114 54	0 00E+00	1 53E-11	3 06E-11
Ra-228	2.2556E-10	57.27	114 54	0 00E+00	1.29E-08	2 58E-08
Ru-106	3.1293E-06	57.27	114 54	0 00E+00	1 79E-04	3 58E-04
Se-79	1.2935E-05	57.27	114 54	0 00E+00	7 41E-04	1 48E-03
Sn-126	1.2238E-05	57.27	114 54	0 00E+00	7 01E-04	1 40E-03
Sr-90	1 8195E+00	57.27	114 54	0 00E+00	1 04E+02	2 08E+02
Tc-99	4 4120E-04	57.27	114 54	0 00E+00	2 53E-02	5 05E-02
Th-229	3 3308E-10	57.27	114.54	0 00E+00	1 91E-08	3 82E-08
Th-230	4 6526E-11	57.27	114 54	0 00E+00	2 66E-09	5 33E-09
Th-232	2 3744E-10	57.27	114 54	0 00E+00	1 36E-08	2 72E-08
Tl-208	1.8195E-08	57.27	114 54	0 00E+00	1 04E-06	2 08E-06
U-232	4.9098E-08	57.27	114 54	0 00E+00	2 81E-06	5 62E-06
U-233	1.3140E-07	57.27	114 54	0 00E+00	7 53E-06	1 51E-05
U-234	2.2571E-07	57 27	114 54	0 00E+00	1 29E-05	2 59E-05
U-235	-2 6159E-06	57.27	0 00	4 67E-03	4 52E-03	4 67E-03
U-236	1.2719E-05	57 27	114 54	0 00E+00	7 28E-04	1 46E-03
U-238	-3 8857E-08	57 27	0 00	2 90E-03	2 90E-03	2 90E-03
Y-90	1 8211E+00	57.27	114 54	0 00E+00	1 04E+02	2 09E+02
Other Radionuclides					1.20E+02	2 40E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 176E+13
0 0250	2 427E+12
0 0375	2.541E+12
0 0575	2.348E+12
0 0850	1.430E+12
0 1250	1.605E+12
0.2250	1.296E+12
0 3750	5.324E+11
0.5750	8 481E+12
0 8500	9.024E+11
1.2500	9 721E+11
1 7500	2.912E+10
2.2500	4 616E+05
2.7500	7 684E+04
3.5000	5.411E+02
5 0000	7 109E+01
7.0000	8 039E+00
11.0000	9 152E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 49E+00	2.97E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences*
Reactor Moderator*	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding*	ALUM	ALUM	
BOL HM Constituents	U	U	
BOL Enrichment %*	20	10 to 20 1	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	52.63	57.27	Nominal burnup calculated from the heavy metal mass destroyed
Bounding*		114 54	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 14	1 09	1 00
Bounding	0.29		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) ITALY
SNF ID #: 467
Fuel Units & Descr: 64 - ELEMENT
Heavy Metal Mass: BOL=11 93kg, EOL=11 904kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1997
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 25 years

Estimated Canister usage: 18"x10' = 0 58

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	3 8271E-09	58 13	116 27	0 00E+00	2.22E-07	4.45E-07
Am-241	4 4195E-03	58 13	116 27	0 00E+00	2 57E-01	5.14E-01
Am-242m	1 8195E-06	58 13	116 27	0 00E+00	1 06E-04	2.12E-04
Am-243	2 3278E-07	58 13	116 27	0 00E+00	1 35E-05	2.71E-05
C-14	4 3203E-05	58 13	116 27	0 00E+00	2.51E-03	5.02E-03
Cl-36	4 3023E-08	58 13	116 27	0 00E+00	2 50E-06	5.00E-06
Cm-243	1 6872E-07	58 13	116 27	0 00E+00	9 81E-06	1.96E-05
Cm-244	1 4660E-06	58 13	116 27	0 00E+00	8 52E-05	1.70E-04
Co-60	2.2376E-03	58 13	116 27	0 00E+00	1 30E-01	2.60E-01
Cs-134	1 2525E-04	58 13	116 27	0 00E+00	7.28E-03	1.46E-02
Cs-135	3.1549E-05	58 13	116 27	0.00E+00	1 83E-03	3 67E-03
Cs-137	1 7368E+00	58 13	116 27	0 00E+00	1.01E+02	2 02E+02
Eu-154	2 6947E-01	58 13	116 27	0 00E+00	1.57E+01	3 13E+01
Eu-155	2 6857E-02	58 13	116 27	0 00E+00	1.56E+00	3 12E+00
Fe-55	4.2105E-05	58 13	116 27	0 00E+00	2 45E-03	4.90E-03
H-3	3.5173E-03	58 13	116 27	0 00E+00	2 04E-01	4.09E-01
I-129	7 3805E-07	58 13	116 27	0 00E+00	4 29E-05	8.58E-05
Kr-85	6 9263E-02	58 13	116 27	0 00E+00	4 03E+00	8 05E+00
Np-237	1 4752E-06	58 13	116 27	0 00E+00	8 58E-05	1.72E-04
Pa-231	8.3970E-09	58 13	116 27	0 00E+00	4 88E-07	9.76E-07
Pb-210	1 4995E-13	58 13	116 27	0 00E+00	8.72E-12	1.74E-11
Pm-147	1.0567E-02	58 13	116 27	0 00E+00	6.14E-01	1.23E+00
Pu-238	1.1543E-03	58 13	116 27	0 00E+00	6 71E-02	1.34E-01
Pu-239	5 6917E-03	58 13	116 27	0 00E+00	3.31E-01	6 62E-01
Pu-240	2.2602E-03	58 13	116 27	0 00E+00	1.31E-01	2 63E-01
Pu-241	4 8045E-02	58 13	116 27	0 00E+00	2.79E+00	5 59E+00
Pu-242	3 0602E-07	58 13	116 27	0 00E+00	1.78E-05	3.56E-05
Ra-226	5.1293E-13	58 13	116 27	0 00E+00	2 98E-11	5 96E-11
Ra-228	2 3323E-10	58 13	116 27	0 00E+00	1.36E-08	2.71E-08
Ru-106	1.0075E-07	58 13	116 27	0 00E+00	5 86E-06	1 17E-05
Se-79	1.2935E-05	58 13	116 27	0 00E+00	7.52E-04	1.50E-03
Sn-126	1.2238E-05	58 13	116 27	0 00E+00	7.11E-04	1 42E-03
Sr-90	1 6165E+00	58 13	116 27	0 00E+00	9 40E+01	1 88E+02
Tc-99	4 4120E-04	58 13	116 27	0 00E+00	2.56E-02	5.13E-02
Th-229	4.5684E-10	58 13	116 27	0 00E+00	2.66E-08	5.31E-08
Th-230	6.8271E-11	58 13	116 27	0 00E+00	3.97E-09	7 94E-09
Th-232	2.3744E-10	58.13	116 27	0 00E+00	1.38E-08	2.76E-08
Tl-208	1.7368E-08	58.13	116 27	0 00E+00	1.01E-06	2.02E-06
U-232	4 6797E-08	58 13	116 27	0 00E+00	2.72E-06	5 44E-06
U-233	1 3146E-07	58 13	116 27	0 00E+00	7 64E-06	1.53E-05
U-234	2.5729E-07	58 13	116 27	0 00E+00	1.50E-05	2.99E-05
U-235	-2 6159E-06	58 13	0 00	5 10E-03	4.94E-03	5.10E-03
U-236	1.2719E-05	58.13	116 27	0 00E+00	7.39E-04	1.48E-03
U-238	-3 8857E-08	58 13	0 00	3 22E-03	3.21E-03	3.22E-03
Y-90	1.6165E+00	58 13	116 27	0 00E+00	9 40E+01	1 88E+02
Other Radionuclides					1 09E+02	2 19E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 051E+13
0 0250	2.171E+12
0 0375	2.174E+12
0 0575	2.085E+12
0 0850	1.254E+12
0 1250	1.275E+12
0.2250	1 135E+12
0 3750	4 719E+11
0 5750	7 632E+12
0 8500	6.299E+11
1.2500	6 610E+11
1 7500	2.023E+10
2.2500	3.105E+05
2.7500	7 151E+04
3.5000	1 843E+02
5 0000	7.259E+01
7 0000	8.204E+00
11 0000	9 337E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.29E+00	2 59E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19 76448407	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	58 13	24 44	Nominal burnup taken directly from SFD (converted to MWd).
Bounding		116.27	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 13	0 42
Bounding	0.26	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD (ALUM) JAPAN	[1]Fuel decay start date	2010
SNF ID #	481	Estimates as of	2030
Fuel Units & Descr	71 - ELEMENT	Template	TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
Heavy Metal Mass	BOL=13.845kg EOL=13 774kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 00018
		Template Decay Time	20 years

Estimated Canister usage: 18"x10' = 0 64

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 4556E-09	134 93	269 87	0 00E+00	3 31E-07	6 63E-07
Am-241	3 8752E-03	134 93	269 87	0 00E+00	5.23E-01	1 05E+00
Am-242m	1.8617E-06	134 93	269 87	0 00E+00	2 51E-04	5 02E-04
Am-243	2.3293E-07	134 93	269 87	0 00E+00	3 14E-05	6 29E-05
C-14	4.3233E-05	134 93	269 87	0 00E+00	5 83E-03	1 17E-02
Cl-36	4.3023E-08	134 93	269 87	0 00E+00	5 81E-06	1.16E-05
Cm-243	1 9053E-07	134 93	269 87	0 00E+00	2 57E-05	5 14E-05
Cm-244	1 7744E-06	134 93	269 87	0 00E+00	2 39E-04	4 79E-04
Co-60	4 3188E-03	134 93	269 87	0 00E+00	5 83E-01	1 17E+00
Cs-134	6 7188E-04	134 93	269 87	0 00E+00	9 07E-02	1.81E-01
Cs-135	3 1549E-05	134 93	269 87	0 00E+00	4 26E-03	8 51E-03
Cs-137	1 9489E+00	134 93	269 87	0 00E+00	2 63E+02	5.26E+02
Eu-154	4 0301E-01	134 93	269 87	0 00E+00	5 44E+01	1 09E+02
Eu-155	5 4000E-02	134.93	269 87	0.00E+00	7 29E+00	1 46E+01
Fe-55	1 5955E-04	134 93	269 87	0 00E+00	2 15E-02	4.31E-02
H-3	4 6571E-03	134.93	269 87	0 00E+00	6 28E-01	1.26E+00
I-129	7 3805E-07	134.93	269 87	0 00E+00	9 96E-05	1 99E-04
Kr-85	9 5684E-02	134.93	269 87	0 00E+00	1 29E+01	2.58E+01
Np-237	1 4618E-06	134 93	269 87	0 00E+00	1 97E-04	3 94E-04
Pa-231	6 4782E-09	134 93	269 87	0 00E+00	8 74E-07	1 75E-06
Pb-210	6 3158E-14	134 93	269 87	0 00E+00	8 52E-12	1 70E-11
Pm-147	3 9564E-02	134 93	269 87	0 00E+00	5 34E+00	1 07E+01
Pu-238	1 2008E-03	134 93	269 87	0 00E+00	1.62E-01	3 24E-01
Pu-239	5 6917E-03	134 93	269 87	0 00E+00	7.68E-01	1.54E+00
Pu-240	2 2617E-03	134 93	269 87	0 00E+00	3.05E-01	6 10E-01
Pu-241	6 1113E-02	134 93	269 87	0 00E+00	8 25E+00	1 65E+01
Pu-242	3 0602E-07	134 93	269 87	0 00E+00	4 13E-05	8 26E-05
Ra-226	2 6707E-13	134 93	269 87	0 00E+00	3 60E-11	7 21E-11
Ra-228	2.2556E-10	134 93	269 87	0 00E+00	3 04E-08	6 09E-08
Ru-106	3 1293E-06	134 93	269 87	0 00E+00	4.22E-04	8 45E-04
Se-79	1.2935E-05	134 93	269 87	0 00E+00	1 75E-03	3 49E-03
Sn-126	1.2238E-05	134 93	269 87	0 00E+00	1 65E-03	3 30E-03
Sr-90	1.8195E+00	134 93	269 87	0 00E+00	2 46E+02	4 91E+02
Tc-99	4 4120E-04	134 93	269 87	0 00E+00	5 95E-02	1.19E-01
Th-229	3.3308E-10	134 93	269 87	0 00E+00	4 49E-08	8.99E-08
Th-230	4 6526E-11	134 93	269 87	0 00E+00	6 28E-09	1.26E-08
Th-232	2.3744E-10	134 93	269 87	0 00E+00	3 20E-08	6.41E-08
Tl-208	1 8195E-08	134 93	269 87	0 00E+00	2 46E-06	4 91E-06
U-232	4 9098E-08	134 93	269 87	0 00E+00	6 62E-06	1.32E-05
U-233	1.3140E-07	134 93	269 87	0 00E+00	1 77E-05	3 55E-05
U-234	2.2571E-07	134 93	269 87	0 00E+00	3 05E-05	6 09E-05
U-235	-2 6159E-06	134 93	0 00	5.98E-03	5 63E-03	5 98E-03
U-236	1.2719E-05	134 93	269 87	0.00E+00	1 72E-03	3 43E-03
U-238	-3 8857E-08	134 93	0 00	3 72E-03	3 72E-03	3 72E-03
Y-90	1 8211E+00	134 93	269 87	0 00E+00	2 46E+02	4 91E+02
Other Radionuclides					2 83E+02	5 65E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 770E+13
0 0250	5 719E+12
0 0375	5 986E+12
0 0575	5 533E+12
0 0850	3 368E+12
0 1250	3 781E+12
0.2250	3 052E+12
0 3750	1.254E+12
0 5750	1 998E+13
0 8500	2 126E+12
1.2500	2 290E+12
1 7500	6 861E+10
2.2500	1 088E+06
2 7500	1 810E+05
3 5000	1.258E+03
5 0000	1 603E+02
7 0000	1 811E+01
11 0000	2.061E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.50E+00	7 01E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20 00000073	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	134 93	67 77	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		269 87	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.26	0 50
Bounding	0 53	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) KANSAS STATE UNIV
SNF ID #: 804
Fuel Units & Descr: 3 - ELEMENT
Heavy Metal Mass: BOL=0.54kg, EOL=0.513kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum., 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' 0 03

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 0632E-10	25 77	51 54	0 00E+00	2 08E-08	4.16E-08
Am-241	2.2586E-03	25 77	51 54	0 00E+00	5 82E-02	1 16E-01
Am-242m	1 9925E-06	25 77	51 54	0 00E+00	5.14E-05	1 03E-04
Am-243	2 3323E-07	25 77	51 54	0 00E+00	6 01E-06	1.20E-05
C-14	4.3308E-05	25 77	51 54	0 00E+00	1.12E-03	2.23E-03
Cl-36	4 3023E-08	25 77	51 54	0 00E+00	1 11E-06	2.22E-06
Cm-243	2 7429E-07	25 77	51 54	0 00E+00	7 07E-06	1 41E-05
Cm-244	3.1504E-06	25 77	51 54	0 00E+00	8 12E-05	1 62E-04
Co-60	3 1008E-02	25 77	51 54	0 00E+00	7 99E-01	1 60E+00
Cs-134	1 0367E-01	25 77	51 54	0 00E+00	2 67E+00	5 34E+00
Cs-135	3 1549E-05	25 77	51 54	0 00E+00	8 13E-04	1 63E-03
Cs-137	2 7564E+00	25 77	51 54	0 00E+00	7.10E+01	1.42E+02
Eu-154	1 3490E+00	25 77	51 54	0 00E+00	3 48E+01	6 95E+01
Eu-155	4 3880E-01	25 77	51 54	0 00E+00	1 13E+01	2.26E+01
Fe-55	8 6782E-03	25 77	51 54	0 00E+00	2 24E-01	4 47E-01
H-3	1 0805E-02	25 77	51 54	0 00E+00	2 78E-01	5 57E-01
I-129	7 3805E-07	25 77	51 54	0 00E+00	1 90E-05	3 80E-05
Kr-85	2 5218E-01	25 77	51 54	0 00E+00	6 50E+00	1 30E+01
Np-237	1 4463E-06	25 77	51 54	0 00E+00	3 73E-05	7 45E-05
Pa-231	3 5970E-09	25 77	51 54	0 00E+00	9 27E-08	1 85E-07
Pb-210	8 2511E-15	25 77	51 54	0 00E+00	2 13E-13	4 25E-13
Pm-147	2 0767E+00	25 77	51 54	0 00E+00	5 35E+01	1 07E+02
Pu-238	1 3514E-03	25 77	51 54	0 00E+00	3 48E-02	6 97E-02
Pu-239	5 6947E-03	25.77	51 54	0 00E+00	1 47E-01	2 94E-01
Pu-240	2 2647E-03	25.77	51 54	0.00E+00	5 84E-02	1 17E-01
Pu-241	1.2574E-01	25.77	51 54	0 00E+00	3 24E+00	6 48E+00
Pu-242	3 0602E-07	25.77	51 54	0 00E+00	7 89E-06	1 58E-05
Ra-226	5 7353E-14	25.77	51 54	0 00E+00	1 48E-12	2 96E-12
Ra-228	1 8150E-10	25.77	51 54	0 00E+00	4 68E-09	9 36E-09
Ru-106	9 3744E-02	25.77	51 54	0 00E+00	2 42E+00	4 83E+00
Se-79	1.2938E-05	25 77	51 54	0 00E+00	3 33E-04	6 67E-04
Sn-126	1.2239E-05	25 77	51 54	0 00E+00	3 15E-04	6 31E-04
Sr-90	2 6000E+00	25 77	51.54	0 00E+00	6 70E+01	1 34E+02
Tc-99	4 4120E-04	25 77	51 54	0 00E+00	1.14E-02	2.27E-02
Th-229	1 4749E-10	25 77	51.54	0 00E+00	3 80E-09	7 60E-09
Th-230	1 9549E-11	25 77	51 54	0 00E+00	5 04E-10	1 01E-09
Th-232	2.3744E-10	25 77	51.54	0 00E+00	6.12E-09	1.22E-08
Tl-208	1.9459E-08	25 77	51.54	0 00E+00	5 01E-07	1.00E-06
U-232	5 6015E-08	25 77	51.54	0 00E+00	1 44E-06	2.89E-06
U-233	1 3132E-07	25 77	51.54	0 00E+00	3 38E-06	6.77E-06
U-234	1 7323E-07	25 77	51.54	0 00E+00	4 46E-06	8 93E-06
U-235	-2 6159E-06	25 77	0 00	2 33E-04	1 66E-04	2.33E-04
U-236	1.2717E-05	25 77	51 54	0 00E+00	3.28E-04	6 55E-04
U-238	-3 8857E-08	25 77	0 00	1 45E-04	1 44E-04	1 45E-04
Y-90	2 6015E+00	25 77	51 54	0 00E+00	6 70E+01	1.34E+02
Other Radionuclides					9 80E+01	1 96E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	8 721E+12
0 0250	1 893E+12
0 0375	2.359E+12
0 0575	1 808E+12
0 0850	1.266E+12
0 1250	1 893E+12
0.2250	1 057E+12
0 3750	4 702E+11
0 5750	5 962E+12
0 8500	1 468E+12
1.2500	1 521E+12
1 7500	4 354E+10
2.2500	5.292E+09
2.7500	4.298E+07
3.5000	5.024E+06
5 0000	2.974E+01
7 0000	3.366E+00
11 0000	3.834E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.29E+00	2.59E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	ALUM	ALUM
BOL HM Constituents:	U	U
BOL Enrichment %:	19 99999834	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		25 77	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		51.54	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	1.29		1 00
Bounding	2.58		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD (ALUM) KSU	[1]Fuel decay start date	1973
SNF ID #	871	Estimates as of	2030
Fuel Units & Descr	61 - ELEMENT	Template	TRIGA-Al (LW/U-Zrx Alum , 10 to 20%, U)
Heavy Metal Mass	BOL=11.285kg EOL=11.206kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 00018
		Template Decay Time	50 years

Estimated Canister usage
18"x10'
0 55

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8 6842E-09	109 98	219 97	0 00E+00	9.55E-07	1 91E-06	Avg MeV	
Am-241	4 9459E-03	109 98	219 97	0 00E+00	5 44E-01	1 09E+00	0.0150	1 079E+13
Am-242m	1 6241E-06	109 98	219 97	0 00E+00	1.79E-04	3 57E-04	0.0250	2.236E+12
Am-243	2 3233E-07	109 98	219 97	0 00E+00	2.56E-05	5 11E-05	0 0375	2 018E+12
C-14	4 3083E-05	109 98	219 97	0 00E+00	4.74E-03	9 48E-03	0 0575	2 112E+12
Cl-36	4 3023E-08	109 98	219 97	0 00E+00	4.73E-06	9 46E-06	0 0850	1.260E+12
Cm-243	9 1880E-08	109 98	219 97	0 00E+00	1.01E-05	2.02E-05	0 1250	9 348E+11
Cm-244	5 6346E-07	109 98	219 97	0 00E+00	6.20E-05	1.24E-04	0.2250	1 106E+12
Co-60	8 3699E-05	109 98	219 97	0 00E+00	9.21E-03	1 84E-02	0.3750	4 770E+11
Cs-134	2 8211E-08	109 98	219 97	0 00E+00	3.10E-06	6.21E-06	0.5750	8 009E+12
Cs-135	3 1549E-05	109 98	219 97	0 00E+00	3 47E-03	6 94E-03	0.8500	2 181E+11
Cs-137	9 7519E-01	109 98	219 97	0 00E+00	1 07E+02	2 15E+02	1.2500	1 844E+11
Eu-154	3 5970E-02	109 98	219 97	0 00E+00	3 96E+00	7.91E+00	1 7500	6 611E+09
Eu-155	8 1774E-04	109 98	219 97	0 00E+00	8.99E-02	1 80E-01	2.2500	2.242E+05
Fe-55	5 3940E-08	109 98	219 97	0 00E+00	5.93E-06	1 19E-05	2 7500	1 059E+05
H-3	8 6571E-04	109 98	219 97	0 00E+00	9.52E-02	1 90E-01	3 5000	3 053E+02
I-129	7 3805E-07	109 98	219 97	0 00E+00	8.12E-05	1 62E-04	5 0000	1.285E+02
Kr-85	1 3771E-02	109 98	219 97	0 00E+00	1.51E+00	3 03E+00	7 0000	1 450E+01
Np-237	1 5218E-06	109 98	219 97	0 00E+00	1.67E-04	3 35E-04	11 0000	1 649E+00
Pa-231	1 4152E-08	109 98	219 97	0 00E+00	1.56E-06	3 11E-06		
Pb-210	7 9774E-13	109 98	219 97	0 00E+00	8 77E-11	1 75E-10		
Pm-147	1 4362E-05	109 98	219 97	0 00E+00	1.58E-03	3 16E-03		
Pu-238	9 4782E-04	109 98	219 97	0 00E+00	1.04E-01	2 08E-01		
Pu-239	5 6872E-03	109 98	219 97	0 00E+00	6.26E-01	1.25E+00		
Pu-240	2.2541E-03	109 98	219 97	0 00E+00	2.48E-01	4 96E-01		
Pu-241	1 4433E-02	109 98	219 97	0 00E+00	1.59E+00	3 17E+00		
Pu-242	3 0602E-07	109 98	219.97	0 00E+00	3.37E-05	6 73E-05		
Ra-226	1 8857E-12	109 98	219 97	0 00E+00	2.07E-10	4 15E-10		
Ra-228	2 3729E-10	109 98	219 97	0 00E+00	2.61E-08	5 22E-08		
Ru-106	3 4857E-15	109 98	219 97	0 00E+00	3.83E-13	7 67E-13		
Se-79	1.2931E-05	109 98	219 97	0 00E+00	1.42E-03	2 84E-03		
Sn-126	1.2235E-05	109 98	219 97	0 00E+00	1.35E-03	2 69E-03		
Sr-90	8 9173E-01	109 98	219 97	0 00E+00	9 81E+01	1 96E+02		
Tc-99	4 4120E-04	109 98	219 97	0 00E+00	4.85E-02	9 71E-02		
Th-229	8 2752E-10	109 98	219 97	0 00E+00	9 10E-08	1 82E-07		
Th-230	1 4908E-10	109 98	219 97	0 00E+00	1.64E-08	3 28E-08		
Th-232	2.3744E-10	109 98	219 97	0 00E+00	2 61E-08	5 22E-08		
Tl-208	1.3668E-08	109 98	219 97	0 00E+00	1.50E-06	3 01E-06		
U-232	3 6797E-08	109 98	219.97	0 00E+00	4 05E-06	8 09E-06		
U-233	1.3164E-07	109 98	219 97	0 00E+00	1 45E-05	2 90E-05		
U-234	3 3865E-07	109 98	219 97	0 00E+00	3 72E-05	7.45E-05		
U-235	-2 6144E-06	109 98	0 00	4 88E-03	4 59E-03	4 88E-03		
U-236	1.2722E-05	109 98	219 97	0 00E+00	1 40E-03	2 80E-03		
U-238	-3 8857E-08	109 98	0 00	3 03E-03	3 03E-03	3 03E-03		
Y-90	8 9203E-01	109 98	219 97	0 00E+00	9 81E+01	1 96E+02		
Other Radionuclides					1.23E+02	2 46E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.26E+00	2.53E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary	From SFD	Used	Basis for Parameter Differences:
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding	ALUM	ALUM	
BOL HM Constituents	U	U	
BOL Enrichment %	20	10 to 20 1	

Burnup Summary (MWd)[2]	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	109 98	75 69	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		219 97	Bounding burnup assumed to be twice nominal burnup

Checks	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 26	0 69	1 00
Bounding	0 53		

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) MSU
SNF ID #: 878
Fuel Units & Descr: 58 - ELEMENT
Heavy Metal Mass: BOL=10 73kg; EOL=10 655kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1973
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum , 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 50 years

Estimated Canister usage, 18"x10': 0 52

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 6842E-09	71 97	143 94	0 00E+00	6 25E-07	1.25E-06
Am-241	4 9459E-03	71.97	143 94	0 00E+00	3 56E-01	7.12E-01
Am-242m	1 6241E-06	71.97	143 94	0 00E+00	1 17E-04	2.34E-04
Am-243	2.3233E-07	71 97	143 94	0 00E+00	1 67E-05	3.34E-05
C-14	4.3083E-05	71.97	143 94	0 00E+00	3 10E-03	6.20E-03
Cl-36	4.3023E-08	71.97	143 94	0 00E+00	3 10E-06	6.19E-06
Cm-243	9 1880E-08	71 97	143 94	0 00E+00	6 61E-06	1.32E-05
Cm-244	5 6346E-07	71 97	143 94	0 00E+00	4 06E-05	8 11E-05
Co-60	8 3699E-05	71 97	143 94	0 00E+00	6 02E-03	1.20E-02
Cs-134	2 8211E-08	71 97	143 94	0 00E+00	2 03E-06	4 06E-06
Cs-135	3 1549E-05	71 97	143 94	0 00E+00	2 27E-03	4 54E-03
Cs-137	9 7519E-01	71 97	143 94	0 00E+00	7 02E+01	1 40E+02
Eu-154	3 5970E-02	71 97	143 94	0 00E+00	2 59E+00	5.18E+00
Eu-155	8 1774E-04	71 97	143 94	0 00E+00	5 89E-02	1 18E-01
Fe-55	5 3940E-08	71 97	143 94	0 00E+00	3 88E-06	7 76E-06
H-3	8 6571E-04	71 97	143 94	0 00E+00	6 23E-02	1 25E-01
I-129	7 3805E-07	71 97	143 94	0 00E+00	5 31E-05	1 06E-04
Kr-85	1 3771E-02	71 97	143 94	0 00E+00	9 91E-01	1 98E+00
Np-237	1 5218E-06	71 97	143 94	0 00E+00	1 10E-04	2 19E-04
Pa-231	1 4152E-08	71 97	143 94	0 00E+00	1 02E-06	2 04E-06
Pb-210	7 9774E-13	71 97	143 94	0 00E+00	5 74E-11	1 15E-10
Pm-147	1 4362E-05	71 97	143 94	0 00E+00	1 03E-03	2 07E-03
Pu-238	9 4782E-04	71 97	143 94	0 00E+00	6 82E-02	1 36E-01
Pu-239	5 6872E-03	71 97	143 94	0 00E+00	4 09E-01	8 19E-01
Pu-240	2 2541E-03	71 97	143 94	0 00E+00	1 62E-01	3 24E-01
Pu-241	1 4433E-02	71 97	143 94	0 00E+00	1 04E+00	2 08E+00
Pu-242	3 0602E-07	71 97	143 94	0 00E+00	2.20E-05	4 40E-05
Ra-226	1 8857E-12	71 97	143 94	0 00E+00	1 36E-10	2 71E-10
Ra-228	2 3729E-10	71 97	143 94	0 00E+00	1 71E-08	3 42E-08
Ru-106	3 4857E-15	71 97	143 94	0 00E+00	2.51E-13	5 02E-13
Se-79	1 2931E-05	71 97	143 94	0 00E+00	9.31E-04	1 86E-03
Sn-126	1.2235E-05	71 97	143 94	0 00E+00	8 81E-04	1 76E-03
Sr-90	8.9173E-01	71 97	143 94	0 00E+00	6 42E+01	1 28E+02
Tc-99	4 4120E-04	71 97	143 94	0 00E+00	3.18E-02	6 35E-02
Th-229	8.2752E-10	71 97	143 94	0 00E+00	5 96E-08	1.19E-07
Th-230	1 4908E-10	71.97	143 94	0 00E+00	1 07E-08	2 15E-08
Th-232	2.3744E-10	71.97	143 94	0 00E+00	1.71E-08	3 42E-08
Tl-208	1.3668E-08	71.97	143 94	0 00E+00	9 84E-07	1 97E-06
U-232	3 6797E-08	71.97	143 94	0 00E+00	2 65E-06	5 30E-06
U-233	1 3164E-07	71.97	143 94	0 00E+00	9 47E-06	1 89E-05
U-234	3.3865E-07	71.97	143 94	0 00E+00	2 44E-05	4 87E-05
U-235	-2 6144E-06	71.97	0 00	4 64E-03	4 45E-03	4 64E-03
U-236	1.2722E-05	71.97	143 94	0 00E+00	9 16E-04	1 83E-03
U-238	-3 8857E-08	71.97	0 00	2 89E-03	2 88E-03	2.89E-03
Y-90	8 9203E-01	71.97	143 94	0 00E+00	6 42E+01	1.28E+02
Other Radionuclides					8 04E+01	1 61E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	7 058E+12
0 0250	1 463E+12
0 0375	1.321E+12
0 0575	1.382E+12
0 0850	8.244E+11
0 1250	6 117E+11
0 2250	7.235E+11
0 3750	3 122E+11
0 5750	5.241E+12
0 8500	1 427E+11
1 2500	1.206E+11
1 7500	4 326E+09
2 2500	1 467E+05
2 7500	6 933E+04
3 5000	2 046E+02
5 0000	8 619E+01
7 0000	9 729E+00
11 0000	1 106E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.28E-01	1 65E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences:
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding	ALUM	ALUM	
BOL HM Constituents	U	U	
BOL Enrichment %	20	10 to 20 1	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	52.29	71 97	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		143 94	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 18	1 38	1 00
Bounding	0 36		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD (ALUM) REED COLLEGE	[1]Fuel decay start date	2026
SNF ID #	256	Estimates as of	2030
Fuel Units & Descr.	58 - ELEMENT	Template	TRIGA-Al (LW/U-Zrx Alum , 10 to 20% U)
Heavy Metal Mass	BOL=10.927kg EOL=10.887kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 00018
		Template Decay Time	5 years

Estimated Canister usage: 18"x10' = 0 52

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 0632E-10	53 25	106 50	0 00E+00	4.29E-08	8 59E-08
Am-241	2.2586E-03	53 25	106 50	0 00E+00	1.20E-01	2 41E-01
Am-242m	1.9925E-06	53 25	106.50	0 00E+00	1 06E-04	2 12E-04
Am-243	2.3323E-07	53 25	106 50	0 00E+00	1.24E-05	2 48E-05
C-14	4.3308E-05	53 25	106.50	0 00E+00	2.31E-03	4 61E-03
Cl-36	4.3023E-08	53 25	106 50	0 00E+00	2.29E-06	4 58E-06
Cm-243	2.7429E-07	53 25	106 50	0 00E+00	1 46E-05	2 92E-05
Cm-244	3.1504E-06	53 25	106 50	0 00E+00	1 68E-04	3 36E-04
Co-60	3 1008E-02	53 25	106 50	0 00E+00	1 65E+00	3 30E+00
Cs-134	1 0367E-01	53 25	106 50	0 00E+00	5.52E+00	1 10E+01
Cs-135	3 1549E-05	53 25	106 50	0 00E+00	1 68E-03	3 36E-03
Cs-137	2 7564E+00	53 25	106.50	0 00E+00	1.47E+02	2 94E+02
Eu-154	1.3490E+00	53 25	106.50	0 00E+00	7 18E+01	1 44E+02
Eu-155	4 3880E-01	53 25	106.50	0 00E+00	2 34E+01	4 67E+01
Fe-55	8 6782E-03	53 25	106.50	0 00E+00	4 62E-01	9.24E-01
H-3	1 0805E-02	53 25	106.50	0 00E+00	5 75E-01	1 15E+00
I-129	7.3805E-07	53 25	106.50	0 00E+00	3 93E-05	7.86E-05
Kr-85	2 5218E-01	53 25	106.50	0 00E+00	1.34E+01	2 69E+01
Np-237	1 4463E-06	53 25	106.50	0.00E+00	7 70E-05	1 54E-04
Pa-231	3 5970E-09	53.25	106 50	0.00E+00	1 92E-07	3 83E-07
Pb-210	8 2511E-15	53.25	106.50	0.00E+00	4 39E-13	8 79E-13
Pm-147	2 0767E+00	53.25	106 50	0 00E+00	1 11E+02	2.21E+02
Pu-238	1 3514E-03	53.25	106 50	0 00E+00	7.20E-02	1 44E-01
Pu-239	5 6947E-03	53.25	106 50	0 00E+00	3 03E-01	6 06E-01
Pu-240	2 2647E-03	53.25	106 50	0 00E+00	1.21E-01	2 41E-01
Pu-241	1 2574E-01	53.25	106 50	0 00E+00	6 70E+00	1.34E+01
Pu-242	3 0602E-07	53.25	106 50	0 00E+00	1 63E-05	3 26E-05
Ra-226	5 7353E-14	53.25	106 50	0 00E+00	3 05E-12	6 11E-12
Ra-228	1 8150E-10	53.25	106 50	0 00E+00	9 66E-09	1 93E-08
Ru-106	9 3744E-02	53.25	106 50	0 00E+00	4 99E+00	9 98E+00
Se-79	1 2938E-05	53.25	106 50	0 00E+00	6 89E-04	1 38E-03
Sn-126	1 2239E-05	53.25	106 50	0.00E+00	6 52E-04	1 30E-03
Sr-90	2 6000E+00	53.25	106 50	0 00E+00	1 38E+02	2 77E+02
Tc-99	4 4120E-04	53.25	106 50	0 00E+00	2 35E-02	4 70E-02
Th-229	1 4749E-10	53.25	106 50	0 00E+00	7 85E-09	1.57E-08
Th-230	1 9549E-11	53.25	106 50	0 00E+00	1.04E-09	2 08E-09
Th-232	2 3744E-10	53.25	106 50	0 00E+00	1.26E-08	2 53E-08
Tl-208	1 9459E-08	53.25	106 50	0 00E+00	1.04E-06	2 07E-06
U-232	5 6015E-08	53.25	106 50	0 00E+00	2.98E-06	5 97E-06
U-233	1.3132E-07	53.25	106 50	0 00E+00	6 99E-06	1 40E-05
U-234	1 7323E-07	53.25	106 50	0 00E+00	9.22E-06	1.84E-05
U-235	-2 6159E-06	53.25	0 00	4 70E-03	4.56E-03	4.70E-03
U-236	1 2717E-05	53.25	106 50	0 00E+00	6 77E-04	1.35E-03
U-238	-3.8857E-08	53.25	0 00	2 94E-03	2 94E-03	2.94E-03
Y-90	2 6015E+00	53.25	106 50	0 00E+00	1.39E+02	2 77E+02
Other Radionuclides					2.02E+02	4 05E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.802E+13
0 0250	3 912E+12
0 0375	4.873E+12
0 0575	3 736E+12
0 0850	2 615E+12
0 1250	3 911E+12
0.2250	2 183E+12
0 3750	9 716E+11
0 5750	1.232E+13
0 8500	3 032E+12
1.2500	3 143E+12
1 7500	8 995E+10
2.2500	1 093E+10
2 7500	8 881E+07
3 5000	1 038E+07
5 0000	6 755E+01
7 0000	7 658E+00
11 0000	8 730E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.68E+00	5.35E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19.89205598	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	53.25	38 75	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		106.50	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 13	0 73	1 00
Bounding	0 26		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) SLOVENIA
SNF ID #: 468
Fuel Units & Descr: 67 - ELEMENT
Heavy Metal Mass: BOL=11 879kg, EOL=11 531kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1999
Estimates as of: 2030
Template: TRIGA-Al (LW/U Zrx, Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 25 years

Estimated Canister usage
18"x10'
0 60

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3 8271E-09	405.21	810 42	0 00E+00	1 55E-06	3 10E-06	Avg MeV	
Am-241	4 4195E-03	405.21	810 42	0 00E+00	1 79E+00	3 58E+00	0 0150	7 324E+13
Am-242m	1 8195E-06	405.21	810 42	0 00E+00	7 37E-04	1 47E-03	0 0250	1 513E+13
Am-243	2 3278E-07	405.21	810 42	0 00E+00	9 43E-05	1 89E-04	0 0375	1 515E+13
C-14	4 3203E-05	405.21	810 42	0 00E+00	1 75E-02	3 50E-02	0 0575	1 453E+13
Cl-36	4 3023E-08	405 21	810 42	0 00E+00	1 74E-05	3 49E-05	0 0850	8 741E+12
Cm-243	1 6872E-07	405.21	810 42	0 00E+00	6 84E-05	1 37E-04	0 1250	8 886E+12
Cm-244	1 4660E-06	405.21	810 42	0 00E+00	5 94E-04	1 19E-03	0.2250	7 908E+12
Co-60	2 2376E-03	405 21	810 42	0 00E+00	9 07E-01	1 81E+00	0.3750	3.289E+12
Cs-134	1 2525E-04	405.21	810 42	0 00E+00	5 08E-02	1 02E-01	0 5750	5 320E+13
Cs-135	3 1549E-05	405.21	810 42	0 00E+00	1 28E-02	2 56E-02	0 8500	4 391E+12
Cs-137	1 7368E+00	405 21	810 42	0 00E+00	7 04E+02	1 41E+03	1.2500	4 607E+12
Eu-154	2 6947E-01	405.21	810 42	0 00E+00	1 09E+02	2 18E+02	1 7500	1 410E+11
Eu-155	2 6857E-02	405.21	810 42	0 00E+00	1 09E+01	2 18E+01	2.2500	2.164E+06
Fe-55	4 2105E-05	405.21	810 42	0 00E+00	1 71E-02	3 41E-02	2 7500	4 983E+05
H-3	3 5173E-03	405.21	810 42	0 00E+00	1 43E+00	2 85E+00	3 5000	1 181E+03
I-129	7 3805E-07	405.21	810 42	0 00E+00	2 99E-04	5 98E-04	5 0000	4 616E+02
Kr-85	6 9263E-02	405.21	810 42	0 00E+00	2 81E+01	5 61E+01	7 0000	5.207E+01
Np-237	1 4752E-06	405.21	810 42	0 00E+00	5 98E-04	1 20E-03	11 0000	5 920E+00
Pa-231	8 3970E-09	405.21	810 42	0 00E+00	3 40E-06	6 81E-06		
Pb-210	1 4995E-13	405.21	810 42	0 00E+00	6 08E-11	1.22E-10		
Pm-147	1 0567E-02	405.21	810 42	0 00E+00	4 28E+00	8 56E+00		
Pu-238	1 1543E-03	405.21	810 42	0 00E+00	4 68E-01	9 35E-01		
Pu-239	5 6917E-03	405.21	810 42	0 00E+00	2 31E+00	4 61E+00		
Pu-240	2.2602E-03	405.21	810 42	0 00E+00	9 16E-01	1 83E+00		
Pu-241	4 8045E-02	405.21	810 42	0 00E+00	1 95E+01	3 89E+01		
Pu-242	3 0602E-07	405.21	810 42	0 00E+00	1.24E-04	2 48E-04		
Ra-226	5 1293E-13	405.21	810 42	0 00E+00	2 08E-10	4 16E-10		
Ra-228	2 3323E-10	405.21	810 42	0 00E+00	9 45E-08	1 89E-07		
Ru-106	1 0075E-07	405.21	810 42	0 00E+00	4 08E-05	8 17E-05		
Se-79	1.2935E-05	405.21	810 42	0 00E+00	5.24E-03	1 05E-02		
Sn-126	1 2238E-05	405.21	810 42	0 00E+00	4 96E-03	9 92E-03		
Sr-90	1 6165E+00	405.21	810 42	0 00E+00	6 55E+02	1 31E+03		
Tc-99	4 4120E-04	405.21	810 42	0 00E+00	1.79E-01	3.58E-01		
Th-229	4 5684E-10	405 21	810 42	0 00E+00	1 85E-07	3.70E-07		
Th-230	6.8271E-11	405.21	810 42	0 00E+00	2.77E-08	5.53E-08		
Th-232	2 3744E-10	405.21	810 42	0 00E+00	9 62E-08	1 92E-07		
Tl-208	1.7368E-08	405.21	810 42	0 00E+00	7.04E-06	1 41E-05		
U-232	4 6797E-08	405.21	810 42	0 00E+00	1.90E-05	3.79E-05	Thermal Power	
U-233	1 3146E-07	405.21	810 42	0 00E+00	5.33E-05	1 07E-04	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-234	2.5729E-07	405 21	810 42	0 00E+00	1 04E-04	2 09E-04		
U-235	-2 6159E-06	405.21	0 00	5 14E-03	4 08E-03	5.14E-03	9 02E+00	1.80E+01
U-236	1.2719E-05	405.21	810 42	0 00E+00	5.15E-03	1 03E-02	Total	Total
U-238	-3 8857E-08	405.21	0 00	3 19E-03	3.18E-03	3.19E-03		
Y-90	1 6165E+00	405 21	810 42	0 00E+00	6 55E+02	1.31E+03		
Other Radionuclides					7 63E+02	1.53E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20 00337313	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	405.21	332.55	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		810 42	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 92	0 82
Bounding	1.85	

Estimated EOL HM/Given EOL HM: 0 99

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD (ALUM) SO KOREA	[1]Fuel decay start date	1972
SNF ID #	483	Estimates as of	2030
Fuel Units & Descr	69 - ELEMENT	Template	TRIGA-Al (LW/U-Zrx Alum , 10 to 20% U)
Heavy Metal Mass	BOL=13 11kg EOL=12.958kg	[2]Template Burnup(MWd):	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 00018
		Template Decay Time	50 years

Estimated Canister usage: 18"x10' = 0 62

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 6842E-09	383.31	766 62	0 00E+00	3 33E-06	6 66E-06
Am-241	4 9459E-03	383.31	766 62	0 00E+00	1 90E+00	3 79E+00
Am-242m	1 6241E-06	383.31	766.62	0 00E+00	6 23E-04	1 25E-03
Am-243	2 3233E-07	383.31	766 62	0 00E+00	8 91E-05	1 78E-04
C-14	4 3083E-05	383.31	766 62	0 00E+00	1 65E-02	3 30E-02
Cl-36	4 3023E-08	383.31	766 62	0 00E+00	1 65E-05	3 30E-05
Cm-243	9 1880E-08	383.31	766 62	0 00E+00	3 52E-05	7 04E-05
Cm-244	5 6346E-07	383 31	766 62	0 00E+00	2 16E-04	4 32E-04
Co-60	8 3699E-05	383 31	766 62	0 00E+00	3.21E-02	6 42E-02
Cs-134	2 8211E-08	383 31	766 62	0 00E+00	1 08E-05	2 16E-05
Cs-135	3 1549E-05	383 31	766 62	0 00E+00	1.21E-02	2 42E-02
Cs-137	9 7519E-01	383 31	766 62	0 00E+00	3 74E+02	7 48E+02
Eu-154	3 5970E-02	383 31	766 62	0 00E+00	1 38E+01	2 76E+01
Eu-155	8 1774E-04	383 31	766 62	0 00E+00	3.13E-01	6.27E-01
Fe-55	5 3940E-08	383 31	766 62	0 00E+00	2 07E-05	4 14E-05
H-3	8 6571E-04	383 31	766 62	0 00E+00	3.32E-01	6 64E-01
I-129	7 3805E-07	383 31	766 62	0 00E+00	2 83E-04	5 66E-04
Kr-85	1.3771E-02	383 31	766 62	0 00E+00	5.28E+00	1 06E+01
Np-237	1 5218E-06	383 31	766 62	0 00E+00	5.83E-04	1.17E-03
Pa-231	1 4152E-08	383 31	766 62	0 00E+00	5 42E-06	1 08E-05
Pb-210	7 9774E-13	383 31	766 62	0 00E+00	3 06E-10	6.12E-10
Pm-147	1 4362E-05	383 31	766 62	0 00E+00	5 51E-03	1.10E-02
Pu-238	9 4782E-04	383 31	766 62	0 00E+00	3 63E-01	7.27E-01
Pu-239	5 6872E-03	383 31	766 62	0 00E+00	2.18E+00	4.36E+00
Pu-240	2.2541E-03	383 31	766 62	0 00E+00	8 64E-01	1.73E+00
Pu-241	1.4433E-02	383 31	766 62	0 00E+00	5.53E+00	1 11E+01
Pu-242	3 0602E-07	383 31	766 62	0.00E+00	1 17E-04	2.35E-04
Ra-226	1.8857E-12	383 31	766 62	0 00E+00	7.23E-10	1.45E-09
Ra-228	2.3729E-10	383 31	766 62	0 00E+00	9 10E-08	1 82E-07
Ru-106	3 4857E-15	383 31	766 62	0 00E+00	1.34E-12	2 67E-12
Se-79	1.2931E-05	383 31	766 62	0 00E+00	4 96E-03	9 91E-03
Sn-126	1.2235E-05	383 31	766 62	0 00E+00	4 69E-03	9 38E-03
Sr-90	8 9173E-01	383 31	766 62	0 00E+00	3 42E+02	6.84E+02
Tc-99	4 4120E-04	383 31	766 62	0 00E+00	1 69E-01	3 38E-01
Th-229	8.2752E-10	383 31	766 62	0 00E+00	3 17E-07	6 34E-07
Th-230	1 4908E-10	383.31	766 62	0 00E+00	5 71E-08	1 14E-07
Th-232	2.3744E-10	383 31	766 62	0 00E+00	9 10E-08	1.82E-07
Tl-208	1.3668E-08	383 31	766 62	0 00E+00	5 24E-06	1 05E-05
U-232	3 6797E-08	383 31	766 62	0 00E+00	1 41E-05	2 82E-05
U-233	1.3164E-07	383 31	766 62	0 00E+00	5 05E-05	1 01E-04
U-234	3 3865E-07	383 31	766 62	0 00E+00	1 30E-04	2 60E-04
U-235	-2 6144E-06	383.31	0 00	5 67E-03	4 66E-03	5 67E-03
U-236	1.2722E-05	383.31	766 62	0 00E+00	4 88E-03	9 75E-03
U-238	-3 8857E-08	383 31	0 00	3 53E-03	3 51E-03	3 53E-03
Y-90	8 9203E-01	383.31	766.62	0 00E+00	3 42E+02	6 84E+02
Other Radionuclides					4 28E+02	8 56E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 759E+13
0 0250	7 793E+12
0 0375	7 033E+12
0 0575	7.360E+12
0 0850	4 391E+12
0 1250	3.258E+12
0.2250	3.853E+12
0.3750	1 663E+12
0.5750	2.791E+13
0.8500	7 601E+11
1.2500	6.425E+11
1 7500	2.304E+10
2.2500	7.812E+05
2 7500	3 692E+05
3.5000	1.026E+03
5 0000	4.317E+02
7 0000	4.867E+01
11 0000	5.530E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 41E+00	8.81E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	383.31	144 90
Bounding		766 62

Basis for burnup used m estimate:
Nominal burnup taken directly from SFD (converted to MWd)
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 79	0 38
Bounding	1.58	

Estimated EOL HM/Given EOL HM: 0 98

[1]Reactor shutdown core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) U OF IL
SNF ID #: 447
Fuel Units & Descr: 58 - ELEMENT
Heavy Metal Mass: BOL=10 44kg; EOL=10 057kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' = 0 52

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 0632E-10	365 39	730 78	0 00E+00	2 95E-07	5 89E-07
Am-241	2.2586E-03	365 39	730 78	0 00E+00	8 25E-01	1 65E+00
Am-242m	1 9925E-06	365 39	730 78	0 00E+00	7 28E-04	1 46E-03
Am-243	2 3323E-07	365 39	730 78	0 00E+00	8 52E-05	1.70E-04
C-14	4 3308E-05	365 39	730 78	0 00E+00	1 58E-02	3.16E-02
Cl-36	4 3023E-08	365 39	730 78	0 00E+00	1 57E-05	3.14E-05
Cm-243	2.7429E-07	365 39	730 78	0 00E+00	1 00E-04	2 00E-04
Cm-244	3 1504E-06	365.39	730 78	0 00E+00	1 15E-03	2.30E-03
Co-60	3 1008E-02	365.39	730 78	0 00E+00	1 13E+01	2.27E+01
Cs-134	1 0367E-01	365 39	730 78	0 00E+00	3 79E+01	7.58E+01
Cs-135	3 1549E-05	365.39	730 78	0 00E+00	1 15E-02	2 31E-02
Cs-137	2 7564E+00	365.39	730 78	0 00E+00	1 01E+03	2 01E+03
Eu-154	1 3490E+00	365.39	730 78	0 00E+00	4 93E+02	9 86E+02
Eu-155	4 3880E-01	365.39	730 78	0 00E+00	1 60E+02	3.21E+02
Fe-55	8 6782E-03	365 39	730 78	0 00E+00	3.17E+00	6 34E+00
H-3	1 0805E-02	365.39	730 78	0 00E+00	3.95E+00	7 90E+00
I-129	7 3805E-07	365 39	730 78	0 00E+00	2.70E-04	5 39E-04
Kr-85	2 5218E-01	365 39	730 78	0 00E+00	9.21E+01	1 84E+02
Np-237	1 4463E-06	365 39	730 78	0 00E+00	5.28E-04	1 06E-03
Pa-231	3 5970E-09	365 39	730 78	0 00E+00	1 31E-06	2 63E-06
Pb-210	8.2511E-15	365 39	730 78	0 00E+00	3 01E-12	6 03E-12
Pm-147	2 0767E+00	365 39	730 78	0 00E+00	7.59E+02	1 52E+03
Pu-238	1 3514E-03	365 39	730 78	0 00E+00	4 94E-01	9 88E-01
Pu-239	5 6947E-03	365 39	730 78	0 00E+00	2 08E+00	4 16E+00
Pu-240	2.2647E-03	365 39	730.78	0 00E+00	8 27E-01	1 65E+00
Pu-241	1.2574E-01	365 39	730.78	0 00E+00	4 59E+01	9 19E+01
Pu-242	3 0602E-07	365 39	730.78	0 00E+00	1 12E-04	2 24E-04
Ra-226	5 7353E-14	365 39	730.78	0 00E+00	2 10E-11	4 19E-11
Ra-228	1 8150E-10	365 39	730.78	0 00E+00	6 63E-08	1 33E-07
Ru-106	9.3744E-02	365 39	730.78	0 00E+00	3 43E+01	6 85E+01
Se-79	1.2938E-05	365 39	730.78	0 00E+00	4 73E-03	9 46E-03
Sn-126	1.2239E-05	365 39	730.78	0 00E+00	4 47E-03	8 94E-03
Sr-90	2.6000E+00	365 39	730.78	0 00E+00	9 50E+02	1 90E+03
Tc-99	4 4120E-04	365 39	730.78	0 00E+00	1 61E-01	3.22E-01
Th-229	1.4749E-10	365 39	730.78	0 00E+00	5 39E-08	1 08E-07
Th-230	1.9549E-11	365 39	730 78	0 00E+00	7 14E-09	1 43E-08
Th-232	2.3744E-10	365 39	730.78	0.00E+00	8 68E-08	1.74E-07
Tl-208	1.9459E-08	365 39	730.78	0 00E+00	7 11E-06	1 42E-05
U-232	5 6015E-08	365 39	730 78	0 00E+00	2 05E-05	4 09E-05
U-233	1.3132E-07	365 39	730 78	0 00E+00	4 80E-05	9.60E-05
U-234	1 7323E-07	365 39	730 78	0 00E+00	6.33E-05	1.27E-04
U-235	-2 6159E-06	365 39	0 00	4 51E-03	3 56E-03	4 51E-03
U-236	1.2717E-05	365 39	730 78	0 00E+00	4 65E-03	9.29E-03
U-238	-3 8857E-08	365 39	0 00	2 81E-03	2.79E-03	2 81E-03
Y-90	2 6015E+00	365 39	730 78	0 00E+00	9 51E+02	1.90E+03
Other Radionuclides					1 39E+03	2.78E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.236E+14
0 0250	2 684E+13
0 0375	3.344E+13
0 0575	2.563E+13
0 0850	1 794E+13
0 1250	2 684E+13
0.2250	1 498E+13
0.3750	6 667E+12
0.5750	8 452E+13
0 8500	2 081E+13
1.2500	2 157E+13
1 7500	6 172E+11
2.2500	7 503E+10
2 7500	6 094E+08
3 5000	7 123E+07
5 0000	4 234E+02
7 0000	4 792E+01
11 0000	5 458E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 84E+01	3 67E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19 99999834	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	203.50	365 39	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		730 78	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0.95	1 80	1 00
Bounding	1 89		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD (ALUM) U OF IL	[1]Fuel decay start date	2035
SNF ID #	501	Estimates as of	2030
Fuel Units & Descr	1 - ELEMENT	Template	TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
Heavy Metal Mass	BOL=0 18kg EOL=0 173kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 000195
		Template Decay Time	5 years

Estimated Canister usage
18"x10'
0 01

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8 5173E-10	6 30	12 60	0 00E+00	5 37E-09	1 07E-08	Avg MeV	
Am-241	1.8331E-03	6 30	12 60	0 00E+00	1 15E-02	2.31E-02	0 0150	2 037E+12
Am-242m	1.4129E-06	6 30	12 60	0 00E+00	8 90E-06	1.78E-05	0 0250	4 481E+11
Am-243	1.4774E-07	6 30	12 60	0 00E+00	9 31E-07	1 86E-06	0 0375	3.816E+11
C-14	1.2871E-04	6 30	12 60	0 00E+00	8 11E-04	1 62E-03	0 0575	3 917E+11
Cl-36	2.8120E-06	6 30	12 60	0 00E+00	1.77E-05	3.54E-05	0 0850	2 427E+11
Cm-243	1.7940E-07	6.30	12.60	0 00E+00	1.13E-06	2.26E-06	0 1250	1 762E+11
Cm-244	1.6962E-06	6 30	12 60	0 00E+00	1.07E-05	2.14E-05	0.2250	2 059E+11
Co-60	1.2839E+00	6 30	12 60	0 00E+00	8 09E+00	1 62E+01	0 3750	1 045E+11
Cs-134	9 0541E-02	6 30	12.60	0 00E+00	5 70E-01	1 14E+00	0 5750	1.389E+12
Cs-135	3.2195E-05	6 30	12 60	0 00E+00	2.03E-04	4.06E-04	0 8500	5.961E+10
Cs-137	2.7564E+00	6.30	12.60	0 00E+00	1 74E+01	3 47E+01	1.2500	1.211E+12
Eu-154	1.5368E-02	6 30	12 60	0 00E+00	9 68E-02	1.94E-01	1 7500	8 069E+08
Eu-155	2 9293E-02	6 30	12 60	0 00E+00	1.85E-01	3 69E-01	2.2500	1.301E+09
Fe-55	7 7158E-01	6.30	12 60	0 00E+00	4 86E+00	9 72E+00	2 7500	1 032E+07
H-3	1 1111E-02	6 30	12 60	0 00E+00	7.00E-02	1.40E-01	3.5000	1.201E+06
I-129	7.3684E-07	6.30	12 60	0 00E+00	4 64E-06	9.28E-06	5 0000	6 716E+00
Kr-85	2 5263E-01	6 30	12 60	0 00E+00	1.59E+00	3.18E+00	7.0000	7 602E-01
Np-237	1 2427E-06	6.30	12.60	0 00E+00	7.83E-06	1.57E-05	11 0000	8 661E-02
Pa-231	3 8511E-09	6.30	12.60	0 00E+00	2.43E-08	4 85E-08		
Pb-210	7 3880E-15	6.30	12.60	0 00E+00	4 65E-14	9.31E-14		
Pm-147	2 1023E+00	6 30	12 60	0 00E+00	1.32E+01	2.65E+01		
Pu-238	1 0383E-03	6.30	12.60	0 00E+00	6.54E-03	1.31E-02		
Pu-239	5 5293E-03	6 30	12.60	0 00E+00	3 48E-02	6 97E-02		
Pu-240	2 1278E-03	6.30	12 60	0 00E+00	1.34E-02	2 68E-02		
Pu-241	1 0195E-01	6.30	12.60	0 00E+00	6 42E-01	1.28E+00		
Pu-242	2 3128E-07	6.30	12.60	0 00E+00	1 46E-06	2 91E-06		
Ra-226	5 2782E-14	6 30	12 60	0 00E+00	3 33E-13	6 65E-13		
Ra-228	1 9338E-10	6 30	12 60	0 00E+00	1.22E-09	2 44E-09		
Ru-106	9 1684E-02	6 30	12 60	0 00E+00	5 78E-01	1 16E+00		
Se-79	1 3018E-05	6.30	12 60	0 00E+00	8 20E-05	1 64E-04		
Sn-126	1.2167E-05	6 30	12 60	0 00E+00	7 67E-05	1 53E-04		
Sr-90	2 6045E+00	6 30	12 60	0 00E+00	1.64E+01	3.28E+01		
Tc-99	4 4241E-04	6.30	12 60	0 00E+00	2 79E-03	5 57E-03		
Th-229	1.3713E-10	6.30	12.60	0 00E+00	8 64E-10	1 73E-09		
Th-230	1 8090E-11	6.30	12 60	0 00E+00	1 14E-10	2 28E-10		
Th-232	2 5278E-10	6 30	12.60	0 00E+00	1 59E-09	3 19E-09		
Tl-208	1 6947E-08	6.30	12.60	0 00E+00	1 07E-07	2 14E-07		
U-232	4 8737E-08	6.30	12.60	0 00E+00	3 07E-07	6 14E-07	Thermal Power	
U-233	1.2203E-07	6.30	12.60	0 00E+00	7 69E-07	1 54E-06	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-234	1 5925E-07	6.30	12.60	0 00E+00	1 00E-06	2 01E-06	3 67E-01	7.33E-01
U-235	-2 6194E-06	6.30	0 00	7.78E-05	6 13E-05	7 78E-05	Total	Total
U-236	1.2693E-05	6.30	12.60	0 00E+00	8 00E-05	1 60E-04		
U-238	-3 6331E-08	6 30	0 00	4 84E-05	4 82E-05	4 84E-05		
Y-90	2 6060E+00	6.30	12 60	0 00E+00	1 64E+01	3 28E+01		
Other Radionuclides					2 27E+01	4 54E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences:
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST	SST	
BOL HM Constituents:	U	U	
BOL Enrichment %	19 99999834	10 to 20 1	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	3.51	6.30	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		12.60	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	1 03	1 80	1 00
Bounding	2.05		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) U OF UTAH
SNF ID #: 699
Fuel Units & Descr: 63 - ELEMENT
Heavy Metal Mass, BOL=11kg, EOL=10 723kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' 0 57

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 0632E-10	264 59	529 19	0 00E+00	2.13E-07	4 27E-07
Am-241	2 2586E-03	264 59	529 19	0 00E+00	5 98E-01	1 20E+00
Am-242m	1 9925E-06	264 59	529.19	0 00E+00	5 27E-04	1 05E-03
Am-243	2 3323E-07	264 59	529.19	0 00E+00	6 17E-05	1 23E-04
C-14	4 3308E-05	264 59	529.19	0 00E+00	1 15E-02	2 29E-02
Cl-36	4 3023E-08	264 59	529 19	0 00E+00	1 14E-05	2.28E-05
Cm-243	2 7429E-07	264 59	529 19	0 00E+00	7 26E-05	1 45E-04
Cm-244	3 1504E-06	264 59	529 19	0 00E+00	8 34E-04	1 67E-03
Co-60	3 1008E-02	264 59	529 19	0 00E+00	8 20E+00	1 64E+01
Cs-134	1 0367E-01	264 59	529 19	0 00E+00	2 74E+01	5 49E+01
Cs-135	3.1549E-05	264.59	529 19	0 00E+00	8 35E-03	1 67E-02
Cs-137	2.7564E+00	264.59	529 19	0 00E+00	7 29E+02	1 46E+03
Eu-154	1.3490E+00	264.59	529 19	0 00E+00	3 57E+02	7.14E+02
Eu-155	4.3880E-01	264 59	529 19	0 00E+00	1 16E+02	2.32E+02
Fe-55	8 6782E-03	264 59	529 19	0 00E+00	2 30E+00	4 59E+00
H-3	1 0805E-02	264 59	529 19	0 00E+00	2 86E+00	5 72E+00
I-129	7 3805E-07	264 59	529 19	0 00E+00	1 95E-04	3 91E-04
Kr-85	2 5218E-01	264 59	529 19	0 00E+00	6 67E+01	1 33E+02
Np-237	1 4463E-06	264 59	529 19	0 00E+00	3 83E-04	7 65E-04
Pa-231	3 5970E-09	264 59	529 19	0 00E+00	9 52E-07	1 90E-06
Pb-210	8 2511E-15	264 59	529 19	0 00E+00	2 18E-12	4 37E-12
Pm-147	2 0767E+00	264 59	529 19	0 00E+00	5 49E+02	1 10E+03
Pu-238	1 3514E-03	264 59	529.19	0 00E+00	3 58E-01	7 15E-01
Pu-239	5 6947E-03	264 59	529.19	0 00E+00	1 51E+00	3 01E+00
Pu-240	2 2647E-03	264 59	529 19	0 00E+00	5 99E-01	1.20E+00
Pu-241	1.2574E-01	264 59	529 19	0 00E+00	3 33E+01	6 65E+01
Pu-242	3 0602E-07	264 59	529 19	0 00E+00	8 10E-05	1 62E-04
Ra-226	5 7353E-14	264 59	529 19	0 00E+00	1 52E-11	3 04E-11
Ra-228	1 8150E-10	264 59	529 19	0 00E+00	4 80E-08	9 60E-08
Ru-106	9 3744E-02	264.59	529 19	0 00E+00	2 48E+01	4 96E+01
Se-79	1.2938E-05	264.59	529 19	0 00E+00	3 42E-03	6 85E-03
Sn-126	1.2239E-05	264.59	529 19	0 00E+00	3 24E-03	6 48E-03
Sr-90	2 6000E+00	264 59	529 19	0 00E+00	6 88E+02	1 38E+03
Tc-99	4 4120E-04	264 59	529 19	0 00E+00	1 17E-01	2 33E-01
Th-229	1 4749E-10	264.59	529 19	0 00E+00	3 90E-08	7 80E-08
Th-230	1 9549E-11	264 59	529 19	0 00E+00	5.17E-09	1 03E-08
Th-232	2 3744E-10	264 59	529 19	0 00E+00	6.28E-08	1 26E-07
Tl-208	1 9459E-08	264 59	529 19	0 00E+00	5.15E-06	1 03E-05
U-232	5 6015E-08	264 59	529 19	0 00E+00	1.48E-05	2 96E-05
U-233	1 3132E-07	264 59	529 19	0 00E+00	3 47E-05	6.95E-05
U-234	1 7323E-07	264 59	529 19	0 00E+00	4 58E-05	9.17E-05
U-235	-2.6159E-06	264 59	0 00	4.73E-03	4 04E-03	4 73E-03
U-236	1.2717E-05	264 59	529.19	0.00E+00	3 36E-03	6.73E-03
U-238	-3 8857E-08	264 59	0 00	2.96E-03	2 95E-03	2 96E-03
Y-90	2 6015E+00	264 59	529 19	0 00E+00	6 88E+02	1.38E+03
Other Radionuclides					1 01E+03	2 01E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	8 954E+13
0.0250	1 944E+13
0 0375	2 421E+13
0 0575	1 856E+13
0 0850	1 299E+13
0 1250	1 943E+13
0 2250	1 085E+13
0 3750	4 828E+12
0 5750	6 121E+13
0 8500	1 507E+13
1 2500	1.562E+13
1 7500	4 470E+11
2.2500	5 433E+10
2.7500	4 413E+08
3 5000	5 158E+07
5.0000	3 087E+02
7 0000	3 495E+01
11 0000	3 981E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.33E+01	2 66E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19 89699819	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	214 41	264.59
Bounding		529 19

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 65	1.23
Bounding	1 30	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD (ALUM) UNIV OF TEXAS	[1]Fuel decay start date:	1973
SNF ID #	877	Estimates as of	2030
Fuel Units & Descr	69 - ELEMENT	Template	TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
Heavy Metal Mass	BOL=12 765kg, EOL=12 675kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 00018
		Template Decay Time	50 years

Estimated Canister usage 18"x10' = 0 62

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 6842E-09	85 62	171 24	0 00E+00	7 44E-07	1 49E-06
Am-241	4.9459E-03	85 62	171.24	0 00E+00	4.23E-01	8 47E-01
Am-242m	1 6241E-06	85 62	171 24	0 00E+00	1.39E-04	2 78E-04
Am-243	2.3233E-07	85 62	171 24	0 00E+00	1 99E-05	3 98E-05
C-14	4.3083E-05	85 62	171 24	0 00E+00	3 69E-03	7 38E-03
Cl-36	4.3023E-08	85 62	171.24	0 00E+00	3 68E-06	7 37E-06
Cm-243	9 1880E-08	85 62	171 24	0 00E+00	7.87E-06	1.57E-05
Cm-244	5 6346E-07	85 62	171 24	0 00E+00	4 82E-05	9 65E-05
Co-60	8.3699E-05	85 62	171.24	0 00E+00	7.17E-03	1 43E-02
Cs-134	2 8211E-08	85 62	171 24	0 00E+00	2 42E-06	4 83E-06
Cs-135	3.1549E-05	85 62	171 24	0 00E+00	2 70E-03	5 40E-03
Cs-137	9 7519E-01	85 62	171 24	0 00E+00	8 35E+01	1 67E+02
Eu-154	3 5970E-02	85 62	171 24	0 00E+00	3 08E+00	6 16E+00
Eu-155	8 1774E-04	85 62	171.24	0 00E+00	7 00E-02	1 40E-01
Fe-55	5.3940E-08	85 62	171 24	0 00E+00	4 62E-06	9 24E-06
H-3	8 6571E-04	85 62	171 24	0 00E+00	7 41E-02	1 48E-01
I-129	7.3805E-07	85 62	171.24	0 00E+00	6.32E-05	1 26E-04
Kr-85	1.3771E-02	85 62	171 24	0 00E+00	1.18E+00	2 36E+00
Np-237	1.5218E-06	85 62	171 24	0 00E+00	1.30E-04	2 61E-04
Pa-231	1.4152E-08	85 62	171 24	0 00E+00	1.21E-06	2 42E-06
Pb-210	7.9774E-13	85 62	171 24	0 00E+00	6 83E-11	1.37E-10
Pm-147	1 4362E-05	85 62	171 24	0 00E+00	1.23E-03	2 46E-03
Pu-238	9 4782E-04	85 62	171 24	0 00E+00	8 12E-02	1 62E-01
Pu-239	5 6872E-03	85 62	171 24	0 00E+00	4 87E-01	9 74E-01
Pu-240	2.2541E-03	85 62	171.24	0 00E+00	1.93E-01	3 86E-01
Pu-241	1 4433E-02	85 62	171 24	0 00E+00	1.24E+00	2 47E+00
Pu-242	3 0602E-07	85 62	171.24	0 00E+00	2.62E-05	5 24E-05
Ra-226	1 8857E-12	85 62	171.24	0 00E+00	1.61E-10	3 23E-10
Ra-228	2 3729E-10	85.62	171.24	0 00E+00	2.03E-08	4 06E-08
Ru-106	3 4857E-15	85 62	171.24	0 00E+00	2.98E-13	5 97E-13
Se-79	1.2931E-05	85.62	171.24	0 00E+00	1.11E-03	2 21E-03
Sn-126	1.2235E-05	85 62	171.24	0 00E+00	1.05E-03	2 10E-03
Sr-90	8 9173E-01	85 62	171.24	0 00E+00	7 64E+01	1 53E+02
Tc-99	4 4120E-04	85 62	171.24	0 00E+00	3 78E-02	7 56E-02
Th-229	8 2752E-10	85 62	171.24	0 00E+00	7.09E-08	1 42E-07
Th-230	1 4908E-10	85 62	171.24	0 00E+00	1.28E-08	2 55E-08
Th-232	2 3744E-10	85 62	171.24	0 00E+00	2 03E-08	4 07E-08
Tl-208	1.3668E-08	85 62	171.24	0 00E+00	1.17E-06	2 34E-06
U-232	3 6797E-08	85 62	171.24	0 00E+00	3.15E-06	6 30E-06
U-233	1 3164E-07	85 62	171.24	0 00E+00	1.13E-05	2.25E-05
U-234	3 3865E-07	85 62	171.24	0 00E+00	2.90E-05	5 80E-05
U-235	-2.6144E-06	85 62	0 00	5 52E-03	5.29E-03	5 52E-03
U-236	1.2722E-05	85 62	171.24	0 00E+00	1 09E-03	2 18E-03
U-238	-3 8857E-08	85 62	0 00	3 43E-03	3 43E-03	3 43E-03
Y-90	8 9203E-01	85 62	171.24	0 00E+00	7 64E+01	1 53E+02
Other Radionuclides					9 56E+01	1 91E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	8 397E+12
0 0250	1 741E+12
0 0375	1 571E+12
0 0575	1 644E+12
0 0850	9 807E+11
0 1250	7.278E+11
0.2250	8 607E+11
0.3750	3 714E+11
0.5750	6.234E+12
0.8500	1 698E+11
1.2500	1 435E+11
1 7500	5 146E+09
2.2500	1 745E+05
2 7500	8.247E+04
3.5000	2 434E+02
5 0000	1 025E+02
7 0000	1 157E+01
11 0000	1.316E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9 84E-01	1 97E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary	From SFD	Used	Basis for Parameter Differences
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding	ALUM	ALUM	
BOL HM Constituents	U	U	
BOL Enrichment %	20	10 to 20 1	

Burnup Summary (MWd)[2]	From SFD	Estimated	Basis for burnup used in estimate
Nominal	62.20	85.62	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		171.24	Bounding burnup assumed to be twice nominal burnup

Checks	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 18	1.38	1 00
Bounding	0.36		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ALUM) USGS
SNF ID #: 267
Fuel Units & Descr: 222 - ELEMENT
Heavy Metal Mass: BOL=42.224kg, EOL=41.292kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 6.65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' 2 00

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventones(Ci)
Ac-227	8 0632E-10	889 99	1,779 99	0 00E+00	7.18E-07	1 44E-06
Am-241	2 2586E-03	889 99	1,779 99	0 00E+00	2 01E+00	4 02E+00
Am-242m	1 9925E-06	889 99	1,779 99	0 00E+00	1 77E-03	3 55E-03
Am-243	2 3323E-07	889 99	1,779 99	0 00E+00	2 08E-04	4 15E-04
C-14	4 3308E-05	889 99	1,779 99	0 00E+00	3 85E-02	7.71E-02
Cl-36	4 3023E-08	889 99	1,779 99	0 00E+00	3 83E-05	7 66E-05
Cm-243	2 7429E-07	889 99	1,779 99	0 00E+00	2 44E-04	4 88E-04
Cm-244	3 1504E-06	889 99	1,779 99	0 00E+00	2 80E-03	5 61E-03
Co-60	3 1008E-02	889 99	1,779 99	0 00E+00	2 76E+01	5.52E+01
Cs-134	1 0367E-01	889 99	1,779 99	0 00E+00	9 23E+01	1.85E+02
Cs-135	3 1549E-05	889 99	1,779 99	0 00E+00	2 81E-02	5 62E-02
Cs-137	2 7564E+00	889 99	1,779 99	0 00E+00	2 45E+03	4 91E+03
Eu-154	1 3490E+00	889 99	1,779.99	0 00E+00	1.20E+03	2 40E+03
Eu-155	4 3880E-01	889 99	1,779 99	0 00E+00	3 91E+02	7 81E+02
Fe-55	8 6782E-03	889 99	1,779 99	0 00E+00	7 72E+00	1 54E+01
H-3	1 0805E-02	889 99	1,779 99	0 00E+00	9 62E+00	1 92E+01
I-129	7.3805E-07	889 99	1,779 99	0 00E+00	6 57E-04	1 31E-03
Kr-85	2 5218E-01	889 99	1,779 99	0 00E+00	2.24E+02	4 49E+02
Np-237	1.4463E-06	889 99	1,779 99	0 00E+00	1.29E-03	2 57E-03
Pa-231	3.5970E-09	889 99	1,779 99	0 00E+00	3.20E-06	6 40E-06
Pb-210	8 2511E-15	889 99	1,779 99	0 00E+00	7 34E-12	1 47E-11
Pm-147	2 0767E+00	889 99	1,779 99	0 00E+00	1 85E+03	3 70E+03
Pu-238	1 3514E-03	889 99	1,779 99	0 00E+00	1 20E+00	2 41E+00
Pu-239	5 6947E-03	889 99	1,779 99	0 00E+00	5 07E+00	1 01E+01
Pu-240	2 2647E-03	889 99	1,779 99	0 00E+00	2 02E+00	4 03E+00
Pu-241	1.2574E-01	889 99	1,779 99	0 00E+00	1 12E+02	2.24E+02
Pu-242	3 0602E-07	889 99	1,779 99	0 00E+00	2 72E-04	5 45E-04
Ra-226	5 7353E-14	889 99	1,779 99	0 00E+00	5 10E-11	1 02E-10
Ra-228	1 8150E-10	889 99	1,779 99	0 00E+00	1 62E-07	3.23E-07
Ru-106	9 3744E-02	889 99	1,779 99	0 00E+00	8 34E+01	1 67E+02
Se-79	1 2938E-05	889 99	1,779 99	0 00E+00	1 15E-02	2 30E-02
Sn-126	1 2239E-05	889 99	1,779 99	0 00E+00	1 09E-02	2 18E-02
Sr-90	2 6000E+00	889 99	1,779 99	0 00E+00	2 31E+03	4 63E+03
Tc-99	4 4120E-04	889 99	1,779 99	0 00E+00	3 93E-01	7 85E-01
Th-229	1 4749E-10	889 99	1,779 99	0 00E+00	1.31E-07	2 63E-07
Th-230	1 9549E-11	889 99	1,779.99	0 00E+00	1.74E-08	3 48E-08
Th-232	2.3744E-10	889 99	1,779 99	0 00E+00	2.11E-07	4.23E-07
Tl-208	1 9459E-08	889 99	1,779 99	0 00E+00	1 73E-05	3 46E-05
U-232	5 6015E-08	889 99	1,779 99	0 00E+00	4 99E-05	9 97E-05
U-233	1.3132E-07	889 99	1,779 99	0 00E+00	1 17E-04	2 34E-04
U-234	1.7323E-07	889 99	1,779 99	0 00E+00	1 54E-04	3 08E-04
U-235	-2 6159E-06	889 99	0 00	1 82E-02	1 58E-02	1.82E-02
U-236	1.2717E-05	889 99	1,779 99	0 00E+00	1.13E-02	2.26E-02
U-238	-3 8857E-08	889 99	0 00	1 14E-02	1 13E-02	1 14E-02
Y-90	2 6015E+00	889 99	1,779 99	0 00E+00	2 32E+03	4 63E+03
Other Radionuclides					3 38E+03	6 77E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3.012E+14
0 0250	6.539E+13
0 0375	8 145E+13
0 0575	6.244E+13
0.0850	4.371E+13
0 1250	6 537E+13
0.2250	3 649E+13
0.3750	1 624E+13
0.5750	2 059E+14
0 8500	5 068E+13
1.2500	5.253E+13
1 7500	1 503E+12
2.2500	1 827E+11
2 7500	1 484E+09
3 5000	1 735E+08
5 0000	1 042E+03
7 0000	1 179E+02
11 0000	1.343E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 47E+01	8 94E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %:	19 898	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	102.86	889 99
Bounding		1 779 99

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 57	8 65
Bounding	1 14	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD (ALUM) ZAIRE	[1]Fuel decay start date	2010		Estimated Canister usage
SNF ID #	487	Estimates as of	2030		18"x10'
Fuel Units & Descr	56 - ELEMENT	Template	TRIGA-Al (LW/U-Zrx Alum , 10 to 20%, U)		0 50
Heavy Metal Mass	BOL=10 08kg EOL=10 052kg	[2]Template Burnup(MWd)	6 65		
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 00018		
		Template Decay Time	20 years		

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.4556E-09	147.36	294 72	0 00E+00	3 62E-07	7.24E-07	Avg MeV	
Am-241	3 8752E-03	147.36	294 72	0 00E+00	5 71E-01	1 14E+00	0 0150	3 025E+13
Am-242m	1.8617E-06	147.36	294 72	0 00E+00	2.74E-04	5 49E-04	0 0250	6.245E+12
Am-243	2.3293E-07	147.36	294 72	0 00E+00	3 43E-05	6.86E-05	0 0375	6.537E+12
C-14	4.3233E-05	147.36	294 72	0 00E+00	6.37E-03	1.27E-02	0 0575	6 042E+12
Cl-36	4.3023E-08	147.36	294 72	0 00E+00	6.34E-06	1.27E-05	0 0850	3 679E+12
Cm-243	1 9053E-07	147.36	294 72	0 00E+00	2 81E-05	5 62E-05	0 1250	4 129E+12
Cm-244	1 7744E-06	147.36	294 72	0 00E+00	2 61E-04	5.23E-04	0.2250	3.334E+12
Co-60	4.3188E-03	147.36	294 72	0 00E+00	6 36E-01	1.27E+00	0.3750	1.370E+12
Cs-134	6 7188E-04	147.36	294 72	0 00E+00	9 90E-02	1 98E-01	0.5750	2.182E+13
Cs-135	3 1549E-05	147.36	294 72	0 00E+00	4 65E-03	9 30E-03	0.8500	2.322E+12
Cs-137	1 9489E+00	147.36	294 72	0 00E+00	2 87E+02	5 74E+02	1.2500	2.501E+12
Eu-154	4 0301E-01	147 36	294 72	0 00E+00	5 94E+01	1 19E+02	1 7500	7 493E+10
Eu-155	5 4000E-02	147.36	294 72	0 00E+00	7 96E+00	1.59E+01	2.2500	1 188E+06
Fe-55	1.5955E-04	147 36	294 72	0 00E+00	2 35E-02	4 70E-02	2 7500	1.977E+05
H-3	4 6571E-03	147 36	294 72	0 00E+00	6 86E-01	1.37E+00	3.5000	1.367E+03
I-129	7.3805E-07	147 36	294 72	0 00E+00	1 09E-04	2 18E-04	5 0000	1 719E+02
Kr-85	9 5684E-02	147 36	294 72	0 00E+00	1 41E+01	2 82E+01	7 0000	1.942E+01
Np-237	1 4618E-06	147 36	294 72	0 00E+00	2 15E-04	4 31E-04	11 0000	2.209E+00
Pa-231	6 4782E-09	147 36	294 72	0 00E+00	9 55E-07	1 91E-06		
Pb-210	6 3158E-14	147 36	294 72	0 00E+00	9 31E-12	1 86E-11		
Pm-147	3 9564E-02	147 36	294 72	0 00E+00	5 83E+00	1 17E+01		
Pu-238	1 2008E-03	147 36	294 72	0 00E+00	1 77E-01	3 54E-01		
Pu-239	5 6917E-03	147 36	294 72	0 00E+00	8 39E-01	1 68E+00		
Pu-240	2 2617E-03	147 36	294 72	0 00E+00	3 33E-01	6 67E-01		
Pu-241	6 1113E-02	147 36	294 72	0 00E+00	9 01E+00	1 80E+01		
Pu-242	3 0602E-07	147 36	294 72	0 00E+00	4 51E-05	9 02E-05		
Ra-226	2 6707E-13	147 36	294 72	0 00E+00	3 94E-11	7 87E-11		
Ra-228	2 2556E-10	147 36	294 72	0 00E+00	3 32E-08	6 65E-08		
Ru-106	3 1293E-06	147 36	294 72	0 00E+00	4 61E-04	9 22E-04		
Se-79	1 2935E-05	147 36	294 72	0 00E+00	1 91E-03	3 81E-03		
Sn-126	1 2238E-05	147 36	294 72	0 00E+00	1 80E-03	3 61E-03		
Sr-90	1 8195E+00	147 36	294 72	0 00E+00	2 68E+02	5 36E+02		
Tc-99	4 4120E-04	147 36	294.72	0 00E+00	6 50E-02	1.30E-01		
Th-229	3 3308E-10	147 36	294.72	0 00E+00	4 91E-08	9 82E-08		
Th-230	4 6526E-11	147 36	294.72	0 00E+00	6 86E-09	1.37E-08		
Th-232	2 3744E-10	147 36	294.72	0 00E+00	3 50E-08	7.00E-08		
Tl-208	1 8195E-08	147 36	294.72	0 00E+00	2 68E-06	5.36E-06		
U-232	4 9098E-08	147 36	294.72	0 00E+00	7.24E-06	1.45E-05	Thermal Power	
U-233	1 3140E-07	147.36	294.72	0 00E+00	1.94E-05	3 87E-05	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-234	2 2571E-07	147.36	294.72	0 00E+00	3.33E-05	6 65E-05		
U-235	-2 6159E-06	147.36	0 00	4.36E-03	3.97E-03	4.36E-03	3 83E+00	7 65E+00
U-236	1 2719E-05	147.36	294.72	0 00E+00	1.87E-03	3 75E-03	Total	Total
U-238	-3.8857E-08	147.36	0 00	2 71E-03	2 70E-03	2 71E-03		
Y-90	1 8211E+00	147.36	294.72	0 00E+00	2 68E+02	5.37E+02		
Other Radionuclides					3.09E+02	6 17E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding	ALUM	ALUM	
BOL HM Constituents	U	U	
BOL Enrichment %	20	10 to 20 1	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	147.36	26 73	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		294 72	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 40	0 18	0 99
Bounding	0 79		

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 12/20 ROMANIA
SNF ID #: 1078
Fuel Units & Descr: 498 - ELEMENT
Heavy Metal Mass: BOL=124.5kg; EOL=121.462kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20% U)
[2]Template Burnup(MWd): 6.65
Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 4.49

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2.6436E-09	2,899.91	5,799.81	0.00E+00	7.67E-06	1.53E-05
Am-241	3.1429E-03	2,899.91	5,799.81	0.00E+00	9.11E+00	1.82E+01
Am-242m	1.3195E-06	2,899.91	5,799.81	0.00E+00	3.83E-03	7.65E-03
Am-243	1.4753E-07	2,899.91	5,799.81	0.00E+00	4.28E-04	8.56E-04
C-14	1.2847E-04	2,899.91	5,799.81	0.00E+00	3.73E-01	7.45E-01
Cl-36	2.8120E-06	2,899.91	5,799.81	0.00E+00	8.15E-03	1.63E-02
Cm-243	1.2465E-07	2,899.91	5,799.81	0.00E+00	3.61E-04	7.23E-04
Cm-244	9.5564E-07	2,899.91	5,799.81	0.00E+00	2.77E-03	5.54E-03
Co-60	1.7880E-01	2,899.91	5,799.81	0.00E+00	5.18E+02	1.04E+03
Cs-134	5.8692E-04	2,899.91	5,799.81	0.00E+00	1.70E+00	3.40E+00
Cs-135	3.2195E-05	2,899.91	5,799.81	0.00E+00	9.34E-02	1.87E-01
Cs-137	1.9489E+00	2,899.91	5,799.81	0.00E+00	5.65E+03	1.13E+04
Eu-154	4.5895E-03	2,899.91	5,799.81	0.00E+00	1.33E+01	2.66E+01
Eu-155	3.6045E-03	2,899.91	5,799.81	0.00E+00	1.05E+01	2.09E+01
Fe-55	1.4185E-02	2,899.91	5,799.81	0.00E+00	4.11E+01	8.23E+01
H-3	4.7895E-03	2,899.91	5,799.81	0.00E+00	1.39E+01	2.78E+01
I-129	7.3684E-07	2,899.91	5,799.81	0.00E+00	2.14E-03	4.27E-03
Kr-85	9.5820E-02	2,899.91	5,799.81	0.00E+00	2.78E+02	5.56E+02
Np-237	1.2552E-06	2,899.91	5,799.81	0.00E+00	3.64E-03	7.28E-03
Pa-231	7.0406E-09	2,899.91	5,799.81	0.00E+00	2.04E-05	4.08E-05
Pb-210	5.8000E-14	2,899.91	5,799.81	0.00E+00	1.68E-10	3.36E-10
Pm-147	4.0075E-02	2,899.91	5,799.81	0.00E+00	1.16E+02	2.32E+02
Pu-238	9.2256E-04	2,899.91	5,799.81	0.00E+00	2.68E+00	5.35E+00
Pu-239	5.5278E-03	2,899.91	5,799.81	0.00E+00	1.60E+01	3.21E+01
Pu-240	2.1248E-03	2,899.91	5,799.81	0.00E+00	6.16E+00	1.23E+01
Pu-241	4.9549E-02	2,899.91	5,799.81	0.00E+00	1.44E+02	2.87E+02
Pu-242	2.3128E-07	2,899.91	5,799.81	0.00E+00	6.71E-04	1.34E-03
Ra-226	2.4526E-13	2,899.91	5,799.81	0.00E+00	7.11E-10	1.42E-09
Ra-228	2.4015E-10	2,899.91	5,799.81	0.00E+00	6.96E-07	1.39E-06
Ru-106	3.0602E-06	2,899.91	5,799.81	0.00E+00	8.87E-03	1.77E-02
Se-79	1.3015E-05	2,899.91	5,799.81	0.00E+00	3.77E-02	7.55E-02
Sn-126	1.2165E-05	2,899.91	5,799.81	0.00E+00	3.53E-02	7.06E-02
Sr-90	1.8226E+00	2,899.91	5,799.81	0.00E+00	5.29E+03	1.06E+04
Tc-99	4.4241E-04	2,899.91	5,799.81	0.00E+00	1.28E+00	2.57E+00
Th-229	3.0962E-10	2,899.91	5,799.81	0.00E+00	8.98E-07	1.80E-06
Th-230	4.2346E-11	2,899.91	5,799.81	0.00E+00	1.23E-07	2.46E-07
Th-232	2.5278E-10	2,899.91	5,799.81	0.00E+00	7.33E-07	1.47E-06
Tl-208	1.5820E-08	2,899.91	5,799.81	0.00E+00	4.59E-05	9.18E-05
U-232	4.2647E-08	2,899.91	5,799.81	0.00E+00	1.24E-04	2.47E-04
U-233	1.2211E-07	2,899.91	5,799.81	0.00E+00	3.54E-04	7.08E-04
U-234	1.9955E-07	2,899.91	5,799.81	0.00E+00	5.79E-04	1.16E-03
U-235	-2.6194E-06	2,899.91	0.00	5.35E-02	4.59E-02	5.35E-02
U-236	1.2693E-05	2,899.91	5,799.81	0.00E+00	3.68E-02	7.36E-02
U-238	-3.6331E-08	2,899.91	0.00	3.35E-02	3.34E-02	3.35E-02
Y-90	1.8241E+00	2,899.91	5,799.81	0.00E+00	5.29E+03	1.06E+04
Other Radionuclides					5.58E+03	1.12E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0.0150	5.812E+14
0.0250	1.210E+14
0.0375	1.048E+14
0.0575	1.128E+14
0.0850	6.807E+13
0.1250	4.449E+13
0.2250	5.845E+13
0.3750	2.562E+13
0.5750	4.213E+14
0.8500	4.749E+12
1.2500	7.870E+13
1.7500	1.220E+11
2.2500	4.203E+08
2.7500	4.630E+06
3.5000	2.578E+04
5.0000	3.091E+03
7.0000	3.492E+02
11.0000	3.973E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.26E+01	1.45E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19.9	10 to 20.1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	1,213.38	2,899.91	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		5,799.81	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0.68	2.39	1.00
Bounding	1.37		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 20/20 (IFE) ENGLAND
SNF ID #: 1043
Fuel Units & Descr: 2 - ELEMENT
Heavy Metal Mass: BOL=0 376kg EOL=0 367kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage 18"x10": 0 02

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	10 63	21 27	0 00E+00	2 81E-08	5 62E-08
Am-241	3 1429E-03	10 63	21 27	0 00E+00	3 34E-02	6 68E-02
Am-242m	1.3195E-06	10 63	21 27	0 00E+00	1 40E-05	2 81E-05
Am-243	1.4753E-07	10 63	21 27	0.00E+00	1.57E-06	3 14E-06
C-14	1.2847E-04	10 63	21 27	0 00E+00	1.37E-03	2.73E-03
Cl-36	2.8120E-06	10 63	21 27	0 00E+00	2 99E-05	5 98E-05
Cm-243	1.2465E-07	10 63	21 27	0 00E+00	1.33E-06	2 65E-06
Cm-244	9 5564E-07	10 63	21 27	0 00E+00	1.02E-05	2.03E-05
Co-60	1.7880E-01	10 63	21 27	0 00E+00	1 90E+00	3 80E+00
Cs-134	5 8692E-04	10 63	21 27	0 00E+00	6.24E-03	1.25E-02
Cs-135	3.2195E-05	10 63	21.27	0 00E+00	3 42E-04	6 85E-04
Cs-137	1 9489E+00	10 63	21.27	0 00E+00	2 07E+01	4 14E+01
Eu-154	4.5895E-03	10 63	21.27	0 00E+00	4 88E-02	9 76E-02
Eu-155	3 6045E-03	10 63	21.27	0 00E+00	3 83E-02	7 67E-02
Fe-55	1 4185E-02	10 63	21.27	0 00E+00	1.51E-01	3 02E-01
H-3	4 7895E-03	10 63	21.27	0 00E+00	5 09E-02	1 02E-01
I-129	7.3684E-07	10 63	21.27	0 00E+00	7 84E-06	1.57E-05
Kr-85	9 5820E-02	10 63	21.27	0 00E+00	1.02E+00	2 04E+00
Np-237	1.2552E-06	10 63	21.27	0 00E+00	1.33E-05	2 67E-05
Pa-231	7 0406E-09	10 63	21.27	0 00E+00	7 49E-08	1 50E-07
Pb-210	5 8000E-14	10 63	21.27	0 00E+00	6 17E-13	1 23E-12
Pm-147	4 0075E-02	10 63	21.27	0 00E+00	4.26E-01	8 52E-01
Pu-238	9 2256E-04	10 63	21.27	0 00E+00	9 81E-03	1 96E-02
Pu-239	5 5278E-03	10 63	21.27	0 00E+00	5 88E-02	1 18E-01
Pu-240	2 1248E-03	10.63	21.27	0 00E+00	2 26E-02	4 52E-02
Pu-241	4 9549E-02	10 63	21.27	0 00E+00	5 27E-01	1 05E+00
Pu-242	2 3128E-07	10.63	21.27	0 00E+00	2 46E-06	4 92E-06
Ra-226	2 4526E-13	10 63	21.27	0 00E+00	2 61E-12	5 22E-12
Ra-228	2 4015E-10	10.63	21.27	0 00E+00	2 55E-09	5 11E-09
Ru-106	3 0602E-06	10.63	21.27	0 00E+00	3 25E-05	6 51E-05
Se-79	1 3015E-05	10.63	21.27	0 00E+00	1 38E-04	2 77E-04
Sn-126	1 2165E-05	10 63	21.27	0 00E+00	1.29E-04	2 59E-04
Sr-90	1 8226E+00	10 63	21.27	0 00E+00	1 94E+01	3 88E+01
Tc-99	4 4241E-04	10 63	21.27	0 00E+00	4 70E-03	9 41E-03
Th-229	3 0962E-10	10 63	21.27	0 00E+00	3 29E-09	6.58E-09
Th-230	4 2346E-11	10 63	21.27	0 00E+00	4 50E-10	9 01E-10
Th-232	2 5278E-10	10 63	21.27	0 00E+00	2 69E-09	5.38E-09
Tl-208	1.5820E-08	10 63	21.27	0 00E+00	1 68E-07	3 36E-07
U-232	4.2647E-08	10 63	21.27	0 00E+00	4 53E-07	9 07E-07
U-233	1.2211E-07	10 63	21.27	0 00E+00	1 30E-06	2 60E-06
U-234	1 9955E-07	10 63	21.27	0 00E+00	2 12E-06	4.24E-06
U-235	-2.6194E-06	10 63	0 00	1 62E-04	1.34E-04	1 62E-04
U-236	1.2693E-05	10 63	21.27	0 00E+00	1.35E-04	2 70E-04
U-238	-3 6331E-08	10 63	0 00	1 01E-04	1 01E-04	1 01E-04
Y-90	1 8241E+00	10 63	21.27	0 00E+00	1 94E+01	3 88E+01
Other Radionuclides					2 05E+01	4 10E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 131E+12
0 0250	4 437E+11
0 0375	3.843E+11
0 0575	4 135E+11
0 0850	2 496E+11
0 1250	1 631E+11
0 2250	2 143E+11
0 3750	9 394E+10
0 5750	1 545E+12
0 8500	1 741E+10
1.2500	2 886E+11
1 7500	4 474E+08
2.2500	1 541E+06
2 7500	1 698E+04
3.5000	9 443E+01
5 0000	1 128E+01
7 0000	1.275E+00
11 0000	1 450E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.66E-01	5.32E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 94680851	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	10 63	8 97	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		21.27	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.83	0 84
Bounding	1 66	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 20/20 ARRR
SNF ID #: 780
Fuel Units & Descr: 15 - ELEMENT
Heavy Metal Mass: BOL=10.275kg, EOL=8 179kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' 0 14

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	2,000 38	4,000 76	0 00E+00	1 70E-06	3 41E-06
Am-241	1 8331E-03	2,000 38	4,000 76	0 00E+00	3 67E+00	7 33E+00
Am-242m	1 4129E-06	2,000 38	4,000 76	0 00E+00	2 83E-03	5 65E-03
Am-243	1 4774E-07	2,000 38	4,000 76	0 00E+00	2 96E-04	5 91E-04
C-14	1 2871E-04	2,000 38	4,000 76	0 00E+00	2 57E-01	5 15E-01
Cl-36	2 8120E-06	2,000 38	4,000 76	0 00E+00	5 63E-03	1 13E-02
Cm-243	1 7940E-07	2,000 38	4,000 76	0 00E+00	3 59E-04	7 18E-04
Cm-244	1 6962E-06	2,000 38	4,000 76	0 00E+00	3 39E-03	6 79E-03
Co-60	1 2839E+00	2,000 38	4,000 76	0 00E+00	2 57E+03	5 14E+03
Cs-134	9 0541E-02	2,000 38	4,000 76	0 00E+00	1 81E+02	3 62E+02
Cs-135	3 2195E-05	2,000 38	4,000 76	0 00E+00	6 44E-02	1 29E-01
Cs-137	2 7564E+00	2,000 38	4,000 76	0 00E+00	5 51E+03	1.10E+04
Eu-154	1 5368E-02	2,000 38	4,000 76	0 00E+00	3 07E+01	6.15E+01
Eu-155	2 9293E-02	2,000 38	4,000 76	0 00E+00	5 86E+01	1.17E+02
Fe-55	7 7158E-01	2,000 38	4,000 76	0 00E+00	1 54E+03	3 09E+03
H-3	1 1111E-02	2,000 38	4,000 76	0 00E+00	2 22E+01	4 45E+01
I-129	7 3684E-07	2,000 38	4,000 76	0 00E+00	1 47E-03	2 95E-03
Kr-85	2 5263E-01	2,000 38	4,000 76	0 00E+00	5 05E+02	1 01E+03
Np-237	1 2427E-06	2,000 38	4,000 76	0 00E+00	2 49E-03	4 97E-03
Pa-231	3 8511E-09	2,000 38	4,000 76	0 00E+00	7 70E-06	1 54E-05
Pb-210	7 3880E-15	2,000 38	4,000 76	0 00E+00	1 48E-11	2 96E-11
Pm-147	2 1023E+00	2,000 38	4,000 76	0 00E+00	4.21E+03	8.41E+03
Pu-238	1 0383E-03	2,000 38	4,000 76	0 00E+00	2 08E+00	4 15E+00
Pu-239	5 5293E-03	2,000 38	4,000 76	0 00E+00	1 11E+01	2.21E+01
Pu-240	2 1278E-03	2,000 38	4,000 76	0 00E+00	4.26E+00	8.51E+00
Pu-241	1 0195E-01	2,000 38	4,000 76	0 00E+00	2 04E+02	4 08E+02
Pu-242	2 3128E-07	2,000 38	4,000 76	0 00E+00	4 63E-04	9 25E-04
Ra-226	5 2782E-14	2,000 38	4,000 76	0 00E+00	1 06E-10	2.11E-10
Ra-228	1 9338E-10	2,000 38	4,000 76	0 00E+00	3 87E-07	7.74E-07
Ru-106	9 1684E-02	2,000 38	4,000 76	0 00E+00	1 83E+02	3 67E+02
Se-79	1 3018E-05	2,000 38	4,000.76	0 00E+00	2 60E-02	5.21E-02
Sn-126	1 2167E-05	2,000 38	4,000.76	0 00E+00	2 43E-02	4 87E-02
Sr-90	2 6045E+00	2,000 38	4,000.76	0 00E+00	5.21E+03	1 04E+04
Tc-99	4 4241E-04	2,000 38	4,000.76	0 00E+00	8 85E-01	1 77E+00
Th-229	1 3713E-10	2,000 38	4,000.76	0 00E+00	2 74E-07	5 49E-07
Th-230	1 8090E-11	2,000 38	4,000.76	0 00E+00	3 62E-08	7.24E-08
Th-232	2 5278E-10	2,000 38	4,000.76	0 00E+00	5 06E-07	1 01E-06
Tl-208	1 6947E-08	2,000 38	4,000.76	0 00E+00	3.39E-05	6.78E-05
U-232	4 8737E-08	2,000 38	4,000.76	0 00E+00	9 75E-05	1 95E-04
U-233	1.2203E-07	2,000 38	4,000 76	0 00E+00	2 44E-04	4 88E-04
U-234	1 5925E-07	2,000 38	4,000 76	0 00E+00	3 19E-04	6.37E-04
U-235	-2 6194E-06	2,000 38	0 00	4 36E-03	0 00E+00	4 36E-03
U-236	1.2693E-05	2,000 38	4,000 76	0 00E+00	2.54E-02	5 08E-02
U-238	-3 6331E-08	2,000.38	0 00	2.77E-03	2.70E-03	2 77E-03
Y-90	2 6060E+00	2,000 38	4 000 76	0 00E+00	5 21E+03	1 04E+04
Other Radionuclides					7.21E+03	1 44E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6 466E+14
0 0250	1 423E+14
0 0375	1 212E+14
0 0575	1 244E+14
0 0850	7 705E+13
0 1250	5 595E+13
0.2250	6 536E+13
0 3750	3 317E+13
0 5750	4 410E+14
0 8500	1 893E+13
1.2500	3 843E+14
1 7500	2 562E+11
2.2500	4 129E+11
2 7500	3 277E+09
3 5000	3 814E+08
5 0000	2.103E+03
7 0000	2 380E+02
11 0000	2 711E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 15E+02	2.33E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 64963504	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	581 16	2,000.38	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		4 000 76	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	5 71	3 44	1 06
Bounding	11 42		

[1]Reactor shutdown core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD 20/20 MNRC	[1]Fuel decay start date	2035	
SNF ID #	1053	Estimates as of	2030	
Fuel Units & Descr	8 - ELEMENT	Template	TRIGA-SS (LW/U-Zrx	SST 10 to 20%, U)
Heavy Metal Mass	BOL=3 962kg, EOL=3.962kg	[2]Template Burnup(MWd)	6 65	
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 000195	
		Template Decay Time	5 years	

Estimated Canister usage: 18"x10' = 0 07

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-241	1 8331E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-242m	1 4129E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-243	1 4774E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
C-14	1 2871E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cl-36	2 8120E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cm-243	1 7940E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cm-244	1 6962E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Co-60	1 2839E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-134	9 0541E-02	0 00	0 00	0.00E+00	0 00E+00	0 00E+00
Cs-135	3 2195E-05	0 00	0 00	0.00E+00	0 00E+00	0 00E+00
Cs-137	2 7564E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Eu-154	1 5368E-02	0 00	0 00	0.00E+00	0 00E+00	0 00E+00
Eu-155	2 9293E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Fe-55	7 7158E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
H-3	1 1111E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
I-129	7 3684E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Kr-85	2 5263E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Np-237	1 2427E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pa-231	3 8511E-09	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pb-210	7 3880E-15	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pm-147	2 1023E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-238	1 0383E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-239	5 5293E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-240	2 1278E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-241	1 0195E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-242	2 3128E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-226	5 2782E-14	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-228	1 9338E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ru-106	9 1684E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Se-79	1 3018E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sn-126	1.2167E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sr-90	2 6045E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Tc-99	4 4241E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-229	1 3713E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-230	1 8090E-11	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-232	2 5278E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Tl-208	1 6947E-08	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-232	4 8737E-08	0 00	0 00	0 00E+00	0 00E+00	0.00E+00
U-233	1.2203E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-234	1 5925E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-235	-2.6194E-06	0 00	0 00	1 69E-03	1.69E-03	1 69E-03
U-236	1.2693E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-238	-3 6331E-08	0 00	0 00	1 07E-03	1 07E-03	1 07E-03
Y-90	2 6060E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Other Radionuclides					0 00E+00	0 00E+00

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 193E+07
0 0250	0 000E+00
0 0375	5 713E+04
0 0575	3 498E+04
0 0850	4 881E+06
0 1250	9 636E+06
0 2250	3 410E+07
0 3750	8 510E+04
0 5750	4 186E+03
0 8500	6 537E+02
1.2500	3 906E+01
1 7500	1.911E+01
2.2500	1 107E+01
2 7500	6 433E+00
3 5000	5 751E+00
5 0000	2 471E+00
7 0000	2.844E-01
11.0000	3.270E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7 14E-05	7 14E-05
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 74990819	10 to 20.1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	0 00	
Bounding		

Basis for burnup used in estimate:

Nominal burnup taken directly from SFD (converted to MWd)

Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 00	
Bounding	0 00	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 20/20 MNRC
SNF ID #: 1054
Fuel Units & Descr: 84 - ELEMENT
Heavy Metal Mass: BOL=41 605kg; EOL=40 555kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' 0 76

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	1,002 34	2,004 68	0 00E+00	8 54E-07	1 71E-06
Am-241	1 8331E-03	1,002 34	2,004 68	0 00E+00	1 84E+00	3 67E+00
Am-242m	1 4129E-06	1,002 34	2,004 68	0 00E+00	1 42E-03	2 83E-03
Am-243	1 4774E-07	1,002 34	2,004 68	0 00E+00	1 48E-04	2 96E-04
C-14	1.2871E-04	1,002 34	2,004 68	0 00E+00	1.29E-01	2 58E-01
Cl-36	2 8120E-06	1,002 34	2,004 68	0 00E+00	2 82E-03	5 64E-03
Cm-243	1.7940E-07	1,002 34	2,004 68	0 00E+00	1 80E-04	3 60E-04
Cm-244	1 6962E-06	1,002 34	2,004 68	0 00E+00	1 70E-03	3 40E-03
Co-60	1.2839E+00	1,002 34	2,004 68	0 00E+00	1 29E+03	2 57E+03
Cs-134	9 0541E-02	1,002 34	2,004 68	0 00E+00	9 08E+01	1 82E+02
Cs-135	3.2195E-05	1,002 34	2,004 68	0 00E+00	3.23E-02	6 45E-02
Cs-137	2 7564E+00	1,002 34	2,004 68	0 00E+00	2 76E+03	5 53E+03
Eu-154	1 5368E-02	1,002 34	2,004 68	0 00E+00	1 54E+01	3 08E+01
Eu-155	2 9293E-02	1,002 34	2,004 68	0 00E+00	2 94E+01	5 87E+01
Fe-55	7 7158E-01	1,002.34	2,004 68	0 00E+00	7 73E+02	1 55E+03
H-3	1 1111E-02	1,002.34	2,004 68	0 00E+00	1 11E+01	2 23E+01
I-129	7 3684E-07	1,002.34	2,004 68	0 00E+00	7.39E-04	1 48E-03
Kr-85	2 5263E-01	1,002.34	2,004 68	0 00E+00	2 53E+02	5 06E+02
Np-237	1.2427E-06	1,002.34	2,004 68	0 00E+00	1.25E-03	2 49E-03
Pa-231	3 8511E-09	1,002.34	2,004 68	0 00E+00	3 86E-06	7 72E-06
Pb-210	7 3880E-15	1,002.34	2,004 68	0 00E+00	7 41E-12	1 48E-11
Pm-147	2 1023E+00	1,002.34	2,004 68	0 00E+00	2 11E+03	4 21E+03
Pu-238	1 0383E-03	1,002.34	2,004 68	0 00E+00	1 04E+00	2 08E+00
Pu-239	5 5293E-03	1,002.34	2,004 68	0 00E+00	5 54E+00	1 11E+01
Pu-240	2 1278E-03	1,002.34	2,004 68	0 00E+00	2.13E+00	4.27E+00
Pu-241	1 0195E-01	1,002.34	2,004 68	0 00E+00	1.02E+02	2 04E+02
Pu-242	2 3128E-07	1,002 34	2,004 68	0 00E+00	2 32E-04	4 64E-04
Ra-226	5 2782E-14	1,002.34	2 004 68	0 00E+00	5 29E-11	1.06E-10
Ra-228	1 9338E-10	1,002.34	2,004 68	0 00E+00	1 94E-07	3 88E-07
Ru-106	9 1684E-02	1,002.34	2,004 68	0 00E+00	9 19E+01	1 84E+02
Se-79	1 3018E-05	1,002.34	2,004 68	0 00E+00	1 30E-02	2.61E-02
Sn-126	1 2167E-05	1,002.34	2,004 68	0 00E+00	1 22E-02	2.44E-02
Sr-90	2 6045E+00	1,002.34	2,004 68	0 00E+00	2 61E+03	5 22E+03
Tc-99	4 4241E-04	1,002.34	2,004 68	0 00E+00	4 43E-01	8 87E-01
Th-229	1 3713E-10	1,002.34	2,004 68	0 00E+00	1 37E-07	2.75E-07
Th-230	1 8090E-11	1,002 34	2,004 68	0 00E+00	1 81E-08	3 63E-08
Th-232	2 5278E-10	1,002 34	2,004 68	0 00E+00	2 53E-07	5 07E-07
Tl-208	1 6947E-08	1,002 34	2,004 68	0 00E+00	1 70E-05	3 40E-05
U-232	4 8737E-08	1,002.34	2,004 68	0 00E+00	4 89E-05	9 77E-05
U-233	1 2203E-07	1,002 34	2,004 68	0 00E+00	1 22E-04	2 45E-04
U-234	1 5925E-07	1,002 34	2,004 68	0 00E+00	1 60E-04	3 19E-04
U-235	-2 6194E-06	1,002 34	0 00	1 78E-02	1 51E-02	1 78E-02
U-236	1.2693E-05	1,002 34	2,004 68	0 00E+00	1 27E-02	2 54E-02
U-238	-3 6331E-08	1,002 34	0 00	1 12E-02	1 12E-02	1 12E-02
Y-90	2 6060E+00	1,002 34	2,004 68	0 00E+00	2 61E+03	5.22E+03
Other Radionuclides					3 61E+03	7.23E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3.240E+14
0 0250	7 129E+13
0 0375	6 071E+13
0 0575	6 232E+13
0 0850	3 861E+13
0 1250	2.804E+13
0.2250	3.275E+13
0.3750	1 662E+13
0.5750	2.210E+14
0.8500	9 483E+12
1.2500	1 926E+14
1 7500	1.284E+11
2.2500	2.069E+11
2 7500	1 642E+09
3.5000	1 911E+08
5.0000	1 077E+03
7 0000	1.219E+02
11 0000	1.389E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 83E+01	1 17E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents:	U	U
BOL Enrichment %:	19 74990819	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	784 42	1,002.34
Bounding		2 004 68

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 71	1.28
Bounding	1 41	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

				Estimated Canister usage
Fuel Name	TRIGA STD 20/20 SOLVENIA	[1]Fuel decay start date	2010	18"x10'
SNF ID #	731	Estimates as of	2030	0 09
Fuel Units & Descr:	10 - ELEMENT	Template	TRIGA-SS (LW/U-Zrx, SST 10 to 20% U)	
Heavy Metal Mass	BOL=4 949kg EOL=4 754kg	[2]Template Burnup(MWd)	6 65	
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 000195	
		Template Decay Time	20 years	

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2 6436E-09	186 62	373 23	0 00E+00	4 93E-07	9 87E-07	Avg MeV	
Am-241	3 1429E-03	186 62	373.23	0 00E+00	5 87E-01	1.17E+00	0 0150	3 740E+13
Am-242m	1.3195E-06	186 62	373 23	0 00E+00	2 46E-04	4 93E-04	0 0250	7 786E+12
Am-243	1.4753E-07	186.62	373 23	0 00E+00	2 75E-05	5 51E-05	0 0375	6 745E+12
C-14	1.2847E-04	186 62	373 23	0 00E+00	2 40E-02	4 79E-02	0 0575	7.256E+12
Cl-36	2.8120E-06	186 62	373 23	0 00E+00	5.25E-04	1 05E-03	0 0850	4 381E+12
Cm-243	1.2465E-07	186 62	373 23	0 00E+00	2.33E-05	4 65E-05	0 1250	2.863E+12
Cm-244	9 5564E-07	186 62	373 23	0 00E+00	1.78E-04	3.57E-04	0.2250	3 761E+12
Co-60	1.7880E-01	186 62	373 23	0 00E+00	3 34E+01	6 67E+01	0.3750	1 649E+12
Cs-134	5 8692E-04	186 62	373 23	0 00E+00	1.10E-01	2.19E-01	0.5750	2 711E+13
Cs-135	3 2195E-05	186 62	373 23	0 00E+00	6 01E-03	1.20E-02	0 8500	3 056E+11
Cs-137	1 9489E+00	186 62	373 23	0 00E+00	3 64E+02	7.27E+02	1.2500	5 064E+12
Eu-154	4 5895E-03	186 62	373 23	0 00E+00	8 56E-01	1 71E+00	1 7500	7.852E+09
Eu-155	3 6045E-03	186 62	373.23	0 00E+00	6 73E-01	1 35E+00	2.2500	2.704E+07
Fe-55	1 4185E-02	186 62	373 23	0 00E+00	2 65E+00	5 29E+00	2 7500	2.980E+05
H-3	4 7895E-03	186 62	373.23	0 00E+00	8 94E-01	1 79E+00	3 5000	1 655E+03
I-129	7 3684E-07	186 62	373.23	0 00E+00	1.38E-04	2 75E-04	5 0000	1 970E+02
Kr-85	9 5820E-02	186 62	373.23	0 00E+00	1 79E+01	3 58E+01	7 0000	2.225E+01
Np-237	1 2552E-06	186 62	373 23	0 00E+00	2 34E-04	4 68E-04	11 0000	2 532E+00
Pa-231	7 0406E-09	186 62	373.23	0 00E+00	1.31E-06	2 63E-06		
Pb-210	5 8000E-14	186 62	373 23	0 00E+00	1 08E-11	2 16E-11		
Pm-147	4 0075E-02	186 62	373.23	0 00E+00	7 48E+00	1 50E+01		
Pu-238	9 2256E-04	186 62	373 23	0 00E+00	1 72E-01	3 44E-01		
Pu-239	5 5278E-03	186 62	373 23	0 00E+00	1 03E+00	2 06E+00		
Pu-240	2 1248E-03	186 62	373 23	0 00E+00	3 97E-01	7 93E-01		
Pu-241	4 9549E-02	186 62	373 23	0 00E+00	9.25E+00	1 85E+01		
Pu-242	2 3128E-07	186 62	373 23	0 00E+00	4 32E-05	8 63E-05		
Ra-226	2 4526E-13	186 62	373 23	0 00E+00	4 58E-11	9 15E-11		
Ra-228	2 4015E-10	186 62	373 23	0 00E+00	4 48E-08	8 96E-08		
Ru-106	3 0602E-06	186 62	373 23	0 00E+00	5 71E-04	1 14E-03		
Se-79	1.3015E-05	186 62	373 23	0 00E+00	2 43E-03	4 86E-03		
Sn-126	1.2165E-05	186 62	373.23	0 00E+00	2.27E-03	4 54E-03		
Sr-90	1 8226E+00	186 62	373.23	0 00E+00	3 40E+02	6.80E+02		
Tc-99	4 4241E-04	186 62	373 23	0 00E+00	8.26E-02	1 65E-01		
Th-229	3 0962E-10	186 62	373.23	0 00E+00	5 78E-08	1.16E-07		
Th-230	4.2346E-11	186 62	373.23	0 00E+00	7.90E-09	1.58E-08		
Th-232	2.5278E-10	186 62	373.23	0 00E+00	4.72E-08	9 43E-08		
Tl-208	1.5820E-08	186 62	373.23	0 00E+00	2.95E-06	5 90E-06		
U-232	4.2647E-08	186 62	373.23	0 00E+00	7 96E-06	1.59E-05		
U-233	1.2211E-07	186 62	373.23	0 00E+00	2.28E-05	4 56E-05		
U-234	1 9955E-07	186 62	373.23	0 00E+00	3 72E-05	7.45E-05		
U-235	-2 6194E-06	186 62	0 00	2 11E-03	1 63E-03	2 11E-03		
U-236	1.2693E-05	186 62	373.23	0 00E+00	2.37E-03	4 74E-03		
U-238	-3 6331E-08	186 62	0 00	1 33E-03	1.33E-03	1.33E-03		
Y-90	1 8241E+00	186 62	373 23	0 00E+00	3 40E+02	6 81E+02		
Other Radionuclides					3 59E+02	7 19E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 67E+00	9.34E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 76747705	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate*
Nominal	186.62	186 15	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		373.23	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	1 11	1 00	1 00
Bounding	2.21		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 30/20
SNF ID #: 995
Fuel Units & Descr: 19 - ELEMENT
Heavy Metal Mass: BOL=16 625kg; EOL=16 433kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' 0 17

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	183.19	366.38	0 00E+00	1 56E-07	3 12E-07
Am-241	1 8331E-03	183 19	366.38	0 00E+00	3 36E-01	6 72E-01
Am-242m	1 4129E-06	183.19	366.38	0 00E+00	2 59E-04	5 18E-04
Am-243	1 4774E-07	183.19	366 38	0 00E+00	2 71E-05	5 41E-05
C-14	1.2871E-04	183.19	366 38	0 00E+00	2 36E-02	4 72E-02
Cl-36	2 8120E-06	183.19	366 38	0 00E+00	5.15E-04	1 03E-03
Cm-243	1 7940E-07	183 19	366 38	0 00E+00	3 29E-05	6 57E-05
Cm-244	1 6962E-06	183 19	366 38	0.00E+00	3 11E-04	6.21E-04
Co-60	1 2839E+00	183 19	366 38	0 00E+00	2.35E+02	4 70E+02
Cs-134	9 0541E-02	183 19	366 38	0 00E+00	1 66E+01	3 32E+01
Cs-135	3 2195E-05	183 19	366 38	0 00E+00	5 90E-03	1.18E-02
Cs-137	2 7564E+00	183 19	366 38	0 00E+00	5 05E+02	1 01E+03
Eu-154	1 5368E-02	183 19	366 38	0 00E+00	2 82E+00	5 63E+00
Eu-155	2 9293E-02	183 19	366.38	0 00E+00	5 37E+00	1 07E+01
Fe-55	7 7158E-01	183 19	366.38	0 00E+00	1 41E+02	2.83E+02
H-3	1 1111E-02	183 19	366.38	0 00E+00	2 04E+00	4 07E+00
I-129	7.3684E-07	183.19	366.38	0 00E+00	1 35E-04	2 70E-04
Kr-85	2.5263E-01	183.19	366 38	0 00E+00	4 63E+01	9 26E+01
Np-237	1.2427E-06	183 19	366 38	0 00E+00	2.28E-04	4 55E-04
Pa-231	3 8511E-09	183 19	366.38	0 00E+00	7 05E-07	1 41E-06
Pb-210	7 3880E-15	183 19	366 38	0 00E+00	1.35E-12	2 71E-12
Pm-147	2 1023E+00	183 19	366 38	0 00E+00	3.85E+02	7 70E+02
Pu-238	1 0383E-03	183 19	366 38	0.00E+00	1 90E-01	3 80E-01
Pu-239	5 5293E-03	183 19	366 38	0 00E+00	1 01E+00	2 03E+00
Pu-240	2 1278E-03	183 19	366 38	0 00E+00	3 90E-01	7 80E-01
Pu-241	1 0195E-01	183 19	366 38	0 00E+00	1 87E+01	3 74E+01
Pu-242	2 3128E-07	183 19	366 38	0 00E+00	4 24E-05	8 47E-05
Ra-226	5.2782E-14	183 19	366 38	0 00E+00	9 67E-12	1 93E-11
Ra-228	1 9338E-10	183 19	366.38	0 00E+00	3 54E-08	7 09E-08
Ru-106	9 1684E-02	183.19	366.38	0 00E+00	1 68E+01	3 36E+01
Se-79	1.3018E-05	183.19	366.38	0 00E+00	2 38E-03	4 77E-03
Sn-126	1.2167E-05	183.19	366.38	0 00E+00	2 23E-03	4 46E-03
Sr-90	2.6045E+00	183 19	366 38	0 00E+00	4 77E+02	9 54E+02
Tc-99	4 4241E-04	183 19	366 38	0 00E+00	8 10E-02	1 62E-01
Th-229	1 3713E-10	183 19	366 38	0 00E+00	2 51E-08	5 02E-08
Th-230	1 8090E-11	183 19	366 38	0 00E+00	3.31E-09	6 63E-09
Th-232	2 5278E-10	183 19	366 38	0 00E+00	4 63E-08	9 26E-08
Tl-208	1 6947E-08	183 19	366 38	0 00E+00	3.10E-06	6.21E-06
U-232	4 8737E-08	183 19	366 38	0 00E+00	8 93E-06	1.79E-05
U-233	1 2203E-07	183 19	366 38	0 00E+00	2.24E-05	4.47E-05
U-234	1 5925E-07	183.19	366 38	0 00E+00	2 92E-05	5 83E-05
U-235	-2 6194E-06	183.19	0 00	7.19E-03	6 71E-03	7.19E-03
U-236	1.2693E-05	183 19	366 38	0 00E+00	2 33E-03	4 65E-03
U-238	-3 6331E-08	183.19	0 00	4 47E-03	4 46E-03	4 47E-03
Y-90	2 6060E+00	183.19	366.38	0 00E+00	4 77E+02	9 55E+02
Other Radionuclides					6 60E+02	1 32E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5 922E+13
0 0250	1 303E+13
0 0375	1 110E+13
0 0575	1 139E+13
0 0850	7 056E+12
0 1250	5 124E+12
0 2250	5 986E+12
0 3750	3 038E+12
0 5750	4 038E+13
0 8500	1 733E+12
1.2500	3 520E+13
1 7500	2 346E+10
2.2500	3 782E+10
2.7500	3 001E+08
3.5000	3 493E+07
5.0000	2 023E+02
7 0000	2.292E+01
11 0000	2 612E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 07E+01	2.13E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		183 19
Bounding		366.38

