Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name FRR MTR-S (U308-LEU) INDONESIA
SNF ID # 502
Fuel Units & Descr 142 - ASSEMBLY
Heavy Metal Mass: BOL=177.5kg EOL=159 75kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 5 years

Estimated Canister usage 18"x10'
5 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	1 4545E-10	16,809 59	33,619 19	0 00E+00	2 44E-06	4 89E-06
Am-241	1 1190E-03	16,809 59	33,619 19	0.00E+00	1 88E+01	3 76E+01
Am-242m	4 5425E-07	16,809 59	33,619 19	0 00E+00	7 64E-03	1.53E-02
Am-243	1 4921E-06	16,809.59	33,619 19	0 00E+00	2 51E-02	5.02E-02
C-14	5 7244E-09	16,809.59	33,619 19	0 00E+00	9 62E-05	1.92E-04
Cl-36	1.3124E-32	16,809 59	33,619 19	0 00E+00	2.21E-28	4 41E-28
Cm-243	2.3676E-07	16,809 59	33,619 19	0 00E+00	3 98E-03	7.96E-03
Cm-244	5.2042E-05	16,809 59	33,619 19	0 00E+00	8.75E-01	1 75E+00
Co-60	3 8208E-05	16,809 59	33 619 19	0 00E+00	6 42E-01	1.28E+00
Cs-134	4 8693E-01	16,809 59	33,619 19	0 00E+00	8 19E+03	1 64E+04
Cs-135	3 4477E-06	16,809 59	33,619 19	0 00E+00	5 80E-02	1 16E-01
Cs-137	2 8731E+00	16,809 59	33,619 19	0 00E+00	4 83E+04	9 66E+04
Eu-154	8 2053E-02	16,809 59	33,619 19	0 00E+00	1.38E+03	2 76E+03
Eu-155	3 9134E-02	16,809 59	33,619 19	0 00E+00	6 58E+02	1.32E+03
Fe-55	6 7429E-03	16,809 59	33,619.19	0 00E+00	1 13E+02	2.27E+02
H-3	1.0599E-02	16,809 59	33,619 19	0 00E+00	1 78E+02	3 56E+02
I-129	7.5300E-07	16,809.59	33 619 19	0 00E+00	1.27E-02	2 53E-02
Kr-85	2 8595E-01	16,809 59	33,619 19	0 00E+00	4 81E+03	9 61E+03
Np-237	9 5479E-06	16,809 59	33,619 19	0 00E+00	1 60E-01	3 21E-01
Pa-231	8 9297E-10	16,809 59	33,619 19	0 00E+00	1.50E-05	3 00E-05
Pb-210	3 7609E-12	16,809 59	33 619 19	0 00E+00	6 32E-08	1.26E-07
Pm-147	2 5452E+00	16,809 59	33,619 19	0 00E+00	4.28E+04	8 56E+04
Pu-238	2 0550E-02	16,809 59	33,619 19	0 00E+00	3 45E+02	6 91E+02
Pu-239	4 2838E-04	16,809 59	33,619 19	0 00E+00	7.20E+00	1 44E+01
Pu-240	2 4401E-04	16,809 59	33,619.19	0 00E+00	4 10E+00	8.20E+00
Pu-241	6 8764E-02	16,809 59	33,619.19	0 00E+00	1 16E+03	2.31E+03
Pu-242	3 6329E-07	16,809 59	33,619 19	0 00E+00	6 11E-03	1.22E-02
Ra-226	3 8045E-11	16,809.59	33,619 19	0 00E+00	6 40E-07	1.28E-06
Ra-228	2 9902E-15	16,809 59	33,619 19	0 00E+00	5 03E-11	1 01E-10
Ru-106	1.9055E-01	16,809 59	33,619 19	0 00E+00	3.20E+03	6 41E+03
Se-79	1.2936E-05	16,809 59	33,619 19	0 00E+00	2 17E-01	4 35E-01
Sn-126	1 1574E-05	16,809 59	33,619 19	0 00E+00	1 95E-01	3 89E-01
Sr-90	2 7505E+00	16,809 59	33,619 19	0 00E+00	4 62E+04	9 25E+04
Tc-99	4.2239E-04	16,809 59	33,619 19	0 00E+00	7 10E+00	1 42E+01
Th-229	1 8848E-12	16,809 59	33,619 19	0 00E+00	3 17E-08	6.34E-08
Th-230	1 7042E-08	16,809 59	33,619 19	0 00E+00	2 86E-04	5.73E-04
Th-232	7 8132E-15	16,809 59	33,619.19	0 00E+00	1 31E-10	2 63E-10
Tl-208	4 4063E-08	16,809 59	33,619 19	0 00E+00	7 41E-04	1 48E-03
U-232	1 3151E-07	16,809 59	33,619 19	0 00E+00	2.21E-03	4 42E-03
U-233	1 9564E-09	16,809 59	33,619 19	0 00E+00	3.29E-05	6 58E-05
U-234	1 8371E-04	16,809 59	33,619 19	0 00E+00	3 09E+00	6 18E+00
U-235	-2 7235E-06	16,809 59	0 00	7 67E-02	3 09E-02	7 67E-02
U-236	1.5493E-05	16,809 59	33,619 19	0 00E+00	2 60E-01	5.21E-01
U-238	-4 2851E-09	16,809 59	0 00	4 77E-02	4 77E-02	4 77E-02
Y-90	2 7505E+00	16,809 59	33,619 19	0 00E+00	4 62E+04	9 25E+04
Other Radionuclides					8 65E+04	1 73E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6 486E+15
0 0250	1.397E+15
0 0375	1.289E+15
0 0575	1.268E+15
0 0850	8 083E+14
0 1250	7 000E+14
0.2250	6 851E+14
0 3750	3 316E+14
0 5750	4 555E+15
0 8500	6 379E+14
1.2500	1 187E+14
1 7500	4 977E+12
2.2500	1 044E+13
2.7500	6 006E+10
3.5000	6 661E+09
5 0000	2.002E+04
7 0000	2.232E+03
11 0000	2.516E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.52E+02	1 70E+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		16 809.59
Bounding		33 619 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 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-S (U308-LEU) PERU	[1]Fuel decay start date.	2010
SNF ID #.	504	Estimates as of:	2010
Fuel Units & Descr:	23 - ASSEMBLY	Template:	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass:	BOL=32.2kg, EOL=28 98kg	[2]Template Burnup(MWd).	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT):	0 00116689
		Template Decay Time:	5 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	1 4545E-10	3,049 40	6,098 80	0 00E+00	4 44E-07	8 87E-07
Am-241	1 1190E-03	3,049 40	6,098 80	0 00E+00	3 41E+00	6.82E+00
Am-242m	4 5425E-07	3,049 40	6,098 80	0 00E+00	1 39E-03	2.77E-03
Am-243	1 4921E-06	3,049 40	6,098 80	0 00E+00	4 55E-03	9 10E-03
C-14	5 7244E-09	3,049 40	6,098 80	0 00E+00	1 75E-05	3 49E-05
Cl-36	1 3124E-32	3,049 40	6,098 80	0 00E+00	4 00E-29	8 00E-29
Cm-243	2 3676E-07	3,049 40	6 098 80	0 00E+00	7 22E-04	1 44E-03
Cm-244	5 2042E-05	3,049 40	6,098 80	0 00E+00	1 59E-01	3.17E-01
Co-60	3 8208E-05	3,049 40	6,098 80	0 00E+00	1 17E-01	2.33E-01
Cs-134	4 8693E-01	3,049 40	6,098 80	0 00E+00	1 48E+03	2 97E+03
Cs-135	3 4477E-06	3,049 40	6,098 80	0 00E+00	1 05E-02	2.10E-02
Cs-137	2 8731E+00	3,049 40	6,098 80	0 00E+00	8 76E+03	1 75E+04
Eu-154	8.2053E-02	3,049 40	6,098 80	0 00E+00	2 50E+02	5 00E+02
Eu-155	3 9134E-02	3,049 40	6,098 80	0 00E+00	1 19E+02	2 39E+02
Fe-55	6 7429E-03	3,049 40	6,098 80	0 00E+00	2 06E+01	4 11E+01
H-3	1.0599E-02	3,049 40	6,098 80	0 00E+00	3.23E+01	6 46E+01
I-129	7.5300E-07	3,049 40	6,098 80	0 00E+00	2 30E-03	4 59E-03
Kr-85	2 8595E-01	3,049 40	6,098 80	0 00E+00	8.72E+02	1 74E+03
Np-237	9.5479E-06	3,049 40	6,098 80	0 00E+00	2 91E-02	5 82E-02
Pa-231	8.9297E-10	3,049 40	6,098 80	0 00E+00	2 72E-06	5 45E-06
Pb-210	3.7609E-12	3,049 40	6,098 80	0 00E+00	1 15E-08	2 29E-08
Pm-147	2 5452E+00	3,049 40	6,098.80	0 00E+00	7.76E+03	1 55E+04
Pu-238	2 0550E-02	3,049 40	6,098.80	0.00E+00	6.27E+01	1 25E+02
Pu-239	4 2838E-04	3,049 40	6,098 80	0.00E+00	1.31E+00	2 61E+00
Pu-240	2 4401E-04	3,049 40	6,098 80	0.00E+00	7 44E-01	1 49E+00
Pu-241	6 8764E-02	3,049 40	6,098 80	0 00E+00	2 10E+02	4 19E+02
Pu-242	3 6329E-07	3,049 40	6,098 80	0 00E+00	1.11E-03	2 22E-03
Ra-226	3 8045E-11	3,049 40	6,098 80	0 00E+00	1 16E-07	2 32E-07
Ra-228	2 9902E-15	3,049 40	6,098 80	0 00E+00	9 12E-12	1 82E-11
Ru-106	1 9055E-01	3,049 40	6,098 80	0 00E+00	5 81E+02	1.16E+03
Se-79	1 2936E-05	3,049 40	6,098 80	0 00E+00	3 94E-02	7 89E-02
Sn-126	1 1574E-05	3,049 40	6,098 80	0 00E+00	3 53E-02	7 06E-02
Sr-90	2 7505E+00	3,049 40	6,098 80	0 00E+00	8 39E+03	1 68E+04
Tc-99	4 2239E-04	3,049 40	6,098 80	0 00E+00	1 29E+00	2.58E+00
Th-229	1 8848E-12	3,049 40	6,098 80	0 00E+00	5 75E-09	1 15E-08
Th-230	1 7042E-08	3,049 40	6,098 80	0 00E+00	5 20E-05	1 04E-04
Th-232	7 8132E-15	3,049 40	6,098 80	0 00E+00	2 38E-11	4 77E-11
Tl-208	4 4063E-08	3,049 40	6,098 80	0 00E+00	1 34E-04	2 69E-04
U-232	1 3151E-07	3,049 40	6,098 80	0 00E+00	4 01E-04	8 02E-04
U-233	1 9564E-09	3,049 40	6,098 80	0 00E+00	5 97E-06	1.19E-05
U-234	1 8371E-04	3,049 40	6,098 80	0 00E+00	5 60E-01	1.12E+00
U-235	-2 7235E-06	3,049 40	0 00	1 14E-02	3 13E-03	1.14E-02
U-236	1 5493E-05	3,049 40	6,098 80	0 00E+00	4 72E-02	9 45E-02
U-238	-4 2851E-09	3,049 40	0 00	9 04E-03	9 03E-03	9 04E-03
Y-90	2.7505E+00	3,049 40	6,098 80	0 00E+00	8 39E+03	1 68E+04
Other Radionuclides					1 57E+04	3.14E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 177E+15
0 0250	2.535E+14
0 0375	2.339E+14
0 0575	2.300E+14
0 0850	1 466E+14
0 1250	1.270E+14
0.2250	1.243E+14
0 3750	6 016E+13
0 5750	8.263E+14
0 8500	1 157E+14
1.2500	2 153E+13
1 7500	9 028E+11
2.2500	1.894E+12
2 7500	1 089E+10
3.5000	1.208E+09
5 0000	3 633E+03
7 0000	4.050E+02
11.0000	4.566E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.55E+02	3 09E+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 %	16 42857201	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		3,049 40
Bounding		6 098 80

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-S (U3SI2 LEU) CANADA
SNF ID #: 513
Fuel Units & Descr: 35 - ASSEMBLY
Heavy Metal Mass: BOL=50 75kg EOL=45 675kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of: 2010
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 5 years

Estimated Canister usage 18"x10' 1 46

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 4545E-10	4,806 12	9,612 25	0 00E+00	6 99E-07	1 40E-06
Am-241	1 1190E-03	4,806 12	9,612 25	0 00E+00	5 38E+00	1 08E+01
Am-242m	4 5425E-07	4,806 12	9,612.25	0 00E+00	2.18E-03	4.37E-03
Am-243	1 4921E-06	4,806 12	9,612.25	0 00E+00	7.17E-03	1 43E-02
C-14	5 7244E-09	4,806 12	9,612.25	0 00E+00	2.75E-05	5.50E-05
Cl-36	1 3124E-32	4,806 12	9,612.25	0 00E+00	6.31E-29	1.26E-28
Cm-243	2 3676E-07	4,806 12	9,612.25	0 00E+00	1 14E-03	2 28E-03
Cm-244	5 2042E-05	4,806 12	9,612.25	0 00E+00	2 50E-01	5 00E-01
Co-60	3 8208E-05	4,806 12	9,612.25	0 00E+00	1 84E-01	3 67E-01
Cs-134	4 8693E-01	4,806.12	9,612.25	0 00E+00	2.34E+03	4 68E+03
Cs-135	3 4477E-06	4,806 12	9,612 25	0 00E+00	1 66E-02	3 31E-02
Cs-137	2 8731E+00	4,806 12	9,612 25	0 00E+00	1.38E+04	2 76E+04
Eu-154	8.2053E-02	4,806 12	9,612 25	0 00E+00	3 94E+02	7 89E+02
Eu-155	3 9134E-02	4,806 12	9,612 25	0 00E+00	1 88E+02	3 76E+02
Fe-55	6 7429E-03	4,806 12	9,612 25	0 00E+00	3 24E+01	6 48E+01
H-3	1 0599E-02	4,806 12	9,612 25	0 00E+00	5 09E+01	1 02E+02
I-129	7.5300E-07	4,806 12	9,612 25	0 00E+00	3 62E-03	7.24E-03
Kr-85	2 8595E-01	4,806 12	9,612.25	0 00E+00	1 37E+03	2 75E+03
Np-237	9 5479E-06	4,806 12	9,612 25	0 00E+00	4 59E-02	9 18E-02
Pa-231	8 9297E-10	4,806 12	9,612.25	0 00E+00	4.29E-06	8 58E-06
Pb-210	3 7609E-12	4,806 12	9,612.25	0 00E+00	1.81E-08	3 62E-08
Pm-147	2 5452E+00	4,806 12	9,612.25	0 00E+00	1.22E+04	2.45E+04
Pu-238	2 0550E-02	4,806 12	9,612.25	0 00E+00	9 88E+01	1 98E+02
Pu-239	4 2838E-04	4,806 12	9,612.25	0 00E+00	2.06E+00	4 12E+00
Pu-240	2 4401E-04	4,806 12	9,612.25	0 00E+00	1.17E+00	2 35E+00
Pu-241	6 8764E-02	4,806.12	9 612.25	0 00E+00	3.30E+02	6 61E+02
Pu-242	3 6329E-07	4,806.12	9,612.25	0 00E+00	1 75E-03	3 49E-03
Ra-226	3 8045E-11	4,806.12	9,612.25	0 00E+00	1 83E-07	3 66E-07
Ra-228	2.9902E-15	4,806 12	9,612 25	0 00E+00	1 44E-11	2 87E-11
Ru-106	1.9055E-01	4,806 12	9,612 25	0 00E+00	9 16E+02	1 83E+03
Se-79	1.2936E-05	4,806 12	9,612 25	0 00E+00	6 22E-02	1.24E-01
Sn-126	1.1574E-05	4,806 12	9,612 25	0 00E+00	5 56E-02	1.11E-01
Sr-90	2 7505E+00	4,806 12	9,612 25	0 00E+00	1 32E+04	2 64E+04
Tc-99	4.2239E-04	4,806 12	9,612 25	0 00E+00	2 03E+00	4 06E+00
Th-229	1 8848E-12	4,806 12	9,612.25	0 00E+00	9 06E-09	1 81E-08
Th-230	1 7042E-08	4,806 12	9,612.25	0 00E+00	8.19E-05	1 64E-04
Th-232	7 8132E-15	4,806 12	9,612.25	0 00E+00	3 76E-11	7 51E-11
Tl-208	4 4063E-08	4,806 12	9,612.25	0 00E+00	2 12E-04	4 24E-04
U-232	1 3151E-07	4,806 12	9,612.25	0 00E+00	6 32E-04	1 26E-03
U-233	1 9564E-09	4,806 12	9,612.25	0 00E+00	9 40E-06	1 88E-05
U-234	1 8371E-04	4,806 12	9,612.25	0 00E+00	8 83E-01	1 77E+00
U-235	-2.7235E-06	4,806 12	0 00	2 19E-02	8 84E-03	2 19E-02
U-236	1.5493E-05	4,806 12	9,612.25	0 00E+00	7 45E-02	1 49E-01
U-238	-4.2851E-09	4,806.12	0 00	1 36E-02	1 36E-02	1.36E-02
Y-90	2 7505E+00	4,806.12	9,612 25	0 00E+00	1.32E+04	2 64E+04
Other Radionuclides					2 47E+04	4 94E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.854E+15
0 0250	3 995E+14
0 0375	3 687E+14
0 0575	3 625E+14
0 0850	2.311E+14
0 1250	2 001E+14
0.2250	1 959E+14
0.3750	9 481E+13
0.5750	1 302E+15
0.8500	1 824E+14
1.2500	3 393E+13
1 7500	1 423E+12
2.2500	2.985E+12
2 7500	1 717E+10
3 5000	1 904E+09
5 0000	5 724E+03
7 0000	6.382E+02
11 0000	7 195E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.44E+02	4.87E+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		4,806 12
Bounding		9 612.25

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	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-S (U3SI2 LEU) GERMANY
SNF ID #: 519
Fuel Units & Descr: 97 - ASSEMBLY
Heavy Metal Mass BOL=155.2kg, EOL=131 804kg
ROD Storage Site SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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' 4 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 0632E-10	22,332 30	44,664.59	0 00E+00	1 80E-05	3 60E-05
Am-241	2 2586E-03	22,332 30	44,664.59	0 00E+00	5 04E+01	1 01E+02
Am-242m	1 9925E-06	22,332 30	44,664 59	0 00E+00	4 45E-02	8 90E-02
Am-243	2 3323E-07	22,332 30	44,664 59	0 00E+00	5 21E-03	1 04E-02
C-14	4 3308E-05	22,332 30	44 664 59	0 00E+00	9 67E-01	1 93E+00
Cl-36	4 3023E-08	22,332 30	44,664 59	0 00E+00	9 61E-04	1 92E-03
Cm-243	2 7429E-07	22,332 30	44,664 59	0 00E+00	6.13E-03	1 23E-02
Cm-244	3 1504E-06	22,332.30	44,664 59	0 00E+00	7 04E-02	1 41E-01
Co-60	3 1008E-02	22,332.30	44,664 59	0 00E+00	6 92E+02	1.38E+03
Cs-134	1 0367E-01	22,332.30	44,664 59	0 00E+00	2 32E+03	4 63E+03
Cs-135	3 1549E-05	22,332 30	44,664 59	0 00E+00	7 05E-01	1 41E+00
Cs-137	2 7564E+00	22,332 30	44,664 59	0 00E+00	6 16E+04	1 23E+05
Eu-154	1.3490E+00	22,332 30	44,664.59	0 00E+00	3 01E+04	6 03E+04
Eu-155	4.3880E-01	22,332 30	44,664.59	0 00E+00	9 80E+03	1 96E+04
Fe-55	8 6782E-03	22,332 30	44,664.59	0 00E+00	1.94E+02	3 88E+02
H-3	1 0805E-02	22,332 30	44,664 59	0 00E+00	2 41E+02	4 83E+02
I-129	7 3805E-07	22,332 30	44,664 59	0 00E+00	1 65E-02	3 30E-02
Kr-85	2 5218E-01	22,332 30	44,664 59	0 00E+00	5 63E+03	1.13E+04
Np-237	1 4463E-06	22,332 30	44,664 59	0 00E+00	3 23E-02	6 46E-02
Pa-231	3 5970E-09	22,332.30	44,664 59	0 00E+00	8 03E-05	1 61E-04
Pb-210	8 2511E-15	22,332.30	44,664 59	0 00E+00	1 84E-10	3 69E-10
Pm-147	2 0767E+00	22,332.30	44,664 59	0 00E+00	4 64E+04	9.28E+04
Pu-238	1 3514E-03	22,332.30	44,664 59	0 00E+00	3 02E+01	6 04E+01
Pu-239	5 6947E-03	22,332.30	44,664 59	0 00E+00	1 27E+02	2 54E+02
Pu-240	2.2647E-03	22,332.30	44,664 59	0 00E+00	5 06E+01	1 01E+02
Pu-241	1 2574E-01	22,332 30	44,664 59	0 00E+00	2 81E+03	5 62E+03
Pu-242	3 0602E-07	22,332 30	44,664.59	0 00E+00	6 83E-03	1 37E-02
Ra-226	5 7353E-14	22,332 30	44,664.59	0 00E+00	1 28E-09	2 56E-09
Ra-228	1 8150E-10	22,332 30	44,664 59	0 00E+00	4.05E-06	8 11E-06
Ru-106	9 3744E-02	22,332 30	44,664 59	0 00E+00	2 09E+03	4 19E+03
Se-79	1 2938E-05	22,332 30	44,664 59	0 00E+00	2 89E-01	5 78E-01
Sn-126	1.2239E-05	22,332 30	44,664 59	0 00E+00	2 73E-01	5 47E-01
Sr-90	2 6000E+00	22,332.30	44,664 59	0 00E+00	5 81E+04	1.16E+05
Tc-99	4 4120E-04	22,332.30	44,664 59	0 00E+00	9 85E+00	1 97E+01
Th-229	1 4749E-10	22,332 30	44,664 59	0 00E+00	3 29E-06	6 59E-06
Th-230	1 9549E-11	22,332.30	44,664 59	0 00E+00	4 37E-07	8.73E-07
Th-232	2 3744E-10	22,332 30	44,664 59	0 00E+00	5 30E-06	1 06E-05
Tl-208	1 9459E-08	22,332 30	44,664 59	0 00E+00	4 35E-04	8 69E-04
U-232	5 6015E-08	22,332 30	44,664.59	0 00E+00	1.25E-03	2 50E-03
U-233	1 3132E-07	22,332 30	44,664 59	0 00E+00	2.93E-03	5 87E-03
U-234	1 7323E-07	22,332.30	44,664 59	0 00E+00	3 87E-03	7 74E-03
U-235	-2 6159E-06	22,332 30	0 00	6 71E-02	8 66E-03	6 71E-02
U-236	1 2717E-05	22,332.30	44,664 59	0 00E+00	2 84E-01	5 68E-01
U-238	-3 8857E-08	22,332.30	0 00	4 17E-02	4 09E-02	4 17E-02
Y-90	2 6015E+00	22,332.30	44,664 59	0 00E+00	5 81E+04	1.16E+05
Other Radionuclides					8 49E+04	1 70E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7.557E+15
0 0250	1 641E+15
0 0375	2.044E+15
0 0575	1.567E+15
0 0850	1 097E+15
0 1250	1 640E+15
0.2250	9 155E+14
0 3750	4 075E+14
0.5750	5 166E+15
0.8500	1.272E+15
1.2500	1 318E+15
1 7500	3 773E+13
2.2500	4.586E+12
2.7500	3 725E+10
3.5000	4.353E+09
5 0000	2.558E+04
7 0000	2.894E+03
11 0000	3.296E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.12E+03	2.24E+03
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 99999963	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		22,332.30	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		44 664 59	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	3.89	
Bounding	7 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 FRR MTR-S (U3Si2 LEU) GERMANY
SNF ID # 1067
Fuel Units & Descr: 7 - ASSEMBLY
Heavy Metal Mass: BOL=14 7kg EOL=12 936kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of: 2010
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 5 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	1 4545E-10	1,670 54	3,341.08	0 00E+00	2 43E-07	4 86E-07
Am-241	1 1190E-03	1,670 54	3,341 08	0 00E+00	1 87E+00	3 74E+00
Am-242m	4 5425E-07	1,670 54	3,341 08	0 00E+00	7 59E-04	1 52E-03
Am-243	1.4921E-06	1,670 54	3,341 08	0 00E+00	2 49E-03	4 99E-03
C-14	5 7244E-09	1,670 54	3,341 08	0 00E+00	9 56E-06	1.91E-05
Cl-36	1.3124E-32	1,670 54	3,341 08	0 00E+00	2.19E-29	4.38E-29
Cm-243	2 3676E-07	1,670 54	3,341 08	0 00E+00	3.96E-04	7.91E-04
Cm-244	5 2042E-05	1,670 54	3,341 08	0 00E+00	8 69E-02	1 74E-01
Co-60	3 8208E-05	1,670 54	3,341 08	0 00E+00	6 38E-02	1 28E-01
Cs-134	4 8693E-01	1,670 54	3,341 08	0 00E+00	8 13E+02	1 63E+03
Cs-135	3 4477E-06	1,670 54	3,341 08	0 00E+00	5 76E-03	1 15E-02
Cs-137	2 8731E+00	1,670 54	3,341 08	0 00E+00	4 80E+03	9 60E+03
Eu-154	8.2053E-02	1,670 54	3,341 08	0 00E+00	1 37E+02	2 74E+02
Eu-155	3 9134E-02	1,670.54	3,341 08	0 00E+00	6 54E+01	1.31E+02
Fe-55	6 7429E-03	1,670 54	3,341 08	0 00E+00	1 13E+01	2.25E+01
H-3	1 0599E-02	1,670 54	3,341 08	0 00E+00	1 77E+01	3 54E+01
I-129	7 5300E-07	1,670 54	3,341.08	0 00E+00	1.26E-03	2 52E-03
Kr-85	2 8595E-01	1,670 54	3,341 08	0 00E+00	4 78E+02	9 55E+02
Np-237	9 5479E-06	1,670 54	3,341 08	0 00E+00	1 60E-02	3 19E-02
Pa-231	8 9297E-10	1,670 54	3,341 08	0 00E+00	1 49E-06	2 98E-06
Pb-210	3.7609E-12	1,670 54	3,341 08	0 00E+00	6 28E-09	1.26E-08
Pm-147	2.5452E+00	1,670.54	3,341 08	0 00E+00	4 25E+03	8 50E+03
Pu-238	2 0550E-02	1,670 54	3,341 08	0 00E+00	3 43E+01	6 87E+01
Pu-239	4.2838E-04	1,670 54	3,341 08	0 00E+00	7.16E-01	1.43E+00
Pu-240	2 4401E-04	1,670 54	3,341 08	0 00E+00	4 08E-01	8 15E-01
Pu-241	6 8764E-02	1,670 54	3,341 08	0 00E+00	1.15E+02	2 30E+02
Pu-242	3 6329E-07	1,670 54	3,341 08	0 00E+00	6 07E-04	1 21E-03
Ra-226	3 8045E-11	1,670 54	3,341 08	0 00E+00	6 36E-08	1.27E-07
Ra-228	2 9902E-15	1,670 54	3,341 08	0 00E+00	5 00E-12	9 99E-12
Ru-106	1.9055E-01	1,670.54	3,341 08	0 00E+00	3 18E+02	6 37E+02
Se-79	1.2936E-05	1,670.54	3,341 08	0 00E+00	2 16E-02	4.32E-02
Sn-126	1 1574E-05	1,670 54	3,341 08	0 00E+00	1.93E-02	3 87E-02
Sr-90	2 7505E+00	1,670 54	3,341 08	0 00E+00	4 59E+03	9 19E+03
Tc-99	4.2239E-04	1,670 54	3,341.08	0.00E+00	7.06E-01	1 41E+00
Th-229	1 8848E-12	1,670 54	3,341 08	0 00E+00	3 15E-09	6 30E-09
Th-230	1 7042E-08	1,670 54	3,341 08	0 00E+00	2 85E-05	5 69E-05
Th-232	7 8132E-15	1,670 54	3,341 08	0 00E+00	1 31E-11	2 61E-11
Tl-208	4 4063E-08	1,670 54	3,341 08	0 00E+00	7.36E-05	1.47E-04
U-232	1.3151E-07	1,670.54	3,341 08	0 00E+00	2.20E-04	4.39E-04
U-233	1 9564E-09	1,670.54	3,341 08	0 00E+00	3.27E-06	6 54E-06
U-234	1 8371E-04	1,670 54	3,341 08	0 00E+00	3 07E-01	6 14E-01
U-235	-2.7235E-06	1,670 54	0 00	6.35E-03	1 80E-03	6 35E-03
U-236	1 5493E-05	1,670 54	3,341.08	0 00E+00	2.59E-02	5 18E-02
U-238	-4.2851E-09	1,670 54	0 00	3 95E-03	3 95E-03	3 95E-03
Y-90	2 7505E+00	1,670 54	3,341 08	0 00E+00	4 59E+03	9 19E+03
Other Radionuclides					8 59E+03	1 72E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6 446E+14
0 0250	1.389E+14
0 0375	1.281E+14
0 0575	1 260E+14
0 0850	8 033E+13
0 1250	6 956E+13
0.2250	6.808E+13
0 3750	3.296E+13
0 5750	4.527E+14
0 8500	6.339E+13
1.2500	1 179E+13
1 7500	4 946E+11
2.2500	1 037E+12
2 7500	5 968E+09
3 5000	6 619E+08
5 0000	1.988E+03
7 0000	2.216E+02
11 0000	2 498E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.47E+01	1.69E+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 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		1 670 54
Bounding		3,341 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	0.36	
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-S (U3Si2 LEU) GREECE
SNF ID #: 532
Fuel Units & Descr: 67 - ASSEMBLY
Heavy Metal Mass: BOL=74 37kg EOL=67 683kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage: 18"x10' 2 79

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 4545E-10	6,332 34	12,664 68	0 00E+00	9.21E-07	1 84E-06
Am-241	1 1190E-03	6,332 34	12,664.68	0 00E+00	7 09E+00	1 42E+01
Am-242m	4 5425E-07	6,332 34	12,664 68	0 00E+00	2 88E-03	5 75E-03
Am-243	1 4921E-06	6,332 34	12 664 68	0 00E+00	9 45E-03	1 89E-02
C-14	5 7244E-09	6,332 34	12,664 68	0 00E+00	3 62E-05	7 25E-05
Cl-36	1 3124E-32	6,332 34	12 664 68	0 00E+00	8 31E-29	1 66E-28
Cm-243	2.3676E-07	6,332 34	12,664 68	0 00E+00	1 50E-03	3 00E-03
Cm-244	5.2042E-05	6,332 34	12,664 68	0 00E+00	3 30E-01	6 59E-01
Co-60	3 8208E-05	6,332 34	12,664 68	0 00E+00	2 42E-01	4 84E-01
Cs-134	4 8693E-01	6,332 34	12,664 68	0 00E+00	3 08E+03	6 17E+03
Cs-135	3 4477E-06	6,332 34	12,664 68	0 00E+00	2 18E-02	4 37E-02
Cs-137	2 8731E+00	6,332 34	12,664 68	0 00E+00	1 82E+04	3 64E+04
Eu-154	8.2053E-02	6,332.34	12,664 68	0.00E+00	5.20E+02	1 04E+03
Eu-155	3 9134E-02	6,332 34	12,664 68	0 00E+00	2 48E+02	4 96E+02
Fe-55	6 7429E-03	6,332.34	12,664 68	0 00E+00	4.27E+01	8.54E+01
H-3	1 0599E-02	6,332.34	12,664 68	0 00E+00	6 71E+01	1.34E+02
I-129	7 5300E-07	6,332.34	12,664 68	0 00E+00	4 77E-03	9 54E-03
Kr-85	2 8595E-01	6,332.34	12,664 68	0 00E+00	1.81E+03	3 62E+03
Np-237	9 5479E-06	6,332.34	12,664 68	0 00E+00	6 05E-02	1.21E-01
Pa-231	8 9297E-10	6,332 34	12,664 68	0 00E+00	5 65E-06	1.13E-05
Pb-210	3 7609E-12	6,332 34	12,664 68	0 00E+00	2.38E-08	4.76E-08
Pm-147	2 5452E+00	6,332 34	12,664 68	0 00E+00	1 61E+04	3 22E+04
Pu-238	2 0550E-02	6,332 34	12,664 68	0 00E+00	1.30E+02	2 60E+02
Pu-239	4 2838E-04	6,332 34	12,664 68	0 00E+00	2 71E+00	5 43E+00
Pu-240	2 4401E-04	6,332 34	12,664 68	0 00E+00	1 55E+00	3 09E+00
Pu-241	6 8764E-02	6,332 34	12,664 68	0 00E+00	4 35E+02	8 71E+02
Pu-242	3 6329E-07	6,332 34	12,664 68	0 00E+00	2.30E-03	4 60E-03
Ra-226	3 8045E-11	6,332 34	12,664 68	0 00E+00	2 41E-07	4 82E-07
Ra-228	2 9902E-15	6 332 34	12,664 68	0 00E+00	1 89E-11	3 79E-11
Ru-106	1 9055E-01	6,332 34	12,664 68	0 00E+00	1 21E+03	2 41E+03
Se-79	1.2936E-05	6,332 34	12,664 68	0 00E+00	8 19E-02	1 64E-01
Sn-126	1.1574E-05	6,332 34	12,664 68	0 00E+00	7 33E-02	1 47E-01
Sr-90	2.7505E+00	6,332 34	12,664 68	0 00E+00	1 74E+04	3 48E+04
Tc-99	4.2239E-04	6,332 34	12,664 68	0 00E+00	2 67E+00	5 35E+00
Th-229	1 8848E-12	6,332.34	12,664 68	0 00E+00	1 19E-08	2 39E-08
Th-230	1 7042E-08	6 332.34	12,664 68	0 00E+00	1 08E-04	2 16E-04
Th-232	7 8132E-15	6,332 34	12,664 68	0 00E+00	4 95E-11	9 90E-11
Tl-208	4 4063E-08	6,332.34	12,664 68	0 00E+00	2 79E-04	5 58E-04
U-232	1 3151E-07	6,332.34	12,664 68	0 00E+00	8 33E-04	1 67E-03
U-233	1 9564E-09	6,332.34	12,664 68	0 00E+00	1.24E-05	2 48E-05
U-234	1 8371E-04	6,332 34	12,664 68	0 00E+00	1.16E+00	2.33E+00
U-235	-2.7235E-06	6,332.34	0 00	3 21E-02	1.49E-02	3.21E-02
U-236	1 5493E-05	6,332 34	12,664 68	0 00E+00	9 81E-02	1 96E-01
U-238	-4.2851E-09	6,332.34	0 00	2 00E-02	2.00E-02	2.00E-02
Y-90	2 7505E+00	6,332 34	12,664 68	0 00E+00	1 74E+04	3 48E+04
Other Radionuclides					3 26E+04	6 51E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	2 443E+15
0 0250	5.264E+14
0 0375	4.857E+14
0 0575	4 776E+14
0.0850	3 045E+14
0 1250	2 637E+14
0.2250	2.581E+14
0.3750	1.249E+14
0.5750	1 716E+15
0 8500	2.403E+14
1.2500	4 471E+13
1 7500	1 875E+12
2.2500	3 932E+12
2.7500	2.262E+10
3 5000	2.509E+09
5 0000	7 547E+03
7 0000	8 414E+02
11 0000	9 486E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.21E+02	6.42E+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		6 332.34
Bounding		12,664 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	0.27	
Bounding	0 54	

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-S (U3Si2 LEU) JAPAN
SNF ID # 506
Fuel Units & Descr 70 - ASSEMBLY
Heavy Metal Mass BOL=73.5kg, EOL=70 413kg
ROD Storage Site SRS

[1]Fuel decay start date: 2010
Estimates as of 2010
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 5 years

Estimated Canister usage: 18"x10' 2 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	1 4545E-10	2,923 45	5,846 90	0 00E+00	4.25E-07	8 50E-07
Am-241	1 1190E-03	2,923 45	5,846 90	0 00E+00	3 27E+00	6 54E+00
Am-242m	4.5425E-07	2,923 45	5,846 90	0 00E+00	1.33E-03	2 66E-03
Am-243	1.4921E-06	2,923 45	5,846 90	0 00E+00	4 36E-03	8 72E-03
C-14	5 7244E-09	2,923 45	5,846 90	0 00E+00	1 67E-05	3 35E-05
Cl-36	1.3124E-32	2,923 45	5,846 90	0 00E+00	3 84E-29	7 67E-29
Cm-243	2.3676E-07	2,923 45	5,846 90	0 00E+00	6 92E-04	1 38E-03
Cm-244	5 2042E-05	2,923.45	5,846 90	0 00E+00	1 52E-01	3 04E-01
Co-60	3 8208E-05	2,923 45	5,846 90	0 00E+00	1 12E-01	2 23E-01
Cs-134	4 8693E-01	2,923 45	5,846 90	0 00E+00	1 42E+03	2 85E+03
Cs-135	3 4477E-06	2,923 45	5,846 90	0 00E+00	1 01E-02	2 02E-02
Cs-137	2 8731E+00	2,923 45	5,846 90	0.00E+00	8 40E+03	1 68E+04
Eu-154	8.2053E-02	2,923 45	5,846 90	0 00E+00	2 40E+02	4 80E+02
Eu-155	3 9134E-02	2,923 45	5,846 90	0 00E+00	1.14E+02	2.29E+02
Fe-55	6 7429E-03	2,923 45	5,846 90	0 00E+00	1.97E+01	3 94E+01
H-3	1.0599E-02	2,923 45	5,846.90	0 00E+00	3 10E+01	6.20E+01
I-129	7 5300E-07	2,923 45	5,846 90	0 00E+00	2.20E-03	4 40E-03
Kr-85	2 8595E-01	2,923 45	5,846 90	0 00E+00	8 36E+02	1 67E+03
Np-237	9 5479E-06	2,923 45	5,846 90	0 00E+00	2 79E-02	5 58E-02
Pa-231	8 9297E-10	2,923.45	5,846 90	0 00E+00	2 61E-06	5 22E-06
Pb-210	3 7609E-12	2,923 45	5,846 90	0 00E+00	1 10E-08	2.20E-08
Pm-147	2 5452E+00	2,923 45	5,846 90	0 00E+00	7 44E+03	1 49E+04
Pu-238	2 0550E-02	2,923 45	5,846 90	0 00E+00	6 01E+01	1.20E+02
Pu-239	4.2838E-04	2,923 45	5,846 90	0 00E+00	1.25E+00	2 50E+00
Pu-240	2 4401E-04	2,923 45	5,846 90	0 00E+00	7.13E-01	1.43E+00
Pu-241	6.8764E-02	2,923 45	5,846 90	0 00E+00	2 01E+02	4 02E+02
Pu-242	3.6329E-07	2,923 45	5,846 90	0 00E+00	1 06E-03	2 12E-03
Ra-226	3 8045E-11	2,923 45	5,846 90	0 00E+00	1 11E-07	2 22E-07
Ra-228	2 9902E-15	2,923 45	5,846.90	0 00E+00	8 74E-12	1 75E-11
Ru-106	1 9055E-01	2,923 45	5 846 90	0 00E+00	5 57E+02	1 11E+03
Se-79	1.2936E-05	2,923 45	5,846 90	0 00E+00	3 78E-02	7 56E-02
Sn-126	1 1574E-05	2,923 45	5,846 90	0 00E+00	3 38E-02	6 77E-02
Sr-90	2 7505E+00	2,923.45	5,846 90	0 00E+00	8 04E+03	1 61E+04
Tc-99	4 2239E-04	2,923 45	5,846 90	0 00E+00	1 23E+00	2 47E+00
Th-229	1 8848E-12	2,923 45	5,846 90	0 00E+00	5 51E-09	1.10E-08
Th-230	1 7042E-08	2,923 45	5,846 90	0 00E+00	4.98E-05	9 96E-05
Th-232	7 8132E-15	2,923 45	5,846 90	0 00E+00	2.28E-11	4 57E-11
Tl-208	4 4063E-08	2,923 45	5,846 90	0 00E+00	1.29E-04	2 58E-04
U-232	1.3151E-07	2,923 45	5,846 90	0 00E+00	3 84E-04	7 69E-04
U-233	1.9564E-09	2,923 45	5,846 90	0 00E+00	5 72E-06	1 14E-05
U-234	1 8371E-04	2,923 45	5,846 90	0 00E+00	5 37E-01	1 07E+00
U-235	-2 7235E-06	2,923 45	0 00	3 18E-02	2 38E-02	3 18E-02
U-236	1.5493E-05	2,923 45	5,846 90	0 00E+00	4 53E-02	9 06E-02
U-238	-4.2851E-09	2,923 45	0 00	1 98E-02	1 98E-02	1 98E-02
Y-90	2 7505E+00	2,923.45	5,846 90	0 00E+00	8 04E+03	1 61E+04
Other Radionuclides					1 50E+04	3 01E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 128E+15
0 0250	2 430E+14
0 0375	2.243E+14
0 0575	2.205E+14
0 0850	1 406E+14
0 1250	1 217E+14
0 2250	1 191E+14
0 3750	5 767E+13
0 5750	7 922E+14
0 8500	1 109E+14
1.2500	2.064E+13
1 7500	8 655E+11
2.2500	1.815E+12
2 7500	1 044E+10
3 5000	1 158E+09
5 0000	3 508E+03
7 0000	3 913E+02
11 0000	4 411E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.48E+02	2.96E+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 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		2,923 45
Bounding		5 846 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 13	
Bounding	0 25	

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-S (U3SI2 LEU) JAPAN
SNF ID #: 508
Fuel Units & Descr: 149 - ASSEMBLY
Heavy Metal Mass: BOL=205 62kg; EOL=193.283kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage
18"x10'
6 21

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 4545E-10	11,683 57	23,367 15	0 00E+00	1 70E-06	3 40E-06
Am-241	1 1190E-03	11,683.57	23,367 15	0 00E+00	1 31E+01	2 61E+01
Am-242m	4 5425E-07	11,683.57	23,367 15	0 00E+00	5 31E-03	1 06E-02
Am-243	1 4921E-06	11,683.57	23,367 15	0 00E+00	1 74E-02	3 49E-02
C-14	5 7244E-09	11,683 57	23,367 15	0 00E+00	6 69E-05	1 34E-04
Cl-36	1 3124E-32	11,683 57	23,367.15	0 00E+00	1 53E-28	3 07E-28
Cm-243	2 3676E-07	11,683 57	23,367.15	0 00E+00	2 77E-03	5 53E-03
Cm-244	5 2042E-05	11,683 57	23,367.15	0 00E+00	6 08E-01	1 22E+00
Co-60	3 8208E-05	11,683 57	23,367.15	0 00E+00	4 46E-01	8 93E-01
Cs-134	4 8693E-01	11,683 57	23,367.15	0 00E+00	5 69E+03	1 14E+04
Cs-135	3 4477E-06	11,683 57	23,367.15	0 00E+00	4 03E-02	8 06E-02
Cs-137	2 8731E+00	11,683 57	23,367 15	0 00E+00	3 36E+04	6 71E+04
Eu-154	8 2053E-02	11,683 57	23,367 15	0 00E+00	9 59E+02	1 92E+03
Eu-155	3 9134E-02	11,683 57	23,367 15	0 00E+00	4 57E+02	9 14E+02
Fe-55	6 7429E-03	11,683 57	23,367 15	0 00E+00	7 88E+01	1 58E+02
H-3	1 0599E-02	11,683 57	23,367 15	0 00E+00	1 24E+02	2 48E+02
I-129	7 5300E-07	11,683 57	23,367 15	0 00E+00	8 80E-03	1 76E-02
Kr-85	2 8595E-01	11,683 57	23,367 15	0 00E+00	3 34E+03	6 68E+03
Np-237	9 5479E-06	11,683 57	23,367 15	0 00E+00	1.12E-01	2 23E-01
Pa-231	8.9297E-10	11,683 57	23,367 15	0 00E+00	1 04E-05	2 09E-05
Pb-210	3.7609E-12	11,683.57	23,367.15	0 00E+00	4 39E-08	8 79E-08
Pm-147	2 5452E+00	11,683.57	23,367 15	0 00E+00	2.97E+04	5 95E+04
Pu-238	2 0550E-02	11,683.57	23,367.15	0 00E+00	2 40E+02	4 80E+02
Pu-239	4.2838E-04	11,683.57	23,367.15	0 00E+00	5.00E+00	1.00E+01
Pu-240	2 4401E-04	11,683 57	23,367.15	0 00E+00	2 85E+00	5 70E+00
Pu-241	6 8764E-02	11,683 57	23,367.15	0 00E+00	8 03E+02	1 61E+03
Pu-242	3 6329E-07	11,683 57	23,367.15	0 00E+00	4.24E-03	8 49E-03
Ra-226	3 8045E-11	11,683 57	23,367.15	0 00E+00	4 44E-07	8.89E-07
Ra-228	2 9902E-15	11,683 57	23,367 15	0 00E+00	3 49E-11	6 99E-11
Ru-106	1 9055E-01	11,683 57	23,367 15	0 00E+00	2 23E+03	4 45E+03
Se-79	1 2936E-05	11,683 57	23,367 15	0 00E+00	1 51E-01	3 02E-01
Sn-126	1 1574E-05	11,683 57	23,367 15	0 00E+00	1 35E-01	2 70E-01
Sr-90	2.7505E+00	11,683 57	23,367 15	0 00E+00	3 21E+04	6 43E+04
Tc-99	4.2239E-04	11,683 57	23,367 15	0 00E+00	4 93E+00	9 87E+00
Th-229	1 8848E-12	11,683 57	23,367 15	0 00E+00	2 20E-08	4 40E-08
Th-230	1 7042E-08	11,683.57	23,367 15	0.00E+00	1 99E-04	3 98E-04
Th-232	7.8132E-15	11,683 57	23,367 15	0 00E+00	9 13E-11	1 83E-10
Tl-208	4 4063E-08	11,683 57	23,367.15	0 00E+00	5 15E-04	1 03E-03
U-232	1 3151E-07	11,683.57	23,367 15	0 00E+00	1 54E-03	3 07E-03
U-233	1 9564E-09	11,683 57	23,367.15	0 00E+00	2.29E-05	4 57E-05
U-234	1 8371E-04	11,683 57	23,367.15	0 00E+00	2.15E+00	4.29E+00
U-235	-2.7235E-06	11,683 57	0 00	8 89E-02	5.70E-02	8 89E-02
U-236	1 5493E-05	11,683 57	23,367.15	0 00E+00	1.81E-01	3 62E-01
U-238	-4.2851E-09	11,683 57	0 00	5 53E-02	5.52E-02	5.53E-02
Y-90	2 7505E+00	11,683 57	23,367.15	0 00E+00	3 21E+04	6 43E+04
Other Radionuclides					6 01E+04	1.20E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	4 508E+15
0 0250	9 712E+14
0 0375	8 962E+14
0 0575	8 813E+14
0 0850	5 618E+14
0 1250	4 865E+14
0.2250	4 762E+14
0.3750	2 305E+14
0 5750	3 166E+15
0 8500	4 434E+14
1.2500	8.249E+13
1 7500	3 459E+12
2.2500	7.255E+12
2.7500	4 174E+10
3 5000	4 629E+09
5 0000	1.397E+04
7 0000	1.557E+03
11 0000	1 756E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 92E+02	1 18E+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 %	19 99999957	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		11 683.57
Bounding		23.367 15

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 18	
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: FRR MTR-S (U3Si2 LEU) NETHERLANDS
SNF ID # 510
Fuel Units & Descr 43 - ASSEMBLY
Heavy Metal Mass BOL=64.5kg; EOL=56 76kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 5 years

Estimated Canister usage.
18"x10'
1 79

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 4545E-10	7,329 93	14,659 86	0.00E+00	1.07E-06	2.13E-06
Am-241	1.1190E-03	7,329 93	14,659 86	0 00E+00	8.20E+00	1 64E+01
Am-242m	4.5425E-07	7,329 93	14,659 86	0 00E+00	3 33E-03	6 66E-03
Am-243	1 4921E-06	7,329 93	14,659 86	0 00E+00	1 09E-02	2 19E-02
C-14	5 7244E-09	7,329 93	14,659 86	0 00E+00	4 20E-05	8 39E-05
Cl-36	1 3124E-32	7,329 93	14,659 86	0 00E+00	9 62E-29	1 92E-28
Cm-243	2 3676E-07	7,329 93	14,659 86	0 00E+00	1.74E-03	3 47E-03
Cm-244	5.2042E-05	7,329 93	14,659 86	0 00E+00	3 81E-01	7.63E-01
Co-60	3.8208E-05	7,329 93	14,659 86	0 00E+00	2 80E-01	5 60E-01
Cs-134	4 8693E-01	7,329 93	14,659 86	0 00E+00	3.57E+03	7 14E+03
Cs-135	3 4477E-06	7,329 93	14,659 86	0 00E+00	2 53E-02	5 05E-02
Cs-137	2 8731E+00	7,329 93	14,659 86	0 00E+00	2 11E+04	4 21E+04
Eu-154	8 2053E-02	7,329 93	14,659 86	0 00E+00	6 01E+02	1 20E+03
Eu-155	3 9134E-02	7,329 93	14,659 86	0 00E+00	2 87E+02	5 74E+02
Fe-55	6 7429E-03	7,329 93	14,659 86	0 00E+00	4 94E+01	9 89E+01
H-3	1.0599E-02	7,329 93	14,659 86	0 00E+00	7.77E+01	1.55E+02
I-129	7.5300E-07	7,329 93	14,659 86	0 00E+00	5 52E-03	1 10E-02
Kr-85	2 8595E-01	7,329 93	14,659 86	0 00E+00	2 10E+03	4 19E+03
Np-237	9 5479E-06	7,329 93	14,659 86	0 00E+00	7 00E-02	1 40E-01
Pa-231	8 9297E-10	7,329 93	14,659 86	0 00E+00	6 55E-06	1.31E-05
Pb-210	3 7609E-12	7,329 93	14,659 86	0 00E+00	2 76E-08	5 51E-08
Pm-147	2 5452E+00	7,329 93	14,659 86	0 00E+00	1 87E+04	3 73E+04
Pu-238	2 0550E-02	7,329 93	14,659 86	0 00E+00	1.51E+02	3 01E+02
Pu-239	4.2838E-04	7,329 93	14,659 86	0 00E+00	3.14E+00	6.28E+00
Pu-240	2 4401E-04	7,329 93	14,659 86	0 00E+00	1 79E+00	3 58E+00
Pu-241	6 8764E-02	7,329 93	14,659 86	0 00E+00	5 04E+02	1 01E+03
Pu-242	3 6329E-07	7,329 93	14,659 86	0 00E+00	2 66E-03	5 33E-03
Ra-226	3 8045E-11	7,329 93	14,659 86	0 00E+00	2 79E-07	5 58E-07
Ra-228	2 9902E-15	7,329 93	14,659 86	0 00E+00	2 19E-11	4.38E-11
Ru-106	1 9055E-01	7,329 93	14,659 86	0 00E+00	1 40E+03	2 79E+03
Se-79	1.2936E-05	7,329 93	14,659 86	0 00E+00	9 48E-02	1 90E-01
Sn-126	1 1574E-05	7,329 93	14,659 86	0 00E+00	8 48E-02	1 70E-01
Sr-90	2 7505E+00	7,329 93	14,659 86	0 00E+00	2 02E+04	4 03E+04
Tc-99	4.2239E-04	7,329 93	14,659 86	0 00E+00	3 10E+00	6 19E+00
Th-229	1 8848E-12	7,329 93	14,659 86	0 00E+00	1.38E-08	2 76E-08
Th-230	1 7042E-08	7,329 93	14,659 86	0 00E+00	1.25E-04	2.50E-04
Th-232	7 8132E-15	7,329 93	14,659 86	0 00E+00	5.73E-11	1.15E-10
Tl-208	4 4063E-08	7,329 93	14,659 86	0 00E+00	3.23E-04	6 46E-04
U-232	1.3151E-07	7,329 93	14,659 86	0 00E+00	9 64E-04	1 93E-03
U-233	1 9564E-09	7,329 93	14,659 86	0 00E+00	1 43E-05	2 87E-05
U-234	1 8371E-04	7,329 93	14,659 86	0 00E+00	1 35E+00	2 69E+00
U-235	-2 7235E-06	7,329 93	0 00	2.79E-02	7 91E-03	2.79E-02
U-236	1 5493E-05	7,329 93	14,659 86	0 00E+00	1.14E-01	2.27E-01
U-238	-4.2851E-09	7,329 93	0 00	1 73E-02	1.73E-02	1.73E-02
Y-90	2.7505E+00	7,329 93	14,659 86	0 00E+00	2.02E+04	4 03E+04
Other Radionuclides					3 77E+04	7.54E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg_MeV	
0 0150	2.828E+15
0 0250	6 093E+14
0 0375	5 623E+14
0 0575	5 529E+14
0 0850	3.525E+14
0 1250	3.052E+14
0 2250	2.987E+14
0 3750	1 446E+14
0.5750	1.986E+15
0 8500	2 782E+14
1.2500	5 175E+13
1 7500	2.170E+12
2.2500	4.552E+12
2.7500	2.619E+10
3.5000	2.904E+09
5.0000	8 722E+03
7.0000	9 724E+02
11 0000	1 096E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 72E+02	7.43E+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 %	20 00000079	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		7,329 93
Bounding		14 659 86