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 32	
Bounding	0 65	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD 30/20 MNRC	[1]Fuel decay start date	2035		Estimated Canister usage
SNF ID #	704	Estimates as of	2030		18"x10'
Fuel Units & Descr	6 - ELEMENT	Template	TRIGA-SS (LW/U-Zrx SST, 10 to 20%, U)		0 05
Heavy Metal Mass	BOL=4 974kg EOL=4 974kg	[2]Template Burnup(MWd)	6 65		
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 000195		
		Template Decay Time	5 years		

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8 5173E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	Avg MeV	
Am-241	1.8331E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	0 0150	5.280E+07
Am-242m	1 4129E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	0 0250	0 000E+00
Am-243	1.4774E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	0 0375	7 199E+04
C-14	1.2871E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	0 0575	4.394E+04
Cl-36	2 8120E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	0 0850	6 150E+06
Cm-243	1.7940E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	0 1250	1.214E+07
Cm-244	1.6962E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	0 2250	4.297E+07
Co-60	1.2839E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	0 3750	1 072E+05
Cs-134	9 0541E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	0 5750	5.275E+03
Cs-135	3.2195E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	0 8500	8.232E+02
Cs-137	2 7564E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	1.2500	4 899E+01
Eu-154	1.5368E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	1 7500	2.397E+01
Eu-155	2 9293E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	2 2500	1 389E+01
Fe-55	7.7158E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	2 7500	8 068E+00
H-3	1 1111E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	3 5000	7.213E+00
I-129	7.3684E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	5 0000	3 099E+00
Kr-85	2 5263E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	7 0000	3 567E-01
Np-237	1.2427E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	11 0000	4 101E-02
Pa-231	3 8511E-09	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Pb-210	7.3880E-15	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Pm-147	2 1023E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Pu-238	1 0383E-03	0 00	0 00	0 00E+00	0 00E+00	0.00E+00		
Pu-239	5 5293E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Pu-240	2 1278E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Pu-241	1 0195E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Pu-242	2 3128E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Ra-226	5 2782E-14	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Ra-228	1 9338E-10	0 00	0 00	0 00E+00	0.00E+00	0 00E+00		
Ru-106	9 1684E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Se-79	1 3018E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Sn-126	1 2167E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Sr-90	2 6045E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Tc-99	4 4241E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Th-229	1.3713E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Th-230	1 8090E-11	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Th-232	2 5278E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Tl-208	1 6947E-08	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
U-232	4 8737E-08	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	Thermal Power	
U-233	1.2203E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-234	1 5925E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
U-235	-2 6194E-06	0 00	0 00	2 13E-03	2.13E-03	2.13E-03		
U-236	1.2693E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00	8 98E-05	8.98E-05
U-238	-3 6331E-08	0 00	0 00	1 34E-03	1.34E-03	1.34E-03	Total	Total
Y-90	2.6060E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00		
Other Radionuclides					0 00E+00	0 00E+00		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences*
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding	SST	SST	
BOL HM Constituents	U	U	
BOL Enrichment %	19 82495894	10 to 20 1	

Burnup Summary (MWd)[2]	From SFD	Estimated	Basis for burnup used in estimate*
Nominal	0 00		Nominal burnup taken directly from SFD (converted to MWd).
Bounding			Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 00		1 00
Bounding	0 00		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20
SNF ID #: 252
Fuel Units & Descr: 50 - ELEMENT
Heavy Metal Mass: BOL=9 37kg, EOL=9 07kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6.65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' = 0 45

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	286 38	572.76	0.00E+00	2 44E-07	4 88E-07
Am-241	1 8331E-03	286 38	572.76	0 00E+00	5.25E-01	1 05E+00
Am-242m	1 4129E-06	286 38	572.76	0 00E+00	4 05E-04	8 09E-04
Am-243	1 4774E-07	286 38	572.76	0 00E+00	4.23E-05	8 46E-05
C-14	1 2871E-04	286 38	572.76	0 00E+00	3 69E-02	7.37E-02
Cl-36	2 8120E-06	286 38	572.76	0 00E+00	8 05E-04	1 61E-03
Cm-243	1 7940E-07	286 38	572.76	0 00E+00	5 14E-05	1 03E-04
Cm-244	1 6962E-06	286 38	572.76	0 00E+00	4 86E-04	9 72E-04
Co-60	1.2839E+00	286.38	572.76	0 00E+00	3 68E+02	7.35E+02
Cs-134	9 0541E-02	286.38	572 76	0 00E+00	2 59E+01	5.19E+01
Cs-135	3.2195E-05	286.38	572.76	0 00E+00	9 22E-03	1 84E-02
Cs-137	2 7564E+00	286.38	572 76	0 00E+00	7 89E+02	1 58E+03
Eu-154	1 5368E-02	286.38	572 76	0 00E+00	4 40E+00	8 80E+00
Eu-155	2 9293E-02	286 38	572 76	0 00E+00	8 39E+00	1 68E+01
Fe-55	7.7158E-01	286 38	572 76	0 00E+00	2 21E+02	4 42E+02
H-3	1.1111E-02	286 38	572 76	0 00E+00	3 18E+00	6 36E+00
I-129	7 3684E-07	286 38	572 76	0 00E+00	2 11E-04	4 22E-04
Kr-85	2 5263E-01	286 38	572 76	0 00E+00	7 23E+01	1 45E+02
Np-237	1.2427E-06	286 38	572 76	0 00E+00	3 56E-04	7 12E-04
Pa-231	3 8511E-09	286 38	572 76	0 00E+00	1 10E-06	2 21E-06
Pb-210	7 3880E-15	286 38	572 76	0 00E+00	2.12E-12	4 23E-12
Pm-147	2 1023E+00	286 38	572 76	0 00E+00	6 02E+02	1 20E+03
Pu-238	1 0383E-03	286 38	572 76	0 00E+00	2 97E-01	5 95E-01
Pu-239	5 5293E-03	286 38	572 76	0 00E+00	1 58E+00	3 17E+00
Pu-240	2 1278E-03	286 38	572 76	0 00E+00	6 09E-01	1 22E+00
Pu-241	1 0195E-01	286 38	572 76	0 00E+00	2 92E+01	5 84E+01
Pu-242	2 3128E-07	286 38	572 76	0 00E+00	6 62E-05	1 32E-04
Ra-226	5 2782E-14	286 38	572 76	0 00E+00	1 51E-11	3 02E-11
Ra-228	1 9338E-10	286 38	572 76	0 00E+00	5 54E-08	1 11E-07
Ru-106	9 1684E-02	286 38	572 76	0 00E+00	2 63E+01	5 25E+01
Se-79	1 3018E-05	286 38	572 76	0 00E+00	3.73E-03	7 46E-03
Sn-126	1 2167E-05	286 38	572.76	0 00E+00	3 48E-03	6 97E-03
Sr-90	2 6045E+00	286 38	572.76	0 00E+00	7 46E+02	1 49E+03
Tc-99	4 4241E-04	286 38	572.76	0.00E+00	1.27E-01	2 53E-01
Th-229	1 3713E-10	286 38	572.76	0.00E+00	3 93E-08	7.85E-08
Th-230	1 8090E-11	286 38	572.76	0 00E+00	5.18E-09	1.04E-08
Th-232	2 5278E-10	286 38	572.76	0.00E+00	7.24E-08	1.45E-07
Tl-208	1 6947E-08	286 38	572.76	0 00E+00	4 85E-06	9 71E-06
U-232	4 8737E-08	286.38	572.76	0 00E+00	1 40E-05	2.79E-05
U-233	1 2203E-07	286.38	572 76	0 00E+00	3 49E-05	6 99E-05
U-234	1 5925E-07	286.38	572 76	0 00E+00	4 56E-05	9 12E-05
U-235	-2 6194E-06	286.38	0 00	3 95E-03	3 20E-03	3 95E-03
U-236	1.2693E-05	286.38	572 76	0 00E+00	3 64E-03	7 27E-03
U-238	-3 6331E-08	286.38	0 00	2 54E-03	2 53E-03	2 54E-03
Y-90	2 6060E+00	286.38	572 76	0 00E+00	7 46E+02	1 49E+03
Other Radionuclides					1 03E+03	2 06E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	9.257E+13
0 0250	2 037E+13
0 0375	1 735E+13
0 0575	1 781E+13
0 0850	1 103E+13
0 1250	8 010E+12
0 2250	9 357E+12
0 3750	4 749E+12
0 5750	6 313E+13
0 8500	2 709E+12
1.2500	5 502E+13
1 7500	3 668E+10
2.2500	5 912E+10
2.7500	4 691E+08
3.5000	5 460E+07
5.0000	3 060E+02
7.0000	3.465E+01
11 0000	3.947E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 67E+01	3.33E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	SST	SST
BOL HM Constituents.	U	U
BOL Enrichment %	19 49184744	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	273 96	286.38	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		572.76	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 90	1 05
Bounding	1 79	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD 8 5/20 (IFE) ITALY	[1]Fuel decay start date	1999
SNF ID #	929	Estimates as of	2030
Fuel Units & Descr	2 - ELEMENT	Template	TRIGA-SS (LW/U-Zrx SST, 10 to 20% U)
Heavy Metal Mass	BOL=0 383kg EOL=0 372kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 000195
		Template Decay Time	25 years

Estimated Canister usage: 18"x10' = 0 02

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4 1459E-09	13 06	26 13	0 00E+00	5 42E-08	1 08E-07	Avg MeV	
Am-241	3 5850E-03	13 06	26 13	0 00E+00	4 68E-02	9 37E-02	0 0150	2.319E+12
Am-242m	1 2899E-06	13 06	26 13	0 00E+00	1 69E-05	3 37E-05	0 0250	4.822E+11
Am-243	1 4747E-07	13 06	26 13	0 00E+00	1 93E-06	3 85E-06	0 0375	4 183E+11
C-14	1 2839E-04	13 06	26 13	0 00E+00	1 68E-03	3 35E-03	0 0575	4.505E+11
Cl-36	2 8120E-06	13 06	26 13	0 00E+00	3 67E-05	7.35E-05	0 0850	2.715E+11
Cm-243	1 1038E-07	13 06	26 13	0 00E+00	1 44E-06	2 88E-06	0 1250	1 772E+11
Cm-244	7 8917E-07	13 06	26 13	0 00E+00	1 03E-05	2 06E-05	0.2250	2.335E+11
Co-60	9 2647E-02	13 06	26 13	0 00E+00	1 21E+00	2 42E+00	0.3750	1 020E+11
Cs-134	1 0940E-04	13 06	26 13	0 00E+00	1 43E-03	2.86E-03	0 5750	1 691E+12
Cs-135	3 2195E-05	13 06	26 13	0 00E+00	4 21E-04	8.41E-04	0 8500	1.815E+10
Cs-137	1 7368E+00	13.06	26 13	0 00E+00	2 27E+01	4 54E+01	1.2500	1.864E+11
Eu-154	3 0677E-03	13 06	26 13	0 00E+00	4 01E-02	8 02E-02	1 7500	4 725E+08
Eu-155	1 7925E-03	13 06	26 13	0 00E+00	2 34E-02	4 68E-02	2.2500	9 963E+05
Fe-55	3 7444E-03	13 06	26 13	0 00E+00	4 89E-02	9 78E-02	2 7500	1 685E+04
H-3	3 6180E-03	13 06	26 13	0 00E+00	4 73E-02	9 45E-02	3 5000	3 541E+01
I-129	7.3684E-07	13 06	26 13	0 00E+00	9 63E-06	1 93E-05	5 0000	1 379E+01
Kr-85	6 9368E-02	13 06	26 13	0 00E+00	9 06E-01	1 81E+00	7 0000	1 557E+00
Np-237	1.2662E-06	13 06	26 13	0 00E+00	1.65E-05	3 31E-05	11 0000	1 771E-01
Pa-231	9 1654E-09	13 06	26 13	0 00E+00	1.20E-07	2 39E-07		
Pb-210	1.3728E-13	13 06	26 13	0 00E+00	1.79E-12	3 59E-12		
Pm-147	1 0702E-02	13 06	26 13	0 00E+00	1 40E-01	2 80E-01		
Pu-238	8 8692E-04	13 06	26 13	0 00E+00	1 16E-02	2 32E-02		
Pu-239	5 5263E-03	13 06	26 13	0 00E+00	7.22E-02	1 44E-01		
Pu-240	2 1233E-03	13 06	26 13	0 00E+00	2 77E-02	5 55E-02		
Pu-241	3 8962E-02	13 06	26 13	0 00E+00	5 09E-01	1 02E+00		
Pu-242	2 3128E-07	13 06	26 13	0 00E+00	3 02E-06	6 04E-06		
Ra-226	4 6752E-13	13 06	26 13	0 00E+00	6 11E-12	1.22E-11		
Ra-228	2 4827E-10	13 06	26 13	0 00E+00	3 24E-09	6 49E-09		
Ru-106	9 8526E-08	13 06	26 13	0 00E+00	1.29E-06	2.57E-06		
Se-79	1.3015E-05	13 06	26 13	0 00E+00	1 70E-04	3 40E-04		
Sn-126	1.2165E-05	13 06	26 13	0 00E+00	1 59E-04	3 18E-04		
Sr-90	1 6195E+00	13 06	26 13	0 00E+00	2 12E+01	4.23E+01		
Tc-99	4 4241E-04	13 06	26.13	0 00E+00	5 78E-03	1 16E-02		
Th-229	4 2451E-10	13 06	26 13	0 00E+00	5 55E-09	1 11E-08		
Th-230	6 1398E-11	13 06	26 13	0 00E+00	8 02E-10	1 60E-09		
Th-232	2 5278E-10	13 06	26.13	0 00E+00	3 30E-09	6 60E-09		
Tl-208	1 5098E-08	13 06	26 13	0 00E+00	1 97E-07	3 94E-07		
U-232	4 0662E-08	13 06	26 13	0 00E+00	5.31E-07	1 06E-06	Thermal Power	
U-233	1.2217E-07	13 06	26 13	0 00E+00	1 60E-06	3 19E-06	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-234	2.2391E-07	13.06	26 13	0 00E+00	2 93E-06	5 85E-06	2.77E-01	5.55E-01
U-235	-2.6194E-06	13.06	0 00	1.66E-04	1.32E-04	1 66E-04	Total	Total
U-236	1.2695E-05	13 06	26 13	0 00E+00	1.66E-04	3.32E-04		
U-238	-3 6331E-08	13 06	0 00	1.03E-04	1.02E-04	1 03E-04		
Y-90	1 6195E+00	13 06	26 13	0 00E+00	2.12E+01	4 23E+01		
Other Radionuclides					2.25E+01	4 50E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 10443864	10 to 20 1

Basis for Parameter Differences:

This Template was used for the following reasons.
This fuel matches on all parameters except enrichment (very close to 20%)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	13 06	10 50
Bounding		26 13

Basis for burnup used in estimate

Nominal burnup taken directly from SFD (converted to MWd)
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 00	0.80
Bounding	2 00	

Estimated EOL HM/Given EOL HM: 0 99

[1]Reactor shutdown core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 (IFE) OSU
SNF ID #: 1040
Fuel Units & Descr: 2 - ELEMENT
Heavy Metal Mass: BOL=0.39kg, EOL=0 38kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2025
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage 18"x10"
0 02

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	9 55	19 09	0 00E+00	8 13E-09	1 63E-08	Avg MeV	
Am-241	1 8331E-03	9 55	19 09	0 00E+00	1 75E-02	3 50E-02	0 0150	3 086E+12
Am-242m	1.4129E-06	9 55	19 09	0 00E+00	1 35E-05	2 70E-05	0 0250	6.790E+11
Am-243	1.4774E-07	9 55	19 09	0 00E+00	1 41E-06	2 82E-06	0 0375	5.782E+11
C-14	1.2871E-04	9 55	19 09	0 00E+00	1 23E-03	2 46E-03	0 0575	5 935E+11
Cl-36	2.8120E-06	9 55	19 09	0 00E+00	2 68E-05	5 37E-05	0 0850	3 677E+11
Cm-243	1.7940E-07	9 55	19 09	0 00E+00	1 71E-06	3 43E-06	0 1250	2 670E+11
Cm-244	1 6962E-06	9 55	19 09	0 00E+00	1 62E-05	3 24E-05	0.2250	3.119E+11
Co-60	1.2839E+00	9 55	19 09	0 00E+00	1.23E+01	2 45E+01	0 3750	1.583E+11
Cs-134	9 0541E-02	9 55	19 09	0 00E+00	8 64E-01	1 73E+00	0 5750	2.104E+12
Cs-135	3.2195E-05	9 55	19 09	0 00E+00	3 07E-04	6 15E-04	0 8500	9 031E+10
Cs-137	2.7564E+00	9 55	19 09	0 00E+00	2 63E+01	5 26E+01	1.2500	1 834E+12
Eu-154	1 5368E-02	9 55	19 09	0 00E+00	1 47E-01	2 93E-01	1 7500	1.223E+09
Eu-155	2 9293E-02	9 55	19 09	0 00E+00	2 80E-01	5 59E-01	2.2500	1.971E+09
Fe-55	7.7158E-01	9 55	19 09	0 00E+00	7.37E+00	1 47E+01	2.7500	1.564E+07
H-3	1 1111E-02	9 55	19 09	0 00E+00	1 06E-01	2 12E-01	3.5000	1 820E+06
I-129	7 3684E-07	9 55	19 09	0 00E+00	7 03E-06	1 41E-05	5 0000	1.025E+01
Kr-85	2.5263E-01	9 55	19 09	0 00E+00	2 41E+00	4 82E+00	7 0000	1 160E+00
Np-237	1.2427E-06	9 55	19 09	0 00E+00	1 19E-05	2 37E-05	11 0000	1 322E-01
Pa-231	3 8511E-09	9 55	19 09	0 00E+00	3 68E-08	7 35E-08		
Pb-210	7 3880E-15	9 55	19 09	0.00E+00	7 05E-14	1 41E-13		
Pm-147	2 1023E+00	9 55	19 09	0 00E+00	2 01E+01	4 01E+01		
Pu-238	1 0383E-03	9 55	19 09	0.00E+00	9 91E-03	1 98E-02		
Pu-239	5 5293E-03	9 55	19 09	0 00E+00	5 28E-02	1 06E-01		
Pu-240	2 1278E-03	9 55	19 09	0 00E+00	2 03E-02	4 06E-02		
Pu-241	1.0195E-01	9 55	19 09	0.00E+00	9 73E-01	1 95E+00		
Pu-242	2 3128E-07	9 55	19 09	0 00E+00	2 21E-06	4 42E-06		
Ra-226	5.2782E-14	9 55	19 09	0.00E+00	5 04E-13	1 01E-12		
Ra-228	1 9338E-10	9 55	19 09	0.00E+00	1 85E-09	3 69E-09		
Ru-106	9 1684E-02	9 55	19 09	0 00E+00	8 75E-01	1 75E+00		
Se-79	1 3018E-05	9 55	19 09	0.00E+00	1 24E-04	2 49E-04		
Sn-126	1.2167E-05	9 55	19 09	0.00E+00	1.16E-04	2 32E-04		
Sr-90	2 6045E+00	9 55	19 09	0.00E+00	2 49E+01	4 97E+01		
Tc-99	4 4241E-04	9 55	19 09	0.00E+00	4 22E-03	8 45E-03		
Th-229	1.3713E-10	9 55	19 09	0 00E+00	1 31E-09	2 62E-09		
Th-230	1 8090E-11	9 55	19 09	0 00E+00	1 73E-10	3 45E-10		
Th-232	2 5278E-10	9 55	19 09	0.00E+00	2 41E-09	4 83E-09		
Tl-208	1 6947E-08	9 55	19 09	0 00E+00	1 62E-07	3.24E-07		
U-232	4 8737E-08	9 55	19 09	0 00E+00	4 65E-07	9 30E-07		
U-233	1.2203E-07	9 55	19 09	0 00E+00	1 16E-06	2 33E-06		
U-234	1 5925E-07	9 55	19 09	0.00E+00	1 52E-06	3.04E-06		
U-235	-2 6194E-06	9 55	0 00	1.68E-04	1 43E-04	1.68E-04		
U-236	1.2693E-05	9 55	19 09	0 00E+00	1 21E-04	2.42E-04		
U-238	-3 6331E-08	9 55	0 00	1.05E-04	1 05E-04	1 05E-04		
Y-90	2 6060E+00	9 55	19 09	0.00E+00	2 49E+01	4 98E+01		
Other Radionuclides					3 44E+01	6 88E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 56E-01	1 11E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 9	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	3 80	9 55	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		19 09	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 72	2.51
Bounding	1 44	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 (IFE) U OF AZ
SNF ID #: 972
Fuel Units & Descr: 1 - ELEMENT
Heavy Metal Mass: BOL=0 195kg EOL=0 188kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1998
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 25 years

Estimated Canister usage: 18"x10' = 0 01

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	4 1459E-09	6 68	13 36	0 00E+00	2 77E-08	5 54E-08
Am-241	3.5850E-03	6 68	13 36	0 00E+00	2 40E-02	4 79E-02
Am-242m	1.2899E-06	6 68	13 36	0 00E+00	8 62E-06	1 72E-05
Am-243	1 4747E-07	6 68	13 36	0 00E+00	9 85E-07	1 97E-06
C-14	1.2839E-04	6 68	13 36	0 00E+00	8 58E-04	1 72E-03
Cl-36	2 8120E-06	6 68	13 36	0 00E+00	1.88E-05	3 76E-05
Cm-243	1 1038E-07	6 68	13 36	0 00E+00	7.38E-07	1 48E-06
Cm-244	7 8917E-07	6 68	13.36	0 00E+00	5.27E-06	1 05E-05
Co-60	9 2647E-02	6 68	13.36	0 00E+00	6 19E-01	1.24E+00
Cs-134	1 0940E-04	6 68	13 36	0 00E+00	7.31E-04	1.46E-03
Cs-135	3 2195E-05	6.68	13 36	0 00E+00	2 15E-04	4.30E-04
Cs-137	1 7368E+00	6 68	13 36	0 00E+00	1 16E+01	2.32E+01
Eu-154	3 0677E-03	6 68	13 36	0 00E+00	2 05E-02	4 10E-02
Eu-155	1 7925E-03	6 68	13 36	0 00E+00	1 20E-02	2 40E-02
Fe-55	3.7444E-03	6 68	13 36	0 00E+00	2 50E-02	5 00E-02
H-3	3 6180E-03	6 68	13 36	0 00E+00	2 42E-02	4 84E-02
I-129	7.3684E-07	6 68	13 36	0 00E+00	4 92E-06	9 85E-06
Kr-85	6 9368E-02	6 68	13 36	0 00E+00	4 64E-01	9 27E-01
Np-237	1.2662E-06	6 68	13 36	0 00E+00	8 46E-06	1 69E-05
Pa-231	9 1654E-09	6 68	13.36	0 00E+00	6 12E-08	1.22E-07
Pb-210	1.3728E-13	6 68	13.36	0 00E+00	9 17E-13	1.83E-12
Pm-147	1 0702E-02	6 68	13.36	0 00E+00	7.15E-02	1 43E-01
Pu-238	8 8692E-04	6 68	13.36	0 00E+00	5 93E-03	1 19E-02
Pu-239	5 5263E-03	6 68	13.36	0 00E+00	3 69E-02	7.39E-02
Pu-240	2 1233E-03	6 68	13 36	0 00E+00	1 42E-02	2 84E-02
Pu-241	3 8962E-02	6 68	13 36	0 00E+00	2 60E-01	5 21E-01
Pu-242	2.3128E-07	6 68	13 36	0 00E+00	1 55E-06	3 09E-06
Ra-226	4 6752E-13	6 68	13 36	0 00E+00	3 12E-12	6.25E-12
Ra-228	2 4827E-10	6 68	13 36	0 00E+00	1 66E-09	3.32E-09
Ru-106	9 8526E-08	6 68	13 36	0 00E+00	6 58E-07	1.32E-06
Se-79	1.3015E-05	6 68	13 36	0 00E+00	8 70E-05	1.74E-04
Sn-126	1.2165E-05	6 68	13 36	0 00E+00	8 13E-05	1.63E-04
Sr-90	1 6195E+00	6 68	13 36	0 00E+00	1 08E+01	2 16E+01
Tc-99	4 4241E-04	6 68	13 36	0 00E+00	2.96E-03	5 91E-03
Th-229	4 2451E-10	6 68	13 36	0 00E+00	2.84E-09	5 67E-09
Th-230	6 1398E-11	6 68	13 36	0 00E+00	4 10E-10	8.21E-10
Th-232	2 5278E-10	6 68	13.36	0 00E+00	1 69E-09	3 38E-09
Tl-208	1 5098E-08	6 68	13.36	0 00E+00	1 01E-07	2 02E-07
U-232	4 0662E-08	6 68	13 36	0 00E+00	2 72E-07	5 43E-07
U-233	1.2217E-07	6 68	13 36	0 00E+00	8 16E-07	1 63E-06
U-234	2.2391E-07	6 68	13 36	0 00E+00	1 50E-06	2 99E-06
U-235	-2 6194E-06	6.68	0 00	8 43E-05	6 68E-05	8 43E-05
U-236	1.2695E-05	6 68	13 36	0 00E+00	8 48E-05	1.70E-04
U-238	-3 6331E-08	6 68	0 00	5 24E-05	5.22E-05	5.24E-05
Y-90	1.6195E+00	6 68	13 36	0 00E+00	1 08E+01	2.16E+01
Other Radionuclides					1 15E+01	2.30E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 186E+12
0 0250	2.466E+11
0 0375	2 140E+11
0 0575	2.304E+11
0 0850	1.389E+11
0 1250	9 062E+10
0.2250	1 194E+11
0 3750	5.217E+10
0.5750	8 648E+11
0 8500	9 285E+09
1.2500	9 534E+10
1 7500	2 417E+08
2.2500	5 096E+05
2 7500	8 617E+03
3 5000	1.811E+01
5 0000	7 053E+00
7 0000	7.962E-01
11 0000	9 055E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.42E-01	2.84E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	1 90	6.68	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		13.36	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.00	3 52
Bounding	2 01	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown core removal, storage, shipping or other date confirming that irradiation ceased for fuel .

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 (IFE) U OF AZ
SNF ID #: 973
Fuel Units & Descr: 2 - ELEMENT
Heavy Metal Mass: BOL=0.39kg EOL=0.378kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6.65
Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 years

Estimated Canister usage
18"x10"
0.02

II. Estimates

	m	x_n	x_b	b	y_a	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	11.46	22.91	0.00E+00	9.76E-09	1.95E-08	Avg MeV	
Am-241	1.8331E-03	11.46	22.91	0.00E+00	2.10E-02	4.20E-02	0.0150	3.703E+12
Am-242m	1.4129E-06	11.46	22.91	0.00E+00	1.62E-05	3.24E-05	0.0250	8.148E+11
Am-243	1.4774E-07	11.46	22.91	0.00E+00	1.69E-06	3.38E-06	0.0375	6.939E+11
C-14	1.2871E-04	11.46	22.91	0.00E+00	1.47E-03	2.95E-03	0.0575	7.122E+11
Cl-36	2.8120E-06	11.46	22.91	0.00E+00	3.22E-05	6.44E-05	0.0850	4.412E+11
Cm-243	1.7940E-07	11.46	22.91	0.00E+00	2.06E-06	4.11E-06	0.1250	3.204E+11
Cm-244	1.6962E-06	11.46	22.91	0.00E+00	1.94E-05	3.89E-05	0.2250	3.743E+11
Co-60	1.2839E+00	11.46	22.91	0.00E+00	1.47E+01	2.94E+01	0.3750	1.899E+11
Cs-134	9.0541E-02	11.46	22.91	0.00E+00	1.04E+00	2.07E+00	0.5750	2.525E+12
Cs-135	3.2195E-05	11.46	22.91	0.00E+00	3.69E-04	7.38E-04	0.8500	1.084E+11
Cs-137	2.7564E+00	11.46	22.91	0.00E+00	3.16E+01	6.32E+01	1.2500	2.201E+12
Eu-154	1.5368E-02	11.46	22.91	0.00E+00	1.76E-01	3.52E-01	1.7500	1.467E+09
Eu-155	2.9293E-02	11.46	22.91	0.00E+00	3.36E-01	6.71E-01	2.2500	2.365E+09
Fe-55	7.7158E-01	11.46	22.91	0.00E+00	8.84E+00	1.77E+01	2.7500	1.877E+07
H-3	1.1111E-02	11.46	22.91	0.00E+00	1.27E-01	2.55E-01	3.5000	2.184E+06
I-129	7.3684E-07	11.46	22.91	0.00E+00	8.44E-06	1.69E-05	5.0000	1.225E+01
Kr-85	2.5263E-01	11.46	22.91	0.00E+00	2.89E+00	5.79E+00	7.0000	1.387E+00
Np-237	1.2427E-06	11.46	22.91	0.00E+00	1.42E-05	2.85E-05	11.0000	1.580E-01
Pa-231	3.8511E-09	11.46	22.91	0.00E+00	4.41E-08	8.82E-08		
Pb-210	7.3880E-15	11.46	22.91	0.00E+00	8.46E-14	1.69E-13		
Pm-147	2.1023E+00	11.46	22.91	0.00E+00	2.41E+01	4.82E+01		
Pu-238	1.0383E-03	11.46	22.91	0.00E+00	1.19E-02	2.38E-02		
Pu-239	5.5293E-03	11.46	22.91	0.00E+00	6.33E-02	1.27E-01		
Pu-240	2.1278E-03	11.46	22.91	0.00E+00	2.44E-02	4.87E-02		
Pu-241	1.0195E-01	11.46	22.91	0.00E+00	1.17E+00	2.34E+00		
Pu-242	2.3128E-07	11.46	22.91	0.00E+00	2.65E-06	5.30E-06		
Ra-226	5.2782E-14	11.46	22.91	0.00E+00	6.05E-13	1.21E-12		
Ra-228	1.9338E-10	11.46	22.91	0.00E+00	2.22E-09	4.43E-09		
Ru-106	9.1684E-02	11.46	22.91	0.00E+00	1.05E+00	2.10E+00		
Se-79	1.3018E-05	11.46	22.91	0.00E+00	1.49E-04	2.98E-04		
Sn-126	1.2167E-05	11.46	22.91	0.00E+00	1.39E-04	2.79E-04		
Sr-90	2.6045E+00	11.46	22.91	0.00E+00	2.98E+01	5.97E+01		
Tc-99	4.4241E-04	11.46	22.91	0.00E+00	5.07E-03	1.01E-02		
Th-229	1.3713E-10	11.46	22.91	0.00E+00	1.57E-09	3.14E-09		
Th-230	1.8090E-11	11.46	22.91	0.00E+00	2.07E-10	4.14E-10		
Th-232	2.5278E-10	11.46	22.91	0.00E+00	2.90E-09	5.79E-09		
Tl-208	1.6947E-08	11.46	22.91	0.00E+00	1.94E-07	3.88E-07		
U-232	4.8737E-08	11.46	22.91	0.00E+00	5.58E-07	1.12E-06	Thermal Power	
U-233	1.2203E-07	11.46	22.91	0.00E+00	1.40E-06	2.80E-06	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-234	1.5925E-07	11.46	22.91	0.00E+00	1.82E-06	3.65E-06		
U-235	-2.6194E-06	11.46	0.00	1.69E-04	1.39E-04	1.69E-04		
U-236	1.2693E-05	11.46	22.91	0.00E+00	1.45E-04	2.91E-04	6.67E-01	1.33E+00
U-238	-3.6331E-08	11.46	0.00	1.05E-04	1.04E-04	1.05E-04	Total	Total
Y-90	2.6060E+00	11.46	22.91	0.00E+00	2.99E+01	5.97E+01		
Other Radionuclides					4.13E+01	8.26E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	1.90	11.46	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		22.91	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0.86	6.03	1.00
Bounding	1.72		

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 (IFE) U OF IL
SNF ID #: 1048
Fuel Units & Descr: 8 - ELEMENT
Heavy Metal Mass: BOL=1.56kg EOL=1.52kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage:

18"x10'
0 07

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	38 18	76 37	0 00E+00	3 25E-08	6 50E-08
Am-241	1 8331E-03	38 18	76 37	0 00E+00	7 00E-02	1 40E-01
Am-242m	1 4129E-06	38 18	76 37	0 00E+00	5 40E-05	1 08E-04
Am-243	1 4774E-07	38 18	76 37	0 00E+00	5 64E-06	1 13E-05
C-14	1.2871E-04	38 18	76 37	0 00E+00	4 91E-03	9 83E-03
Cl-36	2 8120E-06	38.18	76 37	0 00E+00	1 07E-04	2.15E-04
Cm-243	1.7940E-07	38 18	76.37	0 00E+00	6 85E-06	1.37E-05
Cm-244	1.6962E-06	38 18	76.37	0 00E+00	6 48E-05	1.30E-04
Co-60	1.2839E+00	38 18	76 37	0 00E+00	4 90E+01	9 81E+01
Cs-134	9 0541E-02	38 18	76 37	0 00E+00	3 46E+00	6 91E+00
Cs-135	3.2195E-05	38 18	76 37	0 00E+00	1 23E-03	2.46E-03
Cs-137	2 7564E+00	38 18	76 37	0 00E+00	1 05E+02	2 11E+02
Eu-154	1 5368E-02	38 18	76 37	0 00E+00	5 87E-01	1 17E+00
Eu-155	2 9293E-02	38 18	76 37	0 00E+00	1 12E+00	2.24E+00
Fe-55	7 7158E-01	38.18	76 37	0 00E+00	2 95E+01	5 89E+01
H-3	1 1111E-02	38 18	76 37	0 00E+00	4.24E-01	8 49E-01
I-129	7.3684E-07	38 18	76 37	0 00E+00	2 81E-05	5 63E-05
Kr-85	2 5263E-01	38 18	76.37	0 00E+00	9 65E+00	1 93E+01
Np-237	1.2427E-06	38 18	76.37	0 00E+00	4 75E-05	9 49E-05
Pa-231	3 8511E-09	38 18	76 37	0 00E+00	1 47E-07	2 94E-07
Pb-210	7.3880E-15	38 18	76 37	0 00E+00	2 82E-13	5 64E-13
Pm-147	2 1023E+00	38 18	76 37	0 00E+00	8 03E+01	1 61E+02
Pu-238	1 0383E-03	38 18	76 37	0 00E+00	3 96E-02	7 93E-02
Pu-239	5 5293E-03	38 18	76 37	0 00E+00	2 11E-01	4 22E-01
Pu-240	2 1278E-03	38.18	76 37	0 00E+00	8 12E-02	1 62E-01
Pu-241	1 0195E-01	38 18	76 37	0 00E+00	3 89E+00	7 79E+00
Pu-242	2 3128E-07	38 18	76.37	0 00E+00	8 83E-06	1 77E-05
Ra-226	5.2782E-14	38 18	76.37	0 00E+00	2 02E-12	4 03E-12
Ra-228	1.9338E-10	38 18	76 37	0 00E+00	7.38E-09	1 48E-08
Ru-106	9 1684E-02	38 18	76 37	0 00E+00	3 50E+00	7.00E+00
Se-79	1.3018E-05	38 18	76 37	0 00E+00	4 97E-04	9 94E-04
Sn-126	1.2167E-05	38 18	76 37	0 00E+00	4 65E-04	9 29E-04
Sr-90	2 6045E+00	38 18	76 37	0 00E+00	9 95E+01	1 99E+02
Tc-99	4 4241E-04	38 18	76 37	0 00E+00	1.69E-02	3 38E-02
Th-229	1 3713E-10	38.18	76 37	0 00E+00	5.24E-09	1 05E-08
Th-230	1 8090E-11	38 18	76.37	0 00E+00	6 91E-10	1.38E-09
Th-232	2 5278E-10	38 18	76.37	0 00E+00	9 65E-09	1.93E-08
Tl-208	1 6947E-08	38 18	76 37	0 00E+00	6 47E-07	1.29E-06
U-232	4 8737E-08	38 18	76 37	0 00E+00	1 86E-06	3 72E-06
U-233	1.2203E-07	38 18	76 37	0 00E+00	4 66E-06	9.32E-06
U-234	1.5925E-07	38 18	76 37	0 00E+00	6 08E-06	1 22E-05
U-235	-2 6194E-06	38 18	0 00	6 74E-04	5 74E-04	6 74E-04
U-236	1.2693E-05	38.18	76 37	0 00E+00	4 85E-04	9 69E-04
U-238	-3 6331E-08	38 18	0 00	4 19E-04	4 18E-04	4 19E-04
Y-90	2 6060E+00	38.18	76.37	0 00E+00	9 95E+01	1 99E+02
Other Radionuclides					1.38E+02	2.75E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.234E+13
0 0250	2 716E+12
0 0375	2.313E+12
0 0575	2 374E+12
0 0850	1.471E+12
0 1250	1.068E+12
0.2250	1.248E+12
0.3750	6.331E+11
0 5750	8 417E+12
0 8500	3 613E+11
1.2500	7.336E+12
1 7500	4 890E+09
2.2500	7 883E+09
2 7500	6.255E+07
3.5000	7.280E+06
5 0000	4 099E+01
7 0000	4 641E+00
11 0000	5.288E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.22E+00	4 44E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	30 41	38 18	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		76 37	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 72	1.26
Bounding	1.44	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 (IFE) UNIV OF CAL-IRVINE
SNF ID #: 824
Fuel Units & Descr: 5 - ELEMENT
Heavy Metal Mass: BOL=0 916kg EOL=0 916kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage

18"x10'
0 05

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8.5173E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-241	1 8331E-03	0 00	0 00	0 00E+00	0 00E+00	0.00E+00
Am-242m	1 4129E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-243	1 4774E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
C-14	1 2871E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cl-36	2 8120E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cm-243	1.7940E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cm-244	1 6962E-06	0 00	0.00	0 00E+00	0 00E+00	0 00E+00
Co-60	1.2839E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-134	9 0541E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-135	3 2195E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-137	2.7564E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Eu-154	1 5368E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Eu-155	2 9293E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Fe-55	7 7158E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
H-3	1.1111E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
I-129	7.3684E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Kr-85	2 5263E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Np-237	1.2427E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pa-231	3 8511E-09	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pb-210	7 3880E-15	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pm-147	2.1023E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-238	1 0383E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-239	5 5293E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-240	2.1278E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-241	1 0195E-01	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-242	2.3128E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-226	5 2782E-14	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-228	1.9338E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ru-106	9 1684E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Se-79	1 3018E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sn-126	1.2167E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sr-90	2 6045E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Tc-99	4 4241E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-229	1.3713E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-230	1 8090E-11	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-232	2.5278E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Tl-208	1 6947E-08	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-232	4 8737E-08	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-233	1.2203E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-234	1 5925E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-235	-2 6194E-06	0 00	0 00	3 96E-04	3 96E-04	3 96E-04
U-236	1.2693E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-238	-3 6331E-08	0 00	0 00	2 46E-04	2 46E-04	2 46E-04
Y-90	2 6060E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Other Radionuclides					0 00E+00	0 00E+00

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	9 804E+06
0 0250	0 000E+00
0 0375	1 338E+04
0 0575	8 107E+03
0 0850	1 143E+06
0 1250	2.257E+06
0.2250	7 988E+06
0.3750	1 993E+04
0.5750	9 805E+02
0 8500	1 528E+02
1.2500	9 009E+00
1 7500	4 408E+00
2.2500	2.553E+00
2 7500	1 484E+00
3 5000	1 326E+00
5 0000	5 698E-01
7 0000	6 559E-02
11.0000	7 541E-03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 66E-05	1.66E-05
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 99996708	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	0 00	
Bounding		

Basis for burnup used in estimate:
Nominal burnup taken directly from SFD (converted to MWd)
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 00	
Bounding	0 00	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 (IFE) UNIV OF CAL-IRVINE
SNF ID #: 1051
Fuel Units & Descr: 1 - ELEMENT
Heavy Metal Mass: BOL=0 192kg EOL=0 19kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage.
18"x10'
0 01

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	1 87	3 73	0 00E+00	1 59E-09	3.18E-09
Am-241	1 8331E-03	1 87	3 73	0 00E+00	3 42E-03	6 85E-03
Am-242m	1 4129E-06	1 87	3 73	0 00E+00	2 64E-06	5.28E-06
Am-243	1 4774E-07	1 87	3 73	0 00E+00	2 76E-07	5.52E-07
C-14	1.2871E-04	1 87	3 73	0 00E+00	2 40E-04	4 81E-04
Cl-36	2 8120E-06	1 87	3 73	0 00E+00	5 25E-06	1.05E-05
Cm-243	1.7940E-07	1 87	3 73	0 00E+00	3 35E-07	6 70E-07
Cm-244	1 6962E-06	1 87	3 73	0 00E+00	3 17E-06	6.33E-06
Co-60	1.2839E+00	1 87	3 73	0 00E+00	2 40E+00	4 79E+00
Cs-134	9 0541E-02	1 87	3 73	0 00E+00	1 69E-01	3.38E-01
Cs-135	3.2195E-05	1 87	3 73	0 00E+00	6 01E-05	1.20E-04
Cs-137	2.7564E+00	1 87	3 73	0 00E+00	5 15E+00	1.03E+01
Eu-154	1.5368E-02	1 87	3 73	0 00E+00	2 87E-02	5 74E-02
Eu-155	2 9293E-02	1 87	3 73	0 00E+00	5 47E-02	1 09E-01
Fe-55	7.7158E-01	1 87	3 73	0 00E+00	1 44E+00	2 88E+00
H-3	1.1111E-02	1 87	3 73	0 00E+00	2 07E-02	4 15E-02
I-129	7.3684E-07	1 87	3 73	0 00E+00	1.38E-06	2 75E-06
Kr-85	2.5263E-01	1 87	3 73	0 00E+00	4 72E-01	9 43E-01
Np-237	1.2427E-06	1.87	3 73	0 00E+00	2.32E-06	4 64E-06
Pa-231	3 8511E-09	1.87	3 73	0 00E+00	7.19E-09	1 44E-08
Pb-210	7.3880E-15	1 87	3 73	0 00E+00	1.38E-14	2 76E-14
Pm-147	2 1023E+00	1 87	3 73	0.00E+00	3 93E+00	7 85E+00
Pu-238	1.0383E-03	1.87	3 73	0.00E+00	1.94E-03	3 88E-03
Pu-239	5 5293E-03	1.87	3 73	0 00E+00	1.03E-02	2 07E-02
Pu-240	2 1278E-03	1 87	3 73	0 00E+00	3 97E-03	7 95E-03
Pu-241	1 0195E-01	1.87	3 73	0 00E+00	1 90E-01	3 81E-01
Pu-242	2.3128E-07	1.87	3 73	0.00E+00	4.32E-07	8 64E-07
Ra-226	5.2782E-14	1 87	3 73	0 00E+00	9 86E-14	1 97E-13
Ra-228	1 9338E-10	1.87	3 73	0 00E+00	3 61E-10	7 22E-10
Ru-106	9 1684E-02	1.87	3 73	0 00E+00	1 71E-01	3 42E-01
Se-79	1.3018E-05	1.87	3 73	0 00E+00	2 43E-05	4 86E-05
Sn-126	1.2167E-05	1.87	3 73	0 00E+00	2.27E-05	4 54E-05
Sr-90	2 6045E+00	1.87	3 73	0 00E+00	4 86E+00	9 73E+00
Tc-99	4 4241E-04	1.87	3 73	0 00E+00	8.26E-04	1 65E-03
Th-229	1.3713E-10	1.87	3 73	0 00E+00	2 56E-10	5 12E-10
Th-230	1 8090E-11	1.87	3 73	0 00E+00	3 38E-11	6 76E-11
Th-232	2.5278E-10	1.87	3 73	0 00E+00	4 72E-10	9 44E-10
Tl-208	1 6947E-08	1.87	3 73	0 00E+00	3 16E-08	6.33E-08
U-232	4 8737E-08	1.87	3 73	0 00E+00	9 10E-08	1.82E-07
U-233	1.2203E-07	1 87	3 73	0 00E+00	2 28E-07	4.56E-07
U-234	1.5925E-07	1 87	3 73	0 00E+00	2 97E-07	5 95E-07
U-235	-2 6194E-06	1 87	0 00	8 28E-05	7 79E-05	8.28E-05
U-236	1.2693E-05	1 87	3 73	0 00E+00	2 37E-05	4 74E-05
U-238	-3 6331E-08	1 87	0 00	5 15E-05	5 14E-05	5 15E-05
Y-90	2 6060E+00	1 87	3 73	0 00E+00	4 87E+00	9.73E+00
Other Radionuclides					6 73E+00	1.35E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6 036E+11
0 0250	1 328E+11
0 0375	1 131E+11
0 0575	1 161E+11
0 0850	7 192E+10
0 1250	5 223E+10
0 2250	6 101E+10
0 3750	3 096E+10
0 5750	4 116E+11
0 8500	1 767E+10
1.2500	3 588E+11
1 7500	2.392E+08
2.2500	3 855E+08
2.7500	3 059E+06
3 5000	3 560E+05
5 0000	2 076E+00
7 0000	2.352E-01
11 0000	2 681E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.09E-01	2.17E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 00002088	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	1 87	1 43
Bounding		3 73

Basis for burnup used in estimate:
Nominal burnup taken directly from SFD (converted to MWd)
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 29	0 77
Bounding	0 57	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 AFRRI
SNF ID #: 250
Fuel Units & Descr: 95 - ELEMENT
Heavy Metal Mass: BOL=18 525kg EOL=18 012kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2019
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd) 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time 10 years

Estimated Canister usage: 18"x10" 0 86

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	1 3731E-09	489 71	979 43	0 00E+00	6 72E-07	1 34E-06
Am-241	2 3865E-03	489 71	979 43	0 00E+00	1 17E+00	2 34E+00
Am-242m	1 3812E-06	489 71	979 43	0 00E+00	6 76E-04	1 35E-03
Am-243	1 4767E-07	489 71	979 43	0 00E+00	7 23E-05	1 45E-04
C-14	1.2863E-04	489 71	979 43	0 00E+00	6 30E-02	1 26E-01
Cl-36	2 8120E-06	489 71	979 43	0 00E+00	1 38E-03	2 75E-03
Cm-243	1 5895E-07	489 71	979 43	0 00E+00	7 78E-05	1 56E-04
Cm-244	1 4008E-06	489 71	979 43	0 00E+00	6 86E-04	1 37E-03
Co-60	6 6541E-01	489 71	979 43	0 00E+00	3 26E+02	6 52E+02
Cs-134	1 6887E-02	489 71	979 43	0 00E+00	8 27E+00	1 65E+01
Cs-135	3.2195E-05	489.71	979 43	0 00E+00	1 58E-02	3 15E-02
Cs-137	2 4556E+00	489.71	979 43	0 00E+00	1 20E+03	2 41E+03
Eu-154	1 0268E-02	489.71	979 43	0 00E+00	5 03E+00	1 01E+01
Eu-155	1 4570E-02	489 71	979 43	0 00E+00	7 14E+00	1 43E+01
Fe-55	2 0361E-01	489 71	979 43	0 00E+00	9 97E+01	1 99E+02
H-3	8 3940E-03	489 71	979 43	0 00E+00	4 11E+00	8 22E+00
I-129	7 3684E-07	489 71	979 43	0 00E+00	3 61E-04	7.22E-04
Kr-85	1 8286E-01	489 71	979 43	0 00E+00	8 95E+01	1 79E+02
Np-237	1 2462E-06	489 71	979 43	0 00E+00	6.10E-04	1.22E-03
Pa-231	4 9143E-09	489 71	979 43	0 00E+00	2 41E-06	4.81E-06
Pb-210	1 7173E-14	489 71	979 43	0 00E+00	8.41E-12	1 68E-11
Pm-147	5 6165E-01	489 71	979 43	0 00E+00	2 75E+02	5 50E+02
Pu-238	9 9820E-04	489 71	979 43	0 00E+00	4 89E-01	9.78E-01
Pu-239	5 5293E-03	489 71	979 43	0 00E+00	2 71E+00	5 42E+00
Pu-240	2 1263E-03	489 71	979 43	0 00E+00	1 04E+00	2 08E+00
Pu-241	8 0165E-02	489 71	979 43	0 00E+00	3 93E+01	7 85E+01
Pu-242	2 3128E-07	489 71	979 43	0 00E+00	1.13E-04	2.27E-04
Ra-226	9 9774E-14	489 71	979 43	0 00E+00	4 89E-11	9 77E-11
Ra-228	2 1729E-10	489 71	979 43	0 00E+00	1 06E-07	2.13E-07
Ru-106	2 9519E-03	489 71	979 43	0 00E+00	1 45E+00	2 89E+00
Se-79	1.3017E-05	489 71	979 43	0 00E+00	6.37E-03	1.27E-02
Sn-126	1.2167E-05	489 71	979 43	0 00E+00	5 96E-03	1 19E-02
Sr-90	2.3128E+00	489 71	979 43	0 00E+00	1.13E+03	2.27E+03
Tc-99	4 4241E-04	489 71	979 43	0 00E+00	2 17E-01	4 33E-01
Th-229	1 9459E-10	489 71	979 43	0 00E+00	9 53E-08	1 91E-07
Th-230	2 5564E-11	489 71	979 43	0 00E+00	1 25E-08	2 50E-08
Th-232	2.5278E-10	489 71	979 43	0 00E+00	1 24E-07	2 48E-07
Tl-208	1 6947E-08	489 71	979 43	0 00E+00	8 30E-06	1 66E-05
U-232	4 6812E-08	489 71	979 43	0 00E+00	2 29E-05	4 58E-05
U-233	1.2206E-07	489 71	979 43	0 00E+00	5 98E-05	1 20E-04
U-234	1 7323E-07	489.71	979 43	0 00E+00	8 48E-05	1 70E-04
U-235	-2 6194E-06	489.71	0 00	8 01E-03	6 72E-03	8 01E-03
U-236	1.2693E-05	489.71	979 43	0.00E+00	6 22E-03	1 24E-02
U-238	-3 6331E-08	489.71	0 00	4 98E-03	4 96E-03	4 98E-03
Y-90	2.3128E+00	489.71	979 43	0 00E+00	1 13E+03	2 27E+03
Other Radionuclides					1 20E+03	2 40E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 265E+14
0 0250	2.681E+13
0 0375	2.289E+13
0 0575	2.440E+13
0 0850	1 480E+13
0 1250	9 732E+12
0.2250	1.263E+13
0.3750	5.800E+12
0 5750	9 086E+13
0 8500	1 622E+12
1.2500	4 877E+13
1 7500	2.935E+10
2.2500	1.533E+09
2 7500	2.538E+07
3 5000	3 007E+06
5 0000	5.226E+02
7 0000	5 912E+01
11 0000	6 731E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 92E+01	3.84E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	90.27	489 71	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		979 43	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 78	5 42
Bounding	1 55	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 ANL-W
SNF ID #: 353
Fuel Units & Descr: 2 - ELEMENT
Heavy Metal Mass: BOL=0 39kg EOL=0 17kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1994
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 35 years

Estimated Canister usage 18"x10": 0 02

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	6 7038E-09	209 82	372.30	0 00E+00	1 41E-06	2 50E-06
Am-241	3 9068E-03	209 82	372.30	0 00E+00	8 20E-01	1 45E+00
Am-242m	1.2325E-06	209 82	372.30	0 00E+00	2 59E-04	4.59E-04
Am-243	1 4732E-07	209 82	372.30	0 00E+00	3 09E-05	5 48E-05
C-14	1.2824E-04	209 82	372.30	0 00E+00	2 69E-02	4 77E-02
Cl-36	2 8120E-06	209 82	372 30	0 00E+00	5 90E-04	1 05E-03
Cm-243	8.6556E-08	209 82	372 30	0 00E+00	1 82E-05	3.22E-05
Cm-244	5.3835E-07	209 82	372 30	0 00E+00	1.13E-04	2 00E-04
Co-60	2 4887E-02	209 82	372.30	0 00E+00	5.22E+00	9.27E+00
Cs-134	3 8030E-06	209 82	372 30	0 00E+00	7.98E-04	1 42E-03
Cs-135	3 2195E-05	209 82	372 30	0 00E+00	6 76E-03	1 20E-02
Cs-137	1.3788E+00	209 82	372 30	0 00E+00	2 89E+02	5 13E+02
Eu-154	1 3711E-03	209 82	372 30	0 00E+00	2 88E-01	5 10E-01
Eu-155	4 4361E-04	209 82	372 30	0 00E+00	9 31E-02	1 65E-01
Fe-55	2 6075E-04	209 82	372 30	0 00E+00	5 47E-02	9 71E-02
H-3	2 0647E-03	209 82	372 30	0 00E+00	4 33E-01	7 69E-01
I-129	7 3684E-07	209 82	372 30	0 00E+00	1 55E-04	2.74E-04
Kr-85	3 6346E-02	209 82	372 30	0.00E+00	7 63E+00	1 35E+01
Np-237	1.2844E-06	209 82	372.30	0 00E+00	2 69E-04	4 78E-04
Pa-231	1.2352E-08	209 82	372.30	0 00E+00	2 59E-06	4 60E-06
Pb-210	3 5338E-13	209 82	372.30	0 00E+00	7 41E-11	1.32E-10
Pm-147	7 6346E-04	209 82	372.30	0 00E+00	1 60E-01	2.84E-01
Pu-238	8.1970E-04	209 82	372.30	0 00E+00	1 72E-01	3.05E-01
Pu-239	5 5248E-03	209 82	372 30	0 00E+00	1 16E+00	2 06E+00
Pu-240	2.1203E-03	209 82	372.30	0 00E+00	4 45E-01	7.89E-01
Pu-241	2 4075E-02	209 82	372 30	0 00E+00	5 05E+00	8 96E+00
Pu-242	2.3128E-07	209 82	372 30	0 00E+00	4 85E-05	8 61E-05
Ra-226	9 6481E-13	209 82	372 30	0 00E+00	2 02E-10	3 59E-10
Ra-228	2 5188E-10	209 82	372 30	0 00E+00	5.29E-08	9 38E-08
Ru-106	1 0214E-10	209 82	372 30	0 00E+00	2.14E-08	3 80E-08
Se-79	1.3014E-05	209 82	372 30	0 00E+00	2.73E-03	4 84E-03
Sn-126	1 2164E-05	209 82	372 30	0 00E+00	2.55E-03	4 53E-03
Sr-90	1 2762E+00	209 82	372 30	0 00E+00	2.68E+02	4 75E+02
Tc-99	4 4241E-04	209 82	372 30	0 00E+00	9.28E-02	1 65E-01
Th-229	5 9684E-10	209 82	372 30	0 00E+00	1.25E-07	2 22E-07
Th-230	9 3880E-11	209 82	372 30	0.00E+00	1 97E-08	3 50E-08
Th-232	2 5278E-10	209 82	372.30	0 00E+00	5 30E-08	9 41E-08
Tl-208	1.3723E-08	209 82	372.30	0 00E+00	2 88E-06	5 11E-06
U-232	3 6932E-08	209 82	372.30	0 00E+00	7.75E-06	1.37E-05
U-233	1.2224E-07	209 82	372.30	0 00E+00	2 56E-05	4 55E-05
U-234	2.5714E-07	209 82	372.30	0 00E+00	5 40E-05	9 57E-05
U-235	-2 6194E-06	209 82	0 00	1 69E-04	0 00E+00	1.69E-04
U-236	1.2695E-05	209 82	372.30	0 00E+00	2 66E-03	4.73E-03
U-238	-3 6331E-08	209 82	0 00	1 05E-04	9 72E-05	1 05E-04
Y-90	1.2765E+00	209 82	372.30	0 00E+00	2 68E+02	4 75E+02
Other Radionuclides					2 89E+02	5 12E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.599E+13
0 0250	5 400E+12
0 0375	4 691E+12
0 0575	5 054E+12
0 0850	3.041E+12
0 1250	1.979E+12
0 2250	2 620E+12
0 3750	1 142E+12
0 5750	1.911E+13
0 8500	1.955E+11
1.2500	7.588E+11
1 7500	5 075E+09
2.2500	4 159E+06
2 7500	1 912E+05
3.5000	4 573E+02
5 0000	1 925E+02
7.0000	2 171E+01
11 0000	2 468E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.37E+00	5 99E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	13.30	209 82	Nominal burnup calculated from the heavy metal mass destroyed
Bounding	15.99	372.30	Bounding burnup calculated assuming all BOL heavy metal burned.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	15 78	15 77
Bounding	27 99	23.28

Estimated EOL HM/Given EOL HM: 2.07

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 ANL-W
SNF ID #: 370
Fuel Units & Descr: 40 - ELEMENT
Heavy Metal Mass: BOL=7 12kg, EOL=6 86kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1994
Estimates as of 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 35 years

Estimated Canister usage: 18"x10' = 0 36

II. Estimates	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 7038E-09	248.20	496 40	0 00E+00	1 66E-06	3 33E-06
Am-241	3 9068E-03	248.20	496 40	0 00E+00	9 70E-01	1 94E+00
Am-242m	1.2325E-06	248.20	496 40	0 00E+00	3 06E-04	6.12E-04
Am-243	1 4732E-07	248.20	496 40	0 00E+00	3 66E-05	7.31E-05
C-14	1.2824E-04	248.20	496 40	0 00E+00	3.18E-02	6 37E-02
Cl-36	2 8120E-06	248.20	496 40	0 00E+00	6 98E-04	1 40E-03
Cm-243	8 6556E-08	248.20	496 40	0 00E+00	2.15E-05	4 30E-05
Cm-244	5 3835E-07	248 20	496 40	0 00E+00	1 34E-04	2 67E-04
Co-60	2 4887E-02	248.20	496 40	0 00E+00	6 18E+00	1.24E+01
Cs-134	3 8030E-06	248.20	496 40	0 00E+00	9 44E-04	1 89E-03
Cs-135	3 2195E-05	248 20	496 40	0 00E+00	7 99E-03	1 60E-02
Cs-137	1 3788E+00	248 20	496 40	0 00E+00	3 42E+02	6 84E+02
Eu-154	1 3711E-03	248 20	496 40	0 00E+00	3 40E-01	6 81E-01
Eu-155	4 4361E-04	248 20	496 40	0 00E+00	1 10E-01	2 20E-01
Fe-55	2 6075E-04	248 20	496 40	0 00E+00	6 47E-02	1 29E-01
H-3	2 0647E-03	248 20	496 40	0 00E+00	5.12E-01	1 02E+00
I-129	7 3684E-07	248 20	496 40	0 00E+00	1 83E-04	3 66E-04
Kr-85	3 6346E-02	248 20	496 40	0 00E+00	9 02E+00	1 80E+01
Np-237	1 2844E-06	248 20	496 40	0 00E+00	3 19E-04	6 38E-04
Pa-231	1 2352E-08	248 20	496 40	0 00E+00	3 07E-06	6 13E-06
Pb-210	3 5338E-13	248.20	496 40	0 00E+00	8 77E-11	1 75E-10
Pm-147	7 6346E-04	248 20	496 40	0 00E+00	1 89E-01	3 79E-01
Pu-238	8 1970E-04	248 20	496 40	0 00E+00	2 03E-01	4 07E-01
Pu-239	5 5248E-03	248 20	496 40	0 00E+00	1.37E+00	2 74E+00
Pu-240	2 1203E-03	248 20	496 40	0 00E+00	5 26E-01	1 05E+00
Pu-241	2 4075E-02	248 20	496 40	0 00E+00	5 98E+00	1 20E+01
Pu-242	2 3128E-07	248 20	496 40	0 00E+00	5 74E-05	1 15E-04
Ra-226	9 6481E-13	248 20	496 40	0 00E+00	2.39E-10	4 79E-10
Ra-228	2 5188E-10	248 20	496 40	0 00E+00	6 25E-08	1.25E-07
Ru-106	1 0214E-10	248 20	496 40	0 00E+00	2 53E-08	5 07E-08
Se-79	1 3014E-05	248 20	496 40	0 00E+00	3.23E-03	6 46E-03
Sn-126	1 2164E-05	248 20	496 40	0 00E+00	3 02E-03	6 04E-03
Sr-90	1 2762E+00	248 20	496 40	0 00E+00	3.17E+02	6 34E+02
Tc-99	4 4241E-04	248 20	496 40	0 00E+00	1 10E-01	2.20E-01
Th-229	5 9684E-10	248 20	496 40	0 00E+00	1 48E-07	2 96E-07
Th-230	9 3880E-11	248 20	496 40	0 00E+00	2 33E-08	4 66E-08
Th-232	2 5278E-10	248 20	496 40	0 00E+00	6.27E-08	1.25E-07
Tl-208	1 3723E-08	248 20	496 40	0 00E+00	3 41E-06	6 81E-06
U-232	3 6932E-08	248 20	496 40	0 00E+00	9 17E-06	1 83E-05
U-233	1 2224E-07	248 20	496 40	0 00E+00	3 03E-05	6 07E-05
U-234	2 5714E-07	248 20	496 40	0 00E+00	6 38E-05	1.28E-04
U-235	-2.6194E-06	248 20	0 00	3 03E-03	2 38E-03	3 03E-03
U-236	1 2695E-05	248 20	496 40	0 00E+00	3 15E-03	6.30E-03
U-238	-3 6331E-08	248 20	0 00	1 92E-03	1 91E-03	1 92E-03
Y-90	1 2765E+00	248 20	496 40	0 00E+00	3.17E+02	6 34E+02
Other Radionuclides					3 41E+02	6 83E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 465E+13
0 0250	7 199E+12
0 0375	6.255E+12
0 0575	6 739E+12
0 0850	4 055E+12
0 1250	2 639E+12
0.2250	3 493E+12
0.3750	1 523E+12
0.5750	2 548E+13
0 8500	2 607E+11
1.2500	1 012E+12
1 7500	6 767E+09
2.2500	5 545E+06
2.7500	2.549E+05
3.5000	6 193E+02
5.0000	2 608E+02
7.0000	2 942E+01
11 0000	3 346E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.99E+00	7 98E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 66292135	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	173 48	248.20	Nominal burnup calculated from the heavy metal mass destroyed
Bounding	291 92	496 40	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 02	1 43
Bounding	2 04	1 70

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 AUSTRIA
SNF ID #: 469
Fuel Units & Descr: 30 - ELEMENT
Heavy Metal Mass: BOL=5 85kg EOL=5 643kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage

18"x10'
0 27

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	197.60	395 21	0 00E+00	5 22E-07	1.04E-06
Am-241	3 1429E-03	197.60	395.21	0 00E+00	6 21E-01	1.24E+00
Am-242m	1.3195E-06	197.60	395 21	0 00E+00	2 61E-04	5.21E-04
Am-243	1 4753E-07	197 60	395.21	0 00E+00	2 92E-05	5 83E-05
C-14	1.2847E-04	197 60	395.21	0 00E+00	2 54E-02	5 08E-02
Cl-36	2 8120E-06	197 60	395.21	0 00E+00	5 56E-04	1 11E-03
Cm-243	1 2465E-07	197 60	395 21	0 00E+00	2 46E-05	4 93E-05
Cm-244	9 5564E-07	197 60	395 21	0 00E+00	1 89E-04	3 78E-04
Co-60	1 7880E-01	197 60	395 21	0 00E+00	3 53E+01	7 07E+01
Cs-134	5 8692E-04	197 60	395 21	0 00E+00	1.16E-01	2 32E-01
Cs-135	3 2195E-05	197 60	395 21	0 00E+00	6.36E-03	1.27E-02
Cs-137	1 9489E+00	197 60	395 21	0 00E+00	3 85E+02	7 70E+02
Eu-154	4 5895E-03	197 60	395 21	0 00E+00	9 07E-01	1 81E+00
Eu-155	3 6045E-03	197 60	395 21	0 00E+00	7.12E-01	1 42E+00
Fe-55	1.4185E-02	197 60	395 21	0 00E+00	2 80E+00	5 61E+00
H-3	4 7895E-03	197 60	395 21	0 00E+00	9 46E-01	1.89E+00
I-129	7.3684E-07	197 60	395 21	0 00E+00	1 46E-04	2 91E-04
Kr-85	9 5820E-02	197.60	395.21	0 00E+00	1 89E+01	3 79E+01
Np-237	1.2552E-06	197.60	395 21	0 00E+00	2 48E-04	4 96E-04
Pa-231	7 0406E-09	197 60	395.21	0 00E+00	1.39E-06	2 78E-06
Pb-210	5 8000E-14	197.60	395.21	0 00E+00	1.15E-11	2 29E-11
Pm-147	4 0075E-02	197 60	395.21	0 00E+00	7 92E+00	1 58E+01
Pu-238	9 2256E-04	197 60	395.21	0 00E+00	1.82E-01	3 65E-01
Pu-239	5 5278E-03	197 60	395 21	0 00E+00	1 09E+00	2 18E+00
Pu-240	2 1248E-03	197 60	395.21	0 00E+00	4.20E-01	8 40E-01
Pu-241	4 9549E-02	197 60	395 21	0 00E+00	9 79E+00	1 96E+01
Pu-242	2 3128E-07	197 60	395 21	0 00E+00	4 57E-05	9.14E-05
Ra-226	2 4526E-13	197 60	395 21	0 00E+00	4 85E-11	9 69E-11
Ra-228	2 4015E-10	197 60	395 21	0 00E+00	4 75E-08	9 49E-08
Ru-106	3 0602E-06	197 60	395 21	0 00E+00	6 05E-04	1.21E-03
Se-79	1.3015E-05	197 60	395 21	0 00E+00	2 57E-03	5 14E-03
Sn-126	1.2165E-05	197 60	395 21	0 00E+00	2 40E-03	4 81E-03
Sr-90	1 8226E+00	197 60	395 21	0 00E+00	3 60E+02	7.20E+02
Tc-99	4 4241E-04	197.60	395.21	0 00E+00	8 74E-02	1 75E-01
Th-229	3 0962E-10	197.60	395.21	0 00E+00	6 12E-08	1.22E-07
Th-230	4 2346E-11	197.60	395.21	0 00E+00	8 37E-09	1 67E-08
Th-232	2 5278E-10	197 60	395.21	0 00E+00	5.00E-08	9 99E-08
Tl-208	1 5820E-08	197 60	395.21	0 00E+00	3 13E-06	6.25E-06
U-232	4 2647E-08	197 60	395.21	0 00E+00	8 43E-06	1.69E-05
U-233	1.2211E-07	197 60	395.21	0 00E+00	2 41E-05	4 83E-05
U-234	1 9955E-07	197 60	395 21	0 00E+00	3 94E-05	7 89E-05
U-235	-2 6194E-06	197 60	0 00	2 53E-03	2 01E-03	2 53E-03
U-236	1.2693E-05	197 60	395.21	0 00E+00	2 51E-03	5 02E-03
U-238	-3 6331E-08	197 60	0 00	1 57E-03	1 57E-03	1 57E-03
Y-90	1.8241E+00	197 60	395 21	0 00E+00	3 60E+02	7.21E+02
Other Radionuclides					3 81E+02	7 61E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 961E+13
0 0250	8.244E+12
0 0375	7 142E+12
0 0575	7.684E+12
0 0850	4 638E+12
0 1250	3 032E+12
0.2250	3 983E+12
0 3750	1 746E+12
0 5750	2 871E+13
0.8500	3.236E+11
1.2500	5 362E+12
1 7500	8 314E+09
2.2500	2 864E+07
2 7500	3 155E+05
3 5000	1 753E+03
5 0000	2.090E+02
7 0000	2.361E+01
11 0000	2.686E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.94E+00	9 89E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 00000041	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	57 01	197 60	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		395.21	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 99	3 47	1 00
Bounding	1 98		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 BRAZIL
SNF ID #: 1063
Fuel Units & Descr: 9 - ELEMENT
Heavy Metal Mass, BOL=1 755kg, EOL=1 741kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2006
Estimates as of, 2030
Template: TRIGA-SS (LW/U Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage	
18"x10'	
0 08	

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2 6436E-09	17.10	34 21	0 00E+00	4.52E-08	9 04E-08	Avg MeV	
Am-241	3 1429E-03	17 10	34 21	0 00E+00	5.38E-02	1 08E-01	0 0150	3 428E+12
Am-242m	1 3195E-06	17 10	34 21	0 00E+00	2.26E-05	4 51E-05	0 0250	7 136E+11
Am-243	1 4753E-07	17 10	34 21	0 00E+00	2.52E-06	5 05E-06	0 0375	6 182E+11
C-14	1.2847E-04	17 10	34 21	0 00E+00	2.20E-03	4 39E-03	0 0575	6 651E+11
Cl-36	2 8120E-06	17 10	34 21	0 00E+00	4 81E-05	9 62E-05	0 0850	4 015E+11
Cm-243	1.2465E-07	17 10	34 21	0 00E+00	2.13E-06	4 26E-06	0 1250	2 624E+11
Cm-244	9 5564E-07	17 10	34 21	0 00E+00	1.63E-05	3 27E-05	0 2250	3 447E+11
Co-60	1 7880E-01	17 10	34 21	0 00E+00	3 06E+00	6 12E+00	0 3750	1 511E+11
Cs-134	5 8692E-04	17 10	34 21	0 00E+00	1.00E-02	2 01E-02	0 5750	2 485E+12
Cs-135	3.2195E-05	17 10	34 21	0 00E+00	5.51E-04	1 10E-03	0 8500	2 801E+10
Cs-137	1 9489E+00	17 10	34 21	0 00E+00	3.33E+01	6 67E+01	1 2500	4 642E+11
Eu-154	4 5895E-03	17 10	34 21	0 00E+00	7.85E-02	1 57E-01	1 7500	7 197E+08
Eu-155	3 6045E-03	17 10	34 21	0 00E+00	6.17E-02	1 23E-01	2.2500	2 479E+06
Fe-55	1 4185E-02	17 10	34 21	0 00E+00	2.43E-01	4 85E-01	2.7500	2 731E+04
H-3	4 7895E-03	17 10	34 21	0 00E+00	8.19E-02	1 64E-01	3 5000	1 535E+02
I-129	7 3684E-07	17 10	34 21	0 00E+00	1.26E-05	2 52E-05	5 0000	1.886E+01
Kr-85	9 5820E-02	17 10	34 21	0 00E+00	1 64E+00	3 28E+00	7 0000	2 133E+00
Np-237	1 2552E-06	17 10	34 21	0 00E+00	2.15E-05	4 29E-05	11 0000	2 428E-01
Pa-231	7 0406E-09	17 10	34 21	0 00E+00	1.20E-07	2 41E-07		
Pb-210	5 8000E-14	17 10	34 21	0 00E+00	9 92E-13	1 98E-12		
Pm-147	4 0075E-02	17 10	34 21	0 00E+00	6 85E-01	1 37E+00		
Pu-238	9.2256E-04	17 10	34 21	0 00E+00	1.58E-02	3 16E-02		
Pu-239	5 5278E-03	17 10	34 21	0 00E+00	9 45E-02	1 89E-01		
Pu-240	2 1248E-03	17 10	34 21	0 00E+00	3 63E-02	7 27E-02		
Pu-241	4 9549E-02	17.10	34 21	0 00E+00	8.47E-01	1 69E+00		
Pu-242	2 3128E-07	17 10	34 21	0 00E+00	3 96E-06	7 91E-06		
Ra-226	2 4526E-13	17 10	34 21	0 00E+00	4.20E-12	8 39E-12		
Ra-228	2 4015E-10	17 10	34 21	0 00E+00	4 11E-09	8 22E-09		
Ru-106	3 0602E-06	17 10	34 21	0 00E+00	5.23E-05	1 05E-04		
Se-79	1 3015E-05	17 10	34 21	0 00E+00	2.23E-04	4 45E-04		
Sn-126	1.2165E-05	17 10	34 21	0 00E+00	2.08E-04	4 16E-04		
Sr-90	1 8226E+00	17 10	34 21	0 00E+00	3 12E+01	6 23E+01		
Tc-99	4 4241E-04	17 10	34 21	0 00E+00	7 57E-03	1 51E-02		
Th-229	3 0962E-10	17 10	34 21	0 00E+00	5.30E-09	1 06E-08		
Th-230	4.2346E-11	17 10	34 21	0 00E+00	7.24E-10	1 45E-09		
Th-232	2 5278E-10	17 10	34 21	0 00E+00	4.32E-09	8 65E-09		
Tl-208	1 5820E-08	17 10	34 21	0 00E+00	2.71E-07	5 41E-07		
U-232	4.2647E-08	17 10	34 21	0 00E+00	7.29E-07	1 46E-06		
U-233	1.2211E-07	17 10	34 21	0 00E+00	2 09E-06	4 18E-06		
U-234	1 9955E-07	17 10	34 21	0 00E+00	3 41E-06	6 83E-06		
U-235	-2 6194E-06	17.10	0 00	7 59E-04	7 14E-04	7 59E-04		
U-236	1.2693E-05	17 10	34 21	0 00E+00	2.17E-04	4 34E-04		
U-238	-3 6331E-08	17 10	0 00	4 72E-04	4 71E-04	4 72E-04		
Y-90	1 8241E+00	17 10	34 21	0 00E+00	3 12E+01	6 24E+01		
Other Radionuclides					3 29E+01	6 59E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.28E-01	8.56E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences:
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding	SST	SST	
BOL HM Constituents	U	U	
BOL Enrichment %	20	10 to 20 1	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	17 10	13 75	Nominal burnup taken directly from SFD (converted to MWd).
Bounding		34.21	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0.29	0 80	1.00
Bounding	0 57		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 CORNELL
SNF ID #: 246
Fuel Units & Descr: 115 - ELEMENT
Heavy Metal Mass: BOL=21 896kg EOL=21 586kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage (18"x10"): 1 04

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	320 10	640.20	0 00E+00	2 73E-07	5 45E-07
Am-241	1 8331E-03	320 10	640.20	0 00E+00	5 87E-01	1 17E+00
Am-242m	1 4129E-06	320 10	640 20	0.00E+00	4 52E-04	9 05E-04
Am-243	1 4774E-07	320 10	640 20	0 00E+00	4 73E-05	9 46E-05
C-14	1.2871E-04	320 10	640 20	0 00E+00	4 12E-02	8 24E-02
Cl-36	2 8120E-06	320 10	640 20	0 00E+00	9 00E-04	1 80E-03
Cm-243	1.7940E-07	320 10	640 20	0 00E+00	5 74E-05	1 15E-04
Cm-244	1 6962E-06	320 10	640 20	0 00E+00	5 43E-04	1 09E-03
Co-60	1.2839E+00	320 10	640 20	0 00E+00	4 11E+02	8 22E+02
Cs-134	9 0541E-02	320 10	640 20	0 00E+00	2 90E+01	5 80E+01
Cs-135	3.2195E-05	320 10	640 20	0 00E+00	1.03E-02	2 06E-02
Cs-137	2 7564E+00	320 10	640 20	0 00E+00	8 82E+02	1 76E+03
Eu-154	1.5368E-02	320 10	640 20	0 00E+00	4 92E+00	9 84E+00
Eu-155	2 9293E-02	320 10	640 20	0 00E+00	9 38E+00	1.88E+01
Fe-55	7.7158E-01	320 10	640 20	0 00E+00	2 47E+02	4 94E+02
H-3	1 1111E-02	320 10	640 20	0 00E+00	3 56E+00	7.11E+00
I-129	7.3684E-07	320 10	640 20	0 00E+00	2.36E-04	4 72E-04
Kr-85	2 5263E-01	320 10	640.20	0 00E+00	8 09E+01	1.62E+02
Np-237	1.2427E-06	320 10	640.20	0 00E+00	3 98E-04	7 96E-04
Pa-231	3 8511E-09	320 10	640.20	0 00E+00	1 23E-06	2 47E-06
Pb-210	7 3880E-15	320 10	640.20	0 00E+00	2 36E-12	4 73E-12
Pm-147	2 1023E+00	320 10	640.20	0 00E+00	6 73E+02	1 35E+03
Pu-238	1 0383E-03	320 10	640.20	0 00E+00	3 32E-01	6 65E-01
Pu-239	5 5293E-03	320 10	640.20	0 00E+00	1 77E+00	3 54E+00
Pu-240	2 1278E-03	320 10	640.20	0 00E+00	6 81E-01	1 36E+00
Pu-241	1 0195E-01	320.10	640.20	0 00E+00	3 26E+01	6 53E+01
Pu-242	2.3128E-07	320 10	640.20	0 00E+00	7 40E-05	1 48E-04
Ra-226	5.2782E-14	320 10	640 20	0 00E+00	1 69E-11	3.38E-11
Ra-228	1.9338E-10	320 10	640.20	0 00E+00	6 19E-08	1.24E-07
Ru-106	9 1684E-02	320.10	640.20	0 00E+00	2 93E+01	5 87E+01
Se-79	1.3018E-05	320 10	640.20	0 00E+00	4.17E-03	8.33E-03
Sn-126	1.2167E-05	320 10	640 20	0 00E+00	3.89E-03	7.79E-03
Sr-90	2 6045E+00	320 10	640.20	0 00E+00	8 34E+02	1.67E+03
Tc-99	4 4241E-04	320 10	640 20	0 00E+00	1.42E-01	2.83E-01
Th-229	1.3713E-10	320 10	640 20	0 00E+00	4.39E-08	8 78E-08
Th-230	1 8090E-11	320 10	640 20	0 00E+00	5 79E-09	1 16E-08
Th-232	2 5278E-10	320 10	640 20	0 00E+00	8 09E-08	1 62E-07
Tl-208	1 6947E-08	320 10	640 20	0 00E+00	5 42E-06	1 08E-05
U-232	4 8737E-08	320 10	640 20	0 00E+00	1 56E-05	3 12E-05
U-233	1 2203E-07	320 10	640.20	0 00E+00	3 91E-05	7 81E-05
U-234	1 5925E-07	320 10	640 20	0 00E+00	5 10E-05	1 02E-04
U-235	-2 6194E-06	320 10	0 00	9 45E-03	8 61E-03	9 45E-03
U-236	1.2693E-05	320 10	640.20	0 00E+00	4 06E-03	8.13E-03
U-238	-3 6331E-08	320 10	0 00	5 89E-03	5 88E-03	5.89E-03
Y-90	2 6060E+00	320 10	640.20	0 00E+00	8 34E+02	1 67E+03
Other Radionuclides					1 15E+03	2 31E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.035E+14
0 0250	2.277E+13
0 0375	1.939E+13
0 0575	1.990E+13
0 0850	1.233E+13
0 1250	8 953E+12
0 2250	1 046E+13
0 3750	5.308E+12
0 5750	7 056E+13
0 8500	3 028E+12
1.2500	6 150E+13
1 7500	4 100E+10
2.2500	6 608E+10
2 7500	5 244E+08
3.5000	6 103E+07
5.0000	3 491E+02
7 0000	3 954E+01
11 0000	4 505E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.86E+01	3 73E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 97350572	10 to 20 1

Basis for Parameter Drfferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	320 10	296.41	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		640.20	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 43	0.93	1 00
Bounding	0 86		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 DOW
SNF ID #: 251
Fuel Units & Descr: 77 - ELEMENT
Heavy Metal Mass: BOL=15 015kg; EOL=14 63kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 years

Estimated Canister usage

18"x10'
0 69

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activrty (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8 5173E-10	367 52	735 05	0 00E+00	3 13E-07	6 26E-07	Avg MeV	
Am-241	1 8331E-03	367 52	735 05	0 00E+00	6 74E-01	1 35E+00	0.0150	1 188E+14
Am-242m	1 4129E-06	367 52	735 05	0 00E+00	5 19E-04	1 04E-03	0 0250	2 614E+13
Am-243	1 4774E-07	367 52	735 05	0 00E+00	5 43E-05	1 09E-04	0.0375	2.226E+13
C-14	1 2871E-04	367 52	735 05	0 00E+00	4 73E-02	9 46E-02	0 0575	2.285E+13
Cl-36	2 8120E-06	367 52	735 05	0 00E+00	1 03E-03	2 07E-03	0.0850	1 416E+13
Cm-243	1 7940E-07	367 52	735 05	0 00E+00	6.59E-05	1 32E-04	0 1250	1 028E+13
Cm-244	1 6962E-06	367 52	735 05	0 00E+00	6.23E-04	1 25E-03	0.2250	1.201E+13
Co-60	1 2839E+00	367 52	735 05	0 00E+00	4 72E+02	9 44E+02	0.3750	6.094E+12
Cs-134	9 0541E-02	367 52	735 05	0 00E+00	3 33E+01	6 66E+01	0.5750	8 102E+13
Cs-135	3 2195E-05	367.52	735 05	0 00E+00	1.18E-02	2 37E-02	0.8500	3 477E+12
Cs-137	2 7564E+00	367 52	735 05	0 00E+00	1 01E+03	2 03E+03	1.2500	7 061E+13
Eu-154	1 5368E-02	367 52	735 05	0 00E+00	5 65E+00	1 13E+01	1 7500	4 707E+10
Eu-155	2 9293E-02	367 52	735 05	0 00E+00	1 08E+01	2 15E+01	2.2500	7.587E+10
Fe-55	7 7158E-01	367 52	735 05	0 00E+00	2 84E+02	5 67E+02	2 7500	6.021E+08
H-3	1 1111E-02	367 52	735 05	0 00E+00	4 08E+00	8 17E+00	3.5000	7 007E+07
I-129	7 3684E-07	367 52	735 05	0 00E+00	2.71E-04	5 42E-04	5 0000	3.946E+02
Kr-85	2 5263E-01	367 52	735 05	0 00E+00	9 28E+01	1 86E+02	7.0000	4 467E+01
Np-237	1 2427E-06	367 52	735 05	0 00E+00	4.57E-04	9 13E-04	11.0000	5.089E+00
Pa-231	3 8511E-09	367 52	735 05	0 00E+00	1 42E-06	2 83E-06		
Pb-210	7 3880E-15	367 52	735 05	0 00E+00	2.72E-12	5 43E-12		
Pm-147	2 1023E+00	367 52	735 05	0 00E+00	7 73E+02	1 55E+03		
Pu-238	1 0383E-03	367 52	735 05	0 00E+00	3 82E-01	7 63E-01		
Pu-239	5 5293E-03	367 52	735 05	0 00E+00	2 03E+00	4 06E+00		
Pu-240	2 1278E-03	367 52	735 05	0 00E+00	7 82E-01	1 56E+00		
Pu-241	1 0195E-01	367 52	735 05	0 00E+00	3 75E+01	7 49E+01		
Pu-242	2 3128E-07	367 52	735 05	0 00E+00	8.50E-05	1 70E-04		
Ra-226	5 2782E-14	367 52	735 05	0 00E+00	1.94E-11	3 88E-11		
Ra-228	1 9338E-10	367 52	735 05	0 00E+00	7.11E-08	1 42E-07		
Ru-106	9 1684E-02	367 52	735 05	0 00E+00	3 37E+01	6 74E+01		
Se-79	1 3018E-05	367.52	735 05	0 00E+00	4.78E-03	9 57E-03		
Sn-126	1 2167E-05	367 52	735 05	0 00E+00	4 47E-03	8 94E-03		
Sr-90	2 6045E+00	367.52	735 05	0 00E+00	9 57E+02	1 91E+03		
Tc-99	4 4241E-04	367 52	735 05	0 00E+00	1 63E-01	3 25E-01		
Th-229	1 3713E-10	367 52	735 05	0 00E+00	5.04E-08	1 01E-07		
Th-230	1 8090E-11	367 52	735 05	0 00E+00	6 65E-09	1 33E-08		
Th-232	2 5278E-10	367.52	735 05	0 00E+00	9.29E-08	1 86E-07		
Tl-208	1 6947E-08	367 52	735 05	0 00E+00	6.23E-06	1.25E-05		
U-232	4 8737E-08	367.52	735 05	0 00E+00	1.79E-05	3 58E-05		
U-233	1 2203E-07	367 52	735 05	0 00E+00	4 48E-05	8 97E-05		
U-234	1 5925E-07	367.52	735 05	0 00E+00	5.85E-05	1 17E-04		
U-235	-2 6194E-06	367.52	0 00	6 49E-03	5.53E-03	6 49E-03		
U-236	1 2693E-05	367 52	735 05	0 00E+00	4 67E-03	9 33E-03		
U-238	-3 6331E-08	367.52	0 00	4 04E-03	4 02E-03	4 04E-03		
Y-90	2 6060E+00	367.52	735 05	0 00E+00	9 58E+02	1 92E+03		
Other Radionuclides					1 33E+03	2 65E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.14E+01	4.28E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %:	20	10 to 20 1

Basis for Parameter Drfferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	219 50	367.52	Nominal burnup calculated from the heavy metal mass destroyed
Bounding:		735 05	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0 72	1 67
Bounding:	1 44	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 ENGLAND
SNF ID #: 485
Fuel Units & Descr: 84 - ELEMENT
Heavy Metal Mass: BOL=16 187kg EOL=15.826kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 0 76

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	394.39	788 78	0 00E+00	1 04E-06	2 09E-06
Am-241	3 1429E-03	394 39	788 78	0 00E+00	1.24E+00	2 48E+00
Am-242m	1 3195E-06	394 39	788 78	0 00E+00	5.20E-04	1 04E-03
Am-243	1 4753E-07	394 39	788 78	0 00E+00	5 82E-05	1.16E-04
C-14	1 2847E-04	394.39	788 78	0 00E+00	5 07E-02	1 01E-01
Cl-36	2 8120E-06	394 39	788 78	0 00E+00	1 11E-03	2.22E-03
Cm-243	1.2465E-07	394 39	788 78	0 00E+00	4 92E-05	9 83E-05
Cm-244	9 5564E-07	394 39	788 78	0 00E+00	3 77E-04	7.54E-04
Co-60	1 7880E-01	394 39	788 78	0 00E+00	7 05E+01	1 41E+02
Cs-134	5 8692E-04	394 39	788 78	0 00E+00	2 31E-01	4 63E-01
Cs-135	3.2195E-05	394 39	788 78	0 00E+00	1 27E-02	2.54E-02
Cs-137	1 9489E+00	394 39	788 78	0 00E+00	7 69E+02	1.54E+03
Eu-154	4.5895E-03	394 39	788 78	0 00E+00	1 81E+00	3 62E+00
Eu-155	3.6045E-03	394 39	788 78	0 00E+00	1 42E+00	2 84E+00
Fe-55	1.4185E-02	394 39	788 78	0 00E+00	5 59E+00	1 12E+01
H-3	4 7895E-03	394 39	788 78	0 00E+00	1 89E+00	3 78E+00
I-129	7.3684E-07	394 39	788 78	0 00E+00	2 91E-04	5 81E-04
Kr-85	9.5820E-02	394 39	788 78	0 00E+00	3 78E+01	7.56E+01
Np-237	1.2552E-06	394 39	788 78	0 00E+00	4.95E-04	9 90E-04
Pa-231	7.0406E-09	394 39	788 78	0 00E+00	2.78E-06	5 55E-06
Pb-210	5 8000E-14	394 39	788 78	0 00E+00	2.29E-11	4 57E-11
Pm-147	4 0075E-02	394 39	788 78	0 00E+00	1.58E+01	3 16E+01
Pu-238	9.2256E-04	394 39	788 78	0 00E+00	3 64E-01	7.28E-01
Pu-239	5 5278E-03	394 39	788 78	0 00E+00	2.18E+00	4 36E+00
Pu-240	2 1248E-03	394 39	788 78	0 00E+00	8 38E-01	1 68E+00
Pu-241	4 9549E-02	394.39	788 78	0 00E+00	1 95E+01	3 91E+01
Pu-242	2 3128E-07	394.39	788 78	0 00E+00	9 12E-05	1.82E-04
Ra-226	2 4526E-13	394.39	788 78	0 00E+00	9 67E-11	1 93E-10
Ra-228	2 4015E-10	394.39	788 78	0 00E+00	9 47E-08	1.89E-07
Ru-106	3 0602E-06	394.39	788 78	0 00E+00	1 21E-03	2 41E-03
Se-79	1 3015E-05	394.39	788 78	0 00E+00	5 13E-03	1 03E-02
Sn-126	1 2165E-05	394.39	788 78	0 00E+00	4 80E-03	9 60E-03
Sr-90	1 8226E+00	394.39	788 78	0 00E+00	7 19E+02	1.44E+03
Tc-99	4 4241E-04	394.39	788 78	0 00E+00	1 74E-01	3 49E-01
Th-229	3 0962E-10	394.39	788 78	0 00E+00	1.22E-07	2 44E-07
Th-230	4.2346E-11	394.39	788 78	0 00E+00	1 67E-08	3 34E-08
Th-232	2 5278E-10	394 39	788 78	0 00E+00	9 97E-08	1 99E-07
Tl-208	1.5820E-08	394 39	788 78	0 00E+00	6.24E-06	1 25E-05
U-232	4.2647E-08	394 39	788 78	0 00E+00	1.68E-05	3 36E-05
U-233	1.2211E-07	394 39	788 78	0 00E+00	4.82E-05	9 63E-05
U-234	1.9955E-07	394 39	788.78	0 00E+00	7.87E-05	1.57E-04
U-235	-2 6194E-06	394 39	0 00	6 93E-03	5 90E-03	6 93E-03
U-236	1.2693E-05	394 39	788.78	0 00E+00	5 01E-03	1.00E-02
U-238	-3 6331E-08	394 39	0 00	4.36E-03	4 35E-03	4.36E-03
Y-90	1.8241E+00	394 39	788 78	0 00E+00	7.19E+02	1 44E+03
Other Radionuclides					7.59E+02	1.52E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7 905E+13
0 0250	1 645E+13
0 0375	1 425E+13
0 0575	1 534E+13
0 0850	9 258E+12
0 1250	6 051E+12
0.2250	7 949E+12
0.3750	3 484E+12
0.5750	5 730E+13
0.8500	6 459E+11
1.2500	1.070E+13
1 7500	1.659E+10
2.2500	5 716E+07
2 7500	6.297E+05
3 5000	3 505E+03
5 0000	4 199E+02
7 0000	4 744E+01
11 0000	5.398E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.87E+00	1 97E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 80853811	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	394.39	344 80
Bounding		788 78

Basis for burnup used in estimate:
Nominal burnup taken directly from SFD (converted to MWd)
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 71	0 87
Bounding	1 43	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 FINLAND
SNF ID #: 472
Fuel Units & Descr: 102 - ELEMENT
Heavy Metal Mass: BOL=19.89kg EOL=19 686kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6.65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage

18"x10'
0 92

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	194 74	389 48	0 00E+00	5 15E-07	1 03E-06
Am-241	3 1429E-03	194 74	389 48	0 00E+00	6 12E-01	1.22E+00
Am-242m	1 3195E-06	194 74	389 48	0 00E+00	2 57E-04	5 14E-04
Am-243	1 4753E-07	194 74	389 48	0 00E+00	2 87E-05	5 75E-05
C-14	1 2847E-04	194 74	389 48	0 00E+00	2 50E-02	5 00E-02
Cl-36	2 8120E-06	194 74	389 48	0 00E+00	5 48E-04	1 10E-03
Cm-243	1 2465E-07	194 74	389 48	0 00E+00	2 43E-05	4 85E-05
Cm-244	9 5564E-07	194 74	389 48	0 00E+00	1 86E-04	3 72E-04
Co-60	1 7880E-01	194 74	389 48	0 00E+00	3 48E+01	6 96E+01
Cs-134	5 8692E-04	194 74	389 48	0 00E+00	1 14E-01	2 29E-01
Cs-135	3 2195E-05	194 74	389 48	0 00E+00	6 27E-03	1 25E-02
Cs-137	1 9489E+00	194 74	389 48	0 00E+00	3 80E+02	7 59E+02
Eu-154	4 5895E-03	194 74	389 48	0 00E+00	8 94E-01	1 79E+00
Eu-155	3 6045E-03	194 74	389 48	0 00E+00	7 02E-01	1 40E+00
Fe-55	1 4185E-02	194 74	389 48	0 00E+00	2 76E+00	5 52E+00
H-3	4 7895E-03	194 74	389 48	0 00E+00	9 33E-01	1 87E+00
I-129	7 3684E-07	194 74	389 48	0 00E+00	1 43E-04	2 87E-04
Kr-85	9 5820E-02	194 74	389 48	0 00E+00	1 87E+01	3 73E+01
Np-237	1 2552E-06	194 74	389 48	0 00E+00	2 44E-04	4 89E-04
Pa-231	7 0406E-09	194 74	389 48	0 00E+00	1 37E-06	2 74E-06
Pb-210	5 8000E-14	194 74	389 48	0 00E+00	1 13E-11	2 26E-11
Pm-147	4 0075E-02	194 74	389 48	0 00E+00	7 80E+00	1 56E+01
Pu-238	9 2256E-04	194 74	389 48	0 00E+00	1 80E-01	3 59E-01
Pu-239	5 5278E-03	194 74	389 48	0 00E+00	1 08E+00	2.15E+00
Pu-240	2 1248E-03	194 74	389 48	0 00E+00	4 14E-01	8 28E-01
Pu-241	4 9549E-02	194 74	389 48	0 00E+00	9 65E+00	1 93E+01
Pu-242	2 3128E-07	194 74	389 48	0 00E+00	4 50E-05	9 01E-05
Ra-226	2 4526E-13	194 74	389 48	0 00E+00	4 78E-11	9 55E-11
Ra-228	2 4015E-10	194 74	389 48	0 00E+00	4 68E-08	9 35E-08
Ru-106	3 0602E-06	194 74	389 48	0 00E+00	5 96E-04	1 19E-03
Se-79	1 3015E-05	194 74	389 48	0 00E+00	2 53E-03	5 07E-03
Sn-126	1 2165E-05	194 74	389 48	0 00E+00	2 37E-03	4 74E-03
Sr-90	1 8226E+00	194 74	389 48	0 00E+00	3 55E+02	7 10E+02
Tc-99	4 4241E-04	194 74	389 48	0 00E+00	8 62E-02	1 72E-01
Th-229	3 0962E-10	194 74	389 48	0 00E+00	6 03E-08	1.21E-07
Th-230	4 2346E-11	194 74	389 48	0 00E+00	8 25E-09	1 65E-08
Th-232	2 5278E-10	194 74	389 48	0 00E+00	4 92E-08	9 85E-08
Tl-208	1 5820E-08	194 74	389 48	0 00E+00	3 08E-06	6 16E-06
U-232	4 2647E-08	194 74	389 48	0 00E+00	8 30E-06	1 66E-05
U-233	1 2211E-07	194 74	389 48	0 00E+00	2 38E-05	4 76E-05
U-234	1 9955E-07	194 74	389 48	0 00E+00	3 89E-05	7 77E-05
U-235	-2 6194E-06	194 74	0 00	8 60E-03	8 09E-03	8 60E-03
U-236	1 2693E-05	194 74	389 48	0 00E+00	2 47E-03	4 94E-03
U-238	-3 6331E-08	194.74	0 00	5 35E-03	5 34E-03	5 35E-03
Y-90	1 8241E+00	194 74	389.48	0 00E+00	3 55E+02	7.10E+02
Other Radionuclides					3 75E+02	7.50E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	3 903E+13
0 0250	8 125E+12
0 0375	7 039E+12
0 0575	7 572E+12
0 0850	4 571E+12
0 1250	2 988E+12
0 2250	3 925E+12
0 3750	1 720E+12
0 5750	2 829E+13
0 8500	3 189E+11
1 2500	5.285E+12
1 7500	8 194E+09
2.2500	2 822E+07
2.7500	3 110E+05
3 5000	1 748E+03
5 0000	2 147E+02
7 0000	2 427E+01
11 0000	2.763E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.87E+00	9 74E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 00000041	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	193 85	194 74
Bounding		389 48

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 29	1 00
Bounding	0 57	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 GA
SNF ID #: 244
Fuel Units & Descr: 114 - ELEMENT
Heavy Metal Mass: BOL=22.23kg EOL=19 688kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1982
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 35 years

Estimated Canister usage: 18"x10' = 1 03

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	6.7038E-09	2,426 80	4,853 61	0 00E+00	1 63E-05	3 25E-05
Am-241	3 9068E-03	2,426 80	4,853 61	0 00E+00	9 48E+00	1 90E+01
Am-242m	1.2325E-06	2,426 80	4,853 61	0 00E+00	2 99E-03	5 98E-03
Am-243	1 4732E-07	2,426 80	4,853 61	0 00E+00	3 58E-04	7 15E-04
C-14	1.2824E-04	2,426 80	4,853.61	0 00E+00	3 11E-01	6 22E-01
Cl-36	2 8120E-06	2,426 80	4,853 61	0 00E+00	6 82E-03	1.36E-02
Cm-243	8 6556E-08	2,426 80	4,853 61	0 00E+00	2 10E-04	4.20E-04
Cm-244	5 3835E-07	2,426 80	4,853 61	0 00E+00	1.31E-03	2 61E-03
Co-60	2 4887E-02	2,426.80	4,853 61	0 00E+00	6 04E+01	1.21E+02
Cs-134	3 8030E-06	2,426 80	4,853 61	0 00E+00	9 23E-03	1.85E-02
Cs-135	3.2195E-05	2,426 80	4,853 61	0 00E+00	7 81E-02	1.56E-01
Cs-137	1.3788E+00	2,426 80	4,853 61	0 00E+00	3 35E+03	6 69E+03
Eu-154	1.3711E-03	2,426 80	4,853 61	0 00E+00	3 33E+00	6 65E+00
Eu-155	4 4361E-04	2,426 80	4,853 61	0 00E+00	1 08E+00	2 15E+00
Fe-55	2.6075E-04	2,426 80	4,853 61	0 00E+00	6 33E-01	1 27E+00
H-3	2 0647E-03	2,426 80	4,853 61	0 00E+00	5 01E+00	1 00E+01
I-129	7.3684E-07	2,426 80	4,853 61	0 00E+00	1.79E-03	3 58E-03
Kr-85	3 6346E-02	2,426 80	4,853 61	0 00E+00	8 82E+01	1 76E+02
Np-237	1.2844E-06	2,426 80	4,853 61	0 00E+00	3 12E-03	6.23E-03
Pa-231	1 2352E-08	2,426 80	4,853.61	0 00E+00	3 00E-05	6 00E-05
Pb-210	3 5338E-13	2,426 80	4,853 61	0 00E+00	8 58E-10	1 72E-09
Pm-147	7 6346E-04	2,426 80	4,853 61	0 00E+00	1 85E+00	3 71E+00
Pu-238	8 1970E-04	2,426 80	4,853 61	0 00E+00	1 99E+00	3 98E+00
Pu-239	5.5248E-03	2,426.80	4,853 61	0 00E+00	1.34E+01	2 68E+01
Pu-240	2.1203E-03	2,426 80	4,853 61	0 00E+00	5 15E+00	1 03E+01
Pu-241	2 4075E-02	2,426 80	4,853 61	0 00E+00	5 84E+01	1 17E+02
Pu-242	2.3128E-07	2,426 80	4,853 61	0 00E+00	5 61E-04	1 12E-03
Ra-226	9 6481E-13	2,426 80	4,853 61	0 00E+00	2 34E-09	4 68E-09
Ra-228	2.5188E-10	2,426 80	4,853 61	0 00E+00	6 11E-07	1.22E-06
Ru-106	1 0214E-10	2,426 80	4,853 61	0 00E+00	2 48E-07	4 96E-07
Se-79	1.3014E-05	2,426 80	4,853 61	0 00E+00	3.16E-02	6.32E-02
Sn-126	1.2164E-05	2,426 80	4,853 61	0 00E+00	2 95E-02	5 90E-02
Sr-90	1.2762E+00	2,426 80	4,853 61	0 00E+00	3.10E+03	6.19E+03
Tc-99	4 4241E-04	2,426 80	4,853.61	0 00E+00	1.07E+00	2.15E+00
Th-229	5 9684E-10	2,426 80	4,853 61	0 00E+00	1 45E-06	2 90E-06
Th-230	9 3880E-11	2,426 80	4,853 61	0 00E+00	2 28E-07	4 56E-07
Th-232	2.5278E-10	2,426 80	4,853 61	0 00E+00	6 13E-07	1 23E-06
Tl-208	1.3723E-08	2,426 80	4,853 61	0 00E+00	3 33E-05	6 66E-05
U-232	3 6932E-08	2,426.80	4,853 61	0 00E+00	8 96E-05	1 79E-04
U-233	1.2224E-07	2,426 80	4,853 61	0 00E+00	2 97E-04	5 93E-04
U-234	2.5714E-07	2,426 80	4,853 61	0.00E+00	6.24E-04	1.25E-03
U-235	-2 6194E-06	2,426 80	0 00	9 61E-03	3.25E-03	9 61E-03
U-236	1.2695E-05	2,426 80	4,853 61	0 00E+00	3.08E-02	6 16E-02
U-238	-3 6331E-08	2,426 80	0 00	5 98E-03	5.89E-03	5 98E-03
Y-90	1.2765E+00	2,426 80	4,853 61	0 00E+00	3.10E+03	6.20E+03
Other Radionuclides					3.34E+03	6 67E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 388E+14
0 0250	7 039E+13
0 0375	6 116E+13
0 0575	6 589E+13
0 0850	3 965E+13
0 1250	2.580E+13
0.2250	3 415E+13
0 3750	1.489E+13
0 5750	2 491E+14
0 8500	2.549E+12
1.2500	9 893E+12
1 7500	6 616E+10
2.2500	5 422E+07
2 7500	2.492E+06
3.5000	5 987E+03
5 0000	2.520E+03
7 0000	2.843E+02
11 0000	3.232E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.90E+01	7.80E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences*:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	758.29	2 426 80	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		4 853 61	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	3.20	3.20
Bounding	6 40	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 GERMANY
SNF ID #: 305
Fuel Units & Descr: 15 - ELEMENT
Heavy Metal Mass: BOL=2 925kg; EOL=2 883kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 20 years

Estimated Canister usage
18"x10'
0 14

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	40 09	80 19	0 00E+00	1 06E-07	2 12E-07
Am-241	3 1429E-03	40 09	80 19	0 00E+00	1 26E-01	2 52E-01
Am-242m	1.3195E-06	40 09	80 19	0 00E+00	5 29E-05	1 06E-04
Am-243	1 4753E-07	40 09	80 19	0 00E+00	5 92E-06	1 18E-05
C-14	1.2847E-04	40 09	80 19	0 00E+00	5 15E-03	1 03E-02
Cl-36	2 8120E-06	40 09	80 19	0 00E+00	1 13E-04	2 25E-04
Cm-243	1.2465E-07	40 09	80 19	0 00E+00	5 00E-06	1 00E-05
Cm-244	9 5564E-07	40 09	80 19	0 00E+00	3 83E-05	7 66E-05
Co-60	1 7880E-01	40 09	80.19	0 00E+00	7.17E+00	1.43E+01
Cs-134	5 8692E-04	40 09	80 19	0 00E+00	2 35E-02	4 71E-02
Cs-135	3.2195E-05	40 09	80.19	0 00E+00	1 29E-03	2 58E-03
Cs-137	1 9489E+00	40 09	80.19	0 00E+00	7.81E+01	1 56E+02
Eu-154	4 5895E-03	40 09	80.19	0 00E+00	1 84E-01	3 68E-01
Eu-155	3 6045E-03	40 09	80 19	0 00E+00	1 45E-01	2 89E-01
Fe-55	1 4185E-02	40 09	80 19	0 00E+00	5 69E-01	1 14E+00
H-3	4 7895E-03	40 09	80 19	0 00E+00	1 92E-01	3 84E-01
I-129	7 3684E-07	40 09	80 19	0 00E+00	2.95E-05	5 91E-05
Kr-85	9 5820E-02	40 09	80 19	0 00E+00	3 84E+00	7 68E+00
Np-237	1 2552E-06	40 09	80 19	0 00E+00	5 03E-05	1 01E-04
Pa-231	7 0406E-09	40 09	80 19	0 00E+00	2 82E-07	5 65E-07
Pb-210	5 8000E-14	40 09	80 19	0 00E+00	2.33E-12	4 65E-12
Pm-147	4 0075E-02	40 09	80 19	0 00E+00	1 61E+00	3 21E+00
Pu-238	9 2256E-04	40 09	80 19	0 00E+00	3 70E-02	7 40E-02
Pu-239	5 5278E-03	40 09	80 19	0 00E+00	2.22E-01	4 43E-01
Pu-240	2 1248E-03	40 09	80 19	0 00E+00	8 52E-02	1 70E-01
Pu-241	4 9549E-02	40 09	80 19	0 00E+00	1 99E+00	3 97E+00
Pu-242	2 3128E-07	40 09	80 19	0 00E+00	9 27E-06	1 85E-05
Ra-226	2 4526E-13	40 09	80 19	0 00E+00	9 83E-12	1 97E-11
Ra-228	2 4015E-10	40 09	80 19	0 00E+00	9 63E-09	1 93E-08
Ru-106	3 0602E-06	40 09	80 19	0 00E+00	1 23E-04	2 45E-04
Se-79	1 3015E-05	40 09	80 19	0 00E+00	5 22E-04	1 04E-03
Sn-126	1 2165E-05	40 09	80 19	0 00E+00	4 88E-04	9 76E-04
Sr-90	1 8226E+00	40 09	80 19	0 00E+00	7.31E+01	1.46E+02
Tc-99	4 4241E-04	40 09	80 19	0 00E+00	1 77E-02	3 55E-02
Th-229	3 0962E-10	40 09	80 19	0 00E+00	1 24E-08	2 48E-08
Th-230	4.2346E-11	40 09	80.19	0 00E+00	1 70E-09	3 40E-09
Th-232	2.5278E-10	40 09	80.19	0 00E+00	1 01E-08	2.03E-08
Tl-208	1.5820E-08	40.09	80.19	0 00E+00	6 34E-07	1.27E-06
U-232	4.2647E-08	40.09	80 19	0 00E+00	1.71E-06	3.42E-06
U-233	1.2211E-07	40 09	80 19	0 00E+00	4 90E-06	9.79E-06
U-234	1 9955E-07	40 09	80 19	0 00E+00	8 00E-06	1 60E-05
U-235	-2 6194E-06	40 09	0 00	1 26E-03	1.16E-03	1.26E-03
U-236	1.2693E-05	40 09	80 19	0 00E+00	5 09E-04	1 02E-03
U-238	-3 6331E-08	40 09	0 00	7 86E-04	7 85E-04	7 86E-04
Y-90	1 8241E+00	40 09	80 19	0 00E+00	7 31E+01	1 46E+02
Other Radionuclides					7 72E+01	1 54E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8 036E+12
0 0250	1 673E+12
0 0375	1 449E+12
0 0575	1.559E+12
0 0850	9 411E+11
0 1250	6.151E+11
0 2250	8 081E+11
0 3750	3 542E+11
0 5750	5 825E+12
0 8500	6 566E+10
1 2500	1 088E+12
1 7500	1 687E+09
2.2500	5 810E+06
2 7500	6 402E+04
3 5000	3 582E+02
5 0000	4 348E+01
7 0000	4 914E+00
11 0000	5 592E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 00E+00	2.01E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 00000041	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	28 51	40.09	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		80 19	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 40	1 41
Bounding	0 80	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 GERMANY
SNF ID #: 474
Fuel Units & Descr: 70 - ELEMENT
Heavy Metal Mass: BOL=13 65kg EOL=13 377kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage 18"x10': 0 63

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	260 61	521.22	0 00E+00	6 89E-07	1.38E-06
Am-241	3 1429E-03	260 61	521.22	0 00E+00	8 19E-01	1.64E+00
Am-242m	1.3195E-06	260 61	521.22	0 00E+00	3 44E-04	6 88E-04
Am-243	1.4753E-07	260 61	521.22	0 00E+00	3 84E-05	7 69E-05
C-14	1.2847E-04	260 61	521.22	0 00E+00	3 35E-02	6 70E-02
Cl-36	2 8120E-06	260 61	521.22	0 00E+00	7 33E-04	1 47E-03
Cm-243	1 2465E-07	260 61	521 22	0 00E+00	3 25E-05	6 50E-05
Cm-244	9 5564E-07	260 61	521 22	0 00E+00	2 49E-04	4 98E-04
Co-60	1 7880E-01	260 61	521 22	0 00E+00	4 66E+01	9 32E+01
Cs-134	5 8692E-04	260 61	521.22	0 00E+00	1.53E-01	3 06E-01
Cs-135	3.2195E-05	260 61	521.22	0 00E+00	8 39E-03	1 68E-02
Cs-137	1 9489E+00	260 61	521.22	0 00E+00	5 08E+02	1 02E+03
Eu-154	4 5895E-03	260 61	521.22	0 00E+00	1 20E+00	2 39E+00
Eu-155	3 6045E-03	260 61	521.22	0 00E+00	9 39E-01	1 88E+00
Fe-55	1 4185E-02	260 61	521.22	0 00E+00	3 70E+00	7.39E+00
H-3	4 7895E-03	260 61	521.22	0 00E+00	1.25E+00	2.50E+00
I-129	7 3684E-07	260 61	521 22	0 00E+00	1.92E-04	3 84E-04
Kr-85	9 5820E-02	260 61	521 22	0 00E+00	2.50E+01	4 99E+01
Np-237	1.2552E-06	260 61	521.22	0 00E+00	3 27E-04	6 54E-04
Pa-231	7 0406E-09	260 61	521.22	0 00E+00	1 83E-06	3 67E-06
Pb-210	5 8000E-14	260 61	521.22	0 00E+00	1 51E-11	3 02E-11
Pm-147	4 0075E-02	260 61	521.22	0 00E+00	1 04E+01	2 09E+01
Pu-238	9 2256E-04	260 61	521.22	0 00E+00	2 40E-01	4 81E-01
Pu-239	5 5278E-03	260 61	521 22	0 00E+00	1 44E+00	2.88E+00
Pu-240	2 1248E-03	260 61	521 22	0 00E+00	5.54E-01	1 11E+00
Pu-241	4 9549E-02	260 61	521 22	0 00E+00	1.29E+01	2 58E+01
Pu-242	2.3128E-07	260 61	521 22	0 00E+00	6 03E-05	1.21E-04
Ra-226	2 4526E-13	260 61	521.22	0 00E+00	6 39E-11	1.28E-10
Ra-228	2 4015E-10	260 61	521.22	0 00E+00	6 26E-08	1.25E-07
Ru-106	3 0602E-06	260 61	521.22	0 00E+00	7 97E-04	1.59E-03
Se-79	1 3015E-05	260 61	521.22	0.00E+00	3 39E-03	6 78E-03
Sn-126	1 2165E-05	260 61	521.22	0 00E+00	3 17E-03	6 34E-03
Sr-90	1 8226E+00	260 61	521 22	0 00E+00	4 75E+02	9 50E+02
Tc-99	4 4241E-04	260 61	521.22	0 00E+00	1 15E-01	2.31E-01
Th-229	3.0962E-10	260 61	521 22	0 00E+00	8 07E-08	1 61E-07
Th-230	4.2346E-11	260 61	521.22	0 00E+00	1 10E-08	2.21E-08
Th-232	2 5278E-10	260 61	521.22	0 00E+00	6 59E-08	1.32E-07
Tl-208	1.5820E-08	260 61	521.22	0 00E+00	4 12E-06	8.25E-06
U-232	4 2647E-08	260 61	521.22	0 00E+00	1.11E-05	2 22E-05
U-233	1.2211E-07	260 61	521.22	0 00E+00	3.18E-05	6 36E-05
U-234	1 9955E-07	260 61	521.22	0 00E+00	5.20E-05	1 04E-04
U-235	-2 6194E-06	260 61	0 00	5 90E-03	5.22E-03	5 90E-03
U-236	1.2693E-05	260 61	521 22	0 00E+00	3 31E-03	6 62E-03
U-238	-3 6331E-08	260 61	0 00	3 67E-03	3 66E-03	3 67E-03
Y-90	1.8241E+00	260 61	521.22	0 00E+00	4 75E+02	9 51E+02
Other Radionuclides					5 02E+02	1 00E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5.223E+13
0 0250	1 087E+13
0 0375	9 419E+12
0 0575	1 013E+13
0 0850	6 117E+12
0 1250	3 998E+12
0.2250	5.253E+12
0 3750	2.302E+12
0 5750	3 786E+13
0 8500	4.268E+11
1.2500	7 072E+12
1 7500	1 097E+10
2.2500	3 777E+07
2 7500	4 161E+05
3 5000	2.321E+03
5 0000	2 793E+02
7.0000	3 156E+01
11.0000	3 591E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.52E+00	1.30E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %'	20 00000041	10 to 20 1

Basis for Parameter Differences'

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	133 03	260 61
Bounding		521.22

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.56	1 96
Bounding	1 12	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 HANNOVER
SNF ID #: 473
Fuel Units & Descr: 5 - ELEMENT
Heavy Metal Mass: BOL=0 972kg, EOL=0 95kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1999
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 25 years

Estimated Canister usage 18"x10': 0 05

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	4 1459E-09	21 48	42.96	0 00E+00	8 90E-08	1 78E-07
Am-241	3 5850E-03	21 48	42 96	0 00E+00	7 70E-02	1 54E-01
Am-242m	1 2899E-06	21 48	42 96	0 00E+00	2 77E-05	5 54E-05
Am-243	1 4747E-07	21 48	42 96	0 00E+00	3 17E-06	6 34E-06
C-14	1 2839E-04	21 48	42 96	0 00E+00	2 76E-03	5 52E-03
Cl-36	2 8120E-06	21 48	42 96	0 00E+00	6 04E-05	1 21E-04
Cm-243	1.1038E-07	21 48	42 96	0 00E+00	2 37E-06	4 74E-06
Cm-244	7.8917E-07	21 48	42 96	0 00E+00	1 70E-05	3 39E-05
Co-60	9.2647E-02	21 48	42 96	0 00E+00	1.99E+00	3 98E+00
Cs-134	1 0940E-04	21 48	42 96	0 00E+00	2 35E-03	4 70E-03
Cs-135	3.2195E-05	21 48	42 96	0 00E+00	6 92E-04	1 38E-03
Cs-137	1.7368E+00	21 48	42 96	0 00E+00	3 73E+01	7 46E+01
Eu-154	3 0677E-03	21 48	42 96	0 00E+00	6.59E-02	1 32E-01
Eu-155	1 7925E-03	21 48	42 96	0 00E+00	3 85E-02	7.70E-02
Fe-55	3 7444E-03	21 48	42 96	0 00E+00	8 04E-02	1.61E-01
H-3	3 6180E-03	21 48	42 96	0 00E+00	7 77E-02	1 55E-01
I-129	7 3684E-07	21 48	42 96	0 00E+00	1 58E-05	3.17E-05
Kr-85	6 9368E-02	21 48	42 96	0 00E+00	1 49E+00	2 98E+00
Np-237	1 2662E-06	21 48	42.96	0 00E+00	2 72E-05	5 44E-05
Pa-231	9 1654E-09	21 48	42 96	0 00E+00	1 97E-07	3 94E-07
Pb-210	1 3728E-13	21 48	42 96	0 00E+00	2 95E-12	5 90E-12
Pm-147	1 0702E-02	21 48	42 96	0 00E+00	2 30E-01	4 60E-01
Pu-238	8 8692E-04	21 48	42 96	0 00E+00	1 90E-02	3 81E-02
Pu-239	5 5263E-03	21 48	42 96	0 00E+00	1 19E-01	2 37E-01
Pu-240	2 1233E-03	21 48	42 96	0 00E+00	4 56E-02	9 12E-02
Pu-241	3 8962E-02	21 48	42 96	0 00E+00	8 37E-01	1 67E+00
Pu-242	2.3128E-07	21 48	42 96	0 00E+00	4 97E-06	9 94E-06
Ra-226	4 6752E-13	21 48	42 96	0 00E+00	1 00E-11	2 01E-11
Ra-228	2 4827E-10	21 48	42 96	0 00E+00	5 33E-09	1 07E-08
Ru-106	9 8526E-08	21 48	42 96	0 00E+00	2.12E-06	4.23E-06
Se-79	1.3015E-05	21 48	42 96	0 00E+00	2 80E-04	5 59E-04
Sn-126	1.2165E-05	21 48	42 96	0 00E+00	2 61E-04	5.23E-04
Sr-90	1 6195E+00	21 48	42 96	0 00E+00	3 48E+01	6 96E+01
Tc-99	4 4241E-04	21.48	42.96	0 00E+00	9 50E-03	1.90E-02
Th-229	4.2451E-10	21.48	42.96	0 00E+00	9 12E-09	1.82E-08
Th-230	6.1398E-11	21 48	42.96	0 00E+00	1.32E-09	2 64E-09
Th-232	2 5278E-10	21 48	42 96	0 00E+00	5 43E-09	1 09E-08
Tl-208	1 5098E-08	21 48	42.96	0.00E+00	3 24E-07	6 49E-07
U-232	4 0662E-08	21 48	42 96	0 00E+00	8 73E-07	1 75E-06
U-233	1 2217E-07	21 48	42 96	0 00E+00	2 62E-06	5.25E-06
U-234	2 2391E-07	21 48	42 96	0 00E+00	4 81E-06	9 62E-06
U-235	-2 6194E-06	21 48	0 00	4 16E-04	3 60E-04	4 16E-04
U-236	1 2695E-05	21 48	42 96	0 00E+00	2 73E-04	5 45E-04
U-238	-3 6331E-08	21 48	0 00	2 62E-04	2 61E-04	2 62E-04
Y-90	1 6195E+00	21 48	42 96	0 00E+00	3 48E+01	6 96E+01
Other Radionuclides					3 70E+01	7.39E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 813E+12
0 0250	7 927E+11
0 0375	6 877E+11
0 0575	7 406E+11
0 0850	4 464E+11
0 1250	2 913E+11
0 2250	3 839E+11
0 3750	1 677E+11
0 5750	2 780E+12
0 8500	2 984E+10
1.2500	3 064E+11
1 7500	7 768E+08
2.2500	1.638E+06
2 7500	2 770E+04
3.5000	5.871E+01
5.0000	2.289E+01
7.0000	2.584E+00
11.0000	2.939E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.56E-01	9 12E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %:	19.81481481	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	2.37	21 48	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		42 96	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 65	9 07
Bounding	1 30	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 HEIDELBERG
SNF ID #: 1044
Fuel Units & Descr: 56 - ELEMENT
Heavy Metal Mass: BOL=10 713kg EOL=10 556kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2006
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 0 50