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-S (U3Si2 LEU) TURKEY
SNF ID #: 528
Fuel Units & Descr: 32 - ASSEMBLY
Heavy Metal Mass: BOL=67 2kg; EOL=59 136kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage: 18"x10'
1 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	1 4545E-10	7,636 76	15,273 53	0 00E+00	1 11E-06	2.22E-06
Am-241	1 1190E-03	7,636 76	15,273 53	0 00E+00	8 55E+00	1 71E+01
Am-242m	4 5425E-07	7,636 76	15,273 53	0 00E+00	3.47E-03	6 94E-03
Am-243	1 4921E-06	7,636 76	15,273 53	0 00E+00	1 14E-02	2 28E-02
C-14	5 7244E-09	7,636 76	15,273.53	0 00E+00	4 37E-05	8 74E-05
Cl-36	1 3124E-32	7,636 76	15,273 53	0 00E+00	1 00E-28	2 00E-28
Cm-243	2 3676E-07	7,636.76	15,273 53	0 00E+00	1 81E-03	3 62E-03
Cm-244	5.2042E-05	7,636.76	15,273 53	0 00E+00	3 97E-01	7.95E-01
Co-60	3 8208E-05	7,636 76	15,273 53	0 00E+00	2 92E-01	5 84E-01
Cs-134	4 8693E-01	7,636 76	15,273 53	0 00E+00	3.72E+03	7 44E+03
Cs-135	3 4477E-06	7,636 76	15,273 53	0 00E+00	2 63E-02	5 27E-02
Cs-137	2 8731E+00	7,636 76	15,273 53	0 00E+00	2 19E+04	4 39E+04
Eu-154	8 2053E-02	7,636 76	15,273 53	0 00E+00	6 27E+02	1 25E+03
Eu-155	3 9134E-02	7,636 76	15,273 53	0 00E+00	2 99E+02	5 98E+02
Fe-55	6 7429E-03	7,636 76	15,273 53	0 00E+00	5 15E+01	1 03E+02
H-3	1 0599E-02	7,636 76	15,273.53	0 00E+00	8 09E+01	1.62E+02
I-129	7 5300E-07	7,636.76	15,273 53	0 00E+00	5 75E-03	1.15E-02
Kr-85	2 8595E-01	7,636.76	15,273 53	0 00E+00	2 18E+03	4.37E+03
Np-237	9 5479E-06	7,636.76	15,273 53	0 00E+00	7.29E-02	1.46E-01
Pa-231	8.9297E-10	7,636 76	15,273 53	0 00E+00	6 82E-06	1.36E-05
Pb-210	3 7609E-12	7,636 76	15,273 53	0 00E+00	2 87E-08	5 74E-08
Pm-147	2 5452E+00	7,636 76	15,273 53	0 00E+00	1 94E+04	3 89E+04
Pu-238	2 0550E-02	7,636 76	15,273 53	0 00E+00	1 57E+02	3 14E+02
Pu-239	4 2838E-04	7,636 76	15,273 53	0 00E+00	3 27E+00	6 54E+00
Pu-240	2 4401E-04	7,636 76	15,273.53	0 00E+00	1 86E+00	3 73E+00
Pu-241	6 8764E-02	7,636.76	15,273.53	0 00E+00	5.25E+02	1.05E+03
Pu-242	3 6329E-07	7,636.76	15,273 53	0.00E+00	2 77E-03	5.55E-03
Ra-226	3 8045E-11	7,636.76	15,273 53	0 00E+00	2.91E-07	5 81E-07
Ra-228	2 9902E-15	7,636.76	15,273 53	0 00E+00	2.28E-11	4.57E-11
Ru-106	1 9055E-01	7,636 76	15,273 53	0 00E+00	1 46E+03	2 91E+03
Se-79	1 2936E-05	7,636 76	15,273 53	0 00E+00	9 88E-02	1 98E-01
Sn-126	1 1574E-05	7,636 76	15,273 53	0 00E+00	8 84E-02	1 77E-01
Sr-90	2 7505E+00	7,636 76	15,273 53	0 00E+00	2 10E+04	4.20E+04
Tc-99	4 2239E-04	7,636 76	15,273.53	0 00E+00	3 23E+00	6.45E+00
Th-229	1 8848E-12	7,636 76	15,273.53	0 00E+00	1 44E-08	2 88E-08
Th-230	1 7042E-08	7,636.76	15,273 53	0 00E+00	1 30E-04	2.60E-04
Th-232	7.8132E-15	7,636.76	15,273 53	0 00E+00	5 97E-11	1.19E-10
Tl-208	4.4063E-08	7,636 76	15,273 53	0 00E+00	3.37E-04	6.73E-04
U-232	1.3151E-07	7,636 76	15,273 53	0 00E+00	1.00E-03	2 01E-03
U-233	1 9564E-09	7,636 76	15,273 53	0 00E+00	1.49E-05	2 99E-05
U-234	1 8371E-04	7,636 76	15,273 53	0 00E+00	1 40E+00	2 81E+00
U-235	-2 7235E-06	7,636 76	0 00	2 90E-02	8 24E-03	2 90E-02
U-236	1 5493E-05	7,636 76	15,273.53	0 00E+00	1 18E-01	2 37E-01
U-238	-4 2851E-09	7,636.76	0 00	1.81E-02	1 80E-02	1 81E-02
Y-90	2 7505E+00	7,636 76	15,273 53	0 00E+00	2.10E+04	4.20E+04
Other Radionuclides					3.93E+04	7 86E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2 947E+15
0 0250	6.348E+14
0 0375	5.858E+14
0.0575	5 760E+14
0.0850	3.672E+14
0.1250	3 180E+14
0.2250	3 112E+14
0 3750	1 507E+14
0 5750	2 069E+15
0 8500	2 898E+14
1.2500	5.392E+13
1 7500	2.261E+12
2.2500	4 742E+12
2.7500	2.728E+10
3.5000	3 026E+09
5 0000	9 087E+03
7 0000	1 013E+03
11 0000	1 142E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 87E+02	7.74E+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 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		7,636.76
Bounding		15,273 53

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-S (UALX-HEU) CANADA
SNF ID # 720
Fuel Units & Descr: 21 - MTR TYPE
Heavy Metal Mass BOL=4 427kg EOL=2.862kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 5 years

Estimated Canister usage
18"x10'
0 88

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 4545E-10	1,481.61	2,963 22	0 00E+00	2 16E-07	4 31E-07
Am-241	1 1190E-03	1,481.61	2,963 22	0 00E+00	1 66E+00	3.32E+00
Am-242m	4.5425E-07	1,481 61	2,963.22	0 00E+00	6 73E-04	1 35E-03
Am-243	1 4921E-06	1,481 61	2,963.22	0 00E+00	2 21E-03	4 42E-03
C-14	5.7244E-09	1,481 61	2,963 22	0 00E+00	8 48E-06	1 70E-05
Cl-36	1.3124E-32	1,481 61	2,963 22	0 00E+00	1.94E-29	3 89E-29
Cm-243	2 3676E-07	1,481 61	2,963 22	0 00E+00	3 51E-04	7.02E-04
Cm-244	5 2042E-05	1,481 61	2,963 22	0 00E+00	7 71E-02	1.54E-01
Co-60	3 8208E-05	1,481.61	2,963.22	0.00E+00	5 66E-02	1 13E-01
Cs-134	4 8693E-01	1,481.61	2,963.22	0 00E+00	7.21E+02	1 44E+03
Cs-135	3 4477E-06	1,481 61	2,963.22	0 00E+00	5 11E-03	1 02E-02
Cs-137	2.8731E+00	1,481 61	2,963.22	0 00E+00	4 26E+03	8 51E+03
Eu-154	8.2053E-02	1,481 61	2,963 22	0 00E+00	1.22E+02	2 43E+02
Eu-155	3 9134E-02	1,481 61	2,963 22	0 00E+00	5 80E+01	1.16E+02
Fe-55	6 7429E-03	1,481 61	2,963 22	0 00E+00	9 99E+00	2.00E+01
H-3	1 0599E-02	1,481 61	2,963 22	0 00E+00	1.57E+01	3 14E+01
I-129	7 5300E-07	1,481 61	2,963.22	0 00E+00	1 12E-03	2 23E-03
Kr-85	2 8595E-01	1,481 61	2,963.22	0 00E+00	4 24E+02	8 47E+02
Np-237	9.5479E-06	1,481 61	2,963.22	0 00E+00	1 41E-02	2 83E-02
Pa-231	8 9297E-10	1,481 61	2,963 22	0 00E+00	1.32E-06	2 65E-06
Pb-210	3 7609E-12	1,481 61	2,963 22	0 00E+00	5 57E-09	1 11E-08
Pm-147	2 5452E+00	1,481 61	2,963 22	0 00E+00	3 77E+03	7.54E+03
Pu-238	2 0550E-02	1,481.61	2,963.22	0 00E+00	3 04E+01	6 09E+01
Pu-239	4 2838E-04	1,481 61	2,963.22	0.00E+00	6 35E-01	1.27E+00
Pu-240	2 4401E-04	1,481 61	2,963.22	0 00E+00	3 62E-01	7 23E-01
Pu-241	6 8764E-02	1,481 61	2,963.22	0 00E+00	1 02E+02	2 04E+02
Pu-242	3.6329E-07	1,481 61	2,963 22	0 00E+00	5 38E-04	1.08E-03
Ra-226	3 8045E-11	1,481 61	2,963 22	0 00E+00	5 64E-08	1 13E-07
Ra-228	2 9902E-15	1,481 61	2,963 22	0 00E+00	4 43E-12	8 86E-12
Ru-106	1 9055E-01	1,481.61	2,963 22	0 00E+00	2.82E+02	5 65E+02
Se-79	1 2936E-05	1,481.61	2,963.22	0 00E+00	1 92E-02	3 83E-02
Sn-126	1 1574E-05	1,481.61	2,963.22	0 00E+00	1 71E-02	3 43E-02
Sr-90	2 7505E+00	1,481 61	2,963.22	0 00E+00	4 08E+03	8 15E+03
Tc-99	4.2239E-04	1,481 61	2,963.22	0 00E+00	6.26E-01	1.25E+00
Th-229	1 8848E-12	1,481 61	2,963 22	0 00E+00	2.79E-09	5.59E-09
Th-230	1 7042E-08	1,481 61	2,963 22	0 00E+00	2.53E-05	5 05E-05
Th-232	7 8132E-15	1,481.61	2,963 22	0 00E+00	1 16E-11	2.32E-11
Tl-208	4 4063E-08	1,481.61	2,963.22	0 00E+00	6 53E-05	1 31E-04
U-232	1.3151E-07	1,481 61	2,963.22	0 00E+00	1 95E-04	3 90E-04
U-233	1.9564E-09	1,481 61	2,963.22	0 00E+00	2 90E-06	5.80E-06
U-234	1.8371E-04	1,481 61	2,963.22	0 00E+00	2 72E-01	5 44E-01
U-235	-2 7235E-06	1,481.61	0 00	8 90E-03	4.86E-03	8 90E-03
U-236	1.5493E-05	1,481 61	2,963 22	0 00E+00	2.30E-02	4 59E-02
U-238	-4.2851E-09	1,481.61	0 00	1 04E-04	9 78E-05	1 04E-04
Y-90	2 7505E+00	1,481.61	2,963.22	0 00E+00	4 08E+03	8 15E+03
Other Radionuclides					7 62E+03	1 52E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5 717E+14
0 0250	1.232E+14
0 0375	1 137E+14
0 0575	1 118E+14
0 0850	7 124E+13
0 1250	6 170E+13
0.2250	6 038E+13
0 3750	2 923E+13
0 5750	4 015E+14
0 8500	5 622E+13
1.2500	1 046E+13
1 7500	4.387E+11
2.2500	9.201E+11
2 7500	5.293E+09
3.5000	5.871E+08
5 0000	1 755E+03
7 0000	1 957E+02
11 0000	2.206E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.51E+01	1.50E+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 %	92.99999478	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		1,481 61	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		2 963.22	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-S (UALX-HEU) GERMANY
SNF ID #: 582
Fuel Units & Descr: 1 - MTR TYPE
Heavy Metal Mass: BOL=0 176kg; EOL=0 126kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 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	1 4545E-10	48.11	96.22	0 00E+00	7 00E-09	1 40E-08
Am-241	1 1190E-03	48 11	96 22	0 00E+00	5 38E-02	1 08E-01
Am-242m	4 5425E-07	48 11	96 22	0 00E+00	2.19E-05	4.37E-05
Am-243	1 4921E-06	48 11	96 22	0 00E+00	7.18E-05	1 44E-04
C-14	5 7244E-09	48 11	96 22	0 00E+00	2 75E-07	5 51E-07
Cl-36	1 3124E-32	48 11	96 22	0 00E+00	6 31E-31	1 26E-30
Cm-243	2 3676E-07	48 11	96 22	0 00E+00	1 14E-05	2 28E-05
Cm-244	5.2042E-05	48 11	96 22	0 00E+00	2 50E-03	5 01E-03
Co-60	3 8208E-05	48 11	96.22	0 00E+00	1 84E-03	3 68E-03
Cs-134	4 8693E-01	48 11	96.22	0 00E+00	2 34E+01	4 69E+01
Cs-135	3 4477E-06	48 11	96.22	0 00E+00	1 66E-04	3.32E-04
Cs-137	2 8731E+00	48.11	96.22	0 00E+00	1.38E+02	2.76E+02
Eu-154	8.2053E-02	48 11	96.22	0 00E+00	3 95E+00	7 89E+00
Eu-155	3 9134E-02	48 11	96 22	0 00E+00	1 88E+00	3 77E+00
Fe-55	6 7429E-03	48 11	96 22	0 00E+00	3.24E-01	6 49E-01
H-3	1 0599E-02	48 11	96 22	0 00E+00	5 10E-01	1 02E+00
I-129	7 5300E-07	48 11	96 22	0 00E+00	3 62E-05	7 25E-05
Kr-85	2 8595E-01	48 11	96 22	0 00E+00	1 38E+01	2 75E+01
Np-237	9 5479E-06	48 11	96 22	0 00E+00	4 59E-04	9 19E-04
Pa-231	8 9297E-10	48 11	96 22	0 00E+00	4 30E-08	8 59E-08
Pb-210	3 7609E-12	48.11	96.22	0 00E+00	1 81E-10	3 62E-10
Pm-147	2.5452E+00	48.11	96.22	0 00E+00	1.22E+02	2 45E+02
Pu-238	2 0550E-02	48.11	96.22	0 00E+00	9 89E-01	1 98E+00
Pu-239	4 2838E-04	48 11	96 22	0 00E+00	2.06E-02	4 12E-02
Pu-240	2 4401E-04	48 11	96 22	0 00E+00	1.17E-02	2 35E-02
Pu-241	6 8764E-02	48 11	96 22	0 00E+00	3 31E+00	6 62E+00
Pu-242	3 6329E-07	48 11	96 22	0 00E+00	1 75E-05	3 50E-05
Ra-226	3 8045E-11	48 11	96 22	0 00E+00	1 83E-09	3 66E-09
Ra-228	2 9902E-15	48 11	96.22	0 00E+00	1 44E-13	2 88E-13
Ru-106	1 9055E-01	48 11	96.22	0 00E+00	9 17E+00	1 83E+01
Se-79	1 2936E-05	48 11	96.22	0 00E+00	6.22E-04	1.24E-03
Sn-126	1.1574E-05	48.11	96.22	0 00E+00	5 57E-04	1.11E-03
Sr-90	2 7505E+00	48.11	96 22	0 00E+00	1 32E+02	2 65E+02
Tc-99	4.2239E-04	48.11	96 22	0 00E+00	2 03E-02	4 06E-02
Th-229	1 8848E-12	48 11	96 22	0 00E+00	9 07E-11	1 81E-10
Th-230	1 7042E-08	48 11	96 22	0 00E+00	8 20E-07	1 64E-06
Th-232	7 8132E-15	48 11	96 22	0 00E+00	3 76E-13	7 52E-13
Tl-208	4 4063E-08	48 11	96 22	0 00E+00	2 12E-06	4.24E-06
U-232	1.3151E-07	48 11	96.22	0 00E+00	6 33E-06	1.27E-05
U-233	1 9564E-09	48 11	96.22	0 00E+00	9 41E-08	1.88E-07
U-234	1 8371E-04	48.11	96.22	0 00E+00	8 84E-03	1.77E-02
U-235	-2 7235E-06	48.11	0 00	3 54E-04	2.23E-04	3.54E-04
U-236	1 5493E-05	48.11	96.22	0 00E+00	7.45E-04	1 49E-03
U-238	-4.2851E-09	48 11	0 00	4 15E-06	3 94E-06	4 15E-06
Y-90	2 7505E+00	48 11	96 22	0 00E+00	1 32E+02	2 65E+02
Other Radionuclides					2 47E+02	4 95E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 856E+13
0 0250	3 999E+12
0 0375	3 690E+12
0 0575	3 629E+12
0 0850	2.313E+12
0 1250	2.003E+12
0.2250	1 961E+12
0.3750	9 491E+11
0.5750	1 304E+13
0.8500	1 826E+12
1.2500	3 397E+11
1 7500	1 424E+10
2.2500	2 987E+10
2.7500	1 719E+08
3 5000	1 906E+07
5 0000	5.700E+01
7 0000	6 354E+00
11 0000	7 162E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 44E+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	ALUM	ALUM
BOL HM Constituents.	U	U
BOL Enrichment %:	92 99999263	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		48.11
Bounding		96.22

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 87	
Bounding	1 73	

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-S (UALX-HEU) GERMANY
SNF ID # 584
Fuel Units & Descr 44 - MTR TYPE
Heavy Metal Mass BOL=8 136kg EOL=5 944kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 5 years

Estimated Canister usage 18"x10' 1 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	1 4545E-10	2,075 11	4,150 22	0 00E+00	3 02E-07	6 04E-07
Am-241	1.1190E-03	2,075 11	4,150 22	0 00E+00	2 32E+00	4 64E+00
Am-242m	4.5425E-07	2,075 11	4,150 22	0 00E+00	9 43E-04	1.89E-03
Am-243	1.4921E-06	2,075 11	4,150 22	0 00E+00	3 10E-03	6 19E-03
C-14	5.7244E-09	2,075 11	4,150 22	0 00E+00	1.19E-05	2.38E-05
Cl-36	1.3124E-32	2,075 11	4,150 22	0 00E+00	2.72E-29	5 45E-29
Cm-243	2 3676E-07	2,075 11	4,150 22	0 00E+00	4 91E-04	9 83E-04
Cm-244	5 2042E-05	2,075 11	4,150.22	0 00E+00	1 08E-01	2 16E-01
Co-60	3 8208E-05	2,075 11	4,150 22	0 00E+00	7 93E-02	1 59E-01
Cs-134	4 8693E-01	2,075 11	4,150 22	0 00E+00	1.01E+03	2 02E+03
Cs-135	3 4477E-06	2,075 11	4,150.22	0 00E+00	7 15E-03	1 43E-02
Cs-137	2 8731E+00	2,075 11	4,150.22	0 00E+00	5 96E+03	1 19E+04
Eu-154	8 2053E-02	2,075 11	4,150.22	0 00E+00	1 70E+02	3 41E+02
Eu-155	3 9134E-02	2,075.11	4,150.22	0 00E+00	8 12E+01	1 62E+02
Fe-55	6 7429E-03	2,075.11	4,150.22	0 00E+00	1 40E+01	2 80E+01
H-3	1 0599E-02	2,075 11	4,150.22	0 00E+00	2 20E+01	4 40E+01
I-129	7.5300E-07	2,075 11	4,150.22	0 00E+00	1 56E-03	3 13E-03
Kr-85	2 8595E-01	2,075 11	4,150 22	0 00E+00	5 93E+02	1 19E+03
Np-237	9 5479E-06	2,075 11	4,150.22	0 00E+00	1 98E-02	3 96E-02
Pa-231	8 9297E-10	2,075 11	4,150 22	0 00E+00	1 85E-06	3 71E-06
Pb-210	3 7609E-12	2,075 11	4,150 22	0 00E+00	7 80E-09	1.56E-08
Pm-147	2.5452E+00	2,075 11	4,150 22	0 00E+00	5 28E+03	1 06E+04
Pu-238	2 0550E-02	2,075 11	4,150 22	0 00E+00	4.26E+01	8 53E+01
Pu-239	4.2838E-04	2,075 11	4,150 22	0 00E+00	8 89E-01	1.78E+00
Pu-240	2 4401E-04	2,075 11	4,150 22	0 00E+00	5 06E-01	1 01E+00
Pu-241	6 8764E-02	2,075 11	4,150 22	0 00E+00	1.43E+02	2 85E+02
Pu-242	3 6329E-07	2,075 11	4,150 22	0 00E+00	7.54E-04	1 51E-03
Ra-226	3 8045E-11	2,075 11	4,150.22	0 00E+00	7 89E-08	1 58E-07
Ra-228	2 9902E-15	2,075 11	4,150.22	0 00E+00	6.20E-12	1 24E-11
Ru-106	1 9055E-01	2,075 11	4,150.22	0 00E+00	3 95E+02	7 91E+02
Se-79	1 2936E-05	2,075 11	4,150.22	0 00E+00	2 68E-02	5 37E-02
Sn-126	1 1574E-05	2,075 11	4,150.22	0 00E+00	2 40E-02	4 80E-02
Sr-90	2 7505E+00	2,075.11	4,150.22	0 00E+00	5 71E+03	1 14E+04
Tc-99	4 2239E-04	2,075 11	4,150.22	0 00E+00	8 76E-01	1 75E+00
Th-229	1 8848E-12	2,075 11	4,150.22	0 00E+00	3 91E-09	7.82E-09
Th-230	1 7042E-08	2,075 11	4,150.22	0 00E+00	3 54E-05	7.07E-05
Th-232	7 8132E-15	2,075 11	4,150.22	0 00E+00	1 62E-11	3.24E-11
Tl-208	4 4063E-08	2,075 11	4,150 22	0 00E+00	9 14E-05	1.83E-04
U-232	1.3151E-07	2,075 11	4,150 22	0 00E+00	2 73E-04	5 46E-04
U-233	1 9564E-09	2,075 11	4,150 22	0 00E+00	4 06E-06	8 12E-06
U-234	1 8371E-04	2,075 11	4,150 22	0 00E+00	3.81E-01	7 62E-01
U-235	-2 7235E-06	2,075 11	0 00	1 64E-02	1.07E-02	1 64E-02
U-236	1.5493E-05	2,075 11	4,150 22	0 00E+00	3.21E-02	6 43E-02
U-238	-4 2851E-09	2,075 11	0 00	1.91E-04	1 83E-04	1 91E-04
Y-90	2 7505E+00	2,075 11	4,150 22	0 00E+00	5.71E+03	1 14E+04
Other Radionuclides					1.07E+04	2 13E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8 007E+14
0 0250	1 725E+14
0 0375	1 592E+14
0 0575	1 565E+14
0 0850	9 978E+13
0 1250	8 641E+13
0 2250	8 457E+13
0 3750	4 094E+13
0 5750	5 623E+14
0 8500	7.875E+13
1.2500	1 465E+13
1 7500	6 144E+11
2.2500	1.289E+12
2 7500	7 414E+09
3.5000	8.222E+08
5.0000	2 459E+03
7 0000	2 741E+02
11 0000	3 089E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.05E+02	2.10E+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 %	93.00001838	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		2,075 11	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		4 150.22	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 81	
Bounding	1 62	

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-S (UALX-HEU) GERMANY	[1]Fuel decay start date:	2010
SNF ID #	585	Estimates as of.	2010
Fuel Units & Descr:	50 - MTR TYPE	Template.	TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
Heavy Metal Mass·	BOL=9 675kg, EOL=4 635kg	[2]Template Burnup(MWd):	6 65
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT):	0 00018
		Template Decay Time	5 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	8 0632E-10	4,810.77	9,234 97	0 00E+00	3 88E-06	7 45E-06
Am-241	2 2586E-03	4,810.77	9,234 97	0 00E+00	1 09E+01	2 09E+01
Am-242m	1 9925E-06	4 810.77	9,234 97	0 00E+00	9 59E-03	1 84E-02
Am-243	2 3323E-07	4,810 77	9,234 97	0 00E+00	1 12E-03	2 15E-03
C-14	4 3308E-05	4,810 77	9,234 97	0 00E+00	2 08E-01	4 00E-01
Cl-36	4 3023E-08	4,810 77	9,234 97	0 00E+00	2 07E-04	3 97E-04
Cm-243	2 7429E-07	4,810 77	9,234 97	0 00E+00	1 32E-03	2 53E-03
Cm-244	3 1504E-06	4,810 77	9,234 97	0 00E+00	1 52E-02	2 91E-02
Co-60	3 1008E-02	4,810 77	9,234 97	0 00E+00	1 49E+02	2 86E+02
Cs-134	1 0367E-01	4,810 77	9,234.97	0 00E+00	4 99E+02	9 57E+02
Cs-135	3 1549E-05	4,810 77	9,234.97	0 00E+00	1 52E-01	2 91E-01
Cs-137	2 7564E+00	4,810 77	9,234 97	0 00E+00	1 33E+04	2 55E+04
Eu-154	1 3490E+00	4,810 77	9,234 97	0 00E+00	6 49E+03	1.25E+04
Eu-155	4 3880E-01	4,810 77	9,234 97	0 00E+00	2 11E+03	4 05E+03
Fe-55	8 6782E-03	4,810 77	9,234 97	0 00E+00	4 17E+01	8 01E+01
H-3	1 0805E-02	4,810 77	9,234 97	0 00E+00	5.20E+01	9 98E+01
I-129	7 3805E-07	4,810 77	9,234 97	0 00E+00	3 55E-03	6 82E-03
Kr-85	2 5218E-01	4,810 77	9,234 97	0 00E+00	1.21E+03	2.33E+03
Np-237	1 4463E-06	4,810 77	9,234 97	0 00E+00	6 96E-03	1 34E-02
Pa-231	3 5970E-09	4,810 77	9,234 97	0 00E+00	1 73E-05	3 32E-05
Pb-210	8 2511E-15	4,810 77	9,234 97	0 00E+00	3 97E-11	7.62E-11
Pm-147	2 0767E+00	4,810 77	9,234 97	0 00E+00	9 99E+03	1 92E+04
Pu-238	1 3514E-03	4,810 77	9,234 97	0 00E+00	6 50E+00	1 25E+01
Pu-239	5 6947E-03	4,810 77	9,234 97	0 00E+00	2 74E+01	5 26E+01
Pu-240	2.2647E-03	4,810.77	9,234 97	0.00E+00	1 09E+01	2 09E+01
Pu-241	1.2574E-01	4,810.77	9,234 97	0 00E+00	6 05E+02	1 16E+03
Pu-242	3 0602E-07	4,810.77	9,234 97	0.00E+00	1 47E-03	2 83E-03
Ra-226	5.7353E-14	4,810.77	9,234 97	0 00E+00	2 76E-10	5 30E-10
Ra-228	1 8150E-10	4,810.77	9,234 97	0 00E+00	8 73E-07	1 68E-06
Ru-106	9.3744E-02	4,810 77	9,234 97	0 00E+00	4 51E+02	8 66E+02
Se-79	1.2938E-05	4,810 77	9,234 97	0 00E+00	6 22E-02	1 19E-01
Sn-126	1.2239E-05	4,810 77	9,234 97	0 00E+00	5 89E-02	1 13E-01
Sr-90	2 6000E+00	4,810 77	9,234 97	0 00E+00	1 25E+04	2 40E+04
Tc-99	4 4120E-04	4,810 77	9,234.97	0 00E+00	2 12E+00	4 07E+00
Th-229	1 4749E-10	4,810 77	9,234 97	0 00E+00	7 10E-07	1 36E-06
Th-230	1 9549E-11	4,810 77	9,234 97	0 00E+00	9 40E-08	1 81E-07
Th-232	2 3744E-10	4,810 77	9,234 97	0 00E+00	1 14E-06	2 19E-06
Tl-208	1 9459E-08	4,810 77	9,234 97	0 00E+00	9 36E-05	1 80E-04
U-232	5 6015E-08	4,810 77	9,234 97	0 00E+00	2 69E-04	5 17E-04
U-233	1 3132E-07	4,810 77	9,234 97	0 00E+00	6 32E-04	1 21E-03
U-234	1 7323E-07	4,810 77	9,234 97	0 00E+00	8 33E-04	1 60E-03
U-235	-2 6159E-06	4,810 77	0 00	1 94E-02	6 86E-03	1 94E-02
U-236	1 2717E-05	4,810 77	9,234 97	0 00E+00	6 12E-02	1.17E-01
U-238	-3 8857E-08	4,810 77	0 00	2.28E-04	4 07E-05	2.28E-04
Y-90	2 6015E+00	4,810 77	9,234 97	0 00E+00	1.25E+04	2 40E+04
Other Radionuclides					1 83E+04	3.51E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1.563E+15
0 0250	3.392E+14
0 0375	4.226E+14
0 0575	3.239E+14
0 0850	2.268E+14
0 1250	3.391E+14
0.2250	1 893E+14
0 3750	8 425E+13
0 5750	1 068E+15
0 8500	2 629E+14
1.2500	2.725E+14
1 7500	7 800E+12
2.2500	9 481E+11
2.7500	7 701E+09
3 5000	9 001E+08
5 0000	5 269E+03
7 0000	5 962E+02
11 0000	6 790E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.42E+02	4.64E+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 %	92 9999938	10 to 20 1

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		4 810 77
Bounding		9,234 97

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	13 46	
Bounding	25.84	

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-S (UALX-HEU) GERMANY
SNF ID # 588
Fuel Units & Descr 2 - MTR TYPE
Heavy Metal Mass BOL=0 404kg EOL=0 273kg
ROD Storage Site SRS

[1]Fuel decay start date: 2010
Estimates as of 2010
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: 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	1 4545E-10	124 06	248 12	0 00E+00	1 80E-08	3 61E-08
Am-241	1 1190E-03	124 06	248 12	0 00E+00	1.39E-01	2.78E-01
Am-242m	4 5425E-07	124 06	248 12	0 00E+00	5 64E-05	1 13E-04
Am-243	1 4921E-06	124 06	248 12	0 00E+00	1 85E-04	3 70E-04
C-14	5 7244E-09	124 06	248 12	0 00E+00	7 10E-07	1 42E-06
Cl-36	1 3124E-32	124 06	248 12	0 00E+00	1 63E-30	3 26E-30
Cm-243	2 3676E-07	124.06	248 12	0 00E+00	2 94E-05	5 87E-05
Cm-244	5.2042E-05	124 06	248 12	0 00E+00	6 46E-03	1.29E-02
Co-60	3 8208E-05	124 06	248 12	0 00E+00	4 74E-03	9 48E-03
Cs-134	4 8693E-01	124 06	248 12	0 00E+00	6 04E+01	1 21E+02
Cs-135	3 4477E-06	124 06	248 12	0 00E+00	4.28E-04	8 55E-04
Cs-137	2 8731E+00	124 06	248 12	0 00E+00	3 56E+02	7 13E+02
Eu-154	8.2053E-02	124 06	248 12	0 00E+00	1 02E+01	2 04E+01
Eu-155	3 9134E-02	124 06	248 12	0 00E+00	4 85E+00	9 71E+00
Fe-55	6 7429E-03	124 06	248 12	0 00E+00	8.37E-01	1 67E+00
H-3	1 0599E-02	124 06	248.12	0 00E+00	1.31E+00	2 63E+00
I-129	7 5300E-07	124 06	248 12	0 00E+00	9 34E-05	1 87E-04
Kr-85	2 8595E-01	124 06	248 12	0 00E+00	3.55E+01	7.09E+01
Np-237	9 5479E-06	124 06	248 12	0 00E+00	1 18E-03	2 37E-03
Pa-231	8 9297E-10	124 06	248 12	0 00E+00	1 11E-07	2 22E-07
Pb-210	3 7609E-12	124 06	248 12	0 00E+00	4 67E-10	9 33E-10
Pm-147	2.5452E+00	124 06	248 12	0 00E+00	3 16E+02	6 32E+02
Pu-238	2 0550E-02	124 06	248 12	0 00E+00	2 55E+00	5 10E+00
Pu-239	4.2838E-04	124 06	248 12	0 00E+00	5 31E-02	1 06E-01
Pu-240	2 4401E-04	124 06	248 12	0 00E+00	3 03E-02	6 05E-02
Pu-241	6 8764E-02	124 06	248 12	0 00E+00	8 53E+00	1 71E+01
Pu-242	3 6329E-07	124 06	248 12	0 00E+00	4.51E-05	9 01E-05
Ra-226	3 8045E-11	124 06	248 12	0 00E+00	4 72E-09	9 44E-09
Ra-228	2 9902E-15	124 06	248 12	0 00E+00	3 71E-13	7 42E-13
Ru-106	1 9055E-01	124 06	248 12	0 00E+00	2.36E+01	4.73E+01
Se-79	1.2936E-05	124 06	248 12	0 00E+00	1 60E-03	3 21E-03
Sn-126	1 1574E-05	124 06	248 12	0 00E+00	1 44E-03	2 87E-03
Sr-90	2 7505E+00	124 06	248 12	0 00E+00	3 41E+02	6 82E+02
Tc-99	4 2239E-04	124.06	248 12	0 00E+00	5 24E-02	1 05E-01
Th-229	1 8848E-12	124 06	248 12	0 00E+00	2 34E-10	4 68E-10
Th-230	1 7042E-08	124 06	248 12	0 00E+00	2 11E-06	4.23E-06
Th-232	7 8132E-15	124 06	248 12	0 00E+00	9 69E-13	1.94E-12
Tl-208	4 4063E-08	124 06	248 12	0 00E+00	5 47E-06	1.09E-05
U-232	1.3151E-07	124 06	248 12	0 00E+00	1 63E-05	3.26E-05
U-233	1 9564E-09	124 06	248 12	0 00E+00	2 43E-07	4 85E-07
U-234	1 8371E-04	124 06	248 12	0 00E+00	2.28E-02	4 56E-02
U-235	-2 7235E-06	124 06	0 00	7 87E-04	4.49E-04	7.87E-04
U-236	1.5493E-05	124 06	248.12	0 00E+00	1.92E-03	3 84E-03
U-238	-4 2851E-09	124 06	0 00	1.36E-05	1.31E-05	1 36E-05
Y-90	2 7505E+00	124 06	248 12	0 00E+00	3 41E+02	6 82E+02
Other Radionuclides					6.38E+02	1 28E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 787E+13
0 0250	1.031E+13
0 0375	9.516E+12
0 0575	9.357E+12
0 0850	5 965E+12
0 1250	5 166E+12
0.2250	5 056E+12
0 3750	2 447E+12
0 5750	3 362E+13
0 8500	4 708E+12
1.2500	8 759E+11
1.7500	3 673E+10
2.2500	7 704E+10
2.7500	4 432E+08
3 5000	4 916E+07
5 0000	1.470E+02
7 0000	1.639E+01
11 0000	1.847E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.29E+00	1.26E+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 00000989	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		124 06	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		248 12	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 97	
Bounding	1.95	--

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-S (UALX-HEU) JAPAN
SNF ID #: 602
Fuel Units & Descr: 40 - MTR TYPE
Heavy Metal Mass: BOL=7 74kg; EOL=6 012kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage: 18"x10' 1 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	1 4545E-10	1,636 45	3,272 90	0 00E+00	2.38E-07	4 76E-07
Am-241	1.1190E-03	1,636 45	3,272 90	0 00E+00	1 83E+00	3 66E+00
Am-242m	4 5425E-07	1,636 45	3,272 90	0 00E+00	7 43E-04	1 49E-03
Am-243	1 4921E-06	1,636 45	3,272 90	0 00E+00	2 44E-03	4 88E-03
C-14	5 7244E-09	1,636 45	3,272 90	0 00E+00	9 37E-06	1 87E-05
Cl-36	1.3124E-32	1,636 45	3,272 90	0 00E+00	2 15E-29	4 30E-29
Cm-243	2.3676E-07	1,636 45	3,272 90	0 00E+00	3 87E-04	7 75E-04
Cm-244	5.2042E-05	1,636 45	3,272 90	0 00E+00	8 52E-02	1 70E-01
Co-60	3 8208E-05	1,636 45	3,272 90	0 00E+00	6 25E-02	1 25E-01
Cs-134	4 8693E-01	1,636 45	3,272 90	0 00E+00	7 97E+02	1 59E+03
Cs-135	3 4477E-06	1,636 45	3,272 90	0 00E+00	5 64E-03	1 13E-02
Cs-137	2 8731E+00	1,636 45	3,272 90	0 00E+00	4 70E+03	9 40E+03
Eu-154	8.2053E-02	1,636 45	3,272 90	0 00E+00	1 34E+02	2 69E+02
Eu-155	3 9134E-02	1,636 45	3,272 90	0 00E+00	6 40E+01	1.28E+02
Fe-55	6 7429E-03	1,636 45	3,272 90	0 00E+00	1 10E+01	2.21E+01
H-3	1 0599E-02	1,636 45	3,272.90	0 00E+00	1.73E+01	3.47E+01
I-129	7 5300E-07	1,636 45	3,272 90	0 00E+00	1 23E-03	2.46E-03
Kr-85	2 8595E-01	1,636 45	3,272.90	0 00E+00	4 68E+02	9 36E+02
Np-237	9 5479E-06	1,636 45	3,272.90	0 00E+00	1 56E-02	3.12E-02
Pa-231	8 9297E-10	1,636 45	3,272.90	0 00E+00	1 46E-06	2.92E-06
Pb-210	3 7609E-12	1 636 45	3,272 90	0 00E+00	6 15E-09	1.23E-08
Pm-147	2 5452E+00	1,636 45	3,272 90	0 00E+00	4 17E+03	8 33E+03
Pu-238	2 0550E-02	1,636 45	3,272 90	0 00E+00	3.36E+01	6 73E+01
Pu-239	4 2838E-04	1,636 45	3,272 90	0 00E+00	7.01E-01	1 40E+00
Pu-240	2 4401E-04	1,636 45	3,272 90	0 00E+00	3.99E-01	7 99E-01
Pu-241	6 8764E-02	1,636 45	3,272 90	0 00E+00	1 13E+02	2 25E+02
Pu-242	3 6329E-07	1,636 45	3,272 90	0 00E+00	5 95E-04	1 19E-03
Ra-226	3 8045E-11	1,636 45	3,272 90	0 00E+00	6.23E-08	1 25E-07
Ra-228	2 9902E-15	1,636 45	3,272 90	0 00E+00	4 89E-12	9 79E-12
Ru-106	1 9055E-01	1,636 45	3,272 90	0 00E+00	3 12E+02	6 24E+02
Se-79	1.2936E-05	1,636 45	3,272 90	0 00E+00	2.12E-02	4 23E-02
Sn-126	1.1574E-05	1,636 45	3,272 90	0 00E+00	1 89E-02	3 79E-02
Sr-90	2.7505E+00	1,636 45	3,272 90	0 00E+00	4 50E+03	9 00E+03
Tc-99	4.2239E-04	1,636 45	3,272 90	0.00E+00	6 91E-01	1 38E+00
Th-229	1 8848E-12	1,636 45	3,272 90	0 00E+00	3 08E-09	6 17E-09
Th-230	1 7042E-08	1,636 45	3,272 90	0 00E+00	2 79E-05	5 58E-05
Th-232	7 8132E-15	1,636 45	3,272.90	0 00E+00	1 28E-11	2.56E-11
Tl-208	4 4063E-08	1,636 45	3,272 90	0 00E+00	7 21E-05	1 44E-04
U-232	1 3151E-07	1,636 45	3,272.90	0 00E+00	2 15E-04	4 30E-04
U-233	1 9564E-09	1,636 45	3,272.90	0 00E+00	3 20E-06	6 40E-06
U-234	1 8371E-04	1,636 45	3,272.90	0 00E+00	3 01E-01	6 01E-01
U-235	-2.7235E-06	1,636.45	0 00	1 56E-02	1 11E-02	1.56E-02
U-236	1 5493E-05	1,636.45	3,272 90	0 00E+00	2 54E-02	5 07E-02
U-238	-4 2851E-09	1,636.45	0 00	1 82E-04	1 75E-04	1 82E-04
Y-90	2 7505E+00	1,636 45	3,272.90	0 00E+00	4 50E+03	9 00E+03
Other Radionuclides					8 42E+03	1 68E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6 314E+14
0 0250	1 360E+14
0 0375	1.255E+14
0 0575	1.234E+14
0 0850	7 869E+13
0 1250	6.814E+13
0.2250	6 669E+13
0 3750	3.228E+13
0 5750	4 434E+14
0 8500	6.210E+13
1.2500	1 155E+13
1 7500	4 845E+11
2.2500	1 016E+12
2 7500	5 847E+09
3.5000	6 484E+08
5 0000	1 939E+03
7 0000	2.161E+02
11 0000	2 436E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.30E+01	1 66E+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 99999931	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal:		1 636 45	Nominal burnup calculated from the heavy metal mass destroyed
Bounding:		3,272 90	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 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-S (UALX-HEU) NETHERLANDS
SNF ID # 607
Fuel Units & Descr 19 - MTR TYPE
Heavy Metal Mass BOL=2.042kg, EOL=1 093kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 5 years

Estimated Canister usage

18"x10'
0 79

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	1.4545E-10	899 67	1,799 34	0 00E+00	1.31E-07	2 62E-07
Am-241	1 1190E-03	899 67	1,799 34	0 00E+00	1 01E+00	2 01E+00
Am-242m	4 5425E-07	899 67	1,799 34	0 00E+00	4 09E-04	8 17E-04
Am-243	1 4921E-06	899 67	1,799 34	0 00E+00	1 34E-03	2 68E-03
C-14	5 7244E-09	899 67	1,799 34	0 00E+00	5 15E-06	1 03E-05
Cl-36	1 3124E-32	899 67	1,799 34	0 00E+00	1.18E-29	2 36E-29
Cm-243	2 3676E-07	899 67	1,799 34	0 00E+00	2.13E-04	4.26E-04
Cm-244	5 2042E-05	899 67	1,799 34	0 00E+00	4 68E-02	9 36E-02
Co-60	3 8208E-05	899 67	1,799.34	0 00E+00	3 44E-02	6 87E-02
Cs-134	4 8693E-01	899 67	1,799.34	0 00E+00	4.38E+02	8 76E+02
Cs-135	3 4477E-06	899 67	1,799 34	0 00E+00	3 10E-03	6 20E-03
Cs-137	2 8731E+00	899 67	1,799 34	0 00E+00	2 58E+03	5 17E+03
Eu-154	8 2053E-02	899 67	1,799 34	0 00E+00	7 38E+01	1 48E+02
Eu-155	3 9134E-02	899 67	1,799 34	0 00E+00	3 52E+01	7 04E+01
Fe-55	6 7429E-03	899 67	1,799 34	0 00E+00	6 07E+00	1 21E+01
H-3	1 0599E-02	899 67	1,799 34	0 00E+00	9 54E+00	1 91E+01
I-129	7.5300E-07	899 67	1,799.34	0 00E+00	6 77E-04	1.35E-03
Kr-85	2 8595E-01	899 67	1,799.34	0 00E+00	2.57E+02	5.15E+02
Np-237	9 5479E-06	899 67	1,799 34	0 00E+00	8 59E-03	1 72E-02
Pa-231	8 9297E-10	899 67	1,799 34	0 00E+00	8 03E-07	1 61E-06
Pb-210	3 7609E-12	899 67	1,799 34	0 00E+00	3 38E-09	6 77E-09
Pm-147	2 5452E+00	899 67	1,799 34	0 00E+00	2 29E+03	4 58E+03
Pu-238	2 0550E-02	899 67	1,799 34	0 00E+00	1 85E+01	3 70E+01
Pu-239	4 2838E-04	899 67	1,799 34	0 00E+00	3 85E-01	7.71E-01
Pu-240	2 4401E-04	899 67	1,799 34	0 00E+00	2.20E-01	4.39E-01
Pu-241	6 8764E-02	899 67	1,799.34	0 00E+00	6 19E+01	1.24E+02
Pu-242	3 6329E-07	899 67	1,799.34	0 00E+00	3 27E-04	6 54E-04
Ra-226	3 8045E-11	899 67	1,799 34	0 00E+00	3 42E-08	6 85E-08
Ra-228	2 9902E-15	899 67	1,799 34	0 00E+00	2 69E-12	5 38E-12
Ru-106	1 9055E-01	899 67	1,799 34	0 00E+00	1 71E+02	3 43E+02
Se-79	1 2936E-05	899 67	1,799 34	0 00E+00	1.16E-02	2 33E-02
Sn-126	1 1574E-05	899 67	1,799 34	0 00E+00	1.04E-02	2 08E-02
Sr-90	2 7505E+00	899 67	1,799 34	0 00E+00	2 47E+03	4 95E+03
Tc-99	4.2239E-04	899 67	1,799 34	0 00E+00	3 80E-01	7 60E-01
Th-229	1.8848E-12	899 67	1,799.34	0 00E+00	1 70E-09	3 39E-09
Th-230	1 7042E-08	899 67	1,799 34	0.00E+00	1 53E-05	3 07E-05
Th-232	7 8132E-15	899 67	1,799 34	0 00E+00	7 03E-12	1 41E-11
Tl-208	4 4063E-08	899 67	1,799 34	0 00E+00	3 96E-05	7 93E-05
U-232	1.3151E-07	899 67	1,799 34	0 00E+00	1.18E-04	2.37E-04
U-233	1 9564E-09	899 67	1,799 34	0 00E+00	1.76E-06	3 52E-06
U-234	1 8371E-04	899 67	1,799 34	0 00E+00	1 65E-01	3.31E-01
U-235	-2 7235E-06	899 67	0 00	4 10E-03	1 65E-03	4 10E-03
U-236	1.5493E-05	899 67	1,799.34	0 00E+00	1 39E-02	2 79E-02
U-238	-4.2851E-09	899 67	0 00	4 81E-05	4 42E-05	4 81E-05
Y-90	2 7505E+00	899 67	1,799 34	0 00E+00	2 47E+03	4 95E+03
Other Radionuclides					4 63E+03	9 25E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 471E+14
0 0250	7.479E+13
0 0375	6 901E+13
0 0575	6 786E+13
0 0850	4 326E+13
0 1250	3 746E+13
0 2250	3 667E+13
0.3750	1 775E+13
0.5750	2.438E+14
0 8500	3 414E+13
1.2500	6.352E+12
1 7500	2 664E+11
2.2500	5 587E+11
2.7500	3 214E+09
3.5000	3 565E+08
5.0000	1 066E+03
7.0000	1 188E+02
11 0000	1.339E+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	LIGHT WATER	LIGHT WATER
Fuel Cladding	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	92 99998697	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		899 67	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		1,799.34	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-S (UALX-HEU) NETHERLANDS
SNF ID #: 608
Fuel Units & Descr: 61 - MTR TYPE
Heavy Metal Mass. BOL=12 462kg; EOL=6 667kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage: 18"x10' 2 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	1 4545E-10	5,487.98	10,975 95	0 00E+00	7 98E-07	1 60E-06
Am-241	1 1190E-03	5,487.98	10,975 95	0 00E+00	6 14E+00	1.23E+01
Am-242m	4 5425E-07	5,487 98	10,975 95	0 00E+00	2 49E-03	4 99E-03
Am-243	1 4921E-06	5,487 98	10,975 95	0 00E+00	8 19E-03	1 64E-02
C-14	5 7244E-09	5,487 98	10,975 95	0 00E+00	3 14E-05	6 28E-05
Cl-36	1 3124E-32	5,487 98	10,975 95	0 00E+00	7.20E-29	1 44E-28
Cm-243	2 3676E-07	5,487 98	10,975 95	0 00E+00	1.30E-03	2 60E-03
Cm-244	5 2042E-05	5,487 98	10,975 95	0 00E+00	2 86E-01	5 71E-01
Co-60	3 8208E-05	5,487 98	10,975 95	0 00E+00	2.10E-01	4 19E-01
Cs-134	4 8693E-01	5,487 98	10,975 95	0 00E+00	2 67E+03	5 34E+03
Cs-135	3 4477E-06	5,487 98	10,975 95	0 00E+00	1 89E-02	3 78E-02
Cs-137	2 8731E+00	5,487 98	10,975 95	0 00E+00	1 58E+04	3 15E+04
Eu-154	8 2053E-02	5,487 98	10,975 95	0 00E+00	4 50E+02	9 01E+02
Eu-155	3 9134E-02	5,487 98	10,975 95	0 00E+00	2 15E+02	4.30E+02
Fe-55	6.7429E-03	5,487.98	10,975 95	0 00E+00	3 70E+01	7 40E+01
H-3	1 0599E-02	5,487 98	10,975 95	0 00E+00	5 82E+01	1 16E+02
I-129	7 5300E-07	5,487 98	10,975 95	0 00E+00	4 13E-03	8.26E-03
Kr-85	2 8595E-01	5,487 98	10,975 95	0 00E+00	1.57E+03	3 14E+03
Np-237	9 5479E-06	5,487 98	10,975 95	0 00E+00	5.24E-02	1 05E-01
Pa-231	8 9297E-10	5,487 98	10,975 95	0 00E+00	4 90E-06	9 80E-06
Pb-210	3 7609E-12	5,487 98	10,975 95	0 00E+00	2.06E-08	4 13E-08
Pm-147	2 5452E+00	5,487 98	10,975.95	0 00E+00	1 40E+04	2 79E+04
Pu-238	2 0550E-02	5,487 98	10,975.95	0 00E+00	1 13E+02	2 26E+02
Pu-239	4.2838E-04	5,487 98	10,975.95	0 00E+00	2 35E+00	4 70E+00
Pu-240	2 4401E-04	5 487 98	10,975 95	0 00E+00	1 34E+00	2 68E+00
Pu-241	6 8764E-02	5,487 98	10,975 95	0 00E+00	3 77E+02	7.55E+02
Pu-242	3 6329E-07	5,487.98	10,975 95	0 00E+00	1 99E-03	3 99E-03
Ra-226	3 8045E-11	5,487.98	10,975 95	0 00E+00	2 09E-07	4.18E-07
Ra-228	2 9902E-15	5,487.98	10,975 95	0 00E+00	1 64E-11	3.28E-11
Ru-106	1 9055E-01	5,487 98	10,975 95	0 00E+00	1.05E+03	2 09E+03
Se-79	1.2936E-05	5,487 98	10,975 95	0 00E+00	7.10E-02	1 42E-01
Sn-126	1 1574E-05	5,487 98	10,975 95	0 00E+00	6.35E-02	1.27E-01
Sr-90	2 7505E+00	5,487 98	10,975 95	0 00E+00	1 51E+04	3 02E+04
Tc-99	4 2239E-04	5,487 98	10,975 95	0 00E+00	2 32E+00	4 64E+00
Th-229	1 8848E-12	5,487 98	10,975.95	0 00E+00	1 03E-08	2 07E-08
Th-230	1 7042E-08	5,487 98	10,975 95	0 00E+00	9 35E-05	1 87E-04
Th-232	7 8132E-15	5,487 98	10,975 95	0 00E+00	4.29E-11	8 58E-11
Tl-208	4 4063E-08	5,487.98	10,975 95	0 00E+00	2 42E-04	4 84E-04
U-232	1.3151E-07	5,487.98	10,975 95	0.00E+00	7 22E-04	1 44E-03
U-233	1.9564E-09	5,487.98	10,975 95	0 00E+00	1 07E-05	2.15E-05
U-234	1.8371E-04	5,487.98	10,975 95	0 00E+00	1 01E+00	2 02E+00
U-235	-2.7235E-06	5,487 98	0.00	2 50E-02	1 01E-02	2.50E-02
U-236	1 5493E-05	5,487 98	10,975 95	0 00E+00	8 50E-02	1.70E-01
U-238	-4.2851E-09	5,487 98	0 00	2 93E-04	2.70E-04	2 93E-04
Y-90	2 7505E+00	5,487 98	10,975 95	0 00E+00	1 51E+04	3 02E+04
Other Radionuclides					2 82E+04	5 65E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2 118E+15
0 0250	4 562E+14
0 0375	4.210E+14
0 0575	4 139E+14
0 0850	2.639E+14
0 1250	2.285E+14
0.2250	2.237E+14
0 3750	1 083E+14
0 5750	1 487E+15
0 8500	2 083E+14
1 2500	3 875E+13
1 7500	1 625E+12
2.2500	3 408E+12
2 7500	1 961E+10
3 5000	2 175E+09
5 0000	6.501E+03
7 0000	7.247E+02
11.0000	8 169E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.78E+02	5.57E+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 %	92 99998578	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		5 487 98	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		10 975 95	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-S (UALX-HEU) PORTUGAL	[1]Fuel decay start date:	2010	Estimated Canister usage
SNF ID #	632	Estimates as of	2010	18"x10'
Fuel Units & Descr	22 - MTR TYPE	Template	ATR (Light Water, Alum , 60 to 100%, U)	0 92
Heavy Metal Mass	BOL=6.246kg EOL=3 923kg	[2]Template Burnup(MWd):	367.2	
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0 00116689	
		Template Decay Time	5 years	