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	208 81	417 63	0 00E+00	5 52E-07	1 10E-06
Am-241	3 1429E-03	208 81	417 63	0 00E+00	6 56E-01	1.31E+00
Am-242m	1 3195E-06	208 81	417 63	0 00E+00	2 76E-04	5 51E-04
Am-243	1 4753E-07	208 81	417 63	0 00E+00	3 08E-05	6 16E-05
C-14	1 2847E-04	208 81	417.63	0 00E+00	2 68E-02	5.37E-02
Cl-36	2 8120E-06	208 81	417.63	0 00E+00	5 87E-04	1.17E-03
Cm-243	1 2465E-07	208.81	417.63	0 00E+00	2.60E-05	5.21E-05
Cm-244	9 5564E-07	208 81	417.63	0 00E+00	2.00E-04	3.99E-04
Co-60	1 7880E-01	208 81	417.63	0 00E+00	3 73E+01	7 47E+01
Cs-134	5 8692E-04	208 81	417 63	0 00E+00	1.23E-01	2.45E-01
Cs-135	3.2195E-05	208 81	417 63	0 00E+00	6 72E-03	1.34E-02
Cs-137	1 9489E+00	208 81	417 63	0 00E+00	4 07E+02	8 14E+02
Eu-154	4.5895E-03	208 81	417 63	0 00E+00	9 58E-01	1 92E+00
Eu-155	3 6045E-03	208 81	417 63	0 00E+00	7 53E-01	1.51E+00
Fe-55	1.4185E-02	208 81	417 63	0 00E+00	2 96E+00	5 92E+00
H-3	4 7895E-03	208 81	417 63	0 00E+00	1 00E+00	2 00E+00
I-129	7.3684E-07	208 81	417 63	0 00E+00	1 54E-04	3 08E-04
Kr-85	9 5820E-02	208 81	417 63	0 00E+00	2 00E+01	4 00E+01
Np-237	1.2552E-06	208 81	417 63	0 00E+00	2 62E-04	5.24E-04
Pa-231	7 0406E-09	208 81	417 63	0 00E+00	1 47E-06	2 94E-06
Pb-210	5 8000E-14	208 81	417 63	0 00E+00	1.21E-11	2.42E-11
Pm-147	4 0075E-02	208 81	417 63	0 00E+00	8 37E+00	1 67E+01
Pu-238	9 2256E-04	208 81	417 63	0 00E+00	1.93E-01	3 85E-01
Pu-239	5 5278E-03	208 81	417 63	0 00E+00	1.15E+00	2.31E+00
Pu-240	2 1248E-03	208 81	417 63	0 00E+00	4 44E-01	8 87E-01
Pu-241	4 9549E-02	208 81	417 63	0 00E+00	1.03E+01	2 07E+01
Pu-242	2 3128E-07	208 81	417.63	0 00E+00	4 83E-05	9 66E-05
Ra-226	2 4526E-13	208 81	417.63	0 00E+00	5 12E-11	1 02E-10
Ra-228	2 4015E-10	208 81	417.63	0 00E+00	5 01E-08	1 00E-07
Ru-106	3 0602E-06	208 81	417.63	0 00E+00	6 39E-04	1 28E-03
Se-79	1.3015E-05	208 81	417 63	0 00E+00	2 72E-03	5 44E-03
Sn-126	1.2165E-05	208 81	417 63	0 00E+00	2 54E-03	5 08E-03
Sr-90	1.8226E+00	208 81	417 63	0 00E+00	3 81E+02	7 61E+02
Tc-99	4 4241E-04	208 81	417 63	0 00E+00	9 24E-02	1 85E-01
Th-229	3 0962E-10	208 81	417 63	0 00E+00	6 47E-08	1.29E-07
Th-230	4.2346E-11	208 81	417 63	0 00E+00	8 84E-09	1.77E-08
Th-232	2 5278E-10	208 81	417 63	0 00E+00	5.28E-08	1.06E-07
Tl-208	1.5820E-08	208 81	417 63	0 00E+00	3.30E-06	6 61E-06
U-232	4.2647E-08	208 81	417 63	0 00E+00	8 91E-06	1 78E-05
U-233	1.2211E-07	208 81	417 63	0 00E+00	2.55E-05	5 10E-05
U-234	1 9955E-07	208 81	417 63	0 00E+00	4 17E-05	8.33E-05
U-235	-2 6194E-06	208 81	0.00	4 57E-03	4 02E-03	4 57E-03
U-236	1 2693E-05	208 81	417 63	0 00E+00	2 65E-03	5 30E-03
U-238	-3 6331E-08	208 81	0 00	2 89E-03	2 88E-03	2 89E-03
Y-90	1 8241E+00	208 81	417 63	0 00E+00	3 81E+02	7 62E+02
Other Radionuclides					4 02E+02	8 04E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 185E+13
0 0250	8 712E+12
0 0375	7.547E+12
0 0575	8 119E+12
0 0850	4.902E+12
0 1250	3.204E+12
0.2250	4.209E+12
0.3750	1.845E+12
0 5750	3 034E+13
0 8500	3 420E+11
1.2500	5 667E+12
1 7500	8 786E+09
2.2500	3 026E+07
2 7500	3.334E+05
3 5000	1 859E+03
5 0000	2.236E+02
7 0000	2.527E+01
11 0000	2.876E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.22E+00	1 04E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 72849245	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	208.81	149 68	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		417.63	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 57	0 72
Bounding	1 14	

Estimated EOL HM/Given EOL HM: 0 99

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 INDONESIA
SNF ID #: 475
Fuel Units & Descr: 174 - ELEMENT
Heavy Metal Mass: BOL=33 93kg; EOL=33.251kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20°₀, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage	
18"x10'	
1 57	

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	647 80	1,295.59	0 00E+00	1 71E-06	3 43E-06
Am-241	3 1429E-03	647 80	1,295 59	0 00E+00	2 04E+00	4 07E+00
Am-242m	1 3195E-06	647 80	1,295 59	0 00E+00	8 55E-04	1 71E-03
Am-243	1 4753E-07	647 80	1,295 59	0 00E+00	9 56E-05	1 91E-04
C-14	1 2847E-04	647 80	1,295 59	0 00E+00	8 32E-02	1 66E-01
Cl-36	2 8120E-06	647 80	1,295 59	0 00E+00	1 82E-03	3 64E-03
Cm-243	1 2465E-07	647 80	1,295 59	0 00E+00	8 07E-05	1 61E-04
Cm-244	9 5564E-07	647 80	1,295 59	0 00E+00	6 19E-04	1.24E-03
Co-60	1 7880E-01	647 80	1,295 59	0 00E+00	1.16E+02	2.32E+02
Cs-134	5 8692E-04	647 80	1,295 59	0 00E+00	3 80E-01	7 60E-01
Cs-135	3.2195E-05	647 80	1,295 59	0 00E+00	2 09E-02	4 17E-02
Cs-137	1 9489E+00	647 80	1,295 59	0 00E+00	1.26E+03	2 52E+03
Eu-154	4 5895E-03	647 80	1,295 59	0 00E+00	2 97E+00	5 95E+00
Eu-155	3 6045E-03	647 80	1,295 59	0 00E+00	2 33E+00	4 67E+00
Fe-55	1 4185E-02	647 80	1,295 59	0 00E+00	9 19E+00	1 84E+01
H-3	4 7895E-03	647 80	1,295 59	0 00E+00	3 10E+00	6 21E+00
I-129	7.3684E-07	647 80	1,295 59	0 00E+00	4.77E-04	9 55E-04
Kr-85	9 5820E-02	647 80	1,295 59	0 00E+00	6 21E+01	1.24E+02
Np-237	1.2552E-06	647 80	1,295 59	0 00E+00	8.13E-04	1.63E-03
Pa-231	7.0406E-09	647 80	1,295 59	0 00E+00	4.56E-06	9 12E-06
Pb-210	5 8000E-14	647 80	1,295 59	0 00E+00	3.76E-11	7.51E-11
Pm-147	4 0075E-02	647 80	1,295 59	0 00E+00	2 60E+01	5 19E+01
Pu-238	9.2256E-04	647 80	1,295 59	0 00E+00	5 98E-01	1.20E+00
Pu-239	5.5278E-03	647 80	1,295 59	0 00E+00	3 58E+00	7 16E+00
Pu-240	2.1248E-03	647 80	1,295 59	0 00E+00	1 38E+00	2 75E+00
Pu-241	4 9549E-02	647 80	1,295 59	0 00E+00	3 21E+01	6 42E+01
Pu-242	2.3128E-07	647 80	1,295 59	0 00E+00	1 50E-04	3 00E-04
Ra-226	2 4526E-13	647 80	1,295 59	0 00E+00	1 59E-10	3.18E-10
Ra-228	2 4015E-10	647.80	1,295 59	0 00E+00	1 56E-07	3 11E-07
Ru-106	3 0602E-06	647 80	1,295 59	0 00E+00	1 98E-03	3 96E-03
Se-79	1 3015E-05	647.80	1,295 59	0 00E+00	8 43E-03	1 69E-02
Sn-126	1.2165E-05	647.80	1,295 59	0 00E+00	7 88E-03	1.58E-02
Sr-90	1 8226E+00	647 80	1,295 59	0 00E+00	1 18E+03	2 36E+03
Tc-99	4 4241E-04	647.80	1,295 59	0 00E+00	2 87E-01	5 73E-01
Th-229	3 0962E-10	647.80	1,295.59	0 00E+00	2 01E-07	4 01E-07
Th-230	4 2346E-11	647.80	1,295.59	0 00E+00	2 74E-08	5 49E-08
Th-232	2 5278E-10	647.80	1,295.59	0 00E+00	1 64E-07	3 28E-07
Tl-208	1 5820E-08	647.80	1,295.59	0 00E+00	1 02E-05	2 05E-05
U-232	4 2647E-08	647.80	1,295.59	0 00E+00	2 76E-05	5 53E-05
U-233	1 2211E-07	647.80	1,295.59	0 00E+00	7 91E-05	1 58E-04
U-234	1 9955E-07	647.80	1,295 59	0 00E+00	1 29E-04	2 59E-04
U-235	-2 6194E-06	647 80	0 00	1 47E-02	1 30E-02	1 47E-02
U-236	1 2693E-05	647 80	1,295 59	0 00E+00	8 22E-03	1 64E-02
U-238	-3 6331E-08	647 80	0.00	9 12E-03	9 10E-03	9 12E-03
Y-90	1 8241E+00	647 80	1,295 59	0 00E+00	1.18E+03	2 36E+03
Other Radionuclides					1.25E+03	2 49E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.298E+14
0 0250	2 703E+13
0 0375	2.341E+13
0 0575	2 519E+13
0 0850	1 521E+13
0 1250	9 938E+12
0.2250	1 306E+13
0.3750	5.723E+12
0.5750	9 411E+13
0.8500	1 061E+12
1.2500	1 758E+13
1 7500	2.726E+10
2.2500	9 388E+07
2.7500	1 034E+06
3.5000	5 768E+03
5 0000	6 942E+02
7 0000	7 844E+01
11 0000	8 926E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.62E+01	3.24E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 00000041	10 to 20 1

Basis for Parameter Drfferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	330 68	647.80	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		1,295.59	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 56	1 96	1 00
Bounding	1 12		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 INDONESIA
SNF ID #: 476
Fuel Units & Descr: 71 - ELEMENT
Heavy Metal Mass: BOL=13 845kg EOL=13 568kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage

18"x10'
0 64

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	264 33	528 66	0 00E+00	6 99E-07	1 40E-06
Am-241	3 1429E-03	264 33	528 66	0 00E+00	8 31E-01	1 66E+00
Am-242m	1 3195E-06	264 33	528 66	0 00E+00	3 49E-04	6 98E-04
Am-243	1 4753E-07	264 33	528 66	0 00E+00	3 90E-05	7.80E-05
C-14	1.2847E-04	264 33	528 66	0 00E+00	3 40E-02	6 79E-02
Cl-36	2 8120E-06	264 33	528 66	0 00E+00	7 43E-04	1 49E-03
Cm-243	1.2465E-07	264 33	528 66	0 00E+00	3.29E-05	6 59E-05
Cm-244	9 5564E-07	264.33	528 66	0 00E+00	2.53E-04	5 05E-04
Co-60	1 7880E-01	264 33	528 66	0 00E+00	4 73E+01	9 45E+01
Cs-134	5 8692E-04	264 33	528 66	0 00E+00	1 55E-01	3 10E-01
Cs-135	3 2195E-05	264 33	528 66	0 00E+00	8 51E-03	1.70E-02
Cs-137	1.9489E+00	264 33	528 66	0 00E+00	5 15E+02	1 03E+03
Eu-154	4.5895E-03	264 33	528 66	0 00E+00	1 21E+00	2.43E+00
Eu-155	3 6045E-03	264 33	528 66	0 00E+00	9 53E-01	1.91E+00
Fe-55	1 4185E-02	264 33	528 66	0 00E+00	3 75E+00	7.50E+00
H-3	4 7895E-03	264.33	528 66	0 00E+00	1.27E+00	2 53E+00
I-129	7.3684E-07	264.33	528 66	0 00E+00	1 95E-04	3 90E-04
Kr-85	9 5820E-02	264.33	528 66	0 00E+00	2 53E+01	5 07E+01
Np-237	1 2552E-06	264 33	528 66	0 00E+00	3 32E-04	6 64E-04
Pa-231	7 0406E-09	264 33	528 66	0 00E+00	1 86E-06	3 72E-06
Pb-210	5 8000E-14	264 33	528 66	0.00E+00	1 53E-11	3 07E-11
Pm-147	4 0075E-02	264 33	528 66	0 00E+00	1 06E+01	2 12E+01
Pu-238	9.2256E-04	264 33	528 66	0 00E+00	2 44E-01	4 88E-01
Pu-239	5 5278E-03	264 33	528 66	0 00E+00	1 46E+00	2 92E+00
Pu-240	2 1248E-03	264 33	528 66	0 00E+00	5 62E-01	1 12E+00
Pu-241	4 9549E-02	264.33	528 66	0 00E+00	1.31E+01	2 62E+01
Pu-242	2 3128E-07	264.33	528 66	0 00E+00	6 11E-05	1.22E-04
Ra-226	2 4526E-13	264.33	528 66	0 00E+00	6 48E-11	1.30E-10
Ra-228	2 4015E-10	264.33	528 66	0 00E+00	6 35E-08	1.27E-07
Ru-106	3 0602E-06	264 33	528 66	0 00E+00	8 09E-04	1 62E-03
Se-79	1.3015E-05	264 33	528 66	0 00E+00	3 44E-03	6 88E-03
Sn-126	1.2165E-05	264 33	528 66	0 00E+00	3 22E-03	6 43E-03
Sr-90	1 8226E+00	264 33	528 66	0 00E+00	4 82E+02	9 64E+02
Tc-99	4 4241E-04	264 33	528 66	0 00E+00	1 17E-01	2.34E-01
Th-229	3 0962E-10	264 33	528 66	0 00E+00	8 18E-08	1.64E-07
Th-230	4 2346E-11	264.33	528 66	0 00E+00	1 12E-08	2.24E-08
Th-232	2 5278E-10	264.33	528 66	0 00E+00	6 68E-08	1.34E-07
Tl-208	1.5820E-08	264.33	528 66	0 00E+00	4 18E-06	8 36E-06
U-232	4.2647E-08	264 33	528 66	0 00E+00	1.13E-05	2 25E-05
U-233	1.2211E-07	264 33	528 66	0 00E+00	3.23E-05	6 46E-05
U-234	1 9955E-07	264 33	528 66	0 00E+00	5.27E-05	1.05E-04
U-235	-2 6194E-06	264 33	0 00	5 98E-03	5.29E-03	5 98E-03
U-236	1.2693E-05	264 33	528 66	0 00E+00	3 36E-03	6 71E-03
U-238	-3 6331E-08	264 33	0 00	3 72E-03	3 71E-03	3 72E-03
Y-90	1 8241E+00	264 33	528 66	0 00E+00	4 82E+02	9 64E+02
Other Radionuclides					5 09E+02	1 02E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5.298E+13
0 0250	1 103E+13
0 0375	9 554E+12
0 0575	1 028E+13
0 0850	6.205E+12
0 1250	4 055E+12
0 2250	5 328E+12
0 3750	2.335E+12
0 5750	3.840E+13
0 8500	4.329E+11
1.2500	7 173E+12
1 7500	1 112E+10
2.2500	3 831E+07
2 7500	4 221E+05
3 5000	2.354E+03
5 0000	2.833E+02
7 0000	3.201E+01
11.0000	3 642E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6 61E+00	1.32E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 00000041	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	134.93	264 33
Bounding		528.66

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 56	1 96
Bounding	1 12	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 ITALY
SNF ID #: 477
Fuel Units & Descr: 48 - ELEMENT
Heavy Metal Mass. BOL=9 36kg; EOL=9 173kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of 2030
Template TRIGA-SS (LW/U Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6.65
Template BOL Heavy Metal Mass (MT). 0.000195
Template Decay Time 20 years

Estimated Canister usage:

18"x10'
0 43

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	178 70	357 41	0 00E+00	4 72E-07	9 45E-07
Am-241	3 1429E-03	178 70	357 41	0 00E+00	5 62E-01	1 12E+00
Am-242m	1 3195E-06	178 70	357 41	0 00E+00	2.36E-04	4.72E-04
Am-243	1 4753E-07	178 70	357 41	0 00E+00	2 64E-05	5.27E-05
C-14	1 2847E-04	178 70	357 41	0 00E+00	2.30E-02	4.59E-02
Cl-36	2 8120E-06	178 70	357 41	0 00E+00	5 03E-04	1.01E-03
Cm-243	1 2465E-07	178 70	357 41	0 00E+00	2.23E-05	4.45E-05
Cm-244	9 5564E-07	178.70	357 41	0 00E+00	1.71E-04	3.42E-04
Co-60	1 7880E-01	178 70	357 41	0 00E+00	3 20E+01	6 39E+01
Cs-134	5 8692E-04	178.70	357 41	0 00E+00	1.05E-01	2.10E-01
Cs-135	3 2195E-05	178.70	357 41	0 00E+00	5.75E-03	1.15E-02
Cs-137	1 9489E+00	178.70	357 41	0 00E+00	3 48E+02	6 97E+02
Eu-154	4 5895E-03	178 70	357 41	0 00E+00	8.20E-01	1 64E+00
Eu-155	3 6045E-03	178.70	357 41	0 00E+00	6 44E-01	1 29E+00
Fe-55	1 4185E-02	178.70	357 41	0 00E+00	2 53E+00	5 07E+00
H-3	4 7895E-03	178.70	357 41	0 00E+00	8 56E-01	1 71E+00
I-129	7 3684E-07	178.70	357 41	0 00E+00	1 32E-04	2 63E-04
Kr-85	9 5820E-02	178.70	357 41	0 00E+00	1 71E+01	3 42E+01
Np-237	1 2552E-06	178.70	357 41	0 00E+00	2.24E-04	4 49E-04
Pa-231	7 0406E-09	178.70	357 41	0 00E+00	1.26E-06	2 52E-06
Pb-210	5 8000E-14	178.70	357 41	0 00E+00	1 04E-11	2 07E-11
Pm-147	4 0075E-02	178.70	357 41	0 00E+00	7 16E+00	1 43E+01
Pu-238	9 2256E-04	178.70	357 41	0 00E+00	1 65E-01	3 30E-01
Pu-239	5 5278E-03	178.70	357 41	0 00E+00	9 88E-01	1 98E+00
Pu-240	2 1248E-03	178.70	357 41	0 00E+00	3 80E-01	7 59E-01
Pu-241	4 9549E-02	178 70	357 41	0 00E+00	8 85E+00	1 77E+01
Pu-242	2 3128E-07	178.70	357 41	0 00E+00	4 13E-05	8.27E-05
Ra-226	2 4526E-13	178 70	357 41	0 00E+00	4 38E-11	8 77E-11
Ra-228	2 4015E-10	178.70	357 41	0 00E+00	4 29E-08	8 58E-08
Ru-106	3 0602E-06	178 70	357 41	0 00E+00	5 47E-04	1 09E-03
Se-79	1 3015E-05	178 70	357 41	0 00E+00	2 33E-03	4 65E-03
Sn-126	1 2165E-05	178 70	357 41	0 00E+00	2 17E-03	4 35E-03
Sr-90	1 8226E+00	178 70	357 41	0 00E+00	3 26E+02	6 51E+02
Tc-99	4 4241E-04	178 70	357 41	0 00E+00	7 91E-02	1 58E-01
Th-229	3 0962E-10	178 70	357 41	0 00E+00	5 53E-08	1 11E-07
Th-230	4.2346E-11	178 70	357 41	0 00E+00	7 57E-09	1 51E-08
Th-232	2 5278E-10	178 70	357 41	0 00E+00	4 52E-08	9 03E-08
Tl-208	1 5820E-08	178 70	357 41	0 00E+00	2 83E-06	5 65E-06
U-232	4 2647E-08	178 70	357 41	0 00E+00	7 62E-06	1 52E-05
U-233	1.2211E-07	178 70	357 41	0 00E+00	2 18E-05	4 36E-05
U-234	1 9955E-07	178 70	357 41	0 00E+00	3 57E-05	7 13E-05
U-235	-2 6194E-06	178 70	0 00	4 05E-03	3 58E-03	4 05E-03
U-236	1.2693E-05	178 70	357 41	0 00E+00	2 27E-03	4 54E-03
U-238	-3 6331E-08	178 70	0 00	2 52E-03	2 51E-03	2 52E-03
Y-90	1 8241E+00	178 70	357 41	0 00E+00	3.26E+02	6 52E+02
Other Radionuclides					3 44E+02	6 88E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 582E+13
0 0250	7 456E+12
0 0375	6 459E+12
0 0575	6 949E+12
0 0850	4 195E+12
0 1250	2 742E+12
0 2250	3 602E+12
0 3750	1.579E+12
0 5750	2.596E+13
0 8500	2 926E+11
1 2500	4 849E+12
1 7500	7.519E+09
2.2500	2.590E+07
2.7500	2.853E+05
3 5000	1.591E+03
5 0000	1 915E+02
7 0000	2.164E+01
11 0000	2 462E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 47E+00	8 94E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	91.22	178.70	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		357 41	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 56	1 96	1 00
Bounding	1 12		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 ITALY
SNF ID #: 478
Fuel Units & Descr.: 71 - ELEMENT
Heavy Metal Mass: BOL=13 639kg EOL=12.837kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1999
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 25 years

Estimated Canister usage

18"x10'
0 64

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	4 1459E-09	765 88	1,531.76	0 00E+00	3 18E-06	6 35E-06
Am-241	3 5850E-03	765 88	1,531 76	0 00E+00	2 75E+00	5 49E+00
Am-242m	1.2899E-06	765 88	1,531 76	0 00E+00	9 88E-04	1 98E-03
Am-243	1.4747E-07	765 88	1,531 76	0 00E+00	1 13E-04	2 26E-04
C-14	1.2839E-04	765 88	1,531 76	0 00E+00	9 83E-02	1 97E-01
Cl-36	2 8120E-06	765 88	1,531 76	0 00E+00	2 15E-03	4 31E-03
Cm-243	1 1038E-07	765 88	1,531 76	0 00E+00	8 45E-05	1 69E-04
Cm-244	7 8917E-07	765 88	1,531 76	0 00E+00	6 04E-04	1 21E-03
Co-60	9 2647E-02	765 88	1,531 76	0 00E+00	7.10E+01	1 42E+02
Cs-134	1 0940E-04	765 88	1,531 76	0 00E+00	8.38E-02	1 68E-01
Cs-135	3 2195E-05	765.88	1,531 76	0 00E+00	2.47E-02	4 93E-02
Cs-137	1 7368E+00	765 88	1,531 76	0 00E+00	1.33E+03	2 66E+03
Eu-154	3 0677E-03	765 88	1,531 76	0 00E+00	2.35E+00	4 70E+00
Eu-155	1 7925E-03	765 88	1,531 76	0 00E+00	1.37E+00	2.75E+00
Fe-55	3 7444E-03	765 88	1,531 76	0 00E+00	2 87E+00	5 74E+00
H-3	3 6180E-03	765 88	1,531 76	0 00E+00	2 77E+00	5 54E+00
I-129	7.3684E-07	765 88	1,531 76	0 00E+00	5 64E-04	1 13E-03
Kr-85	6 9368E-02	765 88	1,531 76	0 00E+00	5 31E+01	1 06E+02
Np-237	1.2662E-06	765 88	1,531.76	0 00E+00	9 70E-04	1 94E-03
Pa-231	9 1654E-09	765 88	1,531.76	0 00E+00	7 02E-06	1 40E-05
Pb-210	1.3728E-13	765 88	1,531.76	0 00E+00	1 05E-10	2 10E-10
Pm-147	1 0702E-02	765 88	1,531 76	0 00E+00	8 20E+00	1 64E+01
Pu-238	8 8692E-04	765 88	1,531 76	0 00E+00	6 79E-01	1 36E+00
Pu-239	5 5263E-03	765 88	1,531 76	0 00E+00	4.23E+00	8 47E+00
Pu-240	2 1233E-03	765 88	1,531 76	0 00E+00	1 63E+00	3.25E+00
Pu-241	3 8962E-02	765 88	1,531 76	0 00E+00	2.98E+01	5 97E+01
Pu-242	2 3128E-07	765 88	1,531 76	0 00E+00	1 77E-04	3 54E-04
Ra-226	4 6752E-13	765 88	1,531 76	0 00E+00	3 58E-10	7.16E-10
Ra-228	2 4827E-10	765.88	1,531 76	0 00E+00	1 90E-07	3 80E-07
Ru-106	9 8526E-08	765.88	1,531 76	0 00E+00	7 55E-05	1 51E-04
Se-79	1.3015E-05	765 88	1,531 76	0 00E+00	9 97E-03	1 99E-02
Sn-126	1.2165E-05	765 88	1,531 76	0 00E+00	9 32E-03	1 86E-02
Sr-90	1 6195E+00	765 88	1,531 76	0 00E+00	1 24E+03	2 48E+03
Tc-99	4 4241E-04	765 88	1,531 76	0 00E+00	3 39E-01	6 78E-01
Th-229	4.2451E-10	765 88	1,531 76	0 00E+00	3 25E-07	6.50E-07
Th-230	6 1398E-11	765 88	1,531 76	0 00E+00	4 70E-08	9 40E-08
Th-232	2.5278E-10	765 88	1,531.76	0 00E+00	1 94E-07	3 87E-07
Tl-208	1.5098E-08	765 88	1,531.76	0 00E+00	1.16E-05	2.31E-05
U-232	4 0662E-08	765 88	1,531 76	0 00E+00	3.11E-05	6.23E-05
U-233	1.2217E-07	765 88	1,531 76	0 00E+00	9.36E-05	1 87E-04
U-234	2.2391E-07	765 88	1,531 76	0 00E+00	1 71E-04	3 43E-04
U-235	-2 6194E-06	765 88	0 00	5 90E-03	3 90E-03	5 90E-03
U-236	1.2695E-05	765 88	1,531.76	0 00E+00	9 72E-03	1 94E-02
U-238	-3 6331E-08	765 88	0 00	3 67E-03	3 64E-03	3 67E-03
Y-90	1 6195E+00	765 88	1,531 76	0 00E+00	1.24E+03	2 48E+03
Other Radionuclides					1.32E+03	2 64E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.360E+14
0 0250	2.827E+13
0 0375	2.452E+13
0 0575	2 641E+13
0 0850	1.592E+13
0 1250	1 039E+13
0.2250	1.369E+13
0 3750	5 979E+12
0 5750	9 912E+13
0 8500	1 064E+12
1.2500	1 093E+13
1 7500	2.770E+10
2.2500	5.841E+07
2 7500	9 876E+05
3 5000	2.063E+03
5 0000	8.029E+02
7 0000	9 063E+01
11 0000	1.031E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.63E+01	3.25E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 02640698	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	465.24	765.88	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		1,531 76	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 65	1 65
Bounding	3 29	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 ITALY
SNF ID #: 1080
Fuel Units & Descr: 140 - ELEMENT
Heavy Metal Mass: BOL=26.894kg, EOL=25 312kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2006
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage

18"x10'
1 26

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventones(Ci)
Ac-227	2 6436E-09	1,510 19	3,020 38	0 00E+00	3 99E-06	7 98E-06
Am-241	3 1429E-03	1,510 19	3,020 38	0 00E+00	4 75E+00	9 49E+00
Am-242m	1 3195E-06	1,510 19	3,020 38	0 00E+00	1 99E-03	3 99E-03
Am-243	1 4753E-07	1,510.19	3,020 38	0 00E+00	2 23E-04	4 46E-04
C-14	1 2847E-04	1,510.19	3 020 38	0 00E+00	1 94E-01	3 88E-01
Cl-36	2 8120E-06	1,510.19	3,020 38	0 00E+00	4.25E-03	8 49E-03
Cm-243	1 2465E-07	1,510.19	3,020 38	0 00E+00	1 88E-04	3 76E-04
Cm-244	9 5564E-07	1,510 19	3,020 38	0 00E+00	1 44E-03	2 89E-03
Co-60	1 7880E-01	1 510 19	3 020.38	0 00E+00	2 70E+02	5 40E+02
Cs-134	5 8692E-04	1 510 19	3,020.38	0 00E+00	8 86E-01	1 77E+00
Cs-135	3 2195E-05	1,510 19	3,020.38	0 00E+00	4 86E-02	9 72E-02
Cs-137	1 9489E+00	1,510 19	3,020.38	0 00E+00	2 94E+03	5 89E+03
Eu-154	4 5895E-03	1,510 19	3,020 38	0 00E+00	6 93E+00	1 39E+01
Eu-155	3 6045E-03	1,510 19	3,020.38	0 00E+00	5 44E+00	1 09E+01
Fe-55	1 4185E-02	1,510 19	3,020 38	0 00E+00	2 14E+01	4 28E+01
H-3	4.7895E-03	1,510 19	3,020 38	0 00E+00	7 23E+00	1 45E+01
I-129	7 3684E-07	1,510 19	3,020 38	0 00E+00	1 11E-03	2 23E-03
Kr-85	9 5820E-02	1,510 19	3,020 38	0 00E+00	1 45E+02	2 89E+02
Np-237	1.2552E-06	1,510 19	3,020 38	0 00E+00	1 90E-03	3 79E-03
Pa-231	7 0406E-09	1,510 19	3,020 38	0 00E+00	1 06E-05	2 13E-05
Pb-210	5 8000E-14	1,510 19	3,020 38	0 00E+00	8 76E-11	1 75E-10
Pm-147	4 0075E-02	1,510 19	3,020 38	0 00E+00	6 05E+01	1 21E+02
Pu-238	9 2256E-04	1,510 19	3,020 38	0 00E+00	1 39E+00	2 79E+00
Pu-239	5 5278E-03	1,510 19	3,020 38	0 00E+00	8 35E+00	1 67E+01
Pu-240	2 1248E-03	1,510 19	3,020 38	0 00E+00	3 21E+00	6 42E+00
Pu-241	4 9549E-02	1,510.19	3,020 38	0 00E+00	7 48E+01	1 50E+02
Pu-242	2 3128E-07	1,510.19	3,020 38	0 00E+00	3 49E-04	6 99E-04
Ra-226	2 4526E-13	1,510.19	3,020 38	0 00E+00	3 70E-10	7 41E-10
Ra-228	2 4015E-10	1,510.19	3,020 38	0 00E+00	3 63E-07	7.25E-07
Ru-106	3 0602E-06	1,510.19	3,020 38	0 00E+00	4 62E-03	9.24E-03
Se-79	1 3015E-05	1,510.19	3,020 38	0 00E+00	1.97E-02	3 93E-02
Sn-126	1 2165E-05	1,510 19	3,020 38	0 00E+00	1 84E-02	3 67E-02
Sr-90	1 8226E+00	1,510 19	3,020.38	0 00E+00	2 75E+03	5 50E+03
Tc-99	4 4241E-04	1,510 19	3,020.38	0 00E+00	6 68E-01	1 34E+00
Th-229	3 0962E-10	1,510 19	3,020.38	0 00E+00	4 68E-07	9 35E-07
Th-230	4.2346E-11	1,510 19	3,020.38	0 00E+00	6 40E-08	1 28E-07
Th-232	2 5278E-10	1,510 19	3,020 38	0 00E+00	3 82E-07	7 63E-07
Tl-208	1 5820E-08	1,510 19	3 020 38	0 00E+00	2 39E-05	4 78E-05
U-232	4.2647E-08	1,510 19	3,020 38	0 00E+00	6 44E-05	1 29E-04
U-233	1.2211E-07	1,510 19	3,020 38	0 00E+00	1 84E-04	3 69E-04
U-234	1.9955E-07	1,510 19	3,020 38	0 00E+00	3 01E-04	6 03E-04
U-235	-2 6194E-06	1,510 19	0 00	1.16E-02	7 68E-03	1.16E-02
U-236	1.2693E-05	1,510 19	3,020 38	0 00E+00	1 92E-02	3 83E-02
U-238	-3 6331E-08	1,510 19	0 00	7.23E-03	7 17E-03	7.23E-03
Y-90	1 8241E+00	1,510 19	3,020 38	0.00E+00	2.75E+03	5.51E+03
Other Radionuclides					2 91E+03	5 82E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	3 027E+14
0 0250	6 301E+13
0.0375	5 458E+13
0.0575	5.872E+13
0 0850	3 545E+13
0 1250	2.317E+13
0.2250	3 044E+13
0.3750	1 334E+13
0.5750	2 194E+14
0 8500	2 473E+12
1.2500	4 098E+13
1 7500	6.354E+10
2.2500	2 189E+08
2.7500	2.411E+06
3 5000	1.337E+04
5 0000	1.586E+03
7 0000	1 791E+02
11 0000	2 038E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 78E+01	7.56E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 026	10 to 20 1

Basis for Parameter Drfferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	917 38	1,510 19	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		3 020 38	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 65	1 65
Bounding	3.29	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 JAPAN
SNF ID #: 479
Fuel Units & Descr: 73 - ELEMENT
Heavy Metal Mass: BOL=14.235kg EOL=14 089kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage 18"x10': 0 66

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	139.37	278 75	0 00E+00	3 68E-07	7.37E-07
Am-241	3 1429E-03	139.37	278 75	0 00E+00	4.38E-01	8 76E-01
Am-242m	1.3195E-06	139.37	278 75	0 00E+00	1.84E-04	3 68E-04
Am-243	1 4753E-07	139 37	278 75	0 00E+00	2 06E-05	4 11E-05
C-14	1.2847E-04	139 37	278 75	0 00E+00	1 79E-02	3 58E-02
Cl-36	2 8120E-06	139 37	278 75	0 00E+00	3 92E-04	7 84E-04
Cm-243	1 2465E-07	139 37	278 75	0 00E+00	1 74E-05	3 47E-05
Cm-244	9 5564E-07	139 37	278 75	0 00E+00	1 33E-04	2 66E-04
Co-60	1 7880E-01	139 37	278 75	0 00E+00	2 49E+01	4 98E+01
Cs-134	5 8692E-04	139 37	278 75	0 00E+00	8 18E-02	1 64E-01
Cs-135	3.2195E-05	139 37	278 75	0 00E+00	4 49E-03	8 97E-03
Cs-137	1 9489E+00	139.37	278 75	0 00E+00	2 72E+02	5 43E+02
Eu-154	4.5895E-03	139.37	278 75	0 00E+00	6 40E-01	1 28E+00
Eu-155	3 6045E-03	139.37	278 75	0 00E+00	5 02E-01	1 00E+00
Fe-55	1 4185E-02	139 37	278 75	0 00E+00	1.98E+00	3 95E+00
H-3	4 7895E-03	139 37	278 75	0 00E+00	6 68E-01	1.34E+00
I-129	7 3684E-07	139 37	278.75	0 00E+00	1 03E-04	2 05E-04
Kr-85	9 5820E-02	139 37	278 75	0 00E+00	1.34E+01	2 67E+01
Np-237	1 2552E-06	139 37	278 75	0 00E+00	1 75E-04	3 50E-04
Pa-231	7 0406E-09	139 37	278 75	0 00E+00	9 81E-07	1 96E-06
Pb-210	5 8000E-14	139 37	278 75	0 00E+00	8 08E-12	1 62E-11
Pm-147	4 0075E-02	139 37	278 75	0 00E+00	5 59E+00	1 12E+01
Pu-238	9.2256E-04	139.37	278 75	0 00E+00	1.29E-01	2 57E-01
Pu-239	5 5278E-03	139 37	278 75	0 00E+00	7.70E-01	1 54E+00
Pu-240	2 1248E-03	139 37	278 75	0 00E+00	2 96E-01	5 92E-01
Pu-241	4 9549E-02	139 37	278 75	0 00E+00	6 91E+00	1.38E+01
Pu-242	2 3128E-07	139 37	278 75	0 00E+00	3 22E-05	6 45E-05
Ra-226	2 4526E-13	139 37	278 75	0 00E+00	3 42E-11	6 84E-11
Ra-228	2 4015E-10	139 37	278.75	0 00E+00	3 35E-08	6 69E-08
Ru-106	3 0602E-06	139 37	278 75	0 00E+00	4 27E-04	8 53E-04
Se-79	1.3015E-05	139 37	278 75	0 00E+00	1 81E-03	3 63E-03
Sn-126	1.2165E-05	139 37	278 75	0 00E+00	1 70E-03	3 39E-03
Sr-90	1.8226E+00	139 37	278 75	0 00E+00	2 54E+02	5 08E+02
Tc-99	4 4241E-04	139 37	278 75	0 00E+00	6 17E-02	1.23E-01
Th-229	3 0962E-10	139.37	278 75	0 00E+00	4.32E-08	8 63E-08
Th-230	4 2346E-11	139 37	278 75	0 00E+00	5 90E-09	1 18E-08
Th-232	2 5278E-10	139 37	278 75	0 00E+00	3 52E-08	7 05E-08
Tl-208	1 5820E-08	139 37	278 75	0 00E+00	2 20E-06	4 41E-06
U-232	4.2647E-08	139 37	278 75	0 00E+00	5 94E-06	1 19E-05
U-233	1.2211E-07	139 37	278 75	0 00E+00	1 70E-05	3 40E-05
U-234	1.9955E-07	139 37	278 75	0 00E+00	2 78E-05	5 56E-05
U-235	-2 6194E-06	139 37	0 00	6 15E-03	5 79E-03	6 15E-03
U-236	1.2693E-05	139 37	278 75	0 00E+00	1.77E-03	3 54E-03
U-238	-3 6331E-08	139.37	0 00	3 83E-03	3 82E-03	3 83E-03
Y-90	1 8241E+00	139.37	278 75	0 00E+00	2.54E+02	5 08E+02
Other Radionuclides					2 68E+02	5 37E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 793E+13
0.0250	5 815E+12
0 0375	5 037E+12
0 0575	5 419E+12
0 0850	3 272E+12
0 1250	2 138E+12
0 2250	2.809E+12
0 3750	1.231E+12
0 5750	2.025E+13
0 8500	2.282E+11
1.2500	3 782E+12
1 7500	5 864E+09
2.2500	2 020E+07
2 7500	2.226E+05
3 5000	1.251E+03
5 0000	1 537E+02
7 0000	1 737E+01
11 0000	1 977E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 49E+00	6 97E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	138 73	139 37	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		278 75	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.29	1 00
Bounding	0 57	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 KANSAS STATE UNIV
SNF ID #: 253
Fuel Units & Descr: 163 - ELEMENT
Heavy Metal Mass: BOL=31 785kg EOL=30 481kg
ROD Storage Site INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 years

Estimated Canister usage 18"x10": 1 47

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	1,244 81	2,489 62	0 00E+00	1 06E-06	2.12E-06
Am-241	1 8331E-03	1,244 81	2,489 62	0 00E+00	2.28E+00	4 56E+00
Am-242m	1 4129E-06	1,244 81	2,489 62	0 00E+00	1.76E-03	3 52E-03
Am-243	1 4774E-07	1,244 81	2,489 62	0 00E+00	1.84E-04	3 68E-04
C-14	1 2871E-04	1,244 81	2,489 62	0 00E+00	1 60E-01	3.20E-01
Cl-36	2 8120E-06	1,244 81	2,489 62	0 00E+00	3 50E-03	7 00E-03
Cm-243	1 7940E-07	1,244 81	2,489 62	0 00E+00	2.23E-04	4 47E-04
Cm-244	1 6962E-06	1,244 81	2,489 62	0 00E+00	2.11E-03	4.22E-03
Co-60	1 2839E+00	1,244 81	2,489 62	0 00E+00	1 60E+03	3 20E+03
Cs-134	9 0541E-02	1,244 81	2,489 62	0 00E+00	1 13E+02	2 25E+02
Cs-135	3 2195E-05	1,244 81	2,489 62	0 00E+00	4 01E-02	8 02E-02
Cs-137	2 7564E+00	1,244 81	2,489 62	0 00E+00	3 43E+03	6 86E+03
Eu-154	1 5368E-02	1,244 81	2,489 62	0 00E+00	1 91E+01	3 83E+01
Eu-155	2 9293E-02	1,244 81	2,489 62	0 00E+00	3 65E+01	7 29E+01
Fe-55	7.7158E-01	1,244 81	2,489 62	0 00E+00	9 60E+02	1 92E+03
H-3	1.1111E-02	1,244.81	2,489 62	0 00E+00	1 38E+01	2 77E+01
I-129	7.3684E-07	1,244 81	2,489 62	0 00E+00	9 17E-04	1 83E-03
Kr-85	2.5263E-01	1,244 81	2,489 62	0 00E+00	3 14E+02	6.29E+02
Np-237	1.2427E-06	1,244 81	2,489 62	0 00E+00	1 55E-03	3 09E-03
Pa-231	3 8511E-09	1,244 81	2,489 62	0 00E+00	4 79E-06	9 59E-06
Pb-210	7.3880E-15	1,244 81	2,489 62	0 00E+00	9.20E-12	1 84E-11
Pm-147	2.1023E+00	1,244 81	2,489 62	0 00E+00	2 62E+03	5.23E+03
Pu-238	1 0383E-03	1,244 81	2,489 62	0 00E+00	1.29E+00	2 59E+00
Pu-239	5 5293E-03	1,244 81	2,489 62	0 00E+00	6 88E+00	1 38E+01
Pu-240	2 1278E-03	1,244 81	2,489 62	0 00E+00	2 65E+00	5 30E+00
Pu-241	1 0195E-01	1,244 81	2,489 62	0 00E+00	1 27E+02	2 54E+02
Pu-242	2 3128E-07	1,244 81	2,489 62	0 00E+00	2 88E-04	5.76E-04
Ra-226	5 2782E-14	1,244 81	2,489 62	0 00E+00	6 57E-11	1.31E-10
Ra-228	1 9338E-10	1,244 81	2,489 62	0 00E+00	2 41E-07	4 81E-07
Ru-106	9 1684E-02	1,244 81	2,489 62	0 00E+00	1 14E+02	2 28E+02
Se-79	1 3018E-05	1,244 81	2,489 62	0 00E+00	1 62E-02	3.24E-02
Sn-126	1.2167E-05	1,244 81	2,489 62	0 00E+00	1 51E-02	3 03E-02
Sr-90	2 6045E+00	1,244 81	2,489 62	0 00E+00	3.24E+03	6 48E+03
Tc-99	4 4241E-04	1,244 81	2,489 62	0 00E+00	5 51E-01	1 10E+00
Th-229	1 3713E-10	1,244 81	2,489 62	0 00E+00	1.71E-07	3 41E-07
Th-230	1 8090E-11	1,244 81	2,489 62	0 00E+00	2 25E-08	4 50E-08
Th-232	2.5278E-10	1,244 81	2,489 62	0 00E+00	3 15E-07	6 29E-07
Tl-208	1 6947E-08	1,244 81	2,489 62	0 00E+00	2.11E-05	4 22E-05
U-232	4.8737E-08	1,244 81	2,489 62	0 00E+00	6 07E-05	1 21E-04
U-233	1.2203E-07	1,244 81	2,489 62	0 00E+00	1 52E-04	3 04E-04
U-234	1 5925E-07	1,244 81	2,489 62	0 00E+00	1 98E-04	3 96E-04
U-235	-2 6194E-06	1,244 81	0.00	1.37E-02	1 05E-02	1 37E-02
U-236	1.2693E-05	1,244 81	2,489 62	0 00E+00	1 58E-02	3 16E-02
U-238	-3 6331E-08	1,244 81	0 00	8 55E-03	8 50E-03	8 55E-03
Y-90	2 6060E+00	1,244 81	2,489 62	0 00E+00	3.24E+03	6 49E+03
Other Radionuclides					4 49E+03	8 98E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 024E+14
0 0250	8 854E+13
0 0375	7 540E+13
0 0575	7 739E+13
0 0850	4 795E+13
0 1250	3.482E+13
0 2250	4 067E+13
0 3750	2 064E+13
0 5750	2 744E+14
0 8500	1 178E+13
1.2500	2.392E+14
1 7500	1 594E+11
2.2500	2 570E+11
2 7500	2 039E+09
3 5000	2 373E+08
5 0000	1 324E+03
7.0000	1 499E+02
11 0000	1 708E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.24E+01	1 45E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	774 44	1,244 81	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		2 489 62	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	1 15	1 61	1 00
Bounding	2.30		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 MEXICO
SNF ID #: 482
Fuel Units & Descr: 151 - ELEMENT
Heavy Metal Mass: BOL=29 445kg EOL=28 403kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2006
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage 18"x10': 1 36

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	994 60	1,989 21	0 00E+00	2 63E-06	5.26E-06
Am-241	3 1429E-03	994 60	1,989 21	0 00E+00	3 13E+00	6.25E+00
Am-242m	1 3195E-06	994 60	1,989 21	0 00E+00	1.31E-03	2.62E-03
Am-243	1 4753E-07	994 60	1,989 21	0 00E+00	1 47E-04	2 93E-04
C-14	1 2847E-04	994 60	1,989 21	0 00E+00	1 28E-01	2.56E-01
Cl-36	2 8120E-06	994 60	1,989 21	0 00E+00	2 80E-03	5 59E-03
Cm-243	1.2465E-07	994 60	1,989 21	0 00E+00	1 24E-04	2 48E-04
Cm-244	9 5564E-07	994 60	1,989 21	0 00E+00	9 50E-04	1 90E-03
Co-60	1 7880E-01	994 60	1,989.21	0 00E+00	1 78E+02	3 56E+02
Cs-134	5 8692E-04	994 60	1,989.21	0 00E+00	5 84E-01	1 17E+00
Cs-135	3 2195E-05	994 60	1,989 21	0 00E+00	3.20E-02	6 40E-02
Cs-137	1 9489E+00	994 60	1,989.21	0 00E+00	1.94E+03	3 88E+03
Eu-154	4 5895E-03	994 60	1,989 21	0 00E+00	4.56E+00	9.13E+00
Eu-155	3 6045E-03	994 60	1,989 21	0 00E+00	3 59E+00	7.17E+00
Fe-55	1 4185E-02	994 60	1,989 21	0 00E+00	1 41E+01	2 82E+01
H-3	4 7895E-03	994 60	1,989 21	0 00E+00	4 76E+00	9 53E+00
I-129	7.3684E-07	994 60	1,989.21	0 00E+00	7.33E-04	1 47E-03
Kr-85	9 5820E-02	994 60	1,989.21	0 00E+00	9 53E+01	1 91E+02
Np-237	1.2552E-06	994 60	1,989.21	0 00E+00	1.25E-03	2 50E-03
Pa-231	7 0406E-09	994 60	1,989 21	0.00E+00	7 00E-06	1.40E-05
Pb-210	5 8000E-14	994 60	1,989 21	0 00E+00	5 77E-11	1 15E-10
Pm-147	4 0075E-02	994 60	1,989 21	0 00E+00	3 99E+01	7.97E+01
Pu-238	9 2256E-04	994 60	1,989 21	0 00E+00	9 18E-01	1 84E+00
Pu-239	5 5278E-03	994 60	1,989 21	0 00E+00	5 50E+00	1 10E+01
Pu-240	2.1248E-03	994 60	1,989 21	0 00E+00	2 11E+00	4 23E+00
Pu-241	4 9549E-02	994 60	1,989 21	0 00E+00	4 93E+01	9 86E+01
Pu-242	2.3128E-07	994 60	1,989 21	0 00E+00	2 30E-04	4 60E-04
Ra-226	2 4526E-13	994 60	1,989 21	0 00E+00	2 44E-10	4.88E-10
Ra-228	2 4015E-10	994 60	1,989.21	0 00E+00	2.39E-07	4 78E-07
Ru-106	3 0602E-06	994 60	1,989 21	0 00E+00	3 04E-03	6 09E-03
Se-79	1 3015E-05	994 60	1,989.21	0 00E+00	1 29E-02	2 59E-02
Sn-126	1 2165E-05	994 60	1,989 21	0 00E+00	1 21E-02	2 42E-02
Sr-90	1 8226E+00	994 60	1,989 21	0 00E+00	1 81E+03	3 63E+03
Tc-99	4 4241E-04	994 60	1,989 21	0 00E+00	4 40E-01	8 80E-01
Th-229	3 0962E-10	994 60	1,989.21	0 00E+00	3 08E-07	6 16E-07
Th-230	4.2346E-11	994 60	1,989 21	0 00E+00	4.21E-08	8 42E-08
Th-232	2.5278E-10	994 60	1,989.21	0 00E+00	2.51E-07	5.03E-07
Tl-208	1.5820E-08	994 60	1,989.21	0.00E+00	1.57E-05	3.15E-05
U-232	4.2647E-08	994 60	1,989.21	0 00E+00	4.24E-05	8 48E-05
U-233	1.2211E-07	994 60	1,989 21	0 00E+00	1.21E-04	2 43E-04
U-234	1 9955E-07	994 60	1,989 21	0 00E+00	1 98E-04	3 97E-04
U-235	-2.6194E-06	994 60	0 00	1.27E-02	1 01E-02	1.27E-02
U-236	1.2693E-05	994 60	1,989 21	0 00E+00	1.26E-02	2.52E-02
U-238	-3 6331E-08	994 60	0 00	7 92E-03	7 88E-03	7 92E-03
Y-90	1 8241E+00	994 60	1,989 21	0 00E+00	1 81E+03	3 63E+03
Other Radionuclides					1 92E+03	3 83E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.993E+14
0 0250	4 150E+13
0 0375	3 595E+13
0 0575	3 867E+13
0 0850	2 335E+13
0 1250	1 526E+13
0.2250	2.005E+13
0.3750	8 786E+12
0.5750	1.445E+14
0.8500	1 629E+12
1.2500	2 699E+13
1 7500	4 185E+10
2 2500	1 441E+08
2 7500	1 588E+06
3.5000	8 824E+03
5 0000	1 052E+03
7.0000	1 188E+02
11.0000	1.352E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.49E+01	4 98E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20.00000041	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		994.60
Bounding		1,989.21

Basis for burnup used in estimate

Nominal burnup calculated from the heavy metal mass destroyed

Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 99	
Bounding	1 98	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD 8.5/20 MNRC	[1]Fuel decay start date	2035
SNF ID #	254	Estimates as of:	2030
Fuel Units & Descr	96 - ELEMENT	Template	TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
Heavy Metal Mass	BOL=17 99kg; EOL=17 933kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT):	0 000195
		Template Decay Time	5 years

Estimated Canister usage: 18"x10' = 0 86

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	350 58	701.16	0 00E+00	2 99E-07	5 97E-07
Am-241	1 8331E-03	350 58	701.16	0 00E+00	6 43E-01	1.29E+00
Am-242m	1 4129E-06	350 58	701.16	0 00E+00	4 95E-04	9 91E-04
Am-243	1 4774E-07	350 58	701.16	0 00E+00	5 18E-05	1 04E-04
C-14	1 2871E-04	350 58	701.16	0 00E+00	4 51E-02	9 02E-02
Cl-36	2 8120E-06	350.58	701.16	0 00E+00	9 86E-04	1 97E-03
Cm-243	1 7940E-07	350 58	701.16	0 00E+00	6 29E-05	1.26E-04
Cm-244	1 6962E-06	350 58	701.16	0 00E+00	5 95E-04	1 19E-03
Co-60	1 2839E+00	350.58	701 16	0 00E+00	4 50E+02	9 00E+02
Cs-134	9 0541E-02	350.58	701 16	0 00E+00	3 17E+01	6.35E+01
Cs-135	3.2195E-05	350 58	701 16	0 00E+00	1 13E-02	2.26E-02
Cs-137	2 7564E+00	350 58	701 16	0 00E+00	9 66E+02	1 93E+03
Eu-154	1 5368E-02	350 58	701 16	0 00E+00	5.39E+00	1 08E+01
Eu-155	2 9293E-02	350 58	701 16	0 00E+00	1 03E+01	2 05E+01
Fe-55	7.7158E-01	350 58	701 16	0 00E+00	2 70E+02	5 41E+02
H-3	1.1111E-02	350 58	701 16	0 00E+00	3 90E+00	7 79E+00
I-129	7.3684E-07	350 58	701 16	0 00E+00	2.58E-04	5 17E-04
Kr-85	2 5263E-01	350 58	701 16	0.00E+00	8 86E+01	1 77E+02
Np-237	1.2427E-06	350 58	701 16	0 00E+00	4.36E-04	8.71E-04
Pa-231	3 8511E-09	350 58	701.16	0 00E+00	1.35E-06	2 70E-06
Pb-210	7.3880E-15	350 58	701 16	0 00E+00	2 59E-12	5 18E-12
Pm-147	2.1023E+00	350 58	701 16	0 00E+00	7 37E+02	1 47E+03
Pu-238	1 0383E-03	350 58	701 16	0 00E+00	3 64E-01	7.28E-01
Pu-239	5 5293E-03	350 58	701 16	0 00E+00	1 94E+00	3 88E+00
Pu-240	2 1278E-03	350 58	701 16	0 00E+00	7 46E-01	1 49E+00
Pu-241	1 0195E-01	350 58	701 16	0 00E+00	3 57E+01	7 15E+01
Pu-242	2.3128E-07	350 58	701 16	0 00E+00	8.11E-05	1 62E-04
Ra-226	5 2782E-14	350 58	701 16	0 00E+00	1 85E-11	3 70E-11
Ra-228	1 9338E-10	350 58	701 16	0 00E+00	6 78E-08	1 36E-07
Ru-106	9 1684E-02	350 58	701 16	0 00E+00	3 21E+01	6 43E+01
Se-79	1 3018E-05	350 58	701 16	0 00E+00	4 56E-03	9 13E-03
Sn-126	1 2167E-05	350 58	701 16	0 00E+00	4 27E-03	8 53E-03
Sr-90	2 6045E+00	350 58	701.16	0 00E+00	9 13E+02	1 83E+03
Tc-99	4 4241E-04	350 58	701.16	0 00E+00	1 55E-01	3 10E-01
Th-229	1 3713E-10	350 58	701.16	0 00E+00	4 81E-08	9 61E-08
Th-230	1 8090E-11	350 58	701.16	0 00E+00	6 34E-09	1.27E-08
Th-232	2 5278E-10	350 58	701.16	0 00E+00	8 86E-08	1 77E-07
Tl-208	1 6947E-08	350 58	701.16	0 00E+00	5 94E-06	1.19E-05
U-232	4 8737E-08	350 58	701.16	0 00E+00	1.71E-05	3 42E-05
U-233	1 2203E-07	350 58	701 16	0 00E+00	4.28E-05	8 56E-05
U-234	1 5925E-07	350 58	701.16	0 00E+00	5 58E-05	1.12E-04
U-235	-2 6194E-06	350 58	0 00	7 58E-03	6 66E-03	7.58E-03
U-236	1 2693E-05	350.58	701.16	0 00E+00	4 45E-03	8 90E-03
U-238	-3 6331E-08	350 58	0 00	4 87E-03	4 86E-03	4 87E-03
Y-90	2 6060E+00	350 58	701 16	0 00E+00	9 14E+02	1 83E+03
Other Radionuclides					1 26E+03	2.53E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 133E+14
0 0250	2.494E+13
0 0375	2.124E+13
0.0575	2.180E+13
0.0850	1 350E+13
0 1250	9 806E+12
0.2250	1 145E+13
0.3750	5 813E+12
0.5750	7 728E+13
0 8500	3 317E+12
1.2500	6 736E+13
1 7500	4 490E+10
2.2500	7.237E+10
2.7500	5 743E+08
3 5000	6 684E+07
5 0000	3 787E+02
7 0000	4.288E+01
11 0000	4.886E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.04E+01	4 08E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences:
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding	SST	SST	
BOL HM Constituents	U	U	
BOL Enrichment %	19 48980681	10 to 20 1	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	350.58	54 99	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		701 16	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 57	0 16	0 98
Bounding	1 14		

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 MSU
SNF ID #: 873
Fuel Units & Descr: 48 - ELEMENT
Heavy Metal Mass: BOL=9 36kg EOL=8.29kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1982
Estimates as of: 2030
Template: TRIGA SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 35 years

Estimated Canister usage

18"x10'
0 43

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 7038E-09	1,021 81	2,043 62	0 00E+00	6 85E-06	1.37E-05
Am-241	3 9068E-03	1,021 81	2,043 62	0 00E+00	3 99E+00	7.98E+00
Am-242m	1.2325E-06	1,021 81	2,043 62	0 00E+00	1.26E-03	2 52E-03
Am-243	1 4732E-07	1,021 81	2,043 62	0 00E+00	1.51E-04	3 01E-04
C-14	1.2824E-04	1,021 81	2,043 62	0 00E+00	1.31E-01	2 62E-01
Cl-36	2 8120E-06	1,021 81	2,043 62	0 00E+00	2 87E-03	5 75E-03
Cm-243	8 6556E-08	1,021.81	2,043 62	0 00E+00	8 84E-05	1.77E-04
Cm-244	5 3835E-07	1,021.81	2,043 62	0 00E+00	5 50E-04	1.10E-03
Co-60	2 4887E-02	1,021 81	2,043 62	0 00E+00	2 54E+01	5 09E+01
Cs-134	3 8030E-06	1,021 81	2,043 62	0 00E+00	3 89E-03	7 77E-03
Cs-135	3.2195E-05	1,021 81	2,043 62	0.00E+00	3 29E-02	6 58E-02
Cs-137	1.3788E+00	1,021 81	2,043 62	0 00E+00	1 41E+03	2 82E+03
Eu-154	1.3711E-03	1,021 81	2,043 62	0 00E+00	1 40E+00	2 80E+00
Eu-155	4 4361E-04	1,021 81	2,043 62	0 00E+00	4.53E-01	9 07E-01
Fe-55	2 6075E-04	1,021 81	2,043 62	0 00E+00	2 66E-01	5 33E-01
H-3	2 0647E-03	1,021 81	2,043 62	0 00E+00	2.11E+00	4 22E+00
I-129	7 3684E-07	1,021.81	2,043 62	0 00E+00	7.53E-04	1.51E-03
Kr-85	3 6346E-02	1,021.81	2,043 62	0 00E+00	3 71E+01	7.43E+01
Np-237	1.2844E-06	1,021 81	2,043 62	0 00E+00	1 31E-03	2 62E-03
Pa-231	1.2352E-08	1,021 81	2,043 62	0 00E+00	1 26E-05	2 52E-05
Pb-210	3.5338E-13	1,021 81	2,043 62	0 00E+00	3 61E-10	7 22E-10
Pm-147	7 6346E-04	1,021 81	2,043 62	0 00E+00	7 80E-01	1 56E+00
Pu-238	8 1970E-04	1,021 81	2,043 62	0 00E+00	8.38E-01	1 68E+00
Pu-239	5 5248E-03	1,021 81	2,043 62	0 00E+00	5 65E+00	1 13E+01
Pu-240	2 1203E-03	1,021 81	2 043 62	0 00E+00	2.17E+00	4 33E+00
Pu-241	2 4075E-02	1,021 81	2,043 62	0 00E+00	2 46E+01	4 92E+01
Pu-242	2 3128E-07	1,021.81	2,043 62	0 00E+00	2 36E-04	4 73E-04
Ra-226	9 6481E-13	1,021.81	2,043 62	0 00E+00	9 86E-10	1 97E-09
Ra-228	2 5188E-10	1,021 81	2,043 62	0 00E+00	2 57E-07	5 15E-07
Ru-106	1.0214E-10	1,021 81	2,043 62	0 00E+00	1 04E-07	2 09E-07
Se-79	1.3014E-05	1,021 81	2,043 62	0 00E+00	1.33E-02	2 66E-02
Sn-126	1.2164E-05	1,021 81	2,043 62	0 00E+00	1.24E-02	2 49E-02
Sr-90	1.2762E+00	1,021 81	2,043.62	0 00E+00	1.30E+03	2 61E+03
Tc-99	4 4241E-04	1,021 81	2,043 62	0 00E+00	4.52E-01	9 04E-01
Th-229	5 9684E-10	1,021 81	2,043 62	0 00E+00	6 10E-07	1.22E-06
Th-230	9 3880E-11	1,021 81	2,043 62	0 00E+00	9 59E-08	1 92E-07
Th-232	2 5278E-10	1,021.81	2,043 62	0 00E+00	2 58E-07	5 17E-07
Tl-208	1.3723E-08	1,021 81	2,043 62	0 00E+00	1 40E-05	2 80E-05
U-232	3 6932E-08	1,021 81	2,043 62	0.00E+00	3 77E-05	7 55E-05
U-233	1.2224E-07	1,021 81	2,043 62	0 00E+00	1.25E-04	2 50E-04
U-234	2.5714E-07	1,021 81	2,043 62	0 00E+00	2.63E-04	5.26E-04
U-235	-2 6194E-06	1,021 81	0 00	4 05E-03	1.37E-03	4 05E-03
U-236	1.2695E-05	1,021 81	2,043.62	0 00E+00	1.30E-02	2 59E-02
U-238	-3 6331E-08	1,021 81	0 00	2 52E-03	2 48E-03	2 52E-03
Y-90	1 2765E+00	1,021.81	2,043 62	0 00E+00	1.30E+03	2 61E+03
Other Radionuclides					1 41E+03	2 81E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 426E+14
0 0250	2 964E+13
0 0375	2 575E+13
0 0575	2 774E+13
0.0850	1 669E+13
0 1250	1 086E+13
0.2250	1 438E+13
0 3750	6.271E+12
0 5750	1 049E+14
0 8500	1 073E+12
1.2500	4 165E+12
1 7500	2 786E+10
2.2500	2.283E+07
2 7500	1.049E+06
3.5000	2 521E+03
5 0000	1 061E+03
7 0000	1 197E+02
11 0000	1 361E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.64E+01	3.29E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		1,021 81
Bounding		2 043 62

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	3.20	
Bounding	6 40	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 PENN STATE UNIV
SNF ID #: 237
Fuel Units & Descr: 203 - ELEMENT
Heavy Metal Mass: BOL=39 991kg; EOL=37.575kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage 18"x10": 1 83

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	2,306 04	4,612 09	0 00E+00	1 96E-06	3 93E-06
Am-241	1 8331E-03	2,306 04	4,612 09	0 00E+00	4 23E+00	8 45E+00
Am-242m	1 4129E-06	2,306 04	4,612 09	0 00E+00	3 26E-03	6 52E-03
Am-243	1 4774E-07	2,306 04	4,612 09	0 00E+00	3 41E-04	6 81E-04
C-14	1.2871E-04	2,306 04	4,612 09	0 00E+00	2 97E-01	5 94E-01
Cl-36	2 8120E-06	2,306 04	4,612 09	0 00E+00	6 48E-03	1 30E-02
Cm-243	1.7940E-07	2,306 04	4,612 09	0 00E+00	4 14E-04	8.27E-04
Cm-244	1 6962E-06	2,306 04	4,612 09	0 00E+00	3 91E-03	7.82E-03
Co-60	1.2839E+00	2,306 04	4,612 09	0 00E+00	2 96E+03	5 92E+03
Cs-134	9 0541E-02	2,306 04	4,612 09	0 00E+00	2 09E+02	4 18E+02
Cs-135	3.2195E-05	2,306 04	4,612 09	0 00E+00	7.42E-02	1.48E-01
Cs-137	2.7564E+00	2,306 04	4,612 09	0 00E+00	6 36E+03	1.27E+04
Eu-154	1 5368E-02	2,306 04	4,612 09	0 00E+00	3 54E+01	7 09E+01
Eu-155	2 9293E-02	2,306 04	4,612.09	0 00E+00	6 76E+01	1 35E+02
Fe-55	7 7158E-01	2,306 04	4,612.09	0 00E+00	1 78E+03	3 56E+03
H-3	1 1111E-02	2,306 04	4,612.09	0 00E+00	2 56E+01	5 12E+01
I-129	7 3684E-07	2,306 04	4,612.09	0 00E+00	1 70E-03	3 40E-03
Kr-85	2 5263E-01	2,306 04	4,612 09	0 00E+00	5 83E+02	1 17E+03
Np-237	1 2427E-06	2,306 04	4,612 09	0 00E+00	2 87E-03	5 73E-03
Pa-231	3 8511E-09	2,306 04	4,612.09	0 00E+00	8 88E-06	1 78E-05
Pb-210	7 3880E-15	2,306 04	4,612 09	0 00E+00	1 70E-11	3 41E-11
Pm-147	2 1023E+00	2,306.04	4,612 09	0 00E+00	4 85E+03	9 70E+03
Pu-238	1 0383E-03	2,306.04	4,612 09	0 00E+00	2 39E+00	4 79E+00
Pu-239	5 5293E-03	2,306.04	4,612 09	0 00E+00	1 28E+01	2 55E+01
Pu-240	2 1278E-03	2,306 04	4,612 09	0 00E+00	4 91E+00	9 81E+00
Pu-241	1 0195E-01	2,306 04	4,612 09	0 00E+00	2 35E+02	4 70E+02
Pu-242	2 3128E-07	2,306 04	4,612 09	0 00E+00	5 33E-04	1 07E-03
Ra-226	5.2782E-14	2,306 04	4,612 09	0 00E+00	1 22E-10	2 43E-10
Ra-228	1 9338E-10	2,306 04	4,612 09	0 00E+00	4 46E-07	8 92E-07
Ru-106	9 1684E-02	2,306 04	4,612 09	0 00E+00	2.11E+02	4.23E+02
Se-79	1.3018E-05	2,306 04	4,612 09	0 00E+00	3 00E-02	6 00E-02
Sn-126	1.2167E-05	2,306 04	4,612 09	0 00E+00	2.81E-02	5 61E-02
Sr-90	2.6045E+00	2,306 04	4,612 09	0 00E+00	6 01E+03	1.20E+04
Tc-99	4 4241E-04	2,306 04	4,612.09	0 00E+00	1 02E+00	2 04E+00
Th-229	1.3713E-10	2,306 04	4,612 09	0 00E+00	3.16E-07	6.32E-07
Th-230	1 8090E-11	2,306 04	4,612.09	0 00E+00	4.17E-08	8.34E-08
Th-232	2 5278E-10	2,306 04	4,612.09	0 00E+00	5 83E-07	1.17E-06
Tl-208	1 6947E-08	2,306 04	4,612.09	0 00E+00	3 91E-05	7 82E-05
U-232	4 8737E-08	2,306 04	4,612.09	0 00E+00	1 12E-04	2.25E-04
U-233	1 2203E-07	2,306 04	4,612.09	0 00E+00	2 81E-04	5 63E-04
U-234	1 5925E-07	2,306 04	4,612.09	0 00E+00	3 67E-04	7 34E-04
U-235	-2 6194E-06	2,306 04	0.00	1 71E-02	1 11E-02	1 71E-02
U-236	1 2693E-05	2,306 04	4,612 09	0 00E+00	2 93E-02	5 85E-02
U-238	-3 6331E-08	2,306.04	0 00	1 08E-02	1 07E-02	1 08E-02
Y-90	2 6060E+00	2,306 04	4,612 09	0 00E+00	6 01E+03	1 20E+04
Other Radionuclides					8 31E+03	1 66E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7 454E+14
0 0250	1 640E+14
0 0375	1 397E+14
0 0575	1 434E+14
0 0850	8 882E+13
0 1250	6 450E+13
0.2250	7 535E+13
0 3750	3 824E+13
0.5750	5 083E+14
0 8500	2 182E+13
1.2500	4 431E+14
1 7500	2 953E+11
2.2500	4 760E+11
2 7500	3 778E+09
3.5000	4.396E+08
5.0000	2 442E+03
7 0000	2 764E+02
11 0000	3 149E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.34E+02	2.68E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents:	U	U
BOL Enrichment %	19 79695431	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		2,306.04	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		4 612 09	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 69	
Bounding	3.38	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 REED COLLEGE
SNF ID #: 775
Fuel Units & Descr.: 9 - ELEMENT
Heavy Metal Mass: BOL=1 719kg EOL=1 706kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2026
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage

18"x10'
0 12

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	12 89	25 77	0 00E+00	1 10E-08	2.20E-08	Avg MeV	
Am-241	1.8331E-03	12 89	25 77	0 00E+00	2.36E-02	4 72E-02	0 0150	4 166E+12
Am-242m	1.4129E-06	12 89	25 77	0 00E+00	1 82E-05	3 64E-05	0 0250	9 166E+11
Am-243	1.4774E-07	12 89	25 77	0 00E+00	1 90E-06	3 81E-06	0 0375	7.806E+11
C-14	1.2871E-04	12 89	25 77	0 00E+00	1 66E-03	3.32E-03	0 0575	8 012E+11
Cl-36	2.8120E-06	12 89	25 77	0 00E+00	3 62E-05	7 25E-05	0 0850	4 964E+11
Cm-243	1 7940E-07	12 89	25 77	0 00E+00	2 31E-06	4 62E-06	0 1250	3 605E+11
Cm-244	1 6962E-06	12 89	25 77	0 00E+00	2 19E-05	4 37E-05	0.2250	4.211E+11
Co-60	1.2839E+00	12 89	25 77	0 00E+00	1 65E+01	3 31E+01	0.3750	2 137E+11
Cs-134	9 0541E-02	12 89	25 77	0 00E+00	1.17E+00	2.33E+00	0.5750	2.841E+12
Cs-135	3.2195E-05	12 89	25 77	0 00E+00	4 15E-04	8 30E-04	0.8500	1.219E+11
Cs-137	2 7564E+00	12 89	25 77	0 00E+00	3 55E+01	7 10E+01	1.2500	2.476E+12
Eu-154	1.5368E-02	12 89	25 77	0 00E+00	1 98E-01	3 96E-01	1 7500	1 650E+09
Eu-155	2 9293E-02	12 89	25 77	0 00E+00	3 78E-01	7.55E-01	2.2500	2 660E+09
Fe-55	7 7158E-01	12 89	25 77	0 00E+00	9 94E+00	1 99E+01	2 7500	2 111E+07
H-3	1 1111E-02	12 89	25 77	0 00E+00	1 43E-01	2 86E-01	3 5000	2 457E+06
I-129	7.3684E-07	12 89	25 77	0 00E+00	9 50E-06	1 90E-05	5 0000	1 457E+01
Kr-85	2 5263E-01	12 89	25 77	0 00E+00	3 26E+00	6 51E+00	7 0000	1 651E+00
Np-237	1 2427E-06	12.89	25 77	0 00E+00	1 60E-05	3.20E-05	11 0000	1 882E-01
Pa-231	3 8511E-09	12.89	25 77	0 00E+00	4 96E-08	9.93E-08		
Pb-210	7 3880E-15	12.89	25 77	0 00E+00	9 52E-14	1.90E-13		
Pm-147	2 1023E+00	12 89	25 77	0 00E+00	2 71E+01	5 42E+01		
Pu-238	1 0383E-03	12 89	25 77	0 00E+00	1.34E-02	2 68E-02		
Pu-239	5 5293E-03	12 89	25 77	0 00E+00	7 13E-02	1 43E-01		
Pu-240	2 1278E-03	12.89	25.77	0 00E+00	2 74E-02	5 48E-02		
Pu-241	1 0195E-01	12 89	25 77	0 00E+00	1.31E+00	2 63E+00		
Pu-242	2 3128E-07	12 89	25 77	0 00E+00	2 98E-06	5 96E-06		
Ra-226	5.2782E-14	12 89	25 77	0 00E+00	6 80E-13	1 36E-12		
Ra-228	1 9338E-10	12 89	25 77	0 00E+00	2 49E-09	4 98E-09		
Ru-106	9 1684E-02	12 89	25 77	0 00E+00	1 18E+00	2 36E+00		
Se-79	1.3018E-05	12 89	25 77	0 00E+00	1 68E-04	3 36E-04		
Sn-126	1.2167E-05	12 89	25 77	0 00E+00	1 57E-04	3 14E-04		
Sr-90	2 6045E+00	12 89	25 77	0 00E+00	3 36E+01	6 71E+01		
Tc-99	4 4241E-04	12 89	25 77	0 00E+00	5 70E-03	1 14E-02		
Th-229	1.3713E-10	12 89	25 77	0 00E+00	1 77E-09	3 53E-09		
Th-230	1.8090E-11	12 89	25 77	0 00E+00	2 33E-10	4 66E-10		
Th-232	2.5278E-10	12 89	25 77	0 00E+00	3 26E-09	6 52E-09		
Tl-208	1.6947E-08	12 89	25 77	0 00E+00	2 18E-07	4.37E-07		
U-232	4.8737E-08	12 89	25 77	0 00E+00	6 28E-07	1.26E-06		
U-233	1.2203E-07	12 89	25 77	0 00E+00	1.57E-06	3.15E-06		
U-234	1.5925E-07	12 89	25 77	0 00E+00	2 05E-06	4.10E-06		
U-235	-2 6194E-06	12 89	0 00	7.49E-04	7.15E-04	7.49E-04		
U-236	1.2693E-05	12 89	25 77	0.00E+00	1 64E-04	3.27E-04		
U-238	-3 6331E-08	12 89	0 00	4 61E-04	4 61E-04	4 61E-04		
Y-90	2 6060E+00	12 89	25 77	0 00E+00	3 36E+01	6.72E+01		
Other Radionuclides					4 65E+01	9.29E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.50E-01	1.50E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 15706806	10 to 20 1

Basis for Parameter Differences:
This Template was used for the following reasons
This fuel matches on all parameters except enrichment (very close to 20%)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		12.89
Bounding		25 77

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.22	
Bounding	0.44	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 SLOVENIA
SNF ID #: 488
Fuel Units & Descr: 122 - ELEMENT
Heavy Metal Mass: BOL=23 4kg EOL=22.594kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage: 18"x10" 1 10

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	768 65	1,537 30	0 00E+00	2 03E-06	4 06E-06
Am-241	3.1429E-03	768 65	1,537 30	0 00E+00	2 42E+00	4 83E+00
Am-242m	1.3195E-06	768 65	1,537 30	0 00E+00	1 01E-03	2 03E-03
Am-243	1 4753E-07	768 65	1,537 30	0 00E+00	1.13E-04	2 27E-04
C-14	1.2847E-04	768 65	1,537 30	0 00E+00	9 87E-02	1 97E-01
Cl-36	2 8120E-06	768 65	1,537 30	0 00E+00	2.16E-03	4 32E-03
Cm-243	1.2465E-07	768 65	1,537 30	0 00E+00	9 58E-05	1 92E-04
Cm-244	9 5564E-07	768 65	1,537 30	0 00E+00	7.35E-04	1 47E-03
Co-60	1.7880E-01	768 65	1,537 30	0 00E+00	1 37E+02	2 75E+02
Cs-134	5 8692E-04	768 65	1,537 30	0 00E+00	4 51E-01	9 02E-01
Cs-135	3.2195E-05	768 65	1,537 30	0 00E+00	2.47E-02	4 95E-02
Cs-137	1 9489E+00	768 65	1,537 30	0 00E+00	1 50E+03	3 00E+03
Eu-154	4 5895E-03	768 65	1,537 30	0 00E+00	3 53E+00	7 06E+00
Eu-155	3 6045E-03	768 65	1,537 30	0 00E+00	2 77E+00	5 54E+00
Fe-55	1 4185E-02	768 65	1,537 30	0 00E+00	1 09E+01	2 18E+01
H-3	4 7895E-03	768 65	1,537 30	0 00E+00	3 68E+00	7 36E+00
I-129	7.3684E-07	768 65	1,537 30	0 00E+00	5 66E-04	1 13E-03
Kr-85	9.5820E-02	768 65	1,537.30	0 00E+00	7 37E+01	1 47E+02
Np-237	1.2552E-06	768 65	1,537.30	0 00E+00	9 65E-04	1 93E-03
Pa-231	7 0406E-09	768 65	1,537.30	0 00E+00	5 41E-06	1 08E-05
Pb-210	5 8000E-14	768 65	1,537.30	0 00E+00	4 46E-11	8 92E-11
Pm-147	4 0075E-02	768 65	1,537 30	0 00E+00	3 08E+01	6 16E+01
Pu-238	9.2256E-04	768 65	1,537 30	0 00E+00	7 09E-01	1 42E+00
Pu-239	5 5278E-03	768 65	1,537 30	0 00E+00	4 25E+00	8 50E+00
Pu-240	2 1248E-03	768 65	1,537 30	0 00E+00	1 63E+00	3.27E+00
Pu-241	4 9549E-02	768 65	1,537 30	0 00E+00	3 81E+01	7 62E+01
Pu-242	2 3128E-07	768 65	1,537.30	0 00E+00	1 78E-04	3 56E-04
Ra-226	2 4526E-13	768 65	1,537.30	0 00E+00	1 89E-10	3 77E-10
Ra-228	2 4015E-10	768 65	1,537.30	0 00E+00	1 85E-07	3 69E-07
Ru-106	3 0602E-06	768 65	1,537.30	0 00E+00	2 35E-03	4 70E-03
Se-79	1 3015E-05	768 65	1,537.30	0 00E+00	1 00E-02	2 00E-02
Sn-126	1 2165E-05	768 65	1,537.30	0 00E+00	9 35E-03	1 87E-02
Sr-90	1 8226E+00	768 65	1,537.30	0 00E+00	1 40E+03	2 80E+03
Tc-99	4 4241E-04	768 65	1,537.30	0 00E+00	3 40E-01	6 80E-01
Th-229	3 0962E-10	768 65	1,537.30	0 00E+00	2 38E-07	4 76E-07
Th-230	4 2346E-11	768 65	1,537.30	0 00E+00	3 25E-08	6 51E-08
Th-232	2 5278E-10	768 65	1,537 30	0 00E+00	1 94E-07	3 89E-07
Tl-208	1 5820E-08	768 65	1,537.30	0 00E+00	1 22E-05	2 43E-05
U-232	4 2647E-08	768 65	1,537 30	0 00E+00	3 28E-05	6 56E-05
U-233	1 2211E-07	768 65	1,537 30	0 00E+00	9 39E-05	1 88E-04
U-234	1 9955E-07	768 65	1,537 30	0 00E+00	1 53E-04	3 07E-04
U-235	-2 6194E-06	768 65	0 00	1 01E-02	8 04E-03	1 01E-02
U-236	1 2693E-05	768 65	1,537 30	0 00E+00	9 76E-03	1 95E-02
U-238	-3 6331E-08	768 65	0 00	6.30E-03	6 27E-03	6 30E-03
Y-90	1 8241E+00	768 65	1,537 30	0 00E+00	1 40E+03	2 80E+03
Other Radionuclides					1 48E+03	2 96E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 541E+14
0 0250	3.207E+13
0 0375	2.778E+13
0 0575	2 989E+13
0 0850	1 804E+13
0 1250	1 179E+13
0 2250	1 549E+13
0 3750	6 790E+12
0 5750	1 117E+14
0 8500	1 259E+12
1 2500	2 086E+13
1 7500	3 234E+10
2 2500	1 114E+08
2 7500	1 227E+06
3 5000	6 820E+03
5 0000	8 132E+02
7 0000	9 187E+01
11 0000	1 045E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.92E+01	3.85E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 8857762	10 to 20 1

Basis for Parameter Drfferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		768 65	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		1 537.30	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 96	
Bounding	1 93	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 SLOVENIA
SNF ID #: 1079
Fuel Units & Descr: 149 - ELEMENT
Heavy Metal Mass: BOL=28 578kg EOL=27 446kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage

18"x10'
1 34

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 6436E-09	1,081 00	2,161.99	0 00E+00	2 86E-06	5.72E-06
Am-241	3 1429E-03	1,081 00	2,161.99	0 00E+00	3 40E+00	6 79E+00
Am-242m	1.3195E-06	1,081 00	2,161.99	0 00E+00	1.43E-03	2.85E-03
Am-243	1.4753E-07	1,081.00	2,161.99	0 00E+00	1.59E-04	3 19E-04
C-14	1.2847E-04	1,081.00	2,161 99	0 00E+00	1.39E-01	2 78E-01
Cl-36	2.8120E-06	1,081.00	2,161 99	0 00E+00	3 04E-03	6 08E-03
Cm-243	1.2465E-07	1,081 00	2,161 99	0 00E+00	1.35E-04	2 69E-04
Cm-244	9 5564E-07	1,081 00	2,161 99	0 00E+00	1 03E-03	2 07E-03
Co-60	1 7880E-01	1,081 00	2,161 99	0 00E+00	1 93E+02	3 87E+02
Cs-134	5 8692E-04	1,081 00	2,161 99	0 00E+00	6 34E-01	1 27E+00
Cs-135	3 2195E-05	1,081 00	2,161 99	0 00E+00	3 48E-02	6 96E-02
Cs-137	1 9489E+00	1,081 00	2,161 99	0 00E+00	2 11E+03	4 21E+03
Eu-154	4 5895E-03	1,081 00	2,161 99	0 00E+00	4 96E+00	9 92E+00
Eu-155	3 6045E-03	1,081 00	2,161 99	0 00E+00	3 90E+00	7 79E+00
Fe-55	1 4185E-02	1,081 00	2,161 99	0 00E+00	1.53E+01	3 07E+01
H-3	4 7895E-03	1,081 00	2,161 99	0 00E+00	5 18E+00	1.04E+01
I-129	7.3684E-07	1,081 00	2,161.99	0.00E+00	7 97E-04	1 59E-03
Kr-85	9 5820E-02	1,081 00	2,161.99	0 00E+00	1.04E+02	2 07E+02
Np-237	1.2552E-06	1,081 00	2,161.99	0 00E+00	1.36E-03	2 71E-03
Pa-231	7 0406E-09	1,081.00	2,161 99	0 00E+00	7 61E-06	1 52E-05
Pb-210	5 8000E-14	1,081.00	2,161 99	0 00E+00	6 27E-11	1.25E-10
Pm-147	4 0075E-02	1,081.00	2,161 99	0 00E+00	4 33E+01	8 66E+01
Pu-238	9.2256E-04	1,081 00	2,161 99	0 00E+00	9 97E-01	1 99E+00
Pu-239	5 5278E-03	1,081 00	2,161 99	0 00E+00	5 98E+00	1.20E+01
Pu-240	2 1248E-03	1,081 00	2,161 99	0 00E+00	2 30E+00	4.59E+00
Pu-241	4 9549E-02	1,081 00	2,161 99	0 00E+00	5 36E+01	1.07E+02
Pu-242	2 3128E-07	1,081 00	2,161 99	0 00E+00	2 50E-04	5 00E-04
Ra-226	2 4526E-13	1,081 00	2,161 99	0 00E+00	2 65E-10	5 30E-10
Ra-228	2 4015E-10	1,081 00	2,161 99	0 00E+00	2.60E-07	5 19E-07
Ru-106	3 0602E-06	1,081 00	2,161 99	0 00E+00	3 31E-03	6 62E-03
Se-79	1.3015E-05	1,081 00	2,161 99	0 00E+00	1 41E-02	2 81E-02
Sn-126	1.2165E-05	1,081 00	2,161 99	0 00E+00	1.32E-02	2 63E-02
Sr-90	1.8226E+00	1,081 00	2,161.99	0 00E+00	1 97E+03	3 94E+03
Tc-99	4 4241E-04	1,081 00	2,161.99	0 00E+00	4 78E-01	9 56E-01
Th-229	3 0962E-10	1,081.00	2,161.99	0 00E+00	3 35E-07	6 69E-07
Th-230	4.2346E-11	1,081.00	2,161.99	0 00E+00	4 58E-08	9 16E-08
Th-232	2.5278E-10	1,081.00	2,161 99	0 00E+00	2 73E-07	5.47E-07
Tl-208	1.5820E-08	1,081 00	2,161 99	0 00E+00	1 71E-05	3 42E-05
U-232	4.2647E-08	1,081 00	2,161 99	0 00E+00	4 61E-05	9 22E-05
U-233	1 2211E-07	1,081 00	2,161 99	0 00E+00	1.32E-04	2 64E-04
U-234	1 9955E-07	1,081 00	2,161 99	0 00E+00	2.16E-04	4 31E-04
U-235	-2.6194E-06	1,081 00	0 00	1.23E-02	9 45E-03	1 23E-02
U-236	1.2693E-05	1,081 00	2,161 99	0 00E+00	1.37E-02	2 74E-02
U-238	-3 6331E-08	1,081 00	0 00	7.70E-03	7 66E-03	7 70E-03
Y-90	1.8241E+00	1,081 00	2,161 99	0 00E+00	1.97E+03	3 94E+03
Other Radionuclides					2 08E+03	4 16E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.167E+14
0 0250	4.510E+13
0 0375	3 907E+13
0 0575	4.203E+13
0 0850	2.537E+13
0 1250	1 658E+13
0.2250	2 179E+13
0.3750	9 550E+12
0 5750	1 571E+14
0 8500	1 770E+12
1.2500	2.934E+13
1 7500	4 548E+10
2.2500	1.567E+08
2.7500	1 726E+06
3.5000	9 585E+03
5 0000	1 141E+03
7.0000	1.289E+02
11.0000	1 466E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.70E+01	5 41E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 886	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		1 081 00
Bounding		2,161 99

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 11	
Bounding	2.22	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 SO KOREA
SNF ID #: 484
Fuel Units & Descr: 104 - ELEMENT
Heavy Metal Mass: BOL=19 76kg, EOL=19 261kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1996
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 25 years

Estimated Canister usage

18"x10'
0 94

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	4 1459E-09	476 54	953 08	0 00E+00	1 98E-06	3 95E-06
Am-241	3 5850E-03	476 54	953 08	0 00E+00	1 71E+00	3.42E+00
Am-242m	1 2899E-06	476 54	953 08	0 00E+00	6 15E-04	1.23E-03
Am-243	1 4747E-07	476 54	953 08	0 00E+00	7 03E-05	1.41E-04
C-14	1.2839E-04	476 54	953 08	0 00E+00	6 12E-02	1.22E-01
Cl-36	2 8120E-06	476 54	953 08	0 00E+00	1.34E-03	2 68E-03
Cm-243	1.1038E-07	476 54	953 08	0 00E+00	5.26E-05	1 05E-04
Cm-244	7.8917E-07	476.54	953 08	0 00E+00	3.76E-04	7 52E-04
Co-60	9.2647E-02	476 54	953 08	0 00E+00	4 41E+01	8 83E+01
Cs-134	1 0940E-04	476.54	953 08	0 00E+00	5.21E-02	1 04E-01
Cs-135	3.2195E-05	476 54	953 08	0 00E+00	1.53E-02	3 07E-02
Cs-137	1 7368E+00	476 54	953 08	0 00E+00	8 28E+02	1 66E+03
Eu-154	3 0677E-03	476 54	953 08	0 00E+00	1 46E+00	2 92E+00
Eu-155	1 7925E-03	476 54	953 08	0 00E+00	8 54E-01	1 71E+00
Fe-55	3 7444E-03	476 54	953 08	0.00E+00	1 78E+00	3 57E+00
H-3	3 6180E-03	476 54	953 08	0 00E+00	1 72E+00	3 45E+00
I-129	7 3684E-07	476 54	953.08	0 00E+00	3 51E-04	7 02E-04
Kr-85	6 9368E-02	476 54	953 08	0 00E+00	3 31E+01	6 61E+01
Np-237	1 2662E-06	476 54	953 08	0 00E+00	6 03E-04	1 21E-03
Pa-231	9 1654E-09	476 54	953 08	0 00E+00	4 37E-06	8 74E-06
Pb-210	1 3728E-13	476 54	953 08	0 00E+00	6 54E-11	1 31E-10
Pm-147	1 0702E-02	476 54	953 08	0 00E+00	5.10E+00	1 02E+01
Pu-238	8 8692E-04	476 54	953 08	0 00E+00	4 23E-01	8 45E-01
Pu-239	5 5263E-03	476 54	953 08	0 00E+00	2 63E+00	5 27E+00
Pu-240	2.1233E-03	476.54	953 08	0 00E+00	1 01E+00	2 02E+00
Pu-241	3 8962E-02	476.54	953 08	0 00E+00	1 86E+01	3 71E+01
Pu-242	2.3128E-07	476.54	953 08	0 00E+00	1.10E-04	2.20E-04
Ra-226	4 6752E-13	476 54	953 08	0 00E+00	2 23E-10	4 46E-10
Ra-228	2 4827E-10	476 54	953 08	0 00E+00	1 18E-07	2 37E-07
Ru-106	9 8526E-08	476 54	953 08	0 00E+00	4 70E-05	9 39E-05
Se-79	1 3015E-05	476 54	953 08	0.00E+00	6 20E-03	1 24E-02
Sn-126	1 2165E-05	476 54	953 08	0 00E+00	5 80E-03	1 16E-02
Sr-90	1 6195E+00	476 54	953 08	0 00E+00	7 72E+02	1.54E+03
Tc-99	4 4241E-04	476 54	953 08	0 00E+00	2 11E-01	4 22E-01
Th-229	4 2451E-10	476 54	953 08	0 00E+00	2 02E-07	4 05E-07
Th-230	6 1398E-11	476 54	953 08	0 00E+00	2 93E-08	5 85E-08
Th-232	2 5278E-10	476 54	953 08	0 00E+00	1 20E-07	2 41E-07
Tl-208	1 5098E-08	476 54	953 08	0 00E+00	7.19E-06	1 44E-05
U-232	4 0662E-08	476 54	953 08	0 00E+00	1 94E-05	3 88E-05
U-233	1.2217E-07	476 54	953 08	0 00E+00	5 82E-05	1.16E-04
U-234	2.2391E-07	476 54	953 08	0 00E+00	1 07E-04	2.13E-04
U-235	-2 6194E-06	476.54	0 00	8 54E-03	7.29E-03	8 54E-03
U-236	1.2695E-05	476.54	953 08	0 00E+00	6 05E-03	1.21E-02
U-238	-3 6331E-08	476.54	0 00	5 31E-03	5 30E-03	5 31E-03
Y-90	1 6195E+00	476 54	953 08	0 00E+00	7 72E+02	1 54E+03
Other Radionuclides					8 20E+02	1 64E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8 460E+13
0 0250	1 759E+13
0 0375	1 526E+13
0 0575	1 643E+13
0 0850	9 905E+12
0 1250	6 462E+12
0 2250	8 519E+12
0 3750	3 720E+12
0 5750	6 167E+13
0 8500	6 621E+11
1 2500	6 799E+12
1 7500	1 723E+10
2.2500	3 634E+07
2 7500	6 145E+05
3 5000	1.300E+03
5 0000	5.066E+02
7 0000	5 720E+01
11 0000	6.506E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 01E+01	2 02E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal:		476.54	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		953.08	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 71	
Bounding	1 41	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 TEXAS A&M
SNF ID #: 258
Fuel Units & Descr: 85 - ELEMENT
Heavy Metal Mass: BOL=14 875kg EOL=14.34kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' = 0 77

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	511.19	1,022 38	0 00E+00	4 35E-07	8 71E-07
Am-241	1 8331E-03	511.19	1,022.38	0 00E+00	9 37E-01	1.87E+00
Am-242m	1 4129E-06	511.19	1,022 38	0 00E+00	7 22E-04	1 44E-03
Am-243	1 4774E-07	511 19	1,022 38	0 00E+00	7 55E-05	1 51E-04
C-14	1.2871E-04	511 19	1,022 38	0 00E+00	6 58E-02	1 32E-01
Cl-36	2 8120E-06	511 19	1,022 38	0 00E+00	1 44E-03	2 87E-03
Cm-243	1 7940E-07	511 19	1,022 38	0 00E+00	9.17E-05	1 83E-04
Cm-244	1 6962E-06	511 19	1,022 38	0 00E+00	8 67E-04	1.73E-03
Co-60	1.2839E+00	511 19	1,022 38	0 00E+00	6.56E+02	1.31E+03
Cs-134	9 0541E-02	511 19	1,022.38	0 00E+00	4 63E+01	9.26E+01
Cs-135	3 2195E-05	511.19	1,022.38	0 00E+00	1 65E-02	3 29E-02
Cs-137	2 7564E+00	511.19	1,022.38	0 00E+00	1 41E+03	2 82E+03
Eu-154	1 5368E-02	511.19	1,022 38	0 00E+00	7 86E+00	1 57E+01
Eu-155	2 9293E-02	511 19	1,022 38	0 00E+00	1 50E+01	2 99E+01
Fe-55	7.7158E-01	511 19	1,022 38	0 00E+00	3 94E+02	7 89E+02
H-3	1 1111E-02	511 19	1,022 38	0 00E+00	5 68E+00	1.14E+01
I-129	7.3684E-07	511 19	1,022 38	0 00E+00	3 77E-04	7.53E-04
Kr-85	2 5263E-01	511 19	1,022 38	0 00E+00	1.29E+02	2.58E+02
Np-237	1 2427E-06	511 19	1,022 38	0 00E+00	6 35E-04	1 27E-03
Pa-231	3 8511E-09	511 19	1,022.38	0 00E+00	1 97E-06	3 94E-06
Pb-210	7 3880E-15	511.19	1,022.38	0 00E+00	3 78E-12	7 55E-12
Pm-147	2 1023E+00	511.19	1,022 38	0 00E+00	1 07E+03	2 15E+03
Pu-238	1 0383E-03	511.19	1,022 38	0 00E+00	5 31E-01	1 06E+00
Pu-239	5 5293E-03	511 19	1,022 38	0 00E+00	2 83E+00	5 65E+00
Pu-240	2 1278E-03	511 19	1,022 38	0.00E+00	1.09E+00	2.18E+00
Pu-241	1 0195E-01	511 19	1,022 38	0 00E+00	5.21E+01	1 04E+02
Pu-242	2 3128E-07	511 19	1,022 38	0 00E+00	1 18E-04	2 36E-04
Ra-226	5 2782E-14	511 19	1,022 38	0 00E+00	2 70E-11	5 40E-11
Ra-228	1 9338E-10	511 19	1,022.38	0 00E+00	9 89E-08	1 98E-07
Ru-106	9 1684E-02	511.19	1,022.38	0 00E+00	4 69E+01	9 37E+01
Se-79	1.3018E-05	511.19	1,022.38	0 00E+00	6 65E-03	1.33E-02
Sn-126	1.2167E-05	511.19	1,022 38	0 00E+00	6.22E-03	1.24E-02
Sr-90	2 6045E+00	511 19	1,022 38	0 00E+00	1.33E+03	2.66E+03
Tc-99	4.4241E-04	511 19	1,022 38	0 00E+00	2.26E-01	4 52E-01
Th-229	1.3713E-10	511.19	1,022 38	0 00E+00	7 01E-08	1 40E-07
Th-230	1 8090E-11	511 19	1,022.38	0 00E+00	9 25E-09	1 85E-08
Th-232	2.5278E-10	511 19	1,022 38	0 00E+00	1 29E-07	2.58E-07
Tl-208	1 6947E-08	511.19	1,022.38	0 00E+00	8 66E-06	1.73E-05
U-232	4 8737E-08	511.19	1,022.38	0 00E+00	2 49E-05	4 98E-05
U-233	1.2203E-07	511.19	1,022.38	0 00E+00	6.24E-05	1.25E-04
U-234	1.5925E-07	511.19	1,022 38	0 00E+00	8.14E-05	1 63E-04
U-235	-2 6194E-06	511 19	0 00	6 43E-03	5 09E-03	6 43E-03
U-236	1.2693E-05	511 19	1,022 38	0 00E+00	6 49E-03	1.30E-02
U-238	-3 6331E-08	511 19	0 00	4 00E-03	3 98E-03	4 00E-03
Y-90	2 6060E+00	511 19	1,022 38	0 00E+00	1.33E+03	2 66E+03
Other Radionuclides					1 84E+03	3 69E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 652E+14
0 0250	3 636E+13
0 0375	3 096E+13
0 0575	3 178E+13
0 0850	1 969E+13
0 1250	1 430E+13
0.2250	1 670E+13
0.3750	8 476E+12
0 5750	1 127E+14
0 8500	4 836E+12
1 2500	9 822E+13
1 7500	6 547E+10
2.2500	1 055E+11
2 7500	8 374E+08
3.5000	9 746E+07
5 0000	5.450E+02
7 0000	6 170E+01
11 0000	7 029E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 98E+01	5 95E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Drfferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		511 19
Bounding	-	1 022.38

Basis for burnup used in estimate

Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 01	
Bounding	2 02	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 THAILAND
SNF ID #: 489
Fuel Units & Descr: 100 - ELEMENT
Heavy Metal Mass, BOL=19.5kg, EOL=19 3kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage: 18"x10": 0 90

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2 6436E-09	190 92	381 84	0 00E+00	5 05E-07	1 01E-06	Avg MeV	
Am-241	3 1429E-03	190 92	381 84	0 00E+00	6 00E-01	1 20E+00	0 0150	3 827E+13
Am-242m	1 3195E-06	190 92	381 84	0 00E+00	2 52E-04	5 04E-04	0 0250	7 965E+12
Am-243	1 4753E-07	190 92	381 84	0 00E+00	2 82E-05	5 63E-05	0 0375	6 901E+12
C-14	1 2847E-04	190 92	381 84	0 00E+00	2 45E-02	4 91E-02	0 0575	7 424E+12
Cl-36	2 8120E-06	190 92	381 84	0 00E+00	5 37E-04	1 07E-03	0 0850	4 482E+12
Cm-243	1 2465E-07	190 92	381 84	0 00E+00	2 38E-05	4 76E-05	0 1250	2 929E+12
Cm-244	9 5564E-07	190 92	381 84	0 00E+00	1 82E-04	3 65E-04	0 2250	3 848E+12
Co-60	1 7880E-01	190 92	381 84	0 00E+00	3 41E+01	6 83E+01	0 3750	1 687E+12
Cs-134	5 8692E-04	190 92	381.84	0 00E+00	1 12E-01	2.24E-01	0 5750	2.774E+13
Cs-135	3 2195E-05	190 92	381.84	0 00E+00	6 15E-03	1.23E-02	0 8500	3 127E+11
Cs-137	1 9489E+00	190 92	381 84	0 00E+00	3 72E+02	7 44E+02	1 2500	5 181E+12
Eu-154	4 5895E-03	190 92	381 84	0 00E+00	8 76E-01	1 75E+00	1 7500	8.033E+09
Eu-155	3 6045E-03	190 92	381 84	0 00E+00	6 88E-01	1 38E+00	2.2500	2.767E+07
Fe-55	1.4185E-02	190 92	381 84	0 00E+00	2.71E+00	5 42E+00	2 7500	3 049E+05
H-3	4 7895E-03	190 92	381 84	0 00E+00	9 14E-01	1 83E+00	3 5000	1 714E+03
I-129	7 3684E-07	190 92	381 84	0 00E+00	1 41E-04	2 81E-04	5 0000	2.105E+02
Kr-85	9 5820E-02	190 92	381 84	0 00E+00	1 83E+01	3 66E+01	7 0000	2.380E+01
Np-237	1.2552E-06	190 92	381 84	0 00E+00	2 40E-04	4 79E-04	11 0000	2.709E+00
Pa-231	7 0406E-09	190 92	381 84	0 00E+00	1.34E-06	2 69E-06		
Pb-210	5 8000E-14	190 92	381 84	0 00E+00	1 11E-11	2 21E-11		
Pm-147	4 0075E-02	190 92	381 84	0 00E+00	7 65E+00	1 53E+01		
Pu-238	9 2256E-04	190 92	381 84	0 00E+00	1 76E-01	3 52E-01		
Pu-239	5 5278E-03	190 92	381 84	0 00E+00	1 06E+00	2 11E+00		
Pu-240	2 1248E-03	190 92	381 84	0 00E+00	4 06E-01	8 11E-01		
Pu-241	4 9549E-02	190 92	381 84	0 00E+00	9 46E+00	1 89E+01		
Pu-242	2 3128E-07	190 92	381 84	0 00E+00	4 42E-05	8 83E-05		
Ra-226	2 4526E-13	190.92	381 84	0 00E+00	4 68E-11	9 37E-11		
Ra-228	2 4015E-10	190 92	381 84	0 00E+00	4 58E-08	9 17E-08		
Ru-106	3 0602E-06	190 92	381 84	0 00E+00	5 84E-04	1.17E-03		
Se-79	1 3015E-05	190 92	381 84	0 00E+00	2 48E-03	4 97E-03		
Sn-126	1.2165E-05	190 92	381 84	0 00E+00	2 32E-03	4 65E-03		
Sr-90	1 8226E+00	190 92	381 84	0 00E+00	3.48E+02	6 96E+02		
Tc-99	4 4241E-04	190 92	381 84	0 00E+00	8 45E-02	1 69E-01		
Th-229	3.0962E-10	190 92	381 84	0 00E+00	5 91E-08	1.18E-07		
Th-230	4.2346E-11	190 92	381 84	0 00E+00	8 08E-09	1 62E-08		
Th-232	2 5278E-10	190 92	381 84	0 00E+00	4 83E-08	9 65E-08		
Tl-208	1 5820E-08	190 92	381 84	0 00E+00	3.02E-06	6 04E-06		
U-232	4 2647E-08	190 92	381 84	0.00E+00	8.14E-06	1 63E-05		
U-233	1.2211E-07	190 92	381 84	0 00E+00	2 33E-05	4 66E-05		
U-234	1 9955E-07	190 92	381 84	0 00E+00	3 81E-05	7 62E-05		
U-235	-2.6194E-06	190 92	0 00	8 43E-03	7 93E-03	8 43E-03		
U-236	1 2693E-05	190 92	381 84	0 00E+00	2 42E-03	4 85E-03		
U-238	-3 6331E-08	190 92	0 00	5 24E-03	5 24E-03	5 24E-03		
Y-90	1 8241E+00	190 92	381 84	0 00E+00	3 48E+02	6 97E+02		
Other Radionuclides					3 68E+02	7 35E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 78E+00	9 55E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		190 92	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		381 84	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 29	
Bounding	0 57	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 TURKEY
SNF ID #: 490
Fuel Units & Descr: 79 - ELEMENT
Heavy Metal Mass: BOL=15.405kg, EOL=15.247kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 20 years

Estimated Canister usage 18"x10': 0 71

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2.6436E-09	150 83	301.66	0 00E+00	3 99E-07	7 97E-07
Am-241	3 1429E-03	150 83	301.66	0 00E+00	4 74E-01	9 48E-01
Am-242m	1.3195E-06	150 83	301 66	0 00E+00	1 99E-04	3 98E-04
Am-243	1 4753E-07	150 83	301 66	0 00E+00	2.23E-05	4 45E-05
C-14	1.2847E-04	150 83	301 66	0 00E+00	1.94E-02	3 88E-02
Cl-36	2 8120E-06	150 83	301 66	0 00E+00	4.24E-04	8 48E-04
Cm-243	1 2465E-07	150 83	301 66	0 00E+00	1 88E-05	3 76E-05
Cm-244	9 5564E-07	150 83	301 66	0 00E+00	1 44E-04	2.88E-04
Co-60	1 7880E-01	150 83	301 66	0 00E+00	2 70E+01	5 39E+01
Cs-134	5 8692E-04	150 83	301 66	0 00E+00	8 85E-02	1 77E-01
Cs-135	3 2195E-05	150 83	301 66	0 00E+00	4 86E-03	9 71E-03
Cs-137	1 9489E+00	150 83	301 66	0 00E+00	2 94E+02	5 88E+02
Eu-154	4 5895E-03	150 83	301 66	0 00E+00	6 92E-01	1.38E+00
Eu-155	3 6045E-03	150 83	301 66	0 00E+00	5 44E-01	1 09E+00
Fe-55	1.4185E-02	150 83	301 66	0 00E+00	2 14E+00	4 28E+00
H-3	4 7895E-03	150 83	301 66	0 00E+00	7.22E-01	1 44E+00
I-129	7.3684E-07	150 83	301 66	0 00E+00	1.11E-04	2.22E-04
Kr-85	9 5820E-02	150 83	301.66	0 00E+00	1 45E+01	2 89E+01
Np-237	1.2552E-06	150 83	301.66	0 00E+00	1.89E-04	3 79E-04
Pa-231	7 0406E-09	150 83	301 66	0 00E+00	1 06E-06	2.12E-06
Pb-210	5 8000E-14	150 83	301 66	0 00E+00	8 75E-12	1 75E-11
Pm-147	4 0075E-02	150 83	301 66	0 00E+00	6 04E+00	1.21E+01
Pu-238	9 2256E-04	150 83	301 66	0 00E+00	1 39E-01	2 78E-01
Pu-239	5 5278E-03	150 83	301 66	0 00E+00	8 34E-01	1 67E+00
Pu-240	2 1248E-03	150.83	301 66	0 00E+00	3 20E-01	6 41E-01
Pu-241	4 9549E-02	150 83	301 66	0 00E+00	7 47E+00	1 49E+01
Pu-242	2.3128E-07	150 83	301 66	0 00E+00	3 49E-05	6 98E-05
Ra-226	2.4526E-13	150 83	301 66	0 00E+00	3 70E-11	7 40E-11
Ra-228	2.4015E-10	150 83	301 66	0 00E+00	3 62E-08	7.24E-08
Ru-106	3 0602E-06	150 83	301 66	0 00E+00	4 62E-04	9.23E-04
Se-79	1.3015E-05	150 83	301 66	0 00E+00	1.96E-03	3 93E-03
Sn-126	1.2165E-05	150 83	301 66	0 00E+00	1.83E-03	3 67E-03
Sr-90	1 8226E+00	150 83	301 66	0 00E+00	2.75E+02	5.50E+02
Tc-99	4 4241E-04	150 83	301.66	0 00E+00	6 67E-02	1.33E-01
Th-229	3 0962E-10	150 83	301.66	0 00E+00	4 67E-08	9 34E-08
Th-230	4 2346E-11	150 83	301.66	0 00E+00	6 39E-09	1 28E-08
Th-232	2 5278E-10	150 83	301 66	0 00E+00	3 81E-08	7 63E-08
Tl-208	1.5820E-08	150 83	301 66	0 00E+00	2 39E-06	4 77E-06
U-232	4.2647E-08	150 83	301 66	0 00E+00	6 43E-06	1.29E-05
U-233	1.2211E-07	150 83	301 66	0 00E+00	1 84E-05	3 68E-05
U-234	1.9955E-07	150 83	301 66	0 00E+00	3 01E-05	6 02E-05
U-235	-2 6194E-06	150 83	0 00	6 66E-03	6.26E-03	6 66E-03
U-236	1.2693E-05	150 83	301 66	0 00E+00	1.91E-03	3 83E-03
U-238	-3 6331E-08	150 83	0 00	4 14E-03	4.14E-03	4 14E-03
Y-90	1 8241E+00	150 83	301 66	0 00E+00	2 75E+02	5 50E+02
Other Radionuclides					2 90E+02	5 81E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 023E+13
0 0250	6.293E+12
0 0375	5 451E+12
0 0575	5 865E+12
0 0850	3 540E+12
0 1250	2.314E+12
0 2250	3 040E+12
0 3750	1.332E+12
0 5750	2 191E+13
0 8500	2.470E+11
1.2500	4 093E+12
1 7500	6.346E+09
2.2500	2 186E+07
2 7500	2 408E+05
3 5000	1 354E+03
5 0000	1 663E+02
7 0000	1 880E+01
11 0000	2 140E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 77E+00	7.55E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		150 83	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		301 66	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.29	
Bounding	0 57	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 U OF AZ
SNF ID #: 59
Fuel Units & Descr: 84 - ELEMENT
Heavy Metal Mass: BOL=16 38kg EOL=15 75kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' 0 76

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8 5173E-10	601 40	1,202 81	0 00E+00	5 12E-07	1 02E-06	Avg. MeV	
Am-241	1 8331E-03	601 40	1,202 81	0 00E+00	1 10E+00	2 20E+00	0 0150	1 944E+14
Am-242m	1 4129E-06	601 40	1,202 81	0 00E+00	8 50E-04	1 70E-03	0 0250	4 278E+13
Am-243	1 4774E-07	601 40	1,202 81	0 00E+00	8 89E-05	1 78E-04	0 0375	3 643E+13
C-14	1.2871E-04	601 40	1,202 81	0 00E+00	7.74E-02	1 55E-01	0 0575	3 739E+13
Cl-36	2 8120E-06	601 40	1,202 81	0 00E+00	1.69E-03	3 38E-03	0.0850	2 316E+13
Cm-243	1.7940E-07	601 40	1,202 81	0 00E+00	1.08E-04	2 16E-04	0 1250	1 682E+13
Cm-244	1 6962E-06	601 40	1,202 81	0.00E+00	1.02E-03	2 04E-03	0.2250	1 965E+13
Co-60	1.2839E+00	601 40	1,202 81	0.00E+00	7 72E+02	1 54E+03	0 3750	9 972E+12
Cs-134	9 0541E-02	601 40	1,202 81	0 00E+00	5 45E+01	1 09E+02	0.5750	1 326E+14
Cs-135	3 2195E-05	601 40	1,202 81	0 00E+00	1 94E-02	3 87E-02	0 8500	5 690E+12
Cs-137	2 7564E+00	601 40	1,202 81	0 00E+00	1 66E+03	3 32E+03	1.2500	1 155E+14
Eu-154	1 5368E-02	601 40	1,202 81	0 00E+00	9 24E+00	1 85E+01	1 7500	7 702E+10
Eu-155	2 9293E-02	601 40	1,202 81	0 00E+00	1 76E+01	3 52E+01	2.2500	1 241E+11
Fe-55	7 7158E-01	601 40	1,202 81	0 00E+00	4 64E+02	9.28E+02	2.7500	9 852E+08
H-3	1 1111E-02	601 40	1,202 81	0 00E+00	6 68E+00	1 34E+01	3 5000	1 147E+08
I-129	7 3684E-07	601 40	1,202 81	0 00E+00	4 43E-04	8 86E-04	5 0000	6 405E+02
Kr-85	2 5263E-01	601 40	1,202 81	0 00E+00	1 52E+02	3 04E+02	7 0000	7.251E+01
Np-237	1 2427E-06	601 40	1,202 81	0 00E+00	7 47E-04	1 49E-03	11 0000	8 260E+00
Pa-231	3 8511E-09	601 40	1,202 81	0 00E+00	2 32E-06	4 63E-06		
Pb-210	7 3880E-15	601 40	1,202 81	0 00E+00	4 44E-12	8 89E-12		
Pm-147	2 1023E+00	601 40	1,202.81	0 00E+00	1 26E+03	2 53E+03		
Pu-238	1 0383E-03	601 40	1,202.81	0 00E+00	6 24E-01	1.25E+00		
Pu-239	5 5293E-03	601 40	1,202 81	0 00E+00	3 33E+00	6 65E+00		
Pu-240	2 1278E-03	601 40	1,202 81	0 00E+00	1 28E+00	2 56E+00		
Pu-241	1 0195E-01	601 40	1,202 81	0 00E+00	6.13E+01	1.23E+02		
Pu-242	2 3128E-07	601 40	1,202 81	0 00E+00	1 39E-04	2.78E-04		
Ra-226	5 2782E-14	601 40	1,202 81	0 00E+00	3 17E-11	6 35E-11		
Ra-228	1 9338E-10	601 40	1,202 81	0 00E+00	1.16E-07	2 33E-07		
Ru-106	9 1684E-02	601 40	1,202 81	0 00E+00	5 51E+01	1.10E+02		
Se-79	1.3018E-05	601.40	1,202 81	0 00E+00	7 83E-03	1 57E-02		
Sn-126	1.2167E-05	601.40	1,202 81	0 00E+00	7 32E-03	1 46E-02		
Sr-90	2 6045E+00	601 40	1,202 81	0 00E+00	1.57E+03	3 13E+03		
Tc-99	4 4241E-04	601.40	1,202 81	0 00E+00	2 66E-01	5.32E-01		
Th-229	1.3713E-10	601 40	1,202 81	0 00E+00	8.25E-08	1 65E-07		
Th-230	1 8090E-11	601 40	1,202 81	0 00E+00	1 09E-08	2.18E-08		
Th-232	2.5278E-10	601 40	1,202 81	0.00E+00	1 52E-07	3 04E-07		
Tl-208	1 6947E-08	601 40	1,202 81	0 00E+00	1 02E-05	2 04E-05		
U-232	4 8737E-08	601 40	1,202 81	0 00E+00	2.93E-05	5 86E-05		
U-233	1.2203E-07	601 40	1,202 81	0 00E+00	7.34E-05	1 47E-04		
U-234	1.5925E-07	601 40	1,202 81	0 00E+00	9 58E-05	1 92E-04		
U-235	-2 6194E-06	601 40	0 00	7 08E-03	5.50E-03	7 08E-03		
U-236	1.2693E-05	601 40	1,202 81	0 00E+00	7.63E-03	1 53E-02		
U-238	-3 6331E-08	601 40	0 00	4 40E-03	4 38E-03	4 40E-03		
Y-90	2 6060E+00	601 40	1,202 81	0 00E+00	1 57E+03	3 13E+03		
Other Radionuclides					2 17E+03	4 34E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 50E+01	7 00E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		601 40	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		1,202.81	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	1 08		1 00
Bounding	2.15		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD 8 5/20 U OF AZ	[1]Fuel decay start date	2035
SNF ID #	975	Estimates as of	2030
Fuel Units & Descr	8 - ELEMENT	Template	TRIGA-SS (LW/U-Zrx SST, 10 to 20%, U)
Heavy Metal Mass	BOL=1 497kg EOL=1.497kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 000195
		Template Decay Time	5 years

Estimated Canister usage: 18"x10' = 0 07

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	28 58	57 15	0 00E+00	2 43E-08	4 87E-08
Am-241	1 8331E-03	28 58	57 15	0 00E+00	5 24E-02	1 05E-01
Am-242m	1 4129E-06	28 58	57 15	0 00E+00	4 04E-05	8 08E-05
Am-243	1.4774E-07	28 58	57 15	0 00E+00	4.22E-06	8 44E-06
C-14	1.2871E-04	28 58	57 15	0 00E+00	3 68E-03	7 36E-03
Cl-36	2 8120E-06	28 58	57 15	0 00E+00	8 04E-05	1 61E-04
Cm-243	1 7940E-07	28 58	57.15	0 00E+00	5.13E-06	1 03E-05
Cm-244	1 6962E-06	28 58	57.15	0 00E+00	4 85E-05	9 69E-05
Co-60	1.2839E+00	28 58	57.15	0 00E+00	3 67E+01	7 34E+01
Cs-134	9 0541E-02	28 58	57.15	0 00E+00	2 59E+00	5 17E+00
Cs-135	3 2195E-05	28 58	57.15	0 00E+00	9.20E-04	1.84E-03
Cs-137	2 7564E+00	28 58	57 15	0 00E+00	7.88E+01	1.58E+02
Eu-154	1 5368E-02	28 58	57 15	0 00E+00	4.39E-01	8 78E-01
Eu-155	2 9293E-02	28.58	57 15	0 00E+00	8 37E-01	1.67E+00
Fe-55	7 7158E-01	28.58	57 15	0 00E+00	2.20E+01	4 41E+01
H-3	1 1111E-02	28 58	57 15	0 00E+00	3 18E-01	6 35E-01
I-129	7.3684E-07	28 58	57 15	0.00E+00	2 11E-05	4 21E-05
Kr-85	2 5263E-01	28 58	57 15	0 00E+00	7.22E+00	1 44E+01
Np-237	1.2427E-06	28 58	57 15	0 00E+00	3 55E-05	7 10E-05
Pa-231	3 8511E-09	28 58	57 15	0 00E+00	1 10E-07	2 20E-07
Pb-210	7.3880E-15	28 58	57 15	0 00E+00	2 11E-13	4.22E-13
Pm-147	2 1023E+00	28 58	57 15	0 00E+00	6 01E+01	1 20E+02
Pu-238	1 0383E-03	28 58	57 15	0 00E+00	2 97E-02	5 93E-02
Pu-239	5.5293E-03	28 58	57 15	0 00E+00	1.58E-01	3 16E-01
Pu-240	2 1278E-03	28 58	57.15	0 00E+00	6 08E-02	1.22E-01
Pu-241	1 0195E-01	28 58	57.15	0 00E+00	2 91E+00	5 83E+00
Pu-242	2 3128E-07	28 58	57.15	0 00E+00	6 61E-06	1.32E-05
Ra-226	5 2782E-14	28 58	57.15	0 00E+00	1.51E-12	3 02E-12
Ra-228	1 9338E-10	28 58	57.15	0 00E+00	5.53E-09	1 11E-08
Ru-106	9 1684E-02	28 58	57.15	0 00E+00	2.62E+00	5.24E+00
Se-79	1.3018E-05	28.58	57 15	0 00E+00	3 72E-04	7 44E-04
Sn-126	1.2167E-05	28.58	57 15	0 00E+00	3 48E-04	6 95E-04
Sr-90	2 6045E+00	28 58	57 15	0 00E+00	7 44E+01	1 49E+02
Tc-99	4 4241E-04	28 58	57 15	0 00E+00	1 26E-02	2 53E-02
Th-229	1.3713E-10	28 58	57 15	0 00E+00	3 92E-09	7 84E-09
Th-230	1.8090E-11	28 58	57 15	0 00E+00	5 17E-10	1 03E-09
Th-232	2.5278E-10	28 58	57 15	0 00E+00	7 22E-09	1 44E-08
Tl-208	1 6947E-08	28 58	57 15	0 00E+00	4 84E-07	9 69E-07
U-232	4 8737E-08	28 58	57.15	0 00E+00	1.39E-06	2.79E-06
U-233	1.2203E-07	28 58	57.15	0 00E+00	3 49E-06	6.97E-06
U-234	1 5925E-07	28 58	57 15	0 00E+00	4 55E-06	9 10E-06
U-235	-2 6194E-06	28 58	0 00	5 95E-04	5.20E-04	5 95E-04
U-236	1 2693E-05	28 58	57 15	0 00E+00	3 63E-04	7.25E-04
U-238	-3 6331E-08	28 58	0 00	4 11E-04	4 09E-04	4 11E-04
Y-90	2 6060E+00	28 58	57.15	0 00E+00	7.45E+01	1 49E+02
Other Radionuclides					1.03E+02	2 06E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	9.238E+12
0 0250	2.033E+12
0 0375	1 731E+12
0 0575	1 777E+12
0 0850	1 101E+12
0 1250	7 993E+11
0.2250	9 337E+11
0.3750	4 738E+11
0.5750	6.299E+12
0.8500	2 704E+11
1.2500	5 491E+12
1 7500	3 660E+09
2.2500	5 899E+09
2 7500	4 681E+07
3 5000	5 448E+06
5 0000	3 090E+01
7 0000	3 499E+00
11 0000	3.987E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.66E+00	3 33E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	18 3974873	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		28 58	Nominal burnup assumed to be 2% of BOL heavy metal mass
Bounding		57 15	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.56	
Bounding	1 12	