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 4545E-10	2,200 12	4,400.23	0 00E+00	3 20E-07	6 40E-07
Am-241	1.1190E-03	2,200 12	4,400.23	0 00E+00	2 46E+00	4 92E+00
Am-242m	4 5425E-07	2,200 12	4,400.23	0 00E+00	9 99E-04	2 00E-03
Am-243	1 4921E-06	2,200 12	4,400.23	0 00E+00	3 28E-03	6 57E-03
C-14	5 7244E-09	2,200 12	4,400.23	0 00E+00	1.26E-05	2 52E-05
Cl-36	1.3124E-32	2,200 12	4,400.23	0.00E+00	2 89E-29	5 77E-29
Cm-243	2.3676E-07	2,200 12	4,400.23	0 00E+00	5 21E-04	1 04E-03
Cm-244	5.2042E-05	2,200 12	4,400.23	0 00E+00	1 14E-01	2 29E-01
Co-60	3.8208E-05	2,200 12	4,400.23	0 00E+00	8 41E-02	1 68E-01
Cs-134	4 8693E-01	2,200 12	4,400.23	0 00E+00	1 07E+03	2 14E+03
Cs-135	3 4477E-06	2,200 12	4,400.23	0 00E+00	7 59E-03	1.52E-02
Cs-137	2.8731E+00	2,200 12	4,400.23	0.00E+00	6 32E+03	1.26E+04
Eu-154	8.2053E-02	2,200 12	4,400.23	0 00E+00	1 81E+02	3 61E+02
Eu-155	3 9134E-02	2,200 12	4,400.23	0 00E+00	8 61E+01	1 72E+02
Fe-55	6 7429E-03	2,200 12	4,400 23	0 00E+00	1 48E+01	2 97E+01
H-3	1 0599E-02	2,200 12	4,400.23	0 00E+00	2 33E+01	4 66E+01
I-129	7.5300E-07	2,200 12	4,400 23	0 00E+00	1.66E-03	3.31E-03
Kr-85	2 8595E-01	2,200 12	4,400 23	0 00E+00	6.29E+02	1.26E+03
Np-237	9 5479E-06	2,200 12	4,400 23	0 00E+00	2.10E-02	4.20E-02
Pa-231	8 9297E-10	2,200 12	4,400 23	0 00E+00	1.96E-06	3 93E-06
Pb-210	3 7609E-12	2,200 12	4,400 23	0 00E+00	8.27E-09	1 65E-08
Pm-147	2 5452E+00	2,200 12	4,400 23	0 00E+00	5 60E+03	1.12E+04
Pu-238	2 0550E-02	2,200 12	4,400 23	0 00E+00	4.52E+01	9 04E+01
Pu-239	4 2838E-04	2,200 12	4,400 23	0 00E+00	9 42E-01	1.88E+00
Pu-240	2 4401E-04	2,200 12	4,400 23	0 00E+00	5 37E-01	1 07E+00
Pu-241	6 8764E-02	2,200 12	4,400 23	0 00E+00	1.51E+02	3 03E+02
Pu-242	3 6329E-07	2,200 12	4,400 23	0 00E+00	7.99E-04	1 60E-03
Ra-226	3 8045E-11	2,200 12	4,400 23	0 00E+00	8 37E-08	1 67E-07
Ra-228	2 9902E-15	2,200 12	4,400 23	0 00E+00	6 58E-12	1 32E-11
Ru-106	1 9055E-01	2,200 12	4,400 23	0 00E+00	4 19E+02	8 38E+02
Se-79	1 2936E-05	2,200 12	4,400 23	0 00E+00	2 85E-02	5 69E-02
Sn-126	1 1574E-05	2,200 12	4,400 23	0 00E+00	2 55E-02	5 09E-02
Sr-90	2 7505E+00	2,200 12	4,400 23	0 00E+00	6 05E+03	1.21E+04
Tc-99	4 2239E-04	2,200.12	4,400 23	0 00E+00	9 29E-01	1 86E+00
Th-229	1 8848E-12	2,200.12	4,400 23	0 00E+00	4 15E-09	8.29E-09
Th-230	1 7042E-08	2,200.12	4,400 23	0 00E+00	3 75E-05	7.50E-05
Th-232	7 8132E-15	2,200.12	4,400.23	0 00E+00	1 72E-11	3 44E-11
Tl-208	4 4063E-08	2,200.12	4,400.23	0 00E+00	9 69E-05	1.94E-04
U-232	1.3151E-07	2,200 12	4,400.23	0 00E+00	2 89E-04	5.79E-04
U-233	1 9564E-09	2,200 12	4,400.23	0 00E+00	4.30E-06	8 61E-06
U-234	1 8371E-04	2,200 12	4,400.23	0 00E+00	4 04E-01	8 08E-01
U-235	-2 7235E-06	2,200 12	0.00	1.26E-02	6 56E-03	1.26E-02
U-236	1.5493E-05	2,200 12	4,400.23	0.00E+00	3 41E-02	6.82E-02
U-238	-4.2851E-09	2,200 12	0 00	1.47E-04	1.38E-04	1.47E-04
Y-90	2.7505E+00	2,200 12	4,400.23	0 00E+00	6 05E+03	1.21E+04
Other Radionuclides					1 13E+04	2.26E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8.489E+14
0 0250	1 829E+14
0 0375	1 688E+14
0 0575	1 659E+14
0 0850	1 058E+14
0 1250	9 161E+13
0.2250	8 966E+13
0.3750	4 340E+13
0.5750	5 962E+14
0.8500	8 349E+13
1.2500	1 553E+13
1 7500	6 514E+11
2.2500	1 366E+12
2 7500	7 860E+09
3.5000	8 718E+08
5 0000	2.606E+03
7 0000	2.906E+02
11 0000	3.275E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.12E+02	2.23E+02
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 %:	92.99999055	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		2,200 12	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		4 400 23	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	1.12		1 03
Bounding	2.24		

[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-S (UALX-HEU) SWITZERLAND
SNF ID #: 658
Fuel Units & Descr: 55 - MTR TYPE
Heavy Metal Mass: BOL=16 676kg EOL=5 973kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage.
18"x10'
2 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	1 4545E-10	10,135 95	15,792 50	0 00E+00	1 47E-06	2 30E-06
Am-241	1 1190E-03	10,135 95	15,792 50	0 00E+00	1 13E+01	1.77E+01
Am-242m	4 5425E-07	10,135 95	15,792.50	0 00E+00	4 60E-03	7 17E-03
Am-243	1 4921E-06	10,135 95	15,792.50	0 00E+00	1.51E-02	2 36E-02
C-14	5 7244E-09	10,135 95	15,792.50	0 00E+00	5 80E-05	9 04E-05
Cl-36	1 3124E-32	10,135 95	15,792.50	0 00E+00	1.33E-28	2 07E-28
Cm-243	2 3676E-07	10,135 95	15,792 50	0 00E+00	2.40E-03	3 74E-03
Cm-244	5 2042E-05	10,135 95	15,792 50	0 00E+00	5.27E-01	8 22E-01
Co-60	3 8208E-05	10,135 95	15,792 50	0 00E+00	3 87E-01	6 03E-01
Cs-134	4 8693E-01	10,135 95	15,792 50	0 00E+00	4 94E+03	7 69E+03
Cs-135	3 4477E-06	10,135 95	15,792 50	0 00E+00	3.49E-02	5 44E-02
Cs-137	2 8731E+00	10,135 95	15,792 50	0 00E+00	2 91E+04	4 54E+04
Eu-154	8.2053E-02	10,135 95	15,792 50	0 00E+00	8 32E+02	1 30E+03
Eu-155	3 9134E-02	10,135 95	15,792 50	0 00E+00	3 97E+02	6 18E+02
Fe-55	6 7429E-03	10,135 95	15,792 50	0 00E+00	6 83E+01	1 06E+02
H-3	1 0599E-02	10,135 95	15,792 50	0 00E+00	1 07E+02	1 67E+02
I-129	7 5300E-07	10,135 95	15,792 50	0 00E+00	7.63E-03	1.19E-02
Kr-85	2 8595E-01	10,135 95	15,792 50	0 00E+00	2 90E+03	4 52E+03
Np-237	9 5479E-06	10,135 95	15,792 50	0 00E+00	9 68E-02	1 51E-01
Pa-231	8 9297E-10	10,135 95	15,792 50	0 00E+00	9 05E-06	1 41E-05
Pb-210	3.7609E-12	10,135 95	15,792 50	0 00E+00	3 81E-08	5 94E-08
Pm-147	2 5452E+00	10,135 95	15,792 50	0 00E+00	2 58E+04	4 02E+04
Pu-238	2 0550E-02	10,135 95	15,792 50	0 00E+00	2 08E+02	3 25E+02
Pu-239	4.2838E-04	10,135 95	15,792 50	0 00E+00	4.34E+00	6 77E+00
Pu-240	2 4401E-04	10,135 95	15,792 50	0 00E+00	2 47E+00	3 85E+00
Pu-241	6 8764E-02	10,135 95	15,792 50	0 00E+00	6.97E+02	1 09E+03
Pu-242	3 6329E-07	10,135 95	15,792 50	0 00E+00	3 68E-03	5 74E-03
Ra-226	3.8045E-11	10,135 95	15,792 50	0 00E+00	3 86E-07	6 01E-07
Ra-228	2 9902E-15	10,135 95	15,792 50	0 00E+00	3 03E-11	4 72E-11
Ru-106	1 9055E-01	10,135 95	15,792 50	0 00E+00	1.93E+03	3 01E+03
Se-79	1.2936E-05	10,135 95	15,792 50	0 00E+00	1.31E-01	2 04E-01
Sn-126	1 1574E-05	10,135 95	15,792 50	0 00E+00	1.17E-01	1 83E-01
Sr-90	2.7505E+00	10,135 95	15,792 50	0 00E+00	2.79E+04	4 34E+04
Tc-99	4.2239E-04	10,135 95	15,792 50	0 00E+00	4.28E+00	6 67E+00
Th-229	1 8848E-12	10,135 95	15,792 50	0 00E+00	1 91E-08	2 98E-08
Th-230	1.7042E-08	10,135 95	15,792 50	0 00E+00	1 73E-04	2 69E-04
Th-232	7 8132E-15	10,135 95	15,792 50	0 00E+00	7 92E-11	1.23E-10
Tl-208	4 4063E-08	10,135 95	15,792 50	0 00E+00	4 47E-04	6.96E-04
U-232	1.3151E-07	10,135 95	15,792 50	0 00E+00	1 33E-03	2.08E-03
U-233	1 9564E-09	10,135 95	15,792 50	0 00E+00	1 98E-05	3.09E-05
U-234	1 8371E-04	10,135 95	15,792 50	0 00E+00	1 86E+00	2 90E+00
U-235	-2.7235E-06	10,135 95	0 00	3 35E-02	5 91E-03	3.35E-02
U-236	1.5493E-05	10,135 95	15,792 50	0 00E+00	1 57E-01	2.45E-01
U-238	-4 2851E-09	10,135 95	0 00	3 92E-04	3 49E-04	3.92E-04
Y-90	2.7505E+00	10,135 95	15,792 50	0 00E+00	2 79E+04	4 34E+04
Other Radionuclides					5.21E+04	8 12E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 047E+15
0 0250	6 564E+14
0 0375	6 057E+14
0 0575	5 956E+14
0 0850	3 797E+14
0 1250	3 288E+14
0.2250	3 218E+14
0.3750	1 558E+14
0 5750	2.140E+15
0 8500	2 996E+14
1.2500	5 575E+13
1.7500	2.338E+12
2.2500	4 903E+12
2.7500	2 821E+10
3.5000	3 129E+09
5.0000	9 354E+03
7.0000	1 043E+03
11 0000	1 175E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.14E+02	8 01E+02
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 00000816	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		10 135 95	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		15 792 50	Bounding burnup calculated assuming all BOL heavy metal burned.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 93	
Bounding	3 01	

Estimated EOL HM/Given EOL HM: 1 10

[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-S (UALX-HEU) TURKEY
SNF ID #: 644
Fuel Units & Descr: 18 - MTR TYPE
Heavy Metal Mass: BOL=5 42kg EOL=2 9kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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: 5 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	1 4545E-10	2,386 49	4,772 98	0 00E+00	3 47E-07	6 94E-07
Am-241	1.1190E-03	2,386 49	4,772 98	0 00E+00	2 67E+00	5 34E+00
Am-242m	4 5425E-07	2,386 49	4,772 98	0 00E+00	1 08E-03	2.17E-03
Am-243	1 4921E-06	2,386 49	4,772 98	0 00E+00	3 56E-03	7 12E-03
C-14	5 7244E-09	2,386 49	4,772 98	0 00E+00	1.37E-05	2 73E-05
Cl-36	1.3124E-32	2,386 49	4,772.98	0 00E+00	3 13E-29	6 26E-29
Cm-243	2 3676E-07	2,386 49	4,772.98	0 00E+00	5 65E-04	1 13E-03
Cm-244	5 2042E-05	2,386 49	4,772 98	0 00E+00	1 24E-01	2 48E-01
Co-60	3 8208E-05	2,386 49	4,772 98	0 00E+00	9 12E-02	1 82E-01
Cs-134	4 8693E-01	2,386.49	4,772 98	0 00E+00	1 16E+03	2 32E+03
Cs-135	3.4477E-06	2,386 49	4,772 98	0 00E+00	8 23E-03	1.65E-02
Cs-137	2 8731E+00	2,386 49	4,772 98	0 00E+00	6 86E+03	1.37E+04
Eu-154	8.2053E-02	2,386 49	4,772 98	0 00E+00	1 96E+02	3 92E+02
Eu-155	3 9134E-02	2,386 49	4,772.98	0 00E+00	9 34E+01	1 87E+02
Fe-55	6 7429E-03	2,386 49	4,772.98	0 00E+00	1.61E+01	3.22E+01
H-3	1 0599E-02	2,386 49	4,772 98	0 00E+00	2.53E+01	5 06E+01
I-129	7 5300E-07	2,386 49	4,772 98	0 00E+00	1 80E-03	3 59E-03
Kr-85	2 8595E-01	2,386 49	4,772 98	0 00E+00	6 82E+02	1 36E+03
Np-237	9 5479E-06	2,386 49	4,772 98	0 00E+00	2 28E-02	4.56E-02
Pa-231	8 9297E-10	2,386 49	4,772 98	0 00E+00	2 13E-06	4.26E-06
Pb-210	3 7609E-12	2,386 49	4,772 98	0 00E+00	8 98E-09	1 80E-08
Pm-147	2 5452E+00	2,386 49	4,772 98	0 00E+00	6 07E+03	1.21E+04
Pu-238	2 0550E-02	2,386 49	4,772.98	0 00E+00	4 90E+01	9 81E+01
Pu-239	4 2838E-04	2,386 49	4,772.98	0 00E+00	1.02E+00	2 04E+00
Pu-240	2 4401E-04	2,386 49	4,772 98	0 00E+00	5 82E-01	1 16E+00
Pu-241	6 8764E-02	2,386 49	4,772 98	0 00E+00	1 64E+02	3 28E+02
Pu-242	3 6329E-07	2,386 49	4,772 98	0 00E+00	8 67E-04	1.73E-03
Ra-226	3 8045E-11	2,386 49	4,772 98	0 00E+00	9 08E-08	1.82E-07
Ra-228	2 9902E-15	2,386 49	4,772 98	0 00E+00	7.14E-12	1 43E-11
Ru-106	1.9055E-01	2,386 49	4,772 98	0 00E+00	4 55E+02	9 09E+02
Se-79	1.2936E-05	2,386 49	4,772 98	0 00E+00	3.09E-02	6 17E-02
Sn-126	1 1574E-05	2,386 49	4,772 98	0 00E+00	2 76E-02	5 52E-02
Sr-90	2 7505E+00	2,386 49	4,772 98	0 00E+00	6 56E+03	1 31E+04
Tc-99	4 2239E-04	2,386 49	4,772 98	0 00E+00	1 01E+00	2 02E+00
Th-229	1 8848E-12	2,386 49	4,772 98	0 00E+00	4 50E-09	9 00E-09
Th-230	1 7042E-08	2,386.49	4,772 98	0 00E+00	4 07E-05	8.13E-05
Th-232	7.8132E-15	2,386 49	4,772 98	0.00E+00	1 86E-11	3 73E-11
Tl-208	4 4063E-08	2,386 49	4,772 98	0 00E+00	1.05E-04	2 10E-04
U-232	1.3151E-07	2,386 49	4,772.98	0 00E+00	3 14E-04	6 28E-04
U-233	1 9564E-09	2,386 49	4,772.98	0 00E+00	4 67E-06	9 34E-06
U-234	1 8371E-04	2,386 49	4,772.98	0 00E+00	4 38E-01	8 77E-01
U-235	-2 7235E-06	2,386 49	0 00	1 09E-02	4 39E-03	1 09E-02
U-236	1 5493E-05	2,386 49	4,772 98	0 00E+00	3 70E-02	7.39E-02
U-238	-4.2851E-09	2,386 49	0 00	1.28E-04	1 17E-04	1.28E-04
Y-90	2 7505E+00	2,386 49	4,772 98	0.00E+00	6 56E+03	1.31E+04
Other Radionuclides					1.23E+04	2 45E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	9.208E+14
0 0250	1 984E+14
0 0375	1 831E+14
0 0575	1.800E+14
0 0850	1 148E+14
0 1250	9 937E+13
0 2250	9 726E+13
0 3750	4 708E+13
0 5750	6.467E+14
0 8500	9 056E+13
1.2500	1 685E+13
1 7500	7 066E+11
2.2500	1.482E+12
2 7500	8 526E+09
3 5000	9 456E+08
5 0000	2.827E+03
7 0000	3 152E+02
11 0000	3.552E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.21E+02	2.42E+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 %	92.99998782	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		2,386.49	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		4 772.98	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-S (UALX-LEU) JAPAN
SNF ID #: 553
Fuel Units & Descr: 476 - ASSEMBLY
Heavy Metal Mass: BOL=714kg; EOL=632 461kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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 5 years

Estimated Canister usage: 18"x10' — 19 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	1 7533E-10	77,499 76	154,999 52	0 00E+00	1 36E-05	2 72E-05
Am-241	1.2780E-02	77,499 76	154,999 52	0 00E+00	9 90E+02	1 98E+03
Am-242m	9 5467E-06	77,499 76	154,999 52	0 00E+00	7 40E-01	1.48E+00
Am-243	6 4100E-06	77,499 76	154,999 52	0 00E+00	4 97E-01	9 94E-01
C-14	2 9673E-08	77,499 76	154,999.52	0 00E+00	2 30E-03	4 60E-03
Cl-36	5 9513E-35	77,499 76	154,999.52	0 00E+00	4 61E-30	9.22E-30
Cm-243	3 1807E-06	77,499 76	154,999 52	0 00E+00	2 47E-01	4 93E-01
Cm-244	1 9540E-04	77,499 76	154,999 52	0 00E+00	1.51E+01	3 03E+01
Co-60	1 1753E-04	77,499 76	154,999 52	0 00E+00	9 11E+00	1 82E+01
Cs-134	3 3060E-01	77,499 76	154,999 52	0 00E+00	2 56E+04	5 12E+04
Cs-135	4 8607E-06	77,499 76	154,999 52	0 00E+00	3.77E-01	7 53E-01
Cs-137	2 8607E+00	77,499.76	154,999 52	0 00E+00	2 22E+05	4 43E+05
Eu-154	6 9933E-02	77,499.76	154,999 52	0 00E+00	5 42E+03	1 08E+04
Eu-155	3.3253E-02	77,499 76	154,999 52	0 00E+00	2 58E+03	5 15E+03
Fe-55	7.7267E-02	77,499 76	154,999 52	0 00E+00	5 99E+03	1.20E+04
H-3	1 0827E-02	77,499 76	154,999 52	0 00E+00	8 39E+02	1 68E+03
I-129	7 1600E-07	77,499 76	154,999.52	0 00E+00	5 55E-02	1.11E-01
Kr-85	2 7007E-01	77,499 76	154,999.52	0 00E+00	2 09E+04	4 19E+04
Np-237	3 6327E-06	77,499 76	154,999 52	0 00E+00	2 82E-01	5 63E-01
Pa-231	1 1267E-09	77,499 76	154,999 52	0 00E+00	8.73E-05	1 75E-04
Pb-210	1 9773E-15	77,499 76	154,999 52	0 00E+00	1.53E-10	3 06E-10
Pm-147	2 4367E+00	77,499 76	154,999 52	0 00E+00	1 89E+05	3 78E+05
Pu-238	6 2213E-03	77,499.76	154,999 52	0 00E+00	4 82E+02	9 64E+02
Pu-239	1 0320E-02	77,499 76	154,999 52	0 00E+00	8 00E+02	1 60E+03
Pu-240	5.4260E-03	77,499 76	154,999 52	0 00E+00	4 21E+02	8 41E+02
Pu-241	7.7333E-01	77,499 76	154,999 52	0 00E+00	5 99E+04	1.20E+05
Pu-242	3.0713E-06	77,499 76	154,999 52	0 00E+00	2 38E-01	4 76E-01
Ra-226	2.2027E-14	77,499 76	154,999.52	0 00E+00	1 71E-09	3.41E-09
Ra-228	2 6333E-15	77,499 76	154,999 52	0 00E+00	2 04E-10	4 08E-10
Ru-106	2 5580E-01	77,499 76	154,999 52	0 00E+00	1 98E+04	3 96E+04
Se-79	1 2540E-05	77,499 76	154,999 52	0 00E+00	9 72E-01	1 94E+00
Sn-126	1 1393E-05	77,499 76	154,999 52	0 00E+00	8 83E-01	1 77E+00
Sr-90	2 6293E+00	77,499 76	154,999 52	0 00E+00	2 04E+05	4 08E+05
Tc-99	4 3540E-04	77,499.76	154,999 52	0 00E+00	3 37E+01	6 75E+01
Th-229	1 3653E-13	77,499 76	154,999 52	0 00E+00	1 06E-08	2 12E-08
Th-230	1.2607E-11	77,499 76	154,999 52	0 00E+00	9 77E-07	1 95E-06
Th-232	6.7400E-15	77,499 76	154,999 52	0 00E+00	5 22E-10	1 04E-09
Tl-208	7.4667E-09	77,499 76	154 999.52	0 00E+00	5 79E-04	1.16E-03
U-232	2.1927E-08	77,499 76	154,999 52	0 00E+00	1.70E-03	3 40E-03
U-233	1 9920E-10	77,499 76	154,999 52	0 00E+00	1 54E-05	3.09E-05
U-234	2 2487E-07	77,499 76	154,999 52	0 00E+00	1.74E-02	3 49E-02
U-235	-2 5341E-06	77,499 76	0.00	3 09E-01	1.12E-01	3 09E-01
U-236	1 3000E-05	77,499 76	154,999 52	0 00E+00	1 01E+00	2 01E+00
U-238	-1 4207E-08	77,499 76	0 00	1 92E-01	1 91E-01	1 92E-01
Y-90	2 6300E+00	77,499.76	154,999 52	0 00E+00	2 04E+05	4 08E+05
Other Radionuclides					3 66E+05	7 32E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.812E+16
0 0250	6 060E+15
0 0375	5.522E+15
0 0575	5.512E+15
0 0850	3 472E+15
0 1250	2.899E+15
0.2250	2.961E+15
0.3750	1 436E+15
0.5750	1 982E+16
0 8500	2.103E+15
1.2500	4 647E+14
1 7500	2.212E+13
2.2500	3.847E+13
2.7500	3 480E+11
3 5000	4 122E+10
5 0000	4.035E+05
7 0000	4.597E+04
11 0000	5.250E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 67E+03	7.34E+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 %	20	10 to 20

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		77 499 76
Bounding		154 999.52