Estimated EOL HM/Given EOL HM: 0 98

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 U OF IL
SNF ID #: 449
Fuel Units & Descr: 139 - ELEMENT
Heavy Metal Mass: BOL=27 8kg, EOL=26 41kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10" = 1.25

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	1,326 90	2,653 81	0 00E+00	1 13E-06	2.26E-06
Am-241	1 8331E-03	1,326 90	2,653 81	0 00E+00	2 43E+00	4 86E+00
Am-242m	1 4129E-06	1,326 90	2,653 81	0 00E+00	1 87E-03	3 75E-03
Am-243	1 4774E-07	1,326 90	2,653 81	0 00E+00	1 96E-04	3 92E-04
C-14	1 2871E-04	1,326 90	2,653 81	0 00E+00	1.71E-01	3 42E-01
Cl-36	2 8120E-06	1,326 90	2,653 81	0 00E+00	3.73E-03	7 46E-03
Cm-243	1.7940E-07	1,326 90	2,653 81	0 00E+00	2.38E-04	4 76E-04
Cm-244	1 6962E-06	1,326 90	2,653 81	0 00E+00	2.25E-03	4 50E-03
Co-60	1.2839E+00	1,326 90	2,653 81	0 00E+00	1 70E+03	3 41E+03
Cs-134	9 0541E-02	1,326 90	2,653.81	0 00E+00	1 20E+02	2 40E+02
Cs-135	3.2195E-05	1,326 90	2,653 81	0 00E+00	4.27E-02	8 54E-02
Cs-137	2 7564E+00	1,326 90	2,653.81	0 00E+00	3 66E+03	7.31E+03
Eu-154	1 5368E-02	1,326 90	2,653 81	0 00E+00	2 04E+01	4 08E+01
Eu-155	2 9293E-02	1,326 90	2,653 81	0 00E+00	3 89E+01	7.77E+01
Fe-55	7 7158E-01	1,326.90	2,653 81	0 00E+00	1 02E+03	2 05E+03
H-3	1 1111E-02	1,326.90	2,653 81	0 00E+00	1 47E+01	2 95E+01
I-129	7 3684E-07	1,326 90	2,653 81	0 00E+00	9 78E-04	1.96E-03
Kr-85	2 5263E-01	1,326 90	2,653 81	0 00E+00	3 35E+02	6 70E+02
Np-237	1 2427E-06	1,326 90	2,653 81	0 00E+00	1 65E-03	3.30E-03
Pa-231	3 8511E-09	1,326 90	2,653 81	0 00E+00	5 11E-06	1.02E-05
Pb-210	7 3880E-15	1,326 90	2,653 81	0 00E+00	9 80E-12	1 96E-11
Pm-147	2 1023E+00	1,326 90	2,653 81	0 00E+00	2.79E+03	5 58E+03
Pu-238	1 0383E-03	1,326 90	2,653 81	0 00E+00	1 38E+00	2 76E+00
Pu-239	5 5293E-03	1,326 90	2,653 81	0 00E+00	7 34E+00	1 47E+01
Pu-240	2.1278E-03	1,326 90	2,653 81	0 00E+00	2 82E+00	5 65E+00
Pu-241	1 0195E-01	1,326 90	2,653 81	0 00E+00	1 35E+02	2 71E+02
Pu-242	2 3128E-07	1,326 90	2,653 81	0 00E+00	3 07E-04	6 14E-04
Ra-226	5.2782E-14	1,326 90	2,653 81	0 00E+00	7 00E-11	1 40E-10
Ra-228	1.9338E-10	1,326 90	2,653 81	0 00E+00	2 57E-07	5 13E-07
Ru-106	9.1684E-02	1,326 90	2,653 81	0 00E+00	1 22E+02	2 43E+02
Se-79	1.3018E-05	1,326 90	2,653 81	0 00E+00	1 73E-02	3 45E-02
Sn-126	1.2167E-05	1,326.90	2,653 81	0 00E+00	1 61E-02	3.23E-02
Sr-90	2 6045E+00	1,326.90	2,653 81	0 00E+00	3 46E+03	6.91E+03
Tc-99	4 4241E-04	1,326 90	2,653 81	0 00E+00	5 87E-01	1 17E+00
Th-229	1 3713E-10	1,326 90	2,653 81	0 00E+00	1 82E-07	3 64E-07
Th-230	1 8090E-11	1,326 90	2,653 81	0 00E+00	2 40E-08	4 80E-08
Th-232	2 5278E-10	1,326 90	2,653 81	0 00E+00	3 35E-07	6.71E-07
Tl-208	1 6947E-08	1,326 90	2,653 81	0 00E+00	2 25E-05	4 50E-05
U-232	4 8737E-08	1,326 90	2,653 81	0 00E+00	6 47E-05	1.29E-04
U-233	1 2203E-07	1,326 90	2,653 81	0 00E+00	1 62E-04	3 24E-04
U-234	1 5925E-07	1,326 90	2,653 81	0 00E+00	2.11E-04	4 23E-04
U-235	-2 6194E-06	1,326 90	0 00	1 20E-02	8.54E-03	1.20E-02
U-236	1.2693E-05	1,326 90	2,653.81	0 00E+00	1 68E-02	3 37E-02
U-238	-3 6331E-08	1,326 90	0 00	7 47E-03	7 43E-03	7 47E-03
Y-90	2 6060E+00	1,326 90	2,653 81	0 00E+00	3 46E+03	6 92E+03
Other Radionuclides					4 78E+03	9 57E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	4.289E+14
0 0250	9 438E+13
0.0375	8 037E+13
0 0575	8.250E+13
0 0850	5 111E+13
0 1250	3 711E+13
0 2250	4 336E+13
0 3750	2.200E+13
0 5750	2.925E+14
0 8500	1.255E+13
1 2500	2 549E+14
1 7500	1 699E+11
2.2500	2 739E+11
2 7500	2.174E+09
3 5000	2 530E+08
5 0000	1 408E+03
7 0000	1 594E+02
11 0000	1 816E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7 72E+01	1.54E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 00000115	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[1]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		1,326 90	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		2,653 81	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 40	
Bounding	2.80	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 U OF TX AUSTIN
SNF ID #: 265
Fuel Units & Descr: 156 - ELEMENT
Heavy Metal Mass: BOL=30 124kg EOL=29 765kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U Zrx, SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage	
18"x10'	
1 41	

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	342 51	685 03	0 00E+00	2 92E-07	5 83E-07
Am-241	1.8331E-03	342 51	685.03	0 00E+00	6 28E-01	1.26E+00
Am-242m	1 4129E-06	342 51	685 03	0 00E+00	4 84E-04	9 68E-04
Am-243	1 4774E-07	342 51	685 03	0 00E+00	5 06E-05	1 01E-04
C-14	1.2871E-04	342 51	685 03	0 00E+00	4 41E-02	8 82E-02
Cl-36	2 8120E-06	342 51	685 03	0 00E+00	9 63E-04	1 93E-03
Cm-243	1 7940E-07	342 51	685 03	0 00E+00	6 14E-05	1 23E-04
Cm-244	1 6962E-06	342.51	685 03	0 00E+00	5 81E-04	1.16E-03
Co-60	1.2839E+00	342 51	685 03	0 00E+00	4 40E+02	8 80E+02
Cs-134	9 0541E-02	342 51	685 03	0 00E+00	3 10E+01	6.20E+01
Cs-135	3.2195E-05	342 51	685 03	0 00E+00	1 10E-02	2 21E-02
Cs-137	2 7564E+00	342 51	685 03	0 00E+00	9 44E+02	1 89E+03
Eu-154	1.5368E-02	342 51	685 03	0 00E+00	5 26E+00	1 05E+01
Eu-155	2 9293E-02	342 51	685 03	0 00E+00	1 00E+01	2 01E+01
Fe-55	7 7158E-01	342 51	685 03	0 00E+00	2 64E+02	5 29E+02
H-3	1 1111E-02	342.51	685 03	0 00E+00	3 81E+00	7 61E+00
I-129	7 3684E-07	342.51	685 03	0 00E+00	2 52E-04	5.05E-04
Kr-85	2 5263E-01	342 51	685 03	0 00E+00	8 65E+01	1.73E+02
Np-237	1.2427E-06	342 51	685 03	0 00E+00	4 26E-04	8 51E-04
Pa-231	3 8511E-09	342 51	685 03	0 00E+00	1 32E-06	2 64E-06
Pb-210	7.3880E-15	342 51	685 03	0 00E+00	2 53E-12	5 06E-12
Pm-147	2 1023E+00	342 51	685 03	0 00E+00	7.20E+02	1 44E+03
Pu-238	1 0383E-03	342 51	685 03	0 00E+00	3.56E-01	7.11E-01
Pu-239	5 5293E-03	342.51	685 03	0 00E+00	1.89E+00	3 79E+00
Pu-240	2 1278E-03	342.51	685 03	0 00E+00	7.29E-01	1.46E+00
Pu-241	1 0195E-01	342 51	685 03	0 00E+00	3 49E+01	6 98E+01
Pu-242	2.3128E-07	342 51	685 03	0 00E+00	7 92E-05	1 58E-04
Ra-226	5.2782E-14	342 51	685 03	0 00E+00	1 81E-11	3 62E-11
Ra-228	1 9338E-10	342 51	685 03	0 00E+00	6 62E-08	1 32E-07
Ru-106	9 1684E-02	342 51	685 03	0 00E+00	3 14E+01	6 28E+01
Se-79	1 3018E-05	342 51	685 03	0 00E+00	4.46E-03	8 92E-03
Sn-126	1 2167E-05	342 51	685 03	0 00E+00	4 17E-03	8 33E-03
Sr-90	2 6045E+00	342.51	685 03	0 00E+00	8.92E+02	1 78E+03
Tc-99	4 4241E-04	342.51	685 03	0 00E+00	1 52E-01	3 03E-01
Th-229	1.3713E-10	342 51	685 03	0 00E+00	4 70E-08	9 39E-08
Th-230	1.8090E-11	342 51	685 03	0 00E+00	6 20E-09	1.24E-08
Th-232	2 5278E-10	342 51	685 03	0 00E+00	8 66E-08	1.73E-07
Tl-208	1 6947E-08	342 51	685 03	0 00E+00	5 80E-06	1.16E-05
U-232	4 8737E-08	342 51	685 03	0 00E+00	1 67E-05	3 34E-05
U-233	1.2203E-07	342 51	685 03	0 00E+00	4 18E-05	8 36E-05
U-234	1 5925E-07	342.51	685 03	0 00E+00	5 45E-05	1 09E-04
U-235	-2 6194E-06	342.51	0 00	1.29E-02	1 20E-02	1 29E-02
U-236	1.2693E-05	342 51	685 03	0.00E+00	4 35E-03	8 70E-03
U-238	-3 6331E-08	342 51	0 00	8 12E-03	8 11E-03	8.12E-03
Y-90	2 6060E+00	342 51	685 03	0 00E+00	8 93E+02	1.79E+03
Other Radionuclides					1.23E+03	2.47E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 107E+14
0 0250	2 436E+13
0 0375	2 075E+13
0 0575	2 129E+13
0 0850	1 319E+13
0 1250	9 580E+12
0.2250	1 119E+13
0 3750	5 679E+12
0 5750	7.550E+13
0 8500	3 240E+12
1.2500	6 581E+13
1 7500	4 387E+10
2.2500	7 071E+10
2 7500	5.611E+08
3 5000	6.530E+07
5 0000	3 778E+02
7 0000	4.279E+01
11 0000	4 876E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 99E+01	3 99E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 78958118	10 to 20 1

Basis for Parameter Differences

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		342 51	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		685 03	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.33	
Bounding	0 67	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 U OF UTAH
SNF ID #: 261
Fuel Units & Descr: 85 - ELEMENT
Heavy Metal Mass: BOL=14 773kg, EOL=14 518kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage 18"x10': 0 77

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	243 42	486 85	0 00E+00	2 07E-07	4 15E-07
Am-241	1 8331E-03	243 42	486 85	0 00E+00	4 46E-01	8 92E-01
Am-242m	1 4129E-06	243 42	486 85	0 00E+00	3 44E-04	6 88E-04
Am-243	1 4774E-07	243 42	486 85	0 00E+00	3 60E-05	7 19E-05
C-14	1.2871E-04	243 42	486 85	0 00E+00	3 13E-02	6 27E-02
Cl-36	2 8120E-06	243 42	486 85	0 00E+00	6 85E-04	1 37E-03
Cm-243	1.7940E-07	243 42	486 85	0 00E+00	4 37E-05	8 73E-05
Cm-244	1 6962E-06	243 42	486 85	0 00E+00	4.13E-04	8.26E-04
Co-60	1.2839E+00	243 42	486 85	0 00E+00	3 13E+02	6.25E+02
Cs-134	9 0541E-02	243 42	486 85	0 00E+00	2 20E+01	4 41E+01
Cs-135	3 2195E-05	243 42	486 85	0 00E+00	7 84E-03	1.57E-02
Cs-137	2 7564E+00	243.42	486.85	0 00E+00	6 71E+02	1 34E+03
Eu-154	1 5368E-02	243 42	486 85	0 00E+00	3 74E+00	7 48E+00
Eu-155	2 9293E-02	243 42	486 85	0 00E+00	7 13E+00	1 43E+01
Fe-55	7 7158E-01	243 42	486 85	0 00E+00	1 88E+02	3 76E+02
H-3	1 1111E-02	243 42	486 85	0 00E+00	2 70E+00	5 41E+00
I-129	7 3684E-07	243 42	486 85	0 00E+00	1 79E-04	3 59E-04
Kr-85	2 5263E-01	243 42	486 85	0 00E+00	6 15E+01	1 23E+02
Np-237	1.2427E-06	243 42	486 85	0 00E+00	3 03E-04	6 05E-04
Pa-231	3 8511E-09	243 42	486 85	0 00E+00	9 37E-07	1 87E-06
Pb-210	7.3880E-15	243 42	486 85	0 00E+00	1 80E-12	3 60E-12
Pm-147	2.1023E+00	243 42	486 85	0 00E+00	5.12E+02	1.02E+03
Pu-238	1 0383E-03	243 42	486 85	0 00E+00	2.53E-01	5 06E-01
Pu-239	5 5293E-03	243 42	486 85	0 00E+00	1.35E+00	2 69E+00
Pu-240	2 1278E-03	243 42	486 85	0 00E+00	5 18E-01	1 04E+00
Pu-241	1 0195E-01	243.42	486 85	0 00E+00	2 48E+01	4 96E+01
Pu-242	2 3128E-07	243 42	486 85	0 00E+00	5 63E-05	1 13E-04
Ra-226	5 2782E-14	243 42	486 85	0 00E+00	1 28E-11	2 57E-11
Ra-228	1 9338E-10	243 42	486 85	0 00E+00	4 71E-08	9 41E-08
Ru-106	9 1684E-02	243 42	486 85	0 00E+00	2.23E+01	4 46E+01
Se-79	1 3018E-05	243 42	486 85	0 00E+00	3 17E-03	6 34E-03
Sn-126	1.2167E-05	243 42	486 85	0 00E+00	2 96E-03	5 92E-03
Sr-90	2 6045E+00	243 42	486 85	0 00E+00	6 34E+02	1 27E+03
Tc-99	4 4241E-04	243 42	486 85	0 00E+00	1 08E-01	2 15E-01
Th-229	1.3713E-10	243 42	486 85	0 00E+00	3 34E-08	6 68E-08
Th-230	1 8090E-11	243 42	486 85	0 00E+00	4 40E-09	8 81E-09
Th-232	2 5278E-10	243 42	486 85	0 00E+00	6.15E-08	1 23E-07
Tl-208	1 6947E-08	243 42	486 85	0 00E+00	4.13E-06	8.25E-06
U-232	4 8737E-08	243 42	486 85	0 00E+00	1.19E-05	2.37E-05
U-233	1 2203E-07	243 42	486 85	0 00E+00	2 97E-05	5 94E-05
U-234	1 5925E-07	243 42	486 85	0 00E+00	3 88E-05	7.75E-05
U-235	-2 6194E-06	243 42	0 00	6 35E-03	5 72E-03	6.35E-03
U-236	1 2693E-05	243 42	486 85	0 00E+00	3 09E-03	6.18E-03
U-238	-3 6331E-08	243 42	0 00	3 98E-03	3 97E-03	3 98E-03
Y-90	2 6060E+00	243 42	486 85	0 00E+00	6 34E+02	1 27E+03
Other Radionuclides					8 78E+02	1 76E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	7 869E+13
0 0250	1 731E+13
0 0375	1 474E+13
0 0575	1 513E+13
0 0850	9 376E+12
0.1250	6 809E+12
0.2250	7 954E+12
0 3750	4 036E+12
0 5750	5.366E+13
0 8500	2.303E+12
1.2500	4 677E+13
1 7500	3 118E+10
2.2500	5.025E+10
2 7500	3 988E+08
3 5000	4 641E+07
5 0000	2 643E+02
7 0000	2 993E+01
11 0000	3 411E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.42E+01	2.83E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 8999888	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		243 42	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		486 85	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 48	
Bounding	0 97	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 UC @ Berkeley
SNF ID #: 874
Fuel Units & Descr: 111 - ELEMENT
Heavy Metal Mass: BOL=21 645kg, EOL=19 17kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1982
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 35 years

Estimated Canister usage

18"x10'
1 00

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6 7038E-09	2,362.94	4,725 88	0 00E+00	1 58E-05	3 17E-05	Avg MeV	
Am-241	3 9068E-03	2,362 94	4,725 88	0 00E+00	9 23E+00	1 85E+01	0 0150	3 299E+14
Am-242m	1.2325E-06	2,362 94	4,725 88	0 00E+00	2 91E-03	5 82E-03	0 0250	6 854E+13
Am-243	1 4732E-07	2,362 94	4,725 88	0 00E+00	3 48E-04	6 96E-04	0 0375	5 955E+13
C-14	-1.2824E-04	2,362 94	4,725 88	0 00E+00	3 03E-01	6 06E-01	0 0575	6 416E+13
Cl-36	2 8120E-06	2,362 94	4,725 88	0 00E+00	6 64E-03	1.33E-02	0 0850	3 861E+13
Cm-243	8 6556E-08	2,362 94	4,725.88	0 00E+00	2 05E-04	4 09E-04	0 1250	2.512E+13
Cm-244	5 3835E-07	2,362 94	4 725.88	0 00E+00	1.27E-03	2.54E-03	0.2250	3 325E+13
Co-60	2 4887E-02	2,362 94	4,725.88	0 00E+00	5 88E+01	1 18E+02	0 3750	1 450E+13
Cs-134	3 8030E-06	2,362 94	4,725 88	0 00E+00	8 99E-03	1.80E-02	0 5750	2.425E+14
Cs-135	3 2195E-05	2,362 94	4,725 88	0 00E+00	7.61E-02	1.52E-01	0.8500	2 482E+12
Cs-137	1.3788E+00	2,362 94	4,725 88	0 00E+00	3.26E+03	6.52E+03	1.2500	9 632E+12
Eu-154	1 3711E-03	2,362 94	4,725 88	0 00E+00	3.24E+00	6 48E+00	1 7500	6 442E+10
Eu-155	4 4361E-04	2,362 94	4,725 88	0 00E+00	1.05E+00	2.10E+00	2.2500	5.279E+07
Fe-55	2 6075E-04	2,362 94	4,725 88	0 00E+00	6 16E-01	1.23E+00	2 7500	2 427E+06
H-3	2 0647E-03	2,362 94	4,725 88	0 00E+00	4 88E+00	9 76E+00	3 5000	5 829E+03
I-129	7.3684E-07	2,362 94	4,725 88	0 00E+00	1 74E-03	3 48E-03	5 0000	2 454E+03
Kr-85	3 6346E-02	2,362 94	4,725 88	0 00E+00	8 59E+01	1 72E+02	7 0000	2 768E+02
Np-237	1.2844E-06	2,362.94	4,725 88	0 00E+00	3 03E-03	6 07E-03	11 0000	3 147E+01
Pa-231	1.2352E-08	2,362.94	4,725 88	0 00E+00	2 92E-05	5 84E-05		
Pb-210	3 5338E-13	2,362.94	4,725 88	0.00E+00	8 35E-10	1 67E-09		
Pm-147	7 6346E-04	2,362.94	4,725 88	0 00E+00	1 80E+00	3 61E+00		
Pu-238	8 1970E-04	2,362 94	4,725 88	0 00E+00	1 94E+00	3 87E+00		
Pu-239	5 5248E-03	2,362 94	4,725 88	0 00E+00	1 31E+01	2 61E+01		
Pu-240	2 1203E-03	2,362 94	4,725 88	0 00E+00	5 01E+00	1 00E+01		
Pu-241	2 4075E-02	2,362 94	4,725 88	0 00E+00	5 69E+01	1.14E+02		
Pu-242	2 3128E-07	2,362 94	4,725 88	0 00E+00	5 46E-04	1 09E-03		
Ra-226	9 6481E-13	2,362 94	4,725 88	0 00E+00	2.28E-09	4 56E-09		
Ra-228	2 5188E-10	2,362 94	4,725 88	0 00E+00	5 95E-07	1 19E-06		
Ru-106	1 0214E-10	2,362 94	4,725 88	0 00E+00	2.41E-07	4 83E-07		
Se-79	1.3014E-05	2,362 94	4,725 88	0 00E+00	3 08E-02	6 15E-02		
Sn-126	1.2164E-05	2,362 94	4,725 88	0 00E+00	2 87E-02	5 75E-02		
Sr-90	1.2762E+00	2,362 94	4,725 88	0 00E+00	3 02E+03	6 03E+03		
Tc-99	4 4241E-04	2,362 94	4,725 88	0 00E+00	1.05E+00	2 09E+00		
Th-229	5 9684E-10	2,362 94	4,725 88	0 00E+00	1 41E-06	2 82E-06		
Th-230	9 3880E-11	2,362 94	4,725 88	0 00E+00	2 22E-07	4 44E-07		
Th-232	2.5278E-10	2,362 94	4,725 88	0 00E+00	5 97E-07	1 19E-06		
Tl-208	1.3723E-08	2,362 94	4,725 88	0 00E+00	3 24E-05	6 49E-05		
U-232	3 6932E-08	2,362.94	4,725 88	0 00E+00	8 73E-05	1.75E-04	Thermal Power	
U-233	1.2224E-07	2,362.94	4,725 88	0 00E+00	2 89E-04	5.78E-04	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-234	2 5714E-07	2,362.94	4,725 88	0 00E+00	6 08E-04	1.22E-03	3 80E+01	7 60E+01
U-235	-2 6194E-06	2,362.94	0 00	9.35E-03	3 17E-03	9.35E-03	Total	Total
U-236	1.2695E-05	2,362.94	4,725 88	0 00E+00	3 00E-02	6 00E-02		
U-238	-3 6331E-08	2,362 94	0 00	5.82E-03	5 73E-03	5 82E-03		
Y-90	1 2765E+00	2,362 94	4,725 88	0 00E+00	3 02E+03	6 03E+03		
Other Radionuclides					3 25E+03	6 50E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary	From SFD	Used	Basis for Parameter Drfferences:
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding	SST	SST	
BOL HM Constituents	U	U	
BOL Enrichment %:	20	10 to 20 1	

Burnup Summary (MWd)[2]	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		2,362 94	Nominal burnup calculated from the heavy metal mass destroyed
Boundng		4 725 88	Bounding burnup assumed to be twice nominal burnup

Checks	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	3.20		1 00
Boundng	6 40		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 UNIV OF MARYLAND
SNF ID #: 260
Fuel Units & Descr: 93 - ELEMENT
Heavy Metal Mass: BOL=17 205kg EOL=16 489kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U Znx, SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage, 18"x10': 0 84

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	683 59	1,367 19	0 00E+00	5 82E-07	1 16E-06
Am-241	1 8331E-03	683 59	1,367 19	0 00E+00	1 25E+00	2 51E+00
Am-242m	1 4129E-06	683 59	1,367 19	0 00E+00	9 66E-04	1 93E-03
Am-243	1 4774E-07	683.59	1,367 19	0 00E+00	1 01E-04	2 02E-04
C-14	1 2871E-04	683 59	1,367 19	0 00E+00	8 80E-02	1 76E-01
Cl-36	2 8120E-06	683 59	1,367 19	0 00E+00	1 92E-03	3 84E-03
Cm-243	1 7940E-07	683 59	1,367 19	0 00E+00	1 23E-04	2 45E-04
Cm-244	1 6962E-06	683 59	1,367 19	0 00E+00	1 16E-03	2 32E-03
Co-60	1 2839E+00	683 59	1,367 19	0 00E+00	8 78E+02	1 76E+03
Cs-134	9 0541E-02	683.59	1,367 19	0 00E+00	6 19E+01	1 24E+02
Cs-135	3 2195E-05	683 59	1,367 19	0 00E+00	2 20E-02	4 40E-02
Cs-137	2 7564E+00	683.59	1,367 19	0 00E+00	1 88E+03	3 77E+03
Eu-154	1 5368E-02	683.59	1,367 19	0 00E+00	1 05E+01	2 10E+01
Eu-155	2 9293E-02	683 59	1,367 19	0 00E+00	2 00E+01	4 00E+01
Fe-55	7 7158E-01	683.59	1,367 19	0 00E+00	5 27E+02	1 05E+03
H-3	1 1111E-02	683.59	1,367 19	0 00E+00	7 60E+00	1 52E+01
I-129	7 3684E-07	683.59	1,367 19	0 00E+00	5 04E-04	1 01E-03
Kr-85	2 5263E-01	683.59	1,367 19	0 00E+00	1 73E+02	3 45E+02
Np-237	1 2427E-06	683.59	1,367 19	0 00E+00	8 50E-04	1 70E-03
Pa-231	3 8511E-09	683.59	1,367 19	0 00E+00	2 63E-06	5 27E-06
Pb-210	7 3880E-15	683.59	1,367 19	0 00E+00	5 05E-12	1 01E-11
Pm-147	2.1023E+00	683.59	1,367.19	0 00E+00	1 44E+03	2 87E+03
Pu-238	1 0383E-03	683.59	1,367 19	0 00E+00	7 10E-01	1 42E+00
Pu-239	5 5293E-03	683.59	1,367.19	0 00E+00	3 78E+00	7 56E+00
Pu-240	2 1278E-03	683 59	1,367.19	0 00E+00	1 45E+00	2 91E+00
Pu-241	1 0195E-01	683 59	1,367.19	0 00E+00	6 97E+01	1 39E+02
Pu-242	2 3128E-07	683 59	1,367.19	0 00E+00	1 58E-04	3 16E-04
Ra-226	5 2782E-14	683 59	1,367.19	0 00E+00	3 61E-11	7.22E-11
Ra-228	1 9338E-10	683 59	1,367.19	0 00E+00	1 32E-07	2 64E-07
Ru-106	9 1684E-02	683 59	1,367.19	0 00E+00	6.27E+01	1.25E+02
Se-79	1.3018E-05	683 59	1,367.19	0 00E+00	8 90E-03	1 78E-02
Sn-126	1.2167E-05	683 59	1,367.19	0 00E+00	8 32E-03	1 66E-02
Sr-90	2 6045E+00	683 59	1,367.19	0 00E+00	1.78E+03	3.56E+03
Tc-99	4 4241E-04	683 59	1,367 19	0 00E+00	3 02E-01	6 05E-01
Th-229	1.3713E-10	683 59	1,367 19	0 00E+00	9 37E-08	1 87E-07
Th-230	1 8090E-11	683 59	1,367 19	0 00E+00	1.24E-08	2 47E-08
Th-232	2.5278E-10	683 59	1,367.19	0 00E+00	1 73E-07	3 46E-07
Tl-208	1 6947E-08	683 59	1,367 19	0 00E+00	1 16E-05	2.32E-05
U-232	4 8737E-08	683 59	1,367 19	0 00E+00	3 33E-05	6 66E-05
U-233	1.2203E-07	683 59	1,367.19	0 00E+00	8 34E-05	1 67E-04
U-234	1.5925E-07	683 59	1,367 19	0 00E+00	1 09E-04	2.18E-04
U-235	-2 6194E-06	683 59	0 00	7 44E-03	5 65E-03	7 44E-03
U-236	1.2693E-05	683 59	1,367.19	0 00E+00	8 68E-03	1.74E-02
U-238	-3 6331E-08	683 59	0 00	4 63E-03	4 60E-03	4 63E-03
Y-90	2 6060E+00	683 59	1,367 19	0 00E+00	1 78E+03	3.56E+03
Other Radionuclides					2 46E+03	4 93E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2.210E+14
0 0250	4.862E+13
0 0375	4 141E+13
0 0575	4.250E+13
0 0850	2 633E+13
0 1250	1 912E+13
0.2250	2.234E+13
0.3750	1 133E+13
0 5750	1 507E+14
0 8500	6 467E+12
1.2500	1 313E+14
1 7500	8 755E+10
2.2500	1 411E+11
2.7500	1 120E+09
3 5000	1 303E+08
5 0000	7.272E+02
7 0000	8.232E+01
11 0000	9 378E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 98E+01	7 96E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %:	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal:		683 59	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		1 367 19	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 17	
Bounding	2.33	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 UNIV OF CAL-IRVINE
SNF ID #: 264
Fuel Units & Descr: 104 - ELEMENT
Heavy Metal Mass: BOL=19 926kg EOL=19 77kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10": 0.94

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	148 92	297 84	0 00E+00	1.27E-07	2.54E-07
Am-241	1.8331E-03	148 92	297 84	0 00E+00	2.73E-01	5 46E-01
Am-242m	1 4129E-06	148 92	297 84	0 00E+00	2 10E-04	4.21E-04
Am-243	1.4774E-07	148 92	297 84	0 00E+00	2 20E-05	4 40E-05
C-14	1.2871E-04	148 92	297 84	0 00E+00	1 92E-02	3 83E-02
Cl-36	2 8120E-06	148 92	297 84	0 00E+00	4 19E-04	8 38E-04
Cm-243	1 7940E-07	148 92	297 84	0 00E+00	2 67E-05	5 34E-05
Cm-244	1 6962E-06	148 92	297 84	0 00E+00	2 53E-04	5 05E-04
Co-60	1.2839E+00	148 92	297.84	0 00E+00	1 91E+02	3 82E+02
Cs-134	9 0541E-02	148 92	297.84	0 00E+00	1 35E+01	2 70E+01
Cs-135	3.2195E-05	148 92	297 84	0 00E+00	4 79E-03	9.59E-03
Cs-137	2.7564E+00	148 92	297 84	0 00E+00	4.10E+02	8 21E+02
Eu-154	1.5368E-02	148 92	297 84	0 00E+00	2.29E+00	4.58E+00
Eu-155	2 9293E-02	148 92	297 84	0 00E+00	4 36E+00	8 72E+00
Fe-55	7 7158E-01	148 92	297 84	0 00E+00	1 15E+02	2 30E+02
H-3	1 1111E-02	148.92	297 84	0 00E+00	1 65E+00	3 31E+00
I-129	7 3684E-07	148 92	297 84	0 00E+00	1 10E-04	2 19E-04
Kr-85	2 5263E-01	148 92	297 84	0 00E+00	3 76E+01	7 52E+01
Np-237	1 2427E-06	148 92	297 84	0 00E+00	1.85E-04	3 70E-04
Pa-231	3 8511E-09	148 92	297 84	0 00E+00	5.74E-07	1.15E-06
Pb-210	7.3880E-15	148 92	297.84	0 00E+00	1.10E-12	2.20E-12
Pm-147	2 1023E+00	148 92	297.84	0 00E+00	3.13E+02	6.26E+02
Pu-238	1.0383E-03	148 92	297 84	0 00E+00	1.55E-01	3 09E-01
Pu-239	5 5293E-03	148 92	297 84	0 00E+00	8 23E-01	1 65E+00
Pu-240	2 1278E-03	148 92	297 84	0 00E+00	3 17E-01	6 34E-01
Pu-241	1 0195E-01	148 92	297 84	0 00E+00	1.52E+01	3 04E+01
Pu-242	2 3128E-07	148 92	297 84	0 00E+00	3 44E-05	6 89E-05
Ra-226	5 2782E-14	148 92	297 84	0 00E+00	7 86E-12	1.57E-11
Ra-228	1 9338E-10	148 92	297 84	0 00E+00	2 88E-08	5 76E-08
Ru-106	9 1684E-02	148 92	297 84	0 00E+00	1 37E+01	2 73E+01
Se-79	1 3018E-05	148 92	297 84	0 00E+00	1.94E-03	3 88E-03
Sn-126	1.2167E-05	148 92	297 84	0 00E+00	1.81E-03	3 62E-03
Sr-90	2 6045E+00	148 92	297.84	0 00E+00	3.88E+02	7.76E+02
Tc-99	4 4241E-04	148 92	297.84	0 00E+00	6 59E-02	1 32E-01
Th-229	1.3713E-10	148 92	297 84	0 00E+00	2 04E-08	4 08E-08
Th-230	1.8090E-11	148 92	297 84	0.00E+00	2 69E-09	5 39E-09
Th-232	2.5278E-10	148 92	297 84	0 00E+00	3 76E-08	7 53E-08
Tl-208	1 6947E-08	148.92	297 84	0 00E+00	2 52E-06	5 05E-06
U-232	4 8737E-08	148.92	297 84	0 00E+00	7.26E-06	1.45E-05
U-233	1 2203E-07	148 92	297 84	0 00E+00	1.82E-05	3 63E-05
U-234	1 5925E-07	148 92	297 84	0 00E+00	2.37E-05	4 74E-05
U-235	-2.6194E-06	148 92	0 00	8 61E-03	8.22E-03	8 61E-03
U-236	1.2693E-05	148 92	297.84	0 00E+00	1 89E-03	3 78E-03
U-238	-3 6331E-08	148 92	0 00	5.36E-03	5 35E-03	5 36E-03
Y-90	2 6060E+00	148 92	297 84	0 00E+00	3 88E+02	7 76E+02
Other Radionuclides					5 37E+02	1 07E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 814E+13
0 0250	1 059E+13
0 0375	9 020E+12
0 0575	9 259E+12
0 0850	5 736E+12
0 1250	4 165E+12
0.2250	4.866E+12
0.3750	2 469E+12
0.5750	3.283E+13
0.8500	1.409E+12
1.2500	2.861E+13
1 7500	1 907E+10
2.2500	3 074E+10
2 7500	2 440E+08
3.5000	2.839E+07
5 0000	1 685E+02
7.0000	1.909E+01
11.0000	2 176E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 67E+00	1 73E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 00002088	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		148 92
Bounding		297 84

Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.22	
Bounding	0 44	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8 5/20 UNIV OF WISCONSIN
SNF ID #: 262
Fuel Units & Descr: 128 - ELEMENT
Heavy Metal Mass: BOL=24 96kg, EOL=22.182kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of 2030
Template. TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 000195
Template Decay Time: 5 years

Estimated Canister usage

18"x10'
1 15

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	2,651 52	5,303 03	0 00E+00	2.26E-06	4 52E-06
Am-241	1 8331E-03	2,651 52	5,303 03	0 00E+00	4 86E+00	9 72E+00
Am-242m	1 4129E-06	2,651 52	5,303 03	0 00E+00	3.75E-03	7.49E-03
Am-243	1 4774E-07	2,651 52	5,303 03	0 00E+00	3 92E-04	7 83E-04
C-14	1.2871E-04	2,651 52	5,303.03	0 00E+00	3 41E-01	6 83E-01
Cl-36	2 8120E-06	2,651 52	5,303.03	0 00E+00	7 46E-03	1 49E-02
Cm-243	1 7940E-07	2,651 52	5,303.03	0 00E+00	4 76E-04	9 51E-04
Cm-244	1 6962E-06	2,651 52	5,303 03	0 00E+00	4 50E-03	9 00E-03
Co-60	1.2839E+00	2,651 52	5,303 03	0 00E+00	3 40E+03	6 81E+03
Cs-134	9 0541E-02	2,651.52	5,303 03	0 00E+00	2 40E+02	4 80E+02
Cs-135	3.2195E-05	2,651 52	5,303 03	0 00E+00	8 54E-02	1 71E-01
Cs-137	2 7564E+00	2,651 52	5,303 03	0 00E+00	7 31E+03	1 46E+04
Eu-154	1 5368E-02	2,651 52	5,303 03	0 00E+00	4 07E+01	8 15E+01
Eu-155	2 9293E-02	2,651 52	5,303 03	0 00E+00	7.77E+01	1 55E+02
Fe-55	7 7158E-01	2,651 52	5,303 03	0 00E+00	2 05E+03	4 09E+03
H-3	1 1111E-02	2,651 52	5,303 03	0 00E+00	2 95E+01	5 89E+01
I-129	7 3684E-07	2,651 52	5,303 03	0 00E+00	1 95E-03	3 91E-03
Kr-85	2 5263E-01	2,651 52	5,303 03	0 00E+00	6.70E+02	1 34E+03
Np-237	1 2427E-06	2,651 52	5,303 03	0 00E+00	3 30E-03	6 59E-03
Pa-231	3 8511E-09	2,651 52	5,303 03	0 00E+00	1 02E-05	2 04E-05
Pb-210	7 3880E-15	2,651 52	5,303 03	0 00E+00	1.96E-11	3 92E-11
Pm-147	2 1023E+00	2,651 52	5,303 03	0 00E+00	5 57E+03	1.11E+04
Pu-238	1 0383E-03	2,651 52	5,303 03	0.00E+00	2 75E+00	5.51E+00
Pu-239	5 5293E-03	2,651 52	5,303 03	0 00E+00	1 47E+01	2 93E+01
Pu-240	2 1278E-03	2,651 52	5,303 03	0 00E+00	5 64E+00	1 13E+01
Pu-241	1 0195E-01	2,651 52	5,303 03	0 00E+00	2 70E+02	5 41E+02
Pu-242	2 3128E-07	2,651 52	5,303.03	0 00E+00	6 13E-04	1.23E-03
Ra-226	5.2782E-14	2 651 52	5,303 03	0 00E+00	1 40E-10	2 80E-10
Ra-228	1 9338E-10	2,651.52	5,303 03	0 00E+00	5 13E-07	1 03E-06
Ru-106	9 1684E-02	2,651.52	5,303 03	0 00E+00	2 43E+02	4 86E+02
Se-79	1 3018E-05	2,651 52	5,303 03	0 00E+00	3 45E-02	6 90E-02
Sn-126	1 2167E-05	2,651 52	5,303 03	0 00E+00	3 23E-02	6 45E-02
Sr-90	2 6045E+00	2,651 52	5,303 03	0 00E+00	6 91E+03	1 38E+04
Tc-99	4 4241E-04	2,651 52	5,303 03	0 00E+00	1.17E+00	2 35E+00
Th-229	1 3713E-10	2,651 52	5,303 03	0 00E+00	3 64E-07	7 27E-07
Th-230	1 8090E-11	2,651 52	5,303 03	0 00E+00	4 80E-08	9 59E-08
Th-232	2 5278E-10	2,651 52	5,303 03	0 00E+00	6 70E-07	1 34E-06
Tl-208	1 6947E-08	2,651 52	5,303 03	0 00E+00	4 49E-05	8 99E-05
U-232	4 8737E-08	2,651 52	5,303 03	0 00E+00	1.29E-04	2 58E-04
U-233	1 2203E-07	2,651 52	5,303 03	0 00E+00	3.24E-04	6 47E-04
U-234	1 5925E-07	2,651 52	5,303 03	0 00E+00	4.22E-04	8 44E-04
U-235	-2 6194E-06	2,651 52	0 00	1.08E-02	3 84E-03	1 08E-02
U-236	1 2693E-05	2,651 52	5,303 03	0 00E+00	3.37E-02	6 73E-02
U-238	-3 6331E-08	2,651 52	0 00	6.71E-03	6 61E-03	6 71E-03
Y-90	2 6060E+00	2,651 52	5,303.03	0 00E+00	6 91E+03	1.38E+04
Other Radionuclides					9 56E+03	1.91E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8 571E+14
0 0250	1 886E+14
0 0375	1 606E+14
0 0575	1 649E+14
0 0850	1 021E+14
0 1250	7 416E+13
0.2250	8 664E+13
0 3750	4 397E+13
0.5750	5 845E+14
0 8500	2 509E+13
1.2500	5 094E+14
1 7500	3 396E+11
2.2500	5 474E+11
2 7500	4 344E+09
3.5000	5 055E+08
5.0000	2 795E+03
7 0000	3 163E+02
11 0000	3 603E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.54E+02	3 09E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		2,651 52	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		5 303 03	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	3 12	
Bounding	6.23	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD 8.5/20 USGS	[1]Fuel decay start date	2035
SNF ID #	964	Estimates as of	2030
Fuel Units & Descr	1 - ELEMENT	Template	TRIGA SS (LW/U-Zrx SST, 10 to 20%, U)
Heavy Metal Mass	BOL=0 184kg EOL=0 183kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT):	0 000195
		Template Decay Time	5 years

Estimated Canister usage
18"x10'
0 01

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	0 76	1 53	0 00E+00	6 50E-10	1 30E-09
Am-241	1 8331E-03	0 76	1.53	0 00E+00	1 40E-03	2 80E-03
Am-242m	1 4129E-06	0 76	1 53	0 00E+00	1 08E-06	2 16E-06
Am-243	1 4774E-07	0 76	1.53	0 00E+00	1 13E-07	2 26E-07
C-14	1.2871E-04	0 76	1.53	0 00E+00	9 83E-05	1 97E-04
Cl-36	2 8120E-06	0 76	1.53	0 00E+00	2 15E-06	4 30E-06
Cm-243	1 7940E-07	0 76	1.53	0 00E+00	1 37E-07	2 74E-07
Cm-244	1 6962E-06	0 76	1.53	0 00E+00	1 30E-06	2 59E-06
Co-60	1 2839E+00	0 76	1.53	0 00E+00	9 81E-01	1 96E+00
Cs-134	9 0541E-02	0 76	1.53	0 00E+00	6 91E-02	1.38E-01
Cs-135	3 2195E-05	0 76	1.53	0 00E+00	2 46E-05	4.92E-05
Cs-137	2 7564E+00	0 76	1.53	0 00E+00	2 11E+00	4.21E+00
Eu-154	1.5368E-02	0 76	1.53	0 00E+00	1.17E-02	2.35E-02
Eu-155	2 9293E-02	0 76	1.53	0 00E+00	2.24E-02	4 47E-02
Fe-55	7 7158E-01	0 76	1 53	0 00E+00	5.89E-01	1 18E+00
H-3	1.1111E-02	0 76	1 53	0 00E+00	8 49E-03	1 70E-02
I-129	7.3684E-07	0 76	1 53	0 00E+00	5 63E-07	1 13E-06
Kr-85	2.5263E-01	0 76	1 53	0 00E+00	1 93E-01	3 86E-01
Np-237	1.2427E-06	0 76	1 53	0 00E+00	9 49E-07	1 90E-06
Pa-231	3 8511E-09	0 76	1 53	0 00E+00	2 94E-09	5 88E-09
Pb-210	7.3880E-15	0.76	1 53	0 00E+00	5 64E-15	1 13E-14
Pm-147	2 1023E+00	0 76	1 53	0 00E+00	1 61E+00	3 21E+00
Pu-238	1 0383E-03	0 76	1 53	0 00E+00	7 93E-04	1.59E-03
Pu-239	5 5293E-03	0.76	1 53	0 00E+00	4 22E-03	8 45E-03
Pu-240	2 1278E-03	0 76	1.53	0 00E+00	1 62E-03	3.25E-03
Pu-241	1 0195E-01	0 76	1 53	0 00E+00	7 79E-02	1.56E-01
Pu-242	2.3128E-07	0 76	1 53	0 00E+00	1 77E-07	3.53E-07
Ra-226	5 2782E-14	0 76	1.53	0 00E+00	4 03E-14	8 06E-14
Ra-228	1 9338E-10	0 76	1.53	0 00E+00	1 48E-10	2 95E-10
Ru-106	9 1684E-02	0 76	1.53	0 00E+00	7 00E-02	1 40E-01
Se-79	1 3018E-05	0 76	1.53	0 00E+00	9 94E-06	1 99E-05
Sn-126	1 2167E-05	0 76	1.53	0 00E+00	9.29E-06	1 86E-05
Sr-90	2 6045E+00	0 76	1.53	0 00E+00	1 99E+00	3 98E+00
Tc-99	4 4241E-04	0 76	1.53	0 00E+00	3.38E-04	6 76E-04
Th-229	1 3713E-10	0 76	1.53	0 00E+00	1.05E-10	2 09E-10
Th-230	1 8090E-11	0 76	1.53	0 00E+00	1.38E-11	2 76E-11
Th-232	2 5278E-10	0 76	1.53	0.00E+00	1 93E-10	3 86E-10
Tl-208	1 6947E-08	0 76	1.53	0.00E+00	1.29E-08	2 59E-08
U-232	4 8737E-08	0 76	1.53	0 00E+00	3 72E-08	7 44E-08
U-233	1.2203E-07	0 76	1 53	0 00E+00	9 32E-08	1 86E-07
U-234	1.5925E-07	0 76	1 53	0 00E+00	1 22E-07	2 43E-07
U-235	-2 6194E-06	0 76	0 00	7.79E-05	7 59E-05	7.79E-05
U-236	1.2693E-05	0 76	1 53	0 00E+00	9 69E-06	1.94E-05
U-238	-3 6331E-08	0 76	0 00	4 97E-05	4 97E-05	4 97E-05
Y-90	2 6060E+00	0 76	1 53	0 00E+00	1 99E+00	3 98E+00
Other Radionuclides					2 75E+00	5 51E+00

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 469E+11
0 0250	5 432E+10
0 0375	4 626E+10
0 0575	4 748E+10
0 0850	2.942E+10
0 1250	2 136E+10
0.2250	2 495E+10
0.3750	1.266E+10
0.5750	1.683E+11
0.8500	7.225E+09
1.2500	1 467E+11
1 7500	9 781E+07
2.2500	1.577E+08
2 7500	1.251E+06
3 5000	1 456E+05
5 0000	9 154E-01
7 0000	1 038E-01
11 0000	1 184E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 44E-02	8.89E-02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	19 58243102	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		0 76	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		1.53	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 12	
Bounding	0.24	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 8.5/20 WSU
SNF ID #: 268
Fuel Units & Descr: 137 - ELEMENT
Heavy Metal Mass: BOL=26 715kg EOL=23 482kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 2035
Estimates as of: 2030
Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 years

Estimated Canister usage: 18"x10' = 1 23

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	8 5173E-10	3,086 44	6,172 87	0.00E+00	2 63E-06	5 26E-06
Am-241	1 8331E-03	3,086 44	6,172 87	0 00E+00	5 66E+00	1 13E+01
Am-242m	1 4129E-06	3,086 44	6,172 87	0 00E+00	4 36E-03	8 72E-03
Am-243	1 4774E-07	3,086 44	6,172 87	0 00E+00	4 56E-04	9 12E-04
C-14	1 2871E-04	3,086 44	6,172 87	0 00E+00	3 97E-01	7 94E-01
Cl-36	2 8120E-06	3,086 44	6,172 87	0 00E+00	8 68E-03	1 74E-02
Cm-243	1 7940E-07	3,086 44	6,172 87	0 00E+00	5 54E-04	1 11E-03
Cm-244	1 6962E-06	3,086 44	6,172 87	0 00E+00	5.24E-03	1 05E-02
Co-60	1 2839E+00	3,086 44	6,172 87	0 00E+00	3 96E+03	7 93E+03
Cs-134	9 0541E-02	3,086 44	6,172 87	0 00E+00	2.79E+02	5 59E+02
Cs-135	3 2195E-05	3,086 44	6,172 87	0 00E+00	9 94E-02	1 99E-01
Cs-137	2 7564E+00	3,086 44	6,172 87	0 00E+00	8.51E+03	1 70E+04
Eu-154	1 5368E-02	3,086 44	6,172 87	0 00E+00	4.74E+01	9 49E+01
Eu-155	2 9293E-02	3,086 44	6,172 87	0 00E+00	9 04E+01	1 81E+02
Fe-55	7 7158E-01	3,086 44	6,172 87	0 00E+00	2.38E+03	4 76E+03
H-3	1 1111E-02	3 086 44	6,172 87	0 00E+00	3.43E+01	6 86E+01
I-129	7 3684E-07	3,086 44	6,172 87	0 00E+00	2.27E-03	4 55E-03
Kr-85	2 5263E-01	3,086 44	6,172 87	0 00E+00	7 80E+02	1 56E+03
Np-237	1 2427E-06	3,086 44	6,172 87	0 00E+00	3 84E-03	7 67E-03
Pa-231	3 8511E-09	3,086 44	6,172 87	0 00E+00	1 19E-05	2 38E-05
Pb-210	7 3880E-15	3,086 44	6,172 87	0 00E+00	2.28E-11	4 56E-11
Pm-147	2 1023E+00	3,086 44	6,172 87	0 00E+00	6 49E+03	1 30E+04
Pu-238	1 0383E-03	3,086 44	6,172 87	0 00E+00	3.20E+00	6 41E+00
Pu-239	5 5293E-03	3,086 44	6,172 87	0 00E+00	1 71E+01	3 41E+01
Pu-240	2 1278E-03	3,086 44	6,172 87	0 00E+00	6 57E+00	1 31E+01
Pu-241	1 0195E-01	3,086 44	6,172 87	0 00E+00	3 15E+02	6.29E+02
Pu-242	2 3128E-07	3,086 44	6,172 87	0 00E+00	7.14E-04	1 43E-03
Ra-226	5.2782E-14	3,086 44	6,172 87	0 00E+00	1.63E-10	3 26E-10
Ra-228	1 9338E-10	3,086 44	6,172 87	0 00E+00	5 97E-07	1 19E-06
Ru-106	9 1684E-02	3,086 44	6,172 87	0 00E+00	2 83E+02	5 66E+02
Se-79	1 3018E-05	3,086 44	6,172 87	0 00E+00	4 02E-02	8 04E-02
Sn-126	1.2167E-05	3,086 44	6,172 87	0 00E+00	3.76E-02	7 51E-02
Sr-90	2.6045E+00	3,086 44	6,172 87	0 00E+00	8 04E+03	1.61E+04
Tc-99	4 4241E-04	3,086 44	6,172 87	0 00E+00	1 37E+00	2.73E+00
Th-229	1.3713E-10	3,086 44	6,172 87	0 00E+00	4.23E-07	8 46E-07
Th-230	1.8090E-11	3 086 44	6,172 87	0 00E+00	5 58E-08	1 12E-07
Th-232	2.5278E-10	3,086 44	6,172 87	0 00E+00	7.80E-07	1 56E-06
Tl-208	1 6947E-08	3,086.44	6,172 87	0 00E+00	5.23E-05	1 05E-04
U-232	4 8737E-08	3,086.44	6,172 87	0 00E+00	1 50E-04	3 01E-04
U-233	1.2203E-07	3,086.44	6,172 87	0 00E+00	3.77E-04	7.53E-04
U-234	1.5925E-07	3,086 44	6,172 87	0 00E+00	4.92E-04	9 83E-04
U-235	-2 6194E-06	3 086.44	0 00	1 14E-02	3.35E-03	1 14E-02
U-236	1.2693E-05	3,086.44	6,172 87	0 00E+00	3.92E-02	7 84E-02
U-238	-3 6331E-08	3,086.44	0 00	7 20E-03	7.09E-03	7.20E-03
Y-90	2 6060E+00	3,086.44	6,172 87	0 00E+00	8 04E+03	1.61E+04
Other Radionuclides					1 11E+04	2.23E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	9 977E+14
0 0250	2.195E+14
0 0375	1 869E+14
0 0575	1 919E+14
0 0850	1 189E+14
0 1250	8 633E+13
0.2250	1 008E+14
0.3750	5 118E+13
0.5750	6 804E+14
0.8500	2.920E+13
1.2500	5 930E+14
1 7500	3 953E+11
2.2500	6 371E+11
2.7500	5 056E+09
3.5000	5 884E+08
5.0000	3 252E+03
7 0000	3 680E+02
11 0000	4 192E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.80E+02	3.59E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	SST	SST
BOL HM Constituents:	U	U
BOL Enrichment %	19 8	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		3 086 44	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		6 172.87	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	3.39	
Bounding	6 78	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	TRIGA STD 8 5/20 ZAIRE	[1]Fuel decay start date	2010
SNF ID #	486	Estimates as of	2030
Fuel Units & Descr	80 - ELEMENT	Template	TRIGA-SS (LW/U-Zr SST, 10 to 20% U)
Heavy Metal Mass	BOL=15 448kg EOL=15.288kg	[2]Template Burnup(MWd)	6.65
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 000195
		Template Decay Time	20 years

Estimated Canister usage 18"x10'
0 72

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2 6436E-09	152 74	305 47	0 00E+00	4 04E-07	8 08E-07	Avg MeV	
Am-241	3 1429E-03	152 74	305 47	0 00E+00	4 80E-01	9 60E-01	0 0150	3 061E+13
Am-242m	1.3195E-06	152 74	305 47	0 00E+00	2 02E-04	4 03E-04	0 0250	6.372E+12
Am-243	1.4753E-07	152 74	305 47	0 00E+00	2 25E-05	4 51E-05	0 0375	5.520E+12
C-14	1.2847E-04	152 74	305 47	0 00E+00	1 96E-02	3 92E-02	0 0575	5 939E+12
Cl-36	2 8120E-06	152 74	305.47	0 00E+00	4 30E-04	8 59E-04	0 0850	3 585E+12
Cm-243	1.2465E-07	152.74	305.47	0 00E+00	1 90E-05	3 81E-05	0 1250	2.343E+12
Cm-244	9 5564E-07	152.74	305 47	0 00E+00	1 46E-04	2 92E-04	0 2250	3 079E+12
Co-60	1 7880E-01	152.74	305 47	0 00E+00	2 73E+01	5 46E+01	0 3750	1.349E+12
Cs-134	5 8692E-04	152.74	305 47	0 00E+00	8 96E-02	1 79E-01	0 5750	2.219E+13
Cs-135	3.2195E-05	152 74	305 47	0 00E+00	4 92E-03	9 83E-03	0 8500	2 501E+11
Cs-137	1 9489E+00	152 74	305 47	0 00E+00	2 98E+02	5 95E+02	1.2500	4 145E+12
Eu-154	4 5895E-03	152 74	305 47	0 00E+00	7 01E-01	1 40E+00	1 7500	6 426E+09
Eu-155	3 6045E-03	152 74	305 47	0 00E+00	5.51E-01	1 10E+00	2.2500	2.213E+07
Fe-55	1 4185E-02	152 74	305 47	0 00E+00	2.17E+00	4 33E+00	2.7500	2 439E+05
H-3	4 7895E-03	152 74	305 47	0 00E+00	7.32E-01	1 46E+00	3.5000	1 371E+03
I-129	7 3684E-07	152 74	305 47	0 00E+00	1.13E-04	2.25E-04	5.0000	1 683E+02
Kr-85	9 5820E-02	152 74	305 47	0 00E+00	1.46E+01	2 93E+01	7.0000	1 903E+01
Np-237	1 2552E-06	152 74	305 47	0 00E+00	1 92E-04	3 83E-04	11 0000	2 166E+00
Pa-231	7 0406E-09	152 74	305 47	0 00E+00	1 08E-06	2 15E-06		
Pb-210	5 8000E-14	152 74	305 47	0 00E+00	8 86E-12	1.77E-11		
Pm-147	4 0075E-02	152 74	305 47	0 00E+00	6 12E+00	1.22E+01		
Pu-238	9 2256E-04	152 74	305 47	0 00E+00	1 41E-01	2 82E-01		
Pu-239	5 5278E-03	152 74	305 47	0 00E+00	8 44E-01	1 69E+00		
Pu-240	2 1248E-03	152 74	305 47	0 00E+00	3 25E-01	6 49E-01		
Pu-241	4 9549E-02	152 74	305 47	0 00E+00	7 57E+00	1.51E+01		
Pu-242	2.3128E-07	152 74	305 47	0 00E+00	3 53E-05	7 06E-05		
Ra-226	2 4526E-13	152 74	305 47	0 00E+00	3 75E-11	7 49E-11		
Ra-228	2.4015E-10	152 74	305 47	0 00E+00	3 67E-08	7 34E-08		
Ru-106	3 0602E-06	152 74	305 47	0 00E+00	4 67E-04	9 35E-04		
Se-79	1.3015E-05	152 74	305 47	0 00E+00	1 99E-03	3 98E-03		
Sn-126	1.2165E-05	152 74	305 47	0 00E+00	1 86E-03	3 72E-03		
Sr-90	1.8226E+00	152 74	305 47	0 00E+00	2 78E+02	5 57E+02		
Tc-99	4 4241E-04	152 74	305 47	0 00E+00	6 76E-02	1.35E-01		
Th-229	3 0962E-10	152.74	305 47	0 00E+00	4 73E-08	9 46E-08		
Th-230	4.2346E-11	152 74	305 47	0 00E+00	6.47E-09	1.29E-08		
Th-232	2 5278E-10	152.74	305.47	0 00E+00	3.86E-08	7.72E-08		
Tl-208	1.5820E-08	152.74	305 47	0 00E+00	2.42E-06	4 83E-06		
U-232	4.2647E-08	152 74	305 47	0 00E+00	6 51E-06	1.30E-05		
U-233	1.2211E-07	152 74	305 47	0 00E+00	1 87E-05	3 73E-05		
U-234	1 9955E-07	152 74	305 47	0 00E+00	3 05E-05	6 10E-05		
U-235	-2 6194E-06	152 74	0 00	6 68E-03	6 28E-03	6 68E-03		
U-236	1.2693E-05	152.74	305 47	0 00E+00	1 94E-03	3 88E-03		
U-238	-3 6331E-08	152 74	0 00	4 15E-03	4 15E-03	4 15E-03		
Y-90	1 8241E+00	152 74	305 47	0 00E+00	2 79E+02	5 57E+02		
Other Radionuclides					2 94E+02	5 88E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.82E+00	7.64E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	20 00000041	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		152 74
Bounding		305 47

Basis for burnup used in estimate

Nominal burnup calculated from the heavy metal mass destroyed

Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 29	
Bounding	0 58	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRU SCRAP SNF (MOX)
SNF ID #: 368
Fuel Units & Descr: 1 - CANISTER OF SCRAP
Heavy Metal Mass: BOL= , EOL=106.338kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1994
Estimates as of: 2030
Template: FFTF (FAST, SST, 10 to 30%, Pu & U)
[2]Template Burnup(MWd): 5011.2
Template BOL Heavy Metal Mass (MT): 0.0329181
Template Decay Time: 35 years

Estimated Canister usage: HIC = 1.00

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6.1822E-12	106,140.24	106,140.24	0.00E+00	6.56E-07	6.56E-07
Am-241	1.1066E-01	106,140.24	106,140.24	4.10E+02	1.22E+04	1.22E+04
Am-242m	1.9247E-03	106,140.24	106,140.24	0.00E+00	2.04E+02	2.04E+02
Am-243	1.0740E-04	106,140.24	106,140.24	0.00E+00	1.14E+01	1.14E+01
C-14	2.6042E-05	106,140.24	106,140.24	0.00E+00	2.76E+00	2.76E+00
Cl-36	3.4243E-10	106,140.24	106,140.24	0.00E+00	3.63E-05	3.63E-05
Cm-243	4.0629E-04	106,140.24	106,140.24	0.00E+00	4.31E+01	4.31E+01
Cm-244	1.6024E-03	106,140.24	106,140.24	0.00E+00	1.70E+02	1.70E+02
Co-60	3.4275E-03	106,140.24	106,140.24	0.00E+00	3.64E+02	3.64E+02
Cs-134	1.5566E-03	106,140.24	106,140.24	0.00E+00	1.65E+02	1.65E+02
Cs-135	4.7693E-05	106,140.24	106,140.24	0.00E+00	5.06E+00	5.06E+00
Cs-137	1.4007E+00	106,140.24	106,140.24	0.00E+00	1.49E+05	1.49E+05
Eu-154	1.6184E-02	106,140.24	106,140.24	0.00E+00	1.72E+03	1.72E+03
Eu-155	1.3774E-02	106,140.24	106,140.24	0.00E+00	1.46E+03	1.46E+03
Fe-55	3.8028E-04	106,140.24	106,140.24	0.00E+00	4.04E+01	4.04E+01
H-3	3.8454E-03	106,140.24	106,140.24	0.00E+00	4.08E+02	4.08E+02
I-129	1.2891E-06	106,140.24	106,140.24	0.00E+00	1.37E-01	1.37E-01
Kr-85	2.7848E-02	106,140.24	106,140.24	0.00E+00	2.96E+03	2.96E+03
Np-237	3.7516E-06	106,140.24	106,140.24	0.00E+00	3.98E-01	3.98E-01
Pa-231	1.2488E-11	106,140.24	106,140.24	0.00E+00	1.33E-06	1.33E-06
Pb-210	2.4206E-12	106,140.24	106,140.24	0.00E+00	2.57E-07	2.57E-07
Pm-147	1.5671E-02	106,140.24	106,140.24	0.00E+00	1.66E+03	1.66E+03
Pu-238	1.4877E-02	106,140.24	106,140.24	0.00E+00	1.58E+03	1.58E+03
Pu-239	-3.5520E-02	106,140.24	0.00	3.37E+03	0.00E+00	3.37E+03
Pu-240	2.0690E-02	106,140.24	106,140.24	1.71E+03	3.91E+03	3.91E+03
Pu-241	-1.4799E+00	106,140.24	0.00	7.68E+04	0.00E+00	7.68E+04
Pu-242	1.1252E-05	106,140.24	106,140.24	4.56E-01	1.65E+00	1.65E+00
Ra-226	7.8524E-12	106,140.24	106,140.24	0.00E+00	8.33E-07	8.33E-07
Ra-228	2.4086E-16	106,140.24	106,140.24	0.00E+00	2.56E-11	2.56E-11
Ru-106	1.5066E-05	106,140.24	106,140.24	0.00E+00	1.60E+00	1.60E+00
Se-79	1.0127E-05	106,140.24	106,140.24	0.00E+00	1.07E+00	1.07E+00
Sn-126	4.3902E-05	106,140.24	106,140.24	0.00E+00	4.66E+00	4.66E+00
Sr-90	5.0088E-01	106,140.24	106,140.24	0.00E+00	5.32E+04	5.32E+04
Tc-99	3.9412E-04	106,140.24	106,140.24	0.00E+00	4.18E+01	4.18E+01
Th-229	2.7219E-12	106,140.24	106,140.24	0.00E+00	2.89E-07	2.89E-07
Th-230	1.0441E-09	106,140.24	106,140.24	0.00E+00	1.11E-04	1.11E-04
Th-232	3.1689E-16	106,140.24	106,140.24	0.00E+00	3.36E-11	3.36E-11
Tl-208	4.6636E-07	106,140.24	106,140.24	0.00E+00	4.95E-02	4.95E-02
U-232	1.2638E-06	106,140.24	106,140.24	0.00E+00	1.34E-01	1.34E-01
U-233	5.7451E-10	106,140.24	106,140.24	0.00E+00	6.10E-05	6.10E-05
U-234	4.3044E-06	106,140.24	106,140.24	0.00E+00	4.57E-01	4.57E-01
U-235	-7.7765E-09	106,140.24	0.00	6.91E-04	0.00E+00	6.91E-04
U-236	1.8050E-07	106,140.24	106,140.24	0.00E+00	1.92E-02	1.92E-02
U-238	-1.7914E-07	106,140.24	0.00	5.03E-02	3.13E-02	5.03E-02
Y-90	5.0088E-01	106,140.24	106,140.24	0.00E+00	5.32E+04	5.32E+04
Other Radionuclides					1.50E+05	1.50E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0.0150	3.432E+15
0.0250	6.897E+14
0.0375	8.019E+14
0.0575	7.887E+14
0.0850	3.841E+14
0.1250	2.703E+14
0.2250	3.100E+14
0.3750	1.344E+14
0.5750	5.444E+15
0.8500	5.688E+13
1.2500	6.808E+13
1.7500	1.540E+12
2.2500	3.048E+08
2.7500	1.757E+09
3.5000	6.515E+06
5.0000	2.062E+06
7.0000	2.355E+05
11.0000	2.695E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.69E+03	1.80E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	FAST	FAST
Fuel Cladding	UNKNOWN	SST
BOL HM Constituents	Pu and U	Pu and U
BOL Enrichment %		10 to 30

Basis for Parameter Differences:
This Template was used for the following reasons
This fuel matches on all parameters except cladding (SST is conservative) and enrichment (unknown)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		106,140.24
Bounding		106,140.24

Basis for burnup used in estimate:
Nominal burnup set equal to bounding burnup.
Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	3.28	
Bounding	3.28	

Estimated EOL HM/Given EOL HM: 1.05

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRU SCRAP SNF (U METAL)
SNF ID #: 904
Fuel Units & Descr: 1 - CANISTER OF SCRAP
Heavy Metal Mass: BOL= , EOL=106.338kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1994
Estimates as of: 2030
Template: FERMI (Fast, Zirc, 10 to 40% U)
[2]Template Burnup(MWd): 58 6725048
Template BOL Heavy Metal Mass (MT): 0 018774
Template Decay Time: 35 years

Estimated Canister usage: HIC = 4 00

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	9 6110E-08	93,768 99	93,768 99	0 00E+00	9 01E-03	9 01E-03
Am-241	6 5601E-07	93,768 99	93,768 99	0 00E+00	6 15E-02	6 15E-02
Am-242m	0 0000E+00	93,768 99	93,768 99	0 00E+00	0 00E+00	0 00E+00
Am-243	8.3770E-15	93,768 99	93,768 99	0 00E+00	7 86E-10	7.86E-10
C-14	2 1714E-05	93,768 99	93,768 99	0 00E+00	2 04E+00	2 04E+00
Cl-36	5 5188E-08	93,768 99	93,768 99	0 00E+00	5 17E-03	5 17E-03
Cm-243	1 5496E-14	93,768 99	93,768 99	0 00E+00	1 45E-09	1 45E-09
Cm-244	5 2375E-16	93,768 99	93,768 99	0 00E+00	4 91E-11	4 91E-11
Co-60	2 0947E-03	93,768 99	93,768 99	0 00E+00	1 96E+02	1 96E+02
Cs-134	6 2448E-07	93,768 99	93,768 99	0 00E+00	5 86E-02	5 86E-02
Cs-135	4 4996E-05	93,768 99	93,768 99	0 00E+00	4.22E+00	4.22E+00
Cs-137	1 3775E+00	93,768 99	93,768 99	0 00E+00	1.29E+05	1.29E+05
Eu-154	1 8510E-04	93,768 99	93,768 99	0 00E+00	1.74E+01	1 74E+01
Eu-155	1.4163E-03	93,768 99	93,768 99	0 00E+00	1.33E+02	1 33E+02
Fe-55	1 4179E-05	93,768 99	93,768 99	0 00E+00	1.33E+00	1.33E+00
H-3	3 5383E-03	93,768 99	93,768 99	0 00E+00	3.32E+02	3 32E+02
I-129	1 1426E-06	93,768 99	93,768 99	0 00E+00	1 07E-01	1.07E-01
Kr-85	3 8604E-02	93,768 99	93,768 99	0 00E+00	3 62E+03	3 62E+03
Np-237	3 3099E-06	93,768 99	93,768 99	0 00E+00	3 10E-01	3 10E-01
Pa-231	1 8953E-07	93,768 99	93,768 99	0 00E+00	1 78E-02	1 78E-02
Pb-210	8 9531E-12	93,768 99	93,768 99	0 00E+00	8 40E-07	8 40E-07
Pm-147	1 1588E-03	93,768 99	93,768 99	0 00E+00	1 09E+02	1 09E+02
Pu-238	1 7146E-04	93,768 99	93,768 99	0 00E+00	1 61E+01	1 61E+01
Pu-239	1 9464E-02	93,768 99	93,768 99	0 00E+00	1 83E+03	1 83E+03
Pu-240	6 7919E-05	93,768 99	93,768 99	0 00E+00	6 37E+00	6 37E+00
Pu-241	4.1774E-06	93,768 99	93,768 99	0 00E+00	3 92E-01	3 92E-01
Pu-242	4.3751E-13	93,768 99	93,768 99	0 00E+00	4 10E-08	4.10E-08
Ra-226	2 4219E-11	93,768 99	93,768 99	0 00E+00	2.27E-06	2.27E-06
Ra-228	2.3572E-11	93,768 99	93,768 99	0 00E+00	2 21E-06	2.21E-06
Ru-106	3 0951E-10	93,768 99	93,768 99	0 00E+00	2 90E-05	2 90E-05
Se-79	1 6488E-05	93,768 99	93,768 99	0 00E+00	1 55E+00	1.55E+00
Sn-126	3 7564E-05	93,768 99	93,768 99	0 00E+00	3 52E+00	3 52E+00
Sr-90	1 2052E+00	93,768 99	93,768 99	0 00E+00	1 13E+05	1 13E+05
Tc-99	4 4825E-04	93,768 99	93,768 99	0 00E+00	4 20E+01	4 20E+01
Th-229	4 6478E-11	93,768 99	93,768 99	0 00E+00	4.36E-06	4 36E-06
Th-230	2 2259E-09	93,768 99	93,768 99	0 00E+00	2 09E-04	2 09E-04
Th-232	2 3691E-11	93,768 99	93,768 99	0 00E+00	2.22E-06	2.22E-06
Tl-208	5 8256E-09	93,768 99	93,768 99	0 00E+00	5 46E-04	5.46E-04
U-232	1 5759E-08	93,768 99	93,768.99	0 00E+00	1 48E-03	1.48E-03
U-233	1 0110E-08	93,768 99	93,768.99	0 00E+00	9 48E-04	9 48E-04
U-234	4 9001E-06	93,768 99	93,768 99	0 00E+00	4 59E-01	4.59E-01
U-235	-2 3191E-06	93,768 99	0 00	1 18E-01	0 00E+00	1 18E-01
U-236	1.2633E-05	93,768 99	93,768 99	0 00E+00	1.18E+00	1 18E+00
U-238	-9 5407E-08	93,768 99	0 00	5 32E-02	4 42E-02	5 32E-02
Y-90	1.2053E+00	93,768 99	93,768 99	0 00E+00	1 13E+05	1 13E+05
Other Radionuclides					1 28E+05	1 28E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6 205E+15
0 0250	1.289E+15
0 0375	1 134E+15
0 0575	1.201E+15
0 0850	7.264E+14
0 1250	4 705E+14
0.2250	6.235E+14
0 3750	2 717E+14
0 5750	4 799E+15
0 8500	4 432E+13
1.2500	2 940E+13
1 7500	1 144E+12
2.2500	2.017E+08
2 7500	1.944E+07
3 5000	1.608E+04
5 0000	5.319E+03
7 0000	4.316E+02
11 0000	3 760E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.45E+03	1.45E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	FAST	FAST
Fuel Cladding	UNKNOWN	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %		10 to 40

Basis for Parameter Differences

This Template was used for the following reasons
This fuel matches on all parameters except cladding (unknown) and enrichment (unknown)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		93 768 99
Bounding		93 768 99

Basis for burnup used in estimate

Nominal burnup set equal to bounding burnup
Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	141.08	
Bounding	141 08	

Estimated EOL HM/Given EOL HM: 1 69

[1]Reactor shutdown core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TURKEY POINT
SNF ID #: 271
Fuel Units & Descr: 5 - 15 X 15 ROD ARRAY
Heavy Metal Mass: BOL=2285kg; EOL=2221 6kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1977
Estimates as of: 2030
Template: PWR (Light Water, Zirc, 0 to 5%, U)
[2]Template Burnup(MWd): 61.92
Template BOL Heavy Metal Mass (MT): 0 00176911
Template Decay Time: 50 years

Estimated Canister usage: Bare Fuel Transfer

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 0733E-09	63,036 30	63 666.96	0 00E+00	6 77E-05	6 83E-05
Am-241	1 4751E-01	63,036.30	63,666 96	0 00E+00	9 30E+03	9 39E+03
Am-242m	2 6809E-04	63,036.30	63,666 96	0 00E+00	1 69E+01	1 71E+01
Am-243	6.2484E-04	63,036.30	63,666 96	0 00E+00	3.94E+01	3 98E+01
C-14	4 7820E-05	63,036.30	63,666 96	0 00E+00	3 01E+00	3 04E+00
Cl-36	8 0297E-07	63,036 30	63,666 96	0 00E+00	5 06E-02	5 11E-02
Cm-243	1 7426E-04	63,036 30	63,666 96	0 00E+00	1.10E+01	1 11E+01
Cm-244	2.7616E-02	63,036 30	63,666 96	0 00E+00	1 74E+03	1.76E+03
Co-60	3 5610E-04	63,036 30	63,666 96	0 00E+00	2 24E+01	2 27E+01
Cs-134	2 6260E-07	63,036 30	63,666 96	0 00E+00	1.66E-02	1 67E-02
Cs-135	1 4433E-05	63,036 30	63,666 96	0 00E+00	9.10E-01	9 19E-01
Cs-137	9 8870E-01	63,036 30	63,666 96	0 00E+00	6.23E+04	6.29E+04
Eu-154	6 0320E-03	63,036 30	63,666 96	0 00E+00	3 80E+02	3 84E+02
Eu-155	2 1770E-04	63,036 30	63,666 96	0 00E+00	1 37E+01	1 39E+01
Fe-55	7 9296E-07	63,036 30	63,666 96	0 00E+00	5 00E-02	5 05E-02
H-3	8 9486E-03	63,036 30	63,666 96	0 00E+00	5 64E+02	5 70E+02
I-129	9 8288E-07	63,036 30	63 666 96	0 00E+00	6 20E-02	6.26E-02
Kr-85	1 0707E-02	63,036 30	63,666 96	0 00E+00	6 75E+02	6 82E+02
Np-237	1 1927E-05	63 036 30	63,666 96	0 00E+00	7 52E-01	7 59E-01
Pa-231	1 4703E-09	63,036 30	63 666.96	0 00E+00	9 27E-05	9 36E-05
Pb-210	1 6828E-10	63,036 30	63,666 96	0 00E+00	1 06E-05	1 07E-05
Pm-147	6 9606E-06	63,036.30	63,666.96	0 00E+00	4 39E-01	4 43E-01
Pu-238	6 6263E-02	63,036.30	63,666 96	0 00E+00	4.18E+03	4 22E+03
Pu-239	1 1618E-02	63,036.30	63,666 96	0 00E+00	7.32E+02	7 40E+02
Pu-240	1.5142E-02	63,036.30	63,666 96	0 00E+00	9 55E+02	9 64E+02
Pu-241	4 3766E-01	63,036 30	63,666 96	0 00E+00	2.76E+04	2 79E+04
Pu-242	6 4260E-05	63,036.30	63,666 96	0 00E+00	4 05E+00	4 09E+00
Ra-226	3.8501E-10	63,036 30	63,666 96	0 00E+00	2.43E-05	2 45E-05
Ra-228	5.2955E-12	63,036 30	63,666 96	0 00E+00	3 34E-07	3 37E-07
Ru-106	2 0413E-14	63,036 30	63,666 96	0 00E+00	1.29E-09	1 30E-09
Se-79	1.2376E-05	63,036 30	63,666 96	0 00E+00	7 80E-01	7 88E-01
Sn-126	2 5210E-05	63,036 30	63,666 96	0 00E+00	1 59E+00	1 61E+00
Sr-90	6 4163E-01	63,036 30	63,666 96	0 00E+00	4 04E+04	4 09E+04
Tc-99	3 9357E-04	63,036 30	63,666 96	0 00E+00	2 48E+01	2 51E+01
Th-229	1 5644E-10	63,036 30	63,666 96	0 00E+00	9 86E-06	9 96E-06
Th-230	2 7972E-08	63,036 30	63,666 96	0 00E+00	1 76E-03	1.78E-03
Th-232	5 3036E-12	63,036 30	63,666 96	0 00E+00	3 34E-07	3.38E-07
Tl-208	1 5136E-07	63,036 30	63,666 96	0 00E+00	9 54E-03	9 64E-03
U-232	4 1005E-07	63,036 30	63,666 96	0 00E+00	2 58E-02	2 61E-02
U-233	2 5856E-08	63,036 30	63 666.96	0 00E+00	1 63E-03	1 65E-03
U-234	5 2665E-05	63,036.30	63 666 96	0 00E+00	3 32E+00	3 35E+00
U-235	-1 4487E-06	63,036.30	0 00	1 26E-01	3 51E-02	1 26E-01
U-236	7 5888E-06	63,036.30	63,666 96	0 00E+00	4 78E-01	4 83E-01
U-238	-2 6129E-07	63,036.30	0 00	7 48E-01	7 32E-01	7 48E-01
Y-90	6 4180E-01	63,036.30	63,666 96	0 00E+00	4.05E+04	4 09E+04
Other Radionuclides					6 01E+04	6 07E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.423E+15
0 0250	4 855E+14
0 0375	4 575E+14
0 0575	5 724E+14
0 0850	2 675E+14
0 1250	1 779E+14
0 2250	2.284E+14
0 3750	9 863E+13
0 5750	2 323E+15
0 8500	2.268E+13
1.2500	1 443E+13
1 7500	6 344E+11
2.2500	1 043E+08
2 7500	3 675E+08
3 5000	2 622E+07
5 0000	1 121E+07
7 0000	1.291E+06
11 0000	1 483E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 14E+03	1.15E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %	2.559999934	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	63,036 30	60,290.40
Bounding	63 666 96	120 580.80

Basis for burnup used in estimate:
Nominal burnup taken directly from SFD (converted to MWd).
Bounding burnup taken directly from SFD (converted to MWd).

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 79	0 96
Bounding	0 80	1 89

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown core removal storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: US/UK FUEL PINS
SNF ID #: 356
Fuel Units & Descr: 66 - ROD
Heavy Metal Mass: BOL= ; EOL=8 039kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1994
Estimates as of: 2030
Template: (Worst Case)
[2]Template Burnup(MWd): 62 5
Template BOL Heavy Metal Mass (MT): 0 00186865
Template Decay Time: 35 years

Estimated Canister usage: 18"x10": 0 51

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2.3072E-06	7,639 69	7,639 69	0 00E+00	1 76E-02	1 76E-02
Am-241	8 4448E+00	7,639 69	7,639 69	0 00E+00	6 45E+04	6 45E+04
Am-242m	1 6848E-02	7,639 69	7,639 69	0.00E+00	1 29E+02	1 29E+02
Am-243	1 6320E-02	7,639 69	7,639 69	0.00E+00	1.25E+02	1 25E+02
C-14	1.2090E-01	7,639 69	7,639 69	0 00E+00	9.24E+02	9 24E+02
Cl-36	2.2849E-03	7,639 69	7,639 69	0 00E+00	1 75E+01	1 75E+01
Cm-243	8 6624E-04	7,639 69	7,639 69	0 00E+00	6 62E+00	6 62E+00
Cm-244	1 6848E-01	7,639 69	7,639 69	0 00E+00	1.29E+03	1.29E+03
Co-60	2 8086E+01	7,639 69	7,639 69	0 00E+00	2.15E+05	2 15E+05
Cs-134	3 4148E-04	7,639 69	7,639 69	0 00E+00	2 61E+00	2 61E+00
Cs-135	4 3976E-04	7,639 69	7,639 69	0 00E+00	3.36E+00	3 36E+00
Cs-137	2 1049E+01	7,639 69	7,639 69	0 00E+00	1.61E+05	1.61E+05
Eu-154	1 2500E+00	7,639 69	7,639 69	0 00E+00	9 55E+03	9 55E+03
Eu-155	6 8986E-02	7,639 69	7,639 69	0 00E+00	5 27E+02	5.27E+02
Fe-55	2 9308E-01	7,639 69	7,639 69	0 00E+00	2 24E+03	2.24E+03
H-3	2 4311E-01	7,639 69	7,639 69	0 00E+00	1 86E+03	1 86E+03
I-129	1 0618E-05	7,639 69	7,639 69	0 00E+00	8 11E-02	8 11E-02
Kr-85	5 9882E-01	7,639 69	7,639 69	0 00E+00	4 57E+03	4 57E+03
Np-237	1.5668E-04	7,639 69	7,639 69	0 00E+00	1 20E+00	1 20E+00
Pa-231	2.8656E-06	7,639 69	7,639 69	0 00E+00	2 19E-02	2 19E-02
Pb-210	2.3918E-08	7,639 69	7,639 69	0 00E+00	1 83E-04	1 83E-04
Pm-147	1 6900E-02	7,639 69	7,639 69	0 00E+00	1.29E+02	1.29E+02
Pu-238	-8 6120E-01	7,639 69	0 00	2.07E+03	0 00E+00	2 07E+03
Pu-239	-4 8440E-02	7,639 69	0 00	2.50E+02	0 00E+00	2 50E+02
Pu-240	-3 0095E-01	7,639 69	0 00	3.19E+02	0 00E+00	3 19E+02
Pu-241	-1 0411E+02	7,639 69	0 00	8.22E+04	0 00E+00	8 22E+04
Pu-242	-1 1381E-04	7,639 69	0 00	1.38E+00	5.12E-01	1.38E+00
Ra-226	6 4400E-08	7,639 69	7,639 69	0 00E+00	4 92E-04	4 92E-04
Ra-228	5 9952E-07	7,639 69	7,639 69	0 00E+00	4 58E-03	4 58E-03
Ru-106	8 5526E-07	7,639 69	7,639 69	0 00E+00	6 53E-03	6 53E-03
Se-79	1 9181E-04	7,639 69	7,639 69	0 00E+00	1.47E+00	1 47E+00
Sn-126	1 6671E-04	7,639 69	7,639 69	0 00E+00	1.27E+00	1.27E+00
Sr-90	1 9799E+01	7,639 69	7,639 69	0 00E+00	1.51E+05	1 51E+05
Tc-99	6 7678E-03	7,639 69	7,639 69	0 00E+00	5 17E+01	5 17E+01
Th-229	1 7488E-06	7,639 69	7,639 69	0 00E+00	1 34E-02	1.34E-02
Th-230	5 8704E-06	7,639 69	7,639 69	0 00E+00	4 48E-02	4 48E-02
Th-232	6 0208E-07	7,639 69	7,639 69	0 00E+00	4 60E-03	4 60E-03
Tl-208	8 7573E-05	7,639 69	7,639 69	0 00E+00	6 69E-01	6.69E-01
U-232	2.3706E-04	7,639 69	7,639 69	0 00E+00	1 81E+00	1.81E+00
U-233	3 6128E-04	7,639 69	7,639 69	0 00E+00	2 76E+00	2.76E+00
U-234	1.2788E-02	7,639 69	7,639 69	0 00E+00	9 77E+01	9 77E+01
U-235	5 7486E-04	7,639 69	7,639 69	6.92E-03	4 40E+00	4.40E+00
U-236	2.3485E-04	7,639 69	7,639 69	0 00E+00	1 79E+00	1.79E+00
U-238	1 1581E-04	7,639 69	7,639 69	8 61E-04	8.86E-01	8 86E-01
Y-90	1 9804E+01	7,639 69	7,639 69	0 00E+00	1.51E+05	1 51E+05
Other Radionuclides					4 71E+05	4 71E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	9 362E+15
0 0250	1.863E+15
0 0375	1 627E+15
0 0575	2 561E+15
0 0850	9 994E+14
0 1250	7.833E+14
0 2250	8 658E+14
0 3750	3 703E+14
0 5750	6 022E+15
0 8500	2 301E+14
1.2500	1 609E+16
1 7500	7 116E+12
2.2500	8 436E+10
2.7500	2.377E+10
3.5000	1.902E+07
5 0000	8.080E+06
7 0000	9.253E+05
11 0000	1.059E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.53E+03	7 62E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	GRAPHITE	(Worst Case)
Fuel Cladding	SST	SST/Inconel
BOL HM Constituents	Pu and U	U, Th, & Pu
BOL Enrichment %		0 to 100

Basis for Parameter Differences:

This fuel didn't closely match any existing templates, therefore the worst case template was used.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		7 639 69
Bounding		7 639 69

Basis for burnup used in estimate:

Nominal burnup set equal to bounding burnup
Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	14 21	
Bounding	14.21	

Estimated EOL HM/Given EOL HM: 591 64

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VBWR (GENEVA)
SNF ID #: 285
Fuel Units & Descr: 4 - 6 X 6 ROD ARRAY
Heavy Metal Mass, BOL=12 536kg, EOL=12.392kg
ROD Storage Site INEEL

[1]Fuel decay start date: 1961
Estimates as of: 2030
Template: Pathfinder (Light Water, SST, 60 to 100%, U)
[2]Template Burnup(MWd): 6.01
Template BOL Heavy Metal Mass (MT): 0 00012882
Template Decay Time: 65 years

Estimated Canister usage: 18"x10' 0 31

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	4 5940E-08	135 65	271 30	0 00E+00	6.23E-06	1 25E-05
Am-241	1 1471E-04	135 65	271 30	0 00E+00	1 56E-02	3 11E-02
Am-242m	7 4210E-09	135 65	271 30	0 00E+00	1 01E-06	2 01E-06
Am-243	9 8236E-10	135 65	271 30	0 00E+00	1 33E-07	2 67E-07
C-14	2 2928E-04	135 65	271.30	0 00E+00	3 11E-02	6 22E-02
Cl-36	1 2260E-06	135 65	271.30	0 00E+00	1 66E-04	3 33E-04
Cm-243	1 2000E-10	135 65	271 30	0 00E+00	1 63E-08	3 26E-08
Cm-244	7 3577E-10	135 65	271.30	0 00E+00	9 98E-08	2 00E-07
Co-60	1 3732E-03	135 65	271.30	0 00E+00	1 86E-01	3 73E-01
Cs-134	1 2709E-10	135 65	271 30	0 00E+00	1 72E-08	3 45E-08
Cs-135	3 0316E-05	135 65	271 30	0 00E+00	4 11E-03	8.22E-03
Cs-137	7 2579E-01	135 65	271 30	0 00E+00	9 85E+01	1 97E+02
Eu-154	5 9750E-05	135 65	271 30	0 00E+00	8 11E-03	1 62E-02
Eu-155	1 0577E-05	135 65	271 30	0 00E+00	1 43E-03	2 87E-03
Fe-55	4 1631E-07	135 65	271 30	0 00E+00	5 65E-05	1.13E-04
H-3	4 6722E-04	135 65	271 30	0 00E+00	6 34E-02	1.27E-01
I-129	7 3195E-07	135 65	271 30	0 00E+00	9 93E-05	1.99E-04
Kr-85	5 9418E-03	135 65	271 30	0 00E+00	8 06E-01	1 61E+00
Np-237	1 1499E-06	135 65	271 30	0 00E+00	1 56E-04	3.12E-04
Pa-231	7 0899E-08	135 65	271 30	0 00E+00	9 62E-06	1.92E-05
Pb-210	2 2363E-12	135 65	271 30	0 00E+00	3 03E-10	6 07E-10
Pm-147	4 2296E-07	135 65	271 30	0 00E+00	5 74E-05	1.15E-04
Pu-238	2 3295E-04	135 65	271 30	0 00E+00	3 16E-02	6.32E-02
Pu-239	6 6722E-04	135 65	271 30	0 00E+00	9 05E-02	1 81E-01
Pu-240	8 6556E-05	135 65	271 30	0 00E+00	1.17E-02	2.35E-02
Pu-241	1 6889E-04	135 65	271 30	0 00E+00	2.29E-02	4 58E-02
Pu-242	1 9717E-09	135 65	271 30	0 00E+00	2 67E-07	5 35E-07
Ra-226	4 5740E-12	135 65	271 30	0 00E+00	6.20E-10	1.24E-09
Ra-228	8 3511E-12	135 65	271 30	0 00E+00	1.13E-09	2 27E-09
Ru-106	2 0516E-19	135 65	271 30	0 00E+00	2.78E-17	5 57E-17
Se-79	1.3220E-05	135 65	271 30	0 00E+00	1.79E-03	3 59E-03
Sn-126	1.1489E-05	135 65	271 30	0 00E+00	1.56E-03	3 12E-03
Sr-90	6 6872E-01	135 65	271 30	0 00E+00	9 07E+01	1 81E+02
Tc-99	4 6639E-04	135 65	271 30	0 00E+00	6 33E-02	1 27E-01
Th-229	2.3727E-11	135 65	271.30	0 00E+00	3.22E-09	6 44E-09
Th-230	2.7354E-10	135 65	271.30	0 00E+00	3 71E-08	7 42E-08
Th-232	8.3594E-12	135 65	271.30	0 00E+00	1.13E-09	2 27E-09
Tl-208	1 6228E-08	135 65	271.30	0 00E+00	2.20E-06	4 40E-06
U-232	4 3960E-08	135 65	271.30	0 00E+00	5 96E-06	1.19E-05
U-233	3.3344E-09	135 65	271.30	0 00E+00	4 52E-07	9 05E-07
U-234	4 0749E-07	135 65	271.30	0 00E+00	5 53E-05	1 11E-04
U-235	-2 7761E-06	135 65	0 00	5 99E-03	5 62E-03	5 99E-03
U-236	1 6190E-05	135 65	271.30	0 00E+00	2 20E-03	4 39E-03
U-238	-2 8547E-09	135 65	0 00	3.28E-03	3 28E-03	3 28E-03
Y-90	6 6889E-01	135 65	271 30	0 00E+00	9 07E+01	1 81E+02
Other Radionuclides					1 23E+02	2.46E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	9 903E+12
0 0250	2 057E+12
0 0375	1 788E+12
0 0575	1 919E+12
0 0850	1 159E+12
0 1250	7 514E+11
0.2250	9 988E+11
0 3750	4 356E+11
0 5750	7 328E+12
0 8500	7 117E+10
1 2500	5 151E+10
1 7500	1 831E+09
2.2500	3 463E+05
2.7500	1 551E+05
3 5000	3 325E+01
5 0000	1 402E+01
7 0000	1.585E+00
11 0000	1 803E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 10E+00	2.21E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %	22.12897667	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons
This fuel matches on all parameters except enrichment.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		135 65
Bounding		271 30

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 23	
Bounding	0 46	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VEPCO
SNF ID #: 286
Fuel Units & Descr: 20 - 15 X 15 ROD ARRAY
Heavy Metal Mass: BOL=9148.286kg, EOL=8832.178kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1983
Estimates as of: 2030
Template: PWR (Light Water, Zirc, 0 to 5% U)
[2]Template Burnup(MWd): 61.92
Template BOL Heavy Metal Mass (MT): 0.00176911
Template Decay Time: 35 years

Estimated Canister usage
Bare Fuel Transfer: [ ]

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	8.7758E-10	300,603.76	601,207.51	0.00E+00	2.64E-04	5.28E-04
Am-241	1.4352E-01	300,603.76	601,207.51	0.00E+00	4.31E+04	8.63E+04
Am-242m	2.8698E-04	300,603.76	601,207.51	0.00E+00	8.63E+01	1.73E+02
Am-243	6.2565E-04	300,603.76	601,207.51	0.00E+00	1.88E+02	3.76E+02
C-14	4.7901E-05	300,603.76	601,207.51	0.00E+00	1.44E+01	2.88E+01
Cl-36	8.0297E-07	300,603.76	601,207.51	0.00E+00	2.41E-01	4.83E-01
Cm-243	2.5081E-04	300,603.76	601,207.51	0.00E+00	7.54E+01	1.51E+02
Cm-244	4.9015E-02	300,603.76	601,207.51	0.00E+00	1.47E+04	2.95E+04
Co-60	2.5581E-03	300,603.76	601,207.51	0.00E+00	7.69E+02	1.54E+03
Cs-134	4.0536E-05	300,603.76	601,207.51	0.00E+00	1.22E+01	2.44E+01
Cs-135	1.4433E-05	300,603.76	601,207.51	0.00E+00	4.34E+00	8.68E+00
Cs-137	1.3979E+00	300,603.76	601,207.51	0.00E+00	4.20E+05	8.40E+05
Eu-154	2.0203E-02	300,603.76	601,207.51	0.00E+00	6.07E+03	1.21E+04
Eu-155	1.7684E-03	300,603.76	601,207.51	0.00E+00	5.32E+02	1.06E+03
Fe-55	4.3136E-05	300,603.76	601,207.51	0.00E+00	1.30E+01	2.59E+01
H-3	2.0769E-02	300,603.76	601,207.51	0.00E+00	6.24E+03	1.25E+04
I-129	9.8288E-07	300,603.76	601,207.51	0.00E+00	2.95E-01	5.91E-01
Kr-85	2.8214E-02	300,603.76	601,207.51	0.00E+00	8.48E+03	1.70E+04
Np-237	1.1218E-05	300,603.76	601,207.51	0.00E+00	3.37E+00	6.74E+00
Pa-231	1.3036E-09	300,603.76	601,207.51	0.00E+00	3.92E-04	7.84E-04
Pb-210	8.5078E-11	300,603.76	601,207.51	0.00E+00	2.56E-05	5.11E-05
Pm-147	3.6531E-04	300,603.76	601,207.51	0.00E+00	1.10E+02	2.20E+02
Pu-238	7.4564E-02	300,603.76	601,207.51	0.00E+00	2.24E+04	4.48E+04
Pu-239	1.1623E-02	300,603.76	601,207.51	0.00E+00	3.49E+03	6.99E+03
Pu-240	1.5132E-02	300,603.76	601,207.51	0.00E+00	4.55E+03	9.10E+03
Pu-241	9.0036E-01	300,603.76	601,207.51	0.00E+00	2.71E+05	5.41E+05
Pu-242	6.4260E-05	300,603.76	601,207.51	0.00E+00	1.93E+01	3.86E+01
Ra-226	2.2804E-10	300,603.76	601,207.51	0.00E+00	6.85E-05	1.37E-04
Ra-228	5.2713E-12	300,603.76	601,207.51	0.00E+00	1.58E-06	3.17E-06
Ru-106	6.1160E-10	300,603.76	601,207.51	0.00E+00	1.84E-04	3.68E-04
Se-79	1.2377E-05	300,603.76	601,207.51	0.00E+00	3.72E+00	7.44E+00
Sn-126	2.5210E-05	300,603.76	601,207.51	0.00E+00	7.58E+00	1.52E+01
Sr-90	9.1667E-01	300,603.76	601,207.51	0.00E+00	2.76E+05	5.51E+05
Tc-99	3.9357E-04	300,603.76	601,207.51	0.00E+00	1.18E+02	2.37E+02
Th-229	1.2057E-10	300,603.76	601,207.51	0.00E+00	3.62E-05	7.25E-05
Th-230	2.1043E-08	300,603.76	601,207.51	0.00E+00	6.33E-03	1.27E-02
Th-232	5.2972E-12	300,603.76	601,207.51	0.00E+00	1.59E-06	3.18E-06
Tl-208	1.7474E-07	300,603.76	601,207.51	0.00E+00	5.25E-02	1.05E-01
U-232	4.7368E-07	300,603.76	601,207.51	0.00E+00	1.42E-01	2.85E-01
U-233	2.5097E-08	300,603.76	601,207.51	0.00E+00	7.54E-03	1.51E-02
U-234	5.0000E-05	300,603.76	601,207.51	0.00E+00	1.50E+01	3.01E+01
U-235	-1.4489E-06	300,603.76	0.00	5.90E-01	1.55E-01	5.90E-01
U-236	7.5824E-06	300,603.76	601,207.51	0.00E+00	2.28E+00	4.56E+00
U-238	-2.6129E-07	300,603.76	0.00	2.98E+00	2.90E+00	2.98E+00
Y-90	9.1699E-01	300,603.76	601,207.51	0.00E+00	2.76E+05	5.51E+05
Other Radionuclides					4.04E+05	8.07E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	3.235E+16
0.0250	6.523E+15
0.0375	6.221E+15
0.0575	7.189E+15
0.0850	3.620E+15
0.1250	2.512E+15
0.2250	3.104E+15
0.3750	1.335E+15
0.5750	3.104E+16
0.8500	4.294E+14
1.2500	4.218E+14
1.7500	1.263E+13
2.2500	2.034E+09
2.7500	4.167E+09
3.5000	4.291E+08
5.0000	1.835E+08
7.0000	2.115E+07
11.0000	2.429E+06

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.91E+03	1.38E+04
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding:	ZIRC	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %	2.986167273	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	268 593.68	300 603.76
Bounding	288 637.57	601,207.51

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.94	1.12
Bounding	1.88	2.08

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VEPCO
SNF ID #: 700
Fuel Units & Descr: 12 - 15 X 15 ROD ARRAY
Heavy Metal Mass: BOL=5488.2kg, EOL=5313.52kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1981
Estimates as of: 2030
Template: PWR (Light Water, Zirc, 0 to 5%, U)
[2]Template Burnup(MWd): 61.92
Template BOL Heavy Metal Mass (MT): 0.00176911
Template Decay Time: 35 years

Estimated Canister usage: Bare Fuel Transfer

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	8.7758E-10	166,112.80	332,225.60	0.00E+00	1.46E-04	2.92E-04
Am-241	1.4352E-01	166,112.80	332,225.60	0.00E+00	2.38E+04	4.77E+04
Am-242m	2.8698E-04	166,112.80	332,225.60	0.00E+00	4.77E+01	9.53E+01
Am-243	6.2565E-04	166,112.80	332,225.60	0.00E+00	1.04E+02	2.08E+02
C-14	4.7901E-05	166,112.80	332,225.60	0.00E+00	7.96E+00	1.59E+01
Cl-36	8.0297E-07	166,112.80	332,225.60	0.00E+00	1.33E-01	2.67E-01
Cm-243	2.5081E-04	166,112.80	332,225.60	0.00E+00	4.17E+01	8.33E+01
Cm-244	4.9015E-02	166,112.80	332,225.60	0.00E+00	8.14E+03	1.63E+04
Co-60	2.5581E-03	166,112.80	332,225.60	0.00E+00	4.25E+02	8.50E+02
Cs-134	4.0536E-05	166,112.80	332,225.60	0.00E+00	6.73E+00	1.35E+01
Cs-135	1.4433E-05	166,112.80	332,225.60	0.00E+00	2.40E+00	4.80E+00
Cs-137	1.3979E+00	166,112.80	332,225.60	0.00E+00	2.32E+05	4.64E+05
Eu-154	2.0203E-02	166,112.80	332,225.60	0.00E+00	3.36E+03	6.71E+03
Eu-155	1.7684E-03	166,112.80	332,225.60	0.00E+00	2.94E+02	5.88E+02
Fe-55	4.3136E-05	166,112.80	332,225.60	0.00E+00	7.17E+00	1.43E+01
H-3	2.0769E-02	166,112.80	332,225.60	0.00E+00	3.45E+03	6.90E+03
I-129	9.8288E-07	166,112.80	332,225.60	0.00E+00	1.63E-01	3.27E-01
Kr-85	2.8214E-02	166,112.80	332,225.60	0.00E+00	4.69E+03	9.37E+03
Np-237	1.1218E-05	166,112.80	332,225.60	0.00E+00	1.86E+00	3.73E+00
Pa-231	1.3036E-09	166,112.80	332,225.60	0.00E+00	2.17E-04	4.33E-04
Pb-210	8.5078E-11	166,112.80	332,225.60	0.00E+00	1.41E-05	2.83E-05
Pm-147	3.6531E-04	166,112.80	332,225.60	0.00E+00	6.07E+01	1.21E+02
Pu-238	7.4564E-02	166,112.80	332,225.60	0.00E+00	1.24E+04	2.48E+04
Pu-239	1.1623E-02	166,112.80	332,225.60	0.00E+00	1.93E+03	3.86E+03
Pu-240	1.5132E-02	166,112.80	332,225.60	0.00E+00	2.51E+03	5.03E+03
Pu-241	9.0036E-01	166,112.80	332,225.60	0.00E+00	1.50E+05	2.99E+05
Pu-242	6.4260E-05	166,112.80	332,225.60	0.00E+00	1.07E+01	2.13E+01
Ra-226	2.2804E-10	166,112.80	332,225.60	0.00E+00	3.79E-05	7.58E-05
Ra-228	5.2713E-12	166,112.80	332,225.60	0.00E+00	8.76E-07	1.75E-06
Ru-106	6.1160E-10	166,112.80	332,225.60	0.00E+00	1.02E-04	2.03E-04
Se-79	1.2377E-05	166,112.80	332,225.60	0.00E+00	2.06E+00	4.11E+00
Sn-126	2.5210E-05	166,112.80	332,225.60	0.00E+00	4.19E+00	8.38E+00
Sr-90	9.1667E-01	166,112.80	332,225.60	0.00E+00	1.52E+05	3.05E+05
Tc-99	3.9357E-04	166,112.80	332,225.60	0.00E+00	6.54E+01	1.31E+02
Th-229	1.2057E-10	166,112.80	332,225.60	0.00E+00	2.00E-05	4.01E-05
Th-230	2.1043E-08	166,112.80	332,225.60	0.00E+00	3.50E-03	6.99E-03
Th-232	5.2972E-12	166,112.80	332,225.60	0.00E+00	8.80E-07	1.76E-06
Tl-208	1.7474E-07	166,112.80	332,225.60	0.00E+00	2.90E-02	5.81E-02
U-232	4.7368E-07	166,112.80	332,225.60	0.00E+00	7.87E-02	1.57E-01
U-233	2.5097E-08	166,112.80	332,225.60	0.00E+00	4.17E-03	8.34E-03
U-234	5.0000E-05	166,112.80	332,225.60	0.00E+00	8.31E+00	1.66E+01
U-235	-1.4489E-06	166,112.80	0.00	3.36E-01	9.54E-02	3.36E-01
U-236	7.5824E-06	166,112.80	332,225.60	0.00E+00	1.26E+00	2.52E+00
U-238	-2.6129E-07	166,112.80	0.00	1.79E+00	1.75E+00	1.79E+00
Y-90	9.1699E-01	166,112.80	332,225.60	0.00E+00	1.52E+05	3.05E+05
Other Radionuclides					2.23E+05	4.46E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	1.788E+16
0.0250	3.605E+15
0.0375	3.438E+15
0.0575	3.972E+15
0.0850	2.000E+15
0.1250	1.388E+15
0.2250	1.715E+15
0.3750	7.375E+14
0.5750	1.715E+16
0.8500	2.373E+14
1.2500	2.331E+14
1.7500	6.981E+12
2.2500	1.124E+09
2.7500	2.303E+09
3.5000	2.371E+08
5.0000	1.014E+08
7.0000	1.169E+07
11.0000	1.342E+06

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.82E+03	7.64E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding:	ZIRC	ZIRC
BOL HM Constituents:	U	U
BOL Enrichment %:	2.833496228	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	161,133.55	166,112.80	Nominal burnup calculated from the heavy metal mass destroyed
Bounding	173,158.20	332,225.60	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.86	1.03
Bounding	1.73	1.92

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VEPCO (T-11 ASSEMBLY)
SNF ID #: 993
Fuel Units & Descr: 1 - 15 X 15 ROD ARRAY
Heavy Metal Mass: BOL=457 414kg EOL=440kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1983
Estimates as of: 2030
Template: PWR (Light Water, Zirc 0 to 5%, U)
[2]Template Burnup(MWd): 61 92
Template BOL Heavy Metal Mass (MT): 0 00176911
Template Decay Time: 35 years

Estimated Canister usage: HIC = 1 00

II. Estimates m = x_n = x_b b = y_n = y_b

Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	8 7758E-10	16,560 18	33,120.35	0 00E+00	1.45E-05	2 91E-05
Am-241	1 4352E-01	16,560 18	33,120.35	0 00E+00	2 38E+03	4 75E+03
Am-242m	2 8698E-04	16,560 18	33,120.35	0 00E+00	4 75E+00	9 50E+00
Am-243	6 2565E-04	16,560 18	33,120.35	0 00E+00	1 04E+01	2 07E+01
C-14	4 7901E-05	16,560 18	33,120 35	0 00E+00	7.93E-01	1.59E+00
Cl-36	8 0297E-07	16,560 18	33,120 35	0 00E+00	1.33E-02	2 66E-02
Cm-243	2 5081E-04	16,560 18	33,120 35	0 00E+00	4 15E+00	8 31E+00
Cm-244	4 9015E-02	16,560 18	33,120 35	0 00E+00	8 12E+02	1.62E+03
Co-60	2 5581E-03	16,560 18	33,120 35	0 00E+00	4.24E+01	8 47E+01
Cs-134	4 0536E-05	16,560 18	33,120 35	0 00E+00	6 71E-01	1.34E+00
Cs-135	1.4433E-05	16,560 18	33,120 35	0 00E+00	2 39E-01	4 78E-01
Cs-137	1.3979E+00	16,560 18	33,120 35	0 00E+00	2 32E+04	4 63E+04
Eu-154	2 0203E-02	16,560 18	33,120 35	0 00E+00	3 35E+02	6 69E+02
Eu-155	1 7684E-03	16,560 18	33,120 35	0 00E+00	2 93E+01	5 86E+01
Fe-55	4 3136E-05	16,560 18	33,120 35	0 00E+00	7.14E-01	1 43E+00
H-3	2 0769E-02	16,560.18	33,120 35	0 00E+00	3 44E+02	6 88E+02
I-129	9 8288E-07	16 560 18	33,120 35	0 00E+00	1.63E-02	3.26E-02
Kr-85	2 8214E-02	16,560 18	33,120.35	0 00E+00	4 67E+02	9 34E+02
Np-237	1 1218E-05	16,560 18	33,120 35	0 00E+00	1 86E-01	3 72E-01
Pa-231	1.3036E-09	16,560 18	33,120.35	0 00E+00	2.16E-05	4 32E-05
Pb-210	8 5078E-11	16,560 18	33,120 35	0 00E+00	1 41E-06	2 82E-06
Pm-147	3 6531E-04	16,560 18	33,120 35	0 00E+00	6 05E+00	1.21E+01
Pu-238	7 4564E-02	16,560 18	33,120 35	0 00E+00	1.23E+03	2 47E+03
Pu-239	1.1623E-02	16,560 18	33,120 35	0 00E+00	1 92E+02	3 85E+02
Pu-240	1.5132E-02	16,560 18	33,120 35	0 00E+00	2 51E+02	5 01E+02
Pu-241	9 0036E-01	16,560 18	33,120 35	0 00E+00	1 49E+04	2 98E+04
Pu-242	6 4260E-05	16,560 18	33,120 35	0 00E+00	1 06E+00	2 13E+00
Ra-226	2.2804E-10	16,560 18	33,120 35	0 00E+00	3 78E-06	7.55E-06
Ra-228	5 2713E-12	16,560 18	33,120 35	0 00E+00	8.73E-08	1.75E-07
Ru-106	6 1160E-10	16,560 18	33,120 35	0 00E+00	1.01E-05	2 03E-05
Se-79	1 2377E-05	16,560 18	33,120 35	0 00E+00	2 05E-01	4 10E-01
Sn-126	2 5210E-05	16,560.18	33,120.35	0 00E+00	4 17E-01	8 35E-01
Sr-90	9 1667E-01	16,560 18	33,120.35	0 00E+00	1.52E+04	3 04E+04
Tc-99	3 9357E-04	16,560 18	33,120.35	0 00E+00	6 52E+00	1.30E+01
Th-229	1.2057E-10	16,560 18	33,120.35	0 00E+00	2 00E-06	3 99E-06
Th-230	2.1043E-08	16,560 18	33,120 35	0 00E+00	3 48E-04	6 97E-04
Th-232	5.2972E-12	16,560 18	33,120 35	0 00E+00	8 77E-08	1 75E-07
Tl-208	1.7474E-07	16,560 18	33,120 35	0.00E+00	2 89E-03	5 79E-03
U-232	4 7368E-07	16,560 18	33,120 35	0 00E+00	7 84E-03	1.57E-02
U-233	2.5097E-08	16,560 18	33,120 35	0 00E+00	4 16E-04	8.31E-04
U-234	5 0000E-05	16,560 18	33,120 35	0 00E+00	8 28E-01	1.66E+00
U-235	-1 4489E-06	16,560 18	0 00	2 95E-02	5.52E-03	2.95E-02
U-236	7.5824E-06	16,560 18	33,120 35	0 00E+00	1.26E-01	2 51E-01
U-238	-2 6129E-07	16,560 18	0 00	1 49E-01	1.45E-01	1 49E-01
Y-90	9 1699E-01	16,560 18	33,120 35	0 00E+00	1.52E+04	3 04E+04
Other Radionuclides					2.22E+04	4 45E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 782E+15
0 0250	3.594E+14
0 0375	3 427E+14
0 0575	3 960E+14
0 0850	1 994E+14
0 1250	1.384E+14
0.2250	1 710E+14
0 3750	7 353E+13
0.5750	1 710E+15
0.8500	2 366E+13
1.2500	2.324E+13
1 7500	6 959E+11
2.2500	1 121E+08
2 7500	2.296E+08
3 5000	2.364E+07
5 0000	1.011E+07
7 0000	1 165E+06
11 0000	1.338E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 81E+02	7.62E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %	2 986167273	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	13,429 68	16,560 18
Bounding	14 431 88	33,120.35

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 03	1.23
Bounding	2.07	2.29

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VEPCO (T-11 RODS)
SNF ID #: 1049
Fuel Units & Descr: 9 - ROD
Heavy Metal Mass: BOL=20 18kg EOL=19 678kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1983
Estimates as of 2030
Template: PWR (Light Water, Zirc, 0 to 5%, U)
[2]Template Burnup(MWd): 61 92
Template BOL Heavy Metal Mass (MT): 0 00176911
Template Decay Time: 35 years

Estimated Canister usage
18"x10'
0 07

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8 7758E-10	592 48	636 69	0 00E+00	5.20E-07	5.59E-07	Avg MeV	
Am-241	1 4352E-01	592 48	636 69	0 00E+00	8 50E+01	9 14E+01	0 0150	3 426E+13
Am-242m	2 8698E-04	592 48	636 69	0 00E+00	1 70E-01	1 83E-01	0 0250	6 908E+12
Am-243	6.2565E-04	592 48	636 69	0 00E+00	3 71E-01	3 98E-01	0 0375	6 589E+12
C-14	4 7901E-05	592 48	636 69	0 00E+00	2 84E-02	3 05E-02	0 0575	7 613E+12
Cl-36	8.0297E-07	592 48	636 69	0 00E+00	4 76E-04	5 11E-04	0 0850	3 833E+12
Cm-243	2 5081E-04	592 48	636 69	0 00E+00	1 49E-01	1 60E-01	0 1250	2 660E+12
Cm-244	4 9015E-02	592 48	636 69	0 00E+00	2 90E+01	3 12E+01	0 2250	3.287E+12
Co-60	2 5581E-03	592 48	636 69	0 00E+00	1 52E+00	1 63E+00	0 3750	1 413E+12
Cs-134	4 0536E-05	592 48	636 69	0 00E+00	2 40E-02	2 58E-02	0 5750	3.287E+13
Cs-135	1 4433E-05	592 48	636 69	0 00E+00	8 55E-03	9 19E-03	0 8500	4 548E+11
Cs-137	1 3979E+00	592 48	636 69	0 00E+00	8 28E+02	8 90E+02	1.2500	4 467E+11
Eu-154	2 0203E-02	592 48	636 69	0 00E+00	1 20E+01	1 29E+01	1 7500	1 338E+10
Eu-155	1 7684E-03	592 48	636 69	0 00E+00	1 05E+00	1 13E+00	2.2500	2 154E+06
Fe-55	4 3136E-05	592 48	636.69	0 00E+00	2 56E-02	2 75E-02	2 7500	4 413E+06
H-3	2 0769E-02	592 48	636 69	0 00E+00	1.23E+01	1 32E+01	3.5000	4 544E+05
I-129	9 8288E-07	592 48	636 69	0.00E+00	5 82E-04	6 26E-04	5 0000	1 943E+05
Kr-85	2 8214E-02	592.48	636 69	0 00E+00	1 67E+01	1 80E+01	7 0000	2.239E+04
Np-237	1 1218E-05	592 48	636 69	0 00E+00	6 65E-03	7 14E-03	11 0000	2 572E+03
Pa-231	1 3036E-09	592 48	636 69	0 00E+00	7.72E-07	8 30E-07		
Pb-210	8 5078E-11	592 48	636 69	0 00E+00	5 04E-08	5 42E-08		
Pm-147	3 6531E-04	592.48	636 69	0 00E+00	2.16E-01	2.33E-01		
Pu-238	7 4564E-02	592.48	636 69	0 00E+00	4 42E+01	4.75E+01		
Pu-239	1 1623E-02	592 48	636 69	0 00E+00	6 89E+00	7 40E+00		
Pu-240	1 5132E-02	592 48	636 69	0 00E+00	8 97E+00	9 63E+00		
Pu-241	9 0036E-01	592 48	636 69	0 00E+00	5 33E+02	5 73E+02		
Pu-242	6 4260E-05	592 48	636 69	0 00E+00	3 81E-02	4 09E-02		
Ra-226	2.2804E-10	592 48	636 69	0 00E+00	1 35E-07	1 45E-07		
Ra-228	5.2713E-12	592 48	636 69	0 00E+00	3.12E-09	3 36E-09		
Ru-106	6.1160E-10	592 48	636 69	0 00E+00	3 62E-07	3 89E-07		
Se-79	1.2377E-05	592 48	636 69	0 00E+00	7 33E-03	7 88E-03		
Sn-126	2 5210E-05	592 48	636 69	0 00E+00	1 49E-02	1 61E-02		
Sr-90	9 1667E-01	592 48	636 69	0 00E+00	5 43E+02	5 84E+02		
Tc-99	3.9357E-04	592 48	636 69	0 00E+00	2 33E-01	2 51E-01		
Th-229	1.2057E-10	592 48	636 69	0 00E+00	7.14E-08	7 68E-08		
Th-230	2 1043E-08	592 48	636 69	0 00E+00	1 25E-05	1 34E-05		
Th-232	5.2972E-12	592 48	636 69	0 00E+00	3 14E-09	3 37E-09		
Tl-208	1 7474E-07	592 48	636 69	0 00E+00	1 04E-04	1 11E-04		
U-232	4 7368E-07	592 48	636 69	0 00E+00	2 81E-04	3 02E-04		
U-233	2 5097E-08	592 48	636 69	0 00E+00	1 49E-05	1 60E-05		
U-234	5 0000E-05	592 48	636 69	0 00E+00	2 96E-02	3 18E-02		
U-235	-1 4489E-06	592 48	0 00	1.30E-03	4 44E-04	1 30E-03		
U-236	7 5824E-06	592 48	636 69	0 00E+00	4 49E-03	4 83E-03		
U-238	-2 6129E-07	592.48	0 00	6 58E-03	6 43E-03	6 58E-03		
Y-90	9 1699E-01	592.48	636 69	0 00E+00	5 43E+02	5 84E+02		
Other Radionuclides					7 95E+02	8 55E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.36E+01	1 46E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %	2 986165227	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	592 48	477 57
Bounding	636 69	955 14

Basis for burnup used in estimate:
Nominal burnup taken directly from SFD (converted to MWd)
Bounding burnup taken directly from SFD (converted to MWd).

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 84	0 81
Bounding	0 90	1 50

Estimated EOL HM/Given EOL HM: 0 99

[1]Reactor shutdown, core removal storage shipping or other date confirming that irradiation ceased for fuel.