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 48	
Bounding	4 96	

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-S (UALX-LEU) PORTUGAL
SNF ID # 542
Fuel Units & Descr 6 - ASSEMBLY
Heavy Metal Mass BOL=5 4kg EOL=5 152kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of 2010
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 5 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	1.4545E-10	235 24	470 48	0 00E+00	3 42E-08	6 84E-08
Am-241	1.1190E-03	235.24	470 48	0 00E+00	2 63E-01	5 26E-01
Am-242m	4.5425E-07	235 24	470 48	0 00E+00	1 07E-04	2 14E-04
Am-243	1 4921E-06	235 24	470 48	0 00E+00	3 51E-04	7 02E-04
C-14	5 7244E-09	235 24	470 48	0 00E+00	1.35E-06	2 69E-06
Cl-36	1.3124E-32	235 24	470 48	0 00E+00	3 09E-30	6 17E-30
Cm-243	2 3676E-07	235 24	470 48	0 00E+00	5 57E-05	1.11E-04
Cm-244	5 2042E-05	235 24	470 48	0 00E+00	1.22E-02	2.45E-02
Co-60	3 8208E-05	235 24	470 48	0 00E+00	8.99E-03	1.80E-02
Cs-134	4 8693E-01	235.24	470 48	0 00E+00	1.15E+02	2.29E+02
Cs-135	3 4477E-06	235.24	470 48	0 00E+00	8 11E-04	1 62E-03
Cs-137	2.8731E+00	235.24	470 48	0 00E+00	6 76E+02	1.35E+03
Eu-154	8.2053E-02	235.24	470 48	0 00E+00	1 93E+01	3 86E+01
Eu-155	3 9134E-02	235.24	470 48	0 00E+00	9 21E+00	1 84E+01
Fe-55	6 7429E-03	235.24	470 48	0 00E+00	1.59E+00	3 17E+00
H-3	1 0599E-02	235 24	470 48	0 00E+00	2 49E+00	4 99E+00
I-129	7.5300E-07	235 24	470 48	0 00E+00	1 77E-04	3 54E-04
Kr-85	2 8595E-01	235 24	470 48	0 00E+00	6 73E+01	1 35E+02
Np-237	9 5479E-06	235 24	470 48	0 00E+00	2.25E-03	4 49E-03
Pa-231	8 9297E-10	235 24	470 48	0 00E+00	2.10E-07	4.20E-07
Pb-210	3 7609E-12	235.24	470 48	0 00E+00	8 85E-10	1 77E-09
Pm-147	2.5452E+00	235.24	470 48	0 00E+00	5 99E+02	1.20E+03
Pu-238	2 0550E-02	235.24	470.48	0 00E+00	4 83E+00	9 67E+00
Pu-239	4.2838E-04	235.24	470 48	0 00E+00	1 01E-01	2 02E-01
Pu-240	2 4401E-04	235.24	470 48	0 00E+00	5 74E-02	1 15E-01
Pu-241	6 8764E-02	235.24	470 48	0 00E+00	1 62E+01	3 24E+01
Pu-242	3 6329E-07	235.24	470 48	0 00E+00	8 55E-05	1 71E-04
Ra-226	3 8045E-11	235.24	470 48	0 00E+00	8 95E-09	1 79E-08
Ra-228	2 9902E-15	235.24	470 48	0 00E+00	7 03E-13	1 41E-12
Ru-106	1 9055E-01	235.24	470 48	0 00E+00	4 48E+01	8 96E+01
Se-79	1.2936E-05	235 24	470 48	0 00E+00	3 04E-03	6 09E-03
Sn-126	1 1574E-05	235 24	470 48	0 00E+00	2 72E-03	5.45E-03
Sr-90	2 7505E+00	235 24	470 48	0 00E+00	6 47E+02	1.29E+03
Tc-99	4 2239E-04	235 24	470 48	0 00E+00	9.94E-02	1 99E-01
Th-229	1 8848E-12	235.24	470 48	0 00E+00	4 43E-10	8 87E-10
Th-230	1 7042E-08	235.24	470 48	0 00E+00	4 01E-06	8 02E-06
Th-232	7 8132E-15	235.24	470 48	0 00E+00	1 84E-12	3 68E-12
Tl-208	4 4063E-08	235.24	470 48	0.00E+00	1 04E-05	2 07E-05
U-232	1.3151E-07	235.24	470 48	0 00E+00	3 09E-05	6 19E-05
U-233	1 9564E-09	235.24	470 48	0 00E+00	4 60E-07	9.20E-07
U-234	1 8371E-04	235.24	470 48	0 00E+00	4 32E-02	8 64E-02
U-235	-2.7235E-06	235.24	0 00	2 33E-03	1 69E-03	2.33E-03
U-236	1 5493E-05	235 24	470 48	0 00E+00	3 64E-03	7.29E-03
U-238	-4.2851E-09	235 24	0 00	1 45E-03	1 45E-03	1 45E-03
Y-90	2 7505E+00	235 24	470 48	0 00E+00	6 47E+02	1.29E+03
Other Radionuclides					1 21E+03	2 42E+03

Gamma Sources

Photon Energy Group (Avg MeV)	Total Photons/sec (bounding)
0 0150	9 077E+13
0 0250	1.955E+13
0 0375	1.804E+13
0 0575	1 774E+13
0.0850	1 131E+13
0 1250	9 796E+12
0.2250	9 587E+12
0.3750	4 641E+12
0 5750	6 374E+13
0 8500	8 927E+12
1.2500	1 661E+12
1 7500	6 965E+10
2.2500	1 461E+11
2.7500	8 404E+08
3 5000	9 321E+07
5 0000	2.820E+02
7.0000	3 145E+01
11.0000	3.546E+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 %	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		235.24
Bounding		470 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 14	
Bounding	0 28	

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-S (UALX-MEU) GERMANY	[1]Fuel decay start date:	2010
SNF ID #:	1068	Estimates as of:	2010
Fuel Units & Descr.	28 - MTR TYPE	Template:	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass:	BOL=12.88kg; EOL=9 17kg	[2]Template Burnup(MWd):	367.2
ROD Storage Site:	SRS	Template BOL Heavy Metal Mass (MT):	0 00116689
		Template Decay Time:	5 years

Estimated Canister usage: 18"x10' — 1 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	1 4545E-10	3,513 44	7,026 88	0 00E+00	5 11E-07	1 02E-06
Am-241	1 1190E-03	3,513 44	7,026 88	0 00E+00	3 93E+00	7 86E+00
Am-242m	4 5425E-07	3,513 44	7,026 88	0 00E+00	1 60E-03	3.19E-03
Am-243	1 4921E-06	3,513 44	7,026 88	0 00E+00	5 24E-03	1.05E-02
C-14	5 7244E-09	3,513 44	7,026 88	0 00E+00	2 01E-05	4 02E-05
Cl-36	1 3124E-32	3,513 44	7,026 88	0 00E+00	4 61E-29	9.22E-29
Cm-243	2 3676E-07	3,513 44	7,026 88	0 00E+00	8 32E-04	1 66E-03
Cm-244	5.2042E-05	3 513 44	7,026 88	0 00E+00	1 83E-01	3 66E-01
Co-60	3 8208E-05	3,513 44	7,026 88	0 00E+00	1 34E-01	2 68E-01
Cs-134	4 8693E-01	3,513 44	7,026 88	0 00E+00	1 71E+03	3 42E+03
Cs-135	3 4477E-06	3,513.44	7,026 88	0 00E+00	1.21E-02	2 42E-02
Cs-137	2 8731E+00	3,513 44	7,026 88	0 00E+00	1 01E+04	2 02E+04
Eu-154	8.2053E-02	3,513.44	7,026 88	0 00E+00	2 88E+02	5 77E+02
Eu-155	3 9134E-02	3,513.44	7,026 88	0 00E+00	1.37E+02	2 75E+02
Fe-55	6 7429E-03	3,513.44	7,026 88	0 00E+00	2 37E+01	4 74E+01
H-3	1 0599E-02	3,513 44	7,026 88	0 00E+00	3.72E+01	7 45E+01
I-129	7 5300E-07	3,513 44	7,026 88	0 00E+00	2 65E-03	5 29E-03
Kr-85	2 8595E-01	3,513 44	7,026 88	0 00E+00	1 00E+03	2 01E+03
Np-237	9 5479E-06	3,513 44	7,026 88	0 00E+00	3.35E-02	6 71E-02
Pa-231	8 9297E-10	3,513 44	7,026 88	0 00E+00	3.14E-06	6 27E-06
Pb-210	3.7609E-12	3,513 44	7,026.88	0 00E+00	1 32E-08	2 64E-08
Pm-147	2 5452E+00	3,513 44	7,026 88	0 00E+00	8 94E+03	1 79E+04
Pu-238	2 0550E-02	3,513 44	7,026 88	0 00E+00	7 22E+01	1 44E+02
Pu-239	4 2838E-04	3,513 44	7,026 88	0 00E+00	1 51E+00	3 01E+00
Pu-240	2 4401E-04	3,513 44	7,026 88	0 00E+00	8 57E-01	1 71E+00
Pu-241	6 8764E-02	3,513 44	7,026 88	0 00E+00	2 42E+02	4 83E+02
Pu-242	3 6329E-07	3,513 44	7,026 88	0 00E+00	1 28E-03	2 55E-03
Ra-226	3 8045E-11	3,513 44	7,026 88	0 00E+00	1 34E-07	2 67E-07
Ra-228	2 9902E-15	3,513 44	7,026 88	0 00E+00	1 05E-11	2 10E-11
Ru-106	1 9055E-01	3,513 44	7,026 88	0 00E+00	6 69E+02	1.34E+03
Se-79	1.2936E-05	3,513 44	7,026 88	0 00E+00	4 54E-02	9 09E-02
Sn-126	1 1574E-05	3,513 44	7,026 88	0 00E+00	4 07E-02	8.13E-02
Sr-90	2 7505E+00	3,513 44	7,026 88	0 00E+00	9 66E+03	1.93E+04
Tc-99	4 2239E-04	3,513 44	7,026 88	0 00E+00	1 48E+00	2 97E+00
Th-229	1 8848E-12	3,513 44	7,026 88	0 00E+00	6 62E-09	1.32E-08
Th-230	1 7042E-08	3,513 44	7,026 88	0 00E+00	5 99E-05	1.20E-04
Th-232	7 8132E-15	3,513 44	7,026 88	0 00E+00	2 75E-11	5 49E-11
Tl-208	4 4063E-08	3,513 44	7,026 88	0 00E+00	1 55E-04	3.10E-04
U-232	1 3151E-07	3,513 44	7,026 88	0 00E+00	4 62E-04	9.24E-04
U-233	1 9564E-09	3,513 44	7,026 88	0 00E+00	6 87E-06	1.37E-05
U-234	1 8371E-04	3,513 44	7,026 88	0 00E+00	6 45E-01	1.29E+00
U-235	-2 7235E-06	3,513 44	0 00	1.25E-02	2 98E-03	1.25E-02
U-236	1 5493E-05	3,513.44	7,026 88	0 00E+00	5 44E-02	1 09E-01
U-238	-4 2851E-09	3,513 44	0 00	2 38E-03	2.36E-03	2.38E-03
Y-90	2.7505E+00	3,513.44	7,026 88	0 00E+00	9 66E+03	1 93E+04
Other Radionuclides					1 81E+04	3 61E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 356E+15
0 0250	2 921E+14
0 0375	2 695E+14
0 0575	2 650E+14
0 0850	1 689E+14
0 1250	1 463E+14
0.2250	1 432E+14
0 3750	6 931E+13
0.5750	9 521E+14
0 8500	1 333E+14
1.2500	2 481E+13
1 7500	1 040E+12
2.2500	2 182E+12
2 7500	1.255E+10
3.5000	1.392E+09
5 0000	4 167E+03
7 0000	4 646E+02
11 0000	5.237E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 78E+02	3 56E+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 %	45 07	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		3,513 44
Bounding		7 026 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	0.87	
Bounding	1 73	

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 PIN CLUSTER U3SI2-LEU CANADA
SNF ID #: 660
Fuel Units & Descr: 1527 - MULTI-PIN CLUSTER
Heavy Metal Mass BOL=3796.275kg EOL=3226.398kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 5 years

Estimated Canister usage
18"x15'
127 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	1.7533E-10	541,647.53	1,083,295 06	0 00E+00	9 50E-05	1.90E-04
Am-241	1.2780E-02	541,647.53	1,083,295 06	0 00E+00	6 92E+03	1.38E+04
Am-242m	9 5467E-06	541,647.53	1,083,295 06	0 00E+00	5 17E+00	1 03E+01
Am-243	6 4100E-06	541,647.53	1,083,295 06	0 00E+00	3 47E+00	6 94E+00
C-14	2 9673E-08	541,647.53	1,083,295 06	0 00E+00	1 61E-02	3.21E-02
Cl-36	5 9513E-35	541,647.53	1,083,295 06	0 00E+00	3.22E-29	6 45E-29
Cm-243	3 1807E-06	541,647 53	1,083,295 06	0 00E+00	1.72E+00	3 45E+00
Cm-244	1 9540E-04	541,647 53	1,083,295 06	0 00E+00	1 06E+02	2 12E+02
Co-60	1 1753E-04	541,647 53	1,083,295 06	0 00E+00	6.37E+01	1.27E+02
Cs-134	3 3060E-01	541,647 53	1,083,295 06	0 00E+00	1.79E+05	3 58E+05
Cs-135	4 8607E-06	541,647 53	1,083,295 06	0 00E+00	2 63E+00	5 27E+00
Cs-137	2 8607E+00	541,647.53	1,083,295 06	0 00E+00	1 55E+06	3 10E+06
Eu-154	6 9933E-02	541,647 53	1,083,295 06	0 00E+00	3 79E+04	7 58E+04
Eu-155	3.3253E-02	541,647.53	1,083,295 06	0 00E+00	1 80E+04	3 60E+04
Fe-55	7 7267E-02	541,647.53	1,083,295 06	0 00E+00	4 19E+04	8 37E+04
H-3	1 0827E-02	541,647.53	1,083,295 06	0 00E+00	5 86E+03	1.17E+04
I-129	7 1600E-07	541,647.53	1,083,295 06	0 00E+00	3 88E-01	7.76E-01
Kr-85	2 7007E-01	541,647 53	1,083,295 06	0 00E+00	1 46E+05	2.93E+05
Np-237	3 6327E-06	541,647 53	1,083,295 06	0 00E+00	1 97E+00	3.94E+00
Pa-231	1 1267E-09	541,647.53	1,083,295 06	0 00E+00	6 10E-04	1.22E-03
Pb-210	1 9773E-15	541,647 53	1,083,295 06	0 00E+00	1 07E-09	2 14E-09
Pm-147	2 4367E+00	541,647 53	1,083,295 06	0 00E+00	1.32E+06	2 64E+06
Pu-238	6.2213E-03	541,647 53	1,083,295 06	0 00E+00	3.37E+03	6 74E+03
Pu-239	1 0320E-02	541,647 53	1,083,295 06	0 00E+00	5 59E+03	1 12E+04
Pu-240	5 4260E-03	541,647 53	1,083,295 06	0 00E+00	2 94E+03	5 88E+03
Pu-241	7.7333E-01	541,647.53	1,083,295 06	0 00E+00	4 19E+05	8 38E+05
Pu-242	3 0713E-06	541,647.53	1,083,295 06	0 00E+00	1 66E+00	3 33E+00
Ra-226	2.2027E-14	541,647.53	1,083,295 06	0 00E+00	1 19E-08	2.39E-08
Ra-228	2 6333E-15	541,647.53	1,083,295 06	0 00E+00	1 43E-09	2 85E-09
Ru-106	2 5580E-01	541,647.53	1,083,295 06	0 00E+00	1 39E+05	2.77E+05
Se-79	1.2540E-05	541,647.53	1,083,295 06	0 00E+00	6 79E+00	1.36E+01
Sn-126	1 1393E-05	541,647.53	1,083,295 06	0 00E+00	6 17E+00	1.23E+01
Sr-90	2 6293E+00	541,647 53	1,083,295 06	0 00E+00	1 42E+06	2 85E+06
Tc-99	4 3540E-04	541,647 53	1,083,295.06	0 00E+00	2 36E+02	4 72E+02
Th-229	1 3653E-13	541,647 53	1,083,295 06	0 00E+00	7.40E-08	1 48E-07
Th-230	1.2607E-11	541,647.53	1,083,295 06	0 00E+00	6 83E-06	1.37E-05
Th-232	6 7400E-15	541,647 53	1,083,295 06	0 00E+00	3 65E-09	7.30E-09
Tl-208	7 4667E-09	541,647 53	1,083,295 06	0 00E+00	4 04E-03	8 09E-03
U-232	2.1927E-08	541,647 53	1,083,295 06	0 00E+00	1 19E-02	2.38E-02
U-233	1.9920E-10	541,647.53	1,083,295 06	0 00E+00	1 08E-04	2.16E-04
U-234	2.2487E-07	541,647.53	1,083,295 06	0 00E+00	1 22E-01	2.44E-01
U-235	-2 5341E-06	541,647.53	0 00	1 62E+00	2 48E-01	1.62E+00
U-236	1.3000E-05	541,647.53	1,083,295 06	0 00E+00	7 04E+00	1.41E+01
U-238	-1 4207E-08	541,647.53	0 00	1.02E+00	1 02E+00	1 02E+00
Y-90	2 6300E+00	541,647.53	1,083,295 06	0.00E+00	1 42E+06	2 85E+06
Other Radionuclides					2 56E+06	5 12E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.965E+17
0 0250	4.235E+16
0 0375	3.859E+16
0 0575	3.853E+16
0 0850	2 426E+16
0 1250	2 026E+16
0.2250	2 069E+16
0 3750	1 003E+16
0 5750	1.385E+17
0 8500	1 470E+16
1.2500	3.248E+15
1 7500	1 546E+14
2.2500	2.689E+14
2 7500	2.432E+12
3.5000	2.881E+11
5 0000	2.819E+06
7 0000	3.212E+05
11 0000	3 669E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.56E+04	5 13E+04
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 75000043	10 to 20

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		541,647.53	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		1 083,295.06	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	3.26	
Bounding	6.52	

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 PIN CLUSTER U3Si2-LEU SO KOREA	[1]Fuel decay start date:	2010
SNF ID #	293	Estimates as of:	2010
Fuel Units & Descr:	48 - MULTI-PIN CLUSTER	Template:	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass:	BOL=59 52kg, EOL=52 138kg	[2]Template Burnup(MWd)	367.2
ROD Storage Site.	SRS	Template BOL Heavy Metal Mass (MT):	0 00116689
		Template Decay Time:	5 years

Estimated Canister usage 18"x15'
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	1 4545E-10	6,991.28	13,982 55	0 00E+00	1 02E-06	2 03E-06
Am-241	1 1190E-03	6,991.28	13,982 55	0 00E+00	7 82E+00	1 56E+01
Am-242m	4 5425E-07	6,991.28	13,982 55	0 00E+00	3 18E-03	6 35E-03
Am-243	1 4921E-06	6,991.28	13,982 55	0 00E+00	1 04E-02	2 09E-02
C-14	5 7244E-09	6,991.28	13,982 55	0 00E+00	4 00E-05	8 00E-05
Cl-36	1 3124E-32	6,991.28	13,982 55	0 00E+00	9 18E-29	1 84E-28
Cm-243	2 3676E-07	6,991.28	13,982 55	0 00E+00	1 66E-03	3 31E-03
Cm-244	5 2042E-05	6,991.28	13,982 55	0 00E+00	3 64E-01	7 28E-01
Co-60	3 8208E-05	6,991.28	13,982 55	0 00E+00	2 67E-01	5 34E-01
Cs-134	4 8693E-01	6,991.28	13,982 55	0 00E+00	3 40E+03	6 81E+03
Cs-135	3 4477E-06	6,991.28	13,982 55	0 00E+00	2 41E-02	4 82E-02
Cs-137	2 8731E+00	6,991 28	13,982 55	0 00E+00	2 01E+04	4 02E+04
Eu-154	8 2053E-02	6,991 28	13,982 55	0 00E+00	5 74E+02	1 15E+03
Eu-155	3 9134E-02	6,991 28	13,982 55	0 00E+00	2 74E+02	5 47E+02
Fe-55	6 7429E-03	6,991 28	13,982 55	0 00E+00	4 71E+01	9 43E+01
H-3	1 0599E-02	6,991 28	13,982 55	0 00E+00	7.41E+01	1 48E+02
I-129	7 5300E-07	6,991 28	13,982 55	0 00E+00	5 26E-03	1 05E-02
Kr-85	2 8595E-01	6,991 28	13,982 55	0 00E+00	2 00E+03	4 00E+03
Np-237	9 5479E-06	6,991 28	13,982 55	0 00E+00	6 68E-02	1 34E-01
Pa-231	8 9297E-10	6,991 28	13,982 55	0 00E+00	6 24E-06	1 25E-05
Pb-210	3 7609E-12	6,991 28	13,982 55	0 00E+00	2 63E-08	5 26E-08
Pm-147	2 5452E+00	6,991 28	13,982 55	0.00E+00	1.78E+04	3 56E+04
Pu-238	2 0550E-02	6,991 28	13,982 55	0 00E+00	1 44E+02	2 87E+02
Pu-239	4 2838E-04	6,991 28	13,982.55	0 00E+00	2 99E+00	5 99E+00
Pu-240	2 4401E-04	6,991 28	13 982 55	0 00E+00	1.71E+00	3 41E+00
Pu-241	6 8764E-02	6,991 28	13,982.55	0 00E+00	4 81E+02	9 61E+02
Pu-242	3 6329E-07	6,991.28	13,982.55	0 00E+00	2.54E-03	5 08E-03
Ra-226	3 8045E-11	6,991.28	13,982.55	0 00E+00	2 66E-07	5 32E-07
Ra-228	2 9902E-15	6,991.28	13,982.55	0 00E+00	2.09E-11	4 18E-11
Ru-106	1 9055E-01	6,991.28	13,982.55	0 00E+00	1 33E+03	2.66E+03
Se-79	1.2936E-05	6,991.28	13,982.55	0 00E+00	9 04E-02	1 81E-01
Sn-126	1.1574E-05	6,991.28	13,982.55	0 00E+00	8 09E-02	1 62E-01
Sr-90	2.7505E+00	6,991.28	13,982.55	0 00E+00	1 92E+04	3 85E+04
Tc-99	4.2239E-04	6,991.28	13,982 55	0 00E+00	2 95E+00	5 91E+00
Th-229	1 8848E-12	6,991.28	13,982 55	0 00E+00	1 32E-08	2 64E-08
Th-230	1.7042E-08	6,991.28	13,982 55	0 00E+00	1.19E-04	2.38E-04
Th-232	7 8132E-15	6,991.28	13,982 55	0 00E+00	5 46E-11	1 09E-10
Tl-208	4 4063E-08	6,991.28	13,982.55	0 00E+00	3 08E-04	6.16E-04
U-232	1.3151E-07	6,991.28	13,982 55	0 00E+00	9 19E-04	1.84E-03
U-233	1 9564E-09	6,991.28	13,982 55	0 00E+00	1 37E-05	2.74E-05
U-234	1 8371E-04	6,991.28	13,982 55	0 00E+00	1 28E+00	2.57E+00
U-235	-2.7235E-06	6,991.28	0 00	2 57E-02	6 68E-03	2.57E-02
U-236	1 5493E-05	6,991.28	13,982 55	0 00E+00	1 08E-01	2.17E-01
U-238	-4.2851E-09	6,991 28	0.00	1 60E-02	1 60E-02	1 60E-02
Y-90	2 7505E+00	6,991 28	13 982 55	0 00E+00	1 92E+04	3 85E+04
Other Radionuclides					3 60E+04	7 19E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 698E+15
0 0250	5.812E+14
0 0375	5.363E+14
0 0575	5.273E+14
0 0850	3.362E+14
0 1250	2.911E+14
0.2250	2.849E+14
0 3750	1.379E+14
0 5750	1 894E+15
0 8500	2 653E+14
1.2500	4 936E+13
1 7500	2.070E+12
2.2500	4.341E+12
2 7500	2 498E+10
3 5000	2.770E+09
5 0000	8.318E+03
7 0000	9 274E+02
11 0000	1 045E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.54E+02	7.09E+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 99999952	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	Basis for burnup used in estimate:
Nominal.		6,991.28	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		13 982.55	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.37	
Bounding	0 75	

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 PIN CLUSTER U3Si2-LEU SO KOREA
SNF ID #: 659
Fuel Units & Descr 158 - MULTI-PIN CLUSTER
Heavy Metal Mass BOL=343 65kg EOL=298.288kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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: 5 years

Estimated Canister usage
18"x15'
13 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	1 4545E-10	42,958 50	85,917 00	0 00E+00	6 25E-06	1.25E-05
Am-241	1 1190E-03	42,958 50	85,917 00	0 00E+00	4 81E+01	9 61E+01
Am-242m	4 5425E-07	42,958 50	85,917 00	0 00E+00	1 95E-02	3 90E-02
Am-243	1 4921E-06	42,958 50	85,917 00	0 00E+00	6 41E-02	1 28E-01
C-14	5 7244E-09	42,958 50	85,917 00	0 00E+00	2 46E-04	4 92E-04
Cl-36	1 3124E-32	42,958 50	85,917.00	0 00E+00	5 64E-28	1 13E-27
Cm-243	2 3676E-07	42,958 50	85,917 00	0 00E+00	1.02E-02	2 03E-02
Cm-244	5.2042E-05	42,958.50	85,917 00	0 00E+00	2.24E+00	4 47E+00
Co-60	3 8208E-05	42,958.50	85,917 00	0 00E+00	1 64E+00	3.28E+00
Cs-134	4 8693E-01	42,958 50	85,917 00	0 00E+00	2.09E+04	4.18E+04
Cs-135	3 4477E-06	42,958 50	85,917 00	0 00E+00	1 48E-01	2 96E-01
Cs-137	2 8731E+00	42,958 50	85,917 00	0 00E+00	1.23E+05	2 47E+05
Eu-154	8 2053E-02	42,958 50	85,917 00	0 00E+00	3 52E+03	7 05E+03
Eu-155	3 9134E-02	42,958 50	85,917 00	0 00E+00	1 68E+03	3 36E+03
Fe-55	6 7429E-03	42,958 50	85,917 00	0.00E+00	2 90E+02	5 79E+02
H-3	1 0599E-02	42,958 50	85,917.00	0 00E+00	4 55E+02	9 11E+02
I-129	7.5300E-07	42,958 50	85,917.00	0 00E+00	3.23E-02	6 47E-02
Kr-85	2.8595E-01	42,958.50	85,917 00	0 00E+00	1.23E+04	2 46E+04
Np-237	9 5479E-06	42,958.50	85,917 00	0 00E+00	4 10E-01	8.20E-01
Pa-231	8 9297E-10	42,958 50	85,917 00	0 00E+00	3 84E-05	7 67E-05
Pb-210	3 7609E-12	42,958 50	85,917 00	0 00E+00	1 62E-07	3 23E-07
Pm-147	2 5452E+00	42,958 50	85,917 00	0 00E+00	1 09E+05	2 19E+05
Pu-238	2 0550E-02	42,958 50	85,917 00	0 00E+00	8 83E+02	1 77E+03
Pu-239	4 2838E-04	42,958 50	85,917 00	0 00E+00	1 84E+01	3 68E+01
Pu-240	2 4401E-04	42,958 50	85,917 00	0 00E+00	1 05E+01	2 10E+01
Pu-241	6 8764E-02	42,958 50	85,917.00	0 00E+00	2 95E+03	5 91E+03
Pu-242	3 6329E-07	42,958 50	85,917 00	0 00E+00	1.56E-02	3 12E-02
Ra-226	3 8045E-11	42,958.50	85,917 00	0 00E+00	1.63E-06	3.27E-06
Ra-228	2.9902E-15	42,958.50	85,917 00	0 00E+00	1.28E-10	2 57E-10
Ru-106	1.9055E-01	42,958.50	85,917 00	0 00E+00	8 19E+03	1 64E+04
Se-79	1.2936E-05	42,958 50	85,917 00	0 00E+00	5 56E-01	1 11E+00
Sn-126	1 1574E-05	42,958 50	85,917 00	0 00E+00	4 97E-01	9 94E-01
Sr-90	2 7505E+00	42,958 50	85,917 00	0 00E+00	1 18E+05	2 36E+05
Tc-99	4 2239E-04	42,958 50	85,917 00	0 00E+00	1 81E+01	3 63E+01
Th-229	1 8848E-12	42,958 50	85,917.00	0 00E+00	8 10E-08	1 62E-07
Th-230	1 7042E-08	42,958 50	85,917.00	0 00E+00	7.32E-04	1.46E-03
Th-232	7 8132E-15	42,958 50	85,917 00	0 00E+00	3.36E-10	6 71E-10
Tl-208	4.4063E-08	42,958.50	85,917 00	0 00E+00	1 89E-03	3 79E-03
U-232	1.3151E-07	42,958.50	85,917 00	0 00E+00	5 65E-03	1 13E-02
U-233	1 9564E-09	42,958.50	85,917 00	0 00E+00	8 40E-05	1 68E-04
U-234	1 8371E-04	42,958.50	85,917 00	0 00E+00	7 89E+00	1.58E+01
U-235	-2 7235E-06	42,958 50	0 00	1 49E-01	3 15E-02	1 49E-01
U-236	1 5493E-05	42,958 50	85,917.00	0 00E+00	6 66E-01	1.33E+00
U-238	-4.2851E-09	42,958 50	0 00	9.24E-02	9 22E-02	9 24E-02
Y-90	2 7505E+00	42,958 50	85,917.00	0 00E+00	1 18E+05	2.36E+05
Other Radionuclides					2.21E+05	4 42E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 658E+16
0 0250	3 571E+15
0 0375	3.295E+15
0 0575	3.240E+15
0 0850	2 066E+15
0 1250	1 789E+15
0.2250	1 751E+15
0 3750	8 475E+14
0 5750	1 164E+16
0 8500	1 630E+15
1 2500	3 033E+14
1 7500	1.272E+13
2.2500	2.668E+13
2.7500	1 535E+11
3.5000	1 702E+10
5 0000	5 110E+04
7 0000	5 697E+03
11 0000	6 422E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.18E+03	4.36E+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 00000055	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		42,958 50
Bounding		85,917 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	0 40	
Bounding	0 79	

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 PIN CLUSTER UALX HEU CANADA
SNF ID #: 661
Fuel Units & Descr: 225 - MULTI-PIN CLUSTER
Heavy Metal Mass: BOL=118 597kg, EOL=34 627kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage: 18"x15' — 18 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	1 4545E-10	79 521.22	112,314 13	0 00E+00	1 16E-05	1.63E-05
Am-241	1 1190E-03	79,521.22	112,314 13	0 00E+00	8 90E+01	1.26E+02
Am-242m	4 5425E-07	79,521 22	112,314.13	0 00E+00	3 61E-02	5.10E-02
Am-243	1 4921E-06	79,521 22	112,314.13	0 00E+00	1 19E-01	1 68E-01
C-14	5 7244E-09	79,521 22	112,314.13	0 00E+00	4 55E-04	6 43E-04
Cl-36	1 3124E-32	79,521 22	112 314 13	0.00E+00	1 04E-27	1 47E-27
Cm-243	2.3676E-07	79,521 22	112,314 13	0.00E+00	1 88E-02	2 66E-02
Cm-244	5 2042E-05	79,521 22	112,314 13	0 00E+00	4 14E+00	5 85E+00
Co-60	3 8208E-05	79,521 22	112,314 13	0 00E+00	3 04E+00	4 29E+00
Cs-134	4 8693E-01	79,521.22	112,314 13	0 00E+00	3 87E+04	5 47E+04
Cs-135	3 4477E-06	79,521.22	112,314 13	0 00E+00	2 74E-01	3 87E-01
Cs-137	2 8731E+00	79,521.22	112,314 13	0 00E+00	2 28E+05	3.23E+05
Eu-154	8 2053E-02	79,521 22	112,314 13	0 00E+00	6 52E+03	9.22E+03
Eu-155	3 9134E-02	79,521.22	112,314 13	0 00E+00	3 11E+03	4.40E+03
Fe-55	6 7429E-03	79,521.22	112,314 13	0 00E+00	5 36E+02	7.57E+02
H-3	1 0599E-02	79,521.22	112,314 13	0 00E+00	8 43E+02	1.19E+03
I-129	7 5300E-07	79,521.22	112,314 13	0 00E+00	5 99E-02	8 46E-02
Kr-85	2 8595E-01	79,521 22	112,314.13	0 00E+00	2 27E+04	3.21E+04
Np-237	9 5479E-06	79,521 22	112,314.13	0 00E+00	7 59E-01	1 07E+00
Pa-231	8.9297E-10	79,521 22	112,314.13	0 00E+00	7 10E-05	1 00E-04
Pb-210	3.7609E-12	79,521 22	112,314.13	0.00E+00	2.99E-07	4.22E-07
Pm-147	2 5452E+00	79,521 22	112,314 13	0 00E+00	2 02E+05	2 86E+05
Pu-238	2 0550E-02	79,521 22	112,314 13	0 00E+00	1 63E+03	2 31E+03
Pu-239	4 2838E-04	79,521 22	112,314 13	0 00E+00	3 41E+01	4 81E+01
Pu-240	2 4401E-04	79,521.22	112,314 13	0 00E+00	1 94E+01	2 74E+01
Pu-241	6 8764E-02	79,521.22	112,314 13	0 00E+00	5 47E+03	7.72E+03
Pu-242	3 6329E-07	79,521.22	112,314 13	0 00E+00	2 89E-02	4 08E-02
Ra-226	3 8045E-11	79,521.22	112,314 13	0 00E+00	3 03E-06	4 27E-06
Ra-228	2 9902E-15	79,521.22	112,314 13	0 00E+00	2 38E-10	3 36E-10
Ru-106	1 9055E-01	79,521.22	112,314 13	0 00E+00	1 52E+04	2.14E+04
Se-79	1.2936E-05	79,521.22	112,314 13	0 00E+00	1 03E+00	1 45E+00
Sn-126	1.1574E-05	79,521.22	112,314 13	0 00E+00	9 20E-01	1 30E+00
Sr-90	2.7505E+00	79,521 22	112,314.13	0 00E+00	2.19E+05	3 09E+05
Tc-99	4.2239E-04	79,521 22	112,314 13	0 00E+00	3.36E+01	4 74E+01
Th-229	1 8848E-12	79,521 22	112,314 13	0.00E+00	1 50E-07	2.12E-07
Th-230	1 7042E-08	79,521 22	112,314 13	0 00E+00	1.36E-03	1 91E-03
Th-232	7 8132E-15	79,521 22	112,314 13	0 00E+00	6.21E-10	8 78E-10
Tl-208	4 4063E-08	79,521.22	112,314 13	0 00E+00	3.50E-03	4 95E-03
U-232	1 3151E-07	79,521.22	112,314 13	0 00E+00	1.05E-02	1 48E-02
U-233	1 9564E-09	79,521.22	112,314 13	0 00E+00	1 56E-04	2.20E-04
U-234	1 8371E-04	79,521.22	112,314 13	0 00E+00	1 46E+01	2 06E+01
U-235	-2 7235E-06	79,521.22	0 00	2 39E-01	2 22E-02	2 39E-01
U-236	1 5493E-05	79,521.22	112,314 13	0 00E+00	1 23E+00	1 74E+00
U-238	-4 2851E-09	79,521 22	0 00	2 73E-03	2 39E-03	2 73E-03
Y-90	2.7505E+00	79,521 22	112,314.13	0 00E+00	2 19E+05	3 09E+05
Other Radionuclides					4 09E+05	5 78E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.167E+16
0 0250	4 668E+15
0 0375	4 308E+15
0.0575	4 236E+15
0 0850	2.700E+15
0 1250	2.338E+15
0.2250	2.289E+15
0.3750	1 108E+15
0.5750	1 522E+16
0 8500	2 131E+15
1.2500	3 965E+14
1 7500	1 663E+13
2.2500	3 487E+13
2 7500	2 006E+11
3 5000	2.225E+10
5 0000	6 653E+04
7 0000	7 416E+03
11 0000	8.359E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 03E+03	5 69E+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 %	93.14999856	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		79,521 22
Bounding		112,314 13

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	2 13	
Bounding	3 01	

Estimated EOL HM/Given EOL HM: 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 FRR PIN CLUSTER UALX HEU CANADA
SNF ID # 662
Fuel Units & Descr 741 - MULTI-PIN CLUSTER
Heavy Metal Mass. BOL=395 694kg EOL=97.59kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 5 years

Estimated Canister usage 18"x15'
61 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 6950E-11	274,584 76	364,474 92	0 00E+00	1 84E-05	2 44E-05
Am-241	4 4557E-03	274,584 76	364,474 92	0 00E+00	1 22E+03	1 62E+03
Am-242m	1 4666E-06	274,584 76	364,474 92	0 00E+00	4 03E-01	5 35E-01
Am-243	3.7151E-05	274,584 76	364,474.92	0 00E+00	1 02E+01	1.35E+01
C-14	2 6513E-08	274,584 76	364,474 92	0 00E+00	7.28E-03	9 66E-03
Cl-36	4 4441E-31	274,584 76	364,474 92	0 00E+00	1.22E-25	1.62E-25
Cm-243	8 2139E-06	274,584 76	364,474 92	0 00E+00	2.26E+00	2.99E+00
Cm-244	8 2625E-03	274,584 76	364,474 92	0 00E+00	2.27E+03	3 01E+03
Co-60	3 4951E-04	274,584 76	364,474 92	0 00E+00	9 60E+01	1.27E+02
Cs-134	1 6409E+00	274,584 76	364,474 92	0 00E+00	4 51E+05	5 98E+05
Cs-135	4 2564E-06	274,584 76	364,474 92	0 00E+00	1 17E+00	1 55E+00
Cs-137	2 8791E+00	274,584 76	364,474 92	0 00E+00	7 91E+05	1 05E+06
Eu-154	1.7388E-01	274,584 76	364,474 92	0 00E+00	4 77E+04	6 34E+04
Eu-155	1.1616E-01	274,584 76	364,474.92	0 00E+00	3 19E+04	4.23E+04
Fe-55	7.3755E-02	274,584 76	364,474 92	0 00E+00	2 03E+04	2 69E+04
H-3	1 0729E-02	274,584 76	364,474 92	0 00E+00	2.95E+03	3.91E+03
I-129	6 6403E-07	274,584 76	364,474 92	0 00E+00	1 82E-01	2 42E-01
Kr-85	2 8487E-01	274,584 76	364,474 92	0 00E+00	7 82E+04	1 04E+05
Np-237	3 1507E-05	274,584 76	364,474 92	0 00E+00	8 65E+00	1 15E+01
Pa-231	4 1938E-10	274,584 76	364,474 92	0 00E+00	1 15E-04	1 53E-04
Pb-210	8 4083E-13	274,584 76	364,474 92	0 00E+00	2 31E-07	3 06E-07
Pm-147	1.2807E+00	274,584 76	364,474 92	0 00E+00	3 52E+05	4 67E+05
Pu-238	1.7290E-01	274,584 76	364,474 92	0 00E+00	4 75E+04	6 30E+04
Pu-239	6.9563E-04	274,584 76	364,474.92	0 00E+00	1 91E+02	2.54E+02
Pu-240	3 6865E-04	274,584 76	364,474 92	0 00E+00	1.01E+02	1.34E+02
Pu-241	2 7643E-01	274,584 76	364,474 92	0.00E+00	7.59E+04	1 01E+05
Pu-242	3 0911E-06	274,584.76	364,474 92	0 00E+00	8 49E-01	1 13E+00
Ra-226	8 6330E-12	274,584.76	364,474 92	0 00E+00	2 37E-06	3 15E-06
Ra-228	3 1817E-15	274,584 76	364,474 92	0 00E+00	8 74E-10	1 16E-09
Ru-106	2 1981E-01	274,584 76	364,474 92	0 00E+00	6 04E+04	8 01E+04
Se-79	1.2339E-05	274,584 76	364,474 92	0 00E+00	3 39E+00	4 50E+00
Sn-126	1 0194E-05	274,584 76	364,474 92	0 00E+00	2 80E+00	3 72E+00
Sr-90	2 7242E+00	274,584 76	364,474.92	0 00E+00	7 48E+05	9 93E+05
Tc-99	3 8056E-04	274,584 76	364,474 92	0 00E+00	1 04E+02	1.39E+02
Th-229	1.0413E-12	274,584 76	364,474 92	0 00E+00	2.86E-07	3 80E-07
Th-230	3 9648E-09	274,584 76	364,474 92	0 00E+00	1 09E-03	1 45E-03
Th-232	8 3536E-15	274,584.76	364,474 92	0 00E+00	2.29E-09	3 04E-09
Tl-208	4 3888E-08	274,584.76	364,474 92	0 00E+00	1 21E-02	1 60E-02
U-232	1 3645E-07	274,584 76	364,474 92	0 00E+00	3 75E-02	4 97E-02
U-233	1 7023E-09	274,584 76	364,474 92	0 00E+00	4 67E-04	6.20E-04
U-234	4 5389E-05	274,584 76	364,474 92	0 00E+00	1 25E+01	1 65E+01
U-235	-2 8661E-06	274,584 76	0 00	7 95E-01	8.24E-03	7.95E-01
U-236	1.6701E-05	274,584 76	364,474.92	0 00E+00	4 59E+00	6.09E+00
U-238	-9 4194E-09	274,584 76	0 00	9.31E-03	6 72E-03	9 31E-03
Y-90	2.7248E+00	274,584 76	364,474 92	0 00E+00	7.48E+05	9 93E+05
Other Radionuclides					1 46E+06	1 94E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7.241E+16
0 0250	1.543E+16
0 0375	1 489E+16
0 0575	1 421E+16
0 0850	9 306E+15
0 1250	8 490E+15
0.2250	7 666E+15
0 3750	3 631E+15
0 5750	6 948E+16
0 8500	2.125E+16
1 2500	2.901E+15
1 7500	7 628E+13
2.2500	1.206E+14
2.7500	7 421E+11
3.5000	8 334E+10
5 0000	1 896E+07
7 0000	2 181E+06
11 0000	2 501E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 90E+04	2.52E+04
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 %	92 99999565	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		274 584 76	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		364 474 92	Bounding burnup calculated assuming all BOL heavy metal burned

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 59	
Bounding	2.11	

Estimated EOL HM/Given EOL HM: 1 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: FRR PIN CLUSTER UALX HEU CANADA
SNF ID # 663
Fuel Units & Descr: 131 - MULTI-PIN CLUSTER
Heavy Metal Mass BOL=76 648kg; EOL=32.383kg
ROD Storage Site SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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 5 years

Estimated Canister usage: 18"x15' — 10 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	6 6950E-11	40,772 53	70,600 79	0 00E+00	2 73E-06	4 73E-06
Am-241	4 4557E-03	40,772 53	70,600 79	0 00E+00	1 82E+02	3.15E+02
Am-242m	1 4666E-06	40,772 53	70,600 79	0 00E+00	5 98E-02	1.04E-01
Am-243	3.7151E-05	40,772 53	70,600 79	0 00E+00	1 51E+00	2 62E+00
C-14	2 6513E-08	40,772.53	70,600.79	0 00E+00	1 08E-03	1 87E-03
Cl-36	4 4441E-31	40,772.53	70,600 79	0 00E+00	1 81E-26	3.14E-26
Cm-243	8 2139E-06	40,772.53	70,600.79	0 00E+00	3 35E-01	5 80E-01
Cm-244	8 2625E-03	40,772 53	70,600 79	0 00E+00	3.37E+02	5 83E+02
Co-60	3 4951E-04	40,772 53	70,600 79	0 00E+00	1 43E+01	2 47E+01
Cs-134	1 6409E+00	40,772 53	70,600 79	0 00E+00	6 69E+04	1 16E+05
Cs-135	4 2564E-06	40,772 53	70,600 79	0 00E+00	1.74E-01	3 01E-01
Cs-137	2 8791E+00	40,772 53	70,600 79	0 00E+00	1 17E+05	2 03E+05
Eu-154	1 7388E-01	40,772 53	70,600 79	0 00E+00	7 09E+03	1 23E+04
Eu-155	1 1616E-01	40,772 53	70,600 79	0 00E+00	4 74E+03	8 20E+03
Fe-55	7 3755E-02	40,772 53	70,600 79	0 00E+00	3 01E+03	5 21E+03
H-3	1 0729E-02	40,772 53	70,600 79	0 00E+00	4 37E+02	7 57E+02
I-129	6 6403E-07	40,772 53	70,600 79	0 00E+00	2 71E-02	4 69E-02
Kr-85	2 8487E-01	40,772 53	70,600 79	0 00E+00	1 16E+04	2.01E+04
Np-237	3.1507E-05	40,772 53	70,600 79	0 00E+00	1 28E+00	2.22E+00
Pa-231	4.1938E-10	40,772 53	70,600 79	0 00E+00	1 71E-05	2 96E-05
Pb-210	8.4083E-13	40,772 53	70,600 79	0 00E+00	3 43E-08	5 94E-08
Pm-147	1.2807E+00	40,772 53	70,600.79	0 00E+00	5.22E+04	9 04E+04
Pu-238	1 7290E-01	40,772.53	70,600 79	0 00E+00	7.05E+03	1.22E+04
Pu-239	6 9563E-04	40,772 53	70,600 79	0 00E+00	2.84E+01	4 91E+01
Pu-240	3 6865E-04	40,772 53	70,600 79	0 00E+00	1.50E+01	2 60E+01
Pu-241	2 7643E-01	40,772 53	70,600 79	0 00E+00	1 13E+04	1 95E+04
Pu-242	3 0911E-06	40,772 53	70,600 79	0 00E+00	1.26E-01	2 18E-01
Ra-226	8 6330E-12	40,772 53	70,600 79	0 00E+00	3.52E-07	6 10E-07
Ra-228	3 1817E-15	40,772 53	70,600 79	0 00E+00	1.30E-10	2 25E-10
Ru-106	2 1981E-01	40,772 53	70,600 79	0 00E+00	8 96E+03	1 55E+04
Se-79	1 2339E-05	40,772 53	70,600 79	0 00E+00	5 03E-01	8 71E-01
Sn-126	1 0194E-05	40,772 53	70,600 79	0 00E+00	4 16E-01	7 20E-01
Sr-90	2 7242E+00	40,772 53	70,600 79	0 00E+00	1 11E+05	1 92E+05
Tc-99	3 8056E-04	40,772 53	70,600 79	0 00E+00	1 55E+01	2 69E+01
Th-229	1 0413E-12	40,772 53	70,600 79	0 00E+00	4 25E-08	7.35E-08
Th-230	3 9648E-09	40,772 53	70,600.79	0 00E+00	1 62E-04	2 80E-04
Th-232	8.3536E-15	40,772.53	70,600.79	0 00E+00	3 41E-10	5 90E-10
Tl-208	4.3888E-08	40,772.53	70,600 79	0 00E+00	1 79E-03	3 10E-03
U-232	1 3645E-07	40,772.53	70,600 79	0 00E+00	5 56E-03	9 63E-03
U-233	1 7023E-09	40,772 53	70,600 79	0 00E+00	6 94E-05	1.20E-04
U-234	4 5389E-05	40,772 53	70,600 79	0 00E+00	1 85E+00	3.20E+00
U-235	-2 8661E-06	40,772 53	0 00	1 54E-01	3 74E-02	1.54E-01
U-236	1 6701E-05	40,772 53	70,600 79	0 00E+00	6.81E-01	1 18E+00
U-238	-9 4194E-09	40,772 53	0 00	1 76E-03	1.38E-03	1.76E-03
Y-90	2 7248E+00	40,772 53	70,600 79	0 00E+00	1 11E+05	1 92E+05
Other Radionuclides					2 17E+05	3 76E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 403E+16
0 0250	2 988E+15
0 0375	2 885E+15
0 0575	2 752E+15
0 0850	1 803E+15
0 1250	1 645E+15
0.2250	1 485E+15
0.3750	7 033E+14
0 5750	1.346E+16
0.8500	4 115E+15
1.2500	5 619E+14
1 7500	1 478E+13
2.2500	2.337E+13
2.7500	1 438E+11
3.5000	1 614E+10
5 0000	3 673E+06
7 0000	4.224E+05
11 0000	4 845E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.82E+03	4.88E+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 %	93 15000501	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		40,772 53	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		70 600 79	Bounding burnup calculated assuming all BOL heavy metal burned.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 22	
Bounding	2.11	

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 SLOWPOKE (HEU) CANADA
SNF ID # 665
Fuel Units & Descr 2 - 297 ROD ARRAY
Heavy Metal Mass BOL=1 772kg EOL=1 742kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 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	1 4545E-10	28 24	56 48	0 00E+00	4 11E-09	8.22E-09
Am-241	1 1190E-03	28 24	56 48	0 00E+00	3.16E-02	6 32E-02
Am-242m	4 5425E-07	28 24	56 48	0 00E+00	1.28E-05	2 57E-05
Am-243	1 4921E-06	28.24	56 48	0 00E+00	4.21E-05	8 43E-05
C-14	5 7244E-09	28.24	56 48	0 00E+00	1 62E-07	3 23E-07
Cl-36	1 3124E-32	28.24	56 48	0 00E+00	3 71E-31	7 41E-31
Cm-243	2 3676E-07	28.24	56 48	0 00E+00	6 69E-06	1 34E-05
Cm-244	5.2042E-05	28.24	56 48	0 00E+00	1 47E-03	2 94E-03
Co-60	3 8208E-05	28.24	56 48	0 00E+00	1 08E-03	2 16E-03
Cs-134	4 8693E-01	28.24	56.48	0 00E+00	1 38E+01	2 75E+01
Cs-135	3 4477E-06	28 24	56 48	0 00E+00	9 74E-05	1.95E-04
Cs-137	2 6731E+00	28 24	56 48	0 00E+00	8 11E+01	1 62E+02
Eu-154	8 2053E-02	28 24	56 48	0 00E+00	2.32E+00	4 63E+00
Eu-155	3 9134E-02	28 24	56 48	0 00E+00	1.11E+00	2.21E+00
Fe-55	6 7429E-03	28.24	56 48	0 00E+00	1.90E-01	3 81E-01
H-3	1 0599E-02	28.24	56 48	0 00E+00	2 99E-01	5 99E-01
I-129	7.5300E-07	28.24	56 48	0 00E+00	2 13E-05	4 25E-05
Kr-85	2.8595E-01	28.24	56 48	0 00E+00	8 08E+00	1 62E+01
Np-237	9.5479E-06	28.24	56 48	0 00E+00	2 70E-04	5 39E-04
Pa-231	8 9297E-10	28.24	56 48	0 00E+00	2 52E-08	5 04E-08
Pb-210	3 7609E-12	28.24	56 48	0 00E+00	1 06E-10	2 12E-10
Pm-147	2 5452E+00	28 24	56 48	0 00E+00	7 19E+01	1 44E+02
Pu-238	2 0550E-02	28 24	56 48	0 00E+00	5 80E-01	1.16E+00
Pu-239	4 2838E-04	28 24	56 48	0 00E+00	1.21E-02	2 42E-02
Pu-240	2 4401E-04	28 24	56 48	0 00E+00	6 89E-03	1.38E-02
Pu-241	6 8764E-02	28.24	56 48	0 00E+00	1 94E+00	3 88E+00
Pu-242	3 6329E-07	28.24	56 48	0 00E+00	1 03E-05	2 05E-05
Ra-226	3 8045E-11	28.24	56 48	0 00E+00	1 07E-09	2 15E-09
Ra-228	2.9902E-15	28.24	56 48	0 00E+00	8 44E-14	1 69E-13
Ru-106	1.9055E-01	28.24	56 48	0 00E+00	5.38E+00	1 08E+01
Se-79	1.2936E-05	28.24	56 48	0 00E+00	3 65E-04	7.31E-04
Sn-126	1 1574E-05	28.24	56 48	0 00E+00	3 27E-04	6 54E-04
Sr-90	2 7505E+00	28 24	56 48	0 00E+00	7 77E+01	1 55E+02
Tc-99	4.2239E-04	28 24	56 48	0 00E+00	1 19E-02	2.39E-02
Th-229	1 8848E-12	28 24	56 48	0 00E+00	5 32E-11	1.06E-10
Th-230	1 7042E-08	28 24	56 48	0 00E+00	4.81E-07	9 63E-07
Th-232	7 8132E-15	28.24	56 48	0 00E+00	2.21E-13	4 41E-13
Tl-208	4 4063E-08	28.24	56 48	0 00E+00	1.24E-06	2 49E-06
U-232	1.3151E-07	28.24	56 48	0 00E+00	3 71E-06	7 43E-06
U-233	1.9564E-09	28.24	56 48	0 00E+00	5 52E-08	1.10E-07
U-234	1 8371E-04	28.24	56 48	0 00E+00	5 19E-03	1 04E-02
U-235	-2 7235E-06	28 24	0 00	3 57E-03	3 49E-03	3 57E-03
U-236	1.5493E-05	28 24	56 48	0 00E+00	4 38E-04	8.75E-04
U-238	-4 2851E-09	28 24	0.00	4 10E-05	4 09E-05	4.10E-05
Y-90	2 7505E+00	28 24	56 48	0 00E+00	7 77E+01	1.55E+02
Other Radionuclides					1 45E+02	2.90E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 090E+13
0 0250	2.347E+12
0 0375	2 166E+12
0.0575	2 130E+12
0 0850	1 358E+12
0 1250	1 176E+12
0.2250	1 151E+12
0 3750	5 571E+11
0 5750	7 652E+12
0 8500	1.072E+12
1.2500	1.994E+11
1 7500	8 361E+09
2.2500	1 754E+10
2.7500	1 009E+08
3.5000	1 119E+07
5 0000	3 359E+01
7 0000	3 745E+00
11 0000	4.221E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.43E+00	2.86E+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 11512415	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		28.24	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		56.48	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 05	
Bounding	0 10	