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VEPCO T-11
SNF ID #: 994
Fuel Units & Descr: 3 - ROD
Heavy Metal Mass BOL=6 727kg EOL=6.559kg
ROD Storage Site INEEL

[1]Fuel decay start date: 1983
Estimates as of: 2030
Template: PWR (Light Water, Zirc, 0 to 5%, U)
[2]Template Burnup(MWd): 61.92
Template BOL Heavy Metal Mass (MT): 0 00176911
Template Decay Time: 35 years

Estimated Canister usage

18"x10'
0 02

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	8 7758E-10	197 49	212 23	0 00E+00	1 73E-07	1 86E-07
Am-241	1 4352E-01	197 49	212 23	0 00E+00	2 83E+01	3 05E+01
Am-242m	2 8698E-04	197.49	212 23	0 00E+00	5 67E-02	6 09E-02
Am-243	6 2565E-04	197.49	212 23	0 00E+00	1.24E-01	1 33E-01
C-14	4 7901E-05	197 49	212 23	0 00E+00	9 46E-03	1 02E-02
Cl-36	8 0297E-07	197.49	212 23	0 00E+00	1.59E-04	1.70E-04
Cm-243	2 5081E-04	197.49	212 23	0 00E+00	4 95E-02	5.32E-02
Cm-244	4 9015E-02	197.49	212 23	0 00E+00	9 68E+00	1.04E+01
Co-60	2 5581E-03	197 49	212.23	0 00E+00	5 05E-01	5 43E-01
Cs-134	4 0536E-05	197.49	212.23	0 00E+00	8 01E-03	8 60E-03
Cs-135	1.4433E-05	197.49	212.23	0 00E+00	2 85E-03	3 06E-03
Cs-137	1.3979E+00	197 49	212.23	0 00E+00	2 76E+02	2 97E+02
Eu-154	2 0203E-02	197 49	212.23	0 00E+00	3 99E+00	4 29E+00
Eu-155	1 7684E-03	197 49	212.23	0 00E+00	3 49E-01	3 75E-01
Fe-55	4 3136E-05	197 49	212.23	0 00E+00	8 52E-03	9 15E-03
H-3	2 0769E-02	197 49	212 23	0 00E+00	4 10E+00	4 41E+00
I-129	9 8288E-07	197 49	212 23	0 00E+00	1.94E-04	2.09E-04
Kr-85	2 8214E-02	197 49	212 23	0 00E+00	5.57E+00	5 99E+00
Np-237	1 1218E-05	197 49	212 23	0 00E+00	2.22E-03	2 38E-03
Pa-231	1 3036E-09	197.49	212.23	0 00E+00	2 57E-07	2 77E-07
Pb-210	8 5078E-11	197.49	212.23	0 00E+00	1 68E-08	1 81E-08
Pm-147	3 6531E-04	197 49	212.23	0 00E+00	7 21E-02	7 75E-02
Pu-238	7.4564E-02	197.49	212 23	0 00E+00	1 47E+01	1 58E+01
Pu-239	1 1623E-02	197 49	212.23	0 00E+00	2 30E+00	2 47E+00
Pu-240	1.5132E-02	197 49	212.23	0 00E+00	2 99E+00	3 21E+00
Pu-241	9 0036E-01	197 49	212.23	0 00E+00	1 78E+02	1 91E+02
Pu-242	6 4260E-05	197 49	212.23	0 00E+00	1.27E-02	1.36E-02
Ra-226	2 2804E-10	197 49	212.23	0 00E+00	4 50E-08	4 84E-08
Ra-228	5 2713E-12	197 49	212.23	0 00E+00	1 04E-09	1 12E-09
Ru-106	6 1160E-10	197 49	212 23	0 00E+00	1 21E-07	1.30E-07
Se-79	1 2377E-05	197 49	212 23	0 00E+00	2 44E-03	2 63E-03
Sn-126	2 5210E-05	197 49	212 23	0 00E+00	4 98E-03	5 35E-03
Sr-90	9 1667E-01	197 49	212 23	0 00E+00	1 81E+02	1 95E+02
Tc-99	3 9357E-04	197 49	212 23	0 00E+00	7.77E-02	8 35E-02
Th-229	1.2057E-10	197.49	212.23	0 00E+00	2 38E-08	2.56E-08
Th-230	2.1043E-08	197.49	212.23	0 00E+00	4 16E-06	4 47E-06
Th-232	5.2972E-12	197 49	212.23	0 00E+00	1.05E-09	1.12E-09
Tl-208	1.7474E-07	197 49	212.23	0.00E+00	3.45E-05	3 71E-05
U-232	4 7368E-07	197 49	212.23	0 00E+00	9 35E-05	1 01E-04
U-233	2 5097E-08	197 49	212.23	0 00E+00	4 96E-06	5 33E-06
U-234	5 0000E-05	197 49	212.23	0 00E+00	9 87E-03	1 06E-02
U-235	-1 4489E-06	197 49	0 00	4.34E-04	1 48E-04	4 34E-04
U-236	7 5824E-06	197 49	212 23	0 00E+00	1 50E-03	1 61E-03
U-238	-2 6129E-07	197.49	0 00	2 19E-03	2 14E-03	2 19E-03
Y-90	9 1699E-01	197 49	212 23	0 00E+00	1 81E+02	1 95E+02
Other Radionuclides					2 65E+02	2 85E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 142E+13
0 0250	2 303E+12
0 0375	2 196E+12
0 0575	2.538E+12
0 0850	1.278E+12
0 1250	8.867E+11
0.2250	1.096E+12
0.3750	4 712E+11
0.5750	1.096E+13
0.8500	1.516E+11
1.2500	1 489E+11
1 7500	4 459E+09
2.2500	7 181E+05
2.7500	1 471E+06
3 5000	1.515E+05
5 0000	6 477E+04
7.0000	7.465E+03
11.0000	8.574E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.54E+00	4.88E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %	2.986165227	0 to 5

Basis for Parameter Drfferences

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	197.49	159 19	Nominal burnup taken directly from SFD (converted to MWd)
Bounding	212.23	318 38	Bounding burnup taken directly from SFD (converted to MWd)

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 84	0 81
Bounding	0 90	1.50

Estimated EOL HM/Given EOL HM: 0 99

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: ANL-I
SNF ID #: 5
Fuel Units & Descr: 19 - ELEMENT
Heavy Metal Mass: BOL=2.793kg, EOL=2.789kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: ATR (Light Water, Alum 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 50 years

Estimated Canister usage: 18"x10' = 0.79

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2.9739E-09	3.60	7.20	0.00E+00	1.07E-08	2.14E-08
Am-241	2.5986E-03	3.60	7.20	0.00E+00	9.35E-03	1.87E-02
Am-242m	3.7010E-07	3.60	7.20	0.00E+00	1.33E-06	2.66E-06
Am-243	1.4858E-06	3.60	7.20	0.00E+00	5.35E-06	1.07E-05
C-14	5.6944E-09	3.60	7.20	0.00E+00	2.05E-08	4.10E-08
Cl-36	1.3124E-32	3.60	7.20	0.00E+00	4.72E-32	9.45E-32
Cm-243	7.9303E-08	3.60	7.20	0.00E+00	2.85E-07	5.71E-07
Cm-244	9.3083E-06	3.60	7.20	0.00E+00	3.35E-05	6.70E-05
Co-60	1.0310E-07	3.60	7.20	0.00E+00	3.71E-07	7.42E-07
Cs-134	1.3254E-07	3.60	7.20	0.00E+00	4.77E-07	9.54E-07
Cs-135	3.4477E-06	3.60	7.20	0.00E+00	1.24E-05	2.48E-05
Cs-137	1.0161E+00	3.60	7.20	0.00E+00	3.66E+00	7.31E+00
Eu-154	2.1879E-03	3.60	7.20	0.00E+00	7.87E-03	1.57E-02
Eu-155	7.2930E-05	3.60	7.20	0.00E+00	2.62E-04	5.25E-04
Fe-55	4.1912E-08	3.60	7.20	0.00E+00	1.51E-07	3.02E-07
H-3	8.4913E-04	3.60	7.20	0.00E+00	3.06E-03	6.11E-03
I-129	7.5300E-07	3.60	7.20	0.00E+00	2.71E-06	5.42E-06
Kr-85	1.5615E-02	3.60	7.20	0.00E+00	5.62E-02	1.12E-01
Np-237	9.5861E-06	3.60	7.20	0.00E+00	3.45E-05	6.90E-05
Pa-231	5.0790E-09	3.60	7.20	0.00E+00	1.83E-08	3.66E-08
Pb-210	6.6176E-10	3.60	7.20	0.00E+00	2.38E-09	4.76E-09
Pm-147	1.7606E-05	3.60	7.20	0.00E+00	6.34E-05	1.27E-04
Pu-238	1.4406E-02	3.60	7.20	0.00E+00	5.18E-02	1.04E-01
Pu-239	4.2783E-04	3.60	7.20	0.00E+00	1.54E-03	3.08E-03
Pu-240	2.4297E-04	3.60	7.20	0.00E+00	8.74E-04	1.75E-03
Pu-241	7.8949E-03	3.60	7.20	0.00E+00	2.84E-02	5.68E-02
Pu-242	3.6329E-07	3.60	7.20	0.00E+00	1.31E-06	2.61E-06
Ra-226	1.5169E-09	3.60	7.20	0.00E+00	5.46E-09	1.09E-08
Ra-228	4.2429E-14	3.60	7.20	0.00E+00	1.53E-13	3.05E-13
Ru-106	7.0833E-15	3.60	7.20	0.00E+00	2.55E-14	5.10E-14
Se-79	1.2928E-05	3.60	7.20	0.00E+00	4.65E-05	9.30E-05
Sn-126	1.1571E-05	3.60	7.20	0.00E+00	4.16E-05	8.33E-05
Sr-90	9.4308E-01	3.60	7.20	0.00E+00	3.39E+00	6.79E+00
Tc-99	4.2239E-04	3.60	7.20	0.00E+00	1.52E-03	3.04E-03
Th-229	1.7968E-11	3.60	7.20	0.00E+00	6.47E-11	1.29E-10
Th-230	1.0855E-07	3.60	7.20	0.00E+00	3.91E-07	7.81E-07
Th-232	4.9809E-14	3.60	7.20	0.00E+00	1.79E-13	3.58E-13
Tl-208	3.4995E-08	3.60	7.20	0.00E+00	1.26E-07	2.52E-07
U-232	9.4798E-08	3.60	7.20	0.00E+00	3.41E-07	6.82E-07
U-233	4.2538E-09	3.60	7.20	0.00E+00	1.53E-08	3.06E-08
U-234	1.8617E-04	3.60	7.20	0.00E+00	6.70E-04	1.34E-03
U-235	-2.7235E-06	3.60	0.00	5.63E-03	5.62E-03	5.63E-03
U-236	1.5493E-05	3.60	7.20	0.00E+00	5.58E-05	1.12E-04
U-238	-4.2851E-09	3.60	0.00	6.39E-05	6.38E-05	6.39E-05
Y-90	9.4308E-01	3.60	7.20	0.00E+00	3.39E+00	6.79E+00
Other Radionuclides					3.49E+00	6.98E+00

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0.0150	3.709E+11
0.0250	7.697E+10
0.0375	6.689E+10
0.0575	7.206E+10
0.0850	4.338E+10
0.1250	2.837E+10
0.2250	3.752E+10
0.3750	1.630E+10
0.5750	2.723E+11
0.8500	2.917E+09
1.2500	1.180E+09
1.7500	7.727E+07
2.2500	7.495E+03
2.7500	8.850E+03
3.5000	5.381E+00
5.0000	2.196E+00
7.0000	2.396E-01
11.0000	2.668E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.28E-02	8.55E-02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93.197	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		3.60	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		7.20	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.00	
Bounding	0.01	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name ASTRA-(AUSTRIA)(LEU U308)
SNF ID # 1058
Fuel Units & Descr: 3 - 19 FLAT PLATES
Heavy Metal Mass: BOL=5.379kg, EOL=4 818kg
ROD Storage Site SRS

[1]Fuel decay start date 1985
Estimates as of 2030
Template ATR (Light Water Alum , 60 to 100%, U)
[2]Template Burnup(MWd) 367.2
Template BOL Heavy Metal Mass (MT) 0 00116689
Template Decay Time 35 years

Estimated Canister usage
18"x10'
0 08

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2 0068E-09	530 99	1,061 99	0.00E+00	1 07E-06	2 13E-06
Am-241	2 5251E-03	530 99	1,061 99	0 00E+00	1.34E+00	2 68E+00
Am-242m	3 9624E-07	530 99	1,061 99	0 00E+00	2 10E-04	4.21E-04
Am-243	1 4880E-06	530 99	1,061 99	0 00E+00	7 90E-04	1.58E-03
C-14	5.7053E-09	530 99	1,061 99	0 00E+00	3 03E-06	6 06E-06
Cl-36	1.3124E-32	530 99	1,061 99	0 00E+00	6 97E-30	1.39E-29
Cm-243	1 1419E-07	530 99	1,061.99	0 00E+00	6 06E-05	1.21E-04
Cm-244	1 6522E-05	530 99	1,061.99	0 00E+00	8 77E-03	1 75E-02
Co-60	7 4047E-07	530 99	1,061.99	0 00E+00	3.93E-04	7 86E-04
Cs-134	2 0455E-05	530 99	1,061 99	0 00E+00	1.09E-02	2 17E-02
Cs-135	3 4477E-06	530.99	1,061 99	0 00E+00	1 83E-03	3 66E-03
Cs-137	1 4365E+00	530 99	1,061 99	0 00E+00	7.63E+02	1.53E+03
Eu-154	7 3230E-03	530 99	1,061 99	0 00E+00	3 89E+00	7 78E+00
Eu-155	5 9259E-04	530 99	1,061 99	0 00E+00	3 15E-01	6 29E-01
Fe-55	2.2791E-06	530 99	1,061 99	0 00E+00	1 21E-03	2 42E-03
H-3	1 9698E-03	530 99	1,061 99	0 00E+00	1 05E+00	2 09E+00
I-129	7.5300E-07	530 99	1,061 99	0 00E+00	4 00E-04	8 00E-04
Kr-85	4 1176E-02	530 99	1,061 99	0 00E+00	2 19E+01	4.37E+01
Np-237	9.5752E-06	530 99	1,061 99	0 00E+00	5 08E-03	1 02E-02
Pa-231	3 9379E-09	530 99	1,061 99	0 00E+00	2 09E-06	4 18E-06
Pb-210	3 3115E-10	530 99	1,061.99	0 00E+00	1.76E-07	3 52E-07
Pm-147	9.2402E-04	530 99	1,061.99	0 00E+00	4.91E-01	9 81E-01
Pu-238	1 6217E-02	530 99	1,061.99	0 00E+00	8 61E+00	1 72E+01
Pu-239	4 2810E-04	530 99	1,061 99	0 00E+00	2.27E-01	4 55E-01
Pu-240	2 4333E-04	530 99	1,061 99	0 00E+00	1.29E-01	2 58E-01
Pu-241	1 6242E-02	530 99	1,061 99	0 00E+00	8 62E+00	1 72E+01
Pu-242	3 6329E-07	530 99	1,061 99	0 00E+00	1 93E-04	3 86E-04
Ra-226	9 0114E-10	530 99	1,061 99	0 00E+00	4 79E-07	9 57E-07
Ra-228	3 1019E-14	530 99	1,061 99	0 00E+00	1 65E-11	3.29E-11
Ru-106	2.1225E-10	530 99	1,061 99	0 00E+00	1 13E-07	2.25E-07
Se-79	1.2930E-05	530 99	1,061 99	0 00E+00	6 87E-03	1 37E-02
Sn-126	1.1571E-05	530 99	1,061 99	0.00E+00	6 14E-03	1 23E-02
Sr-90	1.3472E+00	530 99	1,061 99	0.00E+00	7 15E+02	1 43E+03
Tc-99	4.2239E-04	530 99	1,061.99	0 00E+00	2.24E-01	4 49E-01
Th-229	1.2407E-11	530 99	1,061.99	0 00E+00	6.59E-09	1 32E-08
Th-230	8 3497E-08	530 99	1,061.99	0 00E+00	4 43E-05	8 87E-05
Th-232	3 8371E-14	530 99	1,061.99	0 00E+00	2 04E-11	4 08E-11
Tl-208	4 0414E-08	530 99	1,061 99	0 00E+00	2 15E-05	4.29E-05
U-232	1 0948E-07	530 99	1,061 99	0 00E+00	5 81E-05	1.16E-04
U-233	3 6275E-09	530 99	1,061 99	0 00E+00	1 93E-06	3 85E-06
U-234	1 8562E-04	530 99	1,061 99	0 00E+00	9 86E-02	1 97E-01
U-235	-2 7235E-06	530 99	0 00	2.27E-03	8 21E-04	2 27E-03
U-236	1.5493E-05	530 99	1,061 99	0 00E+00	8 23E-03	1 65E-02
U-238	-4 2851E-09	530 99	0 00	1.46E-03	1 45E-03	1 46E-03
Y-90	1.3475E+00	530 99	1,061.99	0 00E+00	7 16E+02	1 43E+03
Other Radionuclides					7 27E+02	1 45E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7.822E+13
0 0250	1 624E+13
0 0375	1 412E+13
0 0575	1 520E+13
0 0850	9 156E+12
0 1250	6 047E+12
0.2250	7.904E+12
0 3750	3.439E+12
0 5750	5.683E+13
0 8500	6.942E+11
1.2500	3.358E+11
1 7500	1.890E+10
2.2500	1.580E+06
2 7500	1.508E+06
3.5000	8 812E+02
5 0000	3 602E+02
7 0000	3 944E+01
11 0000	4 398E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.89E+00	1 78E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19.50065847	60 to 100

Basis for Parameter Differences

This Template was used for the following reasons
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		530 99
Bounding		1,061.99

Basis for burnup used in estimate

Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 31	
Bounding	0 63	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: ASTRA-(AUSTRIA)(LEU U3SI2)
SNF ID #: 712
Fuel Units & Descr: 39 - 19 FLAT PLATES
Heavy Metal Mass: BOL=72.236kg; EOL=66 183kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1985
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 35 years

Estimated Canister usage: 18"x10" = 1 08

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 0068E-09	5,732 12	11,464 24	0 00E+00	1.15E-05	2 30E-05
Am-241	2 5251E-03	5,732 12	11,464.24	0 00E+00	1 45E+01	2 89E+01
Am-242m	3 9624E-07	5,732.12	11,464.24	0 00E+00	2.27E-03	4 54E-03
Am-243	1 4880E-06	5,732.12	11,464 24	0 00E+00	8.53E-03	1 71E-02
C-14	5.7053E-09	5,732.12	11,464 24	0 00E+00	3.27E-05	6 54E-05
Cl-36	1 3124E-32	5,732.12	11,464 24	0 00E+00	7.52E-29	1 50E-28
Cm-243	1 1419E-07	5,732.12	11,464 24	0 00E+00	6.55E-04	1.31E-03
Cm-244	1 6522E-05	5,732.12	11,464 24	0 00E+00	9 47E-02	1 89E-01
Co-60	7 4047E-07	5,732.12	11,464 24	0 00E+00	4.24E-03	8 49E-03
Cs-134	2 0455E-05	5,732.12	11,464 24	0 00E+00	1 17E-01	2 34E-01
Cs-135	3 4477E-06	5,732.12	11,464 24	0 00E+00	1 98E-02	3 95E-02
Cs-137	1 4365E+00	5,732.12	11,464 24	0 00E+00	8 23E+03	1 65E+04
Eu-154	7 3230E-03	5,732.12	11,464 24	0 00E+00	4 20E+01	8 40E+01
Eu-155	5 9259E-04	5,732.12	11,464 24	0 00E+00	3 40E+00	6.79E+00
Fe-55	2 2791E-06	5,732.12	11,464 24	0 00E+00	1 31E-02	2 61E-02
H-3	1 9698E-03	5,732 12	11,464 24	0 00E+00	1 13E+01	2.26E+01
I-129	7 5300E-07	5,732 12	11,464 24	0 00E+00	4 32E-03	8.63E-03
Kr-85	4 1176E-02	5,732 12	11,464 24	0 00E+00	2 36E+02	4 72E+02
Np-237	9 5752E-06	5,732 12	11,464 24	0 00E+00	5 49E-02	1.10E-01
Pa-231	3 9379E-09	5,732 12	11,464 24	0 00E+00	2 26E-05	4 51E-05
Pb-210	3 3115E-10	5,732.12	11,464 24	0 00E+00	1 90E-06	3 80E-06
Pm-147	9 2402E-04	5,732 12	11,464 24	0 00E+00	5 30E+00	1 06E+01
Pu-238	1 6217E-02	5,732 12	11,464 24	0 00E+00	9 30E+01	1 86E+02
Pu-239	4 2810E-04	5,732 12	11,464 24	0 00E+00	2 45E+00	4 91E+00
Pu-240	2 4333E-04	5,732 12	11,464.24	0 00E+00	1 39E+00	2 79E+00
Pu-241	1 6242E-02	5,732 12	11,464.24	0 00E+00	9 31E+01	1 86E+02
Pu-242	3 6329E-07	5,732 12	11,464 24	0 00E+00	2 08E-03	4 16E-03
Ra-226	9 0114E-10	5,732 12	11,464 24	0 00E+00	5 17E-06	1 03E-05
Ra-228	3 1019E-14	5,732 12	11,464.24	0 00E+00	1 78E-10	3 56E-10
Ru-106	2 1225E-10	5,732 12	11,464.24	0 00E+00	1 22E-06	2 43E-06
Se-79	1 2930E-05	5,732 12	11,464.24	0 00E+00	7 41E-02	1 48E-01
Sn-126	1 1571E-05	5,732 12	11,464.24	0 00E+00	6 63E-02	1 33E-01
Sr-90	1 3472E+00	5,732 12	11,464.24	0 00E+00	7.72E+03	1 54E+04
Tc-99	4.2239E-04	5,732 12	11,464 24	0 00E+00	2.42E+00	4 84E+00
Th-229	1.2407E-11	5,732 12	11,464.24	0 00E+00	7.11E-08	1 42E-07
Th-230	8.3497E-08	5,732 12	11,464.24	0 00E+00	4 79E-04	9 57E-04
Th-232	3 8371E-14	5,732 12	11,464.24	0 00E+00	2.20E-10	4 40E-10
Tl-208	4 0414E-08	5,732 12	11,464.24	0 00E+00	2.32E-04	4 63E-04
U-232	1 0948E-07	5,732.12	11,464.24	0 00E+00	6.28E-04	1 26E-03
U-233	3 6275E-09	5,732 12	11,464.24	0 00E+00	2 08E-05	4 16E-05
U-234	1 8562E-04	5,732 12	11,464.24	0 00E+00	1 06E+00	2.13E+00
U-235	-2 7235E-06	5,732 12	0 00	3.10E-02	1.54E-02	3 10E-02
U-236	1 5493E-05	5,732.12	11,464 24	0.00E+00	8 88E-02	1 78E-01
U-238	-4 2851E-09	5,732.12	0 00	1.95E-02	1 94E-02	1 95E-02
Y-90	1.3475E+00	5,732.12	11,464 24	0 00E+00	7 72E+03	1.54E+04
Other Radionuclides					7 84E+03	1.57E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8 444E+14
0 0250	1 753E+14
0 0375	1 524E+14
0 0575	1 640E+14
0 0850	9 884E+13
0 1250	6 528E+13
0.2250	8.532E+13
0 3750	3 712E+13
0 5750	6 135E+14
0 8500	7 494E+12
1.2500	3 624E+12
1 7500	2 040E+11
2.2500	1 706E+07
2.7500	1 628E+07
3 5000	9 532E+03
5 0000	3 897E+03
7 0000	4.267E+02
11 0000	4 760E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9 59E+01	1 92E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19 83800556	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons:
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		5,732.12
Bounding		11 464 24

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.25	
Bounding	0.50	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: ASTRA-AUSTRIA (UALX-HEU)
SNF ID #: 646
Fuel Units & Descr: 33 - MTR TYPE
Heavy Metal Mass: BOL=9 026kg, EOL=4.359kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1985
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100% U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 35 years

Estimated Canister usage
18"x10'
0 92

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2 0068E-09	4,418 98	8,547.32	0 00E+00	8 87E-06	1 72E-05
Am-241	2 5251E-03	4,418 98	8,547.32	0 00E+00	1 12E+01	2 16E+01
Am-242m	3 9624E-07	4,418 98	8,547 32	0 00E+00	1 75E-03	3 39E-03
Am-243	1 4880E-06	4,418 98	8,547 32	0 00E+00	6 58E-03	1 27E-02
C-14	5 7053E-09	4,418 98	8,547 32	0 00E+00	2.52E-05	4 88E-05
Cl-36	1.3124E-32	4,418 98	8,547.32	0 00E+00	5 80E-29	1.12E-28
Cm-243	1 1419E-07	4,418.98	8,547.32	0 00E+00	5 05E-04	9.76E-04
Cm-244	1 6522E-05	4,418 98	8,547.32	0 00E+00	7.30E-02	1.41E-01
Co-60	7 4047E-07	4,418 98	8,547.32	0 00E+00	3 27E-03	6 33E-03
Cs-134	2 0455E-05	4,418 98	8,547.32	0 00E+00	9 04E-02	1 75E-01
Cs-135	3 4477E-06	4,418 98	8,547.32	0 00E+00	1 52E-02	2 95E-02
Cs-137	1 4365E+00	4,418 98	8,547 32	0 00E+00	6 35E+03	1.23E+04
Eu-154	7.3230E-03	4,418 98	8,547 32	0 00E+00	3 24E+01	6 26E+01
Eu-155	5 9259E-04	4,418 98	8,547 32	0 00E+00	2 62E+00	5 07E+00
Fe-55	2.2791E-06	4,418 98	8,547.32	0 00E+00	1.01E-02	1.95E-02
H-3	1 9698E-03	4,418.98	8,547.32	0 00E+00	8.70E+00	1 68E+01
I-129	7 5300E-07	4,418 98	8,547.32	0 00E+00	3 33E-03	6 44E-03
Kr-85	4 1176E-02	4,418 98	8,547.32	0 00E+00	1 82E+02	3.52E+02
Np-237	9 5752E-06	4,418 98	8,547.32	0 00E+00	4 23E-02	8 18E-02
Pa-231	3 9379E-09	4,418 98	8,547.32	0 00E+00	1 74E-05	3 37E-05
Pb-210	3 3115E-10	4,418 98	8,547 32	0 00E+00	1 46E-06	2 83E-06
Pm-147	9 2402E-04	4,418 98	8,547 32	0 00E+00	4 08E+00	7 90E+00
Pu-238	1.6217E-02	4,418 98	8,547 32	0 00E+00	7.17E+01	1 39E+02
Pu-239	4.2810E-04	4,418 98	8,547.32	0 00E+00	1.89E+00	3 66E+00
Pu-240	2 4333E-04	4,418 98	8,547.32	0 00E+00	1 08E+00	2 08E+00
Pu-241	1 6242E-02	4,418 98	8,547.32	0 00E+00	7.18E+01	1.39E+02
Pu-242	3 6329E-07	4,418 98	8,547.32	0 00E+00	1 61E-03	3 11E-03
Ra-226	9 0114E-10	4,418 98	8,547.32	0 00E+00	3 98E-06	7 70E-06
Ra-228	3 1019E-14	4,418 98	8,547.32	0 00E+00	1.37E-10	2 65E-10
Ru-106	2 1225E-10	4,418 98	8,547 32	0 00E+00	9 38E-07	1 81E-06
Se-79	1.2930E-05	4,418 98	8,547 32	0 00E+00	5 71E-02	1 11E-01
Sn-126	1.1571E-05	4,418 98	8,547 32	0 00E+00	5 11E-02	9 89E-02
Sr-90	1.3472E+00	4,418 98	8,547.32	0 00E+00	5.95E+03	1 15E+04
Tc-99	4.2239E-04	4,418 98	8,547.32	0 00E+00	1.87E+00	3 61E+00
Th-229	1.2407E-11	4,418 98	8,547.32	0 00E+00	5 48E-08	1.06E-07
Th-230	8 3497E-08	4,418 98	8,547.32	0 00E+00	3 69E-04	7 14E-04
Th-232	3 8371E-14	4,418 98	8,547.32	0 00E+00	1 70E-10	3 28E-10
Tl-208	4 0414E-08	4,418 98	8,547.32	0.00E+00	1.79E-04	3 45E-04
U-232	1 0948E-07	4,418 98	8,547 32	0 00E+00	4.84E-04	9 36E-04
U-233	3 6275E-09	4,418 98	8,547.32	0 00E+00	1.60E-05	3.10E-05
U-234	1.8562E-04	4,418 98	8,547.32	0 00E+00	8 20E-01	1.59E+00
U-235	-2 7235E-06	4,418 98	0 00	1 82E-02	6 12E-03	1 82E-02
U-236	1 5493E-05	4,418.98	8,547.32	0 00E+00	6 85E-02	1 32E-01
U-238	-4.2851E-09	4,418 98	0.00	2 10E-04	1 91E-04	2 10E-04
Y-90	1 3475E+00	4,418 98	8 547.32	0 00E+00	5 95E+03	1 15E+04
Other Radionuclides					6 05E+03	1 17E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6.295E+14
0 0250	1.307E+14
0 0375	1 136E+14
0 0575	1.223E+14
0 0850	7 369E+13
0 1250	4 867E+13
0.2250	6.361E+13
0 3750	2.768E+13
0 5750	4.574E+14
0 8500	5.587E+12
1.2500	2 702E+12
1 7500	1.521E+11
2.2500	1.272E+07
2 7500	1.214E+07
3.5000	7 031E+03
5 0000	2.873E+03
7 0000	3 144E+02
11 0000	3.505E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.40E+01	1.43E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93 07350223	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		4 418.98	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		8,547.32	Bounding burnup calculated assuming all BOL heavy metal burned.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.56	
Bounding	3 01	

Estimated EOL HM/Given EOL HM: 1.06

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: ASTRA-AUSTRIA (UALX-MEU)
SNF ID #: 566
Fuel Units & Descr: 5 - MTR TYPE
Heavy Metal Mass: BOL=3 62kg EOL=2 766kg
ROD Storage Site. SRS

[1]Fuel decay start date. 1985
Estimates as of 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd). 367.2
Template BOL Heavy Metal Mass (MT). 0 00116689
Template Decay Time 35 years

Estimated Canister usage: 18"x10' 0 14

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2 0068E-09	807 81	1,615 62	0 00E+00	1 62E-06	3 24E-06
Am-241	2 5251E-03	807 81	1,615 62	0 00E+00	2 04E+00	4 08E+00
Am-242m	3 9624E-07	807 81	1,615 62	0 00E+00	3.20E-04	6 40E-04
Am-243	1 4880E-06	807 81	1,615 62	0 00E+00	1.20E-03	2 40E-03
C-14	5 7053E-09	807 81	1,615 62	0 00E+00	4 61E-06	9 22E-06
Cl-36	1 3124E-32	807 81	1,615 62	0 00E+00	1 06E-29	2.12E-29
Cm-243	1 1419E-07	807 81	1,615 62	0 00E+00	9.22E-05	1 84E-04
Cm-244	1 6522E-05	807 81	1,615 62	0 00E+00	1.33E-02	2 67E-02
Co-60	7 4047E-07	807 81	1 615 62	0 00E+00	5.98E-04	1.20E-03
Cs-134	2 0455E-05	807 81	1,615 62	0 00E+00	1 65E-02	3 30E-02
Cs-135	3 4477E-06	807 81	1,615 62	0 00E+00	2.79E-03	5 57E-03
Cs-137	1 4365E+00	807 81	1,615 62	0 00E+00	1 16E+03	2.32E+03
Eu-154	7 3230E-03	807 81	1,615 62	0 00E+00	5 92E+00	1.18E+01
Eu-155	5 9259E-04	807 81	1,615 62	0 00E+00	4 79E-01	9 57E-01
Fe-55	2 2791E-06	807 81	1,615 62	0 00E+00	1 84E-03	3 68E-03
H-3	1 9698E-03	807 81	1,615 62	0 00E+00	1 59E+00	3.18E+00
I-129	7 5300E-07	807 81	1,615 62	0 00E+00	6 08E-04	1.22E-03
Kr-85	4 1176E-02	807 81	1,615 62	0 00E+00	3 33E+01	6 65E+01
Np-237	9 5752E-06	807 81	1,615 62	0 00E+00	7 73E-03	1.55E-02
Pa-231	3 9379E-09	807 81	1,615 62	0 00E+00	3 18E-06	6.36E-06
Pb-210	3 3115E-10	807 81	1,615 62	0 00E+00	2 68E-07	5.35E-07
Pm-147	9.2402E-04	807.81	1,615 62	0 00E+00	7 46E-01	1 49E+00
Pu-238	1 6217E-02	807.81	1,615 62	0 00E+00	1 31E+01	2 62E+01
Pu-239	4.2810E-04	807.81	1,615 62	0 00E+00	3 46E-01	6 92E-01
Pu-240	2.4333E-04	807.81	1,615 62	0 00E+00	1 97E-01	3 93E-01
Pu-241	1 6242E-02	807.81	1,615 62	0 00E+00	1 31E+01	2 62E+01
Pu-242	3 6329E-07	807 81	1,615 62	0 00E+00	2 93E-04	5 87E-04
Ra-226	9 0114E-10	807 81	1,615 62	0 00E+00	7 28E-07	1 46E-06
Ra-228	3.1019E-14	807 81	1,615 62	0 00E+00	2 51E-11	5 01E-11
Ru-106	2 1225E-10	807 81	1,615 62	0 00E+00	1 71E-07	3 43E-07
Se-79	1.2930E-05	807 81	1,615 62	0 00E+00	1 04E-02	2 09E-02
Sn-126	1 1571E-05	807 81	1,615 62	0 00E+00	9 35E-03	1 87E-02
Sr-90	1 3472E+00	807 81	1,615 62	0 00E+00	1.09E+03	2 18E+03
Tc-99	4.2239E-04	807 81	1,615 62	0 00E+00	3 41E-01	6 82E-01
Th-229	1 2407E-11	807 81	1,615 62	0 00E+00	1 00E-08	2 00E-08
Th-230	8 3497E-08	807 81	1,615 62	0 00E+00	6.74E-05	1 35E-04
Th-232	3 8371E-14	807 81	1,615 62	0 00E+00	3.10E-11	6 20E-11
Tl-208	4 0414E-08	807 81	1,615 62	0 00E+00	3 26E-05	6 53E-05
U-232	1 0948E-07	807 81	1,615 62	0.00E+00	8 84E-05	1 77E-04
U-233	3 6275E-09	807 81	1,615 62	0 00E+00	2.93E-06	5 86E-06
U-234	1 8562E-04	807 81	1,615 62	0 00E+00	1.50E-01	3 00E-01
U-235	-2 7235E-06	807 81	0 00	3.48E-03	1.28E-03	3 48E-03
U-236	1 5493E-05	807 81	1,615 62	0 00E+00	1.25E-02	2 50E-02
U-238	-4 2851E-09	807 81	0 00	6.76E-04	6 72E-04	6 76E-04
Y-90	1 3475E+00	807 81	1,615 62	0 00E+00	1 09E+03	2.18E+03
Other Radionuclides					1 11E+03	2 21E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 190E+14
0 0250	2 471E+13
0 0375	2 148E+13
0 0575	2.312E+13
0 0850	1.393E+13
0 1250	9.200E+12
0 2250	1.202E+13
0 3750	5.231E+12
0 5750	8 646E+13
0 8500	1 056E+12
1 2500	5 108E+11
1 7500	2.875E+10
2 2500	2.404E+06
2 7500	2.294E+06
3 5000	1.332E+03
5 0000	5.445E+02
7 0000	5 959E+01
11 0000	6 645E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.35E+01	2.70E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	44 43904151	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons:
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		807 81
Bounding		1 615.62

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 71	
Bounding	1 42	

Estimated EOL HM/Given EOL HM: 1 02

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name ATSR
SNF ID # 17
Fuel Units & Descr 20 - 19 FLAT PLATES
Heavy Metal Mass BOL= . EOL=3.21kg
ROD Storage Site SRS

[1]Fuel decay start date 1988
Estimates as of 2030
Template ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd) 367.2
Template BOL Heavy Metal Mass (MT) 0 00116689
Template Decay Time 35 years

Estimated Canister usage: 18"x10' 0 56

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 0068E-09	3,039 93	3,039 93	0 00E+00	6.10E-06	6 10E-06
Am-241	2 5251E-03	3,039 93	3,039 93	0 00E+00	7 68E+00	7 68E+00
Am-242m	3 9624E-07	3,039 93	3,039 93	0 00E+00	1.20E-03	1 20E-03
Am-243	1 4880E-06	3,039 93	3,039 93	0 00E+00	4 52E-03	4 52E-03
C-14	5 7053E-09	3,039 93	3,039 93	0 00E+00	1 73E-05	1 73E-05
Cl-36	1.3124E-32	3,039 93	3,039 93	0 00E+00	3 99E-29	3 99E-29
Cm-243	1 1419E-07	3,039 93	3,039 93	0 00E+00	3 47E-04	3 47E-04
Cm-244	1 6522E-05	3,039 93	3,039 93	0 00E+00	5 02E-02	5 02E-02
Co-60	7 4047E-07	3,039 93	3,039 93	0 00E+00	2.25E-03	2.25E-03
Cs-134	2 0455E-05	3,039 93	3,039 93	0 00E+00	6.22E-02	6.22E-02
Cs-135	3 4477E-06	3,039 93	3,039 93	0 00E+00	1 05E-02	1 05E-02
Cs-137	1 4365E+00	3,039 93	3,039 93	0 00E+00	4.37E+03	4 37E+03
Eu-154	7.3230E-03	3,039 93	3,039 93	0 00E+00	2 23E+01	2 23E+01
Eu-155	5 9259E-04	3,039.93	3,039 93	0 00E+00	1 80E+00	1 80E+00
Fe-55	2.2791E-06	3,039 93	3,039 93	0 00E+00	6 93E-03	6 93E-03
H-3	1 9698E-03	3,039 93	3,039 93	0 00E+00	5 99E+00	5.99E+00
I-129	7 5300E-07	3,039 93	3,039 93	0 00E+00	2.29E-03	2.29E-03
Kr-85	4 1176E-02	3,039 93	3,039 93	0 00E+00	1.25E+02	1.25E+02
Np-237	9 5752E-06	3,039 93	3,039 93	0 00E+00	2 91E-02	2 91E-02
Pa-231	3 9379E-09	3,039 93	3,039 93	0 00E+00	1 20E-05	1.20E-05
Pb-210	3 3115E-10	3,039 93	3,039 93	0 00E+00	1 01E-06	1 01E-06
Pm-147	9.2402E-04	3,039 93	3,039 93	0.00E+00	2 81E+00	2 81E+00
Pu-238	1 6217E-02	3,039 93	3,039 93	0 00E+00	4 93E+01	4 93E+01
Pu-239	4.2810E-04	3,039 93	3,039 93	0 00E+00	1 30E+00	1.30E+00
Pu-240	2 4333E-04	3,039 93	3,039 93	0 00E+00	7.40E-01	7 40E-01
Pu-241	1 6242E-02	3,039 93	3,039 93	0 00E+00	4 94E+01	4 94E+01
Pu-242	3 6329E-07	3,039 93	3,039 93	0 00E+00	1 10E-03	1 10E-03
Ra-226	9 0114E-10	3,039 93	3,039 93	0 00E+00	2 74E-06	2 74E-06
Ra-228	3 1019E-14	3,039 93	3,039 93	0 00E+00	9 43E-11	9 43E-11
Ru-106	2.1225E-10	3,039 93	3,039 93	0 00E+00	6 45E-07	6.45E-07
Se-79	1.2930E-05	3,039 93	3,039 93	0 00E+00	3 93E-02	3 93E-02
Sn-126	1 1571E-05	3,039.93	3,039 93	0 00E+00	3 52E-02	3 52E-02
Sr-90	1.3472E+00	3,039 93	3,039 93	0 00E+00	4 10E+03	4 10E+03
Tc-99	4 2239E-04	3,039 93	3,039 93	0 00E+00	1.28E+00	1.28E+00
Th-229	1 2407E-11	3,039 93	3,039 93	0 00E+00	3 77E-08	3.77E-08
Th-230	8 3497E-08	3,039 93	3,039 93	0 00E+00	2 54E-04	2.54E-04
Th-232	3 8371E-14	3,039 93	3,039 93	0 00E+00	1 17E-10	1 17E-10
Tl-208	4 0414E-08	3,039 93	3,039 93	0.00E+00	1 23E-04	1.23E-04
U-232	1.0948E-07	3,039 93	3,039 93	0 00E+00	3.33E-04	3 33E-04
U-233	3 6275E-09	3,039.93	3,039 93	0 00E+00	1.10E-05	1 10E-05
U-234	1 8562E-04	3,039 93	3,039 93	0 00E+00	5 64E-01	5 64E-01
U-235	-2 7235E-06	3,039 93	0 00	1 28E-02	4.50E-03	1.28E-02
U-236	1 5493E-05	3,039 93	3,039 93	0 00E+00	4 71E-02	4.71E-02
U-238	-4.2851E-09	3,039 93	0 00	1 29E-04	1 16E-04	1.29E-04
Y-90	1 3475E+00	3,039 93	3,039 93	0 00E+00	4 10E+03	4.10E+03
Other Radionuclides					4 16E+03	4 16E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.239E+14
0 0250	4 649E+13
0 0375	4 041E+13
0 0575	4.350E+13
0.0850	2 621E+13
0 1250	1 731E+13
0.2250	2.263E+13
0.3750	9 843E+12
0 5750	1 627E+14
0 8500	1.987E+12
1.2500	9 611E+11
1 7500	5 409E+10
2.2500	4.523E+06
2 7500	4 317E+06
3 5000	2 501E+03
5 0000	1 022E+03
7 0000	1 118E+02
11 0000	1.247E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 09E+01	5 09E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %		60 to 100

Basis for Parameter Differences

This Template was used for the following reasons
This fuel matches on all parameters except enrichment (unknown)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		3 039 93
Bounding		3 039 93

Basis for burnup used in estimate.

Nominal burnup set equal to bounding burnup
Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 50	
Bounding	1 50	

Estimated EOL HM/Given EOL HM: 1 02

[1]Reactor shutdown core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: BABCOCK & WILCOX SCRAP
SNF ID #: 18
Fuel Units & Descr: 1 - CANISTER OF SCRAP
Heavy Metal Mass: BOL= : EOL=0.07kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1969
Estimates as of: 2030
Template: (Worst Case)
[2]Template Burnup(MWd): 62.5
Template BOL Heavy Metal Mass (MT): 0.00186865
Template Decay Time: 50 years

Estimated Canister usage: HIC = 1.00

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2.5200E-06	66.52	66.52	0.00E+00	1.68E-04	1.68E-04
Am-241	8.6432E+00	66.52	66.52	0.00E+00	5.75E+02	5.75E+02
Am-242m	1.5728E-02	66.52	66.52	0.00E+00	1.05E+00	1.05E+00
Am-243	1.6288E-02	66.52	66.52	0.00E+00	1.08E+00	1.08E+00
C-14	1.2068E-01	66.52	66.52	0.00E+00	8.03E+00	8.03E+00
Cl-36	2.2849E-03	66.52	66.52	0.00E+00	1.52E-01	1.52E-01
Cm-243	6.0144E-04	66.52	66.52	0.00E+00	4.00E-02	4.00E-02
Cm-244	9.4880E-02	66.52	66.52	0.00E+00	6.31E+00	6.31E+00
Co-60	3.9052E+00	66.52	66.52	0.00E+00	2.60E+02	2.60E+02
Cs-134	2.2139E-06	66.52	66.52	0.00E+00	1.47E-04	1.47E-04
Cs-135	4.3976E-04	66.52	66.52	0.00E+00	2.93E-02	2.93E-02
Cs-137	1.4887E+01	66.52	66.52	0.00E+00	9.90E+02	9.90E+02
Eu-154	3.7342E-01	66.52	66.52	0.00E+00	2.48E+01	2.48E+01
Eu-155	8.4893E-03	66.52	66.52	0.00E+00	5.65E-01	5.65E-01
Fe-55	5.3750E-03	66.52	66.52	0.00E+00	3.58E-01	3.58E-01
H-3	1.0472E-01	66.52	66.52	0.00E+00	6.97E+00	6.97E+00
I-129	1.0618E-05	66.52	66.52	0.00E+00	7.06E-04	7.06E-04
Kr-85	2.2717E-01	66.52	66.52	0.00E+00	1.51E+01	1.51E+01
Np-237	1.6400E-04	66.52	66.52	0.00E+00	1.09E-02	1.09E-02
Pa-231	2.8688E-06	66.52	66.52	0.00E+00	1.91E-04	1.91E-04
Pb-210	4.7312E-08	66.52	66.52	0.00E+00	3.15E-06	3.15E-06
Pm-147	3.2198E-04	66.52	66.52	0.00E+00	2.14E-02	2.14E-02
Pu-238	-1.1924E+00	66.52	0.00	1.80E+01	0.00E+00	1.80E+01
Pu-239	-4.8600E-02	66.52	0.00	2.18E+00	0.00E+00	2.18E+00
Pu-240	-3.0127E-01	66.52	0.00	2.78E+00	0.00E+00	2.78E+00
Pu-241	-1.2917E+02	66.52	0.00	7.16E+02	0.00E+00	7.16E+02
Pu-242	-1.1381E-04	66.52	0.00	1.20E-02	4.46E-03	1.20E-02
Ra-226	1.0760E-07	66.52	66.52	0.00E+00	7.16E-06	7.16E-06
Ra-228	6.0160E-07	66.52	66.52	0.00E+00	4.00E-05	4.00E-05
Ru-106	1.3388E-13	66.52	66.52	0.00E+00	8.91E-12	8.91E-12
Se-79	1.9179E-04	66.52	66.52	0.00E+00	1.28E-02	1.28E-02
Sn-126	1.6669E-04	66.52	66.52	0.00E+00	1.11E-02	1.11E-02
Sr-90	1.3859E+01	66.52	66.52	0.00E+00	9.22E+02	9.22E+02
Tc-99	6.7678E-03	66.52	66.52	0.00E+00	4.50E-01	4.50E-01
Th-229	2.2592E-06	66.52	66.52	0.00E+00	1.50E-04	1.50E-04
Th-230	7.5955E-06	66.52	66.52	0.00E+00	5.05E-04	5.05E-04
Th-232	6.0208E-07	66.52	66.52	0.00E+00	4.01E-05	4.01E-05
Tl-208	7.5795E-05	66.52	66.52	0.00E+00	5.04E-03	5.04E-03
U-232	2.0521E-04	66.52	66.52	0.00E+00	1.37E-02	1.37E-02
U-233	3.6128E-04	66.52	66.52	0.00E+00	2.40E-02	2.40E-02
U-234	1.2788E-02	66.52	66.52	0.00E+00	8.51E-01	8.51E-01
U-235	5.7486E-04	66.52	66.52	6.02E-05	3.83E-02	3.83E-02
U-236	2.3485E-04	66.52	66.52	0.00E+00	1.56E-02	1.56E-02
U-238	1.1581E-04	66.52	66.52	7.49E-06	7.71E-03	7.71E-03
Y-90	1.3861E+01	66.52	66.52	0.00E+00	9.22E+02	9.22E+02
Other Radionuclides					3.42E+03	3.42E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	5.639E+13
0.0250	1.114E+13
0.0375	9.415E+12
0.0575	1.778E+13
0.0850	5.961E+12
0.1250	4.218E+12
0.2250	5.159E+12
0.3750	2.233E+12
0.5750	3.695E+13
0.8500	8.094E+11
1.2500	1.984E+13
1.7500	2.384E+10
2.2500	1.031E+08
2.7500	1.775E+08
3.5000	9.662E+04
5.0000	4.083E+04
7.0000	4.651E+03
11.0000	5.305E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.57E+01	3.65E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	(Worst Case)
Fuel Cladding	SST	SST/Inconel
BOL HM Constituents	Pu and U	U, Th, & Pu
BOL Enrichment %		0 to 100

Basis for Parameter Differences: This fuel didn't closely match any existing templates, therefore the worst case template was used

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		66.52
Bounding		66.52

Basis for burnup used in estimate: Nominal burnup set equal to bounding burnup; Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	14.21	
Bounding	14.21	

Estimated EOL HM/Given EOL HM: 591.64

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: BER-II [HMI] (END BOXES) GERMANY
SNF ID #: 892
Fuel Units & Descr: 6 - MTR TYPE
Heavy Metal Mass: BOL=0kg EOL=0kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1996
Estimates as of: 2030
Template: ATR (Light Water Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 25 years

Estimated Canister usage: HIC = 1.00

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	1 1465E-09	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-241	2 3056E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-242m	4 1476E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Am-243	1 4894E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
C-14	5 7108E-09	0 00	0 00	0 00E+00	0.00E+00	0 00E+00
Cl-36	1.3124E-32	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cm-243	1.4562E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cm-244	2 4221E-05	0 00	0.00	0 00E+00	0 00E+00	0 00E+00
Co-60	2 7560E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-134	5 8851E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-135	3 4477E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Cs-137	1 8099E+00	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Eu-154	1 6386E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Eu-155	2 3957E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Fe-55	3 2707E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
H-3	3 4504E-03	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
I-129	7 5300E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Kr-85	7.8540E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Np-237	9.5615E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pa-231	2.7968E-09	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pb-210	1.2612E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pm-147	1.2952E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-238	1 7549E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-239	4 2810E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-240	2 4357E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-241	2 6277E-02	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Pu-242	3 6329E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-226	4 4444E-10	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Ra-228	1 9714E-14	0 00	0 00	0 00E+00	0.00E+00	0 00E+00
Ru-106	2 0477E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Se-79	1.2933E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sn-126	1 1574E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Sr-90	1 7092E+00	0 00	0 00	0 00E+00	0 00E+00	0.00E+00
Tc-99	4.2239E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-229	7 7260E-12	0.00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-230	5 8497E-08	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Th-232	2 6906E-14	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Tl-208	4 4336E-08	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-232	1.2037E-07	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-233	3 0011E-09	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-234	1.8497E-04	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-235	-2 7235E-06	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-236	1.5493E-05	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
U-238	-4 2851E-09	0 00	0 00	0 00E+00	0 00E+00	0 00E+00
Y-90	1 7094E+00	0 00	0.00	0 00E+00	0 00E+00	0 00E+00
Other Radionuclides					0 00E+00	0 00E+00

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	0 000E+00
0 0250	0 000E+00
0 0375	0 000E+00
0 0575	0 000E+00
0 0850	0 000E+00
0 1250	0 000E+00
0.2250	0 000E+00
0.3750	0 000E+00
0.5750	0 000E+00
0.8500	0 000E+00
1.2500	0 000E+00
1 7500	0 000E+00
2.2500	0 000E+00
2 7500	0 000E+00
3 5000	0 000E+00
5 0000	0 000E+00
7.0000	0 000E+00
11.0000	0 000E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
0 00E+00	0 00E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	100	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		
Bounding		

Basis for burnup used in estimate:
Nominal burnup assumed to be 2% of BOL heavy metal mass
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal		
Bounding		

Estimated EOL HM/Given EOL HM:

[1]Reactor shutdown core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: BER-II [HMI] (UALX HEU) GERMANY
SNF ID #: 758
Fuel Units & Descr: 112 - 17 FLAT PLATES
Heavy Metal Mass. BOL=20 653kg, EOL=12.074kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1996
Estimates as of: 2030
Template. ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 25 years

Estimated Canister usage: 18"x10' 4 67

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 1465E-09	8,124 67	16,249 34	0 00E+00	9 32E-06	1.86E-05
Am-241	2.3056E-03	8,124 67	16,249.34	0 00E+00	1 87E+01	3 75E+01
Am-242m	4 1476E-07	8,124 67	16,249 34	0 00E+00	3 37E-03	6.74E-03
Am-243	1 4894E-06	8,124 67	16,249.34	0 00E+00	1.21E-02	2 42E-02
C-14	5.7108E-09	8,124 67	16,249.34	0 00E+00	4 64E-05	9.28E-05
Cl-36	1.3124E-32	8,124 67	16,249.34	0 00E+00	1 07E-28	2 13E-28
Cm-243	1 4562E-07	8,124 67	16,249.34	0 00E+00	1 18E-03	2 37E-03
Cm-244	2.4221E-05	8,124 67	16,249.34	0 00E+00	1 97E-01	3 94E-01
Co-60	2.7560E-06	8,124 67	16,249 34	0 00E+00	2.24E-02	4 48E-02
Cs-134	5 8851E-04	8,124 67	16,249 34	0 00E+00	4 78E+00	9 56E+00
Cs-135	3.4477E-06	8,124 67	16,249 34	0 00E+00	2.80E-02	5 60E-02
Cs-137	1 8099E+00	8,124 67	16,249 34	0 00E+00	1 47E+04	2 94E+04
Eu-154	1 6386E-02	8,124 67	16,249 34	0 00E+00	1 33E+02	2 66E+02
Eu-155	2.3957E-03	8,124 67	16,249 34	0 00E+00	1 95E+01	3 89E+01
Fe-55	3.2707E-05	8,124 67	16,249 34	0 00E+00	2 66E-01	5 31E-01
H-3	3 4504E-03	8,124 67	16,249 34	0 00E+00	2 80E+01	5 61E+01
I-129	7 5300E-07	8,124 67	16,249 34	0 00E+00	6.12E-03	1 22E-02
Kr-85	7 8540E-02	8,124 67	16,249 34	0 00E+00	6 38E+02	1 28E+03
Np-237	9 5615E-06	8,124 67	16,249 34	0 00E+00	7 77E-02	1 55E-01
Pa-231	2 7968E-09	8,124 67	16,249 34	0 00E+00	2.27E-05	4 54E-05
Pb-210	1.2612E-10	8,124 67	16,249 34	0 00E+00	1 02E-06	2 05E-06
Pm-147	1 2952E-02	8,124 67	16,249 34	0 00E+00	1 05E+02	2 10E+02
Pu-238	1 7549E-02	8,124 67	16,249 34	0 00E+00	1 43E+02	2 85E+02
Pu-239	4 2810E-04	8,124 67	16,249 34	0 00E+00	3 48E+00	6 96E+00
Pu-240	2 4357E-04	8,124 67	16,249 34	0 00E+00	1 98E+00	3 96E+00
Pu-241	2 6277E-02	8,124 67	16,249 34	0 00E+00	2 13E+02	4.27E+02
Pu-242	3 6329E-07	8,124 67	16,249 34	0 00E+00	2 95E-03	5 90E-03
Ra-226	4 4444E-10	8,124 67	16,249 34	0 00E+00	3 61E-06	7 22E-06
Ra-228	1 9714E-14	8,124 67	16,249 34	0 00E+00	1 60E-10	3 20E-10
Ru-106	2 0477E-07	8,124 67	16,249 34	0 00E+00	1 66E-03	3.33E-03
Se-79	1 2933E-05	8,124 67	16,249 34	0 00E+00	1 05E-01	2 10E-01
Sn-126	1 1574E-05	8,124 67	16,249 34	0 00E+00	9 40E-02	1 88E-01
Sr-90	1 7092E+00	8,124 67	16,249 34	0 00E+00	1.39E+04	2.78E+04
Tc-99	4 2239E-04	8,124 67	16,249.34	0 00E+00	3 43E+00	6 86E+00
Th-229	7 7260E-12	8,124 67	16,249 34	0 00E+00	6 28E-08	1.26E-07
Th-230	5 8497E-08	8,124 67	16,249.34	0 00E+00	4 75E-04	9 51E-04
Th-232	2 6906E-14	8,124 67	16,249.34	0 00E+00	2 19E-10	4.37E-10
Tl-208	4 4336E-08	8,124 67	16,249.34	0 00E+00	3 60E-04	7.20E-04
U-232	1.2037E-07	8,124 67	16,249.34	0 00E+00	9 78E-04	1 96E-03
U-233	3 0011E-09	8,124 67	16,249.34	0 00E+00	2 44E-05	4 88E-05
U-234	1 8497E-04	8,124 67	16,249.34	0 00E+00	1.50E+00	3 01E+00
U-235	-2 7235E-06	8,124 67	0 00	4.15E-02	1 94E-02	4.15E-02
U-236	1 5493E-05	8,124 67	16,249.34	0.00E+00	1.26E-01	2.52E-01
U-238	-4 2851E-09	8,124 67	0 00	4 84E-04	4 49E-04	4 84E-04
Y-90	1 7094E+00	8,124 67	16,249.34	0 00E+00	1.39E+04	2 78E+04
Other Radionuclides					1 40E+04	2 80E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 520E+15
0 0250	3 159E+14
0 0375	2 751E+14
0 0575	2 954E+14
0 0850	1 782E+14
0 1250	1 194E+14
0.2250	1.539E+14
0.3750	6 690E+13
0.5750	1 097E+15
0.8500	1.580E+13
1.2500	8 789E+12
1 7500	4.342E+11
2.2500	3 095E+07
2.7500	2.534E+07
3 5000	1.912E+04
5 0000	6 431E+03
7 0000	7 077E+02
11 0000	7 916E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 72E+02	3.44E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93 03245367	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		8,124 67	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		16,249.34	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.25	
Bounding	2.50	

Estimated EOL HM/Given EOL HM: 1 04

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: BNL MEDICAL RX (BMRR)
SNF ID #: 21
Fuel Units & Descr: 40 - CYLINDRICAL SECTIONS
Heavy Metal Mass: BOL=6 188kg EOL=5 124kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1989
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 35 years

Estimated Canister usage 18"x10": 1 11

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 0068E-09	1,007 63	2,015 26	0 00E+00	2 02E-06	4 04E-06
Am-241	2 5251E-03	1,007 63	2,015 26	0 00E+00	2 54E+00	5 09E+00
Am-242m	3 9624E-07	1,007 63	2,015 26	0 00E+00	3 99E-04	7 99E-04
Am-243	1 4880E-06	1,007 63	2,015 26	0 00E+00	1.50E-03	3 00E-03
C-14	5 7053E-09	1,007 63	2,015.26	0 00E+00	5 75E-06	1 15E-05
Cl-36	1.3124E-32	1,007 63	2,015.26	0 00E+00	1 32E-29	2 64E-29
Cm-243	1 1419E-07	1,007 63	2,015 26	0 00E+00	1 15E-04	2 30E-04
Cm-244	1 6522E-05	1,007.63	2,015 26	0 00E+00	1 66E-02	3.33E-02
Co-60	7 4047E-07	1,007.63	2,015 26	0 00E+00	7 46E-04	1 49E-03
Cs-134	2 0455E-05	1,007 63	2,015 26	0 00E+00	2 06E-02	4 12E-02
Cs-135	3 4477E-06	1,007 63	2,015 26	0 00E+00	3.47E-03	6 95E-03
Cs-137	1 4365E+00	1,007 63	2,015.26	0 00E+00	1.45E+03	2 90E+03
Eu-154	7.3230E-03	1,007 63	2,015.26	0 00E+00	7.38E+00	1 48E+01
Eu-155	5 9259E-04	1,007 63	2,015.26	0 00E+00	5 97E-01	1 19E+00
Fe-55	2.2791E-06	1,007 63	2,015.26	0 00E+00	2 30E-03	4.59E-03
H-3	1 9698E-03	1,007 63	2,015.26	0.00E+00	1 98E+00	3 97E+00
I-129	7 5300E-07	1,007.63	2,015 26	0 00E+00	7.59E-04	1 52E-03
Kr-85	4 1176E-02	1,007 63	2,015 26	0 00E+00	4 15E+01	8 30E+01
Np-237	9 5752E-06	1,007 63	2,015 26	0 00E+00	9 65E-03	1 93E-02
Pa-231	3 9379E-09	1,007 63	2,015.26	0 00E+00	3 97E-06	7 94E-06
Pb-210	3 3115E-10	1,007 63	2,015.26	0 00E+00	3 34E-07	6 67E-07
Pm-147	9.2402E-04	1,007 63	2,015.26	0 00E+00	9 31E-01	1 86E+00
Pu-238	1 6217E-02	1,007 63	2,015.26	0 00E+00	1 63E+01	3 27E+01
Pu-239	4.2810E-04	1,007 63	2,015.26	0 00E+00	4 31E-01	8 63E-01
Pu-240	2 4333E-04	1,007.63	2,015 26	0 00E+00	2 45E-01	4 90E-01
Pu-241	1 6242E-02	1,007.63	2,015 26	0 00E+00	1 64E+01	3.27E+01
Pu-242	3 6329E-07	1,007 63	2,015 26	0 00E+00	3 66E-04	7 32E-04
Ra-226	9 0114E-10	1,007 63	2,015 26	0 00E+00	9 08E-07	1 82E-06
Ra-228	3 1019E-14	1,007 63	2,015.26	0 00E+00	3 13E-11	6.25E-11
Ru-106	2.1225E-10	1,007 63	2,015.26	0 00E+00	2 14E-07	4.28E-07
Se-79	1.2930E-05	1,007 63	2,015.26	0 00E+00	1 30E-02	2 61E-02
Sn-126	1 1571E-05	1,007 63	2,015.26	0 00E+00	1 17E-02	2 33E-02
Sr-90	1.3472E+00	1,007 63	2,015.26	0 00E+00	1 36E+03	2 71E+03
Tc-99	4.2239E-04	1,007 63	2,015 26	0 00E+00	4.26E-01	8 51E-01
Th-229	1 2407E-11	1,007.63	2,015 26	0 00E+00	1.25E-08	2 50E-08
Th-230	8 3497E-08	1,007 63	2,015 26	0 00E+00	8 41E-05	1 68E-04
Th-232	3 8371E-14	1,007 63	2,015.26	0 00E+00	3 87E-11	7.73E-11
Tl-208	4 0414E-08	1,007 63	2,015.26	0.00E+00	4 07E-05	8 14E-05
U-232	1.0948E-07	1,007 63	2,015.26	0 00E+00	1 10E-04	2.21E-04
U-233	3 6275E-09	1,007 63	2,015.26	0 00E+00	3 66E-06	7 31E-06
U-234	1 8562E-04	1,007 63	2,015.26	0.00E+00	1 87E-01	3 74E-01
U-235	-2 7235E-06	1,007 63	0 00	1.24E-02	9 65E-03	1.24E-02
U-236	1 5493E-05	1,007.63	2,015 26	0 00E+00	1.56E-02	3 12E-02
U-238	-4.2851E-09	1,007.63	0 00	1 53E-04	1 49E-04	1.53E-04
Y-90	1.3475E+00	1,007.63	2,015 26	0 00E+00	1.36E+03	2.72E+03
Other Radionuclides					1.38E+03	2 76E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.484E+14
0 0250	3 082E+13
0 0375	2 679E+13
0 0575	2.884E+13
0 0850	1 737E+13
0 1250	1 148E+13
0.2250	1.500E+13
0 3750	6.525E+12
0.5750	1.078E+14
0 8500	1.317E+12
1.2500	6 371E+11
1 7500	3 586E+10
2 2500	2 998E+06
2.7500	2 862E+06
3.5000	1 659E+03
5.0000	6 777E+02
7.0000	7.416E+01
11 0000	8.269E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.69E+01	3 37E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	92 65152255	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		1 007 63
Bounding		2,015.26

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed

Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.52	
Bounding	1 03	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: BSR
SNF ID #: 31
Fuel Units & Descr: 41 - 19 PLATE MTR ASS'Y
Heavy Metal Mass: BOL=7 856kg; EOL=6 941kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1991
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367 2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 35 years

Estimated Canister usage: 18"x10" = 1 71

II. Estimates

Radionuclide	m Ci/MWd From Template	x_a Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2.0068E-09	865 86	1,731 72	0 00E+00	1 74E-06	3 48E-06
Am-241	2 5251E-03	865 86	1,731 72	0 00E+00	2 19E+00	4 37E+00
Am-242m	3.9624E-07	865 86	1,731 72	0 00E+00	3 43E-04	6 86E-04
Am-243	1 4880E-06	865 86	1,731 72	0 00E+00	1 29E-03	2 58E-03
C-14	5 7053E-09	865 86	1,731.72	0 00E+00	4 94E-06	9 88E-06
Cl-36	1 3124E-32	865 86	1,731.72	0 00E+00	1 14E-29	2 27E-29
Cm-243	1 1419E-07	865 86	1,731.72	0 00E+00	9 89E-05	1 98E-04
Cm-244	1 6522E-05	865 86	1,731.72	0 00E+00	1 43E-02	2 86E-02
Co-60	7 4047E-07	865 86	1,731.72	0 00E+00	6 41E-04	1 28E-03
Cs-134	2 0455E-05	865 86	1,731 72	0 00E+00	1.77E-02	3 54E-02
Cs-135	3 4477E-06	865 86	1,731 72	0 00E+00	2.99E-03	5 97E-03
Cs-137	1 4365E+00	865 86	1,731 72	0 00E+00	1.24E+03	2 49E+03
Eu-154	7 3230E-03	865 86	1,731 72	0 00E+00	6 34E+00	1.27E+01
Eu-155	5 9259E-04	865 86	1,731 72	0 00E+00	5.13E-01	1.03E+00
Fe-55	2 2791E-06	865 86	1,731 72	0 00E+00	1 97E-03	3 95E-03
H-3	1 9698E-03	865 86	1,731 72	0 00E+00	1 71E+00	3 41E+00
I-129	7 5300E-07	865 86	1,731 72	0 00E+00	6 52E-04	1.30E-03
Kr-85	4 1176E-02	865 86	1,731 72	0 00E+00	3 57E+01	7 13E+01
Np-237	9 5752E-06	865 86	1,731 72	0 00E+00	8 29E-03	1 66E-02
Pa-231	3 9379E-09	865 86	1,731 72	0 00E+00	3 41E-06	6 82E-06
Pb-210	3 3115E-10	865 86	1,731 72	0 00E+00	2 87E-07	5.73E-07
Pm-147	9.2402E-04	865 86	1,731 72	0 00E+00	8 00E-01	1 60E+00
Pu-238	1 6217E-02	865 86	1,731 72	0 00E+00	1 40E+01	2 81E+01
Pu-239	4.2810E-04	865 86	1,731 72	0 00E+00	3 71E-01	7 41E-01
Pu-240	2 4333E-04	865 86	1,731.72	0 00E+00	2 11E-01	4.21E-01
Pu-241	1 6242E-02	865 86	1,731.72	0 00E+00	1 41E+01	2 81E+01
Pu-242	3 6329E-07	865 86	1,731.72	0 00E+00	3 15E-04	6 29E-04
Ra-226	9 0114E-10	865 86	1,731.72	0 00E+00	7 80E-07	1 56E-06
Ra-228	3 1019E-14	865 86	1,731.72	0 00E+00	2 69E-11	5 37E-11
Ru-106	2 1225E-10	865 86	1,731 72	0 00E+00	1 84E-07	3 68E-07
Se-79	1 2930E-05	865 86	1,731 72	0 00E+00	1 12E-02	2 24E-02
Sn-126	1 1571E-05	865 86	1,731 72	0 00E+00	1 00E-02	2 00E-02
Sr-90	1 3472E+00	865 86	1,731 72	0 00E+00	1 17E+03	2 33E+03
Tc-99	4 2239E-04	865 86	1,731 72	0 00E+00	3 66E-01	7 31E-01
Th-229	1 2407E-11	865 86	1,731 72	0 00E+00	1.07E-08	2 15E-08
Th-230	8 3497E-08	865 86	1,731 72	0 00E+00	7.23E-05	1 45E-04
Th-232	3 8371E-14	865 86	1,731 72	0 00E+00	3.32E-11	6 64E-11
Tl-208	4 0414E-08	865 86	1,731 72	0 00E+00	3 50E-05	7 00E-05
U-232	1 0948E-07	865 86	1,731 72	0 00E+00	9 48E-05	1 90E-04
U-233	3 6275E-09	865.86	1,731 72	0 00E+00	3 14E-06	6.28E-06
U-234	1 8562E-04	865 86	1,731 72	0 00E+00	1 61E-01	3.21E-01
U-235	-2 7235E-06	865 86	0 00	1 58E-02	1 35E-02	1.58E-02
U-236	1 5493E-05	865 86	1,731 72	0 00E+00	1 34E-02	2 68E-02
U-238	-4 2851E-09	865 86	0 00	1 79E-04	1 75E-04	1.79E-04
Y-90	1 3475E+00	865 86	1,731.72	0 00E+00	1.17E+03	2 33E+03
Other Radionuclides					1 18E+03	2 37E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 275E+14
0 0250	2 648E+13
0 0375	2.302E+13
0 0575	2.478E+13
0 0850	1 493E+13
0 1250	9 861E+12
0.2250	1.289E+13
0 3750	5 607E+12
0 5750	9.267E+13
0 8500	1 132E+12
1.2500	5.475E+11
1 7500	3.081E+10
2.2500	2.576E+06
2.7500	2 459E+06
3 5000	1 426E+03
5 0000	5 825E+02
7 0000	6 375E+01
11 0000	7 108E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.45E+01	2.90E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93.23369049	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		865 86
Bounding		1,731 72

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 35	
Bounding	0 70	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: CANDU
SNF ID # 979
Fuel Units & Descr: 4 - ROD
Heavy Metal Mass BOL= , EOL=49.32kg
ROD Storage Site. INEEL

[1]Fuel decay start date: 1964
Estimates as of: 2030
Template: HFBR (Heavy Water, Zirc , 0 to 5% U)
[2]Template Burnup(MWd): 5
Template BOL Heavy Metal Mass (MT): 0 00034251
Template Decay Time: 65 years

Estimated Canister usage: 18"x15" 0 14

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	7 7980E-09	47,275 85	47,275 85	0 00E+00	3 69E-04	3 69E-04
Am-241	2 3560E-02	47,275 85	47,275 85	0 00E+00	1 11E+03	1 11E+03
Am-242m	3 0880E-06	47,275 85	47,275 85	0 00E+00	1.46E-01	1 46E-01
Am-243	2 0520E-06	47,275 85	47,275 85	0 00E+00	9 70E-02	9 70E-02
C-14	1 1222E-03	47,275 85	47,275.85	0 00E+00	5.31E+01	5 31E+01
Cl-36	8 3760E-11	47,275.85	47,275 85	0 00E+00	3 96E-06	3 96E-06
Cm-243	2 4260E-07	47,275 85	47,275 85	0 00E+00	1 15E-02	1 15E-02
Cm-244	3 3140E-06	47,275 85	47,275 85	0 00E+00	1 57E-01	1 57E-01
Co-60	1.2454E-03	47,275 85	47,275 85	0 00E+00	5 89E+01	5 89E+01
Cs-134	3 3040E-10	47,275 85	47,275 85	0 00E+00	1.56E-05	1 56E-05
Cs-135	7 9140E-06	47,275 85	47,275 85	0 00E+00	3 74E-01	3 74E-01
Cs-137	7 1580E-01	47,275 85	47,275 85	0 00E+00	3 38E+04	3.38E+04
Eu-154	6 0500E-04	47,275 85	47,275 85	0 00E+00	2 86E+01	2 86E+01
Eu-155	9 4860E-06	47,275 85	47,275 85	0 00E+00	4 48E-01	4 48E-01
Fe-55	1 9322E-08	47,275 85	47,275 85	0 00E+00	9 13E-04	9 13E-04
H-3	4 4180E-03	47,275 85	47,275 85	0 00E+00	2 09E+02	2 09E+02
I-129	7 5020E-07	47,275 85	47,275 85	0 00E+00	3.55E-02	3.55E-02
Kr-85	5 4940E-03	47,275 85	47,275 85	0 00E+00	2 60E+02	2 60E+02
Np-237	5 8040E-06	47,275 85	47,275 85	0 00E+00	2 74E-01	2 74E-01
Pa-231	1 1096E-08	47,275 85	47,275 85	0 00E+00	5 25E-04	5 25E-04
Pb-210	1.4712E-08	47,275 85	47,275 85	0 00E+00	6 96E-04	6 96E-04
Pm-147	3 5920E-07	47,275 85	47,275 85	0 00E+00	1 70E-02	1 70E-02
Pu-238	5 0700E-03	47,275 85	47,275 85	0 00E+00	2 40E+02	2 40E+02
Pu-239	1 8728E-02	47,275 85	47,275 85	0 00E+00	8 85E+02	8 85E+02
Pu-240	8 3280E-03	47,275 85	47,275 85	0 00E+00	3 94E+02	3 94E+02
Pu-241	3 4460E-02	47,275 85	47,275 85	0 00E+00	1 63E+03	1.63E+03
Pu-242	2 0380E-06	47,275 85	47,275 85	0 00E+00	9 63E-02	9 63E-02
Ra-226	2.9640E-08	47,275 85	47,275.85	0 00E+00	1 40E-03	1 40E-03
Ra-228	1 1922E-09	47,275 85	47,275 85	0 00E+00	5 64E-05	5 64E-05
Ru-106	3 5780E-19	47,275 85	47,275 85	0 00E+00	1.69E-14	1.69E-14
Se-79	1.2520E-05	47,275 85	47,275 85	0 00E+00	5 92E-01	5 92E-01
Sn-126	1 2050E-05	47,275 85	47,275 85	0 00E+00	5 70E-01	5 70E-01
Sr-90	6 1880E-01	47,275 85	47,275 85	0 00E+00	2 93E+04	2 93E+04
Tc-99	4 4120E-04	47,275 85	47,275 85	0 00E+00	2 09E+01	2 09E+01
Th-229	6 9280E-09	47,275 85	47,275 85	0 00E+00	3 28E-04	3.28E-04
Th-230	1.7084E-06	47,275 85	47,275 85	0 00E+00	8 08E-02	8 08E-02
Th-232	1 1926E-09	47,275 85	47,275 85	0 00E+00	5 64E-05	5 64E-05
Tl-208	3 4740E-08	47,275 85	47,275 85	0 00E+00	1.64E-03	1 64E-03
U-232	9 2940E-08	47,275 85	47,275 85	0 00E+00	4 39E-03	4 39E-03
U-233	9 1680E-07	47,275 85	47,275 85	0 00E+00	4 33E-02	4 33E-02
U-234	2 3440E-03	47,275 85	47,275 85	0 00E+00	1 11E+02	1 11E+02
U-235	-2 3296E-06	47,275 85	0 00	1 07E-02	0 00E+00	1.07E-02
U-236	2 6620E-05	47,275.85	47,275 85	0 00E+00	1.26E+00	1.26E+00
U-238	-1 3291E-07	47,275 85	0 00	3 12E-02	2.49E-02	3 12E-02
Y-90	6 1900E-01	47,275 85	47,275 85	0 00E+00	2 93E+04	2 93E+04
Other Radionuclides					3 24E+04	3 24E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 618E+15
0 0250	3 342E+14
0.0375	2 942E+14
0 0575	3.259E+14
0 0850	1.875E+14
0 1250	1.218E+14
0 2250	1.614E+14
0 3750	7 028E+13
0.5750	1.257E+15
0.8500	1.201E+13
1.2500	8 677E+12
1 7500	3 102E+11
2.2500	5.583E+07
2 7500	5.801E+07
3.5000	2.364E+05
5.0000	9 920E+04
7 0000	1 115E+04
11 0000	1.265E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.49E+02	4.49E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	HEAVY WATER	HEAVY WATER
Fuel Cladding	ZIRC	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %:		0 to 5

Basis for Parameter Differences:
This Template was used for the following reasons.
This fuel matches on all parameters except enrichment (unknown)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		47,275.85
Bounding		47,275.85

Basis for burnup used in estimate:
Nominal burnup set equal to bounding burnup
Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	32.83	
Bounding	32.83	

Estimated EOL HM/Given EOL HM: 2.59

[1]Reactor shutdown core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: CVTR FUEL
SNF ID #: 37
Fuel Units & Descr: 34 - ROD
Heavy Metal Mass: BOL=68 656kg, EOL=67 47kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1967
Estimates as of: 2030
Template: HFBR (Heavy Water, Zirc , 0 to 5%, U)
[2]Template Burnup(MWd): 5
Template BOL Heavy Metal Mass (MT): 0 00034251
Template Decay Time: 50 years

Estimated Canister usage
18"x15'
0 45

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 2320E-09	1,137 42	2,274 84	0 00E+00	7 09E-06	1 42E-05
Am-241	2 3540E-02	1,137 42	2,274 84	0 00E+00	2 68E+01	5 35E+01
Am-242m	3 3060E-06	1,137 42	2,274 84	0 00E+00	3 76E-03	7 52E-03
Am-243	2 0560E-06	1,137 42	2,274 84	0 00E+00	2 34E-03	4 68E-03
C-14	1 1244E-03	1,137 42	2,274 84	0 00E+00	1 28E+00	2 56E+00
Cl-36	8 3760E-11	1,137 42	2,274 84	0 00E+00	9 53E-08	1 91E-07
Cm-243	3 4960E-07	1,137 42	2,274 84	0 00E+00	3 98E-04	7 95E-04
Cm-244	5 8860E-06	1,137 42	2,274 84	0 00E+00	6 69E-03	1 34E-02
Co-60	8 9560E-03	1,137 42	2,274 84	0 00E+00	1 02E+01	2 04E+01
Cs-134	5 1180E-08	1,137 42	2,274 84	0 00E+00	5 82E-05	1 16E-04
Cs-135	7 9140E-06	1,137 42	2,274 84	0 00E+00	9 00E-03	1 80E-02
Cs-137	1 0122E+00	1,137 42	2,274 84	0 00E+00	1 15E+03	2 30E+03
Eu-154	2 0260E-03	1,137 42	2,274 84	0 00E+00	2 30E+00	4 61E+00
Eu-155	7 7180E-05	1,137.42	2,274 84	0 00E+00	8 78E-02	1 76E-01
Fe-55	1 0538E-06	1,137 42	2,274 84	0 00E+00	1 20E-03	2 40E-03
H-3	1 0256E-02	1,137.42	2,274 84	0 00E+00	1.17E+01	2.33E+01
I-129	7 5020E-07	1,137 42	2,274 84	0 00E+00	8 53E-04	1 71E-03
Kr-85	1 4492E-02	1,137 42	2,274 84	0 00E+00	1 65E+01	3 30E+01
Np-237	5 6900E-06	1,137 42	2,274 84	0 00E+00	6 47E-03	1 29E-02
Pa-231	9 4900E-09	1,137 42	2,274 84	0 00E+00	1 08E-05	2 16E-05
Pb-210	8 6720E-09	1,137 42	2,274 84	0 00E+00	9 86E-06	1 97E-05
Pm-147	1 8906E-05	1,137 42	2,274 84	0 00E+00	2.15E-02	4 30E-02
Pu-238	5 7080E-03	1,137 42	2,274 84	0 00E+00	6 49E+00	1.30E+01
Pu-239	1 8736E-02	1,137 42	2,274 84	0 00E+00	2.13E+01	4.26E+01
Pu-240	8.3420E-03	1,137 42	2,274 84	0 00E+00	9 49E+00	1.90E+01
Pu-241	7 0960E-02	1,137 42	2,274 84	0 00E+00	8 07E+01	1 61E+02
Pu-242	2 0400E-06	1,137 42	2,274 84	0 00E+00	2.32E-03	4 64E-03
Ra-226	1 9722E-08	1,137 42	2,274 84	0 00E+00	2.24E-05	4 49E-05
Ra-228	1 1912E-09	1,137 42	2,274 84	0 00E+00	1.35E-06	2.71E-06
Ru-106	1 0798E-14	1,137 42	2,274 84	0 00E+00	1.23E-11	2.46E-11
Se-79	1 2522E-05	1,137 42	2,274 84	0 00E+00	1 42E-02	2 85E-02
Sn-126	1 2052E-05	1,137 42	2,274 84	0 00E+00	1 37E-02	2 74E-02
Sr-90	8 8440E-01	1,137 42	2,274 84	0 00E+00	1 01E+03	2 01E+03
Tc-99	4 4120E-04	1,137 42	2,274 84	0 00E+00	5 02E-01	1 00E+00
Th-229	5 6400E-09	1,137 42	2,274 84	0.00E+00	6 42E-06	1.28E-05
Th-230	1 3922E-06	1,137 42	2,274 84	0 00E+00	1 58E-03	3.17E-03
Th-232	1 1926E-09	1,137 42	2,274 84	0 00E+00	1 36E-06	2 71E-06
Tl-208	4 0060E-08	1,137 42	2,274 84	0 00E+00	4 56E-05	9 11E-05
U-232	1 0738E-07	1,137 42	2,274 84	0 00E+00	1 22E-04	2 44E-04
U-233	9 1640E-07	1,137.42	2,274 84	0 00E+00	1 04E-03	2 08E-03
U-234	2 3440E-03	1,137.42	2,274 84	0 00E+00	2 67E+00	5 33E+00
U-235	-2.3296E-06	1,137.42	0 00	2 67E-03	2 09E-05	2 67E-03
U-236	2 6620E-05	1,137.42	2,274 84	0 00E+00	3 03E-02	6 06E-02
U-238	-1 3291E-07	1,137 42	0 00	2 27E-02	2.25E-02	2 27E-02
Y-90	8 8460E-01	1,137 42	2,274 84	0 00E+00	1.01E+03	2 01E+03
Other Radionuclides					1.10E+03	2 20E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 110E+14
0 0250	2.296E+13
0 0375	2 020E+13
0 0575	2.210E+13
0 0850	1 289E+13
0 1250	8 420E+12
0.2250	1 111E+13
0.3750	4 834E+12
0 5750	8 557E+13
0 8500	8 698E+11
1.2500	1 856E+12
1 7500	2 288E+10
2.2500	1 023E+07
2.7500	3.238E+06
3 5000	1 163E+04
5 0000	4 879E+03
7 0000	5 488E+02
11 0000	6.227E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 46E+01	2 93E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	HEAVY WATER	HEAVY WATER
Fuel Cladding	ZIRC OR SST	ZIRC
BOL HM Constituents.	U	U
BOL Enrichment %	1 8	0 to 5

Basis for Parameter Differences

This Template was used for the following reasons.
This fuel matches on all parameters except possibly cladding.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		1,137 42
Bounding		2,274 84

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 13	
Bounding	2.27	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: DR-3 (U3O8 LEU)(DENMARK)
SNF ID #: 1059
Fuel Units & Descr: 3 - 4 CONCENTRIC TUBES
Heavy Metal Mass: BOL=2.752kg EOL=2.517kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1997
Estimates as of: 2030
Template: HFBR (Heavy Water Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 15
Template BOL Heavy Metal Mass (MT): 0.00034251
Template Decay Time: 25 years

Estimated Canister usage
18"x10'
0.08

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	1.4973E-09	224.12	448.24	0.00E+00	3.36E-07	6.71E-07
Am-241	2.6120E-02	224.12	448.24	0.00E+00	5.85E+00	1.17E+01
Am-242m	8.7133E-06	224.12	448.24	0.00E+00	1.95E-03	3.91E-03
Am-243	6.3980E-06	224.12	448.24	0.00E+00	1.43E-03	2.87E-03
C-14	2.9600E-08	224.12	448.24	0.00E+00	6.63E-06	1.33E-05
Cl-36	5.9507E-35	224.12	448.24	0.00E+00	1.33E-32	2.67E-32
Cm-243	1.9560E-06	224.12	448.24	0.00E+00	4.38E-04	8.77E-04
Cm-244	9.0867E-05	224.12	448.24	0.00E+00	2.04E-02	4.07E-02
Co-60	8.4667E-06	224.12	448.24	0.00E+00	1.90E-03	3.80E-03
Cs-134	3.9760E-04	224.12	448.24	0.00E+00	8.91E-02	1.78E-01
Cs-135	4.8607E-06	224.12	448.24	0.00E+00	1.09E-03	2.18E-03
Cs-137	1.8020E+00	224.12	448.24	0.00E+00	4.04E+02	8.08E+02
Eu-154	1.3960E-02	224.12	448.24	0.00E+00	3.13E+00	6.26E+00
Eu-155	2.0313E-03	224.12	448.24	0.00E+00	4.55E-01	9.11E-01
Fe-55	3.7360E-04	224.12	448.24	0.00E+00	8.37E-02	1.67E-01
H-3	3.5233E-03	224.12	448.24	0.00E+00	7.90E-01	1.58E+00
I-129	7.1600E-07	224.12	448.24	0.00E+00	1.60E-04	3.21E-04
Kr-85	7.4133E-02	224.12	448.24	0.00E+00	1.66E+01	3.32E+01
Np-237	3.8020E-06	224.12	448.24	0.00E+00	8.52E-04	1.70E-03
Pa-231	3.7020E-09	224.12	448.24	0.00E+00	8.30E-07	1.66E-06
Pb-210	1.4067E-13	224.12	448.24	0.00E+00	3.15E-11	6.31E-11
Pm-147	1.2360E-02	224.12	448.24	0.00E+00	2.77E+00	5.54E+00
Pu-238	5.3133E-03	224.12	448.24	0.00E+00	1.19E+00	2.38E+00
Pu-239	1.0313E-02	224.12	448.24	0.00E+00	2.31E+00	4.62E+00
Pu-240	5.4153E-03	224.12	448.24	0.00E+00	1.21E+00	2.43E+00
Pu-241	2.9540E-01	224.12	448.24	0.00E+00	6.62E+01	1.32E+02
Pu-242	3.0713E-06	224.12	448.24	0.00E+00	6.88E-04	1.38E-03
Ra-226	5.9440E-13	224.12	448.24	0.00E+00	1.33E-10	2.66E-10
Ra-228	1.6733E-14	224.12	448.24	0.00E+00	3.75E-12	7.50E-12
Ru-106	2.7233E-07	224.12	448.24	0.00E+00	6.10E-05	1.22E-04
Se-79	1.2533E-05	224.12	448.24	0.00E+00	2.81E-03	5.62E-03
Sn-126	1.1393E-05	224.12	448.24	0.00E+00	2.55E-03	5.11E-03
Sr-90	1.6333E+00	224.12	448.24	0.00E+00	3.66E+02	7.32E+02
Tc-99	4.3533E-04	224.12	448.24	0.00E+00	9.76E-02	1.95E-01
Th-229	1.0827E-12	224.12	448.24	0.00E+00	2.43E-10	4.85E-10
Th-230	1.0793E-10	224.12	448.24	0.00E+00	2.42E-08	4.84E-08
Th-232	2.2773E-14	224.12	448.24	0.00E+00	5.10E-12	1.02E-11
Tl-208	7.3067E-09	224.12	448.24	0.00E+00	1.64E-06	3.28E-06
U-232	1.9833E-08	224.12	448.24	0.00E+00	4.45E-06	8.89E-06
U-233	6.0453E-10	224.12	448.24	0.00E+00	1.35E-07	2.71E-07
U-234	6.1000E-07	224.12	448.24	0.00E+00	1.37E-04	2.73E-04
U-235	-2.5335E-06	224.12	0.00	1.16E-03	5.97E-04	1.16E-03
U-236	1.3000E-05	224.12	448.24	0.00E+00	2.91E-03	5.83E-03
U-238	-1.4207E-08	224.12	0.00	7.44E-04	7.41E-04	7.44E-04
Y-90	1.6340E+00	224.12	448.24	0.00E+00	3.66E+02	7.32E+02
Other Radionuclides					3.84E+02	7.67E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	4.029E+13
0.0250	8.360E+12
0.0375	7.333E+12
0.0575	7.951E+12
0.0850	4.707E+12
0.1250	3.140E+12
0.2250	4.059E+12
0.3750	1.764E+12
0.5750	3.008E+13
0.8500	4.008E+11
1.2500	2.168E+11
1.7500	1.100E+10
2.2500	8.218E+05
2.7500	1.184E+05
3.5000	2.241E+03
5.0000	8.888E+02
7.0000	1.003E+02
11.0000	1.140E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.80E+00	9.61E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Drfferences:
Reactor Moderator	HEAVY WATER	HEAVY WATER	
Fuel Cladding	ALUM	ALUM	
BOL HM Constituents	U	U	
BOL Enrichment %	19.58291238	10 to 20	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		224.12	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		448.24	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.86	
Bounding	3.72	

Estimated EOL HM/Given EOL HM: 1.02

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: DR-3 (U3Si2 LEU)(DENMARK)
SNF ID #: 759
Fuel Units & Descr: 375 - 4 CONCENTRIC TUBES
Heavy Metal Mass: BOL=341 662kg, EOL=309 112kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1997
Estimates as of: 2030
Template: HFBR (Heavy Water, Alum , 10 to 20%, U)
[2]Template Burnup(MWd): 15
Template BOL Heavy Metal Mass (MT): 0 00034251
Template Decay Time: 25 years

Estimated Canister usage: 18"x10' 10 42

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 4973E-09	30,937 63	61,875 26	0 00E+00	4 63E-05	9 26E-05
Am-241	2 6120E-02	30,937 63	61,875 26	0 00E+00	8 08E+02	1 62E+03
Am-242m	8 7133E-06	30,937 63	61,875 26	0 00E+00	2.70E-01	5 39E-01
Am-243	6 3980E-06	30,937 63	61,875 26	0 00E+00	1 98E-01	3 96E-01
C-14	2 9600E-08	30,937 63	61,875 26	0 00E+00	9 16E-04	1 83E-03
Cl-36	5 9507E-35	30,937 63	61,875 26	0 00E+00	1 84E-30	3 68E-30
Cm-243	1 9560E-06	30,937 63	61,875 26	0 00E+00	6 05E-02	1 21E-01
Cm-244	9 0867E-05	30,937 63	61,875 26	0 00E+00	2 81E+00	5 62E+00
Co-60	8 4667E-06	30,937 63	61,875 26	0 00E+00	2 62E-01	5 24E-01
Cs-134	3 9760E-04	30,937 63	61,875.26	0 00E+00	1 23E+01	2 46E+01
Cs-135	4 8607E-06	30,937 63	61,875 26	0 00E+00	1 50E-01	3 01E-01
Cs-137	1 8020E+00	30,937 63	61,875.26	0 00E+00	5 57E+04	1.11E+05
Eu-154	1.3960E-02	30,937 63	61,875.26	0 00E+00	4 32E+02	8 64E+02
Eu-155	2 0313E-03	30,937 63	61,875 26	0 00E+00	6 28E+01	1.26E+02
Fe-55	3 7360E-04	30,937 63	61,875.26	0 00E+00	1 16E+01	2.31E+01
H-3	3.5233E-03	30,937 63	61,875.26	0 00E+00	1 09E+02	2.18E+02
I-129	7.1600E-07	30,937 63	61,875.26	0 00E+00	2.22E-02	4 43E-02
Kr-85	7 4133E-02	30,937 63	61,875.26	0 00E+00	2 29E+03	4 59E+03
Np-237	3 8020E-06	30,937 63	61,875.26	0 00E+00	1 18E-01	2 35E-01
Pa-231	3.7020E-09	30,937 63	61,875.26	0 00E+00	1 15E-04	2 29E-04
Pb-210	1 4067E-13	30,937 63	61,875.26	0 00E+00	4.35E-09	8 70E-09
Pm-147	1.2360E-02	30,937 63	61,875.26	0 00E+00	3 82E+02	7 65E+02
Pu-238	5.3133E-03	30,937 63	61,875.26	0 00E+00	1 64E+02	3.29E+02
Pu-239	1 0313E-02	30,937 63	61,875.26	0 00E+00	3 19E+02	6.38E+02
Pu-240	5 4153E-03	30,937 63	61,875.26	0 00E+00	1 68E+02	3 35E+02
Pu-241	2 9540E-01	30,937 63	61,875.26	0 00E+00	9 14E+03	1 83E+04
Pu-242	3 0713E-06	30,937 63	61,875.26	0 00E+00	9 50E-02	1.90E-01
Ra-226	5 9440E-13	30,937 63	61,875 26	0 00E+00	1 84E-08	3 68E-08
Ra-228	1 6733E-14	30,937.63	61,875.26	0 00E+00	5 18E-10	1 04E-09
Ru-106	2 7233E-07	30,937 63	61,875 26	0 00E+00	8 43E-03	1 69E-02
Se-79	1 2533E-05	30,937.63	61,875 26	0 00E+00	3 88E-01	7 76E-01
Sn-126	1 1393E-05	30,937 63	61,875 26	0 00E+00	3 52E-01	7 05E-01
Sr-90	1 6333E+00	30,937 63	61,875 26	0 00E+00	5 05E+04	1 01E+05
Tc-99	4 3533E-04	30,937 63	61,875 26	0 00E+00	1.35E+01	2 69E+01
Th-229	1 0827E-12	30,937 63	61,875 26	0 00E+00	3 35E-08	6 70E-08
Th-230	1 0793E-10	30,937 63	61,875.26	0 00E+00	3 34E-06	6 68E-06
Th-232	2 2773E-14	30,937 63	61,875 26	0 00E+00	7 05E-10	1 41E-09
Tl-208	7 3067E-09	30,937 63	61,875 26	0 00E+00	2.26E-04	4 52E-04
U-232	1 9833E-08	30,937 63	61,875 26	0 00E+00	6 14E-04	1 23E-03
U-233	6 0453E-10	30,937 63	61,875 26	0 00E+00	1 87E-05	3 74E-05
U-234	6 1000E-07	30,937 63	61,875 26	0 00E+00	1 89E-02	3 77E-02
U-235	-2 5335E-06	30,937 63	0 00	1 46E-01	6.75E-02	1 46E-01
U-236	1 3000E-05	30,937 63	61,875 26	0 00E+00	4 02E-01	8 04E-01
U-238	-1 4207E-08	30,937 63	0 00	9 21E-02	9.17E-02	9.21E-02
Y-90	1 6340E+00	30,937 63	61,875 26	0 00E+00	5 06E+04	1 01E+05
Other Radionuclides					5 29E+04	1 06E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5 562E+15
0 0250	1 154E+15
0 0375	1 012E+15
0 0575	1 098E+15
0 0850	6 497E+14
0 1250	4 335E+14
0.2250	5 603E+14
0 3750	2 435E+14
0 5750	4 152E+15
0 8500	5 533E+13
1.2500	2 993E+13
1 7500	1 519E+12
2.2500	1 134E+08
2 7500	1 634E+07
3 5000	3 092E+05
5 0000	1.227E+05
7 0000	1.385E+04
11 0000	1.573E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6 63E+02	1 33E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	HEAVY WATER	HEAVY WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19 7578539	10 to 20

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		30 937 63
Bounding		61 875 26

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	2 07	
Bounding	4 14	

Estimated EOL HM/Given EOL HM: 1 02

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: DR-3 (UALX HEU)(DENMARK)
SNF ID #: 714
Fuel Units & Descr: 88 - 4 CONCENTRIC TUBES
Heavy Metal Mass: BOL=14.529kg EOL=8 8kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1997
Estimates as of: 2030
Template: HFBR (Heavy Water Alum , 40 to 100%, U)
[2]Template Burnup(MWd): 164 6
Template BOL Heavy Metal Mass (MT): 0 000377
Template Decay Time: 25 years

Estimated Canister usage 18"x10': 2 44

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	5 4520E-10	5,276 81	10,553 63	0 00E+00	2 88E-06	5 75E-06
Am-241	9 2284E-03	5,276 81	10,553 63	0 00E+00	4 87E+01	9 74E+01
Am-242m	1.3390E-06	5,276 81	10,553 63	0 00E+00	7 07E-03	1 41E-02
Am-243	3 7084E-05	5,276 81	10,553 63	0 00E+00	1 96E-01	3 91E-01
C-14	2 6452E-08	5,276 81	10,553 63	0 00E+00	1.40E-04	2 79E-04
Cl-36	4 4441E-31	5,276 81	10,553 63	0 00E+00	2.35E-27	4 69E-27
Cm-243	5 0498E-06	5,276 81	10,553 63	0.00E+00	2 66E-02	5.33E-02
Cm-244	3 8451E-03	5,276 81	10,553 63	0 00E+00	2 03E+01	4 06E+01
Co-60	2.5225E-05	5,276 81	10,553 63	0 00E+00	1 33E-01	2 66E-01
Cs-134	1.9830E-03	5,276 81	10,553 63	0 00E+00	1 05E+01	2 09E+01
Cs-135	4.2564E-06	5,276 81	10,553 63	0 00E+00	2.25E-02	4 49E-02
Cs-137	1 8141E+00	5,276 81	10,553 63	0 00E+00	9 57E+03	1 91E+04
Eu-154	3 4733E-02	5,276 81	10,553 63	0 00E+00	1 83E+02	3 67E+02
Eu-155	7.1081E-03	5,276 81	10,553 63	0 00E+00	3 75E+01	7 50E+01
Fe-55	3 5790E-04	5,276 81	10,553 63	0 00E+00	1.89E+00	3 78E+00
H-3	3 4945E-03	5,276 81	10,553 63	0 00E+00	1 84E+01	3 69E+01
I-129	6 6403E-07	5,276 81	10,553 63	0 00E+00	3 50E-03	7 01E-03
Kr-85	7.8250E-02	5,276 81	10,553 63	0 00E+00	4 13E+02	8.26E+02
Np-237	3 1567E-05	5,276 81	10,553 63	0 00E+00	1 67E-01	3 33E-01
Pa-231	1 3372E-09	5,276 81	10,553 63	0 00E+00	7 06E-06	1 41E-05
Pb-210	3 0644E-11	5,276 81	10,553 63	0 00E+00	1.62E-07	3.23E-07
Pm-147	6 5188E-03	5,276 81	10,553 63	0 00E+00	3 44E+01	6 88E+01
Pu-238	1 4769E-01	5,276 81	10,553 63	0 00E+00	7.79E+02	1.56E+03
Pu-239	6 9502E-04	5,276 81	10,553 63	0 00E+00	3 67E+00	7.33E+00
Pu-240	3 7928E-04	5,276 81	10,553 63	0 00E+00	2 00E+00	4 00E+00
Pu-241	1.0565E-01	5,276 81	10,553 63	0 00E+00	5 57E+02	1 11E+03
Pu-242	3 0911E-06	5,276.81	10,553 63	0 00E+00	1 63E-02	3 26E-02
Ra-226	1 1081E-10	5,276.81	10,553 63	0 00E+00	5 85E-07	1 17E-06
Ra-228	2 1185E-14	5,276 81	10,553 63	0 00E+00	1.12E-10	2.24E-10
Ru-106	2.3621E-07	5,276 81	10,553 63	0 00E+00	1.25E-03	2.49E-03
Se-79	1 2339E-05	5,276 81	10,553 63	0 00E+00	6 51E-02	1.30E-01
Sn-126	1 0194E-05	5,276 81	10,553 63	0 00E+00	5 38E-02	1 08E-01
Sr-90	1 6932E+00	5,276 81	10,553 63	0 00E+00	8 93E+03	1 79E+04
Tc-99	3.8056E-04	5,276 81	10,553 63	0 00E+00	2 01E+00	4 02E+00
Th-229	9 1252E-12	5,276 81	10,553 63	0 00E+00	4 82E-08	9 63E-08
Th-230	1.5407E-08	5,276.81	10,553 63	0 00E+00	8 13E-05	1 63E-04
Th-232	2 8937E-14	5,276 81	10,553 63	0 00E+00	1.53E-10	3 05E-10
Tl-208	4 7272E-08	5,276 81	10,553 63	0 00E+00	2.49E-04	4 99E-04
U-232	1.2855E-07	5,276 81	10,553 63	0 00E+00	6 78E-04	1.36E-03
U-233	5 1470E-09	5,276 81	10,553 63	0.00E+00	2 72E-05	5 43E-05
U-234	5 6069E-05	5,276 81	10,553 63	0 00E+00	2 96E-01	5 92E-01
U-235	-2 8661E-06	5,276 81	0 00	2 79E-02	1.28E-02	2 79E-02
U-236	1.6701E-05	5,276 81	10,553 63	0 00E+00	8 81E-02	1.76E-01
U-238	-9 4194E-09	5,276 81	0 00	5 43E-04	4 94E-04	5 43E-04
Y-90	1 6932E+00	5,276 81	10,553 63	0 00E+00	8 93E+03	1.79E+04
Other Radionuclides					9 16E+03	1.83E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	9 894E+14
0 0250	2.036E+14
0 0375	1 798E+14
0 0575	1 918E+14
0 0850	1 154E+14
0 1250	8 010E+13
0.2250	9 963E+13
0.3750	4.313E+13
0 5750	7 152E+14
0 8500	1 409E+13
1.2500	9 507E+12
1.7500	3 935E+11
2.2500	2 121E+07
2 7500	1 823E+07
3.5000	6.259E+05
5 0000	2.653E+05
7 0000	3 043E+04
11 0000	3 486E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.37E+02	2.74E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	HEAVY WATER	HEAVY WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	88 87461392	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		5,276.81
Bounding		10,553.63

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 83	
Bounding	1 66	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: DRESDEN I THO2/UO2 (LEU)
SNF ID #: 44
Fuel Units & Descr: 1000 - ROD
Heavy Metal Mass: BOL= , EOL=2382.5kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: LWBR (Light Water, Zirc, 60 to 100%, Th and U)
[2]Template Burnup(MWd): 10269 14
Template BOL Heavy Metal Mass (MT): 0 45991251
Template Decay Time: 50 years

Estimated Canister usage: 18"x15": 5 00

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 0595E-04	2,318,560 61	2,318,560 61	0 00E+00	2 46E+02	2 46E+02
Am-241	2 4968E-04	2,318,560 61	2,318,560 61	0 00E+00	5 79E+02	5 79E+02
Am-242m	1 3847E-06	2,318,560 61	2,318,560 61	0 00E+00	3 21E+00	3.21E+00
Am-243	3.1103E-07	2,318,560 61	2,318,560 61	0 00E+00	7 21E-01	7 21E-01
C-14	9.2267E-05	2,318,560 61	2,318,560 61	0 00E+00	2 14E+02	2.14E+02
Cl-36	1 8103E-06	2,318,560 61	2,318,560 61	0 00E+00	4.20E+00	4.20E+00
Cm-243	2.1248E-07	2,318,560 61	2,318,560 61	0 00E+00	4 93E-01	4 93E-01
Cm-244	7 9666E-06	2,318,560 61	2,318,560 61	0 00E+00	1 85E+01	1 85E+01
Co-60	1 2143E-04	2,318,560 61	2,318,560 61	0 00E+00	2 82E+02	2 82E+02
Cs-134	1 6535E-07	2,318,560 61	2,318,560 61	0 00E+00	3 83E-01	3 83E-01
Cs-135	2 8639E-05	2,318,560 61	2,318,560 61	0 00E+00	6 64E+01	6 64E+01
Cs-137	1 0449E+00	2,318,560 61	2,318,560 61	0 00E+00	2 42E+06	2.42E+06
Eu-154	2 5679E-03	2,318,560 61	2,318,560 61	0 00E+00	5 95E+03	5 95E+03
Eu-155	8 1175E-05	2,318,560 61	2,318,560 61	0 00E+00	1 88E+02	1 88E+02
Fe-55	4 2194E-08	2,318,560 61	2,318,560.61	0 00E+00	9.78E-02	9 78E-02
H-3	9 1673E-04	2,318,560 61	2,318,560 61	0 00E+00	2 13E+03	2 13E+03
I-129	1 5853E-06	2,318,560 61	2,318,560 61	0 00E+00	3 68E+00	3 68E+00
Kr-85	2 3741E-02	2,318,560 61	2,318,560 61	0 00E+00	5 50E+04	5 50E+04
Np-237	1 2747E-07	2,318,560 61	2,318,560 61	0 00E+00	2 96E-01	2 96E-01
Pa-231	1.2007E-04	2,318,560 61	2,318,560 61	0 00E+00	2 78E+02	2 78E+02
Pb-210	1 8424E-08	2,318,560 61	2,318,560 61	0 00E+00	4 27E-02	4 27E-02
Pm-147	4 9829E-06	2,318,560 61	2,318,560 61	0.00E+00	1 16E+01	1.16E+01
Pu-238	3 7744E-04	2,318,560 61	2,318,560 61	0.00E+00	8 75E+02	8 75E+02
Pu-239	2.7510E-05	2,318,560 61	2,318,560 61	0 00E+00	6 38E+01	6 38E+01
Pu-240	1 6175E-05	2,318,560 61	2,318,560 61	0 00E+00	3 75E+01	3 75E+01
Pu-241	7.1379E-04	2,318,560 61	2,318,560 61	0 00E+00	1 65E+03	1 65E+03
Pu-242	4 0831E-08	2,318,560 61	2,318,560 61	0 00E+00	9 47E-02	9 47E-02
Ra-226	2 9038E-08	2,318,560 61	2,318 560 61	0 00E+00	6 73E-02	6 73E-02
Ra-228	4 6352E-06	2,318,560 61	2,318,560 61	0 00E+00	1.07E+01	1.07E+01
Ru-106	1 3321E-15	2,318 560 61	2,318,560 61	0 00E+00	3 09E-09	3 09E-09
Se-79	3 5407E-05	2,318,560 61	2,318,560 61	0 00E+00	8.21E+01	8.21E+01
Sn-126	3 9838E-05	2,318,560 61	2,318,560 61	0 00E+00	9.24E+01	9.24E+01
Sr-90	1 0449E+00	2,318,560 61	2,318,560 61	0 00E+00	2 42E+06	2 42E+06
Tc-99	3 2525E-04	2,318,560 61	2,318,560 61	0 00E+00	7.54E+02	7 54E+02
Th-229	8 2305E-05	2,318,560 61	2,318,560 61	0 00E+00	1 91E+02	1 91E+02
Th-230	1 2533E-06	2,318,560 61	2,318,560 61	0 00E+00	2 91E+00	2 91E+00
Th-232	-9 0328E-08	2,318,560 61	0 00	5 03E-01	2 94E-01	5 03E-01
Tl-208	1 2085E-02	2,318,560 61	2,318,560 61	0 00E+00	2 80E+04	2 80E+04
U-232	3.2729E-02	2,318,560 61	2,318,560 61	0.00E+00	7 59E+04	7 59E+04
U-233	-3 3244E-03	2,318,560 61	0 00	1 69E+03	0 00E+00	1 69E+03
U-234	8.1769E-04	2,318,560 61	2,318,560 61	0 00E+00	1 90E+03	1 90E+03
U-235	5 7813E-08	2,318,560 61	2,318,560 61	3.46E-04	1 34E-01	1 34E-01
U-236	1 3273E-07	2,318,560 61	2,318,560 61	0 00E+00	3 08E-01	3 08E-01
U-238	-3 1121E-10	2,318,560 61	0 00	2.21E-04	0 00E+00	2 21E-04
Y-90	1 0449E+00	2,318,560 61	2,318,560 61	0 00E+00	2 42E+06	2 42E+06
Other Radionuclides					2 84E+06	2 84E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1.341E+17
0 0250	2.756E+16
0 0375	2.355E+16
0 0575	2.575E+16
0 0850	1 666E+16
0 1250	1 019E+16
0.2250	1.505E+16
0.3750	5 942E+15
0 5750	9 154E+16
0 8500	1 575E+15
1.2500	4 791E+14
1 7500	1 253E+14
2.2500	2 791E+09
2.7500	9 838E+14
3 5000	3 385E+06
5 0000	1 048E+06
7 0000	7 466E+04
11 0000	5.506E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.68E+04	4 69E+04
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	SST	ZIRC
BOL HM Constituents	Th and U	Th and U
BOL Enrichment %		60 to 100

Basis for Parameter Drifferences:

This Template was used for the following reasons
This fuel matches on all parameters except cladding and enrichment (unknown)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		2,318 560 61
Bounding		2,318,560 61

Basis for burnup used in estimate:

Nominal burnup set equal to bounding burnup.
Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	21 79	
Bounding	21 79	

Estimated EOL HM/Given EOL HM: 1 28

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: DRESDEN UO2 (LEU)
SNF ID #: 49
Fuel Units & Descr: 72 - ROD
Heavy Metal Mass: BOL= ; EOL=162.382kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: Pathfinder (Light Water SST, 60 to 100%, U)
[2]Template Burnup(MWd): 6 01
Template BOL Heavy Metal Mass (MT): 0 00012882
Template Decay Time: 50 years

Estimated Canister usage: 18"x15': 0 36

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	3 4276E-08	153,393 39	153,393 39	0 00E+00	5 26E-03	5.26E-03
Am-241	1 1458E-04	153,393 39	153,393 39	0 00E+00	1 76E+01	1.76E+01
Am-242m	7 9468E-09	153,393 39	153,393 39	0 00E+00	1.22E-03	1.22E-03
Am-243	9 8386E-10	153,393 39	153,393 39	0 00E+00	1 51E-04	1 51E-04
C-14	2.2978E-04	153,393 39	153,393 39	0 00E+00	3 52E+01	3 52E+01
Cl-36	1.2261E-06	153,393 39	153,393 39	0 00E+00	1.88E-01	1 88E-01
Cm-243	1.7271E-10	153,393 39	153,393 39	0 00E+00	2.65E-05	2 65E-05
Cm-244	1.3058E-09	153,393 39	153,393 39	0 00E+00	2.00E-04	2 00E-04
Co-60	9 8636E-03	153,393 39	153,393 39	0 00E+00	1.51E+03	1 51E+03
Cs-134	1 9617E-08	153,393 39	153,393.39	0 00E+00	3 01E-03	3 01E-03
Cs-135	3 0316E-05	153,393.39	153,393.39	0 00E+00	4 65E+00	4 65E+00
Cs-137	1 0263E+00	153,393 39	153,393 39	0 00E+00	1 57E+05	1.57E+05
Eu-154	2 0017E-04	153,393 39	153,393 39	0 00E+00	3 07E+01	3.07E+01
Eu-155	8 5957E-05	153,393 39	153,393 39	0 00E+00	1 32E+01	1.32E+01
Fe-55	2.2646E-05	153,393 39	153,393 39	0 00E+00	3 47E+00	3 47E+00
H-3	1 0835E-03	153,393 39	153,393 39	0 00E+00	1 66E+02	1 66E+02
I-129	7.3195E-07	153,393 39	153,393 39	0 00E+00	1.12E-01	1 12E-01
Kr-85	1.5661E-02	153,393 39	153,393 39	0 00E+00	2 40E+03	2 40E+03
Np-237	1 1494E-06	153,393 39	153,393 39	0 00E+00	1.76E-01	1 76E-01
Pa-231	5 8070E-08	153,393 39	153,393 39	0 00E+00	8 91E-03	8 91E-03
Pb-210	1.2985E-12	153,393.39	153,393.39	0 00E+00	1 99E-07	1.99E-07
Pm-147	2 2196E-05	153,393.39	153,393.39	0 00E+00	3 40E+00	3 40E+00
Pu-238	2 6223E-04	153,393.39	153,393.39	0 00E+00	4 02E+01	4.02E+01
Pu-239	6 6739E-04	153,393.39	153 393 39	0 00E+00	1 02E+02	1.02E+02
Pu-240	8 6705E-05	153,393 39	153,393.39	0 00E+00	1 33E+01	1.33E+01
Pu-241	3 4759E-04	153,393 39	153,393.39	0 00E+00	5 33E+01	5 33E+01
Pu-242	1 9717E-09	153,393 39	153,393 39	0.00E+00	3 02E-04	3 02E-04
Ra-226	3 0000E-12	153,393 39	153,393 39	0 00E+00	4 60E-07	4 60E-07
Ra-228	8 3328E-12	153,393 39	153,393 39	0 00E+00	1.28E-06	1.28E-06
Ru-106	6 1464E-15	153,393 39	153,393 39	0 00E+00	9 43E-10	9 43E-10
Se-79	1.3221E-05	153,393 39	153,393 39	0 00E+00	2.03E+00	2 03E+00
Sn-126	1 1491E-05	153,393 39	153,393 39	0 00E+00	1.76E+00	1 76E+00
Sr-90	9 5541E-01	153,393 39	153,393 39	0 00E+00	1.47E+05	1.47E+05
Tc-99	4 6656E-04	153,393 39	153,393 39	0 00E+00	7.16E+01	7.16E+01
Th-229	1 9085E-11	153,393.39	153,393.39	0 00E+00	2 93E-06	2 93E-06
Th-230	2 1913E-10	153,393.39	153,393.39	0 00E+00	3 36E-05	3 36E-05
Th-232	8 3478E-12	153,393.39	153,393 39	0 00E+00	1.28E-06	1 28E-06
Tl-208	1 8752E-08	153,393 39	153,393 39	0 00E+00	2 88E-03	2 88E-03
U-232	5 0782E-08	153,393 39	153,393 39	0 00E+00	7.79E-03	7.79E-03
U-233	3.2596E-09	153,393 39	153,393 39	0 00E+00	5.00E-04	5 00E-04
U-234	3 9817E-07	153,393 39	153,393 39	0 00E+00	6 11E-02	6.11E-02
U-235	-2 7761E-06	153,393 39	0 00	6 56E-01	2.30E-01	6.56E-01
U-236	1.6190E-05	153,393 39	153,393 39	0 00E+00	2.48E+00	2 48E+00
U-238	-2 8547E-09	153,393 39	0 00	7 09E-03	6 65E-03	7 09E-03
Y-90	9 5557E-01	153,393 39	153,393.39	0 00E+00	1 47E+05	1.47E+05
Other Radionuclides					1.87E+05	1 87E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7 998E+15
0 0250	1 662E+15
0 0375	1.441E+15
0 0575	1.550E+15
0 0850	9.363E+14
0 1250	6 074E+14
0.2250	8 069E+14
0 3750	3.520E+14
0 5750	5.860E+15
0.8500	5 786E+13
1.2500	1 318E+14
1 7500	1 490E+12
2.2500	7 550E+08
2 7500	1 028E+08
3 5000	8 989E+03
5 0000	3 711E+03
7 0000	4 099E+02
11 0000	4 601E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 79E+03	1.79E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	SST	SST
BOL HM Constituents	U	U
BOL Enrichment %		60 to 100

Basis for Parameter Drfferences:
This Template was used for the following reasons
This fuel matches on all parameters except enrichment (unknown)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		153,393.39
Bounding		153,393.39

Basis for burnup used in estimate
Nominal burnup set equal to bounding burnup
Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	10 12	
Bounding	10 12	

Estimated EOL HM/Given EOL HM: 1 02

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: EBWR (6% UO2) LEU
SNF ID #: 65
Fuel Units & Descr: 61 - 6 FLAT PLATES
Heavy Metal Mass: BOL=1636 02kg, EOL=1603.519kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: PWR (Light Water, Zirc, 0 to 5%, U)
[2]Template Burnup(MWd): 61 92
Template BOL Heavy Metal Mass (MT): 0 00176911
Template Decay Time: 50 years

Estimated Canister usage 18"x10": 5 08

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	1 0733E-09	30,906.72	61,813 45	0 00E+00	3.32E-05	6 63E-05
Am-241	1 4751E-01	30,906.72	61,813 45	0 00E+00	4.56E+03	9 12E+03
Am-242m	2 6809E-04	30,906.72	61,813 45	0 00E+00	8.29E+00	1 66E+01
Am-243	6 2484E-04	30,906 72	61,813 45	0 00E+00	1 93E+01	3 86E+01
C-14	4 7820E-05	30,906 72	61,813 45	0 00E+00	1 48E+00	2 96E+00
Cl-36	8 0297E-07	30,906 72	61,813 45	0 00E+00	2 48E-02	4 96E-02
Cm-243	1 7426E-04	30,906 72	61,813 45	0 00E+00	5 39E+00	1 08E+01
Cm-244	2 7616E-02	30,906 72	61,813 45	0 00E+00	8 54E+02	1 71E+03
Co-60	3 5610E-04	30,906 72	61,813.45	0 00E+00	1 10E+01	2 20E+01
Cs-134	2 6260E-07	30,906 72	61,813.45	0 00E+00	8.12E-03	1 62E-02
Cs-135	1 4433E-05	30,906 72	61,813.45	0 00E+00	4 46E-01	8 92E-01
Cs-137	9 8870E-01	30,906 72	61,813 45	0 00E+00	3 06E+04	6 11E+04
Eu-154	6 0320E-03	30,906 72	61,813 45	0 00E+00	1 86E+02	3 73E+02
Eu-155	2 1770E-04	30,906 72	61,813 45	0 00E+00	6 73E+00	1 35E+01
Fe-55	7 9296E-07	30,906 72	61,813 45	0 00E+00	2 45E-02	4 90E-02
H-3	8 9486E-03	30,906 72	61,813 45	0.00E+00	2 77E+02	5 53E+02
I-129	9 8288E-07	30,906 72	61,813 45	0 00E+00	3 04E-02	6 08E-02
Kr-85	1 0707E-02	30,906 72	61,813 45	0 00E+00	3 31E+02	6 62E+02
Np-237	1 1927E-05	30,906 72	61,813 45	0 00E+00	3 69E-01	7 37E-01
Pa-231	1 4703E-09	30,906 72	61,813 45	0 00E+00	4 54E-05	9 09E-05
Pb-210	1 6828E-10	30,906 72	61,813 45	0 00E+00	5.20E-06	1 04E-05
Pm-147	6.9606E-06	30,906 72	61,813 45	0 00E+00	2 15E-01	4 30E-01
Pu-238	6 6263E-02	30,906 72	61,813 45	0 00E+00	2 05E+03	4 10E+03
Pu-239	1.1618E-02	30,906 72	61 813 45	0 00E+00	3 59E+02	7.18E+02
Pu-240	1 5142E-02	30,906 72	61,813 45	0 00E+00	4 68E+02	9 36E+02
Pu-241	4 3766E-01	30,906.72	61,813 45	0 00E+00	1.35E+04	2.71E+04
Pu-242	6.4260E-05	30,906.72	61,813 45	0 00E+00	1 99E+00	3 97E+00
Ra-226	3 8501E-10	30,906.72	61,813 45	0 00E+00	1 19E-05	2.38E-05
Ra-228	5.2955E-12	30,906.72	61,813 45	0 00E+00	1 64E-07	3.27E-07
Ru-106	2 0413E-14	30,906.72	61,813 45	0 00E+00	6 31E-10	1.26E-09
Se-79	1 2376E-05	30,906.72	61,813 45	0 00E+00	3 82E-01	7 65E-01
Sn-126	2 5210E-05	30,906 72	61,813 45	0 00E+00	7 79E-01	1.56E+00
Sr-90	6 4163E-01	30,906.72	61,813 45	0 00E+00	1.98E+04	3 97E+04
Tc-99	3 9357E-04	30,906 72	61,813.45	0 00E+00	1.22E+01	2 43E+01
Th-229	1 5644E-10	30,906 72	61,813.45	0 00E+00	4 84E-06	9 67E-06
Th-230	2 7972E-08	30,906 72	61,813.45	0 00E+00	8 65E-04	1.73E-03
Th-232	5 3036E-12	30,906 72	61,813 45	0 00E+00	1 64E-07	3.28E-07
Tl-208	1 5136E-07	30,906 72	61,813 45	0 00E+00	4 68E-03	9.36E-03
U-232	4 1005E-07	30,906 72	61,813 45	0.00E+00	1.27E-02	2.53E-02
U-233	2 5856E-08	30,906 72	61,813 45	0 00E+00	7 99E-04	1 60E-03
U-234	5 2665E-05	30,906 72	61,813 45	0 00E+00	1 63E+00	3.26E+00
U-235	-1 4487E-06	30,906 72	0 00	2.11E-01	1 66E-01	2.11E-01
U-236	7 5888E-06	30,906 72	61,813 45	0 00E+00	2.35E-01	4 69E-01
U-238	-2 6129E-07	30,906 72	0 00	5 17E-01	5 09E-01	5 17E-01
Y-90	6 4180E-01	30,906 72	61,813 45	0 00E+00	1 98E+04	3 97E+04
Other Radionuclides					2 95E+04	5 89E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2.352E+15
0 0250	4 714E+14
0 0375	4 442E+14
0 0575	5 558E+14
0 0850	2.597E+14
0 1250	1 728E+14
0.2250	2.217E+14
0 3750	9 575E+13
0 5750	2.255E+15
0 8500	2.202E+13
1.2500	1 401E+13
1 7500	6 160E+11
2.2500	1 012E+08
2.7500	3.568E+08
3 5000	2.546E+07
5 0000	1 088E+07
7 0000	1.253E+06
11 0000	1 439E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 59E+02	1 12E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %	5 973154429	0 to 5

Basis for Parameter Differences:

This Template was used for the following reasons:
This fuel matches PWR Template on all but one parameter (enrichment) making PWR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		30,906 72
Bounding	2 617 63	61 813 45

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.54	
Bounding	1 08	23 61

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: EBWR (FUEL FOLLOWER) HEU
SNF ID #: 740
Fuel Units & Descr: 4 - CANISTER OF SCRAP
Heavy Metal Mass: BOL=1 76kg EOL=1 728kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: Pathfinder (Light Water, SST, 60 to 100%, U)
[2]Template Burnup(MWd): 6.01
Template BOL Heavy Metal Mass (MT): 0.00012882
Template Decay Time: 50 years

Estimated Canister usage: HIC = 1 00

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Actvity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	3 4276E-08	29 85	59 70	0 00E+00	1 02E-06	2 05E-06
Am-241	1 1458E-04	29 85	59 70	0 00E+00	3 42E-03	6 84E-03
Am-242m	7 9468E-09	29 85	59 70	0 00E+00	2 37E-07	4.74E-07
Am-243	9 8386E-10	29 85	59 70	0 00E+00	2 94E-08	5.87E-08
C-14	2.2978E-04	29 85	59 70	0 00E+00	6 86E-03	1.37E-02
Cl-36	1.2261E-06	29 85	59 70	0.00E+00	3 66E-05	7.32E-05
Cm-243	1 7271E-10	29 85	59 70	0 00E+00	5 16E-09	1 03E-08
Cm-244	1 3058E-09	29 85	59 70	0 00E+00	3 90E-08	7 80E-08
Co-60	9 8636E-03	29 85	59 70	0 00E+00	2 94E-01	5 89E-01
Cs-134	1 9617E-08	29 85	59 70	0 00E+00	5 86E-07	1 17E-06
Cs-135	3 0316E-05	29 85	59 70	0 00E+00	9 05E-04	1 81E-03
Cs-137	1 0263E+00	29 85	59 70	0 00E+00	3 06E+01	6 13E+01
Eu-154	2 0017E-04	29 85	59 70	0 00E+00	5.98E-03	1.20E-02
Eu-155	8 5957E-05	29 85	59 70	0 00E+00	2.57E-03	5.13E-03
Fe-55	2.2646E-05	29 85	59 70	0 00E+00	6 76E-04	1.35E-03
H-3	1.0835E-03	29 85	59 70	0 00E+00	3.23E-02	6 47E-02
I-129	7.3195E-07	29 85	59 70	0 00E+00	2 18E-05	4.37E-05
Kr-85	1 5661E-02	29 85	59 70	0 00E+00	4 67E-01	9 35E-01
Np-237	1 1494E-06	29 85	59 70	0 00E+00	3 43E-05	6 86E-05
Pa-231	5 8070E-08	29 85	59 70	0 00E+00	1 73E-06	3 47E-06
Pb-210	1.2985E-12	29 85	59 70	0 00E+00	3 88E-11	7 75E-11
Pm-147	2 2196E-05	29 85	59 70	0 00E+00	6 63E-04	1 33E-03
Pu-238	2 6223E-04	29 85	59 70	0 00E+00	7 83E-03	1.57E-02
Pu-239	6 6739E-04	29 85	59 70	0 00E+00	1.99E-02	3 98E-02
Pu-240	8 6705E-05	29 85	59 70	0 00E+00	2.59E-03	5 18E-03
Pu-241	3 4759E-04	29 85	59.70	0 00E+00	1.04E-02	2.08E-02
Pu-242	1 9717E-09	29 85	59 70	0 00E+00	5 89E-08	1.18E-07
Ra-226	3 0000E-12	29 85	59 70	0 00E+00	8 96E-11	1 79E-10
Ra-228	8 3328E-12	29 85	59 70	0 00E+00	2 49E-10	4 97E-10
Ru-106	6.1464E-15	29 85	59 70	0 00E+00	1 83E-13	3 67E-13
Se-79	1.3221E-05	29 85	59 70	0 00E+00	3 95E-04	7 89E-04
Sn-126	1.1491E-05	29 85	59 70	0 00E+00	3 43E-04	6 86E-04
Sr-90	9 5541E-01	29 85	59 70	0 00E+00	2 85E+01	5 70E+01
Tc-99	4 6656E-04	29 85	59 70	0.00E+00	1 39E-02	2 79E-02
Th-229	1 9085E-11	29 85	59 70	0 00E+00	5 70E-10	1 14E-09
Th-230	2 1913E-10	29 85	59 70	0 00E+00	6 54E-09	1.31E-08
Th-232	8 3478E-12	29 85	59 70	0 00E+00	2 49E-10	4 98E-10
Tl-208	1 8752E-08	29 85	59 70	0 00E+00	5 60E-07	1.12E-06
U-232	5 0782E-08	29 85	59 70	0 00E+00	1.52E-06	3 03E-06
U-233	3 2596E-09	29.85	59 70	0 00E+00	9 73E-08	1 95E-07
U-234	3 9817E-07	29 85	59 70	0 00E+00	1 19E-05	2 38E-05
U-235	-2 7761E-06	29 85	0 00	3 56E-03	3 48E-03	3 56E-03
U-236	1 6190E-05	29 85	59 70	0 00E+00	4 83E-04	9 67E-04
U-238	-2 8547E-09	29 85	0 00	3 76E-05	3 76E-05	3 76E-05
Y-90	9.5557E-01	29 85	59 70	0 00E+00	2 85E+01	5 70E+01
Other Radionuclides					3 64E+01	7.28E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 113E+12
0 0250	6 469E+11
0 0375	5 609E+11
0 0575	6 033E+11
0 0850	3 644E+11
0 1250	2.364E+11
0 2250	3 141E+11
0 3750	1.370E+11
0 5750	2.281E+12
0 8500	2.252E+10
1.2500	5 129E+10
1 7500	5 798E+08
2.2500	2 939E+05
2 7500	4 003E+04
3 5000	3 796E+00
5 0000	1.569E+00
7 0000	1 736E-01
11 0000	1.950E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 48E-01	6.97E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	SST
BOL HM Constituents	U	U
BOL Enrichment %	93.636	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons.
This fuel matches Pathfinder Template on all but one parameter (cladding but substituting Stainless Steel is a good conservative assumption)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		29.85
Bounding		59 70

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 36	
Bounding	0 73	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name:	EBWR (MOX)	[1]Fuel decay start date:	1966
SNF ID #:	63	Estimates as of:	2030
Fuel Units & Descr:	25 - 6 FLAT PLATES	Template:	(Worst Case)
Heavy Metal Mass	BOL=986kg, EOL=932.562kg	[2]Template Burnup(MWd):	62 5
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT):	0 00186865
		Template Decay Time	50 years

Estimated Canister usage: 18"x10': 2 08

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 5200E-06	50,784 46	101,568 92	0 00E+00	1 28E-01	2 56E-01
Am-241	8 6432E+00	50,784 46	101,568 92	0 00E+00	4 39E+05	8 78E+05
Am-242m	1 5728E-02	50,784 46	101,568 92	0 00E+00	7.99E+02	1 60E+03
Am-243	1 6288E-02	50,784 46	101,568 92	0 00E+00	8.27E+02	1 65E+03
C-14	1.2068E-01	50,784 46	101,568 92	0 00E+00	6.13E+03	1 23E+04
Cl-36	2.2849E-03	50,784 46	101,568 92	0 00E+00	1.16E+02	2 32E+02
Cm-243	6 0144E-04	50,784 46	101,568 92	0 00E+00	3 05E+01	6 11E+01
Cm-244	9 4880E-02	50,784 46	101,568 92	0 00E+00	4 82E+03	9 64E+03
Co-60	3 9052E+00	50,784 46	101,568 92	0 00E+00	1 98E+05	3 97E+05
Cs-134	2 2139E-06	50,784 46	101,568 92	0 00E+00	1.12E-01	2 25E-01
Cs-135	4 3976E-04	50,784 46	101,568 92	0 00E+00	2.23E+01	4 47E+01
Cs-137	1 4887E+01	50,784 46	101,568 92	0 00E+00	7 56E+05	1 51E+06
Eu-154	3 7342E-01	50,784 46	101,568 92	0 00E+00	1 90E+04	3 79E+04
Eu-155	8 4893E-03	50,784 46	101,568 92	0 00E+00	4 31E+02	8 62E+02
Fe-55	5 3750E-03	50,784 46	101,568 92	0 00E+00	2 73E+02	5 46E+02
H-3	1 0472E-01	50,784 46	101,568 92	0 00E+00	5 32E+03	1 06E+04
I-129	1 0618E-05	50,784 46	101,568 92	0 00E+00	5 39E-01	1.08E+00
Kr-85	2 2717E-01	50,784 46	101,568 92	0 00E+00	1 15E+04	2.31E+04
Np-237	1 6400E-04	50,784 46	101,568 92	0 00E+00	8 33E+00	1.67E+01
Pa-231	2 8688E-06	50,784 46	101,568 92	0 00E+00	1 46E-01	2 91E-01
Pb-210	4 7312E-08	50,784 46	101,568 92	0 00E+00	2 40E-03	4 81E-03
Pm-147	3 2198E-04	50,784 46	101,568 92	0 00E+00	1 64E+01	3.27E+01
Pu-238	-1 1924E+00	50,784 46	0 00	1 27E+05	6 61E+04	1.27E+05
Pu-239	-4 8600E-02	50,784 46	0 00	1 53E+04	1 29E+04	1.53E+04
Pu-240	-3 0127E-01	50,784 46	0 00	1 96E+04	4 28E+03	1 96E+04
Pu-241	-1 2917E+02	50,784 46	0 00	5 04E+06	0 00E+00	5 04E+06
Pu-242	-1 1381E-04	50,784 46	0 00	8 47E+01	7 90E+01	8.47E+01
Ra-226	1 0760E-07	50,784 46	101,568.92	0 00E+00	5 46E-03	1 09E-02
Ra-228	6 0160E-07	50,784 46	101,568.92	0 00E+00	3 06E-02	6 11E-02
Ru-106	1 3388E-13	50,784 46	101,568.92	0 00E+00	6 80E-09	1.36E-08
Se-79	1 9179E-04	50,784 46	101,568.92	0 00E+00	9 74E+00	1 95E+01
Sn-126	1 6669E-04	50,784 46	101,568 92	0 00E+00	8 47E+00	1 69E+01
Sr-90	1 3859E+01	50,784 46	101,568 92	0.00E+00	7 04E+05	1 41E+06
Tc-99	6 7678E-03	50,784 46	101,568 92	0 00E+00	3 44E+02	6 87E+02
Th-229	2.2592E-06	50,784 46	101,568 92	0 00E+00	1 15E-01	2.29E-01
Th-230	7 5955E-06	50,784 46	101,568 92	0 00E+00	3 86E-01	7 71E-01
Th-232	6 0208E-07	50,784 46	101,568 92	0 00E+00	3 06E-02	6.12E-02
Tl-208	7 5795E-05	50,784 46	101,568 92	0 00E+00	3 85E+00	7.70E+00
U-232	2 0521E-04	50,784 46	101,568 92	0 00E+00	1 04E+01	2 08E+01
U-233	3 6128E-04	50,784 46	101,568 92	0 00E+00	1 83E+01	3 67E+01
U-234	1.2788E-02	50,784 46	101,568 92	0 00E+00	6 49E+02	1 30E+03
U-235	5 7486E-04	50,784 46	101,568 92	4.24E-01	2 96E+01	5 88E+01
U-236	2.3485E-04	50,784 46	101,568 92	0 00E+00	1.19E+01	2 39E+01
U-238	1.1581E-04	50,784 46	101,568 92	5 28E-02	5 93E+00	1 18E+01
Y-90	1 3861E+01	50,784 46	101,568 92	0 00E+00	7.04E+05	1 41E+06
Other Radionuclides					2 61E+06	5 22E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8 689E+16
0 0250	1 700E+16
0 0375	1 438E+16
0 0575	2 715E+16
0 0850	9 101E+15
0 1250	6 440E+15
0 2250	7 877E+15
0 3750	3 410E+15
0 5750	5 642E+16
0 8500	1.236E+15
1 2500	3 029E+16
1 7500	3 640E+13
2.2500	1 574E+11
2.7500	2.710E+11
3 5000	1 621E+08
5 0000	6 851E+07
7 0000	7 798E+06
11 0000	8 893E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 00E+04	5 99E+04
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	(Worst Case)
Fuel Cladding	ZIRC	SST/Inconel
BOL HM Constituents	Pu and U	U, Th, & Pu
BOL Enrichment %	0.222222216	0 to 100

Basis for Parameter Differences:

This fuel didn't closely match any existing templates, therefore the worst case template was used.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		50 784 46
Bounding		101 568 92

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed.

Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.54	
Bounding	3.08	

Estimated EOL HM/Given EOL HM: 34.51

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: EBWR (NORMAL UO2)
SNF ID #: 60
Fuel Units & Descr: 51 - 6 FLAT PLATES
Heavy Metal Mass: BOL=1358 64kg EOL=1357.824kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: PWR (Light Water Zirc 0 to 5% U)
[2]Template Burnup(MWd): 61.92
Template BOL Heavy Metal Mass (MT): 0 00176911
Template Decay Time: 50 years

Estimated Canister usage: 18"x10' = 4 25

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	1 0733E-09	775 98	1,551 95	0 00E+00	8 33E-07	1 67E-06
Am-241	1 4751E-01	775 98	1,551 95	0 00E+00	1 14E+02	2.29E+02
Am-242m	2.6809E-04	775 98	1,551.95	0 00E+00	2 08E-01	4 16E-01
Am-243	6.2484E-04	775 98	1,551.95	0 00E+00	4 85E-01	9 70E-01
C-14	4 7820E-05	775 98	1,551.95	0 00E+00	3 71E-02	7 42E-02
Cl-36	8 0297E-07	775 98	1,551.95	0 00E+00	6.23E-04	1 25E-03
Cm-243	1 7426E-04	775 98	1,551 95	0 00E+00	1.35E-01	2 70E-01
Cm-244	2 7616E-02	775 98	1,551 95	0 00E+00	2.14E+01	4 29E+01
Co-60	3 5610E-04	775 98	1,551 95	0 00E+00	2 76E-01	5 53E-01
Cs-134	2 6260E-07	775 98	1,551 95	0.00E+00	2 04E-04	4 08E-04
Cs-135	1 4433E-05	775.98	1,551 95	0 00E+00	1 12E-02	2.24E-02
Cs-137	9 8870E-01	775 98	1,551 95	0 00E+00	7 67E+02	1.53E+03
Eu-154	6 0320E-03	775 98	1,551 95	0 00E+00	4 68E+00	9 36E+00
Eu-155	2 1770E-04	775 98	1,551 95	0 00E+00	1 69E-01	3 38E-01
Fe-55	7 9296E-07	775 98	1,551 95	0 00E+00	6 15E-04	1 23E-03
H-3	8 9486E-03	775 98	1,551 95	0 00E+00	6 94E+00	1 39E+01
I-129	9 8288E-07	775 98	1,551 95	0 00E+00	7 63E-04	1 53E-03
Kr-85	1 0707E-02	775 98	1,551.95	0 00E+00	8 31E+00	1 66E+01
Np-237	1 1927E-05	775 98	1,551.95	0 00E+00	9.25E-03	1 85E-02
Pa-231	1 4703E-09	775 98	1,551 95	0 00E+00	1 14E-06	2.28E-06
Pb-210	1 6828E-10	775 98	1,551 95	0 00E+00	1.31E-07	2 61E-07
Pm-147	6 9606E-06	775 98	1,551 95	0.00E+00	5 40E-03	1 08E-02
Pu-238	6 6263E-02	775 98	1,551 95	0 00E+00	5 14E+01	1 03E+02
Pu-239	1 1618E-02	775 98	1,551 95	0 00E+00	9 02E+00	1 80E+01
Pu-240	1.5142E-02	775 98	1,551 95	0 00E+00	1 17E+01	2 35E+01
Pu-241	4 3766E-01	775 98	1,551 95	0 00E+00	3 40E+02	6 79E+02
Pu-242	6 4260E-05	775 98	1,551 95	0 00E+00	4 99E-02	9 97E-02
Ra-226	3 8501E-10	775 98	1,551 95	0 00E+00	2 99E-07	5 98E-07
Ra-228	5.2955E-12	775 98	1,551.95	0 00E+00	4 11E-09	8.22E-09
Ru-106	2 0413E-14	775 98	1,551.95	0 00E+00	1.58E-11	3.17E-11
Se-79	1.2376E-05	775 98	1,551.95	0 00E+00	9 60E-03	1.92E-02
Sn-126	2 5210E-05	775 98	1,551.95	0 00E+00	1 96E-02	3 91E-02
Sr-90	6 4163E-01	775 98	1,551 95	0 00E+00	4 98E+02	9 96E+02
Tc-99	3 9357E-04	775 98	1,551 95	0 00E+00	3 05E-01	6 11E-01
Th-229	1 5644E-10	775 98	1,551 95	0 00E+00	1 21E-07	2 43E-07
Th-230	2 7972E-08	775 98	1,551 95	0 00E+00	2 17E-05	4 34E-05
Th-232	5 3036E-12	775.98	1,551 95	0 00E+00	4 12E-09	8 23E-09
Tl-208	1.5136E-07	775 98	1,551 95	0 00E+00	1.17E-04	2.35E-04
U-232	4 1005E-07	775 98	1,551 95	0 00E+00	3 18E-04	6 36E-04
U-233	2.5856E-08	775 98	1,551 95	0 00E+00	2 01E-05	4 01E-05
U-234	5.2665E-05	775 98	1,551 95	0 00E+00	4 09E-02	8 17E-02
U-235	-1 4487E-06	775 98	0 00	2 09E-02	1.98E-02	2.09E-02
U-236	7.5888E-06	775 98	1,551.95	0 00E+00	5 89E-03	1 18E-02
U-238	-2 6129E-07	775 98	0 00	4 53E-01	4 53E-01	4 53E-01
Y-90	6 4180E-01	775 98	1,551.95	0 00E+00	4 98E+02	9 96E+02
Other Radionuclides					7.39E+02	1 48E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5.906E+13
0 0250	1 183E+13
0 0375	1 115E+13
0 0575	1.395E+13
0 0850	6 520E+12
0 1250	4.338E+12
0 2250	5 567E+12
0 3750	2 404E+12
0 5750	5 661E+13
0.8500	5.528E+11
1.2500	3.518E+11
1 7500	1.547E+10
2.2500	2.546E+06
2 7500	8 962E+06
3 5000	6 416E+05
5 0000	2 742E+05
7 0000	3 159E+04
11 0000	3 627E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.40E+01	2 81E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences*
Reactor Moderator*	LIGHT WATER	LIGHT WATER	
Fuel Cladding	ZIRC	ZIRC	
BOL HM Constituents	U	U	
BOL Enrichment %	0 711000016	0 to 5	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate*
Nominal		775 98	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		1,551 95	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 02		1.00
Bounding	0 03		

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: EBWR (SPIKES)
SNF ID #: 891
Fuel Units & Descr: 31 - 7 X 7 ROD ARRAY
Heavy Metal Mass: BOL=29.205kg, EOL=26 989kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: Pathfinder (Light Water, SST, 60 to 100%, U)
[2]Template Burnup(MWd): 6 01
Template BOL Heavy Metal Mass (MT): 0 00012882
Template Decay Time: 50 years

Estimated Canister usage: 18"x10' = 2 58

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	3 4276E-08	2,093 81	4,187 62	0 00E+00	7 18E-05	1 44E-04
Am-241	1 1458E-04	2,093 81	4,187 62	0 00E+00	2 40E-01	4 80E-01
Am-242m	7 9468E-09	2,093 81	4,187 62	0 00E+00	1 66E-05	3 33E-05
Am-243	9 8386E-10	2,093 81	4,187 62	0 00E+00	2 06E-06	4 12E-06
C-14	2 2978E-04	2,093 81	4,187 62	0 00E+00	4 81E-01	9 62E-01
Cl-36	1 2261E-06	2,093 81	4,187 62	0 00E+00	2 57E-03	5 13E-03
Cm-243	1 7271E-10	2,093 81	4,187 62	0 00E+00	3 62E-07	7 23E-07
Cm-244	1 3058E-09	2 093 81	4,187 62	0 00E+00	2.73E-06	5 47E-06
Co-60	9 8636E-03	2,093 81	4,187 62	0 00E+00	2 07E+01	4 13E+01
Cs-134	1 9617E-08	2,093 81	4,187 62	0 00E+00	4.11E-05	8 21E-05
Cs-135	3 0316E-05	2,093 81	4,187 62	0 00E+00	6.35E-02	1 27E-01
Cs-137	1 0263E+00	2,093 81	4,187 62	0 00E+00	2 15E+03	4 30E+03
Eu-154	2 0017E-04	2,093 81	4,187 62	0 00E+00	4 19E-01	8 38E-01
Eu-155	8 5957E-05	2,093 81	4,187 62	0 00E+00	1 80E-01	3 60E-01
Fe-55	2.2646E-05	2,093 81	4,187 62	0 00E+00	4 74E-02	9 48E-02
H-3	1 0835E-03	2,093.81	4,187 62	0 00E+00	2 27E+00	4 54E+00
I-129	7 3195E-07	2,093 81	4,187 62	0 00E+00	1 53E-03	3 07E-03
Kr-85	1 5661E-02	2,093 81	4,187 62	0 00E+00	3 28E+01	6 56E+01
Np-237	1 1494E-06	2,093 81	4,187 62	0 00E+00	2 41E-03	4 81E-03
Pa-231	5 8070E-08	2,093 81	4,187 62	0 00E+00	1 22E-04	2 43E-04
Pb-210	1 2985E-12	2,093 81	4,187 62	0 00E+00	2 72E-09	5 44E-09
Pm-147	2 2196E-05	2,093 81	4,187 62	0 00E+00	4 65E-02	9.29E-02
Pu-238	2 6223E-04	2,093 81	4,187 62	0 00E+00	5 49E-01	1 10E+00
Pu-239	6 6739E-04	2,093 81	4,187 62	0 00E+00	1 40E+00	2 79E+00
Pu-240	8 6705E-05	2,093 81	4,187 62	0 00E+00	1 82E-01	3 63E-01
Pu-241	3 4759E-04	2,093 81	4,187 62	0 00E+00	7.28E-01	1 46E+00
Pu-242	1 9717E-09	2,093 81	4,187 62	0 00E+00	4 13E-06	8.26E-06
Ra-226	3 0000E-12	2,093 81	4,187.62	0 00E+00	6.28E-09	1 26E-08
Ra-228	8 3328E-12	2,093 81	4,187.62	0 00E+00	1.74E-08	3 49E-08
Ru-106	6 1464E-15	2,093 81	4,187.62	0 00E+00	1.29E-11	2 57E-11
Se-79	1 3221E-05	2,093 81	4,187 62	0 00E+00	2.77E-02	5 54E-02
Sn-126	1.1491E-05	2,093 81	4,187 62	0 00E+00	2 41E-02	4 81E-02
Sr-90	9 5541E-01	2,093 81	4,187 62	0 00E+00	2 00E+03	4 00E+03
Tc-99	4 6656E-04	2,093 81	4,187 62	0 00E+00	9 77E-01	1 95E+00
Th-229	1 9085E-11	2,093 81	4,187 62	0 00E+00	4 00E-08	7 99E-08
Th-230	2 1913E-10	2,093 81	4,187 62	0 00E+00	4 59E-07	9 18E-07
Th-232	8.3478E-12	2,093.81	4,187 62	0 00E+00	1 75E-08	3 50E-08
Tl-208	1 8752E-08	2,093 81	4,187 62	0 00E+00	3 93E-05	7 85E-05
U-232	5 0782E-08	2,093 81	4,187 62	0 00E+00	1 06E-04	2 13E-04
U-233	3 2596E-09	2,093 81	4,187 62	0 00E+00	6 82E-06	1 36E-05
U-234	3 9817E-07	2,093 81	4,187 62	0 00E+00	8 34E-04	1 67E-03
U-235	-2.7761E-06	2,093 81	0 00	5 88E-02	5 30E-02	5 88E-02
U-236	1 6190E-05	2,093 81	4,187 62	0 00E+00	3 39E-02	6 78E-02
U-238	-2 8547E-09	2,093 81	0 00	6 68E-04	6 62E-04	6 68E-04
Y-90	9 5557E-01	2,093 81	4,187.62	0 00E+00	2 00E+03	4 00E+03
Other Radionuclides					2 55E+03	5 11E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2.184E+14
0 0250	4 538E+13
0 0375	3 934E+13
0 0575	4 232E+13
0 0850	2 556E+13
0 1250	1 658E+13
0.2250	2 203E+13
0 3750	9 609E+12
0 5750	1 600E+14
0 8500	1 580E+12
1.2500	3 597E+12
1 7500	4 067E+10
2.2500	2 061E+07
2.7500	2.808E+06
3 5000	2 493E+02
5 0000	1 029E+02
7 0000	1 138E+01
11 0000	1.277E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.44E+01	4 89E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	SST
BOL HM Constituents	U	U
BOL Enrichment %	93 18999022	60 to 100

Basis for Parameter Differences:

This Template was used for the following reasons
This fuel matches Pathfinder Template on all but one parameter (cladding, but substituting Stainless Steel is a good conservative assumption).

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	1,233.24	2,093.81
Bounding	1 767 05	4,187 62

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.54	1 70
Bounding	3 07	2 37

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: EBWR (U METAL) ENRICHED HEAVY
SNF ID #: 64
Fuel Units & Descr: 53 - 6 FLAT PLATES
Heavy Metal Mass: BOL=2989.2kg EOL=2982 962kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: PWR (Light Water, Zirc, 0 to 5% U)
[2]Template Burnup(MWd): 61.92
Template BOL Heavy Metal Mass (MT): 0 00176911
Template Decay Time: 50 years

Estimated Canister usage: 18"x10' = 4 42

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	1 0733E-09	5,932 14	11,864 28	0 00E+00	6 37E-06	1.27E-05
Am-241	1 4751E-01	5,932 14	11,864.28	0.00E+00	8 75E+02	1.75E+03
Am-242m	2 6809E-04	5,932 14	11,864.28	0 00E+00	1 59E+00	3 18E+00
Am-243	6 2484E-04	5,932 14	11,864.28	0 00E+00	3 71E+00	7.41E+00
C-14	4 7820E-05	5,932 14	11,864.28	0 00E+00	2 84E-01	5 67E-01
Cl-36	8 0297E-07	5,932 14	11,864.28	0 00E+00	4 76E-03	9 53E-03
Cm-243	1 7426E-04	5,932 14	11,864.28	0 00E+00	1 03E+00	2 07E+00
Cm-244	2 7616E-02	5,932 14	11,864.28	0 00E+00	1 64E+02	3 28E+02
Co-60	3 5610E-04	5,932 14	11,864.28	0 00E+00	2.11E+00	4 22E+00
Cs-134	2 6260E-07	5,932 14	11,864 28	0 00E+00	1.56E-03	3.12E-03
Cs-135	1.4433E-05	5,932 14	11,864 28	0 00E+00	8 56E-02	1.71E-01
Cs-137	9 8870E-01	5,932 14	11,864 28	0 00E+00	5 87E+03	1.17E+04
Eu-154	6 0320E-03	5,932 14	11,864 28	0 00E+00	3 58E+01	7.16E+01
Eu-155	2 1770E-04	5,932 14	11,864 28	0 00E+00	1.29E+00	2.58E+00
Fe-55	7 9296E-07	5,932 14	11,864 28	0 00E+00	4 70E-03	9 41E-03
H-3	8 9486E-03	5,932 14	11,864.28	0 00E+00	5 31E+01	1 06E+02
I-129	9 8288E-07	5,932 14	11,864.28	0 00E+00	5 83E-03	1.17E-02
Kr-85	1 0707E-02	5,932 14	11,864 28	0 00E+00	6 35E+01	1 27E+02
Np-237	1 1927E-05	5,932 14	11,864.28	0 00E+00	7 08E-02	1 42E-01
Pa-231	1 4703E-09	5,932 14	11,864.28	0 00E+00	8 72E-06	1.74E-05
Pb-210	1 6828E-10	5,932 14	11,864.28	0 00E+00	9 98E-07	2.00E-06
Pm-147	6 9606E-06	5,932 14	11,864.28	0 00E+00	4 13E-02	8.26E-02
Pu-238	6 6263E-02	5,932 14	11,864.28	0 00E+00	3 93E+02	7 86E+02
Pu-239	1.1618E-02	5,932 14	11,864.28	0 00E+00	6 89E+01	1.38E+02
Pu-240	1.5142E-02	5,932.14	11,864.28	0 00E+00	8 98E+01	1.80E+02
Pu-241	4.3766E-01	5,932.14	11,864 28	0 00E+00	2 60E+03	5 19E+03
Pu-242	6.4260E-05	5,932 14	11,864 28	0 00E+00	3 81E-01	7 62E-01
Ra-226	3 8501E-10	5,932 14	11,864 28	0 00E+00	2 28E-06	4 57E-06
Ra-228	5.2955E-12	5,932 14	11,864 28	0 00E+00	3 14E-08	6 28E-08
Ru-106	2 0413E-14	5,932 14	11,864 28	0 00E+00	1.21E-10	2 42E-10
Se-79	1.2376E-05	5,932 14	11,864 28	0 00E+00	7.34E-02	1.47E-01
Sn-126	2 5210E-05	5,932 14	11,864 28	0.00E+00	1.50E-01	2.99E-01
Sr-90	6 4163E-01	5,932 14	11,864.28	0 00E+00	3 81E+03	7.61E+03
Tc-99	3 9357E-04	5,932 14	11,864.28	0 00E+00	2 33E+00	4.67E+00
Th-229	1 5644E-10	5,932 14	11,864.28	0 00E+00	9.28E-07	1 86E-06
Th-230	2 7972E-08	5,932 14	11,864.28	0 00E+00	1 66E-04	3 32E-04
Th-232	5 3036E-12	5,932 14	11,864.28	0 00E+00	3 15E-08	6 29E-08
Tl-208	1 5136E-07	5,932 14	11,864.28	0 00E+00	8 98E-04	1 80E-03
U-232	4 1005E-07	5,932.14	11,864.28	0 00E+00	2 43E-03	4 86E-03
U-233	2.5856E-08	5,932 14	11,864 28	0 00E+00	1 53E-04	3 07E-04
U-234	5.2665E-05	5,932.14	11,864 28	0 00E+00	3 12E-01	6.25E-01
U-235	-1 4487E-06	5,932.14	0 00	9.28E-02	8 42E-02	9.28E-02
U-236	7.5888E-06	5,932 14	11,864 28	0 00E+00	4 50E-02	9.00E-02
U-238	-2 6129E-07	5,932 14	0 00	9.90E-01	9 89E-01	9 90E-01
Y-90	6 4180E-01	5,932 14	11,864 28	0.00E+00	3 81E+03	7.61E+03
Other Radionuclides					5 65E+03	1.13E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4.515E+14
0 0250	9 047E+13
0 0375	8.525E+13
0 0575	1 067E+14
0 0850	4 984E+13
0 1250	3 316E+13
0.2250	4 256E+13
0.3750	1 838E+13
0.5750	4 328E+14
0.8500	4.226E+12
1.2500	2.689E+12
1 7500	1.182E+11
2 2500	1.944E+07
2.7500	6.850E+07
3 5000	4.891E+06
5 0000	2.090E+06
7.0000	2 408E+05
11.0000	2 765E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 07E+02	2.15E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %	1.436170175	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		5 932.14	Nominal burnup calculated from the heavy metal mass destroyed
Bounding	4,782.72	11,864.28	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.06	
Bounding	0 11	2 48

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: EBWR (U METAL) ENRICHED THIN
SNF ID #: 887
Fuel Units & Descr: 54 - 6 FLAT PLATES
Heavy Metal Mass BOL= ; EOL=2194 101kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: PWR (Light Water, Zirc, 0 to 5%, U)
[2]Template Burnup(MWd): 61 92
Template BOL Heavy Metal Mass (MT): 0 00176911
Template Decay Time: 50 years

Estimated Canister usage: 18"x10' 4 50

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 0733E-09	3,516.48	3,516 48	0 00E+00	3 77E-06	3 77E-06
Am-241	1.4751E-01	3,516 48	3,516 48	0 00E+00	5 19E+02	5 19E+02
Am-242m	2 6809E-04	3,516 48	3,516 48	0 00E+00	9 43E-01	9 43E-01
Am-243	6.2484E-04	3,516 48	3,516.48	0 00E+00	2 20E+00	2.20E+00
C-14	4 7820E-05	3,516 48	3,516 48	0 00E+00	1 68E-01	1 68E-01
Cl-36	8 0297E-07	3,516 48	3,516 48	0 00E+00	2 82E-03	2 82E-03
Cm-243	1 7426E-04	3,516 48	3,516 48	0 00E+00	6 13E-01	6.13E-01
Cm-244	2 7616E-02	3,516 48	3,516 48	0 00E+00	9 71E+01	9 71E+01
Co-60	3 5610E-04	3,516 48	3,516 48	0 00E+00	1.25E+00	1 25E+00
Cs-134	2 6260E-07	3,516 48	3,516 48	0 00E+00	9.23E-04	9.23E-04
Cs-135	1 4433E-05	3,516 48	3,516 48	0 00E+00	5 08E-02	5 08E-02
Cs-137	9 8870E-01	3,516 48	3,516 48	0 00E+00	3.48E+03	3 48E+03
Eu-154	6 0320E-03	3,516 48	3,516 48	0 00E+00	2 12E+01	2 12E+01
Eu-155	2 1770E-04	3,516.48	3,516 48	0 00E+00	7 66E-01	7 66E-01
Fe-55	7 9296E-07	3,516.48	3,516 48	0 00E+00	2.79E-03	2 79E-03
H-3	8 9486E-03	3,516 48	3,516 48	0 00E+00	3.15E+01	3 15E+01
I-129	9 8288E-07	3,516 48	3,516.48	0 00E+00	3 46E-03	3 46E-03
Kr-85	1.0707E-02	3,516 48	3,516.48	0 00E+00	3 77E+01	3.77E+01
Np-237	1 1927E-05	3,516 48	3,516 48	0 00E+00	4 19E-02	4 19E-02
Pa-231	1 4703E-09	3,516 48	3,516 48	0 00E+00	5 17E-06	5 17E-06
Pb-210	1 6828E-10	3,516 48	3,516 48	0 00E+00	5 92E-07	5 92E-07
Pm-147	6 9606E-06	3,516 48	3,516 48	0 00E+00	2 45E-02	2.45E-02
Pu-238	6 6263E-02	3,516 48	3,516 48	0 00E+00	2 33E+02	2 33E+02
Pu-239	1 1618E-02	3,516 48	3,516 48	0 00E+00	4 09E+01	4 09E+01
Pu-240	1 5142E-02	3,516 48	3,516 48	0 00E+00	5 32E+01	5.32E+01
Pu-241	4 3766E-01	3,516.48	3,516 48	0 00E+00	1.54E+03	1 54E+03
Pu-242	6 4260E-05	3,516.48	3,516 48	0 00E+00	2.26E-01	2 26E-01
Ra-226	3 8501E-10	3,516 48	3,516 48	0 00E+00	1.35E-06	1 35E-06
Ra-228	5 2955E-12	3,516 48	3,516 48	0 00E+00	1.86E-08	1 86E-08
Ru-106	2.0413E-14	3,516 48	3,516 48	0 00E+00	7.18E-11	7 18E-11
Se-79	1.2376E-05	3,516 48	3,516 48	0 00E+00	4 35E-02	4 35E-02
Sn-126	2 5210E-05	3,516 48	3,516 48	0 00E+00	8 87E-02	8 87E-02
Sr-90	6.4163E-01	3,516 48	3,516 48	0 00E+00	2 26E+03	2.26E+03
Tc-99	3 9357E-04	3,516 48	3,516 48	0 00E+00	1 38E+00	1.38E+00
Th-229	1 5644E-10	3,516 48	3,516 48	0 00E+00	5 50E-07	5 50E-07
Th-230	2 7972E-08	3,516 48	3,516 48	0 00E+00	9 84E-05	9 84E-05
Th-232	5 3036E-12	3,516 48	3,516 48	0 00E+00	1 87E-08	1.87E-08
Tl-208	1 5136E-07	3,516 48	3,516 48	0.00E+00	5 32E-04	5.32E-04
U-232	4 1005E-07	3,516.48	3,516 48	0 00E+00	1 44E-03	1 44E-03
U-233	2 5856E-08	3,516.48	3,516 48	0 00E+00	9 09E-05	9 09E-05
U-234	5 2665E-05	3,516 48	3,516 48	0 00E+00	1 85E-01	1 85E-01
U-235	-1 4487E-06	3,516.48	0 00	1 52E-01	1.47E-01	1 52E-01
U-236	7.5888E-06	3,516 48	3,516 48	0 00E+00	2.67E-02	2 67E-02
U-238	-2 6129E-07	3,516 48	0 00	7 15E-01	7 14E-01	7 15E-01
Y-90	6 4180E-01	3,516 48	3,516 48	0 00E+00	2 26E+03	2.26E+03
Other Radionuclides					3 35E+03	3 35E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 338E+14
0 0250	2 681E+13
0 0375	2.527E+13
0 0575	3 162E+13
0 0850	1 477E+13
0 1250	9 829E+12
0.2250	1.262E+13
0 3750	5 447E+12
0 5750	1.283E+14
0 8500	1.253E+12
1.2500	7 970E+11
1 7500	3 504E+10
2.2500	5 766E+06
2 7500	2 030E+07
3 5000	1 452E+06
5 0000	6.206E+05
7 0000	7 149E+04
11 0000	8.209E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.36E+01	6.36E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	ZIRC
BOL HM Constituents:	U	U
BOL Enrichment %.		0 to 5

Basis for Parameter Differences:
This Template was used for the following reasons.
This fuel matches on all parameters except enrichment (unknown)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		3 516 48
Bounding		3,516 48

Basis for burnup used in estimate:
Nominal burnup set equal to bounding burnup
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 05	
Bounding	0 05	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: EBWR (U METAL) ET-11
SNF ID #: 888
Fuel Units & Descr: 1 - 6 FLAT PLATES
Heavy Metal Mass: BOL=40.2kg EOL=38.365kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: PWR (Light Water, Zirc, 0 to 5%, U)
[2]Template Burnup(MWd): 61 92
Template BOL Heavy Metal Mass (MT): 0 00176911
Template Decay Time: 50 years

Estimated Canister usage 18"x10': 0 08

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 0733E-09	1,745 00	3 490 00	0 00E+00	1 87E-06	3 75E-06
Am-241	1 4751E-01	1,745 00	3,490 00	0 00E+00	2 57E+02	5 15E+02
Am-242m	2 6809E-04	1,745 00	3,490.00	0 00E+00	4 68E-01	9 36E-01
Am-243	6 2484E-04	1,745 00	3,490 00	0.00E+00	1 09E+00	2 18E+00
C-14	4 7820E-05	1,745.00	3,490 00	0 00E+00	-8 34E-02	1 67E-01
Cl-36	8 0297E-07	1,745 00	3,490 00	0 00E+00	1 40E-03	2 80E-03
Cm-243	1 7426E-04	1,745 00	3,490 00	0 00E+00	3 04E-01	6 08E-01
Cm-244	2 7616E-02	1,745 00	3,490 00	0 00E+00	4 82E+01	9 64E+01
Co-60	3 5610E-04	1,745 00	3,490 00	0 00E+00	6.21E-01	1.24E+00
Cs-134	2 6260E-07	1,745 00	3,490 00	0 00E+00	4 58E-04	9.16E-04
Cs-135	1.4433E-05	1,745 00	3,490 00	0 00E+00	2 52E-02	5 04E-02
Cs-137	9 8870E-01	1,745 00	3,490 00	0 00E+00	1 73E+03	3 45E+03
Eu-154	6 0320E-03	1,745 00	3,490 00	0 00E+00	1 05E+01	2 11E+01
Eu-155	2 1770E-04	1,745 00	3,490 00	0 00E+00	3 80E-01	7 60E-01
Fe-55	7 9296E-07	1,745 00	3,490 00	0 00E+00	1 38E-03	2 77E-03
H-3	8 9486E-03	1,745 00	3,490 00	0 00E+00	1 56E+01	3 12E+01
I-129	9 8288E-07	1,745 00	3,490 00	0 00E+00	1 72E-03	3 43E-03
Kr-85	1 0707E-02	1,745 00	3,490 00	0 00E+00	1 87E+01	3 74E+01
Np-237	1.1927E-05	1,745 00	3,490 00	0 00E+00	2.08E-02	4.16E-02
Pa-231	1 4703E-09	1,745 00	3,490 00	0 00E+00	2.57E-06	5 13E-06
Pb-210	1.6828E-10	1,745 00	3,490 00	0 00E+00	2 94E-07	5 87E-07
Pm-147	6 9606E-06	1,745 00	3,490 00	0 00E+00	1.21E-02	2 43E-02
Pu-238	6 6263E-02	1,745 00	3,490 00	0 00E+00	1 16E+02	2 31E+02
Pu-239	1 1618E-02	1,745 00	3,490 00	0 00E+00	2 03E+01	4 05E+01
Pu-240	1 5142E-02	1,745 00	3,490 00	0 00E+00	2 64E+01	5 28E+01
Pu-241	4 3766E-01	1,745 00	3,490 00	0 00E+00	7 64E+02	1 53E+03
Pu-242	6 4260E-05	1,745 00	3,490 00	0 00E+00	1 12E-01	2.24E-01
Ra-226	3 8501E-10	1,745 00	3,490 00	0 00E+00	6 72E-07	1.34E-06
Ra-228	5.2955E-12	1,745 00	3,490 00	0 00E+00	9.24E-09	1.85E-08
Ru-106	2 0413E-14	1,745 00	3,490 00	0 00E+00	3.56E-11	7 12E-11
Se-79	1.2376E-05	1,745 00	3,490 00	0 00E+00	2 16E-02	4.32E-02
Sn-126	2.5210E-05	1,745 00	3,490 00	0 00E+00	4 40E-02	8 80E-02
Sr-90	6 4163E-01	1,745 00	3,490 00	0 00E+00	1.12E+03	2.24E+03
Tc-99	3 9357E-04	1,745 00	3,490 00	0 00E+00	6 87E-01	1.37E+00
Th-229	1.5644E-10	1,745 00	3,490.00	0 00E+00	2 73E-07	5 46E-07
Th-230	2 7972E-08	1,745.00	3,490.00	0 00E+00	4 88E-05	9 76E-05
Th-232	5 3036E-12	1,745 00	3,490 00	0 00E+00	9 25E-09	1.85E-08
Tl-208	1 5136E-07	1,745 00	3,490 00	0 00E+00	2 64E-04	5.28E-04
U-232	4 1005E-07	1,745 00	3,490 00	0 00E+00	7.16E-04	1 43E-03
U-233	2 5856E-08	1,745 00	3,490 00	0 00E+00	4.51E-05	9 02E-05
U-234	5.2665E-05	1,745 00	3,490 00	0 00E+00	9 19E-02	1 84E-01
U-235	-1.4487E-06	1,745 00	0 00	1 26E-03	0 00E+00	1.26E-03
U-236	7.5888E-06	1,745 00	3,490 00	0 00E+00	1.32E-02	2 65E-02
U-238	-2 6129E-07	1,745 00	0 00	1.33E-02	1.29E-02	1 33E-02
Y-90	6 4180E-01	1,745 00	3,490 00	0 00E+00	1 12E+03	2 24E+03
Other Radionuclides					1 66E+03	3 33E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.328E+14
0 0250	2.661E+13
0 0375	2.508E+13
0 0575	3 138E+13
0 0850	1 466E+13
0 1250	9 755E+12
0.2250	1 252E+13
0.3750	5 406E+12
0 5750	1.273E+14
0 8500	1.243E+12
1.2500	7.910E+11
1 7500	3 478E+10
2.2500	5 716E+06
2.7500	2.015E+07
3 5000	1.437E+06
5.0000	6 143E+05
7.0000	7 077E+04
11 0000	8 126E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 16E+01	6.31E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %:	1 447761165	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		1,745.00
Bounding	64.32	3 490 00

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 24	
Bounding	2 48	54 26

Estimated EOL HM/Given EOL HM: 1 02

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: EBWR (U METAL) NORMAL HEAVY
SNF ID #: 889
Fuel Units & Descr: 11 - 6 FLAT PLATES
Heavy Metal Mass: BOL=620 4kg, EOL=566 145kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: PWR (Light Water, Zirc, 0 to 5% U)
[2]Template Burnup(MWd): 61 92
Template BOL Heavy Metal Mass (MT): 0 00176911
Template Decay Time: 50 years

Estimated Canister usage: 18"x10' 0 92

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 0733E-09	51,594 22	103,188 45	0 00E+00	5 54E-05	1.11E-04
Am-241	1 4751E-01	51,594 22	103,188 45	0 00E+00	7 61E+03	1.52E+04
Am-242m	2 6809E-04	51,594 22	103,188.45	0 00E+00	1 38E+01	2 77E+01
Am-243	6.2484E-04	51,594 22	103,188.45	0 00E+00	3.22E+01	6 45E+01
C-14	4 7820E-05	51,594 22	103,188 45	0 00E+00	2 47E+00	4 93E+00
Cl-36	8 0297E-07	51,594 22	103,188 45	0 00E+00	4 14E-02	8.29E-02
Cm-243	1 7426E-04	51,594 22	103,188 45	0 00E+00	8 99E+00	1 80E+01
Cm-244	2 7616E-02	51,594 22	103,188 45	0 00E+00	1 42E+03	2 85E+03
Co-60	3 5610E-04	51,594 22	103,188 45	0 00E+00	1 84E+01	3 67E+01
Cs-134	2 6260E-07	51,594 22	103,188 45	0 00E+00	1 35E-02	2 71E-02
Cs-135	1 4433E-05	51,594 22	103,188 45	0 00E+00	7 45E-01	1 49E+00
Cs-137	9 8870E-01	51,594 22	103,188 45	0 00E+00	5.10E+04	1 02E+05
Eu-154	6 0320E-03	51,594 22	103,188 45	0 00E+00	3.11E+02	6 22E+02
Eu-155	2 1770E-04	51,594 22	103,188 45	0 00E+00	1.12E+01	2 25E+01
Fe-55	7 9296E-07	51,594 22	103,188 45	0 00E+00	4 09E-02	8 18E-02
H-3	8 9486E-03	51,594.22	103,188 45	0 00E+00	4 62E+02	9 23E+02
I-129	9 8288E-07	51,594.22	103,188 45	0 00E+00	5 07E-02	1 01E-01
Kr-85	1 0707E-02	51,594.22	103,188 45	0 00E+00	5.52E+02	1 10E+03
Np-237	1 1927E-05	51,594.22	103,188 45	0 00E+00	6.15E-01	1 23E+00
Pa-231	1 4703E-09	51,594.22	103,188 45	0 00E+00	7.59E-05	1 52E-04
Pb-210	1 6828E-10	51,594.22	103,188 45	0 00E+00	8 68E-06	1 74E-05
Pm-147	6 9606E-06	51,594.22	103,188 45	0 00E+00	3 59E-01	7 18E-01
Pu-238	6 6263E-02	51,594.22	103,188 45	0 00E+00	3 42E+03	6 84E+03
Pu-239	1 1618E-02	51,594.22	103,188 45	0 00E+00	5 99E+02	1 20E+03
Pu-240	1 5142E-02	51,594.22	103,188 45	0.00E+00	7 81E+02	1 56E+03
Pu-241	4 3766E-01	51,594.22	103,188 45	0 00E+00	2 26E+04	4 52E+04
Pu-242	6 4260E-05	51,594.22	103,188 45	0 00E+00	3 32E+00	6 63E+00
Ra-226	3 8501E-10	51,594.22	103,188 45	0 00E+00	1 99E-05	3 97E-05
Ra-228	5.2955E-12	51,594.22	103,188.45	0 00E+00	2 73E-07	5 46E-07
Ru-106	2.0413E-14	51,594.22	103,188 45	0 00E+00	1 05E-09	2 11E-09
Se-79	1.2376E-05	51,594.22	103,188.45	0 00E+00	6 39E-01	1.28E+00
Sn-126	2 5210E-05	51,594 22	103,188.45	0 00E+00	1 30E+00	2 60E+00
Sr-90	6 4163E-01	51,594 22	103,188 45	0 00E+00	3 31E+04	6 62E+04
Tc-99	3 9357E-04	51,594 22	103,188 45	0 00E+00	2.03E+01	4 06E+01
Th-229	1 5644E-10	51,594 22	103,188 45	0 00E+00	8 07E-06	1 61E-05
Th-230	2 7972E-08	51,594 22	103,188 45	0 00E+00	1 44E-03	2 89E-03
Th-232	5 3036E-12	51,594 22	103,188 45	0 00E+00	2 74E-07	5 47E-07
Tl-208	1 5136E-07	51,594 22	103,188 45	0 00E+00	7 81E-03	1.56E-02
U-232	4 1005E-07	51,594 22	103,188 45	0 00E+00	2 12E-02	4.23E-02
U-233	2 5856E-08	51,594 22	103,188 45	0 00E+00	1 33E-03	2.67E-03
U-234	5 2665E-05	51,594 22	103,188 45	0 00E+00	2.72E+00	5 43E+00
U-235	-1 4487E-06	51,594.22	0 00	9 56E-03	0 00E+00	9.56E-03
U-236	7 5888E-06	51,594.22	103,188 45	0 00E+00	3 92E-01	7.83E-01
U-238	-2 6129E-07	51,594 22	0 00	2 07E-01	1 94E-01	2 07E-01
Y-90	6 4180E-01	51,594.22	103,188 45	0 00E+00	3.31E+04	6 62E+04
Other Radionuclides					4.92E+04	9 83E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	3 926E+15
0 0250	7 869E+14
0 0375	7 414E+14
0 0575	9.278E+14
0 0850	4 335E+14
0 1250	2.884E+14
0.2250	3 701E+14
0.3750	1 598E+14
0.5750	3 764E+15
0 8500	3 676E+13
1.2500	2.339E+13
1 7500	1 028E+12
2.2500	1 690E+08
2.7500	5 957E+08
3 5000	4.250E+07
5 0000	1 816E+07
7 0000	2.092E+06
11 0000	2 403E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9 33E+02	1.87E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %	0 712765938	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		51,594.22
Bounding	992.64	103 188 45

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	2 38	
Bounding	4 75	103 95

Estimated EOL HM/Given EOL HM: 1 05

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: EBWR (U METAL) NORMAL THIN
SNF ID #: 890
Fuel Units & Descr: 7 - 6 FLAT PLATES
Heavy Metal Mass: BOL=281 4kg EOL=279 076kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: PWR (Light Water Zirc 0 to 5% U)
[2]Template Burnup(MWd): 61 92
Template BOL Heavy Metal Mass (MT): 0 00176911
Template Decay Time: 50 years

Estimated Canister usage: 18"x10' = 0 58

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	1 0733E-09	2,210 01	4,420 01	0 00E+00	2.37E-06	4.74E-06
Am-241	1 4751E-01	2,210 01	4,420 01	0 00E+00	3 26E+02	6 52E+02
Am-242m	2 6809E-04	2,210 01	4,420 01	0 00E+00	5 92E-01	1.18E+00
Am-243	6.2484E-04	2,210 01	4,420 01	0 00E+00	1.38E+00	2.76E+00
C-14	4 7820E-05	2,210 01	4,420 01	0 00E+00	1.06E-01	2 11E-01
Cl-36	8 0297E-07	2,210 01	4,420 01	0 00E+00	1 77E-03	3 55E-03
Cm-243	1 7426E-04	2,210 01	4,420 01	0 00E+00	3 85E-01	7 70E-01
Cm-244	2 7616E-02	2,210 01	4,420 01	0 00E+00	6 10E+01	1 22E+02
Co-60	3 5610E-04	2,210 01	4,420 01	0 00E+00	7 87E-01	1 57E+00
Cs-134	2 6260E-07	2,210 01	4,420 01	0 00E+00	5 80E-04	1 16E-03
Cs-135	1 4433E-05	2,210 01	4,420 01	0 00E+00	3 19E-02	6.38E-02
Cs-137	9 8870E-01	2,210 01	4,420 01	0 00E+00	2 19E+03	4 37E+03
Eu-154	6 0320E-03	2,210 01	4,420 01	0 00E+00	1 33E+01	2 67E+01
Eu-155	2.1770E-04	2,210 01	4,420 01	0 00E+00	4 81E-01	9 62E-01
Fe-55	7 9296E-07	2,210 01	4,420 01	0 00E+00	1.75E-03	3 50E-03
H-3	8 9486E-03	2,210 01	4,420 01	0 00E+00	1.98E+01	3 96E+01
I-129	9 8288E-07	2,210 01	4,420 01	0 00E+00	2 17E-03	4 34E-03
Kr-85	1 0707E-02	2,210 01	4,420 01	0 00E+00	2.37E+01	4 73E+01
Np-237	1 1927E-05	2,210 01	4,420 01	0 00E+00	2 64E-02	5.27E-02
Pa-231	1 4703E-09	2,210 01	4,420 01	0 00E+00	3 25E-06	6 50E-06
Pb-210	1 6828E-10	2,210 01	4,420 01	0 00E+00	3 72E-07	7.44E-07
Pm-147	6 9606E-06	2,210 01	4,420 01	0 00E+00	1.54E-02	3 08E-02
Pu-238	6 6263E-02	2,210 01	4,420 01	0 00E+00	1 46E+02	2.93E+02
Pu-239	1 1618E-02	2,210 01	4,420 01	0 00E+00	2 57E+01	5 14E+01
Pu-240	1.5142E-02	2,210 01	4,420 01	0 00E+00	3 35E+01	6 69E+01
Pu-241	4.3766E-01	2,210 01	4,420.01	0 00E+00	9 67E+02	1 93E+03
Pu-242	6 4260E-05	2,210 01	4,420.01	0 00E+00	1.42E-01	2 84E-01
Ra-226	3 8501E-10	2,210 01	4,420 01	0 00E+00	8 51E-07	1 70E-06
Ra-228	5.2955E-12	2,210 01	4,420 01	0 00E+00	1 17E-08	2.34E-08
Ru-106	2 0413E-14	2,210 01	4,420 01	0 00E+00	4 51E-11	9 02E-11
Se-79	1 2376E-05	2,210 01	4,420 01	0 00E+00	2 74E-02	5 47E-02
Sn-126	2 5210E-05	2,210 01	4,420 01	0 00E+00	5 57E-02	1 11E-01
Sr-90	6 4163E-01	2,210 01	4,420 01	0 00E+00	1 42E+03	2.84E+03
Tc-99	3 9357E-04	2,210 01	4,420 01	0 00E+00	8 70E-01	1 74E+00
Th-229	1 5644E-10	2,210 01	4,420 01	0 00E+00	3 46E-07	6 91E-07
Th-230	2.7972E-08	2,210 01	4,420 01	0 00E+00	6.18E-05	1.24E-04
Th-232	5 3036E-12	2,210 01	4,420 01	0 00E+00	1.17E-08	2 34E-08
Tl-208	1.5136E-07	2,210 01	4,420 01	0 00E+00	3 34E-04	6 69E-04
U-232	4 1005E-07	2,210 01	4,420 01	0.00E+00	9 06E-04	1.81E-03
U-233	2 5856E-08	2,210 01	4,420 01	0 00E+00	5 71E-05	1.14E-04
U-234	5.2665E-05	2,210 01	4,420 01	0 00E+00	1 16E-01	2 33E-01
U-235	-1 4487E-06	2,210 01	0 00	4 36E-03	1 15E-03	4 36E-03
U-236	7 5888E-06	2,210 01	4,420 01	0 00E+00	1 68E-02	3 35E-02
U-238	-2 6129E-07	2,210 01	0 00	9 39E-02	9.33E-02	9 39E-02
Y-90	6 4180E-01	2,210 01	4,420 01	0 00E+00	1 42E+03	2 84E+03
Other Radionuclides					2 11E+03	4 21E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 682E+14
0 0250	3 370E+13
0 0375	3 176E+13
0 0575	3.974E+13
0 0850	1.857E+13
0 1250	1.235E+13
0.2250	1.585E+13
0.3750	6 847E+12
0.5750	1 612E+14
0 8500	1 574E+12
1.2500	1 002E+12
1 7500	4 405E+10
2.2500	7.240E+06
2.7500	2.552E+07
3.5000	1.821E+06
5 0000	7 782E+05
7 0000	8 965E+04
11 0000	1 029E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 00E+01	7 99E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ZIRC	ZIRC
BOL HM Constituents	U	U
BOL Enrichment %	0 716417866	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		2,210 01	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding	450 24	4,420 01	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.22	
Bounding	0 45	9 82

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: ENEA (LEU UALX) SALUGGIA ITALY
SNF ID #: 760
Fuel Units & Descr: 32 - MTR TYPE
Heavy Metal Mass: BOL=22 4kg; EOL=21.568kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1996
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 25 years

Estimated Canister usage: 18"x10' 0 89

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	1 1465E-09	787 92	1,575 84	0 00E+00	9 03E-07	1 81E-06
Am-241	2.3056E-03	787 92	1,575 84	0 00E+00	1 82E+00	3 63E+00
Am-242m	4.1476E-07	787 92	1,575 84	0 00E+00	3.27E-04	6 54E-04
Am-243	1 4894E-06	787 92	1,575 84	0 00E+00	1 17E-03	2.35E-03
C-14	5 7108E-09	787 92	1,575 84	0 00E+00	4 50E-06	9 00E-06
Cl-36	1 3124E-32	787 92	1,575 84	0 00E+00	1 03E-29	2 07E-29
Cm-243	1 4562E-07	787 92	1,575 84	0 00E+00	1.15E-04	2.29E-04
Cm-244	2 4221E-05	787 92	1,575 84	0 00E+00	1.91E-02	3 82E-02
Co-60	2 7560E-06	787 92	1,575 84	0 00E+00	2.17E-03	4 34E-03
Cs-134	5 8851E-04	787 92	1,575 84	0 00E+00	4 64E-01	9.27E-01
Cs-135	3 4477E-06	787 92	1,575 84	0 00E+00	2 72E-03	5 43E-03
Cs-137	1 8099E+00	787 92	1,575 84	0 00E+00	1 43E+03	2 85E+03
Eu-154	1 6386E-02	787 92	1,575 84	0 00E+00	1 29E+01	2 58E+01
Eu-155	2 3957E-03	787.92	1,575 84	0 00E+00	1 89E+00	3 78E+00
Fe-55	3 2707E-05	787.92	1,575 84	0 00E+00	2 58E-02	5 15E-02
H-3	3 4504E-03	787.92	1,575 84	0 00E+00	2 72E+00	5 44E+00
I-129	7 5300E-07	787 92	1,575 84	0 00E+00	5 93E-04	1 19E-03
Kr-85	7 8540E-02	787.92	1,575 84	0.00E+00	6 19E+01	1.24E+02
Np-237	9 5615E-06	787 92	1,575 84	0 00E+00	7 53E-03	1 51E-02
Pa-231	2 7968E-09	787 92	1,575 84	0 00E+00	2 20E-06	4 41E-06
Pb-210	1.2612E-10	787 92	1,575 84	0 00E+00	9 94E-08	1 99E-07
Pm-147	1.2952E-02	787 92	1,575 84	0 00E+00	1.02E+01	2.04E+01
Pu-238	1.7549E-02	787 92	1,575 84	0 00E+00	1.38E+01	2.77E+01
Pu-239	4.2810E-04	787 92	1,575 84	0 00E+00	3.37E-01	6.75E-01
Pu-240	2 4357E-04	787 92	1,575 84	0 00E+00	1 92E-01	3 84E-01
Pu-241	2.6277E-02	787 92	1,575 84	0 00E+00	2 07E+01	4 14E+01
Pu-242	3 6329E-07	787 92	1,575.84	0 00E+00	2.86E-04	5 72E-04
Ra-226	4 4444E-10	787 92	1,575 84	0 00E+00	3 50E-07	7 00E-07
Ra-228	1 9714E-14	787 92	1,575 84	0 00E+00	1.55E-11	3.11E-11
Ru-106	2 0477E-07	787 92	1,575 84	0 00E+00	1 61E-04	3.23E-04
Se-79	1 2933E-05	787.92	1,575 84	0 00E+00	1 02E-02	2 04E-02
Sn-126	1 1574E-05	787.92	1,575 84	0 00E+00	9 12E-03	1 82E-02
Sr-90	1 7092E+00	787.92	1,575 84	0 00E+00	1 35E+03	2 69E+03
Tc-99	4 2239E-04	787.92	1,575 84	0 00E+00	3 33E-01	6 66E-01
Th-229	7 7260E-12	787 92	1,575 84	0 00E+00	6 09E-09	1 22E-08
Th-230	5 8497E-08	787 92	1,575 84	0.00E+00	4 61E-05	9 22E-05
Th-232	2 6906E-14	787 92	1,575 84	0 00E+00	2 12E-11	4 24E-11
Tl-208	4 4336E-08	787 92	1,575 84	0 00E+00	3 49E-05	6 99E-05
U-232	1.2037E-07	787 92	1,575 84	0 00E+00	9 48E-05	1 90E-04
U-233	3 0011E-09	787 92	1,575 84	0 00E+00	2.36E-06	4 73E-06
U-234	1 8497E-04	787 92	1,575 84	0 00E+00	1 46E-01	2.91E-01
U-235	-2 7235E-06	787 92	0 00	9 68E-03	7 54E-03	9 68E-03
U-236	1.5493E-05	787 92	1,575 84	0 00E+00	1.22E-02	2.44E-02
U-238	-4.2851E-09	787 92	0 00	6 02E-03	6 02E-03	6 02E-03
Y-90	1 7094E+00	787 92	1,575.84	0 00E+00	1 35E+03	2 69E+03
Other Radionuclides					1 36E+03	2 71E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 475E+14
0 0250	3 063E+13
0 0375	2 668E+13
0 0575	2.865E+13
0 0850	1 729E+13
0 1250	1 158E+13
0 2250	1 492E+13
0 3750	6 488E+12
0 5750	1 064E+14
0 8500	1.533E+12
1.2500	8.523E+11
1 7500	4.211E+10
2.2500	3 001E+06
2 7500	2.458E+06
3 5000	1 886E+03
5.0000	6 375E+02
7.0000	7 021E+01
11.0000	7 859E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 67E+01	3.33E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	60 to 100

Basis for Parameter Differences:

This Template was used for the following reasons:
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		787 92
Bounding		1,575 84

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 11	
Bounding	0 22	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: ENEA (UALX HEU) SALUGGIA ITALY
SNF ID #: 574
Fuel Units & Descr: 116 - MTR TYPE
Heavy Metal Mass: BOL=18.56kg EOL=17.226kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1996
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 25 years

Estimated Canister usage: 18"x10' = 3.22

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	1.1465E-09	1,263.32	2,526.65	0.00E+00	1.45E-06	2.90E-06
Am-241	2.3056E-03	1,263.32	2,526.65	0.00E+00	2.91E+00	5.83E+00
Am-242m	4.1476E-07	1,263.32	2,526.65	0.00E+00	5.24E-04	1.05E-03
Am-243	1.4894E-06	1,263.32	2,526.65	0.00E+00	1.88E-03	3.76E-03
C-14	5.7108E-09	1,263.32	2,526.65	0.00E+00	7.21E-06	1.44E-05
Cl-36	1.3124E-32	1,263.32	2,526.65	0.00E+00	1.66E-29	3.32E-29
Cm-243	1.4562E-07	1,263.32	2,526.65	0.00E+00	1.84E-04	3.68E-04
Cm-244	2.4221E-05	1,263.32	2,526.65	0.00E+00	3.06E-02	6.12E-02
Co-60	2.7560E-06	1,263.32	2,526.65	0.00E+00	3.48E-03	6.96E-03
Cs-134	5.8851E-04	1,263.32	2,526.65	0.00E+00	7.43E-01	1.49E+00
Cs-135	3.4477E-06	1,263.32	2,526.65	0.00E+00	4.36E-03	8.71E-03
Cs-137	1.8099E+00	1,263.32	2,526.65	0.00E+00	2.29E+03	4.57E+03
Eu-154	1.6386E-02	1,263.32	2,526.65	0.00E+00	2.07E+01	4.14E+01
Eu-155	2.3957E-03	1,263.32	2,526.65	0.00E+00	3.03E+00	6.05E+00
Fe-55	3.2707E-05	1,263.32	2,526.65	0.00E+00	4.13E-02	8.26E-02
H-3	3.4504E-03	1,263.32	2,526.65	0.00E+00	4.36E+00	8.72E+00
I-129	7.5300E-07	1,263.32	2,526.65	0.00E+00	9.51E-04	1.90E-03
Kr-85	7.8540E-02	1,263.32	2,526.65	0.00E+00	9.92E+01	1.98E+02
Np-237	9.5615E-06	1,263.32	2,526.65	0.00E+00	1.21E-02	2.42E-02
Pa-231	2.7968E-09	1,263.32	2,526.65	0.00E+00	3.53E-06	7.07E-06
Pb-210	1.2612E-10	1,263.32	2,526.65	0.00E+00	1.59E-07	3.19E-07
Pm-147	1.2952E-02	1,263.32	2,526.65	0.00E+00	1.64E+01	3.27E+01
Pu-238	1.7549E-02	1,263.32	2,526.65	0.00E+00	2.22E+01	4.43E+01
Pu-239	4.2810E-04	1,263.32	2,526.65	0.00E+00	5.41E-01	1.08E+00
Pu-240	2.4357E-04	1,263.32	2,526.65	0.00E+00	3.08E-01	6.15E-01
Pu-241	2.6277E-02	1,263.32	2,526.65	0.00E+00	3.32E+01	6.64E+01
Pu-242	3.6329E-07	1,263.32	2,526.65	0.00E+00	4.59E-04	9.18E-04
Ra-226	4.4444E-10	1,263.32	2,526.65	0.00E+00	5.61E-07	1.12E-06
Ra-228	1.9714E-14	1,263.32	2,526.65	0.00E+00	2.49E-11	4.98E-11
Ru-106	2.0477E-07	1,263.32	2,526.65	0.00E+00	2.59E-04	5.17E-04
Se-79	1.2933E-05	1,263.32	2,526.65	0.00E+00	1.63E-02	3.27E-02
Sn-126	1.1574E-05	1,263.32	2,526.65	0.00E+00	1.46E-02	2.92E-02
Sr-90	1.7092E+00	1,263.32	2,526.65	0.00E+00	2.16E+03	4.32E+03
Tc-99	4.2239E-04	1,263.32	2,526.65	0.00E+00	5.34E-01	1.07E+00
Th-229	7.7260E-12	1,263.32	2,526.65	0.00E+00	9.76E-09	1.95E-08
Th-230	5.8497E-08	1,263.32	2,526.65	0.00E+00	7.39E-05	1.48E-04
Th-232	2.6906E-14	1,263.32	2,526.65	0.00E+00	3.40E-11	6.80E-11
Tl-208	4.4336E-08	1,263.32	2,526.65	0.00E+00	5.60E-05	1.12E-04
U-232	1.2037E-07	1,263.32	2,526.65	0.00E+00	1.52E-04	3.04E-04
U-233	3.0011E-09	1,263.32	2,526.65	0.00E+00	3.79E-06	7.58E-06
U-234	1.8497E-04	1,263.32	2,526.65	0.00E+00	2.34E-01	4.67E-01
U-235	-2.7235E-06	1,263.32	0.00	3.74E-02	3.39E-02	3.74E-02
U-236	1.5493E-05	1,263.32	2,526.65	0.00E+00	1.96E-02	3.91E-02
U-238	-4.2851E-09	1,263.32	0.00	4.29E-04	4.23E-04	4.29E-04
Y-90	1.7094E+00	1,263.32	2,526.65	0.00E+00	2.16E+03	4.32E+03
Other Radionuclides					2.18E+03	4.35E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	2.364E+14
0.0250	4.912E+13
0.0375	4.278E+13
0.0575	4.593E+13
0.0850	2.772E+13
0.1250	1.856E+13
0.2250	2.393E+13
0.3750	1.040E+13
0.5750	1.705E+14
0.8500	2.457E+12
1.2500	1.367E+12
1.7500	6.752E+10
2.2500	4.812E+06
2.7500	3.940E+06
3.5000	2.976E+03
5.0000	1.001E+03
7.0000	1.102E+02
11.0000	1.232E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.67E+01	5.34E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences:
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents	U	U	
BOL Enrichment %	93.125	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		1,263.32	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		2,526.65	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0.22		1.00
Bounding	0.43		

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: EPRI
SNF ID #: 67
Fuel Units & Descr: 1 - CANISTER OF SCRAP
Heavy Metal Mass: BOL= , EOL=0 02kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template. (Worst Case)
[2]Template Burnup(MWd): 62.5
Template BOL Heavy Metal Mass (MT): 0 00186865
Template Decay Time: 50 years

Estimated Canister usage
18"x10"
0 03

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2.5200E-06	19 01	19 01	0 00E+00	4.79E-05	4 79E-05
Am-241	8 6432E+00	19 01	19 01	0 00E+00	1 64E+02	1 64E+02
Am-242m	1 5728E-02	19 01	19 01	0 00E+00	2.99E-01	2 99E-01
Am-243	1 6288E-02	19 01	19 01	0 00E+00	3.10E-01	3 10E-01
C-14	1 2068E-01	19 01	19 01	0 00E+00	2.29E+00	2.29E+00
Cl-36	2 2849E-03	19 01	19 01	0 00E+00	4 34E-02	4 34E-02
Cm-243	6 0144E-04	19 01	19 01	0 00E+00	1 14E-02	1.14E-02
Cm-244	9 4880E-02	19 01	19 01	0 00E+00	1 80E+00	1 80E+00
Co-60	3 9052E+00	19 01	19 01	0 00E+00	7 42E+01	7 42E+01
Cs-134	2 2139E-06	19 01	19 01	0.00E+00	4.21E-05	4.21E-05
Cs-135	4 3976E-04	19 01	19 01	0 00E+00	8 36E-03	8.36E-03
Cs-137	1 4887E+01	19 01	19 01	0.00E+00	2 83E+02	2 83E+02
Eu-154	3 7342E-01	19 01	19 01	0 00E+00	7 10E+00	7 10E+00
Eu-155	8 4893E-03	19 01	19 01	0 00E+00	1 61E-01	1 61E-01
Fe-55	5 3750E-03	19 01	19 01	0 00E+00	1 02E-01	1 02E-01
H-3	1 0472E-01	19 01	19 01	0 00E+00	1 99E+00	1 99E+00
I-129	1 0618E-05	19 01	19 01	0 00E+00	2 02E-04	2.02E-04
Kr-85	2 2717E-01	19 01	19 01	0 00E+00	4 32E+00	4 32E+00
Np-237	1 6400E-04	19 01	19 01	0 00E+00	3 12E-03	3 12E-03
Pa-231	2 8688E-06	19 01	19 01	0 00E+00	5 45E-05	5 45E-05
Pb-210	4 7312E-08	19 01	19 01	0 00E+00	8 99E-07	8 99E-07
Pm-147	3.2198E-04	19 01	19 01	0 00E+00	6 12E-03	6 12E-03
Pu-238	-1 1924E+00	19 01	0 00	5 14E+00	0 00E+00	5 14E+00
Pu-239	-4 8600E-02	19 01	0 00	6 22E-01	0 00E+00	6 22E-01
Pu-240	-3 0127E-01	19 01	0 00	7 94E-01	0 00E+00	7 94E-01
Pu-241	-1 2917E+02	19 01	0 00	2 04E+02	0 00E+00	2 04E+02
Pu-242	-1 1381E-04	19 01	0 00	3 44E-03	1 27E-03	3 44E-03
Ra-226	1 0760E-07	19 01	19 01	0 00E+00	2 05E-06	2 05E-06
Ra-228	6.0160E-07	19 01	19 01	0 00E+00	1 14E-05	1 14E-05
Ru-106	1 3388E-13	19 01	19 01	0 00E+00	2 54E-12	2 54E-12
Se-79	1 9179E-04	19 01	19 01	0 00E+00	3 65E-03	3 65E-03
Sn-126	1 6669E-04	19 01	19 01	0 00E+00	3 17E-03	3 17E-03
Sr-90	1 3859E+01	19 01	19 01	0 00E+00	2 63E+02	2 63E+02
Tc-99	6 7678E-03	19 01	19 01	0 00E+00	1.29E-01	1 29E-01
Th-229	2 2592E-06	19 01	19 01	0 00E+00	4.29E-05	4 29E-05
Th-230	7 5955E-06	19 01	19 01	0 00E+00	1.44E-04	1 44E-04
Th-232	6 0208E-07	19 01	19 01	0 00E+00	1.14E-05	1 14E-05
Tl-208	7 5795E-05	19 01	19 01	0 00E+00	1.44E-03	1 44E-03
U-232	2 0521E-04	19 01	19 01	0 00E+00	3.90E-03	3 90E-03
U-233	3 6128E-04	19 01	19 01	0 00E+00	6.87E-03	6 87E-03
U-234	1 2788E-02	19 01	19 01	0 00E+00	2 43E-01	2 43E-01
U-235	5 8772E-04	19 01	19.01	0.00E+00	1.12E-02	1 12E-02
U-236	2 3485E-04	19 01	19 01	0 00E+00	4 46E-03	4 46E-03
U-238	1 1741E-04	19 01	19 01	0 00E+00	2.23E-03	2.23E-03
Y-90	1 3861E+01	19 01	19 01	0 00E+00	2 63E+02	2 63E+02
Other Radionuclides					9 77E+02	9.77E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 611E+13
0 0250	3 182E+12
0 0375	2 690E+12
0 0575	5 081E+12
0 0850	1 703E+12
0 1250	1.205E+12
0.2250	1 474E+12
0 3750	6.380E+11
0.5750	1 056E+13
0 8500	2.313E+11
1.2500	5 668E+12
1 7500	6 812E+09
2.2500	2.946E+07
2 7500	5 071E+07
3.5000	2.761E+04
5 0000	1 167E+04
7 0000	1 329E+03
11.0000	1 516E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 02E+01	1 04E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	(Worst Case)
Fuel Cladding	SST	SST/Inconel
BOL HM Constituents	Pu	U, Th & Pu
BOL Enrichment %		0 to 100

Basis for Parameter Differences:
This fuel didn't closely match any existing templates, therefore the worst case template was used.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		19 01
Bounding		19 01

Basis for burnup used in estimate:
Nominal burnup set equal to bounding burnup.
Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	14.21	
Bounding	14.21	

Estimated EOL HM/Given EOL HM: 601 11

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name ERR (ASSEMBLIES)
SNF ID # 68
Fuel Units & Descr. 190 - 5 X 5 ROD ARRAY
Heavy Metal Mass BOL=5056 66kg EOL=5041 023kg
ROD Storage Site INEEL

[1]Fuel decay start date 1966
Estimates as of 2030
Template LWBR (Light Water, Zirc 60 to 100% Th and U)
[2]Template Burnup(MWd) 10269 14
Template BOL Heavy Metal Mass (MT) 0 45991251
Template Decay Time 50 years

Estimated Canister usage
18"x10'
10 56

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	1 0595E-04	27,366 64	65,736 58	0 00E+00	2 90E+00	6.96E+00
Am-241	2 4968E-04	27,366 64	65,736 58	0 00E+00	6 83E+00	1.64E+01
Am-242m	1.3847E-06	27,366 64	65,736 58	0 00E+00	3 79E-02	9 10E-02
Am-243	3 1103E-07	27,366 64	65,736.58	0 00E+00	8 51E-03	2 04E-02
C-14	9.2267E-05	27,366 64	65,736.58	0 00E+00	2 53E+00	6 07E+00
Cl-36	1.8103E-06	27,366 64	65,736 58	0 00E+00	4 95E-02	1 19E-01
Cm-243	2 1248E-07	27,366 64	65,736 58	0 00E+00	5 81E-03	1 40E-02
Cm-244	7 9666E-06	27,366 64	65,736 58	0 00E+00	2.18E-01	5 24E-01
Co-60	1.2143E-04	27,366 64	65,736 58	0 00E+00	3 32E+00	7 98E+00
Cs-134	1 6535E-07	27,366 64	65,736 58	0 00E+00	4.53E-03	1 09E-02
Cs-135	2 8639E-05	27,366 64	65,736 58	0 00E+00	7.84E-01	1 88E+00
Cs-137	1 0449E+00	27,366 64	65,736 58	0 00E+00	2 86E+04	6 87E+04
Eu-154	2 5679E-03	27,366 64	65,736 58	0.00E+00	7.03E+01	1.69E+02
Eu-155	8 1175E-05	27,366 64	65,736 58	0 00E+00	2.22E+00	5.34E+00
Fe-55	4 2194E-08	27,366 64	65,736 58	0 00E+00	1 15E-03	2 77E-03
H-3	9 1673E-04	27,366.64	65,736 58	0 00E+00	2 51E+01	6 03E+01
I-129	1.5853E-06	27,366 64	65,736 58	0 00E+00	4 34E-02	1 04E-01
Kr-85	2.3741E-02	27,366 64	65,736 58	0 00E+00	6 50E+02	1.56E+03
Np-237	1.2747E-07	27,366 64	65,736.58	0 00E+00	3 49E-03	8 38E-03
Pa-231	1.2007E-04	27,366 64	65,736 58	0 00E+00	3 29E+00	7 89E+00
Pb-210	1 8424E-08	27,366 64	65,736 58	0 00E+00	5 04E-04	1.21E-03
Pm-147	4 9829E-06	27,366 64	65,736 58	0 00E+00	1.36E-01	3.28E-01
Pu-238	3 7744E-04	27,366 64	65,736 58	0 00E+00	1 03E+01	2 48E+01
Pu-239	2 7510E-05	27,366 64	65,736 58	0 00E+00	7.53E-01	1 81E+00
Pu-240	1 6175E-05	27,366 64	65,736 58	0 00E+00	4.43E-01	1.06E+00
Pu-241	7 1379E-04	27,366 64	65,736 58	0 00E+00	1 95E+01	4 69E+01
Pu-242	4 0831E-08	27,366 64	65,736 58	0 00E+00	1 12E-03	2 68E-03
Ra-226	2 9038E-08	27,366 64	65,736 58	0 00E+00	7 95E-04	1 91E-03
Ra-228	4 6352E-06	27,366 64	65,736 58	0 00E+00	1 27E-01	3 05E-01
Ru-106	1.3321E-15	27,366 64	65,736 58	0 00E+00	3 65E-11	8 76E-11
Se-79	3.5407E-05	27,366 64	65,736.58	0 00E+00	9 69E-01	2 33E+00
Sn-126	3.9838E-05	27,366 64	65,736 58	0 00E+00	1 09E+00	2 62E+00
Sr-90	1 0449E+00	27,366 64	65,736 58	0 00E+00	2 86E+04	6 87E+04
Tc-99	3.2525E-04	27,366 64	65,736 58	0 00E+00	8 90E+00	2 14E+01
Th-229	8.2305E-05	27,366 64	65,736.58	0 00E+00	2 25E+00	5 41E+00
Th-230	1.2533E-06	27,366 64	65,736.58	0 00E+00	3 43E-02	8.24E-02
Th-232	-9 0328E-08	27,366 64	0 00	5 34E-01	5.32E-01	5 34E-01
Tl-208	1.2085E-02	27,366 64	65,736 58	0 00E+00	3 31E+02	7.94E+02
U-232	3.2729E-02	27,366 64	65,736 58	0 00E+00	8 96E+02	2 15E+03
U-233	-3 3244E-03	27,366 64	0 00	1 80E+03	1.70E+03	1 80E+03
U-234	8 1769E-04	27,366 64	65,736 58	0 00E+00	2.24E+01	5 38E+01
U-235	5 7813E-08	27,366 64	65,736 58	3 67E-04	1 95E-03	4 17E-03
U-236	1.3273E-07	27,366 64	65,736 58	0 00E+00	3 63E-03	8 73E-03
U-238	-3 1121E-10	27,366 64	0 00	2.35E-04	2 26E-04	2.35E-04
Y-90	1 0449E+00	27,366 64	65,736 58	0 00E+00	2 86E+04	6 87E+04
Other Radionuclides					3 35E+04	8 04E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 807E+15
0 0250	7.815E+14
0 0375	6 678E+14
0 0575	7.299E+14
0 0850	4 723E+14
0 1250	2.889E+14
0 2250	4.266E+14
0 3750	1 685E+14
0 5750	2.595E+15
0 8500	4 464E+13
1.2500	1 358E+13
1 7500	3 553E+12
2.2500	7 916E+07
2 7500	2 789E+13
3 5000	1.074E+05
5 0000	3.313E+04
7 0000	2.338E+03
11 0000	1 701E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.02E+02	1.38E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	SST	ZIRC
BOL HM Constituents	Th and U	Th and U
BOL Enrichment %	92 94902719	60 to 100

Basis for Parameter Differences

This Template was used for the following reasons
This fuel matches LWBR Template on all but one parameter (cladding) making LWBR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	27,366 64	15,217.35
Bounding	65,736.58	30 434 70

Basis for burnup used in estimate:

Nominal burnup taken directly from SFD (converted to MWd)
Bounding burnup taken directly from SFD (converted to MWd)

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.24	0 56
Bounding	0 58	0 46

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: ERR (RODS)
SNF ID #: 1057
Fuel Units & Descr: 4 - ROD
Heavy Metal Mass: BOL=4.293kg, EOL=4.242kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2030
Template: LWBR (Light Water, Zirc, 60 to 100%, Th and U)
[2]Template Burnup(MWd): 10269 14
Template BOL Heavy Metal Mass (MT): 0 45991251
Template Decay Time: 50 years

Estimated Canister usage: 18"x10": 0 17

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 0595E-04	49 83	99 65	0 00E+00	5.28E-03	1 06E-02
Am-241	2 4968E-04	49 83	99 65	0 00E+00	1 24E-02	2 49E-02
Am-242m	1 3847E-06	49 83	99 65	0 00E+00	6 90E-05	1 38E-04
Am-243	3 1103E-07	49 83	99 65	0 00E+00	1 55E-05	3.10E-05
C-14	9.2267E-05	49 83	99 65	0 00E+00	4 60E-03	9.19E-03
Cl-36	1 8103E-06	49 83	99 65	0 00E+00	9 02E-05	1.80E-04
Cm-243	2.1248E-07	49 83	99 65	0 00E+00	1 06E-05	2.12E-05
Cm-244	7 9666E-06	49 83	99 65	0 00E+00	3 97E-04	7 94E-04
Co-60	1.2143E-04	49 83	99 65	0 00E+00	6 05E-03	1.21E-02
Cs-134	1 6535E-07	49 83	99 65	0 00E+00	8 24E-06	1 65E-05
Cs-135	2 8639E-05	49 83	99 65	0 00E+00	1 43E-03	2 85E-03
Cs-137	1.0449E+00	49 83	99 65	0 00E+00	5.21E+01	1 04E+02
Eu-154	2 5679E-03	49 83	99 65	0 00E+00	1 28E-01	2 56E-01
Eu-155	8.1175E-05	49 83	99 65	0 00E+00	4 04E-03	8 09E-03
Fe-55	4.2194E-08	49 83	99 65	0 00E+00	2 10E-06	4 20E-06
H-3	9 1673E-04	49 83	99 65	0 00E+00	4 57E-02	9 14E-02
I-129	1 5853E-06	49 83	99 65	0 00E+00	7 90E-05	1 58E-04
Kr-85	2 3741E-02	49 83	99 65	0 00E+00	1.18E+00	2 37E+00
Np-237	1 2747E-07	49 83	99 65	0 00E+00	6 35E-06	1 27E-05
Pa-231	1 2007E-04	49 83	99 65	0 00E+00	5 98E-03	1 20E-02
Pb-210	1 8424E-08	49 83	99 65	0 00E+00	9 18E-07	1 84E-06
Pm-147	4 9829E-06	49 83	99 65	0 00E+00	2.48E-04	4 97E-04
Pu-238	3 7744E-04	49 83	99 65	0 00E+00	1 88E-02	3 76E-02
Pu-239	2 7510E-05	49 83	99 65	0 00E+00	1.37E-03	2 74E-03
Pu-240	1 6175E-05	49 83	99 65	0 00E+00	8 06E-04	1 61E-03
Pu-241	7 1379E-04	49 83	99 65	0 00E+00	3 56E-02	7 11E-02
Pu-242	4 0831E-08	49 83	99 65	0 00E+00	2 03E-06	4 07E-06
Ra-226	2 9038E-08	49 83	99 65	0 00E+00	1 45E-06	2.89E-06
Ra-228	4 6352E-06	49 83	99 65	0 00E+00	2 31E-04	4 62E-04
Ru-106	1.3321E-15	49 83	99 65	0 00E+00	6 64E-14	1.33E-13
Se-79	3.5407E-05	49 83	99 65	0 00E+00	1 76E-03	3 53E-03
Sn-126	3 9838E-05	49 83	99 65	0 00E+00	1 98E-03	3 97E-03
Sr-90	1.0449E+00	49 83	99 65	0 00E+00	5 21E+01	1 04E+02
Tc-99	3.2525E-04	49 83	99.65	0.00E+00	1 62E-02	3 24E-02
Th-229	8.2305E-05	49 83	99 65	0 00E+00	4 10E-03	8.20E-03
Th-230	1.2533E-06	49 83	99 65	0 00E+00	6 24E-05	1.25E-04
Th-232	-9 0328E-08	49 83	0 00	4 53E-04	4 49E-04	4 53E-04
Tl-208	1.2085E-02	49 83	99 65	0 00E+00	6 02E-01	1 20E+00
U-232	3.2729E-02	49 83	99 65	0 00E+00	1 63E+00	3 26E+00
U-233	-3.3244E-03	49 83	0 00	1 52E+00	1.36E+00	1 52E+00
U-234	8.1769E-04	49 83	99 65	0 00E+00	4 07E-02	8 15E-02
U-235	5 7813E-08	49 83	99 65	3 12E-07	3 19E-06	6 07E-06
U-236	1 3273E-07	49 83	99 65	0 00E+00	6 61E-06	1 32E-05
U-238	-3.1121E-10	49 83	0 00	1 99E-07	1 84E-07	1 99E-07
Y-90	1 0449E+00	49 83	99 65	0 00E+00	5.21E+01	1 04E+02
Other Radionuclides					6 09E+01	1.22E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	5 767E+12
0 0250	1 185E+12
0 0375	1 012E+12
0 0575	1 107E+12
0 0850	7 160E+11
0 1250	4.380E+11
0.2250	6 467E+11
0 3750	2.554E+11
0 5750	3.935E+12
0 8500	6 768E+10
1 2500	2.059E+10
1 7500	5.386E+09
2.2500	1.200E+05
2 7500	4.229E+10
3 5000	1.550E+02
5 0000	4 789E+01
7 0000	3.393E+00
11 0000	2 483E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.05E+00	2.06E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	SST	ZIRC
BOL HM Constituents	Th and U	Th and U
BOL Enrichment %	93 0868939	60 to 100

Basis for Parameter Differences:

This Template was used for the following reasons.
This fuel matches LWBR Template on all but one parameter (cladding) making LWBR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	28.26	49 83	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding	45 49	99 65	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 52	1 76
Bounding	1 04	2 19

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: ESSOR (UALX-HEU) ITALY
SNF ID #: 762
Fuel Units & Descr: 12 - 18 CURVED PLATES
Heavy Metal Mass: BOL=7.8kg EOL=5 73kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2006
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 1.00

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	1,960 33	3,920 66	0 00E+00	1 30E-06	2 60E-06
Am-241	2 0060E-03	1,960 33	3,920 66	0 00E+00	3 93E+00	7.86E+00
Am-242m	4 2429E-07	1,960 33	3,920 66	0 00E+00	8 32E-04	1 66E-03
Am-243	1 4899E-06	1,960 33	3,920 66	0 00E+00	2 92E-03	5 84E-03
C-14	5 7135E-09	1,960 33	3,920 66	0.00E+00	1 12E-05	2 24E-05
Cl-36	1.3124E-32	1,960 33	3,920 66	0 00E+00	2.57E-29	5 15E-29
Cm-243	1 6443E-07	1,960.33	3,920 66	0 00E+00	3.22E-04	6 45E-04
Cm-244	2.9330E-05	1,960.33	3,920 66	0 00E+00	5 75E-02	1.15E-01
Co-60	5.3186E-06	1,960.33	3,920 66	0 00E+00	1 04E-02	2 09E-02
Cs-134	3 1563E-03	1,960.33	3,920 66	0 00E+00	6 19E+00	1.24E+01
Cs-135	3 4477E-06	1,960.33	3,920 66	0 00E+00	6 76E-03	1.35E-02
Cs-137	2 0313E+00	1,960 33	3,920 66	0 00E+00	3 98E+03	7 96E+03
Eu-154	2 4513E-02	1,960 33	3,920 66	0 00E+00	4 81E+01	9 61E+01
Eu-155	4 8175E-03	1,960 33	3,920 66	0 00E+00	9 44E+00	1.89E+01
Fe-55	1.2397E-04	1,960 33	3,920 66	0 00E+00	2 43E-01	4 86E-01
H-3	4 5697E-03	1,960 33	3,920 66	0 00E+00	8 96E+00	1 79E+01
I-129	7 5300E-07	1,960 33	3,920.66	0 00E+00	1 48E-03	2 95E-03
Kr-85	1 0850E-01	1,960 33	3,920 66	0 00E+00	2 13E+02	4 25E+02
Np-237	9 5561E-06	1,960 33	3,920 66	0 00E+00	1 87E-02	3 75E-02
Pa-231	2 0359E-09	1,960 33	3 920 66	0 00E+00	3.99E-06	7 98E-06
Pb-210	4 9728E-11	1,960 33	3,920 66	0 00E+00	9 75E-08	1.95E-07
Pm-147	4 8502E-02	1,960 33	3,920 66	0 00E+00	9 51E+01	1 90E+02
Pu-238	1.8254E-02	1,960 33	3,920 66	0 00E+00	3.58E+01	7.16E+01
Pu-239	4.2810E-04	1,960.33	3,920 66	0 00E+00	8 39E-01	1 68E+00
Pu-240	2 4368E-04	1,960.33	3,920 66	0 00E+00	4 78E-01	9 55E-01
Pu-241	3 3415E-02	1,960.33	3,920 66	0 00E+00	6 55E+01	1.31E+02
Pu-242	3 6329E-07	1,960 33	3,920 66	0 00E+00	7 12E-04	1 42E-03
Ra-226	2.2854E-10	1,960 33	3,920 66	0 00E+00	4 48E-07	8 96E-07
Ra-228	1.2426E-14	1,960 33	3,920 66	0 00E+00	2 44E-11	4 87E-11
Ru-106	6 3589E-06	1,960 33	3,920 66	0 00E+00	1 25E-02	2 49E-02
Se-79	1.2933E-05	1,960 33	3,920 66	0 00E+00	2 54E-02	5 07E-02
Sn-126	1 1574E-05	1,960.33	3,920 66	0 00E+00	2 27E-02	4 54E-02
Sr-90	1 9248E+00	1,960 33	3,920 66	0 00E+00	3 77E+03	7 55E+03
Tc-99	4 2239E-04	1,960 33	3,920 66	0 00E+00	8.28E-01	1 66E+00
Th-229	5 0953E-12	1,960 33	3,920.66	0 00E+00	9 99E-09	2.00E-08
Th-230	4 1885E-08	1,960 33	3,920 66	0 00E+00	8.21E-05	1 64E-04
Th-232	1.9270E-14	1,960.33	3,920 66	0 00E+00	3 78E-11	7.56E-11
Tl-208	4.6024E-08	1,960 33	3,920 66	0 00E+00	9 02E-05	1.80E-04
U-232	1.2582E-07	1,960 33	3,920 66	0 00E+00	2 47E-04	4 93E-04
U-233	2.5825E-09	1,960.33	3,920 66	0 00E+00	5 06E-06	1 01E-05
U-234	1 8450E-04	1,960.33	3,920 66	0 00E+00	3 62E-01	7 23E-01
U-235	-2 7235E-06	1,960.33	0 00	1 56E-02	1 03E-02	1 56E-02
U-236	1 5493E-05	1,960 33	3,920 66	0 00E+00	3 04E-02	6 07E-02
U-238	-4 2851E-09	1,960 33	0 00	1 96E-04	1 87E-04	1 96E-04
Y-90	1 9254E+00	1,960 33	3,920 66	0 00E+00	3 77E+03	7.55E+03
Other Radionuclides					3 79E+03	7.58E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 139E+14
0 0250	8 606E+13
0 0375	7.506E+13
0 0575	8 040E+13
0 0850	4 858E+13
0 1250	3 288E+13
0 2250	4 192E+13
0 3750	1 825E+13
0 5750	2 977E+14
0 8500	5 032E+12
1.2500	2.874E+12
1 7500	1.319E+11
2.2500	1 157E+07
2 7500	6.541E+06
3 5000	3 005E+04
5 0000	1 699E+03
7 0000	1 875E+02
11 0000	2 102E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 67E+01	9.35E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	92.52828863	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		1 960 33
Bounding		3 920 66

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 80	
Bounding	1 60	

Estimated EOL HM/Given EOL HM: 1 02

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FMRB (GERMANY)
SNF ID #: 577
Fuel Units & Descr: 92 - MTR TYPE
Heavy Metal Mass: BOL=13 138kg, EOL=11 666kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1994
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 35 years

Estimated Canister usage

18"x10'
3 83

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	2 0068E-09	1,394 01	2,788 03	0 00E+00	2 80E-06	5 60E-06
Am-241	2 5251E-03	1,394 01	2,788 03	0 00E+00	3 52E+00	7 04E+00
Am-242m	3 9624E-07	1,394 01	2,788 03	0 00E+00	5 52E-04	1.10E-03
Am-243	1 4880E-06	1,394 01	2,788 03	0 00E+00	2 07E-03	4 15E-03
C-14	5 7053E-09	1,394 01	2,788 03	0 00E+00	7 95E-06	1 59E-05
Cl-36	1 3124E-32	1,394 01	2,788 03	0 00E+00	1 83E-29	3 66E-29
Cm-243	1 1419E-07	1,394 01	2,788 03	0 00E+00	1 59E-04	3 18E-04
Cm-244	1 6522E-05	1,394 01	2,788 03	0 00E+00	2.30E-02	4 61E-02
Co-60	7 4047E-07	1,394 01	2,788 03	0 00E+00	1 03E-03	2 06E-03
Cs-134	2 0455E-05	1,394 01	2,788 03	0 00E+00	2.85E-02	5 70E-02
Cs-135	3.4477E-06	1,394 01	2,788.03	0 00E+00	4 81E-03	9 61E-03
Cs-137	1 4365E+00	1,394 01	2,788 03	0 00E+00	2 00E+03	4 01E+03
Eu-154	7 3230E-03	1,394 01	2,788 03	0 00E+00	1 02E+01	2 04E+01
Eu-155	5 9259E-04	1,394.01	2,788 03	0 00E+00	8.26E-01	1 65E+00
Fe-55	2.2791E-06	1,394.01	2,788 03	0 00E+00	3.18E-03	6 35E-03
H-3	1 9698E-03	1,394.01	2,788 03	0 00E+00	2 75E+00	5 49E+00
I-129	7 5300E-07	1,394 01	2,788 03	0 00E+00	1 05E-03	2 10E-03
Kr-85	4 1176E-02	1,394 01	2,788 03	0 00E+00	5 74E+01	1.15E+02
Np-237	9 5752E-06	1,394 01	2,788 03	0 00E+00	1 33E-02	2 67E-02
Pa-231	3 9379E-09	1,394 01	2,788 03	0 00E+00	5 49E-06	1 10E-05
Pb-210	3 3115E-10	1,394 01	2,788 03	0 00E+00	4 62E-07	9.23E-07
Pm-147	9 2402E-04	1,394 01	2,788 03	0 00E+00	1 29E+00	2.58E+00
Pu-238	1 6217E-02	1,394 01	2,788 03	0 00E+00	2 26E+01	4.52E+01
Pu-239	4 2810E-04	1,394 01	2,788 03	0 00E+00	5 97E-01	1 19E+00
Pu-240	2 4333E-04	1,394 01	2,788 03	0 00E+00	3 39E-01	6.78E-01
Pu-241	1 6242E-02	1,394 01	2,788 03	0 00E+00	2 26E+01	4 53E+01
Pu-242	3 6329E-07	1,394 01	2,788 03	0 00E+00	5 06E-04	1.01E-03
Ra-226	9 0114E-10	1,394 01	2,788 03	0 00E+00	1 26E-06	2.51E-06
Ra-228	3 1019E-14	1,394 01	2,788 03	0 00E+00	4 32E-11	8 65E-11
Ru-106	2 1225E-10	1,394 01	2,788 03	0 00E+00	2.96E-07	5 92E-07
Se-79	1.2930E-05	1,394 01	2,788 03	0 00E+00	1 80E-02	3 60E-02
Sn-126	1.1571E-05	1,394 01	2,788 03	0 00E+00	1.61E-02	3 23E-02
Sr-90	1.3472E+00	1,394 01	2,788 03	0 00E+00	1 88E+03	3 76E+03
Tc-99	4.2239E-04	1,394 01	2,788 03	0 00E+00	5 89E-01	1 18E+00
Th-229	1.2407E-11	1,394 01	2,788 03	0 00E+00	1.73E-08	3 46E-08
Th-230	8.3497E-08	1,394.01	2,788 03	0 00E+00	1.16E-04	2 33E-04
Th-232	3 8371E-14	1,394.01	2,788 03	0 00E+00	5.35E-11	1 07E-10
Tl-208	4 0414E-08	1,394 01	2,788 03	0 00E+00	5 63E-05	1 13E-04
U-232	1 0948E-07	1,394 01	2,788 03	0 00E+00	1.53E-04	3 05E-04
U-233	3 6275E-09	1,394 01	2,788 03	0 00E+00	5 06E-06	1 01E-05
U-234	1 8562E-04	1,394 01	2,788 03	0 00E+00	2.59E-01	5 18E-01
U-235	-2.7235E-06	1,394 01	0 00	2 59E-02	2 21E-02	2 59E-02
U-236	1 5493E-05	1,394 01	2,788 03	0 00E+00	2 16E-02	4 32E-02
U-238	-4 2851E-09	1,394 01	0 00	3 86E-04	3 80E-04	3 86E-04
Y-90	1 3475E+00	1,394 01	2,788 03	0 00E+00	1 88E+03	3.76E+03
Other Radionuclides					1 91E+03	3 82E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 053E+14
0 0250	4.264E+13
0 0375	3 706E+13
0 0575	3 989E+13
0 0850	2 404E+13
0 1250	1 588E+13
0 2250	2 075E+13
0 3750	9 028E+12
0 5750	1 492E+14
0 8500	1.822E+12
1.2500	8.814E+11
1 7500	4 961E+10
2.2500	4 148E+06
2 7500	3.959E+06
3 5000	2.296E+03
5 0000	9 381E+02
7 0000	1 027E+02
11.0000	1 145E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 33E+01	4 67E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	91 25787542	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		1,394 01
Bounding		2,788 03

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 34	
Bounding	0 67	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRG-1 (U3O8 LEU) GERMANY
SNF ID #: 581
Fuel Units & Descr: 7 - MTR TYPE
Heavy Metal Mass: BOL=9.566kg EOL=8.635kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1994
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100% U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated Canister usage: 18"x10' = 0.29

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2.0068E-09	881.01	1,762.02	0.00E+00	1.77E-06	3.54E-06
Am-241	2.5251E-03	881.01	1,762.02	0.00E+00	2.22E+00	4.45E+00
Am-242m	3.9624E-07	881.01	1,762.02	0.00E+00	3.49E-04	6.98E-04
Am-243	1.4880E-06	881.01	1,762.02	0.00E+00	1.31E-03	2.62E-03
C-14	5.7053E-09	881.01	1,762.02	0.00E+00	5.03E-06	1.01E-05
Cl-36	1.3124E-32	881.01	1,762.02	0.00E+00	1.16E-29	2.31E-29
Cm-243	1.1419E-07	881.01	1,762.02	0.00E+00	1.01E-04	2.01E-04
Cm-244	1.6522E-05	881.01	1,762.02	0.00E+00	1.46E-02	2.91E-02
Co-60	7.4047E-07	881.01	1,762.02	0.00E+00	6.52E-04	1.30E-03
Cs-134	2.0455E-05	881.01	1,762.02	0.00E+00	1.80E-02	3.60E-02
Cs-135	3.4477E-06	881.01	1,762.02	0.00E+00	3.04E-03	6.07E-03
Cs-137	1.4365E+00	881.01	1,762.02	0.00E+00	1.27E+03	2.53E+03
Eu-154	7.3230E-03	881.01	1,762.02	0.00E+00	6.45E+00	1.29E+01
Eu-155	5.9259E-04	881.01	1,762.02	0.00E+00	5.22E-01	1.04E+00
Fe-55	2.2791E-06	881.01	1,762.02	0.00E+00	2.01E-03	4.02E-03
H-3	1.9698E-03	881.01	1,762.02	0.00E+00	1.74E+00	3.47E+00
I-129	7.5300E-07	881.01	1,762.02	0.00E+00	6.63E-04	1.33E-03
Kr-85	4.1176E-02	881.01	1,762.02	0.00E+00	3.63E+01	7.26E+01
Np-237	9.5752E-06	881.01	1,762.02	0.00E+00	8.44E-03	1.69E-02
Pa-231	3.9379E-09	881.01	1,762.02	0.00E+00	3.47E-06	6.94E-06
Pb-210	3.3115E-10	881.01	1,762.02	0.00E+00	2.92E-07	5.84E-07
Pm-147	9.2402E-04	881.01	1,762.02	0.00E+00	8.14E-01	1.63E+00
Pu-238	1.6217E-02	881.01	1,762.02	0.00E+00	1.43E+01	2.86E+01
Pu-239	4.2810E-04	881.01	1,762.02	0.00E+00	3.77E-01	7.54E-01
Pu-240	2.4333E-04	881.01	1,762.02	0.00E+00	2.14E-01	4.29E-01
Pu-241	1.6242E-02	881.01	1,762.02	0.00E+00	1.43E+01	2.86E+01
Pu-242	3.6329E-07	881.01	1,762.02	0.00E+00	3.20E-04	6.40E-04
Ra-226	9.0114E-10	881.01	1,762.02	0.00E+00	7.94E-07	1.59E-06
Ra-228	3.1019E-14	881.01	1,762.02	0.00E+00	2.73E-11	5.47E-11
Ru-106	2.1225E-10	881.01	1,762.02	0.00E+00	1.87E-07	3.74E-07
Se-79	1.2930E-05	881.01	1,762.02	0.00E+00	1.14E-02	2.28E-02
Sn-126	1.1571E-05	881.01	1,762.02	0.00E+00	1.02E-02	2.04E-02
Sr-90	1.3472E+00	881.01	1,762.02	0.00E+00	1.19E+03	2.37E+03
Tc-99	4.2239E-04	881.01	1,762.02	0.00E+00	3.72E-01	7.44E-01
Th-229	1.2407E-11	881.01	1,762.02	0.00E+00	1.09E-08	2.19E-08
Th-230	8.3497E-08	881.01	1,762.02	0.00E+00	7.36E-05	1.47E-04
Th-232	3.8371E-14	881.01	1,762.02	0.00E+00	3.38E-11	6.76E-11
Tl-208	4.0414E-08	881.01	1,762.02	0.00E+00	3.56E-05	7.12E-05
U-232	1.0948E-07	881.01	1,762.02	0.00E+00	9.65E-05	1.93E-04
U-233	3.6275E-09	881.01	1,762.02	0.00E+00	3.20E-06	6.39E-06
U-234	1.8562E-04	881.01	1,762.02	0.00E+00	1.64E-01	3.27E-01
U-235	-2.7235E-06	881.01	0.00	4.08E-03	1.68E-03	4.08E-03
U-236	-1.5493E-05	881.01	1,762.02	0.00E+00	1.36E-02	2.73E-02
U-238	-4.2851E-09	881.01	0.00	2.58E-03	2.58E-03	2.58E-03
Y-90	1.3475E+00	881.01	1,762.02	0.00E+00	1.19E+03	2.37E+03
Other Radionuclides					1.21E+03	2.41E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	1.298E+14
0.0250	2.695E+13
0.0375	2.342E+13
0.0575	2.521E+13
0.0850	1.519E+13
0.1250	1.003E+13
0.2250	1.311E+13
0.3750	5.705E+12
0.5750	9.429E+13
0.8500	1.152E+12
1.2500	5.571E+11
1.7500	3.135E+10
2.2500	2.621E+06
2.7500	2.502E+06
3.5000	1.463E+03
5.0000	5.981E+02
7.0000	6.548E+01
11.0000	7.303E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.47E+01	2.95E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19.73077542	60 to 100

Basis for Parameter Differences:

This Template was used for the following reasons
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		881.01
Bounding		1,762.02

Basis for burnup used in estimate

Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.29	
Bounding	0.59	

Estimated EOL HM/Given EOL HM: 1.01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRG-1 (U3Si2 LEU) GERMANY
SNF ID #: 741
Fuel Units & Descr: 109 - MTR TYPE
Heavy Metal Mass: BOL=161.56kg EOL=150.932kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1994
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated Canister usage: 18"x10": 4.54

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2.0068E-09	10,064.45	20,128.90	0.00E+00	2.02E-05	4.04E-05
Am-241	2.5251E-03	10,064.45	20,128.90	0.00E+00	2.54E+01	5.08E+01
Am-242m	3.9624E-07	10,064.45	20,128.90	0.00E+00	3.99E-03	7.98E-03
Am-243	1.4880E-06	10,064.45	20,128.90	0.00E+00	1.50E-02	3.00E-02
C-14	5.7053E-09	10,064.45	20,128.90	0.00E+00	5.74E-05	1.15E-04
Cl-36	1.3124E-32	10,064.45	20,128.90	0.00E+00	1.32E-28	2.64E-28
Cm-243	1.1419E-07	10,064.45	20,128.90	0.00E+00	1.15E-03	2.30E-03
Cm-244	1.6522E-05	10,064.45	20,128.90	0.00E+00	1.66E-01	3.33E-01
Co-60	7.4047E-07	10,064.45	20,128.90	0.00E+00	7.45E-03	1.49E-02
Cs-134	2.0455E-05	10,064.45	20,128.90	0.00E+00	2.06E-01	4.12E-01
Cs-135	3.4477E-06	10,064.45	20,128.90	0.00E+00	3.47E-02	6.94E-02
Cs-137	1.4365E+00	10,064.45	20,128.90	0.00E+00	1.45E+04	2.89E+04
Eu-154	7.3230E-03	10,064.45	20,128.90	0.00E+00	7.37E+01	1.47E+02
Eu-155	5.9259E-04	10,064.45	20,128.90	0.00E+00	5.96E+00	1.19E+01
Fe-55	2.2791E-06	10,064.45	20,128.90	0.00E+00	2.29E-02	4.59E-02
H-3	1.9698E-03	10,064.45	20,128.90	0.00E+00	1.98E+01	3.96E+01
I-129	7.5300E-07	10,064.45	20,128.90	0.00E+00	7.58E-03	1.52E-02
Kr-85	4.1176E-02	10,064.45	20,128.90	0.00E+00	4.14E+02	8.29E+02
Np-237	9.5752E-06	10,064.45	20,128.90	0.00E+00	9.64E-02	1.93E-01
Pa-231	3.9379E-09	10,064.45	20,128.90	0.00E+00	3.96E-05	7.93E-05
Pb-210	3.3115E-10	10,064.45	20,128.90	0.00E+00	3.33E-06	6.67E-06
Pm-147	9.2402E-04	10,064.45	20,128.90	0.00E+00	9.30E+00	1.86E+01
Pu-238	1.6217E-02	10,064.45	20,128.90	0.00E+00	1.63E+02	3.26E+02
Pu-239	4.2810E-04	10,064.45	20,128.90	0.00E+00	4.31E+00	8.62E+00
Pu-240	2.4333E-04	10,064.45	20,128.90	0.00E+00	2.45E+00	4.90E+00
Pu-241	1.6242E-02	10,064.45	20,128.90	0.00E+00	1.63E+02	3.27E+02
Pu-242	3.6329E-07	10,064.45	20,128.90	0.00E+00	3.66E-03	7.31E-03
Ra-226	9.0114E-10	10,064.45	20,128.90	0.00E+00	9.07E-06	1.81E-05
Ra-228	3.1019E-14	10,064.45	20,128.90	0.00E+00	3.12E-10	6.24E-10
Ru-106	2.1225E-10	10,064.45	20,128.90	0.00E+00	2.14E-06	4.27E-06
Se-79	1.2930E-05	10,064.45	20,128.90	0.00E+00	1.30E-01	2.60E-01
Sn-126	1.1571E-05	10,064.45	20,128.90	0.00E+00	1.16E-01	2.33E-01
Sr-90	1.3472E+00	10,064.45	20,128.90	0.00E+00	1.36E+04	2.71E+04
Tc-99	4.2239E-04	10,064.45	20,128.90	0.00E+00	4.25E+00	8.50E+00
Th-229	1.2407E-11	10,064.45	20,128.90	0.00E+00	1.25E-07	2.50E-07
Th-230	8.3497E-08	10,064.45	20,128.90	0.00E+00	8.40E-04	1.68E-03
Th-232	3.8371E-14	10,064.45	20,128.90	0.00E+00	3.86E-10	7.72E-10
Tl-208	4.0414E-08	10,064.45	20,128.90	0.00E+00	4.07E-04	8.13E-04
U-232	1.0948E-07	10,064.45	20,128.90	0.00E+00	1.10E-03	2.20E-03
U-233	3.6275E-09	10,064.45	20,128.90	0.00E+00	3.65E-05	7.30E-05
U-234	1.8562E-04	10,064.45	20,128.90	0.00E+00	1.87E+00	3.74E+00
U-235	-2.7235E-06	10,064.45	0.00	6.92E-02	4.18E-02	6.92E-02
U-236	1.5493E-05	10,064.45	20,128.90	0.00E+00	1.56E-01	3.12E-01
U-238	-4.2851E-09	10,064.45	0.00	4.35E-02	4.35E-02	4.35E-02
Y-90	1.3475E+00	10,064.45	20,128.90	0.00E+00	1.36E+04	2.71E+04
Other Radionuclides					1.38E+04	2.75E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0.0150	1.483E+15
0.0250	3.078E+14
0.0375	2.676E+14
0.0575	2.880E+14
0.0850	1.735E+14
0.1250	1.146E+14
0.2250	1.498E+14
0.3750	6.518E+13
0.5750	1.077E+15
0.8500	1.316E+13
1.2500	6.364E+12
1.7500	3.582E+11
2.2500	2.995E+07
2.7500	2.858E+07
3.5000	1.679E+04
5.0000	6.865E+03
7.0000	7.518E+02
11.0000	8.386E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.68E+02	3.37E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19.81106509	60 to 100

Basis for Parameter Differences:

This Template was used for the following reasons.
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		10,064.45
Bounding		20,128.90

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.20	
Bounding	0.40	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRG-1 (UALX HEU) GERMANY
SNF ID #: 742
Fuel Units & Descr: 141 - MTR TYPE
Heavy Metal Mass: BOL=23 42kg EOL=16 539kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1995
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 35 years

Estimated Canister usage 18"x10'
5 88

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 0068E-09	6,516 25	13,032 50	0 00E+00	1 31E-05	2 62E-05
Am-241	2 5251E-03	6 516 25	13,032 50	0 00E+00	1 65E+01	3 29E+01
Am-242m	3 9624E-07	6,516 25	13,032.50	0 00E+00	2 58E-03	5.16E-03
Am-243	1 4880E-06	6,516 25	13,032.50	0 00E+00	9 70E-03	1.94E-02
C-14	5 7053E-09	6,516 25	13,032.50	0 00E+00	3 72E-05	7.44E-05
Cl-36	1 3124E-32	6,516 25	13,032.50	0 00E+00	8 55E-29	1 71E-28
Cm-243	1 1419E-07	6,516 25	13,032.50	0 00E+00	7 44E-04	1 49E-03
Cm-244	1 6522E-05	6,516 25	13,032 50	0 00E+00	1 08E-01	2 15E-01
Co-60	7 4047E-07	6,516 25	13,032 50	0 00E+00	4.83E-03	9 65E-03
Cs-134	2 0455E-05	6,516.25	13,032.50	0 00E+00	1.33E-01	2 67E-01
Cs-135	3 4477E-06	6,516.25	13,032.50	0 00E+00	2.25E-02	4 49E-02
Cs-137	1 4365E+00	6,516.25	13,032 50	0 00E+00	9 36E+03	1 87E+04
Eu-154	7.3230E-03	6,516.25	13,032 50	0 00E+00	4.77E+01	9 54E+01
Eu-155	5 9259E-04	6,516.25	13,032 50	0 00E+00	3 86E+00	7 72E+00
Fe-55	2.2791E-06	6,516.25	13,032 50	0 00E+00	1 49E-02	2 97E-02
H-3	1 9698E-03	6,516.25	13,032 50	0 00E+00	1.28E+01	2 57E+01
I-129	7.5300E-07	6,516.25	13,032 50	0 00E+00	4 91E-03	9 81E-03
Kr-85	4 1176E-02	6,516.25	13,032 50	0 00E+00	2 68E+02	5 37E+02
Np-237	9 5752E-06	6,516 25	13,032 50	0 00E+00	6 24E-02	1.25E-01
Pa-231	3 9379E-09	6,516 25	13,032 50	0 00E+00	2 57E-05	5 13E-05
Pb-210	3 3115E-10	6,516 25	13,032 50	0 00E+00	2 16E-06	4.32E-06
Pm-147	9.2402E-04	6,516 25	13,032.50	0 00E+00	6 02E+00	1.20E+01
Pu-238	1 6217E-02	6,516 25	13,032.50	0 00E+00	1 06E+02	2.11E+02
Pu-239	4 2810E-04	6,516 25	13,032.50	0 00E+00	2 79E+00	5 58E+00
Pu-240	2 4333E-04	6,516 25	13,032 50	0 00E+00	1.59E+00	3 17E+00
Pu-241	1 6242E-02	6,516.25	13,032 50	0 00E+00	1 06E+02	2 12E+02
Pu-242	3 6329E-07	6,516.25	13,032 50	0 00E+00	2.37E-03	4 73E-03
Ra-226	9 0114E-10	6,516.25	13,032 50	0 00E+00	5 87E-06	1 17E-05
Ra-228	3 1019E-14	6,516.25	13,032 50	0 00E+00	2 02E-10	4 04E-10
Ru-106	2 1225E-10	6,516.25	13,032 50	0 00E+00	1.38E-06	2.77E-06
Se-79	1.2930E-05	6,516.25	13,032 50	0 00E+00	8 43E-02	1.69E-01
Sn-126	1 1571E-05	6,516.25	13,032 50	0 00E+00	7 54E-02	1.51E-01
Sr-90	1.3472E+00	6,516.25	13,032 50	0 00E+00	8 78E+03	1.76E+04
Tc-99	4.2239E-04	6,516.25	13,032 50	0 00E+00	2 75E+00	5.50E+00
Th-229	1.2407E-11	6,516.25	13,032 50	0 00E+00	8 08E-08	1 62E-07
Th-230	8.3497E-08	6,516.25	13,032 50	0 00E+00	5 44E-04	1 09E-03
Th-232	3 8371E-14	6,516.25	13,032 50	0 00E+00	2.50E-10	5 00E-10
Tl-208	4 0414E-08	6 516.25	13,032.50	0 00E+00	2 63E-04	5 27E-04
U-232	1 0948E-07	6,516 25	13,032 50	0 00E+00	7.13E-04	1 43E-03
U-233	3 6275E-09	6,516 25	13,032.50	0 00E+00	2.36E-05	4 73E-05
U-234	1 8562E-04	6,516 25	13,032.50	0 00E+00	1.21E+00	2 42E+00
U-235	-2 7235E-06	6,516.25	0 00	4 70E-02	2.92E-02	4 70E-02
U-236	1 5493E-05	6,516 25	13,032.50	0 00E+00	1 01E-01	2.02E-01
U-238	-4.2851E-09	6,516 25	0 00	5 63E-04	5 35E-04	5 63E-04
Y-90	1 3475E+00	6,516.25	13,032.50	0 00E+00	8 78E+03	1.76E+04
Other Radionuclides					8 92E+03	1 78E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	9 599E+14
0 0250	1 993E+14
0 0375	1 732E+14
0 0575	1.865E+14
0 0850	1 124E+14
0 1250	7 421E+13
0.2250	9 700E+13
0 3750	4.220E+13
0 5750	6.974E+14
0 8500	8.519E+12
1 2500	4 120E+12
1 7500	2 319E+11
2.2500	1 939E+07
2.7500	1 851E+07
3 5000	1 072E+04
5 0000	4 381E+03
7 0000	4 794E+02
11.0000	5 346E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.09E+02	2.18E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	92.84381755	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		6,516.25	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		13 032.50	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 88	
Bounding	1 77	

Estimated EOL HM/Given EOL HM: 1 02

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRJ (UALX-HEU) GERMANY
SNF ID #: 933
Fuel Units & Descr: 195 - CONCENTRIC TUBES
Heavy Metal Mass: BOL=39 312kg, EOL=26 871kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1995
Estimates as of: 2030
Template: HFBR (Heavy Water, Alum , 40 to 100%, U)
[2]Template Burnup(MWd): 164 6
Template BOL Heavy Metal Mass (MT): 0 000377
Template Decay Time: 35 years

Estimated Canister usage 18"x10': 5 42

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	9 5869E-10	11,459 44	22,918 88	0 00E+00	1 10E-05	2 20E-05
Am-241	1 0109E-02	11,459 44	22,918 88	0 00E+00	1.16E+02	2 32E+02
Am-242m	1 2789E-06	11,459 44	22,918 88	0 00E+00	1 47E-02	2 93E-02
Am-243	3 7047E-05	11,459 44	22,918 88	0 00E+00	4.25E-01	8 49E-01
C-14	2 6416E-08	11,459 44	22,918 88	0 00E+00	3 03E-04	6 05E-04
Cl-36	4 4441E-31	11,459 44	22 918 88	0 00E+00	5 09E-27	1 02E-26
Cm-243	3 9605E-06	11,459 44	22,918 88	0 00E+00	4.54E-02	9 08E-02
Cm-244	2 6227E-03	11,459 44	22,918 88	0 00E+00	3 01E+01	6 01E+01
Co-60	6 7740E-06	11,459 44	22,918 88	0 00E+00	7 76E-02	1 55E-01
Cs-134	6 8894E-05	11,459 44	22,918 88	0 00E+00	7 89E-01	1 58E+00
Cs-135	4 2564E-06	11,459 44	22,918 88	0 00E+00	4 88E-02	9 76E-02
Cs-137	1 4399E+00	11,459 44	22,918 88	0 00E+00	1 65E+04	3 30E+04
Eu-154	1 5522E-02	11,459 44	22,918 88	0 00E+00	1 78E+02	3 56E+02
Eu-155	1 7588E-03	11,459 44	22,918 88	0 00E+00	2 02E+01	4 03E+01
Fe-55	2 4933E-05	11,459 44	22,918 88	0 00E+00	2 86E-01	5 71E-01
H-3	1 9945E-03	11,459 44	22,918 88	0 00E+00	2 29E+01	4 57E+01
I-129	6 6403E-07	11,459 44	22,918 88	0 00E+00	7 61E-03	1.52E-02
Kr-85	4 1002E-02	11,459 44	22,918 88	0 00E+00	4 70E+02	9 40E+02
Np-237	3 1610E-05	11,459 44	22,918 88	0 00E+00	3 62E-01	7.24E-01
Pa-231	1 8876E-09	11,459 44	22,918 88	0 00E+00	2 16E-05	4.33E-05
Pb-210	8.3840E-11	11,459 44	22,918.88	0 00E+00	9 61E-07	1 92E-06
Pm-147	4 6501E-04	11,459 44	22,918 88	0 00E+00	5 33E+00	1 07E+01
Pu-238	1 3645E-01	11,459 44	22,918 88	0 00E+00	1 56E+03	3.13E+03
Pu-239	6 9502E-04	11,459 44	22,918 88	0 00E+00	7 96E+00	1 59E+01
Pu-240	3 8183E-04	11,459 44	22,918 88	0 00E+00	4 38E+00	8 75E+00
Pu-241	6 5310E-02	11,459 44	22,918 88	0 00E+00	7.48E+02	1 50E+03
Pu-242	3 0911E-06	11,459 44	22,918 88	0 00E+00	3 54E-02	7 08E-02
Ra-226	2 3512E-10	11,459 44	22,918 88	0 00E+00	2 69E-06	5 39E-06
Ra-228	3 3366E-14	11,459 44	22,918 88	0 00E+00	3 82E-10	7 65E-10
Ru-106	2 4490E-10	11,459 44	22,918 88	0 00E+00	2 81E-06	5 61E-06
Se-79	1 2333E-05	11,459 44	22,918 88	0 00E+00	1 41E-01	2 83E-01
Sn-126	1 0194E-05	11,459 44	22,918 88	0 00E+00	1.17E-01	2 34E-01
Sr-90	1 3348E+00	11,459 44	22,918 88	0 00E+00	1.53E+04	3 06E+04
Tc-99	3 8056E-04	11,459 44	22,918 88	0 00E+00	4 36E+00	8 72E+00
Th-229	1 7868E-11	11,459 44	22,918 88	0 00E+00	2.05E-07	4 10E-07
Th-230	2 3348E-08	11,459 44	22,918 88	0 00E+00	2 68E-04	5 35E-04
Th-232	4 1288E-14	11,459 44	22,918 88	0 00E+00	4.73E-10	9 46E-10
Tl-208	4 3190E-08	11,459 44	22,918 88	0 00E+00	4.95E-04	9 90E-04
U-232	1 1707E-07	11,459 44	22,918 88	0 00E+00	1.34E-03	2 68E-03
U-233	7.2175E-09	11,459 44	22,918 88	0 00E+00	8.27E-05	1 65E-04
U-234	6.1543E-05	11,459 44	22,918 88	0 00E+00	7 05E-01	1 41E+00
U-235	-2 8661E-06	11,459 44	0 00	6 79E-02	3 50E-02	6 79E-02
U-236	1 6701E-05	11,459 44	22,918.88	0 00E+00	1 91E-01	3 83E-01
U-238	-9 4194E-09	11,459 44	0 00	2.66E-03	2 55E-03	2 66E-03
Y-90	1.3348E+00	11,459 44	22,918 88	0 00E+00	1 53E+04	3 06E+04
Other Radionuclides					1 58E+04	3 16E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 693E+15
0 0250	3 478E+14
0 0375	3 049E+14
0 0575	3 280E+14
0 0850	1 963E+14
0 1250	1 324E+14
0.2250	1 696E+14
0 3750	7.361E+13
0.5750	1.230E+15
0 8500	1 821E+13
1.2500	1 088E+13
1 7500	5 147E+11
2.2500	3.563E+07
2.7500	3.582E+07
3.5000	9.523E+05
5 0000	4 047E+05
7 0000	4 633E+04
11 0000	5.302E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.42E+02	4 83E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	HEAVY WATER	HEAVY WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	79 89992512	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		11 459 44	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		22,918.88	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 67	
Bounding	1 34	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRJ (UALX-MEU) GERMANY
SNF ID #: 1000
Fuel Units & Descr: 10 - CONCENTRIC TUBES
Heavy Metal Mass: BOL=3 781kg EOL=3 338kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1993
Estimates as of: 2030
Template: HFBR (Heavy Water, Alum , 40 to 100% U)
[2]Template Burnup(MWd): 164 6
Template BOL Heavy Metal Mass (MT): 0 000377
Template Decay Time: 35 years

Estimated Canister usage: 18"x10" = 0 28

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	9 5869E-10	408.05	816 10	0 00E+00	3 91E-07	7 82E-07
Am-241	1 0109E-02	408 05	816 10	0 00E+00	4 13E+00	8.25E+00
Am-242m	1 2789E-06	408 05	816 10	0 00E+00	5 22E-04	1 04E-03
Am-243	3 7047E-05	408 05	816 10	0 00E+00	1 51E-02	3 02E-02
C-14	2 6416E-08	408 05	816 10	0 00E+00	1 08E-05	2 16E-05
Cl-36	4 4441E-31	408 05	816 10	0 00E+00	1 81E-28	3 63E-28
Cm-243	3 9605E-06	408 05	816 10	0 00E+00	1 62E-03	3 23E-03
Cm-244	2 6227E-03	408 05	816 10	0 00E+00	1 07E+00	2 14E+00
Co-60	6 7740E-06	408 05	816 10	0 00E+00	2 76E-03	5 53E-03
Cs-134	6 8894E-05	408 05	816 10	0 00E+00	2 81E-02	5 62E-02
Cs-135	4.2564E-06	408 05	816 10	0 00E+00	1 74E-03	3 47E-03
Cs-137	1.4399E+00	408 05	816 10	0 00E+00	5 88E+02	1 18E+03
Eu-154	1.5522E-02	408 05	816 10	0 00E+00	6 33E+00	1.27E+01
Eu-155	1.7588E-03	408 05	816 10	0 00E+00	7.18E-01	1 44E+00
Fe-55	2.4933E-05	408 05	816 10	0 00E+00	1 02E-02	2.03E-02
H-3	1.9945E-03	408 05	816 10	0 00E+00	8.14E-01	1 63E+00
I-129	6.6403E-07	408 05	816 10	0 00E+00	2.71E-04	5 42E-04
Kr-85	4 1002E-02	408 05	816.10	0 00E+00	1 67E+01	3.35E+01
Np-237	3 1610E-05	408 05	816.10	0 00E+00	1.29E-02	2.58E-02
Pa-231	1 8876E-09	408 05	816 10	0 00E+00	7.70E-07	1.54E-06
Pb-210	8 3840E-11	408 05	816 10	0 00E+00	3 42E-08	6 84E-08
Pm-147	4 6501E-04	408 05	816 10	0 00E+00	1 90E-01	3 79E-01
Pu-238	1.3645E-01	408 05	816 10	0 00E+00	5.57E+01	1 11E+02
Pu-239	6 9502E-04	408 05	816 10	0 00E+00	2 84E-01	5 67E-01
Pu-240	3 8183E-04	408 05	816 10	0 00E+00	1 56E-01	3 12E-01
Pu-241	6 5310E-02	408 05	816 10	0 00E+00	2 66E+01	5 33E+01
Pu-242	3 0911E-06	408 05	816 10	0 00E+00	1 26E-03	2 52E-03
Ra-226	2 3512E-10	408 05	816 10	0 00E+00	9 59E-08	1 92E-07
Ra-228	3 3366E-14	408 05	816 10	0 00E+00	1 36E-11	2 72E-11
Ru-106	2 4490E-10	408 05	816 10	0 00E+00	9 99E-08	2 00E-07
Se-79	1.2333E-05	408.05	816 10	0 00E+00	5 03E-03	1 01E-02
Sn-126	1 0194E-05	408 05	816 10	0 00E+00	4 16E-03	8.32E-03
Sr-90	1 3348E+00	408 05	816 10	0 00E+00	5 45E+02	1.09E+03
Tc-99	3 8056E-04	408.05	816 10	0 00E+00	1 55E-01	3 11E-01
Th-229	1 7868E-11	408 05	816 10	0 00E+00	7.29E-09	1.46E-08
Th-230	2.3348E-08	408 05	816 10	0 00E+00	9 53E-06	1 91E-05
Th-232	4 1288E-14	408 05	816 10	0 00E+00	1 68E-11	3 37E-11
Tl-208	4.3190E-08	408 05	816 10	0 00E+00	1 76E-05	3 52E-05
U-232	1.1707E-07	408 05	816 10	0 00E+00	4.78E-05	9 55E-05
U-233	7.2175E-09	408 05	816 10	0 00E+00	2.95E-06	5 89E-06
U-234	6 1543E-05	408 05	816.10	0 00E+00	2.51E-02	5 02E-02
U-235	-2 8661E-06	408 05	0 00	3 67E-03	2.50E-03	3 67E-03
U-236	1 6701E-05	408 05	816 10	0 00E+00	6 81E-03	1.36E-02
U-238	-9 4194E-09	408 05	0 00	7.00E-04	6 97E-04	7 00E-04
Y-90	1.3348E+00	408 05	816 10	0 00E+00	5 45E+02	1 09E+03
Other Radionuclides					5 63E+02	1 13E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6 028E+13
0 0250	1.239E+13
0 0375	1 086E+13
0 0575	1 168E+13
0 0850	6.989E+12
0 1250	4 713E+12
0.2250	6.039E+12
0 3750	2.621E+12
0 5750	4.378E+13
0 8500	6 484E+11
1.2500	3 874E+11
1 7500	1.833E+10
2.2500	1.269E+06
2.7500	1.275E+06
3.5000	3.391E+04
5.0000	1 441E+04
7.0000	1 650E+03
11.0000	1.888E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 60E+00	1 72E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	HEAVY WATER	HEAVY WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	44 88296013	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		408 05
Bounding		816 10

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.25	
Bounding	0 49	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRJ TUBES (U3O8 LEU) GERMANY
SNF ID #: 999
Fuel Units & Descr: 3 - CONCENTRIC TUBES
Heavy Metal Mass: BOL=3.038kg, EOL=3.008kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1998
Estimates as of: 2030
Template: HFBR (Heavy Water Alum., 10 to 20%, U)
[2]Template Burnup(MWd): 15
Template BOL Heavy Metal Mass (MT): 0.00034251
Template Decay Time: 25 years

Estimated Canister usage

18"x10'
0.13

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.4973E-09	28.23	56.46	0.00E+00	4.23E-08	8.45E-08	Avg MeV	
Am-241	2.6120E-02	28.23	56.46	0.00E+00	7.37E-01	1.47E+00	0.0150	5.075E+12
Am-242m	8.7133E-06	28.23	56.46	0.00E+00	2.46E-04	4.92E-04	0.0250	1.053E+12
Am-243	6.3980E-06	28.23	56.46	0.00E+00	1.81E-04	3.61E-04	0.0375	9.236E+11
C-14	2.9600E-08	28.23	56.46	0.00E+00	8.36E-07	1.67E-06	0.0575	1.001E+12
Cl-36	5.9507E-35	28.23	56.46	0.00E+00	1.68E-33	3.36E-33	0.0850	5.928E+11
Cm-243	1.9560E-06	28.23	56.46	0.00E+00	5.52E-05	1.10E-04	0.1250	3.955E+11
Cm-244	9.0867E-05	28.23	56.46	0.00E+00	2.57E-03	5.13E-03	0.2250	5.112E+11
Co-60	8.4667E-06	28.23	56.46	0.00E+00	2.39E-04	4.78E-04	0.3750	2.222E+11
Cs-134	3.9760E-04	28.23	56.46	0.00E+00	1.12E-02	2.24E-02	0.5750	3.788E+12
Cs-135	4.8607E-06	28.23	56.46	0.00E+00	1.37E-04	2.74E-04	0.8500	5.049E+10
Cs-137	1.8020E+00	28.23	56.46	0.00E+00	5.09E+01	1.02E+02	1.2500	2.731E+10
Eu-154	1.3960E-02	28.23	56.46	0.00E+00	3.94E-01	7.88E-01	1.7500	1.386E+09
Eu-155	2.0313E-03	28.23	56.46	0.00E+00	5.73E-02	1.15E-01	2.2500	1.035E+05
Fe-55	3.7360E-04	28.23	56.46	0.00E+00	1.05E-02	2.11E-02	2.7500	1.491E+04
H-3	3.5233E-03	28.23	56.46	0.00E+00	9.95E-02	1.99E-01	3.5000	2.861E+02
I-129	7.1600E-07	28.23	56.46	0.00E+00	2.02E-05	4.04E-05	5.0000	1.136E+02
Kr-85	7.4133E-02	28.23	56.46	0.00E+00	2.09E+00	4.19E+00	7.0000	1.283E+01
Np-237	3.8020E-06	28.23	56.46	0.00E+00	1.07E-04	2.15E-04	11.0000	1.458E+00
Pa-231	3.7020E-09	28.23	56.46	0.00E+00	1.05E-07	2.09E-07		
Pb-210	1.4067E-13	28.23	56.46	0.00E+00	3.97E-12	7.94E-12		
Pm-147	1.2360E-02	28.23	56.46	0.00E+00	3.49E-01	6.98E-01		
Pu-238	5.3133E-03	28.23	56.46	0.00E+00	1.50E-01	3.00E-01		
Pu-239	1.0313E-02	28.23	56.46	0.00E+00	2.91E-01	5.82E-01		
Pu-240	5.4153E-03	28.23	56.46	0.00E+00	1.53E-01	3.06E-01		
Pu-241	2.9540E-01	28.23	56.46	0.00E+00	8.34E+00	1.67E+01		
Pu-242	3.0713E-06	28.23	56.46	0.00E+00	8.67E-05	1.73E-04		
Ra-226	5.9440E-13	28.23	56.46	0.00E+00	1.68E-11	3.36E-11		
Ra-228	1.6733E-14	28.23	56.46	0.00E+00	4.72E-13	9.45E-13		
Ru-106	2.7233E-07	28.23	56.46	0.00E+00	7.69E-06	1.54E-05		
Se-79	1.2533E-05	28.23	56.46	0.00E+00	3.54E-04	7.08E-04		
Sn-126	1.1393E-05	28.23	56.46	0.00E+00	3.22E-04	6.43E-04		
Sr-90	1.6333E+00	28.23	56.46	0.00E+00	4.61E+01	9.22E+01		
Tc-99	4.3533E-04	28.23	56.46	0.00E+00	1.23E-02	2.46E-02		
Th-229	1.0827E-12	28.23	56.46	0.00E+00	3.06E-11	6.11E-11		
Th-230	1.0793E-10	28.23	56.46	0.00E+00	3.05E-09	6.09E-09		
Th-232	2.2773E-14	28.23	56.46	0.00E+00	6.43E-13	1.29E-12		
Tl-208	7.3067E-09	28.23	56.46	0.00E+00	2.06E-07	4.13E-07		
U-232	1.9833E-08	28.23	56.46	0.00E+00	5.60E-07	1.12E-06		
U-233	6.0453E-10	28.23	56.46	0.00E+00	1.71E-08	3.41E-08		
U-234	6.1000E-07	28.23	56.46	0.00E+00	1.72E-05	3.44E-05		
U-235	-2.5335E-06	28.23	0.00	1.30E-03	1.22E-03	1.30E-03		
U-236	1.3000E-05	28.23	56.46	0.00E+00	3.67E-04	7.34E-04		
U-238	-1.4207E-08	28.23	0.00	8.20E-04	8.19E-04	8.20E-04		
Y-90	1.6340E+00	28.23	56.46	0.00E+00	4.61E+01	9.23E+01		
Other Radionuclides					4.83E+01	9.66E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.05E-01	1.21E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	HEAVY WATER	HEAVY WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19.73	10 to 20

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	0.25	28.23	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		56.46	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.21	113.31
Bounding	0.42	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	FRM (UALX HEU 45%) GERMANY	[1]Fuel decay start date	1995	Estimated Canister usage:	
SNF ID #	805	Estimates as of	2030	18"x10'	
Fuel Units & Descr	50 - MTR TYPE	Template	ATR (Light Water, Alum , 60 to 100% U)	2 08	
Heavy Metal Mass	BOL=28 18kg EOL=23 47kg	[2]Template Burnup(MWd)	367.2		
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0 00116689		
		Template Decay Time	35 years		

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2 0068E-09	4,460 46	8,920 92	0 00E+00	8 95E-06	1 79E-05	Avg MeV	
Am-241	2.5251E-03	4,460 46	8,920 92	0 00E+00	1 13E+01	2.25E+01	0 0150	6 570E+14
Am-242m	3 9624E-07	4,460 46	8,920 92	0 00E+00	1 77E-03	3 53E-03	0 0250	1.364E+14
Am-243	1 4880E-06	4,460.46	8,920 92	0 00E+00	6 64E-03	1.33E-02	0 0375	1 186E+14
C-14	5 7053E-09	4,460 46	8,920 92	0 00E+00	2 54E-05	5 09E-05	0 0575	1.276E+14
Cl-36	1.3124E-32	4,460.46	8,920 92	0 00E+00	5 85E-29	1 17E-28	0.0850	7 691E+13
Cm-243	1 1419E-07	4,460.46	8,920 92	0.00E+00	5 09E-04	1 02E-03	0 1250	5 080E+13
Cm-244	1 6522E-05	4,460 46	8,920 92	0.00E+00	7 37E-02	1 47E-01	0.2250	6 640E+13
Co-60	7 4047E-07	4,460 46	8,920 92	0 00E+00	3 30E-03	6 61E-03	0.3750	2.889E+13
Cs-134	2 0455E-05	4,460.46	8,920 92	0 00E+00	9 12E-02	1 82E-01	0.5750	4 774E+14
Cs-135	3 4477E-06	4,460 46	8,920 92	0.00E+00	1 54E-02	3 08E-02	0.8500	5 831E+12
Cs-137	1 4365E+00	4,460 46	8,920 92	0 00E+00	6 41E+03	1.28E+04	1.2500	2 820E+12
Eu-154	7.3230E-03	4,460 46	8,920 92	0 00E+00	3 27E+01	6 53E+01	1 7500	1 587E+11
Eu-155	5 9259E-04	4,460 46	8,920 92	0 00E+00	2 64E+00	5 29E+00	2.2500	1 327E+07
Fe-55	2 2791E-06	4,460 46	8,920 92	0 00E+00	1 02E-02	2 03E-02	2 7500	1 267E+07
H-3	1 9698E-03	4,460 46	8,920 92	0 00E+00	8 79E+00	1 76E+01	3 5000	7 365E+03
I-129	7 5300E-07	4,460 46	8,920 92	0 00E+00	3 36E-03	6 72E-03	5 0000	3 010E+03
Kr-85	4 1176E-02	4,460 46	8,920 92	0 00E+00	1 84E+02	3 67E+02	7 0000	3.294E+02
Np-237	9 5752E-06	4,460 46	8,920 92	0 00E+00	4.27E-02	8 54E-02	11 0000	3 674E+01
Pa-231	3 9379E-09	4,460 46	8,920 92	0 00E+00	1 76E-05	3 51E-05		
Pb-210	3 3115E-10	4,460 46	8,920 92	0 00E+00	1 48E-06	2 95E-06		
Pm-147	9 2402E-04	4,460 46	8,920 92	0 00E+00	4 12E+00	8 24E+00		
Pu-238	1 6217E-02	4,460 46	8,920 92	0 00E+00	7 23E+01	1 45E+02		
Pu-239	4 2810E-04	4,460 46	8,920 92	0 00E+00	1 91E+00	3 82E+00		
Pu-240	2 4333E-04	4,460 46	8,920 92	0 00E+00	1 09E+00	2 17E+00		
Pu-241	1 6242E-02	4,460 46	8,920 92	0 00E+00	7.24E+01	1 45E+02		
Pu-242	3 6329E-07	4,460 46	8,920 92	0 00E+00	1.62E-03	3.24E-03		
Ra-226	9 0114E-10	4,460 46	8,920 92	0 00E+00	4 02E-06	8 04E-06		
Ra-228	3 1019E-14	4,460 46	8,920 92	0 00E+00	1.38E-10	2 77E-10		
Ru-106	2 1225E-10	4,460 46	8,920 92	0 00E+00	9 47E-07	1.89E-06		
Se-79	1.2930E-05	4,460 46	8,920 92	0 00E+00	5 77E-02	1 15E-01		
Sn-126	1 1571E-05	4,460 46	8,920.92	0 00E+00	5 16E-02	1 03E-01		
Sr-90	1.3472E+00	4,460 46	8,920 92	0 00E+00	6 01E+03	1.20E+04		
Tc-99	4 2239E-04	4,460 46	8,920 92	0 00E+00	1.88E+00	3.77E+00		
Th-229	1.2407E-11	4,460 46	8,920.92	0 00E+00	5 53E-08	1 11E-07		
Th-230	8.3497E-08	4,460 46	8,920 92	0 00E+00	3 72E-04	7 45E-04		
Th-232	3 8371E-14	4,460 46	8,920 92	0 00E+00	1 71E-10	3 42E-10		
Tl-208	4 0414E-08	4,460 46	8,920 92	0 00E+00	1.80E-04	3 61E-04		
U-232	1 0948E-07	4,460 46	8,920 92	0 00E+00	4 88E-04	9 77E-04	Thermal Power	
U-233	3 6275E-09	4,460 46	8,920 92	0 00E+00	1 62E-05	3 24E-05	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-234	1 8562E-04	4,460 46	8,920 92	0 00E+00	8 28E-01	1 66E+00	7.46E+01	1.49E+02
U-235	-2 7235E-06	4,460 46	0 00	2.74E-02	1 52E-02	2 74E-02	Total	Total
U-236	1.5493E-05	4,460 46	8,920 92	0 00E+00	6 91E-02	1 38E-01		
U-238	-4.2851E-09	4,460 46	0 00	5.21E-03	5 19E-03	5 21E-03		
Y-90	1.3475E+00	4,460 46	8,920 92	0 00E+00	6 01E+03	1 20E+04		
Other Radionuclides					6 10E+03	1 22E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	44 97952648	60 to 100

Basis for Parameter Differences

This Template was used for the following reasons

This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal	686 61	4,460 46
Bounding		8 920.92

Basis for burnup used in estimate

Nominal burnup calculated from the heavy metal mass destroyed.

Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 50	6.50
Bounding	1 01	

Estimated EOL HM/Given EOL HM: 1.01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRM (UALX HEU) GERMANY
SNF ID #: 806
Fuel Units & Descr: 31 - MTR TYPE
Heavy Metal Mass: BOL=6.395kg, EOL=3 171kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1995
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 35 years

Estimated Canister usage: 18"x10' 1 29

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activrty (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 0068E-09	3,053 19	6,056 47	0 00E+00	6 13E-06	1 22E-05
Am-241	2 5251E-03	3,053 19	6,056 47	0 00E+00	7 71E+00	1 53E+01
Am-242m	3 9624E-07	3,053 19	6,056 47	0 00E+00	1 21E-03	2 40E-03
Am-243	1 4880E-06	3,053 19	6,056 47	0 00E+00	4 54E-03	9 01E-03
C-14	5 7053E-09	3,053 19	6,056 47	0 00E+00	1 74E-05	3 46E-05
Cl-36	1 3124E-32	3,053 19	6,056 47	0 00E+00	4 01E-29	7 95E-29
Cm-243	1 1419E-07	3,053 19	6,056 47	0 00E+00	3 49E-04	6 92E-04
Cm-244	1 6522E-05	3,053 19	6 056 47	0 00E+00	5 04E-02	1 00E-01
Co-60	7 4047E-07	3,053 19	6 056 47	0 00E+00	2 26E-03	4 48E-03
Cs-134	2 0455E-05	3,053 19	6,056 47	0 00E+00	6 25E-02	1 24E-01
Cs-135	3 4477E-06	3,053 19	6,056 47	0 00E+00	1 05E-02	2 09E-02
Cs-137	1 4365E+00	3,053 19	6,056 47	0 00E+00	4 39E+03	8 70E+03
Eu-154	7 3230E-03	3,053 19	6,056 47	0 00E+00	2 24E+01	4 44E+01
Eu-155	5 9259E-04	3,053 19	6,056 47	0 00E+00	1 81E+00	3 59E+00
Fe-55	2 2791E-06	3,053 19	6,056 47	0 00E+00	6 96E-03	1 38E-02
H-3	1 9698E-03	3,053 19	6,056 47	0 00E+00	6 01E+00	1 19E+01
I-129	7 5300E-07	3,053 19	6,056 47	0 00E+00	2 30E-03	4 56E-03
Kr-85	4 1176E-02	3,053 19	6,056 47	0 00E+00	1 26E+02	2 49E+02
Np-237	9 5752E-06	3,053 19	6,056 47	0 00E+00	2 92E-02	5 80E-02
Pa-231	3 9379E-09	3,053 19	6,056 47	0 00E+00	1 20E-05	2 38E-05
Pb-210	3 3115E-10	3,053 19	6,056 47	0 00E+00	1 01E-06	2 01E-06
Pm-147	9 2402E-04	3,053 19	6,056 47	0 00E+00	2 82E+00	5 60E+00
Pu-238	1 6217E-02	3,053 19	6,056 47	0 00E+00	4 95E+01	9 82E+01
Pu-239	4 2810E-04	3,053 19	6,056 47	0 00E+00	1 31E+00	2 59E+00
Pu-240	2 4333E-04	3,053 19	6,056 47	0 00E+00	7 43E-01	1 47E+00
Pu-241	1 6242E-02	3,053 19	6,056 47	0 00E+00	4 96E+01	9 84E+01
Pu-242	3 6329E-07	3,053 19	6,056 47	0 00E+00	1 11E-03	2 20E-03
Ra-226	9 0114E-10	3,053 19	6,056 47	0 00E+00	2 75E-06	5 46E-06
Ra-228	3.1019E-14	3,053 19	6,056 47	0 00E+00	9 47E-11	1 88E-10
Ru-106	2 1225E-10	3,053 19	6,056 47	0 00E+00	6 48E-07	1 29E-06
Se-79	1 2930E-05	3,053 19	6,056 47	0 00E+00	3 95E-02	7 83E-02
Sn-126	1 1571E-05	3,053 19	6,056 47	0 00E+00	3 53E-02	7 01E-02
Sr-90	1 3472E+00	3,053.19	6,056 47	0 00E+00	4.11E+03	8 16E+03
Tc-99	4 2239E-04	3,053 19	6,056 47	0 00E+00	1.29E+00	2 56E+00
Th-229	1 2407E-11	3,053.19	6,056 47	0 00E+00	3 79E-08	7 51E-08
Th-230	8 3497E-08	3,053.19	6,056 47	0 00E+00	2 55E-04	5 06E-04
Th-232	3 8371E-14	3 053.19	6,056 47	0 00E+00	1 17E-10	2 32E-10
Tl-208	4 0414E-08	3,053 19	6,056 47	0 00E+00	1.23E-04	2 45E-04
U-232	1 0948E-07	3,053 19	6 056 47	0 00E+00	3.34E-04	6 63E-04
U-233	3 6275E-09	3,053 19	6,056 47	0 00E+00	1 11E-05	2 20E-05
U-234	1 8562E-04	3,053 19	6,056 47	0 00E+00	5 67E-01	1 12E+00
U-235	-2 7235E-06	3,053 19	0 00	1.26E-02	4 28E-03	1 26E-02
U-236	1 5493E-05	3,053.19	6,056 47	0 00E+00	4 73E-02	9 38E-02
U-238	-4.2851E-09	3,053 19	0 00	1 91E-04	1 78E-04	1 91E-04
Y-90	1 3475E+00	3,053 19	6,056 47	0 00E+00	4.11E+03	8 16E+03
Other Radionuclides					4 18E+03	8 29E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 461E+14
0 0250	9.263E+13
0 0375	8 051E+13
0 0575	8 666E+13
0 0850	5.221E+13
0 1250	3.449E+13
0.2250	4 508E+13
0 3750	1 961E+13
0 5750	3.241E+14
0 8500	3.959E+12
1.2500	1 915E+12
1 7500	1 078E+11
2.2500	9 010E+06
2.7500	8.600E+06
3 5000	4 982E+03
5 0000	2 036E+03
7 0000	2.228E+02
11 0000	2 484E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 11E+01	1.01E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents.	U	U
BOL Enrichment %	91 10863593	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		3,053 19
Bounding		6 056 47

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup calculated assuming all BOL heavy metal burned.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 52	
Bounding	3 01	

Estimated EOL HM/Given EOL HM: 1 06

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR ASTRA (U308-LEU) AUSTRIA
SNF ID #: 556
Fuel Units & Descr: 4 - MTR TYPE
Heavy Metal Mass: BOL= , EOL=6 96kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 0 11

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	6,591 26	6,591.26	0 00E+00	4.37E-06	4 37E-06
Am-241	2.0060E-03	6,591 26	6,591.26	0 00E+00	1.32E+01	1 32E+01
Am-242m	4.2429E-07	6,591 26	6,591.26	0 00E+00	2 80E-03	2 80E-03
Am-243	1 4899E-06	6,591 26	6,591.26	0 00E+00	9 82E-03	9 82E-03
C-14	5 7135E-09	6,591.26	6,591 26	0 00E+00	3 77E-05	3 77E-05
Cl-36	1.3124E-32	6,591.26	6,591 26	0 00E+00	8 65E-29	8 65E-29
Cm-243	1 6443E-07	6,591.26	6,591 26	0 00E+00	1 08E-03	1 08E-03
Cm-244	2 9330E-05	6,591.26	6,591 26	0 00E+00	1.93E-01	1 93E-01
Co-60	5 3186E-06	6,591.26	6,591 26	0 00E+00	3 51E-02	3 51E-02
Cs-134	3 1563E-03	6,591.26	6,591.26	0 00E+00	2 08E+01	2 08E+01
Cs-135	3.4477E-06	6,591.26	6,591.26	0 00E+00	2.27E-02	2.27E-02
Cs-137	2 0313E+00	6,591 26	6,591.26	0 00E+00	1.34E+04	1.34E+04
Eu-154	2 4513E-02	6,591 26	6,591.26	0 00E+00	1 62E+02	1 62E+02
Eu-155	4 8175E-03	6,591 26	6,591.26	0.00E+00	3 18E+01	3.18E+01
Fe-55	1.2397E-04	6,591.26	6,591.26	0 00E+00	8 17E-01	8 17E-01
H-3	4 5697E-03	6,591.26	6,591 26	0 00E+00	3 01E+01	3 01E+01
I-129	7 5300E-07	6,591.26	6,591 26	0 00E+00	4.96E-03	4 96E-03
Kr-85	1 0850E-01	6,591.26	6,591 26	0 00E+00	7.15E+02	7 15E+02
Np-237	9 5561E-06	6,591.26	6,591.26	0 00E+00	6 30E-02	6 30E-02
Pa-231	2 0359E-09	6,591.26	6,591.26	0 00E+00	1.34E-05	1.34E-05
Pb-210	4 9728E-11	6,591 26	6,591.26	0 00E+00	3 28E-07	3.28E-07
Pm-147	4 8502E-02	6,591 26	6,591.26	0 00E+00	3 20E+02	3.20E+02
Pu-238	1 8254E-02	6,591 26	6,591.26	0.00E+00	1 20E+02	1.20E+02
Pu-239	4.2810E-04	6,591.26	6,591.26	0 00E+00	2 82E+00	2.82E+00
Pu-240	2 4368E-04	6,591.26	6,591 26	0 00E+00	1 61E+00	1 61E+00
Pu-241	3 3415E-02	6,591.26	6,591 26	0 00E+00	2.20E+02	2 20E+02
Pu-242	3 6329E-07	6,591.26	6,591.26	0 00E+00	2.39E-03	2.39E-03
Ra-226	2 2854E-10	6,591.26	6,591.26	0 00E+00	1.51E-06	1.51E-06
Ra-228	1 2426E-14	6,591.26	6,591.26	0 00E+00	8 19E-11	8 19E-11
Ru-106	6 3589E-06	6,591.26	6,591.26	0 00E+00	4 19E-02	4 19E-02
Se-79	1.2933E-05	6,591.26	6,591.26	0 00E+00	8 52E-02	8 52E-02
Sn-126	1.1574E-05	6,591 26	6,591 26	0 00E+00	7 63E-02	7 63E-02
Sr-90	1 9248E+00	6,591 26	6,591.26	0 00E+00	1.27E+04	1.27E+04
Tc-99	4.2239E-04	6,591.26	6,591 26	0 00E+00	2 78E+00	2 78E+00
Th-229	5 0953E-12	6,591.26	6,591 26	0 00E+00	3 36E-08	3 36E-08
Th-230	4 1885E-08	6,591.26	6,591.26	0 00E+00	2 76E-04	2.76E-04
Th-232	1 9270E-14	6,591.26	6,591.26	0 00E+00	1 27E-10	1.27E-10
Tl-208	4 6024E-08	6,591.26	6,591.26	0 00E+00	3 03E-04	3 03E-04
U-232	1 2582E-07	6,591.26	6,591.26	0 00E+00	8 29E-04	8 29E-04
U-233	2.5825E-09	6,591.26	6,591.26	0 00E+00	1 70E-05	1 70E-05
U-234	1.8450E-04	6,591.26	6,591.26	0 00E+00	1 22E+00	1 22E+00
U-235	-2 7235E-06	6,591.26	0 00	2 77E-02	9 76E-03	2 77E-02
U-236	1.5493E-05	6,591.26	6,591 26	0 00E+00	1.02E-01	1.02E-01
U-238	-4 2851E-09	6,591.26	0 00	2 80E-04	2.52E-04	2.80E-04
Y-90	1 9254E+00	6,591.26	6,591.26	0 00E+00	1.27E+04	1.27E+04
Other Radionuclides					1.27E+04	1.27E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6.958E+14
0 0250	1.447E+14
0 0375	1.262E+14
0.0575	1.352E+14
0 0850	8 168E+13
0 1250	5 527E+13
0.2250	7.048E+13
0.3750	3.068E+13
0 5750	5.004E+14
0 8500	8 460E+12
1.2500	4.831E+12
1 7500	2.217E+11
2.2500	1 945E+07
2 7500	1 100E+07
3.5000	5 051E+04
5 0000	2.856E+03
7 0000	3.153E+02
11 0000	3.534E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.57E+02	1.57E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %		60 to 100

Basis for Parameter Drfferences:
This Template was used for the following reasons
This fuel matches on all parameters except enrichment (unknown)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		6,591.26
Bounding		6,591.26

Basis for burnup used in estimate:
Nominal burnup set equal to bounding burnup
Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.50	
Bounding	1.50	

Estimated EOL HM/Given EOL HM: 1 02

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR ASTRA (U3SI2 LEU) AUSTRIA
SNF ID #: 515
Fuel Units & Descr.: 49 - MTR TYPE
Heavy Metal Mass: BOL=78 4kg; EOL=74 602kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367 2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 2 04

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	3,596 31	7,192 61	0 00E+00	2 38E-06	4.77E-06
Am-241	2 0060E-03	3,596 31	7,192 61	0 00E+00	7 21E+00	1 44E+01
Am-242m	4.2429E-07	3,596 31	7,192 61	0 00E+00	1 53E-03	3 05E-03
Am-243	1 4899E-06	3,596 31	7,192 61	0 00E+00	5 36E-03	1 07E-02
C-14	5.7135E-09	3,596 31	7,192 61	0 00E+00	2 05E-05	4.11E-05
Cl-36	1.3124E-32	3,596 31	7,192 61	0 00E+00	4 72E-29	9 44E-29
Cm-243	1 6443E-07	3,596 31	7,192 61	0 00E+00	5 91E-04	1 18E-03
Cm-244	2 9330E-05	3,596 31	7,192 61	0 00E+00	1 05E-01	2 11E-01
Co-60	5.3186E-06	3,596 31	7,192 61	0 00E+00	1 91E-02	3 83E-02
Cs-134	3.1563E-03	3,596 31	7,192 61	0 00E+00	1.14E+01	2 27E+01
Cs-135	3.4477E-06	3,596 31	7,192 61	0 00E+00	1.24E-02	2 48E-02
Cs-137	2 0313E+00	3,596 31	7,192 61	0 00E+00	7.31E+03	1 46E+04
Eu-154	2 4513E-02	3,596 31	7,192 61	0 00E+00	8 82E+01	1 76E+02
Eu-155	4 8175E-03	3,596.31	7,192 61	0 00E+00	1.73E+01	3 47E+01
Fe-55	1.2397E-04	3,596.31	7,192 61	0 00E+00	4 46E-01	8 92E-01
H-3	4 5697E-03	3,596.31	7,192 61	0 00E+00	1 64E+01	3.29E+01
I-129	7 5300E-07	3,596.31	7,192 61	0 00E+00	2.71E-03	5 42E-03
Kr-85	1 0850E-01	3,596.31	7,192 61	0 00E+00	3 90E+02	7.80E+02
Np-237	9 5561E-06	3,596.31	7,192 61	0 00E+00	3 44E-02	6 87E-02
Pa-231	2 0359E-09	3,596 31	7,192 61	0 00E+00	7.32E-06	1 46E-05
Pb-210	4 9728E-11	3,596 31	7,192 61	0 00E+00	1.79E-07	3 58E-07
Pm-147	4 8502E-02	3,596 31	7,192 61	0 00E+00	1 74E+02	3 49E+02
Pu-238	1 8254E-02	3,596.31	7,192.61	0 00E+00	6 56E+01	1.31E+02
Pu-239	4 2810E-04	3,596 31	7,192 61	0 00E+00	1 54E+00	3 08E+00
Pu-240	2 4368E-04	3,596 31	7,192 61	0 00E+00	8 76E-01	1 75E+00
Pu-241	3 3415E-02	3,596 31	7,192 61	0 00E+00	1 20E+02	2 40E+02
Pu-242	3 6329E-07	3,596 31	7,192 61	0 00E+00	1 31E-03	2 61E-03
Ra-226	2 2854E-10	3,596 31	7,192 61	0 00E+00	8 22E-07	1 64E-06
Ra-228	1 2426E-14	3,596 31	7,192 61	0 00E+00	4 47E-11	8 94E-11
Ru-106	6 3589E-06	3,596 31	7,192 61	0 00E+00	2 29E-02	4.57E-02
Se-79	1 2933E-05	3,596 31	7,192 61	0 00E+00	4 65E-02	9 30E-02
Sn-126	1 1574E-05	3,596 31	7,192 61	0 00E+00	4 16E-02	8 32E-02
Sr-90	1 9248E+00	3,596 31	7,192 61	0 00E+00	6 92E+03	1 38E+04
Tc-99	4.2239E-04	3,596 31	7,192 61	0 00E+00	1.52E+00	3 04E+00
Th-229	5 0953E-12	3,596 31	7,192 61	0 00E+00	1 83E-08	3 66E-08
Th-230	4 1885E-08	3,596 31	7,192 61	0.00E+00	1 51E-04	3 01E-04
Th-232	1.9270E-14	3,596 31	7,192 61	0 00E+00	6 93E-11	1 39E-10
Tl-208	4 6024E-08	3,596 31	7,192 61	0.00E+00	1 66E-04	3 31E-04
U-232	1.2582E-07	3,596 31	7,192 61	0.00E+00	4 52E-04	9 05E-04
U-233	2.5825E-09	3,596.31	7,192 61	0 00E+00	9.29E-06	1 86E-05
U-234	1.8450E-04	3,596.31	7,192 61	0 00E+00	6 64E-01	1 33E+00
U-235	-2.7235E-06	3,596.31	0 00	1 43E-02	4.50E-03	1 43E-02
U-236	1.5493E-05	3,596.31	7,192 61	0 00E+00	5.57E-02	1.11E-01
U-238	-4.2851E-09	3,596.31	0 00	2 41E-02	2.41E-02	2.41E-02
Y-90	1 9254E+00	3,596 31	7,192 61	0 00E+00	6 92E+03	1.38E+04
Other Radionuclides					6 96E+03	1.39E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	7.592E+14
0 0250	1.579E+14
0 0375	1.377E+14
0 0575	1 475E+14
0.0850	8.913E+13
0 1250	6.031E+13
0.2250	7 690E+13
0.3750	3.348E+13
0.5750	5.461E+14
0 8500	9 232E+12
1.2500	5.272E+12
1 7500	2 420E+11
2.2500	2.122E+07
2.7500	1 200E+07
3 5000	5.525E+04
5 0000	3 171E+03
7 0000	3 503E+02
11 0000	3 928E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.57E+01	1 71E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	8 4375	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons.
This fuel matches on all parameters except enrichment.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		3,596 31
Bounding		7,192 61

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 15	
Bounding	0 29	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR ASTRA (UALX-HEU) AUSTRIA
SNF ID #: 654
Fuel Units & Descr: 2 - MTR TYPE
Heavy Metal Mass: BOL=0 14kg EOL=0 12kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage 18"x10": 0 08

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	18 94	37.88	0 00E+00	1 26E-08	2 51E-08
Am-241	2 0060E-03	18 94	37 88	0 00E+00	3 80E-02	7 60E-02
Am-242m	4 2429E-07	18 94	37 88	0 00E+00	8 04E-06	1 61E-05
Am-243	1 4899E-06	18 94	37 88	0 00E+00	2 82E-05	5 64E-05
C-14	5 7135E-09	18 94	37 88	0 00E+00	1 08E-07	2.16E-07
Cl-36	1.3124E-32	18 94	37 88	0 00E+00	2 49E-31	4 97E-31
Cm-243	1.6443E-07	18 94	37 88	0 00E+00	3 11E-06	6.23E-06
Cm-244	2 9330E-05	18 94	37.88	0 00E+00	5 56E-04	1 11E-03
Co-60	5 3186E-06	18 94	37.88	0 00E+00	1 01E-04	2 01E-04
Cs-134	3 1563E-03	18 94	37.88	0 00E+00	5 98E-02	1.20E-01
Cs-135	3 4477E-06	18.94	37 88	0 00E+00	6.53E-05	1.31E-04
Cs-137	2 0313E+00	18 94	37 88	0 00E+00	3.85E+01	7 69E+01
Eu-154	2 4513E-02	18 94	37 88	0 00E+00	4 64E-01	9.29E-01
Eu-155	4 8175E-03	18 94	37 88	0 00E+00	9 12E-02	1 82E-01
Fe-55	1.2397E-04	18 94	37 88	0 00E+00	2 35E-03	4 70E-03
H-3	4 5697E-03	18 94	37 88	0 00E+00	8 66E-02	1 73E-01
I-129	7 5300E-07	18 94	37.88	0 00E+00	1 43E-05	2 85E-05
Kr-85	1 0850E-01	18.94	37.88	0 00E+00	2 05E+00	4 11E+00
Np-237	9 5561E-06	18.94	37 88	0 00E+00	1 81E-04	3 62E-04
Pa-231	2 0359E-09	18 94	37 88	0 00E+00	3 86E-08	7.71E-08
Pb-210	4 9728E-11	18 94	37 88	0 00E+00	9 42E-10	1 88E-09
Pm-147	4 8502E-02	18 94	37 88	0 00E+00	9 19E-01	1 84E+00
Pu-238	1.8254E-02	18 94	37 88	0 00E+00	3 46E-01	6 91E-01
Pu-239	4.2810E-04	18 94	37 88	0 00E+00	8 11E-03	1 62E-02
Pu-240	2 4368E-04	18 94	37.88	0 00E+00	4 62E-03	9 23E-03
Pu-241	3 3415E-02	18 94	37 88	0 00E+00	6 33E-01	1.27E+00
Pu-242	3 6329E-07	18 94	37 88	0 00E+00	6 88E-06	1.38E-05
Ra-226	2 2854E-10	18 94	37 88	0 00E+00	4 33E-09	8 66E-09
Ra-228	1.2426E-14	18 94	37 88	0 00E+00	2 35E-13	4 71E-13
Ru-106	6.3589E-06	18 94	37 88	0 00E+00	1 20E-04	2 41E-04
Se-79	1.2933E-05	18 94	37 88	0 00E+00	2 45E-04	4 90E-04
Sn-126	1 1574E-05	18 94	37 88	0 00E+00	2.19E-04	4 38E-04
Sr-90	1 9248E+00	18 94	37.88	0 00E+00	3 65E+01	7.29E+01
Tc-99	4 2239E-04	18 94	37.88	0 00E+00	8 00E-03	1.60E-02
Th-229	5 0953E-12	18.94	37 88	0 00E+00	9 65E-11	1 93E-10
Th-230	4 1885E-08	18 94	37 88	0 00E+00	7 93E-07	1 59E-06
Th-232	1 9270E-14	18 94	37 88	0 00E+00	3 65E-13	7 30E-13
Tl-208	4 6024E-08	18 94	37 88	0 00E+00	8 72E-07	1 74E-06
U-232	1.2582E-07	18 94	37 88	0.00E+00	2 38E-06	4 77E-06
U-233	2.5825E-09	18 94	37.88	0 00E+00	4 89E-08	9 78E-08
U-234	1 8450E-04	18 94	37.88	0 00E+00	3 49E-03	6 99E-03
U-235	-2 7235E-06	18 94	0.00	2 82E-04	2 30E-04	2 82E-04
U-236	1 5493E-05	18.94	37 88	0 00E+00	2 93E-04	5 87E-04
U-238	-4.2851E-09	18.94	0 00	3.22E-06	3 14E-06	3 22E-06
Y-90	1 9254E+00	18 94	37 88	0 00E+00	3 65E+01	7.29E+01
Other Radionuclides					3 66E+01	7.33E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 999E+12
0 0250	8 315E+11
0 0375	7.253E+11
0.0575	7 768E+11
0 0850	4 694E+11
0 1250	3 176E+11
0.2250	4 050E+11
0 3750	1 763E+11
0 5750	2.876E+12
0 8500	4 862E+10
1.2500	2 776E+10
1 7500	1 274E+09
2.2500	1 118E+05
2 7500	6.320E+04
3 5000	2 903E+02
5.0000	1 642E+01
7 0000	1.813E+00
11 0000	2 032E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.52E-01	9 03E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93 15	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		18 94
Bounding		37.88

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 43	
Bounding	0 86	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR ASTRA (UALX-HEU) AUSTRIA
SNF ID #: 738
Fuel Units & Descr: 14 - MTR TYPE
Heavy Metal Mass: BOL=5 6kg, EOL=4 858kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' 0 58

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	702 69	1,405 38	0 00E+00	4 66E-07	9 32E-07
Am-241	2 0060E-03	702.69	1,405 38	0 00E+00	1 41E+00	2 82E+00
Am-242m	4 2429E-07	702 69	1,405 38	0 00E+00	2 98E-04	5 96E-04
Am-243	1 4899E-06	702 69	1,405 38	0 00E+00	1 05E-03	2 09E-03
C-14	5 7135E-09	702 69	1,405.38	0 00E+00	4 01E-06	8 03E-06
Cl-36	1 3124E-32	702 69	1,405.38	0 00E+00	9 22E-30	1 84E-29
Cm-243	1 6443E-07	702 69	1,405.38	0 00E+00	1 16E-04	2 31E-04
Cm-244	2 9330E-05	702 69	1,405 38	0 00E+00	2 06E-02	4 12E-02
Co-60	5 3186E-06	702 69	1,405 38	0 00E+00	3 74E-03	7.47E-03
Cs-134	3 1563E-03	702 69	1,405 38	0 00E+00	2.22E+00	4 44E+00
Cs-135	3 4477E-06	702 69	1,405 38	0 00E+00	2 42E-03	4 85E-03
Cs-137	2 0313E+00	702 69	1,405 38	0 00E+00	1 43E+03	2 85E+03
Eu-154	2.4513E-02	702 69	1,405 38	0 00E+00	1.72E+01	3 44E+01
Eu-155	4 8175E-03	702 69	1,405 38	0 00E+00	3.39E+00	6.77E+00
Fe-55	1.2397E-04	702 69	1,405 38	0 00E+00	8.71E-02	1.74E-01
H-3	4 5697E-03	702 69	1,405 38	0 00E+00	3.21E+00	6 42E+00
I-129	7 5300E-07	702 69	1,405 38	0 00E+00	5.29E-04	1 06E-03
Kr-85	1 0850E-01	702 69	1,405 38	0 00E+00	7 62E+01	1 52E+02
Np-237	9 5561E-06	702.69	1,405 38	0 00E+00	6.71E-03	1 34E-02
Pa-231	2 0359E-09	702.69	1,405.38	0 00E+00	1 43E-06	2 86E-06
Pb-210	4 9728E-11	702 69	1,405.38	0 00E+00	3 49E-08	6 99E-08
Pm-147	4 8502E-02	702 69	1,405.38	0 00E+00	3 41E+01	6 82E+01
Pu-238	1 8254E-02	702 69	1,405 38	0 00E+00	1 28E+01	2.57E+01
Pu-239	4 2810E-04	702 69	1,405 38	0 00E+00	3 01E-01	6 02E-01
Pu-240	2 4368E-04	702 69	1,405 38	0 00E+00	1 71E-01	3 42E-01
Pu-241	3 3415E-02	702 69	1,405 38	0 00E+00	2 35E+01	4.70E+01
Pu-242	3 6329E-07	702 69	1,405 38	0 00E+00	2 55E-04	5 11E-04
Ra-226	2.2854E-10	702 69	1,405 38	0 00E+00	1 61E-07	3.21E-07
Ra-228	1.2426E-14	702 69	1,405 38	0 00E+00	8 73E-12	1.75E-11
Ru-106	6 3589E-06	702 69	1,405 38	0 00E+00	4 47E-03	8.94E-03
Se-79	1.2933E-05	702 69	1,405 38	0 00E+00	9 09E-03	1.82E-02
Sn-126	1 1574E-05	702 69	1,405 38	0 00E+00	8.13E-03	1 63E-02
Sr-90	1 9248E+00	702 69	1,405 38	0 00E+00	1 35E+03	2 71E+03
Tc-99	4 2239E-04	702 69	1,405 38	0 00E+00	2 97E-01	5 94E-01
Th-229	5 0953E-12	702 69	1,405.38	0 00E+00	3 58E-09	7.16E-09
Th-230	4 1885E-08	702 69	1,405.38	0 00E+00	2 94E-05	5 89E-05
Th-232	1 9270E-14	702 69	1,405.38	0 00E+00	1 35E-11	2.71E-11
Tl-208	4 6024E-08	702 69	1,405.38	0 00E+00	3 23E-05	6 47E-05
U-232	1 2582E-07	702 69	1,405.38	0 00E+00	8 84E-05	1 77E-04
U-233	2 5825E-09	702 69	1,405 38	0 00E+00	1 81E-06	3 63E-06
U-234	1 8450E-04	702 69	1,405 38	0 00E+00	1.30E-01	2 59E-01
U-235	-2.7235E-06	702 69	0 00	1.13E-02	9 36E-03	1 13E-02
U-236	1 5493E-05	702 69	1,405 38	0 00E+00	1 09E-02	2.18E-02
U-238	-4 2851E-09	702 69	0 00	1 29E-04	1.26E-04	1.29E-04
Y-90	1 9254E+00	702 69	1,405 38	0 00E+00	1.35E+03	2.71E+03
Other Radionuclides					1 36E+03	2.72E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 484E+14
0 0250	3 085E+13
0 0375	2 691E+13
0 0575	2.882E+13
0 0850	1 741E+13
0 1250	1 178E+13
0.2250	1.503E+13
0.3750	6.541E+12
0.5750	1.067E+14
0.8500	1 804E+12
1.2500	1 030E+12
1 7500	4 728E+10
2.2500	4 147E+06
2.7500	2.345E+06
3.5000	1 077E+04
5 0000	6 092E+02
7 0000	6 725E+01
11 0000	7 537E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 68E+01	3.35E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93 15	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		702 69	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		1 405.38	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 40	
Bounding	0 80	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR FMRB (GERMANY)
SNF ID #: 1066
Fuel Units & Descr: 18 - MTR TYPE
Heavy Metal Mass: BOL=2 57kg EOL=2.282kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1994
Estimates as of: 2030
Template: ATR (Light Water Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 35 years

Estimated Canister usage: 18"x10" = 0 75

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 0068E-09	272.74	545 48	0 00E+00	5 47E-07	1.09E-06
Am-241	2 5251E-03	272.74	545 48	0 00E+00	6 89E-01	1.38E+00
Am-242m	3 9624E-07	272.74	545.48	0 00E+00	1 08E-04	2 16E-04
Am-243	1 4880E-06	272 74	545 48	0 00E+00	4 06E-04	8 12E-04
C-14	5 7053E-09	272 74	545 48	0 00E+00	1.56E-06	3 11E-06
Cl-36	1.3124E-32	272 74	545 48	0 00E+00	3.58E-30	7 16E-30
Cm-243	1 1419E-07	272 74	545 48	0 00E+00	3 11E-05	6.23E-05
Cm-244	1 6522E-05	272 74	545 48	0 00E+00	4 51E-03	9 01E-03
Co-60	7 4047E-07	272 74	545 48	0 00E+00	2 02E-04	4 04E-04
Cs-134	2 0455E-05	272 74	545 48	0 00E+00	5 58E-03	1 12E-02
Cs-135	3 4477E-06	272.74	545 48	0 00E+00	9 40E-04	1 88E-03
Cs-137	1 4365E+00	272.74	545 48	0 00E+00	3 92E+02	7 84E+02
Eu-154	7.3230E-03	272.74	545 48	0 00E+00	2 00E+00	3 99E+00
Eu-155	5 9259E-04	272 74	545 48	0 00E+00	1 62E-01	3 23E-01
Fe-55	2.2791E-06	272 74	545 48	0 00E+00	6.22E-04	1.24E-03
H-3	1 9698E-03	272 74	545 48	0 00E+00	5.37E-01	1 07E+00
I-129	7.5300E-07	272 74	545 48	0 00E+00	2 05E-04	4 11E-04
Kr-85	4 1176E-02	272 74	545 48	0 00E+00	1.12E+01	2.25E+01
Np-237	9 5752E-06	272 74	545 48	0 00E+00	2 61E-03	5.22E-03
Pa-231	3 9379E-09	272.74	545 48	0 00E+00	1 07E-06	2 15E-06
Pb-210	3 3115E-10	272.74	545 48	0 00E+00	9 03E-08	1 81E-07
Pm-147	9.2402E-04	272.74	545 48	0 00E+00	2 52E-01	5 04E-01
Pu-238	1 6217E-02	272.74	545 48	0 00E+00	4 42E+00	8 85E+00
Pu-239	4.2810E-04	272 74	545 48	0 00E+00	1.17E-01	2.34E-01
Pu-240	2 4333E-04	272 74	545 48	0 00E+00	6 64E-02	1.33E-01
Pu-241	1 6242E-02	272 74	545 48	0 00E+00	4.43E+00	8 86E+00
Pu-242	3 6329E-07	272 74	545 48	0 00E+00	9 91E-05	1 98E-04
Ra-226	9 0114E-10	272 74	545 48	0 00E+00	2 46E-07	4 92E-07
Ra-228	3 1019E-14	272 74	545 48	0 00E+00	8 46E-12	1 69E-11
Ru-106	2 1225E-10	272.74	545 48	0 00E+00	5 79E-08	1 16E-07
Se-79	1.2930E-05	272.74	545 48	0 00E+00	3 53E-03	7.05E-03
Sn-126	1.1571E-05	272 74	545 48	0 00E+00	3 16E-03	6.31E-03
Sr-90	1.3472E+00	272 74	545 48	0 00E+00	3 67E+02	7.35E+02
Tc-99	4.2239E-04	272 74	545 48	0 00E+00	1 15E-01	2 30E-01
Th-229	1.2407E-11	272 74	545 48	0 00E+00	3 38E-09	6 77E-09
Th-230	8 3497E-08	272 74	545 48	0 00E+00	2.28E-05	4 55E-05
Th-232	3 8371E-14	272 74	545 48	0 00E+00	1 05E-11	2.09E-11
Tl-208	4 0414E-08	272 74	545 48	0 00E+00	1.10E-05	2.20E-05
U-232	1.0948E-07	272.74	545 48	0 00E+00	2.99E-05	5 97E-05
U-233	3.6275E-09	272.74	545.48	0 00E+00	9 89E-07	1 98E-06
U-234	1 8562E-04	272 74	545 48	0.00E+00	5 06E-02	1 01E-01
U-235	-2 7235E-06	272 74	0 00	5 07E-03	4.33E-03	5 07E-03
U-236	1 5493E-05	272 74	545 48	0 00E+00	4.23E-03	8 45E-03
U-238	-4.2851E-09	272 74	0 00	7.55E-05	7 44E-05	7.55E-05
Y-90	1 3475E+00	272 74	545 48	0 00E+00	3 68E+02	7.35E+02
Other Radionuclides					3 73E+02	7 46E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 018E+13
0 0250	8.342E+12
0 0375	7.251E+12
0 0575	7.805E+12
0 0850	4 703E+12
0 1250	3 106E+12
0.2250	4 060E+12
0.3750	1 766E+12
0.5750	2 919E+13
0 8500	3.566E+11
1.2500	1 725E+11
1 7500	9 706E+09
2.2500	8 115E+05
2.7500	7 746E+05
3.5000	4 492E+02
5 0000	1.835E+02
7 0000	2.009E+01
11 0000	2.239E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.56E+00	9 13E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	91.25787542	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		272 74
Bounding		545 48

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 34	
Bounding	0 67	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR (UALX HEU) AUSTRALIA
SNF ID #: 649
Fuel Units & Descr: 12 - ASSEMBLY
Heavy Metal Mass: BOL=3 32kg, EOL=3 317kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT) 0 00116689
Template Decay Time 20 years

Estimated Canister usage: 18"x10' 0 50

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	3 41	6 82	0 00E+00	2.26E-09	4 52E-09
Am-241	2 0060E-03	3 41	6 82	0 00E+00	6 84E-03	1 37E-02
Am-242m	4.2429E-07	3 41	6 82	0 00E+00	1.45E-06	2 89E-06
Am-243	1 4899E-06	3 41	6 82	0 00E+00	5 08E-06	1 02E-05
C-14	5 7135E-09	3 41	6 82	0 00E+00	1 95E-08	3 90E-08
Cl-36	1 3124E-32	3.41	6 82	0 00E+00	4 47E-32	8 95E-32
Cm-243	1 6443E-07	3 41	6 82	0 00E+00	5 61E-07	1 12E-06
Cm-244	2 9330E-05	3 41	6 82	0 00E+00	1 00E-04	2 00E-04
Co-60	5 3186E-06	3 41	6 82	0 00E+00	1 81E-05	3 63E-05
Cs-134	3 1563E-03	3 41	6 82	0 00E+00	1 08E-02	2.15E-02
Cs-135	3 4477E-06	3 41	6 82	0 00E+00	1 18E-05	2.35E-05
Cs-137	2 0313E+00	3 41	6 82	0 00E+00	6 93E+00	1 39E+01
Eu-154	2 4513E-02	3 41	6 82	0 00E+00	8 36E-02	1 67E-01
Eu-155	4 8175E-03	3 41	6 82	0 00E+00	1 64E-02	3 28E-02
Fe-55	1 2397E-04	3 41	6 82	0 00E+00	4 23E-04	8 45E-04
H-3	4 5697E-03	3 41	6 82	0 00E+00	1 56E-02	3 12E-02
I-129	7 5300E-07	3 41	6 82	0 00E+00	2 57E-06	5 13E-06
Kr-85	1 0850E-01	3 41	6 82	0 00E+00	3 70E-01	7 40E-01
Np-237	9 5561E-06	3 41	6 82	0 00E+00	3 26E-05	6 52E-05
Pa-231	2 0359E-09	3 41	6 82	0 00E+00	6 94E-09	1 39E-08
Pb-210	4 9728E-11	3 41	6 82	0 00E+00	1 70E-10	3 39E-10
Pm-147	4 8502E-02	3 41	6 82	0 00E+00	1 65E-01	3 31E-01
Pu-238	1 8254E-02	3 41	6 82	0 00E+00	6.22E-02	1 24E-01
Pu-239	4.2810E-04	3 41	6 82	0 00E+00	1 46E-03	2 92E-03
Pu-240	2.4368E-04	3 41	6.82	0 00E+00	8.31E-04	1 66E-03
Pu-241	3.3415E-02	3 41	6.82	0 00E+00	1.14E-01	2 28E-01
Pu-242	3 6329E-07	3.41	6.82	0 00E+00	1.24E-06	2 48E-06
Ra-226	2.2854E-10	3.41	6.82	0 00E+00	7 79E-10	1 56E-09
Ra-228	1.2426E-14	3.41	6 82	0 00E+00	4.24E-14	8 47E-14
Ru-106	6 3589E-06	3 41	6 82	0 00E+00	2 17E-05	4.34E-05
Se-79	1.2933E-05	3 41	6 82	0 00E+00	4 41E-05	8 82E-05
Sn-126	1 1574E-05	3 41	6 82	0 00E+00	3 95E-05	7 89E-05
Sr-90	1 9248E+00	3 41	6 82	0 00E+00	6 56E+00	1 31E+01
Tc-99	4.2239E-04	3 41	6 82	0 00E+00	1 44E-03	2 88E-03
Th-229	5 0953E-12	3 41	6 82	0 00E+00	1 74E-11	3.47E-11
Th-230	4 1885E-08	3 41	6 82	0 00E+00	1 43E-07	2 86E-07
Th-232	1 9270E-14	3 41	6 82	0 00E+00	6 57E-14	1.31E-13
Tl-208	4 6024E-08	3 41	6 82	0 00E+00	1 57E-07	3 14E-07
U-232	1 2582E-07	3 41	6 82	0 00E+00	4 29E-07	8 58E-07
U-233	2 5825E-09	3 41	6 82	0 00E+00	8 80E-09	1 76E-08
U-234	1 8450E-04	3 41	6 82	0 00E+00	6 29E-04	1.26E-03
U-235	-2 7235E-06	3 41	0 00	6 46E-03	6 45E-03	6 46E-03
U-236	1 5493E-05	3 41	6 82	0 00E+00	5.28E-05	1 06E-04
U-238	-4 2851E-09	3 41	0 00	1 12E-04	1.12E-04	1 12E-04
Y-90	1 9254E+00	3 41	6 82	0 00E+00	6.56E+00	1 31E+01
Other Radionuclides					6 59E+00	1 32E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0.0150	7 199E+11
0.0250	1 497E+11
0.0375	1 305E+11
0 0575	1 398E+11
0 0850	8.451E+10
0 1250	5 721E+10
0.2250	7.304E+10
0.3750	3 174E+10
0 5750	5 177E+11
0 8500	8 752E+09
1 2500	4 997E+09
1 7500	2.294E+08
2.2500	2 012E+04
2 7500	1 138E+04
3 5000	5.307E+01
5 0000	3.297E+00
7 0000	3 650E-01
11 0000	4 098E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 14E-02	1 63E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	89 99998815	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[1]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		3 41	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		6 82	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 00	
Bounding	0 01	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR (UALX-HEU) JAPAN
SNF ID #: 603
Fuel Units & Descr: 12 - MTR TYPE
Heavy Metal Mass: BOL=3 553kg EOL=3.553kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage
18"x10'
0 33

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	67.30	134 60	0 00E+00	4 46E-08	8 93E-08
Am-241	2 0060E-03	67 30	134 60	0 00E+00	1 35E-01	2 70E-01
Am-242m	4.2429E-07	67 30	134 60	0 00E+00	2 86E-05	5 71E-05
Am-243	1.4899E-06	67 30	134 60	0 00E+00	1 00E-04	2 01E-04
C-14	5 7135E-09	67.30	134 60	0 00E+00	3 85E-07	7 69E-07
Cl-36	1.3124E-32	67 30	134 60	0 00E+00	8 83E-31	1 77E-30
Cm-243	1 6443E-07	67 30	134 60	0 00E+00	1.11E-05	2.21E-05
Cm-244	2 9330E-05	67 30	134 60	0 00E+00	1.97E-03	3 95E-03
Co-60	5.3186E-06	67 30	134 60	0 00E+00	3 58E-04	7.16E-04
Cs-134	3 1563E-03	67 30	134 60	0 00E+00	2.12E-01	4.25E-01
Cs-135	3 4477E-06	67 30	134 60	0 00E+00	2.32E-04	4 64E-04
Cs-137	2 0313E+00	67.30	134 60	0 00E+00	1.37E+02	2.73E+02
Eu-154	2 4513E-02	67.30	134 60	0 00E+00	1.65E+00	3 30E+00
Eu-155	4 8175E-03	67 30	134 60	0 00E+00	3.24E-01	6 48E-01
Fe-55	1.2397E-04	67.30	134 60	0 00E+00	8 34E-03	1 67E-02
H-3	4 5697E-03	67.30	134 60	0 00E+00	3 08E-01	6 15E-01
I-129	7 5300E-07	67.30	134 60	0 00E+00	5 07E-05	1 01E-04
Kr-85	1 0850E-01	67.30	134 60	0 00E+00	7.30E+00	1 46E+01
Np-237	9 5561E-06	67.30	134 60	0 00E+00	6 43E-04	1.29E-03
Pa-231	2 0359E-09	67.30	134 60	0 00E+00	1.37E-07	2 74E-07
Pb-210	4 9728E-11	67.30	134 60	0.00E+00	3 35E-09	6 69E-09
Pm-147	4 8502E-02	67.30	134 60	0 00E+00	3 26E+00	6.53E+00
Pu-238	1 8254E-02	67.30	134 60	0 00E+00	1.23E+00	2 46E+00
Pu-239	4.2810E-04	67.30	134 60	0 00E+00	2 88E-02	5 76E-02
Pu-240	2 4368E-04	67.30	134 60	0 00E+00	1.64E-02	3.28E-02
Pu-241	3.3415E-02	67 30	134 60	0 00E+00	2.25E+00	4.50E+00
Pu-242	3 6329E-07	67 30	134 60	0 00E+00	2 44E-05	4 89E-05
Ra-226	2.2854E-10	67 30	134 60	0 00E+00	1.54E-08	3 08E-08
Ra-228	1.2426E-14	67 30	134 60	0 00E+00	8 36E-13	1 67E-12
Ru-106	6.3589E-06	67 30	134 60	0 00E+00	4.28E-04	8 56E-04
Se-79	1.2933E-05	67 30	134 60	0 00E+00	8 70E-04	1 74E-03
Sn-126	1 1574E-05	67 30	134 60	0 00E+00	7 79E-04	1.56E-03
Sr-90	1 9248E+00	67.30	134 60	0 00E+00	1.30E+02	2 59E+02
Tc-99	4.2239E-04	67.30	134 60	0 00E+00	2 84E-02	5 69E-02
Th-229	5 0953E-12	67.30	134 60	0 00E+00	3 43E-10	6 86E-10
Th-230	4 1885E-08	67.30	134 60	0 00E+00	2 82E-06	5 64E-06
Th-232	1 9270E-14	67.30	134 60	0.00E+00	1.30E-12	2.59E-12
Tl-208	4 6024E-08	67.30	134 60	0 00E+00	3.10E-06	6 19E-06
U-232	1.2582E-07	67.30	134 60	0 00E+00	8 47E-06	1 69E-05
U-233	2 5825E-09	67.30	134 60	0 00E+00	1.74E-07	3 48E-07
U-234	1 8450E-04	67.30	134 60	0 00E+00	1.24E-02	2 48E-02
U-235	-2 7235E-06	67.30	0 00	6 90E-03	6 71E-03	6 90E-03
U-236	1.5493E-05	67.30	134 60	0 00E+00	1 04E-03	2 09E-03
U-238	-4.2851E-09	67.30	0 00	1 22E-04	1.21E-04	1 22E-04
Y-90	1.9254E+00	67.30	134 60	0 00E+00	1.30E+02	2 59E+02
Other Radionuclides					1.30E+02	2 60E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 421E+13
0 0250	2 954E+12
0 0375	2.577E+12
0 0575	2.760E+12
0 0850	1 668E+12
0 1250	1 129E+12
0.2250	1.439E+12
0.3750	6.265E+11
0 5750	1.022E+13
0.8500	1 728E+11
1.2500	9 865E+10
1 7500	4 528E+09
2.2500	3 972E+05
2 7500	2.245E+05
3.5000	1 032E+03
5 0000	5 867E+01
7 0000	6 478E+00
11 0000	7.261E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.60E+00	3.21E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	89 81998522	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		67.30	Nominal burnup assumed to be 2% of BOL heavy metal mass
Bounding		134 60	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 06	
Bounding	0 12	

Estimated EOL HM/Given EOL HM: 0 98

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR (UALX-HEU) JAPAN
SNF ID #: 605
Fuel Units & Descr: 81 - MTR TYPE
Heavy Metal Mass: BOL=24 818kg EOL=24 786kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 3 38

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	30 68	61 37	0 00E+00	2 03E-08	4 07E-08
Am-241	2 0060E-03	30 68	61.37	0 00E+00	6 16E-02	1.23E-01
Am-242m	4.2429E-07	30 68	61.37	0 00E+00	1 30E-05	2 60E-05
Am-243	1 4899E-06	30 68	61.37	0 00E+00	4 57E-05	9 14E-05
C-14	5 7135E-09	30 68	61.37	0 00E+00	1 75E-07	3 51E-07
Cl-36	1 3124E-32	30 68	61.37	0 00E+00	4 03E-31	8 05E-31
Cm-243	1 6443E-07	30 68	61 37	0 00E+00	5 05E-06	1.01E-05
Cm-244	2 9330E-05	30 68	61 37	0 00E+00	9 00E-04	1.80E-03
Co-60	5 3186E-06	30 68	61 37	0.00E+00	1 63E-04	3.26E-04
Cs-134	3 1563E-03	30 68	61 37	0 00E+00	9 68E-02	1 94E-01
Cs-135	3 4477E-06	30 68	61 37	0 00E+00	1.06E-04	2.12E-04
Cs-137	2 0313E+00	30 68	61 37	0.00E+00	6.23E+01	1.25E+02
Eu-154	2 4513E-02	30 68	61 37	0 00E+00	7.52E-01	1.50E+00
Eu-155	4 8175E-03	30 68	61 37	0 00E+00	1 48E-01	2 96E-01
Fe-55	1 2397E-04	30 68	61 37	0 00E+00	3 80E-03	7 61E-03
H-3	4 5697E-03	30 68	61 37	0 00E+00	1 40E-01	2 80E-01
I-129	7 5300E-07	30 68	61 37	0 00E+00	2.31E-05	4 62E-05
Kr-85	1 0850E-01	30 68	61 37	0 00E+00	3.33E+00	6 66E+00
Np-237	9 5561E-06	30.68	61 37	0 00E+00	2 93E-04	5 86E-04
Pa-231	2 0359E-09	30 68	61 37	0 00E+00	6 25E-08	1 25E-07
Pb-210	4 9728E-11	30 68	61 37	0 00E+00	1 53E-09	3 05E-09
Pm-147	4 8502E-02	30 68	61 37	0 00E+00	1 49E+00	2 98E+00
Pu-238	1 8254E-02	30 68	61 37	0 00E+00	5 60E-01	1 12E+00
Pu-239	4.2810E-04	30 68	61 37	0 00E+00	1 31E-02	2 63E-02
Pu-240	2 4368E-04	30 68	61 37	0 00E+00	7 48E-03	1 50E-02
Pu-241	3.3415E-02	30 68	61 37	0 00E+00	1 03E+00	2 05E+00
Pu-242	3 6329E-07	30 68	61 37	0 00E+00	1 11E-05	2.23E-05
Ra-226	2.2854E-10	30 68	61 37	0 00E+00	7 01E-09	1 40E-08
Ra-228	1.2426E-14	30 68	61 37	0 00E+00	3 81E-13	7 63E-13
Ru-106	6 3589E-06	30 68	61.37	0 00E+00	1 95E-04	3 90E-04
Se-79	1.2933E-05	30 68	61 37	0 00E+00	3 97E-04	7 94E-04
Sn-126	1.1574E-05	30 68	61 37	0 00E+00	3 55E-04	7.10E-04
Sr-90	1 9248E+00	30 68	61 37	0 00E+00	5 91E+01	1 18E+02
Tc-99	4 2239E-04	30 68	61 37	0 00E+00	1 30E-02	2 59E-02
Th-229	5 0953E-12	30 68	61.37	0 00E+00	1 56E-10	3.13E-10
Th-230	4 1885E-08	30 68	61.37	0 00E+00	1 29E-06	2.57E-06
Th-232	1 9270E-14	30 68	61.37	0 00E+00	5 91E-13	1.18E-12
Tl-208	4 6024E-08	30 68	61.37	0 00E+00	1 41E-06	2.82E-06
U-232	1 2582E-07	30 68	61.37	0 00E+00	3 86E-06	7.72E-06
U-233	2 5825E-09	30 68	61.37	0 00E+00	7 92E-08	1 58E-07
U-234	1 8450E-04	30 68	61.37	0 00E+00	5 66E-03	1 13E-02
U-235	-2.7235E-06	30 68	0 00	4 99E-02	4 98E-02	4 99E-02
U-236	1 5493E-05	30 68	61.37	0 00E+00	4.75E-04	9 51E-04
U-238	-4.2851E-09	30 68	0 00	5 84E-04	5 84E-04	5 84E-04
Y-90	1 9254E+00	30 68	61.37	0 00E+00	5 91E+01	1 18E+02
Other Radionuclides					5 93E+01	1 19E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6.479E+12
0 0250	1.347E+12
0 0375	1 175E+12
0 0575	1.258E+12
0 0850	7 606E+11
0 1250	5 149E+11
0.2250	6.572E+11
0 3750	2.856E+11
0.5750	4 659E+12
0 8500	7.877E+10
1.2500	4 498E+10
1 7500	2 064E+09
2.2500	1 811E+05
2 7500	1 024E+05
3 5000	4 751E+02
5 0000	2 860E+01
7 0000	3 162E+00
11 0000	3 547E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.33E-01	1 46E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93 00000613	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		30 68
Bounding		61 37

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 00	
Bounding	0 01	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR (UALX-HEU) NETHERLANDS
SNF ID # 609
Fuel Units & Descr 14 - MTR TYPE
Heavy Metal Mass BOL=3 192kg EOL=3 188kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd) 367.2
Template BOL Heavy Metal Mass (MT) 0 00116689
Template Decay Time 20 years

Estimated Canister usage
18"x10'
0 58

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	3 98	7.96	0 00E+00	2 64E-09	5 28E-09
Am-241	2.0060E-03	3 98	7.96	0 00E+00	7 98E-03	1 60E-02
Am-242m	4.2429E-07	3 98	7.96	0 00E+00	1 69E-06	3 38E-06
Am-243	1 4899E-06	3 98	7.96	0 00E+00	5 93E-06	1 19E-05
C-14	5 7135E-09	3 98	7 96	0 00E+00	2.27E-08	4.55E-08
Cl-36	1.3124E-32	3 98	7 96	0 00E+00	5.22E-32	1 04E-31
Cm-243	1 6443E-07	3 98	7 96	0.00E+00	6.54E-07	1.31E-06
Cm-244	2 9330E-05	3 98	7 96	0 00E+00	1 17E-04	2.33E-04
Co-60	5 3186E-06	3 98	7.96	0 00E+00	2 12E-05	4.23E-05
Cs-134	3 1563E-03	3 98	7 96	0 00E+00	1.26E-02	2 51E-02
Cs-135	3 4477E-06	3 98	7 96	0 00E+00	1.37E-05	2 74E-05
Cs-137	2 0313E+00	3 98	7 96	0 00E+00	8 08E+00	1.62E+01
Eu-154	2 4513E-02	3 98	7 96	0 00E+00	9 75E-02	1 95E-01
Eu-155	4 8175E-03	3 98	7 96	0 00E+00	1 92E-02	3 83E-02
Fe-55	1.2397E-04	3.98	7 96	0 00E+00	4 93E-04	9 86E-04
H-3	4.5697E-03	3 98	7 96	0 00E+00	1 82E-02	3 64E-02
I-129	7.5300E-07	3 98	7 96	0 00E+00	3 00E-06	5 99E-06
Kr-85	1 0850E-01	3 98	7.96	0 00E+00	4 32E-01	8 63E-01
Np-237	9 5561E-06	3 98	7.96	0 00E+00	3 80E-05	7.60E-05
Pa-231	2 0359E-09	3 98	7.96	0 00E+00	8 10E-09	1.62E-08
Pb-210	4 9728E-11	3 98	7.96	0 00E+00	1.98E-10	3 96E-10
Pm-147	4 8502E-02	3 98	7.96	0 00E+00	1 93E-01	3 86E-01
Pu-238	1 8254E-02	3 98	7 96	0 00E+00	7.26E-02	1 45E-01
Pu-239	4 2810E-04	3 98	7 96	0 00E+00	1 70E-03	3 41E-03
Pu-240	2 4368E-04	3 98	7 96	0 00E+00	9 69E-04	1 94E-03
Pu-241	3 3415E-02	3 98	7 96	0 00E+00	1.33E-01	2 66E-01
Pu-242	3 6329E-07	3 98	7 96	0 00E+00	1 44E-06	2 89E-06
Ra-226	2.2854E-10	3 98	7 96	0 00E+00	9 09E-10	1 82E-09
Ra-228	1.2426E-14	3 98	7 96	0 00E+00	4 94E-14	9 89E-14
Ru-106	6 3589E-06	3 98	7 96	0 00E+00	2.53E-05	5 06E-05
Se-79	1.2933E-05	3 98	7 96	0 00E+00	5 14E-05	1.03E-04
Sn-126	1 1574E-05	3 98	7 96	0 00E+00	4 60E-05	9.21E-05
Sr-90	1 9248E+00	3.98	7 96	0 00E+00	7 66E+00	1.53E+01
Tc-99	4.2239E-04	3 98	7 96	0 00E+00	1.68E-03	3 36E-03
Th-229	5 0953E-12	3.98	7 96	0 00E+00	2.03E-11	4 05E-11
Th-230	4 1885E-08	3 98	7 96	0 00E+00	1.67E-07	3 33E-07
Th-232	1 9270E-14	3 98	7.96	0 00E+00	7 66E-14	1 53E-13
Tl-208	4 6024E-08	3 98	7.96	0 00E+00	1 83E-07	3 66E-07
U-232	1.2582E-07	3 98	7.96	0 00E+00	5 00E-07	1 00E-06
U-233	2 5825E-09	3 98	7.96	0 00E+00	1 03E-08	2 05E-08
U-234	1 8450E-04	3 98	7 96	0 00E+00	7 34E-04	1.47E-03
U-235	-2 7235E-06	3 98	0 00	6 42E-03	6 40E-03	6.42E-03
U-236	1.5493E-05	3 98	7 96	0 00E+00	6 16E-05	1.23E-04
U-238	-4 2851E-09	3 98	0 00	7 51E-05	7.51E-05	7.51E-05
Y-90	1 9254E+00	3 98	7 96	0 00E+00	7 66E+00	1.53E+01
Other Radionuclides					7 69E+00	1.54E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8 399E+11
0 0250	1 746E+11
0 0375	1 523E+11
0 0575	1 631E+11
0 0850	9 859E+10
0 1250	6 674E+10
0.2250	8.519E+10
0.3750	3 703E+10
0.5750	6.040E+11
0 8500	1.021E+10
1.2500	5.830E+09
1 7500	2 676E+08
2 2500	2.348E+04
2 7500	1 327E+04
3.5000	6 158E+01
5 0000	3 705E+00
7.0000	4 096E-01
11 0000	4 595E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.50E-02	1 90E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	92 9999964	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		3 98
Bounding		7.96

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 00	
Bounding	0 01	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR (UALX-HEU) TAIWAN
SNF ID #: 628
Fuel Units & Descr: 35 - MTR TYPE
Heavy Metal Mass: BOL=4 764kg; EOL=4 76kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time 20 years

Estimated Canister usage: 18"x10' = 1 46

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	3 31	6 63	0 00E+00	2.20E-09	4 40E-09
Am-241	2 0060E-03	3 31	6 63	0 00E+00	6 65E-03	1 33E-02
Am-242m	4 2429E-07	3 31	6 63	0 00E+00	1 41E-06	2 81E-06
Am-243	1 4899E-06	3 31	6 63	0 00E+00	4 94E-06	9 88E-06
C-14	5 7135E-09	3 31	6 63	0 00E+00	1 89E-08	3 79E-08
Cl-36	1 3124E-32	3 31	6 63	0 00E+00	4 35E-32	8 70E-32
Cm-243	1 6443E-07	3 31	6 63	0 00E+00	5 45E-07	1 09E-06
Cm-244	2 9330E-05	3 31	6 63	0 00E+00	9 72E-05	1 94E-04
Co-60	5 3186E-06	3.31	6 63	0 00E+00	1 76E-05	3 53E-05
Cs-134	3 1563E-03	3.31	6 63	0 00E+00	1 05E-02	2 09E-02
Cs-135	3 4477E-06	3.31	6 63	0 00E+00	1 14E-05	2 29E-05
Cs-137	2 0313E+00	3.31	6 63	0 00E+00	6 73E+00	1 35E+01
Eu-154	2 4513E-02	3.31	6 63	0 00E+00	8.12E-02	1 62E-01
Eu-155	4 8175E-03	3.31	6 63	0 00E+00	1 60E-02	3 19E-02
Fe-55	1.2397E-04	3.31	6 63	0 00E+00	4 11E-04	8 22E-04
H-3	4 5697E-03	3.31	6 63	0 00E+00	1 51E-02	3 03E-02
I-129	7.5300E-07	3.31	6.63	0 00E+00	2 50E-06	4 99E-06
Kr-85	1 0850E-01	3.31	6 63	0.00E+00	3 60E-01	7 19E-01
Np-237	9.5561E-06	3 31	6 63	0 00E+00	3 17E-05	6.33E-05
Pa-231	2 0359E-09	3 31	6 63	0 00E+00	6 75E-09	1.35E-08
Pb-210	4.9728E-11	3 31	6 63	0 00E+00	1 65E-10	3.30E-10
Pm-147	4 8502E-02	3 31	6 63	0 00E+00	1 61E-01	3.22E-01
Pu-238	1 8254E-02	3 31	6 63	0 00E+00	6 05E-02	1.21E-01
Pu-239	4.2810E-04	3 31	6 63	0 00E+00	1 42E-03	2 84E-03
Pu-240	2.4368E-04	3 31	6 63	0 00E+00	8 08E-04	1 62E-03
Pu-241	3 3415E-02	3 31	6 63	0 00E+00	1.11E-01	2.22E-01
Pu-242	3 6329E-07	3 31	6 63	0 00E+00	1.20E-06	2 41E-06
Ra-226	2.2854E-10	3 31	6 63	0 00E+00	7 58E-10	1 52E-09
Ra-228	1.2426E-14	3 31	6 63	0 00E+00	4.12E-14	8.24E-14
Ru-106	6 3589E-06	3 31	6 63	0 00E+00	2.11E-05	4.22E-05
Se-79	1 2933E-05	3 31	6 63	0 00E+00	4.29E-05	8 57E-05
Sn-126	1 1574E-05	3 31	6 63	0 00E+00	3 84E-05	7 67E-05
Sr-90	1 9248E+00	3 31	6 63	0 00E+00	6 38E+00	1 28E+01
Tc-99	4 2239E-04	3 31	6 63	0 00E+00	1 40E-03	2 80E-03
Th-229	5 0953E-12	3 31	6 63	0 00E+00	1 69E-11	3 38E-11
Th-230	4 1885E-08	3 31	6 63	0 00E+00	1 39E-07	2 78E-07
Th-232	1 9270E-14	3 31	6 63	0 00E+00	6 39E-14	1 28E-13
Tl-208	4 6024E-08	3 31	6 63	0 00E+00	1 53E-07	3 05E-07
U-232	1 2582E-07	3 31	6 63	0 00E+00	4.17E-07	8 34E-07
U-233	2 5825E-09	3.31	6 63	0 00E+00	8 56E-09	1 71E-08
U-234	1 8450E-04	3.31	6 63	0 00E+00	6 12E-04	1 22E-03
U-235	-2 7235E-06	3.31	0.00	9.59E-03	9 58E-03	9 59E-03
U-236	1 5493E-05	3.31	6.63	0 00E+00	5 14E-05	1 03E-04
U-238	-4 2851E-09	3.31	0 00	1 09E-04	1 09E-04	1 09E-04
Y-90	1 9254E+00	3.31	6 63	0 00E+00	6 38E+00	1.28E+01
Other Radionuclides					6 41E+00	1 28E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	7 000E+11
0 0250	1 455E+11
0 0375	1.269E+11
0 0575	1.359E+11
0 0850	8.217E+10
0 1250	5.564E+10
0.2250	7 107E+10
0.3750	3 086E+10
0.5750	5 033E+11
0.8500	8 509E+09
1.2500	4 859E+09
1 7500	2.230E+08
2.2500	1 956E+04
2.7500	1 106E+04
3.5000	5 171E+01
5 0000	3 252E+00
7 0000	3.598E-01
11 0000	4 039E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7 93E-02	1 58E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93 19000561	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		3.31
Bounding		6 63

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 00	
Bounding	0 00	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR (UALX-LEU) ARGENTINA
SNF ID #: 547
Fuel Units & Descr: 30 - ASSEMBLY
Heavy Metal Mass: BOL=18 75kg, EOL=18 714kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 1.25

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	34 09	68 19	0.00E+00	2.26E-08	4.52E-08
Am-241	2 0060E-03	34 09	68 19	0 00E+00	6 84E-02	1.37E-01
Am-242m	4.2429E-07	34.09	68 19	0 00E+00	1 45E-05	2.89E-05
Am-243	1 4899E-06	34.09	68 19	0 00E+00	5 08E-05	1 02E-04
C-14	5 7135E-09	34 09	68 19	0 00E+00	1 95E-07	3 90E-07
Cl-36	1.3124E-32	34 09	68 19	0 00E+00	4 47E-31	8 95E-31
Cm-243	1 6443E-07	34 09	68 19	0 00E+00	5 61E-06	1 12E-05
Cm-244	2 9330E-05	34 09	68 19	0 00E+00	1 00E-03	2 00E-03
Co-60	5 3186E-06	34 09	68 19	0 00E+00	1.81E-04	3 63E-04
Cs-134	3 1563E-03	34 09	68 19	0 00E+00	1.08E-01	2 15E-01
Cs-135	3 4477E-06	34 09	68 19	0 00E+00	1 18E-04	2 35E-04
Cs-137	2 0313E+00	34 09	68 19	0 00E+00	6.93E+01	1.39E+02
Eu-154	2 4513E-02	34 09	68.19	0 00E+00	8 36E-01	1.67E+00
Eu-155	4 8175E-03	34 09	68 19	0 00E+00	1 64E-01	3.28E-01
Fe-55	1.2397E-04	34 09	68 19	0 00E+00	4 23E-03	8 45E-03
H-3	4 5697E-03	34 09	68 19	0 00E+00	1 56E-01	3 12E-01
I-129	7.5300E-07	34.09	68 19	0 00E+00	2 57E-05	5 13E-05
Kr-85	1 0850E-01	34 09	68 19	0 00E+00	3 70E+00	7 40E+00
Np-237	9 5561E-06	34 09	68 19	0 00E+00	3.26E-04	6 52E-04
Pa-231	2 0359E-09	34 09	68 19	0 00E+00	6.94E-08	1.39E-07
Pb-210	4 9728E-11	34 09	68 19	0 00E+00	1.70E-09	3.39E-09
Pm-147	4 8502E-02	34 09	68 19	0 00E+00	1 65E+00	3 31E+00
Pu-238	1 8254E-02	34 09	68 19	0 00E+00	6.22E-01	1.24E+00
Pu-239	4.2810E-04	34 09	68 19	0 00E+00	1 46E-02	2 92E-02
Pu-240	2 4368E-04	34 09	68 19	0 00E+00	8 31E-03	1 66E-02
Pu-241	3.3415E-02	34 09	68 19	0 00E+00	1 14E+00	2.28E+00
Pu-242	3.6329E-07	34 09	68 19	0 00E+00	1 24E-05	2 48E-05
Ra-226	2.2854E-10	34 09	68 19	0 00E+00	7 79E-09	1 56E-08
Ra-228	1.2426E-14	34 09	68 19	0 00E+00	4.24E-13	8 47E-13
Ru-106	6 3589E-06	34.09	68 19	0 00E+00	2.17E-04	4.34E-04
Se-79	1.2933E-05	34.09	68 19	0 00E+00	4 41E-04	8 82E-04
Sn-126	1 1574E-05	34 09	68 19	0 00E+00	3.95E-04	7.89E-04
Sr-90	1 9248E+00	34 09	68 19	0 00E+00	6.56E+01	1.31E+02
Tc-99	4 2239E-04	34 09	68 19	0 00E+00	1.44E-02	2 88E-02
Th-229	5 0953E-12	34 09	68 19	0 00E+00	1 74E-10	3 47E-10
Th-230	4 1885E-08	34 09	68 19	0 00E+00	1 43E-06	2 86E-06
Th-232	1 9270E-14	34 09	68 19	0 00E+00	6 57E-13	1 31E-12
Tl-208	4 6024E-08	34 09	68 19	0 00E+00	1 57E-06	3 14E-06
U-232	1.2582E-07	34 09	68.19	0.00E+00	4.29E-06	8 58E-06
U-233	2.5825E-09	34 09	68 19	0 00E+00	8 80E-08	1.76E-07
U-234	1 8450E-04	34 09	68 19	0 00E+00	6.29E-03	1.26E-02
U-235	-2 7235E-06	34 09	0 00	8 10E-03	8.01E-03	8 10E-03
U-236	1 5493E-05	34 09	68 19	0 00E+00	5.28E-04	1 06E-03
U-238	-4 2851E-09	34 09	0 00	5 04E-03	5 04E-03	5 04E-03
Y-90	1 9254E+00	34 09	68 19	0 00E+00	6 56E+01	1.31E+02
Other Radionuclides					6 59E+01	1 32E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7 198E+12
0 0250	1 497E+12
0 0375	1.305E+12
0 0575	1.398E+12
0 0850	8 450E+11
0 1250	5 718E+11
0 2250	7.292E+11
0 3750	3 174E+11
0 5750	5 177E+12
0 8500	8 752E+10
1.2500	4 997E+10
1 7500	2 294E+09
2.2500	2 013E+05
2 7500	1 138E+05
3.5000	5 497E+02
5 0000	4 119E+01
7 0000	4 602E+00
11 0000	5 197E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 13E-01	1 63E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	60 to 100

Basis for Parameter Differences:

This Template was used for the following reasons
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		34 09
Bounding		68 19

Basis for burnup used in estimate

Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 01	
Bounding	0 01	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR (UALX-LEU) JAPAN
SNF ID #: 551
Fuel Units & Descr: 27 - ASSEMBLY
Heavy Metal Mass: BOL=17 482kg, EOL=17 469kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage 18"x10": 1 13

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	12 78	25 57	0 00E+00	8 48E-09	1 70E-08
Am-241	2 0060E-03	12 78	25 57	0 00E+00	2 56E-02	5 13E-02
Am-242m	4.2429E-07	12 78	25 57	0 00E+00	5 42E-06	1 08E-05
Am-243	1 4899E-06	12 78	25 57	0 00E+00	1 90E-05	3 81E-05
C-14	5 7135E-09	12 78	25 57	0 00E+00	7 30E-08	1 46E-07
Cl-36	1 3124E-32	12 78	25 57	0 00E+00	1 68E-31	3 36E-31
Cm-243	1 6443E-07	12 78	25 57	0 00E+00	2 10E-06	4.20E-06
Cm-244	2 9330E-05	12 78	25 57	0 00E+00	3 75E-04	7 50E-04
Co-60	5 3186E-06	12 78	25.57	0 00E+00	6 80E-05	1 36E-04
Cs-134	3 1563E-03	12 78	25 57	0 00E+00	4 04E-02	8 07E-02
Cs-135	3 4477E-06	12 78	25 57	0 00E+00	4 41E-05	8 82E-05
Cs-137	2 0313E+00	12 78	25 57	0 00E+00	2 60E+01	5 19E+01
Eu-154	2 4513E-02	12 78	25 57	0 00E+00	3 13E-01	6 27E-01
Eu-155	4 8175E-03	12 78	25 57	0 00E+00	6 16E-02	1 23E-01
Fe-55	1 2397E-04	12 78	25 57	0 00E+00	1 58E-03	3 17E-03
H-3	4 5697E-03	12 78	25 57	0 00E+00	5 84E-02	1 17E-01
I-129	7 5300E-07	12 78	25 57	0 00E+00	9 63E-06	1 93E-05
Kr-85	1 0850E-01	12 78	25 57	0 00E+00	1 39E+00	2 77E+00
Np-237	9 5561E-06	12 78	25 57	0 00E+00	1.22E-04	2 44E-04
Pa-231	2 0359E-09	12 78	25.57	0 00E+00	2 60E-08	5 21E-08
Pb-210	4 9728E-11	12 78	25 57	0 00E+00	6 36E-10	1 27E-09
Pm-147	4 8502E-02	12 78	25 57	0 00E+00	6 20E-01	1.24E+00
Pu-238	1 8254E-02	12 78	25 57	0 00E+00	2 33E-01	4 67E-01
Pu-239	4 2810E-04	12 78	25 57	0 00E+00	5 47E-03	1 09E-02
Pu-240	2 4368E-04	12 78	25 57	0 00E+00	3 12E-03	6 23E-03
Pu-241	3 3415E-02	12 78	25.57	0 00E+00	4.27E-01	8 54E-01
Pu-242	3 6329E-07	12 78	25 57	0 00E+00	4 64E-06	9 29E-06
Ra-226	2 2854E-10	12 78	25 57	0 00E+00	2 92E-09	5 84E-09
Ra-228	1 2426E-14	12 78	25 57	0 00E+00	1 59E-13	3 18E-13
Ru-106	6 3589E-06	12 78	25 57	0 00E+00	8 13E-05	1 63E-04
Se-79	1 2933E-05	12 78	25 57	0 00E+00	1 65E-04	3 31E-04
Sn-126	1 1574E-05	12 78	25.57	0 00E+00	1 48E-04	2 96E-04
Sr-90	1 9248E+00	12 78	25 57	0 00E+00	2 46E+01	4 92E+01
Tc-99	4 2239E-04	12 78	25.57	0 00E+00	5 40E-03	1 08E-02
Th-229	5 0953E-12	12 78	25.57	0 00E+00	6 51E-11	1 30E-10
Th-230	4 1885E-08	12 78	25 57	0 00E+00	5 35E-07	1 07E-06
Th-232	1 9270E-14	12 78	25 57	0 00E+00	2 46E-13	4 93E-13
Tl-208	4 6024E-08	12 78	25 57	0 00E+00	5 88E-07	1 18E-06
U-232	1.2582E-07	12 78	25.57	0 00E+00	1 61E-06	3 22E-06
U-233	2 5825E-09	12 78	25.57	0 00E+00	3 30E-08	6 60E-08
U-234	1 8450E-04	12 78	25 57	0 00E+00	2 36E-03	4 72E-03
U-235	-2.7235E-06	12 78	0 00	7 56E-03	7 52E-03	7 56E-03
U-236	1 5493E-05	12 78	25 57	0 00E+00	1 98E-04	3 96E-04
U-238	-4.2851E-09	12 78	0 00	4 70E-03	4 70E-03	4 70E-03
Y-90	1 9254E+00	12 78	25 57	0 00E+00	2 46E+01	4 92E+01
Other Radionuclides					2 47E+01	4 95E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 699E+12
0 0250	5 613E+11
0 0375	4.896E+11
0 0575	5.243E+11
0 0850	3 169E+11
0 1250	2 145E+11
0.2250	2.735E+11
0 3750	1 190E+11
0.5750	1 941E+12
0 8500	3.282E+10
1.2500	1.874E+10
1 7500	8 602E+08
2.2500	7.550E+04
2.7500	4.269E+04
3.5000	2.212E+02
5.0000	2 194E+01
7 0000	2 474E+00
11.0000	2.809E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 05E-01	6.10E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20 00000092	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons:
This fuel matches on all parameters except enrichment.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		12.78
Bounding		25 57

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.00	
Bounding	0.00	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR (UALX-LEU) TAIWAN
SNF ID #: 555
Fuel Units & Descr: 23 - ASSEMBLY
Heavy Metal Mass: BOL=34 797kg EOL=34 797kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage
18"x10'
0 96

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	659 06	1,318 13	0 00E+00	4.37E-07	8 74E-07
Am-241	2 0060E-03	659 06	1,318 13	0 00E+00	1 32E+00	2 64E+00
Am-242m	4 2429E-07	659 06	1,318 13	0 00E+00	2 80E-04	5 59E-04
Am-243	1 4899E-06	659 06	1,318 13	0 00E+00	9 82E-04	1.96E-03
C-14	5 7135E-09	659 06	1,318 13	0 00E+00	3 77E-06	7.53E-06
Cl-36	1 3124E-32	659 06	1,318 13	0 00E+00	8 65E-30	1.73E-29
Cm-243	1 6443E-07	659 06	1,318 13	0 00E+00	1 08E-04	2 17E-04
Cm-244	2 9330E-05	659 06	1,318 13	0 00E+00	1 93E-02	3 87E-02
Co-60	5 3186E-06	659 06	1,318 13	0 00E+00	3 51E-03	7.01E-03
Cs-134	3 1563E-03	659 06	1,318 13	0 00E+00	2.08E+00	4.16E+00
Cs-135	3 4477E-06	659 06	1,318 13	0 00E+00	2.27E-03	4.54E-03
Cs-137	2 0313E+00	659 06	1,318.13	0 00E+00	1.34E+03	2.68E+03
Eu-154	2 4513E-02	659 06	1,318 13	0 00E+00	1 62E+01	3.23E+01
Eu-155	4 8175E-03	659 06	1,318 13	0 00E+00	3 18E+00	6.35E+00
Fe-55	1.2397E-04	659 06	1,318.13	0 00E+00	8 17E-02	1 63E-01
H-3	4 5697E-03	659 06	1,318 13	0 00E+00	3 01E+00	6 02E+00
I-129	7.5300E-07	659 06	1,318.13	0 00E+00	4 96E-04	9 93E-04
Kr-85	1 0850E-01	659 06	1,318 13	0 00E+00	7 15E+01	1 43E+02
Np-237	9 5561E-06	659 06	1,318 13	0 00E+00	6 30E-03	1 26E-02
Pa-231	2.0359E-09	659 06	1,318 13	0 00E+00	1 34E-06	2 68E-06
Pb-210	4 9728E-11	659 06	1,318 13	0 00E+00	3 28E-08	6 55E-08
Pm-147	4 8502E-02	659 06	1,318 13	0 00E+00	3 20E+01	6 39E+01
Pu-238	1 8254E-02	659 06	1,318 13	0 00E+00	1 20E+01	2 41E+01
Pu-239	4.2810E-04	659 06	1,318 13	0 00E+00	2 82E-01	5 64E-01
Pu-240	2 4368E-04	659 06	1,318 13	0 00E+00	1 61E-01	3 21E-01
Pu-241	3 3415E-02	659 06	1,318 13	0 00E+00	2 20E+01	4 40E+01
Pu-242	3 6329E-07	659 06	1,318 13	0 00E+00	2.39E-04	4 79E-04
Ra-226	2.2854E-10	659 06	1,318 13	0 00E+00	1.51E-07	3 01E-07
Ra-228	1.2426E-14	659 06	1,318 13	0 00E+00	8 19E-12	1 64E-11
Ru-106	6 3589E-06	659 06	1,318 13	0 00E+00	4.19E-03	8 38E-03
Se-79	1.2933E-05	659 06	1,318 13	0 00E+00	8.52E-03	1.70E-02
Sn-126	1 1574E-05	659 06	1,318 13	0 00E+00	7.63E-03	1.53E-02
Sr-90	1 9248E+00	659 06	1,318 13	0 00E+00	1.27E+03	2 54E+03
Tc-99	4 2239E-04	659 06	1,318 13	0 00E+00	2.78E-01	5 57E-01
Th-229	5 0953E-12	659 06	1,318 13	0.00E+00	3 36E-09	6 72E-09
Th-230	4 1885E-08	659 06	1,318 13	0 00E+00	2 76E-05	5 52E-05
Th-232	1 9270E-14	659 06	1,318 13	0 00E+00	1.27E-11	2 54E-11
Tl-208	4 6024E-08	659 06	1,318 13	0.00E+00	3 03E-05	6 07E-05
U-232	1 2582E-07	659 06	1,318 13	0.00E+00	8 29E-05	1 66E-04
U-233	2 5825E-09	659 06	1,318 13	0.00E+00	1 70E-06	3 40E-06
U-234	1 8450E-04	659 06	1,318 13	0 00E+00	1 22E-01	2 43E-01
U-235	-2.7235E-06	659 06	0 00	1.49E-02	1.31E-02	1 49E-02
U-236	1 5493E-05	659 06	1,318 13	0 00E+00	1 02E-02	2 04E-02
U-238	-4.2851E-09	659 06	0 00	9 38E-03	9 37E-03	9 38E-03
Y-90	1 9254E+00	659 06	1,318 13	0 00E+00	1 27E+03	2 54E+03
Other Radionuclides					1.27E+03	2 55E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.391E+14
0 0250	2.893E+13
0 0375	2 524E+13
0 0575	2 703E+13
0 0850	1 633E+13
0 1250	1 105E+13
0.2250	1 409E+13
0.3750	6 135E+12
0 5750	1 001E+14
0 8500	1 692E+12
1.2500	9 661E+11
1 7500	4 434E+10
2.2500	3.890E+06
2 7500	2 199E+06
3 5000	1 015E+04
5 0000	5 926E+02
7 0000	6 552E+01
11 0000	7.351E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.57E+01	3 14E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19 83000026	60 to 100

Basis for Parameter Differences:

This Template was used for the following reasons
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		659 06
Bounding		1,318 13

Basis for burnup used in estimate:

Nominal burnup assumed to be 2% of BOL heavy metal mass
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 06	
Bounding	0 12	

Estimated EOL HM/Given EOL HM: 0 98

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR (UALX-LEU) VENEZUELA
SNF ID #: 559
Fuel Units & Descr: 64 - ASSEMBLY
Heavy Metal Mass: BOL=43.2kg, EOL=39.046kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10" = 2.67

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6.6313E-10	3,933.54	7,867.08	0.00E+00	2.61E-06	5.22E-06
Am-241	2.0060E-03	3,933.54	7,867.08	0.00E+00	7.89E+00	1.58E+01
Am-242m	4.2429E-07	3,933.54	7,867.08	0.00E+00	1.67E-03	3.34E-03
Am-243	1.4899E-06	3,933.54	7,867.08	0.00E+00	5.86E-03	1.17E-02
C-14	5.7135E-09	3,933.54	7,867.08	0.00E+00	2.25E-05	4.49E-05
Cl-36	1.3124E-32	3,933.54	7,867.08	0.00E+00	5.16E-29	1.03E-28
Cm-243	1.6443E-07	3,933.54	7,867.08	0.00E+00	6.47E-04	1.29E-03
Cm-244	2.9330E-05	3,933.54	7,867.08	0.00E+00	1.15E-01	2.31E-01
Co-60	5.3186E-06	3,933.54	7,867.08	0.00E+00	2.09E-02	4.18E-02
Cs-134	3.1563E-03	3,933.54	7,867.08	0.00E+00	1.24E+01	2.48E+01
Cs-135	3.4477E-06	3,933.54	7,867.08	0.00E+00	1.36E-02	2.71E-02
Cs-137	2.0313E+00	3,933.54	7,867.08	0.00E+00	7.99E+03	1.60E+04
Eu-154	2.4513E-02	3,933.54	7,867.08	0.00E+00	9.64E+01	1.93E+02
Eu-155	4.8175E-03	3,933.54	7,867.08	0.00E+00	1.89E+01	3.79E+01
Fe-55	1.2397E-04	3,933.54	7,867.08	0.00E+00	4.88E-01	9.75E-01
H-3	4.5697E-03	3,933.54	7,867.08	0.00E+00	1.80E+01	3.60E+01
I-129	7.5300E-07	3,933.54	7,867.08	0.00E+00	2.96E-03	5.92E-03
Kr-85	1.0850E-01	3,933.54	7,867.08	0.00E+00	4.27E+02	8.54E+02
Np-237	9.5561E-06	3,933.54	7,867.08	0.00E+00	3.76E-02	7.52E-02
Pa-231	2.0359E-09	3,933.54	7,867.08	0.00E+00	8.01E-06	1.60E-05
Pb-210	4.9728E-11	3,933.54	7,867.08	0.00E+00	1.96E-07	3.91E-07
Pm-147	4.8502E-02	3,933.54	7,867.08	0.00E+00	1.91E+02	3.82E+02
Pu-238	1.8254E-02	3,933.54	7,867.08	0.00E+00	7.18E+01	1.44E+02
Pu-239	4.2810E-04	3,933.54	7,867.08	0.00E+00	1.68E+00	3.37E+00
Pu-240	2.4368E-04	3,933.54	7,867.08	0.00E+00	9.59E-01	1.92E+00
Pu-241	3.3415E-02	3,933.54	7,867.08	0.00E+00	1.31E+02	2.63E+02
Pu-242	3.6329E-07	3,933.54	7,867.08	0.00E+00	1.43E-03	2.86E-03
Ra-226	2.2854E-10	3,933.54	7,867.08	0.00E+00	8.99E-07	1.80E-06
Ra-228	1.2426E-14	3,933.54	7,867.08	0.00E+00	4.89E-11	9.78E-11
Ru-106	6.3589E-06	3,933.54	7,867.08	0.00E+00	2.50E-02	5.00E-02
Se-79	1.2933E-05	3,933.54	7,867.08	0.00E+00	5.09E-02	1.02E-01
Sn-126	1.1574E-05	3,933.54	7,867.08	0.00E+00	4.55E-02	9.11E-02
Sr-90	1.9248E+00	3,933.54	7,867.08	0.00E+00	7.57E+03	1.51E+04
Tc-99	4.2239E-04	3,933.54	7,867.08	0.00E+00	1.66E+00	3.32E+00
Th-229	5.0953E-12	3,933.54	7,867.08	0.00E+00	2.00E-08	4.01E-08
Th-230	4.1885E-08	3,933.54	7,867.08	0.00E+00	1.65E-04	3.30E-04
Th-232	1.9270E-14	3,933.54	7,867.08	0.00E+00	7.58E-11	1.52E-10
Tl-208	4.6024E-08	3,933.54	7,867.08	0.00E+00	1.81E-04	3.62E-04
U-232	1.2582E-07	3,933.54	7,867.08	0.00E+00	4.95E-04	9.90E-04
U-233	2.5825E-09	3,933.54	7,867.08	0.00E+00	1.02E-05	2.03E-05
U-234	1.8450E-04	3,933.54	7,867.08	0.00E+00	7.26E-01	1.45E+00
U-235	-2.7235E-06	3,933.54	0.00	1.87E-02	7.96E-03	1.87E-02
U-236	1.5493E-05	3,933.54	7,867.08	0.00E+00	6.09E-02	1.22E-01
U-238	-4.2851E-09	3,933.54	0.00	1.16E-02	1.16E-02	1.16E-02
Y-90	1.9254E+00	3,933.54	7,867.08	0.00E+00	7.57E+03	1.51E+04
Other Radionuclides					7.61E+03	1.52E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	8.304E+14
0.0250	1.727E+14
0.0375	1.506E+14
0.0575	1.613E+14
0.0850	9.749E+13
0.1250	6.597E+13
0.2250	8.412E+13
0.3750	3.662E+13
0.5750	5.973E+14
0.8500	1.010E+13
1.2500	5.766E+12
1.7500	2.646E+11
2.2500	2.321E+07
2.7500	1.312E+07
3.5000	6.035E+04
5.0000	3.434E+03
7.0000	3.793E+02
11.0000	4.252E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.38E+01	1.88E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	60 to 100

Basis for Parameter Differences:

This Template was used for the following reasons.
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		3,933.54
Bounding		7,867.08

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.29	
Bounding	0.58	

Estimated EOL HM/Given EOL HM: 1.01

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	FRR MTR (UALX-MEU) JAPAN	[1]Fuel decay start date:	2010
SNF ID #	565	Estimates as of	2030
Fuel Units & Descr	30 - MTR TYPE	Template	ATR (Light Water Alum , 60 to 100%, U)
Heavy Metal Mass	BOL=21.543kg EOL=21.525kg	[2]Template Burnup(MWd)	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0.00116689
		Template Decay Time	20 years

Estimated Canister usage: 18"x10' = 1.25

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	6.6313E-10	17.05	34.09	0.00E+00	1.13E-08	2.26E-08
Am-241	2.0060E-03	17.05	34.09	0.00E+00	3.42E-02	6.84E-02
Am-242m	4.2429E-07	17.05	34.09	0.00E+00	7.23E-06	1.45E-05
Am-243	1.4899E-06	17.05	34.09	0.00E+00	2.54E-05	5.08E-05
C-14	5.7135E-09	17.05	34.09	0.00E+00	9.74E-08	1.95E-07
Cl-36	1.3124E-32	17.05	34.09	0.00E+00	2.24E-31	4.47E-31
Cm-243	1.6443E-07	17.05	34.09	0.00E+00	2.80E-06	5.61E-06
Cm-244	2.9330E-05	17.05	34.09	0.00E+00	5.00E-04	1.00E-03
Co-60	5.3186E-06	17.05	34.09	0.00E+00	9.07E-05	1.81E-04
Cs-134	3.1563E-03	17.05	34.09	0.00E+00	5.38E-02	1.08E-01
Cs-135	3.4477E-06	17.05	34.09	0.00E+00	5.88E-05	1.18E-04
Cs-137	2.0313E+00	17.05	34.09	0.00E+00	3.46E+01	6.93E+01
Eu-154	2.4513E-02	17.05	34.09	0.00E+00	4.18E-01	8.36E-01
Eu-155	4.8175E-03	17.05	34.09	0.00E+00	8.21E-02	1.64E-01
Fe-55	1.2397E-04	17.05	34.09	0.00E+00	2.11E-03	4.23E-03
H-3	4.5697E-03	17.05	34.09	0.00E+00	7.79E-02	1.56E-01
I-129	7.5300E-07	17.05	34.09	0.00E+00	1.28E-05	2.57E-05
Kr-85	1.0850E-01	17.05	34.09	0.00E+00	1.85E+00	3.70E+00
Np-237	9.5561E-06	17.05	34.09	0.00E+00	1.63E-04	3.26E-04
Pa-231	2.0359E-09	17.05	34.09	0.00E+00	3.47E-08	6.94E-08
Pb-210	4.9728E-11	17.05	34.09	0.00E+00	8.48E-10	1.70E-09
Pm-147	4.8502E-02	17.05	34.09	0.00E+00	8.27E-01	1.65E+00
Pu-238	1.8254E-02	17.05	34.09	0.00E+00	3.11E-01	6.22E-01
Pu-239	4.2810E-04	17.05	34.09	0.00E+00	7.30E-03	1.46E-02
Pu-240	2.4368E-04	17.05	34.09	0.00E+00	4.15E-03	8.31E-03
Pu-241	3.3415E-02	17.05	34.09	0.00E+00	5.70E-01	1.14E+00
Pu-242	3.6329E-07	17.05	34.09	0.00E+00	6.19E-06	1.24E-05
Ra-226	2.2854E-10	17.05	34.09	0.00E+00	3.90E-09	7.79E-09
Ra-228	1.2426E-14	17.05	34.09	0.00E+00	2.12E-13	4.24E-13
Ru-106	6.3589E-06	17.05	34.09	0.00E+00	1.08E-04	2.17E-04
Se-79	1.2933E-05	17.05	34.09	0.00E+00	2.20E-04	4.41E-04
Sn-126	1.1574E-05	17.05	34.09	0.00E+00	1.97E-04	3.95E-04
Sr-90	1.9248E+00	17.05	34.09	0.00E+00	3.28E+01	6.56E+01
Tc-99	4.2239E-04	17.05	34.09	0.00E+00	7.20E-03	1.44E-02
Th-229	5.0953E-12	17.05	34.09	0.00E+00	8.69E-11	1.74E-10
Th-230	4.1885E-08	17.05	34.09	0.00E+00	7.14E-07	1.43E-06
Th-232	1.9270E-14	17.05	34.09	0.00E+00	3.28E-13	6.57E-13
Tl-208	4.6024E-08	17.05	34.09	0.00E+00	7.85E-07	1.57E-06
U-232	1.2582E-07	17.05	34.09	0.00E+00	2.14E-06	4.29E-06
U-233	2.5825E-09	17.05	34.09	0.00E+00	4.40E-08	8.80E-08
U-234	1.8450E-04	17.05	34.09	0.00E+00	3.15E-03	6.29E-03
U-235	-2.7235E-06	17.05	0.00	2.09E-02	2.09E-02	2.09E-02
U-236	1.5493E-05	17.05	34.09	0.00E+00	2.64E-04	5.28E-04
U-238	-4.2851E-09	17.05	0.00	3.98E-03	3.98E-03	3.98E-03
Y-90	1.9254E+00	17.05	34.09	0.00E+00	3.28E+01	6.56E+01
Other Radionuclides					3.30E+01	6.59E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	3.599E+12
0.0250	7.484E+11
0.0375	6.527E+11
0.0575	6.991E+11
0.0850	4.225E+11
0.1250	2.860E+11
0.2250	3.649E+11
0.3750	1.587E+11
0.5750	2.588E+12
0.8500	4.376E+10
1.2500	2.499E+10
1.7500	1.147E+09
2.2500	1.006E+05
2.7500	5.690E+04
3.5000	2.832E+02
5.0000	2.418E+01
7.0000	2.712E+00
11.0000	3.070E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.07E-01	8.13E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	44.97911463	60 to 100

Basis for Parameter Differences:

This Template was used for the following reasons
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		17.05
Bounding		34.09

Basis for burnup used in estimate:

Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.00	
Bounding	0.01	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR UALX HEU CANADA
SNF ID #: 294
Fuel Units & Descr. 14 - MULTI-PIN CLUSTER
Heavy Metal Mass. BOL=2.204kg, EOL=2 192kg
ROD Storage Site SRS

[1]Fuel decay start date: 2010
Estimates as of 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367 2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time 20 years

Estimated Canister usage: 18"x10" = 0 58

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	10 61	21 21	0 00E+00	7 03E-09	1 41E-08
Am-241	2 0060E-03	10 61	21 21	0 00E+00	2.13E-02	4.26E-02
Am-242m	4 2429E-07	10 61	21 21	0 00E+00	4 50E-06	9 00E-06
Am-243	1 4899E-06	10 61	21 21	0 00E+00	1 58E-05	3 16E-05
C-14	5 7135E-09	10 61	21 21	0 00E+00	6 06E-08	1.21E-07
Cl-36	1 3124E-32	10 61	21 21	0 00E+00	1.39E-31	2 78E-31
Cm-243	1 6443E-07	10 61	21 21	0 00E+00	1.74E-06	3 49E-06
Cm-244	2 9330E-05	10 61	21 21	0 00E+00	3.11E-04	6.22E-04
Co-60	5 3186E-06	10 61	21 21	0 00E+00	5 64E-05	1 13E-04
Cs-134	3 1563E-03	10 61	21 21	0 00E+00	3.35E-02	6.70E-02
Cs-135	3 4477E-06	10 61	21 21	0 00E+00	3 66E-05	7.31E-05
Cs-137	2 0313E+00	10 61	21 21	0 00E+00	2.15E+01	4.31E+01
Eu-154	2 4513E-02	10 61	21 21	0 00E+00	2 60E-01	5.20E-01
Eu-155	4 8175E-03	10 61	21 21	0 00E+00	5 11E-02	1 02E-01
Fe-55	1.2397E-04	10 61	21 21	0 00E+00	1.31E-03	2 63E-03
H-3	4 5697E-03	10 61	21 21	0 00E+00	4 85E-02	9 69E-02
I-129	7 5300E-07	10 61	21 21	0 00E+00	7.99E-06	1 60E-05
Kr-85	1 0850E-01	10 61	21 21	0 00E+00	1.15E+00	2.30E+00
Np-237	9 5561E-06	10 61	21 21	0 00E+00	1 01E-04	2 03E-04
Pa-231	2 0359E-09	10 61	21 21	0 00E+00	2.16E-08	4.32E-08
Pb-210	4 9728E-11	10 61	21 21	0 00E+00	5.27E-10	1 05E-09
Pm-147	4 8502E-02	10 61	21 21	0 00E+00	5 14E-01	1.03E+00
Pu-238	1 8254E-02	10 61	21 21	0 00E+00	1 94E-01	3 87E-01
Pu-239	4.2810E-04	10 61	21 21	0 00E+00	4.54E-03	9 08E-03
Pu-240	2 4368E-04	10 61	21 21	0 00E+00	2 58E-03	5.17E-03
Pu-241	3 3415E-02	10 61	21 21	0 00E+00	3 54E-01	7 09E-01
Pu-242	3 6329E-07	10 61	21 21	0 00E+00	3 85E-06	7.71E-06
Ra-226	2 2854E-10	10 61	21 21	0 00E+00	2 42E-09	4 85E-09
Ra-228	1.2426E-14	10 61	21 21	0 00E+00	1.32E-13	2 64E-13
Ru-106	6 3589E-06	10 61	21 21	0 00E+00	6.74E-05	1.35E-04
Se-79	1.2933E-05	10 61	21 21	0 00E+00	1.37E-04	2.74E-04
Sn-126	1 1574E-05	10 61	21 21	0 00E+00	1.23E-04	2 46E-04
Sr-90	1 9248E+00	10 61	21 21	0 00E+00	2 04E+01	4 08E+01
Tc-99	4.2239E-04	10 61	21 21	0 00E+00	4 48E-03	8 96E-03
Th-229	5 0953E-12	10.61	21 21	0 00E+00	5.40E-11	1 08E-10
Th-230	4 1885E-08	10 61	21 21	0 00E+00	4 44E-07	8 89E-07
Th-232	1 9270E-14	10 61	21 21	0 00E+00	2 04E-13	4 09E-13
Tl-208	4 6024E-08	10.61	21 21	0 00E+00	4 88E-07	9 76E-07
U-232	1.2582E-07	10.61	21 21	0 00E+00	1.33E-06	2 67E-06
U-233	2 5825E-09	10 61	21 21	0 00E+00	2.74E-08	5 48E-08
U-234	1 8450E-04	10 61	21 21	0 00E+00	1.96E-03	3 91E-03
U-235	-2.7235E-06	10.61	0 00	4 43E-03	4.40E-03	4 43E-03
U-236	1 5493E-05	10.61	21.21	0 00E+00	1.64E-04	3.29E-04
U-238	-4.2851E-09	10.61	0 00	5 11E-05	5.11E-05	5.11E-05
Y-90	1 9254E+00	10.61	21.21	0 00E+00	2 04E+01	4 08E+01
Other Radionuclides					2 05E+01	4.10E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.239E+12
0 0250	4 656E+11
0 0375	4 062E+11
0 0575	4.350E+11
0 0850	2 629E+11
0 1250	1 779E+11
0.2250	2.269E+11
0 3750	9 874E+10
0 5750	1 611E+12
0 8500	2 723E+10
1.2500	1.555E+10
1 7500	7 136E+08
2.2500	6.260E+04
2.7500	3.539E+04
3 5000	1 630E+02
5 0000	9.366E+00
7 0000	1.034E+00
11 0000	1 160E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.53E-01	5 06E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93 09999644	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[1]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		10.61	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		21.21	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 02	
Bounding	0 03	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	FRR MTR-C (U308-LEU) PERU	[1]Fuel decay start date	2010
SNF ID #	503	Estimates as of	2030
Fuel Units & Descr	6 - ASSEMBLY	Template	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass	BOL=6kg, EOL=5 67kg	[2]Template Burnup(MWd)	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT).	0 00116689
		Template Decay Time	20 years

Estimated Canister usage: 18"x10" = 0 25

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	312.52	625 03	0 00E+00	2.07E-07	4 14E-07
Am-241	2 0060E-03	312.52	625 03	0 00E+00	6.27E-01	1.25E+00
Am-242m	4 2429E-07	312.52	625 03	0 00E+00	1.33E-04	2 65E-04
Am-243	1 4899E-06	312 52	625 03	0 00E+00	4 66E-04	9 31E-04
C-14	5 7135E-09	312 52	625 03	0 00E+00	1 79E-06	3 57E-06
Cl-36	1.3124E-32	312 52	625 03	0 00E+00	4 10E-30	8 20E-30
Cm-243	1 6443E-07	312 52	625 03	0 00E+00	5 14E-05	1 03E-04
Cm-244	2 9330E-05	312 52	625 03	0 00E+00	9 17E-03	1 83E-02
Co-60	5.3186E-06	312 52	625 03	0 00E+00	1 66E-03	3 32E-03
Cs-134	3 1563E-03	312 52	625 03	0 00E+00	9 86E-01	1 97E+00
Cs-135	3 4477E-06	312 52	625 03	0 00E+00	1 08E-03	2 15E-03
Cs-137	2.0313E+00	312 52	625 03	0 00E+00	6 35E+02	1 27E+03
Eu-154	2 4513E-02	312 52	625 03	0 00E+00	7.66E+00	1 53E+01
Eu-155	4 8175E-03	312 52	625 03	0 00E+00	1 51E+00	3 01E+00
Fe-55	1.2397E-04	312 52	625 03	0 00E+00	3 87E-02	7.75E-02
H-3	4 5697E-03	312 52	625 03	0 00E+00	1 43E+00	2 86E+00
I-129	7 5300E-07	312 52	625 03	0 00E+00	2 35E-04	4.71E-04
Kr-85	1 0850E-01	312 52	625 03	0 00E+00	3 39E+01	6 78E+01
Np-237	9 5561E-06	312 52	625 03	0 00E+00	2 99E-03	5 97E-03
Pa-231	2 0359E-09	312 52	625 03	0 00E+00	6 36E-07	1.27E-06
Pb-210	4 9728E-11	312.52	625 03	0 00E+00	1.55E-08	3 11E-08
Pm-147	4 8502E-02	312 52	625 03	0 00E+00	1 52E+01	3 03E+01
Pu-238	1 8254E-02	312.52	625 03	0 00E+00	5 70E+00	1 14E+01
Pu-239	4 2810E-04	312 52	625 03	0 00E+00	1.34E-01	2 68E-01
Pu-240	2 4368E-04	312 52	625 03	0 00E+00	7.62E-02	1 52E-01
Pu-241	3 3415E-02	312.52	625 03	0 00E+00	1.04E+01	2 09E+01
Pu-242	3 6329E-07	312.52	625 03	0 00E+00	1 14E-04	2 27E-04
Ra-226	2.2854E-10	312.52	625 03	0 00E+00	7 14E-08	1 43E-07
Ra-228	1.2426E-14	312.52	625 03	0 00E+00	3 88E-12	7 77E-12
Ru-106	6 3589E-06	312.52	625 03	0 00E+00	1 99E-03	3 97E-03
Se-79	1.2933E-05	312.52	625 03	0 00E+00	4 04E-03	8 08E-03
Sn-126	1.1574E-05	312 52	625 03	0 00E+00	3 62E-03	7.23E-03
Sr-90	1.9248E+00	312 52	625 03	0 00E+00	6 02E+02	1.20E+03
Tc-99	4.2239E-04	312.52	625 03	0 00E+00	1 32E-01	2.64E-01
Th-229	5 0953E-12	312 52	625 03	0 00E+00	1 59E-09	3 18E-09
Th-230	4 1885E-08	312 52	625 03	0.00E+00	1.31E-05	2 62E-05
Th-232	1 9270E-14	312 52	625 03	0 00E+00	6 02E-12	1.20E-11
Tl-208	4 6024E-08	312 52	625 03	0 00E+00	1 44E-05	2 88E-05
U-232	1.2582E-07	312 52	625 03	0 00E+00	3 93E-05	7 86E-05
U-233	2 5825E-09	312 52	625 03	0 00E+00	8 07E-07	1 61E-06
U-234	1 8450E-04	312 52	625 03	0 00E+00	5.77E-02	1 15E-01
U-235	-2 7235E-06	312 52	0 00	2 59E-03	1.74E-03	2 59E-03
U-236	1.5493E-05	312 52	625 03	0 00E+00	4.84E-03	9 68E-03
U-238	-4.2851E-09	312 52	0 00	1 61E-03	1 61E-03	1 61E-03
Y-90	1 9254E+00	312 52	625 03	0 00E+00	6 02E+02	1.20E+03
Other Radionuclides					6 04E+02	1.21E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6.598E+13
0 0250	1.372E+13
0 0375	1 197E+13
0 0575	1.282E+13
0 0850	7 745E+12
0 1250	5 241E+12
0.2250	6 683E+12
0.3750	2.909E+12
0 5750	4 745E+13
0 8500	8 023E+11
1.2500	4 581E+11
1 7500	2.103E+10
2.2500	1.844E+06
2 7500	1 043E+06
3 5000	4 799E+03
5 0000	2.745E+02
7 0000	3 032E+01
11 0000	3.399E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.45E+00	1.49E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		312 52
Bounding		625 03

Basis for burnup used in estimate
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 17	
Bounding	0 33	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (U3Si2 LEU) CANADA
SNF ID #: 512
Fuel Units & Descr: 8 - ASSEMBLY
Heavy Metal Mass: BOL=6 52kg EOL=5 868kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage
18"x10'
0 33

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	617 46	1,234 91	0 00E+00	4 09E-07	8 19E-07
Am-241	2 0060E-03	617 46	1,234 91	0 00E+00	1 24E+00	2 48E+00
Am-242m	4 2429E-07	617 46	1,234 91	0 00E+00	2 62E-04	5.24E-04
Am-243	1 4899E-06	617 46	1,234 91	0 00E+00	9 20E-04	1.84E-03
C-14	5 7135E-09	617 46	1,234 91	0 00E+00	3 53E-06	7.06E-06
Cl-36	1 3124E-32	617 46	1,234 91	0 00E+00	8 10E-30	1 62E-29
Cm-243	1 6443E-07	617 46	1,234 91	0 00E+00	1 02E-04	2.03E-04
Cm-244	2 9330E-05	617 46	1,234 91	0 00E+00	1 81E-02	3.62E-02
Co-60	5 3186E-06	617 46	1,234 91	0 00E+00	3 28E-03	6.57E-03
Cs-134	3 1563E-03	617 46	1,234 91	0 00E+00	1 95E+00	3 90E+00
Cs-135	3 4477E-06	617 46	1,234.91	0 00E+00	2 13E-03	4.26E-03
Cs-137	2 0313E+00	617 46	1,234 91	0 00E+00	1 25E+03	2 51E+03
Eu-154	2 4513E-02	617 46	1,234 91	0 00E+00	1 51E+01	3 03E+01
Eu-155	4 8175E-03	617 46	1,234.91	0 00E+00	2 97E+00	5 95E+00
Fe-55	1 2397E-04	617 46	1,234 91	0 00E+00	7 65E-02	1 53E-01
H-3	4 5697E-03	617 46	1,234 91	0 00E+00	2 82E+00	5 64E+00
I-129	7 5300E-07	617.46	1,234 91	0 00E+00	4 65E-04	9 30E-04
Kr-85	1 0850E-01	617 46	1,234 91	0 00E+00	6 70E+01	1 34E+02
Np-237	9 5561E-06	617.46	1,234 91	0 00E+00	5 90E-03	1 18E-02
Pa-231	2 0359E-09	617.46	1,234 91	0 00E+00	1 26E-06	2 51E-06
Pb-210	4 9728E-11	617 46	1,234 91	0 00E+00	3 07E-08	6.14E-08
Pm-147	4 8502E-02	617.46	1,234 91	0 00E+00	2 99E+01	5 99E+01
Pu-238	1 8254E-02	617.46	1,234 91	0 00E+00	1 13E+01	2 25E+01
Pu-239	4.2810E-04	617.46	1,234 91	0 00E+00	2 64E-01	5 29E-01
Pu-240	2 4368E-04	617.46	1,234 91	0 00E+00	1 50E-01	3 01E-01
Pu-241	3 3415E-02	617.46	1,234 91	0 00E+00	2 06E+01	4 13E+01
Pu-242	3 6329E-07	617.46	1,234 91	0 00E+00	2 24E-04	4 49E-04
Ra-226	2.2854E-10	617.46	1,234 91	0 00E+00	1 41E-07	2 82E-07
Ra-228	1 2426E-14	617.46	1,234 91	0 00E+00	7 67E-12	1 53E-11
Ru-106	6 3589E-06	617 46	1,234 91	0 00E+00	3 93E-03	7 85E-03
Se-79	1.2933E-05	617 46	1,234 91	0 00E+00	7 99E-03	1 60E-02
Sn-126	1.1574E-05	617 46	1,234 91	0.00E+00	7 15E-03	1 43E-02
Sr-90	1.9248E+00	617 46	1,234 91	0 00E+00	1.19E+03	2 38E+03
Tc-99	4.2239E-04	617 46	1,234 91	0 00E+00	2 61E-01	5.22E-01
Th-229	5 0953E-12	617 46	1,234 91	0 00E+00	3 15E-09	6.29E-09
Th-230	4.1885E-08	617 46	1,234 91	0 00E+00	2.59E-05	5 17E-05
Th-232	1.9270E-14	617 46	1,234 91	0 00E+00	1.19E-11	2 38E-11
Tl-208	4 6024E-08	617 46	1,234 91	0 00E+00	2.84E-05	5 68E-05
U-232	1.2582E-07	617 46	1,234 91	0 00E+00	7.77E-05	1.55E-04
U-233	2.5825E-09	617 46	1,234 91	0 00E+00	1.59E-06	3 19E-06
U-234	1.8450E-04	617 46	1,234 91	0 00E+00	1.14E-01	2 28E-01
U-235	-2 7235E-06	617 46	0 00	2 82E-03	1 14E-03	2 82E-03
U-236	1.5493E-05	617 46	1,234 91	0 00E+00	9.57E-03	1 91E-02
U-238	-4.2851E-09	617 46	0 00	1 75E-03	1.75E-03	1 75E-03
Y-90	1 9254E+00	617 46	1,234 91	0 00E+00	1 19E+03	2 38E+03
Other Radionuclides					1 19E+03	2 39E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.304E+14
0 0250	2 711E+13
0 0375	2.364E+13
0 0575	2.532E+13
0 0850	1.530E+13
0 1250	1 036E+13
0.2250	1.320E+13
0 3750	5 748E+12
0 5750	9.376E+13
0 8500	1.585E+12
1.2500	9 051E+11
1 7500	4 154E+10
2.2500	3 644E+06
2 7500	2 060E+06
3 5000	9 473E+03
5 0000	5 390E+02
7 0000	5 952E+01
11 0000	6 672E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 47E+01	2.94E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20 00000037	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons.
This fuel matches on all parameters except enrichment.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		617 46
Bounding		1 234 91

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.30	
Bounding	0 60	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (U3SI2 LEU) GERMANY
SNF ID #: 517
Fuel Units & Descr.: 26 - ASSEMBLY
Heavy Metal Mass: BOL=30 94kg EOL=26 114kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: TRIGA-Al (LW/U-Zrx Alum , 10 to 20% U)
[2]Template Burnup(MWd): 6 65
Template BOL Heavy Metal Mass (MT): 0 00018
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 1 08

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	2 4556E-09	4,606 13	9,212 25	0 00E+00	1 13E-05	2 26E-05
Am-241	3 8752E-03	4,606 13	9,212 25	0 00E+00	1 78E+01	3 57E+01
Am-242m	1 8617E-06	4,606 13	9,212 25	0 00E+00	8 58E-03	1 72E-02
Am-243	2 3293E-07	4,606 13	9,212 25	0 00E+00	1 07E-03	2 15E-03
C-14	4 3233E-05	4,606.13	9,212 25	0 00E+00	1 99E-01	3 98E-01
Cl-36	4 3023E-08	4,606.13	9,212 25	0 00E+00	1.98E-04	3 96E-04
Cm-243	1 9053E-07	4,606.13	9,212 25	0 00E+00	8 78E-04	1.76E-03
Cm-244	1.7744E-06	4,606.13	9,212.25	0 00E+00	8 17E-03	1.63E-02
Co-60	4.3188E-03	4,606 13	9,212.25	0 00E+00	1.99E+01	3 98E+01
Cs-134	6.7188E-04	4,606 13	9,212.25	0 00E+00	3 09E+00	6.19E+00
Cs-135	3 1549E-05	4,606 13	9,212.25	0 00E+00	1 45E-01	2 91E-01
Cs-137	1 9489E+00	4,606 13	9,212.25	0 00E+00	8 98E+03	1.80E+04
Eu-154	4 0301E-01	4,606 13	9,212.25	0 00E+00	1 86E+03	3 71E+03
Eu-155	5 4000E-02	4,606 13	9,212.25	0 00E+00	2 49E+02	4 97E+02
Fe-55	1 5955E-04	4,606 13	9,212.25	0 00E+00	7 35E-01	1 47E+00
H-3	4 6571E-03	4,606 13	9,212.25	0 00E+00	2 15E+01	4 29E+01
I-129	7 3805E-07	4,606 13	9,212 25	0 00E+00	3 40E-03	6 80E-03
Kr-85	9 5684E-02	4,606 13	9,212 25	0 00E+00	4 41E+02	8 81E+02
Np-237	1 4618E-06	4,606 13	9,212 25	0 00E+00	6 73E-03	1.35E-02
Pa-231	6 4782E-09	4,606 13	9,212 25	0 00E+00	2 98E-05	5 97E-05
Pb-210	6 3158E-14	4,606.13	9,212.25	0 00E+00	2 91E-10	5 82E-10
Pm-147	3 9564E-02	4,606 13	9,212 25	0 00E+00	1.82E+02	3 64E+02
Pu-238	1.2008E-03	4,606.13	9,212.25	0 00E+00	5.53E+00	1.11E+01
Pu-239	5 6917E-03	4,606.13	9,212.25	0 00E+00	2 62E+01	5.24E+01
Pu-240	2.2617E-03	4,606 13	9,212.25	0 00E+00	1 04E+01	2 08E+01
Pu-241	6 1113E-02	4,606 13	9,212.25	0 00E+00	2 81E+02	5 63E+02
Pu-242	3 0602E-07	4,606 13	9,212.25	0 00E+00	1 41E-03	2 82E-03
Ra-226	2 6707E-13	4,606 13	9,212.25	0 00E+00	1 23E-09	2 46E-09
Ra-228	2.2556E-10	4,606 13	9,212.25	0 00E+00	1 04E-06	2 08E-06
Ru-106	3 1293E-06	4,606 13	9,212.25	0 00E+00	1 44E-02	2 88E-02
Se-79	1.2935E-05	4,606 13	9,212.25	0.00E+00	5 96E-02	1.19E-01
Sn-126	1 2238E-05	4,606 13	9,212.25	0 00E+00	5 64E-02	1.13E-01
Sr-90	1 8195E+00	4,606 13	9,212 25	0 00E+00	8 38E+03	1 68E+04
Tc-99	4 4120E-04	4,606 13	9,212 25	0 00E+00	2 03E+00	4 06E+00
Th-229	3 3308E-10	4,606 13	9,212 25	0 00E+00	1.53E-06	3 07E-06
Th-230	4 6526E-11	4,606 13	9,212 25	0 00E+00	2 14E-07	4.29E-07
Th-232	2 3744E-10	4,606 13	9,212 25	0 00E+00	1 09E-06	2 19E-06
Tl-208	1.8195E-08	4,606.13	9,212.25	0 00E+00	8.38E-05	1 68E-04
U-232	4.9098E-08	4,606 13	9,212.25	0 00E+00	2.26E-04	4 52E-04
U-233	1.3140E-07	4,606 13	9,212.25	0 00E+00	6 05E-04	1.21E-03
U-234	2.2571E-07	4,606 13	9,212.25	0 00E+00	1 04E-03	2 08E-03
U-235	-2 6159E-06	4,606 13	0 00	1.34E-02	1.32E-03	1.34E-02
U-236	1.2719E-05	4,606.13	9,212.25	0 00E+00	5 86E-02	1.17E-01
U-238	-3 8857E-08	4,606 13	0 00	8.32E-03	8 14E-03	8.32E-03
Y-90	1 8211E+00	4,606 13	9,212.25	0 00E+00	8 39E+03	1 68E+04
Other Radionuclides					9 65E+03	1.93E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	9 454E+14
0 0250	1.952E+14
0 0375	2.043E+14
0 0575	1.889E+14
0 0850	1 150E+14
0 1250	1.291E+14
0.2250	1 042E+14
0.3750	4.282E+13
0.5750	6 821E+14
0 8500	7.258E+13
1.2500	7 818E+13
1 7500	2.342E+12
2.2500	3.712E+07
2 7500	6 179E+06
3 5000	4.231E+04
5 0000	5 197E+03
7 0000	5.866E+02
11 0000	6 671E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.20E+02	2.39E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19 9999995	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		4 606 13
Bounding		9,212.25

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	4 03	
Bounding	8 06	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name	FRR MTR-C (U3SI2 LEU) GREECE	[1]Fuel decay start date:	2010
SNF ID #.	531	Estimates as of:	2030
Fuel Units & Descr	18 - ASSEMBLY	Template:	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass	BOL=11 07kg; EOL=10.294kg	[2]Template Burnup(MWd).	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT):	0 00116689
		Template Decay Time:	20 years

Estimated Canister usage: 18"x10" = 0 75

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	734 70	1,469 40	0 00E+00	4 87E-07	9 74E-07
Am-241	2 0060E-03	734 70	1,469 40	0 00E+00	1 47E+00	2 95E+00
Am-242m	4 2429E-07	734 70	1,469 40	0 00E+00	3 12E-04	6.23E-04
Am-243	1 4899E-06	734 70	1,469 40	0 00E+00	1 09E-03	2.19E-03
C-14	5 7135E-09	734 70	1,469 40	0.00E+00	4 20E-06	8 40E-06
Cl-36	1 3124E-32	734 70	1,469 40	0.00E+00	9 64E-30	1 93E-29
Cm-243	1 6443E-07	734 70	1,469 40	0 00E+00	1 21E-04	2 42E-04
Cm-244	2 9330E-05	734 70	1,469 40	0 00E+00	2 15E-02	4.31E-02
Co-60	5 3186E-06	734 70	1,469 40	0 00E+00	3 91E-03	7 82E-03
Cs-134	3 1563E-03	734 70	1,469 40	0 00E+00	2.32E+00	4 64E+00
Cs-135	3 4477E-06	734 70	1,469 40	0 00E+00	2 53E-03	5 07E-03
Cs-137	2 0313E+00	734 70	1,469 40	0 00E+00	1 49E+03	2 98E+03
Eu-154	2 4513E-02	734 70	1,469 40	0 00E+00	1 80E+01	3 60E+01
Eu-155	4 8175E-03	734 70	1,469 40	0 00E+00	3 54E+00	7 08E+00
Fe-55	1.2397E-04	734 70	1,469 40	0 00E+00	9 11E-02	1.82E-01
H-3	4 5697E-03	734 70	1,469 40	0 00E+00	3 36E+00	6 71E+00
I-129	7 5300E-07	734 70	1,469 40	0 00E+00	5 53E-04	1 11E-03
Kr-85	1 0850E-01	734 70	1,469 40	0 00E+00	7.97E+01	1 59E+02
Np-237	9 5561E-06	734 70	1,469 40	0 00E+00	7 02E-03	1.40E-02
Pa-231	2 0359E-09	734 70	1,469 40	0 00E+00	1 50E-06	2 99E-06
Pb-210	4 9728E-11	734 70	1,469 40	0 00E+00	3 65E-08	7.31E-08
Pm-147	4 8502E-02	734 70	1,469 40	0 00E+00	3 56E+01	7 13E+01
Pu-238	1 8254E-02	734 70	1,469 40	0 00E+00	1.34E+01	2 68E+01
Pu-239	4.2810E-04	734 70	1,469 40	0 00E+00	3 15E-01	6.29E-01
Pu-240	2 4368E-04	734 70	1,469 40	0 00E+00	1 79E-01	3 58E-01
Pu-241	3.3415E-02	734 70	1,469 40	0 00E+00	2 45E+01	4 91E+01
Pu-242	3 6329E-07	734 70	1,469 40	0 00E+00	2 67E-04	5.34E-04
Ra-226	2.2854E-10	734 70	1,469 40	0 00E+00	1 68E-07	3.36E-07
Ra-228	1.2426E-14	734 70	1,469 40	0 00E+00	9 13E-12	1 83E-11
Ru-106	6.3589E-06	734 70	1,469.40	0 00E+00	4 67E-03	9 34E-03
Se-79	1.2933E-05	734 70	1,469 40	0 00E+00	9 50E-03	1 90E-02
Sn-126	1.1574E-05	734 70	1,469 40	0 00E+00	8 50E-03	1 70E-02
Sr-90	1 9248E+00	734 70	1,469.40	0 00E+00	1 41E+03	2 83E+03
Tc-99	4.2239E-04	734 70	1,469 40	0 00E+00	3 10E-01	6.21E-01
Th-229	5 0953E-12	734 70	1,469.40	0 00E+00	3 74E-09	7 49E-09
Th-230	4 1885E-08	734 70	1,469 40	0 00E+00	3 08E-05	6.15E-05
Th-232	1 9270E-14	734 70	1,469 40	0 00E+00	1.42E-11	2.83E-11
Tl-208	4 6024E-08	734 70	1,469 40	0 00E+00	3.38E-05	6.76E-05
U-232	1.2582E-07	734 70	1,469 40	0 00E+00	9.24E-05	1.85E-04
U-233	2 5825E-09	734 70	1,469 40	0 00E+00	1.90E-06	3.79E-06
U-234	1 8450E-04	734 70	1,469 40	0 00E+00	1.36E-01	2.71E-01
U-235	-2.7235E-06	734 70	0 00	4 78E-03	2.78E-03	4.78E-03
U-236	1 5493E-05	734 70	1,469 40	0 00E+00	1.14E-02	2.28E-02
U-238	-4 2851E-09	734 70	0 00	2 98E-03	2.97E-03	2 98E-03
Y-90	1 9254E+00	734 70	1,469 40	0 00E+00	1 41E+03	2 83E+03
Other Radionuclides					1 42E+03	2 84E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 551E+14
0 0250	3.225E+13
0 0375	2.813E+13
0 0575	3.013E+13
0 0850	1 821E+13
0 1250	1.232E+13
0.2250	1.571E+13
0 3750	6.839E+12
0 5750	1 116E+14
0 8500	1 886E+12
1.2500	1 077E+12
1 7500	4 943E+10
2.2500	4.336E+06
2.7500	2.451E+06
3 5000	1 128E+04
5 0000	6.434E+02
7 0000	7 105E+01
11 0000	7 966E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.75E+01	3 50E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20 00000024	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons:
This fuel matches on all parameters except enrichment.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		734 70
Bounding		1,469 40

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.21	
Bounding	0 42	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name FRR MTR-C (U3Si2 LEU) JAPAN
SNF ID #. 289
Fuel Units & Descr: 17 - ASSEMBLY
Heavy Metal Mass BOL=8 925kg EOL=8 6kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2030
Template ATR (Light Water, Alum , 60 to 100% U)
[2]Template Burnup(MWd) 367.2
Template BOL Heavy Metal Mass (MT) 0 00116689
Template Decay Time 20 years

Estimated Canister usage:

18"x10'
0 71

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6 6313E-10	307 50	614 99	0 00E+00	2 04E-07	4 08E-07	Avg MeV	
Am-241	2 0060E-03	307 50	614 99	0 00E+00	6 17E-01	1.23E+00	0 0150	6 492E+13
Am-242m	4.2429E-07	307.50	614 99	0 00E+00	1.30E-04	2 61E-04	0 0250	1.350E+13
Am-243	1 4899E-06	307 50	614 99	0 00E+00	4.58E-04	9 16E-04	0 0375	1 177E+13
C-14	5 7135E-09	307 50	614 99	0 00E+00	1.76E-06	3 51E-06	0 0575	1.261E+13
Cl-36	1.3124E-32	307.50	614 99	0 00E+00	4 04E-30	8 07E-30	0 0850	7 621E+12
Cm-243	1 6443E-07	307 50	614 99	0 00E+00	5 06E-05	1 01E-04	0 1250	5 157E+12
Cm-244	2 9330E-05	307.50	614 99	0 00E+00	9 02E-03	1 80E-02	0 2250	6 576E+12
Co-60	5 3186E-06	307.50	614 99	0 00E+00	1 64E-03	3 27E-03	0 3750	2.862E+12
Cs-134	3 1563E-03	307.50	614 99	0 00E+00	9 71E-01	1 94E+00	0 5750	4 669E+13
Cs-135	3 4477E-06	307.50	614 99	0 00E+00	1 06E-03	2 12E-03	0 8500	7 894E+11
Cs-137	2 0313E+00	307.50	614 99	0 00E+00	6 25E+02	1 25E+03	1.2500	4 507E+11
Eu-154	2 4513E-02	307 50	614 99	0 00E+00	7 54E+00	1 51E+01	1 7500	2.069E+10
Eu-155	4 8175E-03	307.50	614 99	0 00E+00	1 48E+00	2 96E+00	2.2500	1.815E+06
Fe-55	1.2397E-04	307.50	614 99	0 00E+00	3 81E-02	7.62E-02	2 7500	1 026E+06
H-3	4.5697E-03	307.50	614 99	0 00E+00	1 41E+00	2 81E+00	3.5000	4 726E+03
I-129	7.5300E-07	307.50	614 99	0 00E+00	2 32E-04	4 63E-04	5 0000	2.719E+02
Kr-85	1 0850E-01	307 50	614 99	0 00E+00	3 34E+01	6 67E+01	7 0000	3.005E+01
Np-237	9 5561E-06	307 50	614 99	0 00E+00	2 94E-03	5 88E-03	11 0000	3.369E+00
Pa-231	2 0359E-09	307 50	614 99	0 00E+00	6.26E-07	1.25E-06		
Pb-210	4 9728E-11	307 50	614 99	0 00E+00	1.53E-08	3 06E-08		
Pm-147	4 8502E-02	307 50	614 99	0 00E+00	1.49E+01	2 98E+01		
Pu-238	1 8254E-02	307 50	614 99	0 00E+00	5.61E+00	1 12E+01		
Pu-239	4 2810E-04	307.50	614 99	0 00E+00	1.32E-01	2 63E-01		
Pu-240	2 4368E-04	307.50	614 99	0 00E+00	7 49E-02	1.50E-01		
Pu-241	3 3415E-02	307.50	614 99	0 00E+00	1 03E+01	2 06E+01		
Pu-242	3 6329E-07	307.50	614.99	0 00E+00	1 12E-04	2.23E-04		
Ra-226	2.2854E-10	307.50	614 99	0 00E+00	7 03E-08	1.41E-07		
Ra-228	1.2426E-14	307.50	614 99	0 00E+00	3 82E-12	7.64E-12		
Ru-106	6 3589E-06	307.50	614 99	0 00E+00	1 96E-03	3 91E-03		
Se-79	1.2933E-05	307.50	614 99	0 00E+00	3 98E-03	7 95E-03		
Sn-126	1.1574E-05	307.50	614 99	0 00E+00	3 56E-03	7 12E-03		
Sr-90	1.9248E+00	307.50	614 99	0 00E+00	5 92E+02	1.18E+03		
Tc-99	4.2239E-04	307.50	614 99	0 00E+00	1.30E-01	2 60E-01		
Th-229	5 0953E-12	307.50	614 99	0 00E+00	1.57E-09	3 13E-09		
Th-230	4 1885E-08	307 50	614 99	0 00E+00	1.29E-05	2 58E-05		
Th-232	1 9270E-14	307 50	614 99	0.00E+00	5 93E-12	1 19E-11		
Tl-208	4 6024E-08	307 50	614 99	0 00E+00	1 42E-05	2 83E-05		
U-232	1.2582E-07	307 50	614 99	0 00E+00	3 87E-05	7.74E-05		
U-233	2 5825E-09	307 50	614 99	0 00E+00	7 94E-07	1.59E-06		
U-234	1 8450E-04	307 50	614 99	0 00E+00	5 67E-02	1 13E-01		
U-235	-2.7235E-06	307.50	0 00	3 86E-03	3 02E-03	3 86E-03		
U-236	1.5493E-05	307.50	614.99	0 00E+00	4 76E-03	9 53E-03		
U-238	-4.2851E-09	307.50	0 00	2 40E-03	2 40E-03	2 40E-03		
Y-90	1 9254E+00	307.50	614.99	0 00E+00	5 92E+02	1 18E+03		
Other Radionuclides					5 95E+02	1 19E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.33E+00	1.47E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20 00000028	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons
This fuel matches on all parameters except enrichment.

Burnup Summary (MWd)[2]		
	From SFD	Estimated
Nominal		307.50
Bounding		614 99

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 11	
Bounding	0.22	

Estimated EOL HM/Given EOL HM: 1 00

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (U3Si2 LEU) NETHERLANDS
SNF ID #: 509
Fuel Units & Descr: 7 - ASSEMBLY
Heavy Metal Mass: BOL=5.53kg, EOL=4 866kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage:

18"x10'
0.29

II. Estimates

	m	x_a	x_b	b	y_a	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6 6313E-10	628 44	1,256 88	0 00E+00	4 17E-07	8 33E-07	Avg MeV	
Am-241	2 0060E-03	628.44	1,256 88	0 00E+00	1 26E+00	2 52E+00	0 0150	1 327E+14
Am-242m	4 2429E-07	628.44	1,256 88	0 00E+00	2 67E-04	5 33E-04	0 0250	2.759E+13
Am-243	1 4899E-06	628.44	1,256.88	0 00E+00	9 36E-04	1 87E-03	0 0375	2 406E+13
C-14	5 7135E-09	628.44	1,256 88	0 00E+00	3 59E-06	7 18E-06	0.0575	2 577E+13
Cl-36	1 3124E-32	628.44	1,256 88	0 00E+00	8.25E-30	1 65E-29	0 0850	1 557E+13
Cm-243	1 6443E-07	628.44	1,256 88	0 00E+00	1 03E-04	2 07E-04	0 1250	1 054E+13
Cm-244	2 9330E-05	628 44	1,256 88	0 00E+00	1 84E-02	3 69E-02	0.2250	1 344E+13
Co-60	5 3186E-06	628 44	1,256 88	0 00E+00	3 34E-03	6 68E-03	0 3750	5 850E+12
Cs-134	3 1563E-03	628 44	1,256 88	0 00E+00	1 98E+00	3 97E+00	0.5750	9 543E+13
Cs-135	3 4477E-06	628.44	1,256 88	0 00E+00	2 17E-03	4 33E-03	0 8500	1 613E+12
Cs-137	2 0313E+00	628.44	1,256 88	0 00E+00	1 28E+03	2 55E+03	1.2500	9 212E+11
Eu-154	2 4513E-02	628.44	1,256 88	0 00E+00	1 54E+01	3 08E+01	1 7500	4 228E+10
Eu-155	4 8175E-03	628.44	1,256 88	0 00E+00	3 03E+00	6 06E+00	2.2500	3 709E+06
Fe-55	1 2397E-04	628.44	1,256 88	0 00E+00	7 79E-02	1 56E-01	2 7500	2 097E+06
H-3	4 5697E-03	628.44	1,256 88	0 00E+00	2 87E+00	5 74E+00	3.5000	9 640E+03
I-129	7 5300E-07	628 44	1,256 88	0 00E+00	4 73E-04	9 46E-04	5 0000	5 479E+02
Kr-85	1 0850E-01	628.44	1,256 88	0 00E+00	6 82E+01	1 36E+02	7 0000	6 050E+01
Np-237	9 5561E-06	628 44	1,256 88	0 00E+00	6 01E-03	1 20E-02	11 0000	6.781E+00
Pa-231	2 0359E-09	628 44	1,256 88	0 00E+00	1 28E-06	2 56E-06		
Pb-210	4 9728E-11	628 44	1,256 88	0 00E+00	3 13E-08	6 25E-08		
Pm-147	4 8502E-02	628.44	1,256 88	0 00E+00	3 05E+01	6 10E+01		
Pu-238	1 8254E-02	628 44	1,256 88	0 00E+00	1 15E+01	2.29E+01		
Pu-239	4 2810E-04	628 44	1,256 88	0 00E+00	2 69E-01	5 38E-01		
Pu-240	2 4368E-04	628 44	1,256 88	0 00E+00	1 53E-01	3 06E-01		
Pu-241	3 3415E-02	628 44	1,256 88	0 00E+00	2.10E+01	4.20E+01		
Pu-242	3 6329E-07	628 44	1,256 88	0 00E+00	2 28E-04	4 57E-04		
Ra-226	2 2854E-10	628 44	1,256 88	0 00E+00	1 44E-07	2 87E-07		
Ra-228	1 2426E-14	628 44	1,256 88	0 00E+00	7 81E-12	1 56E-11		
Ru-106	6 3589E-06	628 44	1,256 88	0 00E+00	4 00E-03	7 99E-03		
Se-79	1 2933E-05	628 44	1,256 88	0 00E+00	8 13E-03	1 63E-02		
Sn-126	1 1574E-05	628 44	1,256 88	0 00E+00	7.27E-03	1 45E-02		
Sr-90	1 9248E+00	628 44	1,256 88	0 00E+00	1.21E+03	2 42E+03		
Tc-99	4 2239E-04	628 44	1,256 88	0 00E+00	2 65E-01	5 31E-01		
Th-229	5 0953E-12	628 44	1,256 88	0 00E+00	3.20E-09	6 40E-09		
Th-230	4 1885E-08	628 44	1,256 88	0 00E+00	2 63E-05	5 26E-05		
Th-232	1 9270E-14	628 44	1,256 88	0 00E+00	1.21E-11	2 42E-11		
Tl-208	4 6024E-08	628 44	1,256 88	0 00E+00	2 89E-05	5 78E-05		
U-232	1 2582E-07	628 44	1,256 88	0 00E+00	7 91E-05	1 58E-04		
U-233	2 5825E-09	628 44	1,256 88	0 00E+00	1 62E-06	3 25E-06		
U-234	1 8450E-04	628 44	1,256 88	0 00E+00	1.16E-01	2 32E-01		
U-235	-2 7235E-06	628 44	0 00	2.39E-03	6 78E-04	2 39E-03		
U-236	1 5493E-05	628 44	1,256 88	0 00E+00	9 74E-03	1 95E-02		
U-238	-4.2851E-09	628 44	0 00	1 49E-03	1 48E-03	1 49E-03		
Y-90	1 9254E+00	628 44	1,256 88	0 00E+00	1.21E+03	2.42E+03		
Other Radionuclides					1.22E+03	2 43E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.50E+01	3 00E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20 00000038	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons.
This fuel matches on all parameters except enrichment.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		628 44
Bounding		1,256.88

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 36	
Bounding	0 72	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (UALX LEU) SWEDEN
SNF ID # 523
Fuel Units & Descr. 480 - ASSEMBLY
Heavy Metal Mass BOL=960kg, EOL=789.888kg
ROD Storage Site SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated Canister usage
18"x10": 20.00

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6.6313E-10	161,099.36	322,198.73	0.00E+00	1.07E-04	2.14E-04
Am-241	2.0060E-03	161,099.36	322,198.73	0.00E+00	3.23E+02	6.46E+02
Am-242m	4.2429E-07	161,099.36	322,198.73	0.00E+00	6.84E-02	1.37E-01
Am-243	1.4899E-06	161,099.36	322,198.73	0.00E+00	2.40E-01	4.80E-01
C-14	5.7135E-09	161,099.36	322,198.73	0.00E+00	9.20E-04	1.84E-03
Cl-36	1.3124E-32	161,099.36	322,198.73	0.00E+00	2.11E-27	4.23E-27
Cm-243	1.6443E-07	161,099.36	322,198.73	0.00E+00	2.65E-02	5.30E-02
Cm-244	2.9330E-05	161,099.36	322,198.73	0.00E+00	4.73E+00	9.45E+00
Co-60	5.3186E-06	161,099.36	322,198.73	0.00E+00	8.57E-01	1.71E+00
Cs-134	3.1563E-03	161,099.36	322,198.73	0.00E+00	5.08E+02	1.02E+03
Cs-135	3.4477E-06	161,099.36	322,198.73	0.00E+00	5.55E-01	1.11E+00
Cs-137	2.0313E+00	161,099.36	322,198.73	0.00E+00	3.27E+05	6.54E+05
Eu-154	2.4513E-02	161,099.36	322,198.73	0.00E+00	3.95E+03	7.90E+03
Eu-155	4.8175E-03	161,099.36	322,198.73	0.00E+00	7.76E+02	1.55E+03
Fe-55	1.2397E-04	161,099.36	322,198.73	0.00E+00	2.00E+01	3.99E+01
H-3	4.5697E-03	161,099.36	322,198.73	0.00E+00	7.36E+02	1.47E+03
I-129	7.5300E-07	161,099.36	322,198.73	0.00E+00	1.21E-01	2.43E-01
Kr-85	1.0850E-01	161,099.36	322,198.73	0.00E+00	1.75E+04	3.50E+04
Np-237	9.5561E-06	161,099.36	322,198.73	0.00E+00	1.54E+00	3.08E+00
Pa-231	2.0359E-09	161,099.36	322,198.73	0.00E+00	3.28E-04	6.56E-04
Pb-210	4.9728E-11	161,099.36	322,198.73	0.00E+00	8.01E-06	1.60E-05
Pm-147	4.8502E-02	161,099.36	322,198.73	0.00E+00	7.81E+03	1.56E+04
Pu-238	1.8254E-02	161,099.36	322,198.73	0.00E+00	2.94E+03	5.88E+03
Pu-239	4.2810E-04	161,099.36	322,198.73	0.00E+00	6.90E+01	1.38E+02
Pu-240	2.4368E-04	161,099.36	322,198.73	0.00E+00	3.93E+01	7.85E+01
Pu-241	3.3415E-02	161,099.36	322,198.73	0.00E+00	5.38E+03	1.08E+04
Pu-242	3.6329E-07	161,099.36	322,198.73	0.00E+00	5.85E-02	1.17E-01
Ra-226	2.2854E-10	161,099.36	322,198.73	0.00E+00	3.68E-05	7.36E-05
Ra-228	1.2426E-14	161,099.36	322,198.73	0.00E+00	2.00E-09	4.00E-09
Ru-106	6.3589E-06	161,099.36	322,198.73	0.00E+00	1.02E+00	2.05E+00
Se-79	1.2933E-05	161,099.36	322,198.73	0.00E+00	2.08E+00	4.17E+00
Sn-126	1.1574E-05	161,099.36	322,198.73	0.00E+00	1.86E+00	3.73E+00
Sr-90	1.9248E+00	161,099.36	322,198.73	0.00E+00	3.10E+05	6.20E+05
Tc-99	4.2239E-04	161,099.36	322,198.73	0.00E+00	6.80E+01	1.36E+02
Th-229	5.0953E-12	161,099.36	322,198.73	0.00E+00	8.21E-07	1.64E-06
Th-230	4.1885E-08	161,099.36	322,198.73	0.00E+00	6.75E-03	1.35E-02
Th-232	1.9270E-14	161,099.36	322,198.73	0.00E+00	3.10E-09	6.21E-09
Tl-208	4.6024E-08	161,099.36	322,198.73	0.00E+00	7.41E-03	1.48E-02
U-232	1.2582E-07	161,099.36	322,198.73	0.00E+00	2.03E-02	4.05E-02
U-233	2.5825E-09	161,099.36	322,198.73	0.00E+00	4.16E-04	8.32E-04
U-234	1.8450E-04	161,099.36	322,198.73	0.00E+00	2.97E+01	5.94E+01
U-235	-2.7235E-06	161,099.36	0.00	4.15E-01	0.00E+00	4.15E-01
U-236	1.5493E-05	161,099.36	322,198.73	0.00E+00	2.50E+00	4.99E+00
U-238	-4.2851E-09	161,099.36	0.00	2.58E-01	2.57E-01	2.58E-01
Y-90	1.9254E+00	161,099.36	322,198.73	0.00E+00	3.10E+05	6.20E+05
Other Radionuclides					3.12E+05	6.23E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	3.401E+16
0.0250	7.072E+15
0.0375	6.169E+15
0.0575	6.607E+15
0.0850	3.993E+15
0.1250	2.702E+15
0.2250	3.445E+15
0.3750	1.500E+15
0.5750	2.446E+16
0.8500	4.136E+14
1.2500	2.361E+14
1.7500	1.084E+13
2.2500	9.508E+08
2.7500	5.375E+08
3.5000	2.471E+06
5.0000	1.402E+05
7.0000	1.548E+04
11.0000	1.735E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.84E+03	7.68E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	60 to 100

Basis for Parameter Differences

This Template was used for the following reasons
This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		161,099.36
Bounding		322,198.73

Basis for burnup used in estimate

Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.53	
Bounding	1.07	

Estimated EOL HM/Given EOL HM: 1.03

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (UALX-HEU) ARGENTINA
SNF ID #: 635
Fuel Units & Descr: 14 - MTR TYPE
Heavy Metal Mass: BOL=2.395kg; EOL=1 749kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage, 18"x10": 0 58

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	612.53	1,225 06	0 00E+00	4 06E-07	8 12E-07
Am-241	2.0060E-03	612.53	1,225 06	0 00E+00	1 23E+00	2 46E+00
Am-242m	4.2429E-07	612.53	1,225 06	0 00E+00	2.60E-04	5 20E-04
Am-243	1 4899E-06	612.53	1,225 06	0 00E+00	9.13E-04	1 83E-03
C-14	5 7135E-09	612.53	1,225 06	0 00E+00	3.50E-06	7 00E-06
Cl-36	1.3124E-32	612.53	1,225 06	0 00E+00	8 04E-30	1 61E-29
Cm-243	1 6443E-07	612.53	1,225 06	0 00E+00	1 01E-04	2 01E-04
Cm-244	2 9330E-05	612.53	1,225 06	0 00E+00	1 80E-02	3 59E-02
Co-60	5 3186E-06	612.53	1,225 06	0 00E+00	3 26E-03	6 52E-03
Cs-134	3 1563E-03	612.53	1,225 06	0 00E+00	1 93E+00	3 87E+00
Cs-135	3 4477E-06	612.53	1,225 06	0 00E+00	2 11E-03	4 22E-03
Cs-137	2 0313E+00	612.53	1,225 06	0 00E+00	1 24E+03	2 49E+03
Eu-154	2 4513E-02	612 53	1,225 06	0 00E+00	1 50E+01	3 00E+01
Eu-155	4 8175E-03	612.53	1,225 06	0 00E+00	2 95E+00	5 90E+00
Fe-55	1.2397E-04	612 53	1,225 06	0 00E+00	7 59E-02	1 52E-01
H-3	4 5697E-03	612 53	1,225 06	0 00E+00	2 80E+00	5 60E+00
I-129	7 5300E-07	612.53	1,225 06	0 00E+00	4 61E-04	9.22E-04
Kr-85	1 0850E-01	612 53	1,225 06	0 00E+00	6 65E+01	1.33E+02
Np-237	9 5561E-06	612 53	1,225 06	0 00E+00	5 85E-03	1 17E-02
Pa-231	2 0359E-09	612 53	1,225 06	0 00E+00	1.25E-06	2 49E-06
Pb-210	4 9728E-11	612 53	1,225 06	0 00E+00	3 05E-08	6 09E-08
Pm-147	4 8502E-02	612 53	1,225 06	0 00E+00	2 97E+01	5 94E+01
Pu-238	1 8254E-02	612 53	1,225 06	0 00E+00	1 12E+01	2.24E+01
Pu-239	4 2810E-04	612 53	1,225 06	0 00E+00	2 62E-01	5.24E-01
Pu-240	2 4368E-04	612 53	1,225 06	0 00E+00	1 49E-01	2 99E-01
Pu-241	3 3415E-02	612 53	1,225 06	0 00E+00	2 05E+01	4 09E+01
Pu-242	3 6329E-07	612 53	1,225 06	0 00E+00	2 23E-04	4 45E-04
Ra-226	2 2854E-10	612 53	1,225 06	0 00E+00	1 40E-07	2 80E-07
Ra-228	1 2426E-14	612 53	1,225 06	0 00E+00	7 61E-12	1.52E-11
Ru-106	6 3589E-06	612 53	1,225 06	0 00E+00	3 90E-03	7.79E-03
Se-79	1 2933E-05	612 53	1,225 06	0 00E+00	7 92E-03	1.58E-02
Sn-126	1 1574E-05	612 53	1,225 06	0 00E+00	7 09E-03	1 42E-02
Sr-90	1 9248E+00	612 53	1,225 06	0 00E+00	1.18E+03	2.36E+03
Tc-99	4 2239E-04	612 53	1,225 06	0 00E+00	2 59E-01	5.17E-01
Th-229	5 0953E-12	612 53	1,225 06	0 00E+00	3 12E-09	6.24E-09
Th-230	4 1885E-08	612.53	1,225 06	0 00E+00	2 57E-05	5.13E-05
Th-232	1 9270E-14	612 53	1,225 06	0 00E+00	1 18E-11	2.36E-11
Tl-208	4 6024E-08	612 53	1,225 06	0 00E+00	2 82E-05	5.64E-05
U-232	1.2582E-07	612.53	1,225 06	0 00E+00	7.71E-05	1.54E-04
U-233	2 5825E-09	612 53	1,225 06	0 00E+00	1 58E-06	3.16E-06
U-234	1 8450E-04	612 53	1,225 06	0 00E+00	1 13E-01	2.26E-01
U-235	-2 7235E-06	612.53	0 00	4 66E-03	2 99E-03	4 66E-03
U-236	1 5493E-05	612 53	1,225 06	0 00E+00	9 49E-03	1.90E-02
U-238	-4 2851E-09	612 53	0 00	8 05E-05	7.79E-05	8 05E-05
Y-90	1 9254E+00	612.53	1,225 06	0 00E+00	1.18E+03	2 36E+03
Other Radionuclides					1 18E+03	2 37E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.293E+14
0 0250	2.689E+13
0 0375	2.345E+13
0 0575	2 512E+13
0 0850	1 518E+13
0 1250	1 027E+13
0.2250	1.310E+13
0 3750	5.702E+12
0 5750	9 301E+13
0 8500	1 572E+12
1.2500	8 979E+11
1 7500	4 121E+10
2.2500	3 615E+06
2 7500	2 044E+06
3 5000	9 389E+03
5 0000	5.309E+02
7 0000	5.861E+01
11 0000	6 569E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.48E+01	2 92E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	90 00000174	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		612 53	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		1,225 06	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 81	
Bounding	1 63	

Estimated EOL HM/Given EOL HM: 1 02

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (UALX-HEU) CANADA
SNF ID #: 612
Fuel Units & Descr: 23 - MTR TYPE
Heavy Metal Mass: BOL=2 721kg EOL=1 76kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage

18"x10'
0 96

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	910 46	1,820 93	0 00E+00	6 04E-07	1 21E-06
Am-241	2 0060E-03	910 46	1,820 93	0 00E+00	1 83E+00	3 65E+00
Am-242m	4.2429E-07	910 46	1,820 93	0 00E+00	3 86E-04	7.73E-04
Am-243	1.4899E-06	910 46	1,820 93	0 00E+00	1.36E-03	2.71E-03
C-14	5 7135E-09	910.46	1,820 93	0 00E+00	5.20E-06	1.04E-05
Cl-36	1.3124E-32	910 46	1,820 93	0 00E+00	1 19E-29	2 39E-29
Cm-243	1 6443E-07	910 46	1,820 93	0 00E+00	1.50E-04	2 99E-04
Cm-244	2 9330E-05	910 46	1,820 93	0 00E+00	2 67E-02	5 34E-02
Co-60	5 3186E-06	910 46	1,820 93	0 00E+00	4 84E-03	9 68E-03
Cs-134	3 1563E-03	910 46	1,820 93	0 00E+00	2 87E+00	5 75E+00
Cs-135	3 4477E-06	910 46	1,820 93	0 00E+00	3 14E-03	6.28E-03
Cs-137	2 0313E+00	910 46	1,820 93	0 00E+00	1 85E+03	3 70E+03
Eu-154	2 4513E-02	910 46	1,820 93	0 00E+00	2.23E+01	4 46E+01
Eu-155	4 8175E-03	910 46	1,820 93	0 00E+00	4.39E+00	8 77E+00
Fe-55	1.2397E-04	910 46	1,820 93	0 00E+00	1 13E-01	2 26E-01
H-3	4 5697E-03	910 46	1,820 93	0 00E+00	4 16E+00	8.32E+00
I-129	7 5300E-07	910 46	1,820 93	0 00E+00	6 86E-04	1 37E-03
Kr-85	1 0850E-01	910 46	1,820 93	0 00E+00	9 88E+01	1 98E+02
Np-237	9 5561E-06	910 46	1,820.93	0 00E+00	8 70E-03	1.74E-02
Pa-231	2 0359E-09	910 46	1,820 93	0 00E+00	1 85E-06	3.71E-06
Pb-210	4 9728E-11	910 46	1,820 93	0 00E+00	4.53E-08	9 06E-08
Pm-147	4 8502E-02	910 46	1,820 93	0 00E+00	4 42E+01	8 83E+01
Pu-238	1 8254E-02	910 46	1,820 93	0 00E+00	1.66E+01	3 32E+01
Pu-239	4 2810E-04	910 46	1,820 93	0 00E+00	3 90E-01	7 80E-01
Pu-240	2 4368E-04	910 46	1,820 93	0 00E+00	2.22E-01	4 44E-01
Pu-241	3 3415E-02	910 46	1,820 93	0 00E+00	3 04E+01	6 08E+01
Pu-242	3 6329E-07	910 46	1,820 93	0 00E+00	3 31E-04	6 62E-04
Ra-226	2.2854E-10	910 46	1,820 93	0 00E+00	2 08E-07	4 16E-07
Ra-228	1.2426E-14	910 46	1,820.93	0 00E+00	1 13E-11	2.26E-11
Ru-106	6.3589E-06	910 46	1,820 93	0 00E+00	5 79E-03	1 16E-02
Se-79	1.2933E-05	910 46	1,820 93	0 00E+00	1.18E-02	2 36E-02
Sn-126	1 1574E-05	910 46	1,820 93	0 00E+00	1 05E-02	2 11E-02
Sr-90	1 9248E+00	910 46	1,820 93	0 00E+00	1 75E+03	3 50E+03
Tc-99	4 2239E-04	910 46	1,820 93	0 00E+00	3 85E-01	7.69E-01
Th-229	5 0953E-12	910 46	1,820 93	0 00E+00	4 64E-09	9.28E-09
Th-230	4 1885E-08	910 46	1,820 93	0 00E+00	3 81E-05	7 63E-05
Th-232	1.9270E-14	910 46	1,820 93	0 00E+00	1 75E-11	3 51E-11
Tl-208	4 6024E-08	910 46	1,820 93	0 00E+00	4.19E-05	8 38E-05
U-232	1.2582E-07	910 46	1,820 93	0 00E+00	1.15E-04	2 29E-04
U-233	2.5825E-09	910 46	1,820 93	0 00E+00	2.35E-06	4 70E-06
U-234	1 8450E-04	910 46	1,820 93	0 00E+00	1 68E-01	3.36E-01
U-235	-2 7235E-06	910 46	0 00	5 47E-03	2 99E-03	5.47E-03
U-236	1 5493E-05	910.46	1,820 93	0 00E+00	1 41E-02	2.82E-02
U-238	-4.2851E-09	910.46	0 00	6 40E-05	6 01E-05	6 40E-05
Y-90	1 9254E+00	910 46	1,820 93	0 00E+00	1 75E+03	3.51E+03
Other Radionuclides					1 76E+03	3 52E+03

Gamma Sources

Photon Energy Group Avg MeV	Total Photons/sec (bounding)
0 0150	1 922E+14
0 0250	3 997E+13
0 0375	3 486E+13
0 0575	3 734E+13
0 0850	2.256E+13
0 1250	1.527E+13
0.2250	1 947E+13
0.3750	8 475E+12
0 5750	1.382E+14
0 8500	2.337E+12
1.2500	1.335E+12
1.7500	6 126E+10
2.2500	5 373E+06
2.7500	3 038E+06
3.5000	1.395E+04
5 0000	7 890E+02
7 0000	8 710E+01
11 0000	9 762E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 17E+01	4.34E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	92 99997633	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		910 46	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		1,820 93	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 06	
Bounding	2 13	

Estimated EOL HM/Given EOL HM: 1 03

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (UALX-HEU) GERMANY
SNF ID #: 579
Fuel Units & Descr: 33 - MTR TYPE
Heavy Metal Mass: BOL=3.336kg, EOL=2.062kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100% U)
[2]Template Burnup(MWd): 367 2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10" 1.38

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	1,206 31	2,412 63	0 00E+00	8 00E-07	1 60E-06
Am-241	2 0060E-03	1,206 31	2,412 63	0 00E+00	2 42E+00	4 84E+00
Am-242m	4 2429E-07	1,206 31	2,412 63	0 00E+00	5 12E-04	1 02E-03
Am-243	1 4899E-06	1,206 31	2,412 63	0 00E+00	1.80E-03	3 59E-03
C-14	5 7135E-09	1,206 31	2,412 63	0 00E+00	6.89E-06	1 38E-05
Cl-36	1 3124E-32	1,206 31	2,412 63	0 00E+00	1.58E-29	3 17E-29
Cm-243	1 6443E-07	1,206 31	2,412 63	0 00E+00	1 98E-04	3 97E-04
Cm-244	2.9330E-05	1,206 31	2,412 63	0 00E+00	3 54E-02	7 08E-02
Co-60	5 3186E-06	1,206 31	2,412 63	0 00E+00	6 42E-03	1 28E-02
Cs-134	3.1563E-03	1,206 31	2,412 63	0 00E+00	3 81E+00	7 62E+00
Cs-135	3 4477E-06	1,206.31	2,412 63	0 00E+00	4 16E-03	8.32E-03
Cs-137	2.0313E+00	1,206.31	2,412.63	0 00E+00	2 45E+03	4 90E+03
Eu-154	2 4513E-02	1,206 31	2,412.63	0 00E+00	2 96E+01	5 91E+01
Eu-155	4 8175E-03	1,206.31	2,412 63	0 00E+00	5 81E+00	1 16E+01
Fe-55	1.2397E-04	1,206.31	2,412 63	0 00E+00	1 50E-01	2 99E-01
H-3	4 5697E-03	1,206 31	2,412 63	0 00E+00	5.51E+00	1 10E+01
I-129	7 5300E-07	1,206 31	2,412 63	0 00E+00	9 08E-04	1 82E-03
Kr-85	1 0850E-01	1,206 31	2,412 63	0 00E+00	1.31E+02	2 62E+02
Np-237	9 5561E-06	1,206 31	2,412 63	0 00E+00	1.15E-02	2 31E-02
Pa-231	2 0359E-09	1,206 31	2,412 63	0 00E+00	2.46E-06	4 91E-06
Pb-210	4 9728E-11	1,206 31	2,412 63	0 00E+00	6.00E-08	1.20E-07
Pm-147	4 8502E-02	1,206 31	2,412 63	0 00E+00	5 85E+01	1.17E+02
Pu-238	1 8254E-02	1,206 31	2,412 63	0 00E+00	2 20E+01	4 40E+01
Pu-239	4.2810E-04	1,206 31	2,412.63	0 00E+00	5 16E-01	1 03E+00
Pu-240	2 4368E-04	1,206 31	2,412.63	0 00E+00	2 94E-01	5.88E-01
Pu-241	3.3415E-02	1,206.31	2,412 63	0 00E+00	4 03E+01	8 06E+01
Pu-242	3 6329E-07	1,206.31	2,412 63	0 00E+00	4 38E-04	8.76E-04
Ra-226	2.2854E-10	1,206.31	2,412 63	0 00E+00	2 76E-07	5 51E-07
Ra-228	1.2426E-14	1,206 31	2,412 63	0 00E+00	1 50E-11	3 00E-11
Ru-106	6 3589E-06	1,206 31	2,412 63	0 00E+00	7 67E-03	1 53E-02
Se-79	1.2933E-05	1,206 31	2,412 63	0 00E+00	1.56E-02	3 12E-02
Sn-126	1 1574E-05	1,206 31	2,412 63	0 00E+00	1.40E-02	2 79E-02
Sr-90	1 9248E+00	1,206 31	2,412 63	0 00E+00	2 32E+03	4 64E+03
Tc-99	4 2239E-04	1,206 31	2,412 63	0 00E+00	5.10E-01	1 02E+00
Th-229	5 0953E-12	1,206 31	2,412 63	0 00E+00	6.15E-09	1.23E-08
Th-230	4 1885E-08	1,206.31	2,412 63	0 00E+00	5 05E-05	1 01E-04
Th-232	1 9270E-14	1,206.31	2,412 63	0 00E+00	2 32E-11	4 65E-11
Tl-208	4 6024E-08	1,206 31	2,412.63	0 00E+00	5 55E-05	1.11E-04
U-232	1.2582E-07	1,206.31	2,412 63	0 00E+00	1 52E-04	3.04E-04
U-233	2.5825E-09	1,206.31	2,412 63	0 00E+00	3 12E-06	6.23E-06
U-234	1 8450E-04	1,206.31	2,412 63	0 00E+00	2 23E-01	4 45E-01
U-235	-2.7235E-06	1,206.31	0 00	6 71E-03	3 42E-03	6 71E-03
U-236	1 5493E-05	1,206 31	2,412 63	0 00E+00	1 87E-02	3 74E-02
U-238	-4.2851E-09	1,206 31	0 00	7.85E-05	7.33E-05	7 85E-05
Y-90	1 9254E+00	1,206 31	2,412 63	0.00E+00	2.32E+03	4 65E+03
Other Radionuclides					2.33E+03	4 67E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.547E+14
0 0250	5.296E+13
0 0375	4 619E+13
0 0575	4 947E+13
0 0850	2 990E+13
0 1250	2 023E+13
0.2250	2 580E+13
0.3750	1 123E+13
0 5750	1 832E+14
0.8500	3 097E+12
1.2500	1 768E+12
1 7500	8 116E+10
2.2500	7 119E+06
2.7500	4.025E+06
3.5000	1.849E+04
5 0000	1.045E+03
7 0000	1 154E+02
11 0000	1.293E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.88E+01	5.75E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	92 99997131	60 to 100

Basis for Parameter Drifferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		1,206.31
Bounding		2,412.63

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 15	
Bounding	2.30	

Estimated EOL HM/Given EOL HM: 1 04

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (UALX-HEU) JAPAN
SNF ID #: 600
Fuel Units & Descr: 54 - MTR TYPE
Heavy Metal Mass: BOL=5.227kg EOL=4 158kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 2 25

II. Estimates

Radionuclide	m Ci/MWd From Template	x_n Nominal Fuel Burnup (MWd)[2]	x_b Bounding Fuel Burnup (MWd)[2]	b Initial Activity (Ci)	y_n Nominal Fuel Inventories(Ci)	y_b Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	1,012.55	2,025 11	0 00E+00	6 71E-07	1.34E-06
Am-241	2 0060E-03	1,012.55	2,025 11	0 00E+00	2 03E+00	4 06E+00
Am-242m	4.2429E-07	1,012.55	2,025.11	0 00E+00	4.30E-04	8.59E-04
Am-243	1 4899E-06	1,012 55	2,025 11	0.00E+00	1.51E-03	3 02E-03
C-14	5 7135E-09	1,012 55	2,025 11	0 00E+00	5 79E-06	1 16E-05
Cl-36	1.3124E-32	1,012 55	2,025 11	0 00E+00	1.33E-29	2 66E-29
Cm-243	1 6443E-07	1,012 55	2,025 11	0 00E+00	1 66E-04	3 33E-04
Cm-244	2 9330E-05	1,012 55	2,025 11	0 00E+00	2 97E-02	5 94E-02
Co-60	5 3186E-06	1,012 55	2,025 11	0 00E+00	5 39E-03	1 08E-02
Cs-134	3 1563E-03	1,012 55	2,025 11	0 00E+00	3 20E+00	6 39E+00
Cs-135	3 4477E-06	1,012.55	2,025 11	0 00E+00	3 49E-03	6 98E-03
Cs-137	2 0313E+00	1,012.55	2,025 11	0 00E+00	2 06E+03	4 11E+03
Eu-154	2 4513E-02	1,012.55	2,025 11	0 00E+00	2 48E+01	4 96E+01
Eu-155	4 8175E-03	1,012 55	2,025.11	0.00E+00	4 88E+00	9 76E+00
Fe-55	1.2397E-04	1,012 55	2,025 11	0 00E+00	1.26E-01	2 51E-01
H-3	4 5697E-03	1,012 55	2,025 11	0 00E+00	4 63E+00	9 25E+00
I-129	7 5300E-07	1,012 55	2,025 11	0 00E+00	7 62E-04	1 52E-03
Kr-85	1 0850E-01	1,012 55	2,025 11	0 00E+00	1 10E+02	2 20E+02
Np-237	9 5561E-06	1,012 55	2,025 11	0 00E+00	9 68E-03	1 94E-02
Pa-231	2 0359E-09	1,012 55	2,025 11	0 00E+00	2 06E-06	4 12E-06
Pb-210	4 9728E-11	1,012 55	2,025 11	0 00E+00	5 04E-08	1 01E-07
Pm-147	4 8502E-02	1,012 55	2,025 11	0 00E+00	4 91E+01	9 82E+01
Pu-238	1.8254E-02	1,012.55	2,025 11	0 00E+00	1 85E+01	3 70E+01
Pu-239	4.2810E-04	1,012.55	2,025 11	0.00E+00	4 33E-01	8 67E-01
Pu-240	2 4368E-04	1,012 55	2,025.11	0 00E+00	2 47E-01	4 93E-01
Pu-241	3 3415E-02	1,012.55	2,025.11	0 00E+00	3.38E+01	6 77E+01
Pu-242	3 6329E-07	1,012 55	2,025 11	0 00E+00	3 68E-04	7.36E-04
Ra-226	2 2854E-10	1,012 55	2,025 11	0 00E+00	2 31E-07	4 63E-07
Ra-228	1 2426E-14	1,012 55	2,025 11	0 00E+00	1 26E-11	2 52E-11
Ru-106	6 3589E-06	1,012 55	2,025 11	0 00E+00	6 44E-03	1.29E-02
Se-79	1 2933E-05	1,012 55	2,025 11	0 00E+00	1 31E-02	2.62E-02
Sn-126	1.1574E-05	1,012 55	2,025 11	0 00E+00	1.17E-02	2.34E-02
Sr-90	1.9248E+00	1,012.55	2,025 11	0 00E+00	1 95E+03	3 90E+03
Tc-99	4.2239E-04	1,012 55	2,025 11	0 00E+00	4.28E-01	8 55E-01
Th-229	5 0953E-12	1,012.55	2,025 11	0 00E+00	5 16E-09	1 03E-08
Th-230	4 1885E-08	1,012.55	2,025.11	0 00E+00	4 24E-05	8 48E-05
Th-232	1 9270E-14	1,012.55	2,025.11	0 00E+00	1 95E-11	3 90E-11
Tl-208	4 6024E-08	1,012 55	2,025.11	0 00E+00	4 66E-05	9.32E-05
U-232	1 2582E-07	1,012 55	2,025 11	0 00E+00	1.27E-04	2.55E-04
U-233	2 5825E-09	1,012 55	2,025 11	0 00E+00	2 61E-06	5.23E-06
U-234	1 8450E-04	1,012 55	2,025 11	0 00E+00	1.87E-01	3 74E-01
U-235	-2 7235E-06	1,012 55	0 00	1 05E-02	7.75E-03	1 05E-02
U-236	1.5493E-05	1,012 55	2,025 11	0 00E+00	1 57E-02	3 14E-02
U-238	-4 2851E-09	1,012 55	0 00	1.23E-04	1.19E-04	1 23E-04
Y-90	1.9254E+00	1,012 55	2,025 11	0.00E+00	1 95E+03	3 90E+03
Other Radionuclides					1 96E+03	3 92E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 138E+14
0 0250	4 445E+13
0 0375	3 877E+13
0 0575	4 153E+13
0 0850	2 509E+13
0 1250	1 698E+13
0 2250	2 165E+13
0 3750	9 426E+12
0 5750	1.538E+14
0 8500	2.599E+12
1.2500	1.484E+12
1 7500	6.812E+10
2.2500	5 976E+06
2 7500	3 378E+06
3 5000	1 552E+04
5 0000	8 776E+02
7 0000	9 688E+01
11 0000	1.086E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.41E+01	4.83E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	92 99999931	60 to 100

Basis for Parameter Drfferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		1,012.55
Bounding		2 025 11

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multipler	Estimated Burnup/ Given Burnup
Nominal	0 62	
Bounding	1.23	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (UALX-HEU) PORTUGAL
SNF ID #: 631
Fuel Units & Descr: 9 - MTR TYPE
Heavy Metal Mass: BOL=1 423kg; EOL=0 894kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 0 38

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	501 16	1,002.33	0 00E+00	3 32E-07	6 65E-07
Am-241	2 0060E-03	501 16	1,002.33	0 00E+00	1 01E+00	2.01E+00
Am-242m	4.2429E-07	501 16	1,002.33	0 00E+00	2 13E-04	4.25E-04
Am-243	1 4899E-06	501 16	1,002.33	0 00E+00	7 47E-04	1 49E-03
C-14	5.7135E-09	501 16	1,002 33	0 00E+00	2.86E-06	5 73E-06
Cl-36	1 3124E-32	501.16	1,002 33	0 00E+00	6 58E-30	1.32E-29
Cm-243	1 6443E-07	501.16	1,002 33	0 00E+00	8.24E-05	1 65E-04
Cm-244	2 9330E-05	501.16	1,002 33	0 00E+00	1 47E-02	2.94E-02
Co-60	5 3186E-06	501 16	1,002 33	0 00E+00	2 67E-03	5.33E-03
Cs-134	3 1563E-03	501 16	1,002 33	0 00E+00	1 58E+00	3 16E+00
Cs-135	3 4477E-06	501 16	1,002 33	0 00E+00	1 73E-03	3 46E-03
Cs-137	2 0313E+00	501 16	1,002 33	0 00E+00	1 02E+03	2 04E+03
Eu-154	2 4513E-02	501 16	1,002 33	0 00E+00	1 23E+01	2 46E+01
Eu-155	4 8175E-03	501 16	1,002 33	0 00E+00	2 41E+00	4 83E+00
Fe-55	1 2397E-04	501 16	1,002 33	0 00E+00	6 21E-02	1 24E-01
H-3	4 5697E-03	501 16	1,002 33	0 00E+00	2 29E+00	4 58E+00
I-129	7 5300E-07	501.16	1,002.33	0 00E+00	3 77E-04	7 55E-04
Kr-85	1 0850E-01	501 16	1,002.33	0 00E+00	5 44E+01	1 09E+02
Np-237	9 5561E-06	501 16	1,002.33	0 00E+00	4 79E-03	9 58E-03
Pa-231	2 0359E-09	501 16	1,002.33	0 00E+00	1 02E-06	2 04E-06
Pb-210	4 9728E-11	501 16	1,002.33	0 00E+00	2 49E-08	4 98E-08
Pm-147	4 8502E-02	501 16	1,002.33	0 00E+00	2 43E+01	4 86E+01
Pu-238	1 8254E-02	501.16	1,002 33	0 00E+00	9 15E+00	1 83E+01
Pu-239	4.2810E-04	501.16	1,002 33	0 00E+00	2.15E-01	4.29E-01
Pu-240	2 4368E-04	501.16	1,002 33	0 00E+00	1.22E-01	2.44E-01
Pu-241	3.3415E-02	501.16	1,002 33	0 00E+00	1 67E+01	3 35E+01
Pu-242	3 6329E-07	501 16	1,002 33	0 00E+00	1 82E-04	3 64E-04
Ra-226	2.2854E-10	501.16	1,002 33	0 00E+00	1 15E-07	2.29E-07
Ra-228	1.2426E-14	501.16	1,002 33	0 00E+00	6 23E-12	1.25E-11
Ru-106	6 3589E-06	501 16	1,002 33	0 00E+00	3 19E-03	6 37E-03
Se-79	1 2933E-05	501 16	1,002.33	0 00E+00	6 48E-03	1.30E-02
Sn-126	1 1574E-05	501 16	1,002.33	0 00E+00	5 80E-03	1 16E-02
Sr-90	1 9248E+00	501.16	1,002.33	0 00E+00	9 65E+02	1 93E+03
Tc-99	4 2239E-04	501 16	1,002.33	0 00E+00	2.12E-01	4 23E-01
Th-229	5 0953E-12	501 16	1,002 33	0 00E+00	2 55E-09	5 11E-09
Th-230	4 1885E-08	501 16	1,002 33	0 00E+00	2 10E-05	4 20E-05
Th-232	1 9270E-14	501 16	1,002 33	0 00E+00	9 66E-12	1 93E-11
Tl-208	4 6024E-08	501.16	1,002 33	0 00E+00	2.31E-05	4 61E-05
U-232	1.2582E-07	501.16	1,002 33	0 00E+00	6.31E-05	1.26E-04
U-233	2 5825E-09	501.16	1,002 33	0 00E+00	1.29E-06	2 59E-06
U-234	1.8450E-04	501 16	1,002 33	0 00E+00	9.25E-02	1 85E-01
U-235	-2 7235E-06	501 16	0 00	2 86E-03	1 49E-03	2.86E-03
U-236	1 5493E-05	501 16	1,002 33	0 00E+00	7.76E-03	1.55E-02
U-238	-4.2851E-09	501 16	0 00	3 35E-05	3 13E-05	3.35E-05
Y-90	1 9254E+00	501 16	1,002 33	0 00E+00	9 65E+02	1 93E+03
Other Radionuclides					9 69E+02	1 94E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 058E+14
0 0250	2.200E+13
0 0375	1 919E+13
0 0575	2.055E+13
0 0850	1.242E+13
0 1250	8 405E+12
0.2250	1 072E+13
0.3750	4 665E+12
0.5750	7 610E+13
0.8500	1.287E+12
1.2500	7 346E+11
1 7500	3 372E+10
2.2500	2 958E+06
2.7500	1 672E+06
3.5000	7 681E+03
5 0000	4.343E+02
7 0000	4 794E+01
11 0000	5.373E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 19E+01	2.39E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93 00000971	60 to 100

Basis for Parameter Drfferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		501 16	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		1,002.33	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 12	
Boundmg	2 24	

Estimated EOL HM/Given EOL HM: 1 03

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (UALX-HEU) TURKEY
SNF ID #: 643
Fuel Units & Descr: 8 - MTR TYPE
Heavy Metal Mass: BOL=1 781kg EOL=0.953kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367 2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 0.33

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	784 13	1,568.26	0 00E+00	5 20E-07	1.04E-06
Am-241	2 0060E-03	784 13	1,568.26	0 00E+00	1.57E+00	3 15E+00
Am-242m	4 2429E-07	784 13	1,568.26	0 00E+00	3 33E-04	6 65E-04
Am-243	1 4899E-06	784 13	1,568.26	0 00E+00	1 17E-03	2.34E-03
C-14	5 7135E-09	784 13	1,568.26	0 00E+00	4 48E-06	8 96E-06
Cl-36	1 3124E-32	784 13	1,568.26	0 00E+00	1 03E-29	2 06E-29
Cm-243	1 6443E-07	784 13	1,568.26	0 00E+00	1 29E-04	2.58E-04
Cm-244	2 9330E-05	784 13	1,568.26	0 00E+00	2 30E-02	4 60E-02
Co-60	5 3186E-06	784 13	1,568.26	0 00E+00	4 17E-03	8 34E-03
Cs-134	3 1563E-03	784 13	1,568.26	0 00E+00	2 47E+00	4 95E+00
Cs-135	3 4477E-06	784 13	1,568.26	0 00E+00	2 70E-03	5 41E-03
Cs-137	2 0313E+00	784 13	1,568.26	0 00E+00	1 59E+03	3 19E+03
Eu-154	2 4513E-02	784 13	1,568.26	0 00E+00	1 92E+01	3 84E+01
Eu-155	4 8175E-03	784 13	1,568.26	0 00E+00	3 78E+00	7 56E+00
Fe-55	1.2397E-04	784 13	1,568 26	0 00E+00	9 72E-02	1 94E-01
H-3	4.5697E-03	784 13	1,568 26	0 00E+00	3 58E+00	7 17E+00
I-129	7.5300E-07	784.13	1,568 26	0 00E+00	5.90E-04	1.18E-03
Kr-85	1 0850E-01	784.13	1,568 26	0 00E+00	8 51E+01	1.70E+02
Np-237	9 5561E-06	784.13	1,568 26	0 00E+00	7.49E-03	1.50E-02
Pa-231	2 0359E-09	784.13	1,568 26	0 00E+00	1 60E-06	3 19E-06
Pb-210	4 9728E-11	784.13	1,568 26	0 00E+00	3 90E-08	7 80E-08
Pm-147	4 8502E-02	784.13	1,568 26	0 00E+00	3 80E+01	7 61E+01
Pu-238	1 8254E-02	784.13	1,568 26	0 00E+00	1.43E+01	2 86E+01
Pu-239	4.2810E-04	784.13	1,568 26	0 00E+00	3 36E-01	6 71E-01
Pu-240	2 4368E-04	784 13	1,568.26	0 00E+00	1 91E-01	3 82E-01
Pu-241	3 3415E-02	784 13	1,568 26	0 00E+00	2 62E+01	5 24E+01
Pu-242	3 6329E-07	784 13	1,568 26	0.00E+00	2 85E-04	5 70E-04
Ra-226	2 2854E-10	784 13	1,568.26	0 00E+00	1 79E-07	3 58E-07
Ra-228	1.2426E-14	784 13	1,568.26	0 00E+00	9 74E-12	1 95E-11
Ru-106	6 3589E-06	784 13	1,568.26	0 00E+00	4 99E-03	9 97E-03
Se-79	1 2933E-05	784 13	1,568 26	0 00E+00	1 01E-02	2 03E-02
Sn-126	1 1574E-05	784 13	1,568.26	0 00E+00	9 08E-03	1 82E-02
Sr-90	1 9248E+00	784 13	1,568.26	0 00E+00	1 51E+03	3 02E+03
Tc-99	4 2239E-04	784 13	1,568.26	0 00E+00	3.31E-01	6 62E-01
Th-229	5 0953E-12	784 13	1,568.26	0 00E+00	4 00E-09	7.99E-09
Th-230	4 1885E-08	784 13	1,568.26	0 00E+00	3.28E-05	6 57E-05
Th-232	1 9270E-14	784 13	1,568.26	0 00E+00	1.51E-11	3 02E-11
Tl-208	4 6024E-08	784 13	1,568.26	0 00E+00	3 61E-05	7.22E-05
U-232	1.2582E-07	784 13	1,568.26	0 00E+00	9 87E-05	1 97E-04
U-233	2.5825E-09	784 13	1,568.26	0 00E+00	2 03E-06	4 05E-06
U-234	1.8450E-04	784 13	1,568.26	0 00E+00	1 45E-01	2 89E-01
U-235	-2 7235E-06	784 13	0 00	3 58E-03	1.44E-03	3 58E-03
U-236	1.5493E-05	784 13	1,568.26	0 00E+00	1.21E-02	2 43E-02
U-238	-4.2851E-09	784 13	0 00	4 19E-05	3 85E-05	4 19E-05
Y-90	1 9254E+00	784 13	1,568 26	0 00E+00	1.51E+03	3 02E+03
Other Radionuclides					1.52E+03	3 03E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 655E+14
0 0250	3.442E+13
0 0375	3 003E+13
0 0575	3 216E+13
0 0850	1 943E+13
0 1250	1 315E+13
0 2250	1 677E+13
0 3750	7.299E+12
0 5750	1.191E+14
0 8500	2.013E+12
1.2500	1 149E+12
1 7500	5.276E+10
2.2500	4 628E+06
2 7500	2.616E+06
3.5000	1.202E+04
5 0000	6 794E+02
7.0000	7.501E+01
11 0000	8.407E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.87E+01	3.74E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93.00002122	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		784 13	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		1,568.26	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 40	
Bounding	2.80	

Estimated EOL HM/Given EOL HM: 1 05

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (UALX-LEU) JAPAN
SNF ID #: 552
Fuel Units & Descr: 99 - ASSEMBLY
Heavy Metal Mass: BOL=94 05kg EOL=84.645kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: HFBR (Heavy Water, Alum , 10 to 20% U)
[2]Template Burnup(MWd): 15
Template BOL Heavy Metal Mass (MT): 0 00034251
Template Decay Time: 20 years

Estimated Canister usage, 18"x10'
4 13

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8 5333E-10	8,939 12	17,878.25	0 00E+00	7 63E-06	1 53E-05	Avg MeV	
Am-241	2 2753E-02	8,939 12	17,878.25	0 00E+00	2 03E+02	4 07E+02	0 0150	1 812E+15
Am-242m	8 9133E-06	8,939 12	17,878.25	0 00E+00	7 97E-02	1 59E-01	0 0250	3 763E+14
Am-243	6 4007E-06	8,939 12	17,878.25	0 00E+00	5 72E-02	1.14E-01	0 0375	3 306E+14
C-14	2 9620E-08	8,939 12	17,878 25	0 00E+00	2 65E-04	5.30E-04	0 0575	3 561E+14
Cl-36	5 9513E-35	8,939 12	17,878 25	0 00E+00	5 32E-31	1.06E-30	0 0850	2 120E+14
Cm-243	2 2087E-06	8,939 12	17,878 25	0 00E+00	1 97E-02	3 95E-02	0 1250	1 427E+14
Cm-244	1 1007E-04	8,939 12	17,878 25	0 00E+00	9 84E-01	1 97E+00	0 2250	1 827E+14
Co-60	1 6340E-05	8,939 12	17,878 25	0 00E+00	1 46E-01	2 92E-01	0 3750	7 952E+13
Cs-134	2 1353E-03	8,939 12	17,878 25	0 00E+00	1 91E+01	3 82E+01	0 5750	1 349E+15
Cs-135	4 8607E-06	8,939 12	17,878 25	0 00E+00	4 35E-02	8 69E-02	0 8500	2 062E+13
Cs-137	2 0227E+00	8,939 12	17,878 25	0 00E+00	1 81E+04	3 62E+04	1.2500	1 162E+13
Eu-154	2.0887E-02	8,939 12	17,878.25	0 00E+00	1 87E+02	3 73E+02	1 7500	5 482E+11
Eu-155	4.0867E-03	8,939 12	17,878.25	0 00E+00	3 65E+01	7 31E+01	2.2500	5 141E+07
Fe-55	1 4167E-03	8,939.12	17,878.25	0 00E+00	1.27E+01	2 53E+01	2 7500	6 084E+06
H-3	4 6653E-03	8,939.12	17,878.25	0 00E+00	4.17E+01	8 34E+01	3.5000	2 465E+05
I-129	7 1600E-07	8,939 12	17,878.25	0 00E+00	6 40E-03	1 28E-02	5 0000	3 744E+04
Kr-85	1 0240E-01	8,939 12	17,878.25	0 00E+00	9.15E+02	1 83E+03	7 0000	4.237E+03
Np-237	3 7227E-06	8,939 12	17,878.25	0 00E+00	3 33E-02	6 66E-02	11 0000	4 821E+02
Pa-231	2 6727E-09	8,939 12	17,878.25	0 00E+00	2.39E-05	4 78E-05		
Pb-210	4 3313E-14	8,939 12	17,878.25	0 00E+00	3.87E-10	7 74E-10		
Pm-147	4 6307E-02	8,939 12	17,878 25	0 00E+00	4 14E+02	8.28E+02		
Pu-238	5 5273E-03	8,939 12	17,878 25	0 00E+00	4 94E+01	9 88E+01		
Pu-239	1 0313E-02	8,939 12	17,878 25	0 00E+00	9 22E+01	1 84E+02		
Pu-240	5 4180E-03	8,939 12	17,878 25	0 00E+00	4 84E+01	9 69E+01		
Pu-241	3 7573E-01	8,939 12	17,878 25	0 00E+00	3 36E+03	6 72E+03		
Pu-242	3 0713E-06	8,939 12	17,878 25	0 00E+00	2 75E-02	5 49E-02		
Ra-226	2 3807E-13	8,939 12	17,878.25	0 00E+00	2 13E-09	4.26E-09		
Ra-228	1 0607E-14	8,939.12	17,878.25	0 00E+00	9 48E-11	1 90E-10		
Ru-106	8.4800E-06	8,939.12	17,878 25	0 00E+00	7 58E-02	1 52E-01		
Se-79	1.2533E-05	8,939.12	17,878.25	0 00E+00	1 12E-01	2 24E-01		
Sn-126	1 1393E-05	8,939.12	17,878.25	0 00E+00	1 02E-01	2 04E-01		
Sr-90	1 8400E+00	8,939 12	17,878 25	0 00E+00	1 64E+04	3 29E+04		
Tc-99	4 3533E-04	8,939 12	17,878.25	0 00E+00	3 89E+00	7 78E+00		
Th-229	5 8947E-13	8,939 12	17,878.25	0 00E+00	5.27E-09	1 05E-08		
Th-230	5 9500E-11	8,939 12	17,878 25	0 00E+00	5 32E-07	1 06E-06		
Th-232	1 6360E-14	8,939 12	17,878 25	0 00E+00	1.46E-10	2 92E-10		
Tl-208	7 6000E-09	8,939 12	17,878 25	0 00E+00	6.79E-05	1 36E-04		
U-232	2 0747E-08	8,939 12	17,878 25	0 00E+00	1.85E-04	3 71E-04		
U-233	4 4013E-10	8,939 12	17,878 25	0 00E+00	3 93E-06	7 87E-06		
U-234	4 6500E-07	8,939 12	17,878 25	0 00E+00	4 16E-03	8.31E-03		
U-235	-2 5335E-06	8,939 12	0 00	4 06E-02	1 80E-02	4 06E-02		
U-236	1.3000E-05	8,939 12	17,878 25	0 00E+00	1 16E-01	2.32E-01		
U-238	-1 4207E-08	8,939.12	0 00	2 53E-02	2 52E-02	2.53E-02		
Y-90	1 8400E+00	8,939.12	17,878.25	0 00E+00	1 64E+04	3.29E+04		
Other Radionuclides					1 72E+04	3 44E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.14E+02	4.28E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	HEAVY WATER	HEAVY WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20	10 to 20

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		8 939 12
Bounding		17 878.25

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	2 17	
Bounding	4 34	

Estimated EOL HM/Given EOL HM: 1 02

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

Estimated Canister usage: 18"x10' = 0.38

I. Fuel and Template Information

Fuel Name: FRR MTR-C (UALX-LEU) PORTUGAL
SNF ID #: 540
Fuel Units & Descr: 9 - ASSEMBLY
Heavy Metal Mass: BOL=4.05kg EOL=3.912kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100% U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6.6313E-10	130.40	260.81	0.00E+00	8.65E-08	1.73E-07
Am-241	2.0060E-03	130.40	260.81	0.00E+00	2.62E-01	5.23E-01
Am-242m	4.2429E-07	130.40	260.81	0.00E+00	5.53E-05	1.11E-04
Am-243	1.4899E-06	130.40	260.81	0.00E+00	1.94E-04	3.89E-04
C-14	5.7135E-09	130.40	260.81	0.00E+00	7.45E-07	1.49E-06
Cl-36	1.3124E-32	130.40	260.81	0.00E+00	1.71E-30	3.42E-30
Cm-243	1.6443E-07	130.40	260.81	0.00E+00	2.14E-05	4.29E-05
Cm-244	2.9330E-05	130.40	260.81	0.00E+00	3.82E-03	7.65E-03
Co-60	5.3186E-06	130.40	260.81	0.00E+00	6.94E-04	1.39E-03
Cs-134	3.1563E-03	130.40	260.81	0.00E+00	4.12E-01	8.23E-01
Cs-135	3.4477E-06	130.40	260.81	0.00E+00	4.50E-04	8.99E-04
Cs-137	2.0313E+00	130.40	260.81	0.00E+00	2.65E+02	5.30E+02
Eu-154	2.4513E-02	130.40	260.81	0.00E+00	3.20E+00	6.39E+00
Eu-155	4.8175E-03	130.40	260.81	0.00E+00	6.28E-01	1.26E+00
Fe-55	1.2397E-04	130.40	260.81	0.00E+00	1.62E-02	3.23E-02
H-3	4.5697E-03	130.40	260.81	0.00E+00	5.96E-01	1.19E+00
I-129	7.5300E-07	130.40	260.81	0.00E+00	9.82E-05	1.96E-04
Kr-85	1.0850E-01	130.40	260.81	0.00E+00	1.41E+01	2.83E+01
Np-237	9.5561E-06	130.40	260.81	0.00E+00	1.25E-03	2.49E-03
Pa-231	2.0359E-09	130.40	260.81	0.00E+00	2.65E-07	5.31E-07
Pb-210	4.9728E-11	130.40	260.81	0.00E+00	6.48E-09	1.30E-08
Pm-147	4.8502E-02	130.40	260.81	0.00E+00	6.32E+00	1.26E+01
Pu-238	1.8254E-02	130.40	260.81	0.00E+00	2.38E+00	4.76E+00
Pu-239	4.2810E-04	130.40	260.81	0.00E+00	5.58E-02	1.12E-01
Pu-240	2.4368E-04	130.40	260.81	0.00E+00	3.18E-02	6.36E-02
Pu-241	3.3415E-02	130.40	260.81	0.00E+00	4.36E+00	8.71E+00
Pu-242	3.6329E-07	130.40	260.81	0.00E+00	4.74E-05	9.47E-05
Ra-226	2.2854E-10	130.40	260.81	0.00E+00	2.98E-08	5.96E-08
Ra-228	1.2426E-14	130.40	260.81	0.00E+00	1.62E-12	3.24E-12
Ru-106	6.3589E-06	130.40	260.81	0.00E+00	8.29E-04	1.66E-03
Se-79	1.2933E-05	130.40	260.81	0.00E+00	1.69E-03	3.37E-03
Sn-126	1.1574E-05	130.40	260.81	0.00E+00	1.51E-03	3.02E-03
Sr-90	1.9248E+00	130.40	260.81	0.00E+00	2.51E+02	5.02E+02
Tc-99	4.2239E-04	130.40	260.81	0.00E+00	5.51E-02	1.10E-01
Th-229	5.0953E-12	130.40	260.81	0.00E+00	6.64E-10	1.33E-09
Th-230	4.1885E-08	130.40	260.81	0.00E+00	5.46E-06	1.09E-05
Th-232	1.9270E-14	130.40	260.81	0.00E+00	2.51E-12	5.03E-12
Tl-208	4.6024E-08	130.40	260.81	0.00E+00	6.00E-06	1.20E-05
U-232	1.2582E-07	130.40	260.81	0.00E+00	1.64E-05	3.28E-05
U-233	2.5825E-09	130.40	260.81	0.00E+00	3.37E-07	6.74E-07
U-234	1.8450E-04	130.40	260.81	0.00E+00	2.41E-02	4.81E-02
U-235	-2.7235E-06	130.40	0.00	1.75E-03	1.40E-03	1.75E-03
U-236	1.5493E-05	130.40	260.81	0.00E+00	2.02E-03	4.04E-03
U-238	-4.2851E-09	130.40	0.00	1.09E-03	1.09E-03	1.09E-03
Y-90	1.9254E+00	130.40	260.81	0.00E+00	2.51E+02	5.02E+02
Other Radionuclides					2.52E+02	5.04E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	2.753E+13
0.0250	5.725E+12
0.0375	4.993E+12
0.0575	5.348E+12
0.0850	3.232E+12
0.1250	2.187E+12
0.2250	2.789E+12
0.3750	1.214E+12
0.5750	1.980E+13
0.8500	3.348E+11
1.2500	1.912E+11
1.7500	8.774E+09
2.2500	7.696E+05
2.7500	4.351E+05
3.5000	2.005E+03
5.0000	1.155E+02
7.0000	1.276E+01
11.0000	1.431E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.11E+00	6.22E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20.00000132	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons
This fuel matches on all parameters except enrichment.

Burnup Summary (MWd)[1]

	From SFD	Estimated	Basis for burnup used in estimate.
Nominal		130.40	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		260.81	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.10	
Bounding	0.20	

Estimated EOL HM/Given EOL HM: 1.00

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C1 (UALX-HEU) SWITZERLAND
SNF ID #: 656
Fuel Units & Descr: 7 - MTR TYPE
Heavy Metal Mass: BOL=1.28kg, EOL=0.518kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water Alum 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10' = 0.29

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6.6313E-10	721.25	1,211.81	0.00E+00	4.78E-07	8.04E-07
Am-241	2.0060E-03	721.25	1,211.81	0.00E+00	1.45E+00	2.43E+00
Am-242m	4.2429E-07	721.25	1,211.81	0.00E+00	3.06E-04	5.14E-04
Am-243	1.4899E-06	721.25	1,211.81	0.00E+00	1.07E-03	1.81E-03
C-14	5.7135E-09	721.25	1,211.81	0.00E+00	4.12E-06	6.92E-06
Cl-36	1.3124E-32	721.25	1,211.81	0.00E+00	9.47E-30	1.59E-29
Cm-243	1.6443E-07	721.25	1,211.81	0.00E+00	1.19E-04	1.99E-04
Cm-244	2.9330E-05	721.25	1,211.81	0.00E+00	2.12E-02	3.55E-02
Co-60	5.3186E-06	721.25	1,211.81	0.00E+00	3.84E-03	6.45E-03
Cs-134	3.1563E-03	721.25	1,211.81	0.00E+00	2.28E+00	3.82E+00
Cs-135	3.4477E-06	721.25	1,211.81	0.00E+00	2.49E-03	4.18E-03
Cs-137	2.0313E+00	721.25	1,211.81	0.00E+00	1.47E+03	2.46E+03
Eu-154	2.4513E-02	721.25	1,211.81	0.00E+00	1.77E+01	2.97E+01
Eu-155	4.8175E-03	721.25	1,211.81	0.00E+00	3.47E+00	5.84E+00
Fe-55	1.2397E-04	721.25	1,211.81	0.00E+00	8.94E-02	1.50E-01
H-3	4.5697E-03	721.25	1,211.81	0.00E+00	3.30E+00	5.54E+00
I-129	7.5300E-07	721.25	1,211.81	0.00E+00	5.43E-04	9.12E-04
Kr-85	1.0850E-01	721.25	1,211.81	0.00E+00	7.83E+01	1.31E+02
Np-237	9.5561E-06	721.25	1,211.81	0.00E+00	6.89E-03	1.16E-02
Pa-231	2.0359E-09	721.25	1,211.81	0.00E+00	1.47E-06	2.47E-06
Pb-210	4.9728E-11	721.25	1,211.81	0.00E+00	3.59E-08	6.03E-08
Pm-147	4.8502E-02	721.25	1,211.81	0.00E+00	3.50E+01	5.88E+01
Pu-238	1.8254E-02	721.25	1,211.81	0.00E+00	1.32E+01	2.21E+01
Pu-239	4.2810E-04	721.25	1,211.81	0.00E+00	3.09E-01	5.19E-01
Pu-240	2.4368E-04	721.25	1,211.81	0.00E+00	1.76E-01	2.95E-01
Pu-241	3.3415E-02	721.25	1,211.81	0.00E+00	2.41E+01	4.05E+01
Pu-242	3.6329E-07	721.25	1,211.81	0.00E+00	2.62E-04	4.40E-04
Ra-226	2.2854E-10	721.25	1,211.81	0.00E+00	1.65E-07	2.77E-07
Ra-228	1.2426E-14	721.25	1,211.81	0.00E+00	8.96E-12	1.51E-11
Ru-106	6.3589E-06	721.25	1,211.81	0.00E+00	4.59E-03	7.71E-03
Se-79	1.2933E-05	721.25	1,211.81	0.00E+00	9.33E-03	1.57E-02
Sn-126	1.1574E-05	721.25	1,211.81	0.00E+00	8.35E-03	1.40E-02
Sr-90	1.9248E+00	721.25	1,211.81	0.00E+00	1.39E+03	2.33E+03
Tc-99	4.2239E-04	721.25	1,211.81	0.00E+00	3.05E-01	5.12E-01
Th-229	5.0953E-12	721.25	1,211.81	0.00E+00	3.67E-09	6.17E-09
Th-230	4.1885E-08	721.25	1,211.81	0.00E+00	3.02E-05	5.08E-05
Th-232	1.9270E-14	721.25	1,211.81	0.00E+00	1.39E-11	2.34E-11
Tl-208	4.6024E-08	721.25	1,211.81	0.00E+00	3.32E-05	5.58E-05
U-232	1.2582E-07	721.25	1,211.81	0.00E+00	9.07E-05	1.52E-04
U-233	2.5825E-09	721.25	1,211.81	0.00E+00	1.86E-06	3.13E-06
U-234	1.8450E-04	721.25	1,211.81	0.00E+00	1.33E-01	2.24E-01
U-235	-2.7235E-06	721.25	0.00	2.57E-03	6.07E-04	2.57E-03
U-236	1.5493E-05	721.25	1,211.81	0.00E+00	1.12E-02	1.88E-02
U-238	-4.2851E-09	721.25	0.00	3.01E-05	2.70E-05	3.01E-05
Y-90	1.9254E+00	721.25	1,211.81	0.00E+00	1.39E+03	2.33E+03
Other Radionuclides					1.39E+03	2.34E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0.0150	1.279E+14
0.0250	2.660E+13
0.0375	2.320E+13
0.0575	2.485E+13
0.0850	1.502E+13
0.1250	1.016E+13
0.2250	1.296E+13
0.3750	5.640E+12
0.5750	9.200E+13
0.8500	1.555E+12
1.2500	8.882E+11
1.7500	4.076E+10
2.2500	3.576E+06
2.7500	2.022E+06
3.5000	9.287E+03
5.0000	5.250E+02
7.0000	5.796E+01
11.0000	6.496E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.72E+01	2.89E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	92.9999987	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		721.25
Bounding		1,211.81

Basis for burnup used in estimate:
Nominal burnup calculated from the heavy metal mass destroyed.
Bounding burnup calculated assuming all BOL heavy metal burned.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.79	
Bounding	3.01	

Estimated EOL HM/Given EOL HM: 1.09

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C2 (U3Si2 LEU) TURKEY
SNF ID #: 527
Fuel Units & Descr: 9 - ASSEMBLY
Heavy Metal Mass: BOL=13 95kg EOL=12.276kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage 18"x10'
0 38

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	1,585.31	3,170 62	0 00E+00	1 05E-06	2 10E-06
Am-241	2 0060E-03	1,585.31	3,170 62	0 00E+00	3 18E+00	6 36E+00
Am-242m	4.2429E-07	1,585.31	3,170 62	0 00E+00	6.73E-04	1 35E-03
Am-243	1 4899E-06	1,585 31	3,170 62	0 00E+00	2.36E-03	4 72E-03
C-14	5 7135E-09	1,585 31	3,170 62	0 00E+00	9 06E-06	1 81E-05
Cl-36	1 3124E-32	1,585 31	3,170 62	0 00E+00	2 08E-29	4.16E-29
Cm-243	1 6443E-07	1,585 31	3,170 62	0 00E+00	2 61E-04	5.21E-04
Cm-244	2 9330E-05	1,585 31	3,170 62	0 00E+00	4 65E-02	9.30E-02
Co-60	5 3186E-06	1,585 31	3,170 62	0 00E+00	8 43E-03	1 69E-02
Cs-134	3 1563E-03	1,585 31	3,170 62	0 00E+00	5 00E+00	1.00E+01
Cs-135	3 4477E-06	1,585 31	3,170 62	0 00E+00	5 47E-03	1 09E-02
Cs-137	2 0313E+00	1,585 31	3,170 62	0 00E+00	3 22E+03	6 44E+03
Eu-154	2 4513E-02	1,585 31	3,170 62	0 00E+00	3 89E+01	7 77E+01
Eu-155	4 8175E-03	1,585 31	3,170 62	0 00E+00	7 64E+00	1 53E+01
Fe-55	1.2397E-04	1,585 31	3,170 62	0 00E+00	1 97E-01	3 93E-01
H-3	4 5697E-03	1,585.31	3,170 62	0 00E+00	7 24E+00	1 45E+01
I-129	7.5300E-07	1,585.31	3,170 62	0 00E+00	1.19E-03	2.39E-03
Kr-85	1 0850E-01	1,585.31	3,170 62	0 00E+00	1 72E+02	3 44E+02
Np-237	9 5561E-06	1,585.31	3,170 62	0 00E+00	1.51E-02	3 03E-02
Pa-231	2 0359E-09	1,585 31	3,170 62	0 00E+00	3 23E-06	6 46E-06
Pb-210	4 9728E-11	1,585 31	3,170 62	0 00E+00	7 88E-08	1 58E-07
Pm-147	4 8502E-02	1,585 31	3,170 62	0 00E+00	7.69E+01	1.54E+02
Pu-238	1 8254E-02	1,585 31	3,170 62	0 00E+00	2.89E+01	5 79E+01
Pu-239	4.2810E-04	1,585 31	3,170 62	0 00E+00	6 79E-01	1.36E+00
Pu-240	2 4368E-04	1,585 31	3,170.62	0 00E+00	3 86E-01	7 73E-01
Pu-241	3 3415E-02	1,585 31	3,170 62	0 00E+00	5 30E+01	1 06E+02
Pu-242	3 6329E-07	1,585 31	3,170 62	0 00E+00	5 76E-04	1.15E-03
Ra-226	2.2854E-10	1,585 31	3,170 62	0 00E+00	3 62E-07	7.25E-07
Ra-228	1.2426E-14	1,585.31	3,170 62	0 00E+00	1 97E-11	3 94E-11
Ru-106	6.3589E-06	1,585.31	3,170 62	0.00E+00	1.01E-02	2.02E-02
Se-79	1.2933E-05	1,585 31	3,170 62	0 00E+00	2 05E-02	4 10E-02
Sn-126	1 1574E-05	1,585.31	3,170 62	0 00E+00	1.83E-02	3 67E-02
Sr-90	1 9248E+00	1,585.31	3,170 62	0 00E+00	3 05E+03	6 10E+03
Tc-99	4 2239E-04	1,585.31	3,170 62	0 00E+00	6 70E-01	1.34E+00
Th-229	5 0953E-12	1,585.31	3,170 62	0 00E+00	8 08E-09	1 62E-08
Th-230	4 1885E-08	1,585.31	3,170 62	0 00E+00	6 64E-05	1 33E-04
Th-232	1 9270E-14	1,585 31	3,170 62	0 00E+00	3 05E-11	6 11E-11
Tl-208	4 6024E-08	1,585 31	3,170 62	0 00E+00	7.30E-05	1 46E-04
U-232	1.2582E-07	1,585 31	3,170 62	0 00E+00	1 99E-04	3 99E-04
U-233	2.5825E-09	1,585 31	3 170 62	0 00E+00	4 09E-06	8.19E-06
U-234	1.8450E-04	1,585 31	3,170 62	0 00E+00	2 92E-01	5.85E-01
U-235	-2 7235E-06	1,585 31	0 00	6 03E-03	1 71E-03	6 03E-03
U-236	1.5493E-05	1,585 31	3,170 62	0 00E+00	2 46E-02	4 91E-02
U-238	-4 2851E-09	1,585 31	0 00	3.75E-03	3 74E-03	3 75E-03
Y-90	1 9254E+00	1,585 31	3,170 62	0 00E+00	3 05E+03	6 10E+03
Other Radionuclides					3 07E+03	6 13E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 347E+14
0 0250	6 960E+13
0 0375	6 070E+13
0 0575	6.502E+13
0 0850	3.929E+13
0 1250	2.659E+13
0.2250	3.390E+13
0 3750	1.476E+13
0.5750	2.407E+14
0.8500	4 070E+12
1.2500	2.324E+12
1 7500	1 067E+11
2.2500	9 356E+06
2 7500	5.289E+06
3.5000	2.432E+04
5 0000	1.382E+03
7 0000	1.526E+02
11 0000	1.711E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 78E+01	7.56E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	20 00000077	60 to 100

Basis for Parameter Differences
This Template was used for the following reasons
This fuel matches on all parameters except enrichment.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		1,585.31
Bounding		3 170 62

Basis for burnup used in estimate
Nominal burnup calculated from the heavy metal mass destroyed
Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.36	
Bounding	0 72	

Estimated EOL HM/Given EOL HM: 1 01

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C2 (UALX-HEU) SWITZERLAND
SNF ID #: 657
Fuel Units & Descr: 11 - MTR TYPE
Heavy Metal Mass: BOL=2 461kg, EOL=0 995kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT) 0 00116689
Template Decay Time: 20 years

Estimated Canister usage:

18"x10'
0 46

II. Estimates

	m	x_n	x_b	b	y_n	y_b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6 6313E-10	1,387 57	2,330 33	0 00E+00	9.20E-07	1 55E-06	Avg. MeV	
Am-241	2 0060E-03	1,387 57	2,330 33	0 00E+00	2 78E+00	4 67E+00	0.0150	2 460E+14
Am-242m	4.2429E-07	1,387 57	2,330 33	0 00E+00	5 89E-04	9 89E-04	0.0250	5 115E+13
Am-243	1 4899E-06	1,387 57	2,330 33	0 00E+00	2 07E-03	3 47E-03	0 0375	4 462E+13
C-14	5 7135E-09	1,387 57	2,330 33	0 00E+00	7 93E-06	1 33E-05	0.0575	4 779E+13
Cl-36	1 3124E-32	1,387 57	2,330 33	0 00E+00	1 82E-29	3 06E-29	0 0850	2.888E+13
Cm-243	1 6443E-07	1,387 57	2,330 33	0 00E+00	2 28E-04	3 83E-04	0 1250	1 954E+13
Cm-244	2 9330E-05	1,387 57	2,330 33	0 00E+00	4 07E-02	6 83E-02	0.2250	2 492E+13
Co-60	5 3186E-06	1,387 57	2,330 33	0 00E+00	7 38E-03	1 24E-02	0.3750	1.085E+13
Cs-134	3 1563E-03	1,387 57	2,330 33	0 00E+00	4 38E+00	7 36E+00	0.5750	1 769E+14
Cs-135	3 4477E-06	1,387.57	2,330 33	0 00E+00	4 78E-03	8 03E-03	0 8500	2 991E+12
Cs-137	2 0313E+00	1,387 57	2,330 33	0 00E+00	2 82E+03	4 73E+03	1.2500	1 708E+12
Eu-154	2 4513E-02	1,387 57	2,330 33	0 00E+00	3 40E+01	5 71E+01	1 7500	7.839E+10
Eu-155	4 8175E-03	1,387 57	2,330 33	0 00E+00	6 68E+00	1.12E+01	2.2500	6.877E+06
Fe-55	1 2397E-04	1,387.57	2,330 33	0 00E+00	1 72E-01	2 89E-01	2.7500	3.888E+06
H-3	4 5697E-03	1,387.57	2,330 33	0 00E+00	6 34E+00	1 06E+01	3.5000	1 786E+04
I-129	7 5300E-07	1,387 57	2,330 33	0 00E+00	1 04E-03	1 75E-03	5 0000	1 010E+03
Kr-85	1 0850E-01	1,387.57	2,330.33	0 00E+00	1 51E+02	2 53E+02	7 0000	1 115E+02
Np-237	9 5561E-06	1,387.57	2,330.33	0 00E+00	1 33E-02	2.23E-02	11 0000	1.249E+01
Pa-231	2 0359E-09	1,387.57	2,330.33	0 00E+00	2 83E-06	4 74E-06		
Pb-210	4 9728E-11	1,387.57	2,330.33	0 00E+00	6 90E-08	1 16E-07		
Pm-147	4 8502E-02	1,387 57	2,330.33	0 00E+00	6.73E+01	1 13E+02		
Pu-238	1 8254E-02	1,387 57	2,330 33	0 00E+00	2 53E+01	4.25E+01		
Pu-239	4.2810E-04	1,387 57	2,330 33	0 00E+00	5 94E-01	9 98E-01		
Pu-240	2.4368E-04	1,387 57	2,330 33	0 00E+00	3.38E-01	5 68E-01		
Pu-241	3.3415E-02	1,387 57	2,330 33	0 00E+00	4 64E+01	7 79E+01		
Pu-242	3 6329E-07	1,387 57	2,330 33	0 00E+00	5 04E-04	8.47E-04		
Ra-226	2.2854E-10	1,387 57	2,330 33	0 00E+00	3.17E-07	5 33E-07		
Ra-228	1.2426E-14	1,387 57	2,330 33	0 00E+00	1 72E-11	2 90E-11		
Ru-106	6.3589E-06	1,387 57	2,330 33	0 00E+00	8 82E-03	1 48E-02		
Se-79	1.2933E-05	1,387 57	2,330 33	0 00E+00	1 79E-02	3 01E-02		
Sn-126	1.1574E-05	1,387 57	2,330 33	0 00E+00	1 61E-02	2.70E-02		
Sr-90	1 9248E+00	1,387 57	2,330 33	0 00E+00	2 67E+03	4 49E+03		
Tc-99	4.2239E-04	1,387 57	2,330 33	0 00E+00	5 86E-01	9 84E-01		
Th-229	5 0953E-12	1,387 57	2,330 33	0 00E+00	7 07E-09	1 19E-08		
Th-230	4 1885E-08	1,387 57	2,330 33	0 00E+00	5 81E-05	9 76E-05		
Th-232	1 9270E-14	1,387 57	2,330 33	0 00E+00	2 67E-11	4 49E-11		
Tl-208	4 6024E-08	1,387 57	2,330 33	0 00E+00	6 39E-05	1 07E-04		
U-232	1 2582E-07	1,387 57	2,330 33	0 00E+00	1 75E-04	2 93E-04		
U-233	2 5825E-09	1,387 57	2,330 33	0 00E+00	3 58E-06	6 02E-06		
U-234	1 8450E-04	1,387.57	2,330 33	0 00E+00	2 56E-01	4 30E-01		
U-235	-2.7235E-06	1,387 57	0 00	4 95E-03	1 17E-03	4 95E-03		
U-236	1 5493E-05	1,387.57	2,330 33	0 00E+00	2 15E-02	3 61E-02		
U-238	-4.2851E-09	1,387.57	0 00	5 79E-05	5 19E-05	5 79E-05		
Y-90	1 9254E+00	1,387.57	2,330.33	0 00E+00	2 67E+03	4 49E+03		
Other Radionuclides					2 68E+03	4 51E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 31E+01	5.56E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	93 00001006	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		1 387 57	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		2,330.33	Bounding burnup calculated assuming all BOL heavy metal burned.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 79	
Bounding	3.01	

Estimated EOL HM/Given EOL HM: 1 09

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-O (UALX-HEU) TURKEY
SNF ID #: 642
Fuel Units & Descr.: 2 - MTR TYPE
Heavy Metal Mass: BOL=0.366kg EOL=0 196kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100% U)
[2]Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10" = 0 08

II. Estimates

Radionuclide	m: Ci/MWd From Template	x_n: Nominal Fuel Burnup (MWd)[2]	x_b: Bounding Fuel Burnup (MWd)[2]	b: Initial Activity (Ci)	y_n: Nominal Fuel Inventories(Ci)	y_b: Bounding Fuel Inventones(Ci)
Ac-227	6 6313E-10	160 99	321 99	0 00E+00	1 07E-07	2 14E-07
Am-241	2 0060E-03	160 99	321 99	0 00E+00	3 23E-01	6 46E-01
Am-242m	4.2429E-07	160.99	321 99	0 00E+00	6 83E-05	1 37E-04
Am-243	1.4899E-06	160 99	321 99	0 00E+00	2 40E-04	4 80E-04
C-14	5.7135E-09	160 99	321.99	0 00E+00	9.20E-07	1 84E-06
Cl-36	1.3124E-32	160 99	321.99	0 00E+00	2.11E-30	4 23E-30
Cm-243	1 6443E-07	160 99	321.99	0 00E+00	2.65E-05	5.29E-05
Cm-244	2 9330E-05	160 99	321.99	0 00E+00	4 72E-03	9 44E-03
Co-60	5 3186E-06	160 99	321 99	0 00E+00	8 56E-04	1.71E-03
Cs-134	3 1563E-03	160 99	321 99	0 00E+00	5 08E-01	1 02E+00
Cs-135	3 4477E-06	160 99	321 99	0 00E+00	5 55E-04	1.11E-03
Cs-137	2 0313E+00	160 99	321 99	0 00E+00	3.27E+02	6 54E+02
Eu-154	2 4513E-02	160 99	321 99	0 00E+00	3 95E+00	7 89E+00
Eu-155	4 8175E-03	160 99	321 99	0 00E+00	7.76E-01	1 55E+00
Fe-55	1.2397E-04	160 99	321 99	0 00E+00	2 00E-02	3 99E-02
H-3	4.5697E-03	160.99	321 99	0 00E+00	7 36E-01	1 47E+00
I-129	7.5300E-07	160.99	321 99	0 00E+00	1.21E-04	2 42E-04
Kr-85	1 0850E-01	160 99	321 99	0 00E+00	1.75E+01	3 49E+01
Np-237	9 5561E-06	160 99	321.99	0 00E+00	1.54E-03	3 08E-03
Pa-231	2 0359E-09	160 99	321.99	0 00E+00	3.28E-07	6 56E-07
Pb-210	4 9728E-11	160 99	321.99	0 00E+00	8 01E-09	1 60E-08
Pm-147	4 8502E-02	160 99	321 99	0 00E+00	7.81E+00	1.56E+01
Pu-238	1 8254E-02	160 99	321 99	0.00E+00	2 94E+00	5 88E+00
Pu-239	4 2810E-04	160 99	321 99	0 00E+00	6 89E-02	1 38E-01
Pu-240	2 4368E-04	160 99	321 99	0 00E+00	3 92E-02	7 85E-02
Pu-241	3 3415E-02	160 99	321 99	0 00E+00	5 38E+00	1 08E+01
Pu-242	3 6329E-07	160 99	321 99	0 00E+00	5 85E-05	1 17E-04
Ra-226	2.2854E-10	160 99	321 99	0 00E+00	3 68E-08	7.36E-08
Ra-228	1.2426E-14	160 99	321 99	0 00E+00	2 00E-12	4 00E-12
Ru-106	6.3589E-06	160 99	321 99	0 00E+00	1.02E-03	2 05E-03
Se-79	1.2933E-05	160.99	321 99	0 00E+00	2.08E-03	4 16E-03
Sn-126	1 1574E-05	160 99	321 99	0 00E+00	1 86E-03	3 73E-03
Sr-90	1 9248E+00	160 99	321.99	0 00E+00	3 10E+02	6.20E+02
Tc-99	4 2239E-04	160 99	321.99	0 00E+00	6 80E-02	1 36E-01
Th-229	5 0953E-12	160 99	321.99	0 00E+00	8 20E-10	1 64E-09
Th-230	4 1885E-08	160 99	321.99	0 00E+00	6 74E-06	1 35E-05
Th-232	1 9270E-14	160 99	321 99	0 00E+00	3 10E-12	6 20E-12
Tl-208	4 6024E-08	160 99	321 99	0 00E+00	7 41E-06	1.48E-05
U-232	1.2582E-07	160 99	321 99	0 00E+00	2 03E-05	4.05E-05
U-233	2.5825E-09	160 99	321 99	0 00E+00	4.16E-07	8.32E-07
U-234	1 8450E-04	160 99	321 99	0 00E+00	2.97E-02	5 94E-02
U-235	-2 7235E-06	160 99	0.00	7 35E-04	2.96E-04	7.35E-04
U-236	1 5493E-05	160 99	321 99	0 00E+00	2 49E-03	4 99E-03
U-238	-4 2851E-09	160 99	0 00	8 60E-06	7 91E-06	8 60E-06
Y-90	1 9254E+00	160 99	321 99	0 00E+00	3 10E+02	6 20E+02
Other Radionuclides					3 11E+02	6 23E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 399E+13
0 0250	7 068E+12
0 0375	6 165E+12
0 0575	6 603E+12
0 0850	3 990E+12
0 1250	2 700E+12
0.2250	3.443E+12
0 3750	1 499E+12
0.5750	2.445E+13
0 8500	4 133E+11
1.2500	2 360E+11
1 7500	1 083E+10
2.2500	9 501E+05
2.7500	5.372E+05
3.5000	2 468E+03
5 0000	1.395E+02
7.0000	1.540E+01
11 0000	1 726E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.84E+00	7 68E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents:	U	U
BOL Enrichment %	92 9999987	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		160 99	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		321.99	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.40	
Bounding	2.80	

Estimated EOL HM/Given EOL HM: 1 05

[1]Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-O (UALX-LEU) PORTUGAL
SNF ID #: 541
Fuel Units & Descr: 3 - ASSEMBLY
Heavy Metal Mass: BOL=1.35kg; EOL=1.35kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum , 60 to 100%, U)
[2]Template Burnup(MWd): 367 2
Template BOL Heavy Metal Mass (MT): 0 00116689
Template Decay Time: 20 years

Estimated Canister usage: 18"x10" 0 13

II. Estimates

	m	x_n	x_b	b	y_n	y_b
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd)[2]	Bounding Fuel Burnup (MWd)[2]	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 6313E-10	25 57	51 14	0 00E+00	1 70E-08	3 39E-08
Am-241	2 0060E-03	25 57	51.14	0 00E+00	5 13E-02	1 03E-01
Am-242m	4.2429E-07	25 57	51 14	0 00E+00	1 08E-05	2 17E-05
Am-243	1 4899E-06	25 57	51 14	0 00E+00	3 81E-05	7 62E-05
C-14	5 7135E-09	25 57	51 14	0 00E+00	1 46E-07	2 92E-07
Cl-36	1 3124E-32	25 57	51 14	0 00E+00	3 36E-31	6 71E-31
Cm-243	1 6443E-07	25 57	51 14	0 00E+00	4 20E-06	8 41E-06
Cm-244	2 9330E-05	25 57	51 14	0 00E+00	7 50E-04	1 50E-03
Co-60	5 3186E-06	25 57	51 14	0 00E+00	1 36E-04	2 72E-04
Cs-134	3 1563E-03	25 57	51 14	0 00E+00	8 07E-02	1 61E-01
Cs-135	3 4477E-06	25 57	51 14	0 00E+00	8 82E-05	1 76E-04
Cs-137	2 0313E+00	25 57	51.14	0 00E+00	5 19E+01	1 04E+02
Eu-154	2 4513E-02	25 57	51.14	0 00E+00	6.27E-01	1.25E+00
Eu-155	4 8175E-03	25 57	51.14	0 00E+00	1.23E-01	2 46E-01
Fe-55	1.2397E-04	25 57	51.14	0 00E+00	3 17E-03	6 34E-03
H-3	4 5697E-03	25 57	51 14	0 00E+00	1.17E-01	2.34E-01
I-129	7 5300E-07	25 57	51 14	0 00E+00	1 93E-05	3 85E-05
Kr-85	1 0850E-01	25 57	51 14	0 00E+00	2 77E+00	5.55E+00
Np-237	9 5561E-06	25 57	51 14	0 00E+00	2.44E-04	4 89E-04
Pa-231	2.0359E-09	25.57	51 14	0 00E+00	5.21E-08	1.04E-07
Pb-210	4 9728E-11	25 57	51 14	0 00E+00	1.27E-09	2.54E-09
Pm-147	4 8502E-02	25 57	51 14	0 00E+00	1.24E+00	2 48E+00
Pu-238	1 8254E-02	25 57	51 14	0 00E+00	4 67E-01	9.34E-01
Pu-239	4.2810E-04	25 57	51 14	0 00E+00	1 09E-02	2.19E-02
Pu-240	2 4368E-04	25 57	51 14	0 00E+00	6.23E-03	1.25E-02
Pu-241	3 3415E-02	25 57	51 14	0 00E+00	8 54E-01	1 71E+00
Pu-242	3 6329E-07	25 57	51 14	0 00E+00	9 29E-06	1 86E-05
Ra-226	2.2854E-10	25 57	51 14	0 00E+00	5 84E-09	1 17E-08
Ra-228	1.2426E-14	25 57	51 14	0 00E+00	3 18E-13	6 35E-13
Ru-106	6 3589E-06	25 57	51 14	0 00E+00	1 63E-04	3 25E-04
Se-79	1 2933E-05	25 57	51 14	0 00E+00	3 31E-04	6 61E-04
Sn-126	1 1574E-05	25 57	51.14	0 00E+00	2 96E-04	5 92E-04
Sr-90	1 9248E+00	25 57	51.14	0 00E+00	4 92E+01	9 84E+01
Tc-99	4 2239E-04	25 57	51.14	0 00E+00	1 08E-02	2 16E-02
Th-229	5 0953E-12	25.57	51 14	0 00E+00	1 30E-10	2 61E-10
Th-230	4 1885E-08	25 57	51 14	0 00E+00	1 07E-06	2 14E-06
Th-232	1 9270E-14	25 57	51 14	0 00E+00	4 93E-13	9 85E-13
Tl-208	4 6024E-08	25 57	51 14	0 00E+00	1 18E-06	2 35E-06
U-232	1 2582E-07	25 57	51.14	0 00E+00	3.22E-06	6 43E-06
U-233	2 5825E-09	25 57	51 14	0 00E+00	6 60E-08	1 32E-07
U-234	1 8450E-04	25 57	51 14	0 00E+00	4 72E-03	9 44E-03
U-235	-2 7235E-06	25.57	0 00	5 83E-04	5 14E-04	5 83E-04
U-236	1 5493E-05	25 57	51 14	0 00E+00	3.96E-04	7 92E-04
U-238	-4 2851E-09	25 57	0 00	3 63E-04	3 63E-04	3 63E-04
Y-90	1.9254E+00	25 57	51 14	0.00E+00	4 92E+01	9 85E+01
Other Radionuclides					4 95E+01	9 89E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	5 398E+12
0 0250	1 123E+12
0 0375	9 791E+11
0 0575	1 049E+12
0 0850	6.337E+11
0 1250	4.288E+11
0.2250	5.468E+11
0 3750	2.380E+11
0 5750	3 883E+12
0.8500	6 564E+10
1.2500	3 748E+10
1 7500	1 720E+09
2.2500	1.509E+05
2 7500	8.532E+04
3.5000	3.938E+02
5.0000	2.299E+01
7 0000	2.542E+00
11 0000	2.852E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6 10E-01	1.22E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding:	ALUM	ALUM
BOL HM Constituents:	U	U
BOL Enrichment %:	20 00000132	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons.
This fuel matches on all parameters except enrichment.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		25 57
Bounding		51 14

Basis for burnup used in estimate:
Nominal burnup assumed to be 2% of BOL heavy metal mass.
Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 06	
Bounding	0 12	

Estimated EOL HM/Given EOL HM: 0 98

[1]Reactor shutdown, core removal, storage shipping or other date confirming that irradiation ceased for fuel.

[2]Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).