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 SLOWPOKE (HEU) CANADA
SNF ID #: 666
Fuel Units & Descr: 2 - 297 ROD ARRAY
Heavy Metal Mass: BOL=1 772kg, EOL=1 742kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 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	1 4545E-10	28 24	56 48	0 00E+00	4 11E-09	8.22E-09
Am-241	1 1190E-03	28 24	56 48	0 00E+00	3 16E-02	6 32E-02
Am-242m	4 5425E-07	28 24	56 48	0 00E+00	1.28E-05	2 57E-05
Am-243	1 4921E-06	28 24	56 48	0 00E+00	4.21E-05	8 43E-05
C-14	5 7244E-09	28 24	56 48	0 00E+00	1 62E-07	3 23E-07
Cl-36	1 3124E-32	28 24	56 48	0 00E+00	3 71E-31	7 41E-31
Cm-243	2 3676E-07	28 24	56 48	0 00E+00	6 69E-06	1 34E-05
Cm-244	5 2042E-05	28 24	56 48	0 00E+00	1 47E-03	2 94E-03
Co-60	3 8208E-05	28.24	56 48	0 00E+00	1 08E-03	2 16E-03
Cs-134	4 8693E-01	28.24	56 48	0 00E+00	1 38E+01	2 75E+01
Cs-135	3 4477E-06	28.24	56 48	0 00E+00	9 74E-05	1 95E-04
Cs-137	2 8731E+00	28.24	56 48	0 00E+00	8 11E+01	1 62E+02
Eu-154	8.2053E-02	28.24	56 48	0 00E+00	2 32E+00	4 63E+00
Eu-155	3.9134E-02	28.24	56.48	0 00E+00	1 11E+00	2.21E+00
Fe-55	6.7429E-03	28.24	56 48	0 00E+00	1 90E-01	3 81E-01
H-3	1 0599E-02	28.24	56.48	0 00E+00	2 99E-01	5 99E-01
I-129	7 5300E-07	28.24	56.48	0 00E+00	2 13E-05	4 25E-05
Kr-85	2 8595E-01	28.24	56 48	0 00E+00	8 08E+00	1 62E+01
Np-237	9 5479E-06	28 24	56 48	0 00E+00	2 70E-04	5 39E-04
Pa-231	8 9297E-10	28 24	56 48	0 00E+00	2 52E-08	5 04E-08
Pb-210	3 7609E-12	28 24	56 48	0 00E+00	1 06E-10	2.12E-10
Pm-147	2 5452E+00	28 24	56 48	0 00E+00	7 19E+01	1 44E+02
Pu-238	2 0550E-02	28 24	56 48	0 00E+00	5 80E-01	1 16E+00
Pu-239	4 2838E-04	28 24	56 48	0 00E+00	1.21E-02	2 42E-02
Pu-240	2 4401E-04	28 24	56 48	0 00E+00	6 89E-03	1.38E-02
Pu-241	6 8764E-02	28 24	56 48	0 00E+00	1 94E+00	3 88E+00
Pu-242	3 6329E-07	28.24	56 48	0 00E+00	1 03E-05	2 05E-05
Ra-226	3 8045E-11	28 24	56 48	0 00E+00	1 07E-09	2 15E-09
Ra-228	2 9902E-15	28.24	56 48	0 00E+00	8 44E-14	1 69E-13
Ru-106	1.9055E-01	28.24	56 48	0 00E+00	5 38E+00	1 08E+01
Se-79	1.2936E-05	28.24	56 48	0 00E+00	3 65E-04	7 31E-04
Sn-126	1.1574E-05	28.24	56.48	0 00E+00	3 27E-04	6 54E-04
Sr-90	2.7505E+00	28.24	56 48	0 00E+00	7 77E+01	1 55E+02
Tc-99	4.2239E-04	28.24	56.48	0 00E+00	1 19E-02	2 39E-02
Th-229	1 8848E-12	28 24	56 48	0 00E+00	5 32E-11	1 06E-10
Th-230	1 7042E-08	28.24	56 48	0 00E+00	4 81E-07	9 63E-07
Th-232	7 8132E-15	28 24	56 48	0 00E+00	2.21E-13	4 41E-13
Tl-208	4 4063E-08	28 24	56 48	0 00E+00	1.24E-06	2 49E-06
U-232	1 3151E-07	28 24	56 48	0 00E+00	3 71E-06	7 43E-06
U-233	1 9564E-09	28 24	56 48	0 00E+00	5 52E-08	1.10E-07
U-234	1 8371E-04	28 24	56 48	0 00E+00	5.19E-03	1 04E-02
U-235	-2 7235E-06	28 24	0 00	3 57E-03	3.49E-03	3 57E-03
U-236	1 5493E-05	28 24	56 48	0 00E+00	4 38E-04	8.75E-04
U-238	-4 2851E-09	28 24	0 00	4 10E-05	4 09E-05	4 10E-05
Y-90	2 7505E+00	28 24	56 48	0 00E+00	7 77E+01	1 55E+02
Other Radionuclides					1 45E+02	2 90E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 090E+13
0 0250	2.347E+12
0 0375	2.166E+12
0 0575	2 130E+12
0 0850	1 358E+12
0 1250	1 176E+12
0.2250	1 151E+12
0.3750	5 571E+11
0 5750	7 652E+12
0 8500	1 072E+12
1.2500	1 994E+11
1 7500	8.361E+09
2.2500	1 754E+10
2 7500	1 009E+08
3.5000	1 119E+07
5.0000	3.359E+01
7 0000	3 745E+00
11.0000	4.221E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 43E+00	2.86E+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 11512415	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		28.24	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		56 48	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 05	
Bounding	0 10	

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 SLOWPOKE (HEU) CANADA
SNF ID # 668
Fuel Units & Descr· 2 - 297 ROD ARRAY
Heavy Metal Mass BOL=1 772kg· EOL=1 742kg
ROD Storage Site· SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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: 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	1 4545E-10	28 24	56 48	0 00E+00	4 11E-09	8.22E-09
Am-241	1 1190E-03	28 24	56 48	0 00E+00	3.16E-02	6.32E-02
Am-242m	4 5425E-07	28 24	56 48	0 00E+00	1.28E-05	2.57E-05
Am-243	1 4921E-06	28 24	56 48	0 00E+00	4.21E-05	8 43E-05
C-14	5 7244E-09	28 24	56 48	0 00E+00	1 62E-07	3.23E-07
Cl-36	1 3124E-32	28 24	56.48	0 00E+00	3 71E-31	7 41E-31
Cm-243	2 3676E-07	28 24	56 48	0 00E+00	6 69E-06	1.34E-05
Cm-244	5 2042E-05	28.24	56 48	0 00E+00	1 47E-03	2 94E-03
Co-60	3 8208E-05	28.24	56 48	0 00E+00	1 08E-03	2 16E-03
Cs-134	4 8693E-01	28.24	56 48	0 00E+00	1.38E+01	2 75E+01
Cs-135	3 4477E-06	28 24	56 48	0 00E+00	9 74E-05	1 95E-04
Cs-137	2.8731E+00	28 24	56 48	0 00E+00	8 11E+01	1 62E+02
Eu-154	8.2053E-02	28 24	56 48	0 00E+00	2 32E+00	4 63E+00
Eu-155	3 9134E-02	28 24	56 48	0 00E+00	1 11E+00	2.21E+00
Fe-55	6 7429E-03	28 24	56 48	0 00E+00	1.90E-01	3 81E-01
H-3	1 0599E-02	28 24	56 48	0 00E+00	2.99E-01	5 99E-01
I-129	7 5300E-07	28 24	56 48	0 00E+00	2 13E-05	4.25E-05
Kr-85	2 8595E-01	28.24	56 48	0 00E+00	8 08E+00	1.62E+01
Np-237	9 5479E-06	28.24	56 48	0 00E+00	2 70E-04	5.39E-04
Pa-231	8 9297E-10	28.24	56 48	0 00E+00	2 52E-08	5 04E-08
Pb-210	3 7609E-12	28.24	56 48	0 00E+00	1 06E-10	2 12E-10
Pm-147	2 5452E+00	28 24	56 48	0 00E+00	7 19E+01	1 44E+02
Pu-238	2 0550E-02	28.24	56 48	0 00E+00	5 80E-01	1 16E+00
Pu-239	4.2838E-04	28 24	56 48	0 00E+00	1 21E-02	2 42E-02
Pu-240	2 4401E-04	28 24	56 48	0 00E+00	6 89E-03	1.38E-02
Pu-241	6 8764E-02	28 24	56 48	0 00E+00	1 94E+00	3 88E+00
Pu-242	3 6329E-07	28 24	56 48	0 00E+00	1 03E-05	2.05E-05
Ra-226	3 8045E-11	28 24	56 48	0 00E+00	1 07E-09	2.15E-09
Ra-228	2 9902E-15	28 24	56 48	0 00E+00	8.44E-14	1 69E-13
Ru-106	1 9055E-01	28.24	56 48	0 00E+00	5.38E+00	1.08E+01
Se-79	1 2936E-05	28.24	56 48	0 00E+00	3 65E-04	7.31E-04
Sn-126	1 1574E-05	28.24	56 48	0 00E+00	3.27E-04	6 54E-04
Sr-90	2 7505E+00	28.24	56 48	0 00E+00	7 77E+01	1.55E+02
Tc-99	4.2239E-04	28.24	56 48	0 00E+00	1 19E-02	2 39E-02
Th-229	1.8848E-12	28 24	56 48	0 00E+00	5 32E-11	1 06E-10
Th-230	1.7042E-08	28.24	56 48	0 00E+00	4 81E-07	9 63E-07
Th-232	7.8132E-15	28 24	56 48	0 00E+00	2 21E-13	4 41E-13
Tl-208	4 4063E-08	28 24	56 48	0 00E+00	1.24E-06	2 49E-06
U-232	1.3151E-07	28 24	56 48	0.00E+00	3 71E-06	7.43E-06
U-233	1 9564E-09	28 24	56 48	0 00E+00	5.52E-08	1.10E-07
U-234	1 8371E-04	28 24	56 48	0 00E+00	5.19E-03	1 04E-02
U-235	-2 7235E-06	28.24	0 00	3 57E-03	3.49E-03	3 57E-03
U-236	1 5493E-05	28.24	56 48	0 00E+00	4.38E-04	8 75E-04
U-238	-4.2851E-09	28.24	0 00	4 10E-05	4 09E-05	4 10E-05
Y-90	2 7505E+00	28.24	56 48	0 00E+00	7 77E+01	1.55E+02
Other Radionuclides					1 45E+02	2 90E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 090E+13
0 0250	2 347E+12
0 0375	2 166E+12
0 0575	2.130E+12
0 0850	1.358E+12
0 1250	1 176E+12
0 2250	1 151E+12
0.3750	5.571E+11
0.5750	7 652E+12
0 8500	1.072E+12
1.2500	1.994E+11
1 7500	8.361E+09
2.2500	1 754E+10
2 7500	1 009E+08
3.5000	1 119E+07
5 0000	3 359E+01
7 0000	3 745E+00
11 0000	4.221E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.43E+00	2.86E+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 11512415	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		28.24
Bounding		56 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 05	
Bounding	0 10	

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 SLOWPOKE (HEU) CANADA	[1]Fuel decay start date:	2010
SNF ID #:	669	Estimates as of:	2010
Fuel Units & Descr	2 - 297 ROD ARRAY	Template:	ATR (Light Water, Alum 60 to 100%, U)
Heavy Metal Mass	BOL=1 772kg, EOL=1 742kg	[2]Template Burnup(MWd)	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT):	0 00116689
		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 Inventones(Ci)
Ac-227	1 4545E-10	28.22	56 44	0 00E+00	4 10E-09	8.21E-09
Am-241	1 1190E-03	28.22	56 44	0 00E+00	3 16E-02	6 32E-02
Am-242m	4 5425E-07	28.22	56 44	0 00E+00	1 28E-05	2 56E-05
Am-243	1 4921E-06	28 22	56 44	0 00E+00	4 21E-05	8 42E-05
C-14	5 7244E-09	28.22	56 44	0 00E+00	1 62E-07	3.23E-07
Cl-36	1 3124E-32	28 22	56 44	0 00E+00	3 70E-31	7 41E-31
Cm-243	2 3676E-07	28 22	56 44	0 00E+00	6 68E-06	1.34E-05
Cm-244	5 2042E-05	28 22	56 44	0 00E+00	1.47E-03	2 94E-03
Co-60	3 8208E-05	28 22	56 44	0 00E+00	1.08E-03	2 16E-03
Cs-134	4 8693E-01	28 22	56 44	0 00E+00	1 37E+01	2 75E+01
Cs-135	3 4477E-06	28 22	56 44	0 00E+00	9 73E-05	1 95E-04
Cs-137	2 8731E+00	28 22	56 44	0 00E+00	8 11E+01	1 62E+02
Eu-154	8.2053E-02	28 22	56 44	0 00E+00	2 32E+00	4 63E+00
Eu-155	3 9134E-02	28 22	56 44	0 00E+00	1 10E+00	2 21E+00
Fe-55	6 7429E-03	28 22	56 44	0 00E+00	1 90E-01	3 81E-01
H-3	1 0599E-02	28 22	56 44	0 00E+00	2 99E-01	5 98E-01
I-129	7 5300E-07	28 22	56 44	0 00E+00	2 13E-05	4 25E-05
Kr-85	2 8595E-01	28 22	56 44	0 00E+00	8 07E+00	1 61E+01
Np-237	9 5479E-06	28.22	56.44	0 00E+00	2 69E-04	5 39E-04
Pa-231	8 9297E-10	28.22	56.44	0 00E+00	2 52E-08	5 04E-08
Pb-210	3 7609E-12	28.22	56 44	0 00E+00	1 06E-10	2 12E-10
Pm-147	2 5452E+00	28.22	56 44	0 00E+00	7.18E+01	1 44E+02
Pu-238	2 0550E-02	28.22	56 44	0 00E+00	5 80E-01	1 16E+00
Pu-239	4 2838E-04	28.22	56 44	0 00E+00	1.21E-02	2 42E-02
Pu-240	2 4401E-04	28.22	56 44	0 00E+00	6 89E-03	1.38E-02
Pu-241	6 8764E-02	28 22	56 44	0 00E+00	1 94E+00	3 88E+00
Pu-242	3 6329E-07	28 22	56 44	0 00E+00	1 03E-05	2 05E-05
Ra-226	3 8045E-11	28 22	56 44	0 00E+00	1 07E-09	2 15E-09
Ra-228	2 9902E-15	28 22	56 44	0 00E+00	8 44E-14	1 69E-13
Ru-106	1 9055E-01	28 22	56 44	0 00E+00	5 38E+00	1 08E+01
Se-79	1.2936E-05	28.22	56 44	0 00E+00	3 65E-04	7 30E-04
Sn-126	1.1574E-05	28.22	56 44	0 00E+00	3 27E-04	6 53E-04
Sr-90	2.7505E+00	28.22	56.44	0 00E+00	7 76E+01	1 55E+02
Tc-99	4.2239E-04	28.22	56 44	0 00E+00	1 19E-02	2 38E-02
Th-229	1 8848E-12	28.22	56.44	0 00E+00	5 32E-11	1 06E-10
Th-230	1 7042E-08	28.22	56 44	0 00E+00	4 81E-07	9 62E-07
Th-232	7 8132E-15	28.22	56 44	0 00E+00	2 20E-13	4 41E-13
Tl-208	4 4063E-08	28.22	56 44	0 00E+00	1.24E-06	2.49E-06
U-232	1 3151E-07	28.22	56 44	0 00E+00	3 71E-06	7.42E-06
U-233	1 9564E-09	28.22	56 44	0 00E+00	5 52E-08	1.10E-07
U-234	1 8371E-04	28 22	56 44	0 00E+00	5.18E-03	1.04E-02
U-235	-2.7235E-06	28 22	0 00	3 57E-03	3.49E-03	3.57E-03
U-236	1 5493E-05	28 22	56 44	0 00E+00	4 37E-04	8.74E-04
U-238	-4 2851E-09	28 22	0 00	4 10E-05	4 09E-05	4 10E-05
Y-90	2 7505E+00	28 22	56 44	0 00E+00	7 76E+01	1 55E+02
Other Radionuclides					1 45E+02	2 90E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 089E+13
0 0250	2.346E+12
0 0375	2.165E+12
0 0575	2.129E+12
0 0850	1 357E+12
0 1250	1 175E+12
0.2250	1 150E+12
0.3750	5 567E+11
0.5750	7 647E+12
0.8500	1 071E+12
1.2500	1 992E+11
1 7500	8 355E+09
2.2500	1 752E+10
2.7500	1 008E+08
3 5000	1 118E+07
5 0000	3.357E+01
7 0000	3 742E+00
11.0000	4.218E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.43E+00	2.86E+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 11512415	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		28.22	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		56 44	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 05	
Bounding	0 10	

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 SLOWPOKE (HEU) MONTREAL
SNF ID #: 667
Fuel Units & Descr: 2 - 297 ROD ARRAY
Heavy Metal Mass: BOL=1 772kg EOL=1 742kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 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	1 4545E-10	28 24	56 48	0 00E+00	4 11E-09	8 22E-09
Am-241	1 1190E-03	28.24	56 48	0 00E+00	3 16E-02	6 32E-02
Am-242m	4 5425E-07	28.24	56 48	0 00E+00	1.28E-05	2 57E-05
Am-243	1 4921E-06	28.24	56 48	0 00E+00	4.21E-05	8 43E-05
C-14	5 7244E-09	28.24	56 48	0 00E+00	1 62E-07	3 23E-07
Cl-36	1 3124E-32	28.24	56 48	0 00E+00	3.71E-31	7 41E-31
Cm-243	2 3676E-07	28.24	56 48	0 00E+00	6 69E-06	1.34E-05
Cm-244	5 2042E-05	28 24	56.48	0 00E+00	1.47E-03	2.94E-03
Co-60	3 8208E-05	28 24	56.48	0 00E+00	1 08E-03	2.16E-03
Cs-134	4 8693E-01	28 24	56 48	0 00E+00	1.38E+01	2 75E+01
Cs-135	3 4477E-06	28 24	56 48	0 00E+00	9 74E-05	1 95E-04
Cs-137	2 8731E+00	28 24	56 48	0 00E+00	8 11E+01	1.62E+02
Eu-154	8.2053E-02	28 24	56 48	0 00E+00	2.32E+00	4 63E+00
Eu-155	3.9134E-02	28 24	56 48	0 00E+00	1 11E+00	2.21E+00
Fe-55	6 7429E-03	28.24	56 48	0 00E+00	1 90E-01	3 81E-01
H-3	1 0599E-02	28.24	56 48	0 00E+00	2 99E-01	5 99E-01
I-129	7.5300E-07	28.24	56 48	0 00E+00	2 13E-05	4 25E-05
Kr-85	2 8595E-01	28.24	56 48	0 00E+00	8 08E+00	1 62E+01
Np-237	9 5479E-06	28.24	56 48	0 00E+00	2.70E-04	5 39E-04
Pa-231	8 9297E-10	28.24	56 48	0 00E+00	2.52E-08	5 04E-08
Pb-210	3 7609E-12	28.24	56 48	0 00E+00	1.06E-10	2.12E-10
Pm-147	2 5452E+00	28.24	56 48	0 00E+00	7.19E+01	1 44E+02
Pu-238	2 0550E-02	28.24	56 48	0 00E+00	5 80E-01	1.16E+00
Pu-239	4 2838E-04	28 24	56 48	0 00E+00	1.21E-02	2 42E-02
Pu-240	2 4401E-04	28 24	56 48	0 00E+00	6 89E-03	1.38E-02
Pu-241	6 8764E-02	28 24	56 48	0 00E+00	1 94E+00	3 88E+00
Pu-242	3 6329E-07	28 24	56 48	0 00E+00	1 03E-05	2 05E-05
Ra-226	3 8045E-11	28 24	56 48	0 00E+00	1 07E-09	2 15E-09
Ra-228	2 9902E-15	28 24	56 48	0 00E+00	8 44E-14	1 69E-13
Ru-106	1.9055E-01	28.24	56 48	0 00E+00	5 38E+00	1 08E+01
Se-79	1.2936E-05	28.24	56 48	0 00E+00	3 65E-04	7.31E-04
Sn-126	1 1574E-05	28.24	56 48	0 00E+00	3 27E-04	6 54E-04
Sr-90	2 7505E+00	28.24	56 48	0 00E+00	7 77E+01	1 55E+02
Tc-99	4.2239E-04	28.24	56 48	0 00E+00	1.19E-02	2.39E-02
Th-229	1 8848E-12	28.24	56 48	0 00E+00	5.32E-11	1.06E-10
Th-230	1 7042E-08	28.24	56 48	0 00E+00	4.81E-07	9 63E-07
Th-232	7 8132E-15	28 24	56 48	0 00E+00	2.21E-13	4 41E-13
Tl-208	-4 4063E-08	28 24	56.48	0 00E+00	1.24E-06	2 49E-06
U-232	1 3151E-07	28 24	56 48	0 00E+00	3 71E-06	7 43E-06
U-233	1 9564E-09	28 24	56 48	0 00E+00	5.52E-08	1 10E-07
U-234	1 8371E-04	28 24	56 48	0 00E+00	5 19E-03	1 04E-02
U-235	-2 7235E-06	28 24	0 00	3.57E-03	3 49E-03	3 57E-03
U-236	-1.5493E-05	28 24	56 48	0 00E+00	4 38E-04	8 75E-04
U-238	-4.2851E-09	28 24	0 00	4 10E-05	4 09E-05	4 10E-05
Y-90	2.7505E+00	28.24	56 48	0 00E+00	7 77E+01	1 55E+02
Other Radionuclides					1 45E+02	2 90E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 090E+13
0 0250	2 347E+12
0 0375	2 166E+12
0 0575	2 130E+12
0 0850	1.358E+12
0 1250	1 176E+12
0.2250	1.151E+12
0 3750	5 571E+11
0 5750	7.652E+12
0 8500	1 072E+12
1.2500	1.994E+11
1 7500	8.361E+09
2.2500	1 754E+10
2 7500	1 009E+08
3 5000	1 119E+07
5 0000	3 359E+01
7 0000	3 745E+00
11 0000	4 221E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.43E+00	2.86E+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 11512415	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		28.24	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		56.48	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 05	
Bounding	0 10	

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 TARGET ARGENTINA
SNF ID #: 297
Fuel Units & Descr: 48 - PARTICULATE
Heavy Metal Mass: BOL=3 97kg; EOL=3 97kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage 18"x10': 1 33

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	1 9667E-09	75 00	149 99	0 00E+00	1 47E-07	2 95E-07
Am-241	4 9468E-05	75 00	149 99	0 00E+00	3 71E-03	7 42E-03
Am-242m	9 7537E-09	75 00	149 99	0 00E+00	7 32E-07	1 46E-06
Am-243	9 8802E-10	75 00	149 99	0 00E+00	7 41E-08	1 48E-07
C-14	2.3095E-04	75 00	149 99	0 00E+00	1.73E-02	3 46E-02
Cl-36	1.2261E-06	75 00	149 99	0 00E+00	9.20E-05	1 84E-04
Cm-243	5.1581E-10	75 00	149 99	0 00E+00	3 87E-08	7 74E-08
Cm-244	7.3012E-09	75 00	149 99	0 00E+00	5 48E-07	1.10E-06
Co-60	3 6556E+00	75 00	149 99	0 00E+00	2 74E+02	5 48E+02
Cs-134	7.2063E-02	75 00	149 99	0 00E+00	5 40E+00	1 08E+01
Cs-135	3 0316E-05	75 00	149 99	0 00E+00	2.27E-03	4.55E-03
Cs-137	2 9002E+00	75 00	149 99	0 00E+00	2 18E+02	4 35E+02
Eu-154	7 5025E-03	75 00	149 99	0 00E+00	5 63E-01	1 13E+00
Eu-155	4 6123E-02	75 00	149 99	0 00E+00	3 46E+00	6 92E+00
Fe-55	3 6439E+00	75 00	149 99	0 00E+00	2 73E+02	5 47E+02
H-3	1 3524E-02	75 00	149 99	0 00E+00	1 01E+00	2 03E+00
I-129	7 3195E-07	75 00	149 99	0 00E+00	5 49E-05	1 10E-04
Kr-85	2 8686E-01	75 00	149 99	0 00E+00	2 15E+01	4 30E+01
Np-237	1 1478E-06	75 00	149 99	0 00E+00	8 61E-05	1 72E-04
Pa-231	1 0990E-08	75 00	149 99	0 00E+00	8 24E-07	1 65E-06
Pb-210	8 0782E-15	75 00	149 99	0 00E+00	6 06E-13	1 21E-12
Pm-147	3 2097E+00	75.00	149 99	0 00E+00	2 41E+02	4 81E+02
Pu-238	3 7404E-04	75 00	149 99	0 00E+00	2 81E-02	5 61E-02
Pu-239	6 6839E-04	75.00	149 99	0 00E+00	5 01E-02	1 00E-01
Pu-240	8 7121E-05	75 00	149 99	0 00E+00	6 53E-03	1 31E-02
Pu-241	3 0283E-03	75 00	149 99	0 00E+00	2 27E-01	4 54E-01
Pu-242	1 9717E-09	75 00	149 99	0 00E+00	1 48E-07	2 96E-07
Ra-226	7 3527E-14	75 00	149 99	0 00E+00	5 51E-12	1 10E-11
Ra-228	6 0965E-12	75 00	149 99	0 00E+00	4 57E-10	9 14E-10
Ru-106	1 6531E-01	75 00	149 99	0 00E+00	1.24E+01	2 48E+01
Se-79	1 3228E-05	75 00	149 99	0 00E+00	9 92E-04	1 98E-03
Sn-126	1 1494E-05	75 00	149 99	0 00E+00	8 62E-04	1 72E-03
Sr-90	2.7854E+00	75 00	149 99	0 00E+00	2 09E+02	4.18E+02
Tc-99	4 6656E-04	75 00	149 99	0 00E+00	3.50E-02	7 00E-02
Th-229	2 9368E-12	75 00	149 99	0 00E+00	2.20E-10	4 41E-10
Th-230	3.2662E-11	75 00	149 99	0 00E+00	2 45E-09	4 90E-09
Th-232	8.3045E-12	75 00	149 99	0 00E+00	6.23E-10	1.25E-09
Tl-208	2.6722E-08	75 00	149 99	0 00E+00	2 00E-06	4 01E-06
U-232	7.7720E-08	75 00	149 99	0 00E+00	5 83E-06	1.17E-05
U-233	2.9834E-09	75 00	149 99	0 00E+00	2.24E-07	4 47E-07
U-234	3 5275E-07	75 00	149 99	0 00E+00	2 65E-05	5.29E-05
U-235	-2.7761E-06	75 00	0 00	4.15E-03	3 94E-03	4 15E-03
U-236	1 6190E-05	75 00	149 99	0 00E+00	1 21E-03	2 43E-03
U-238	-2 8547E-09	75 00	0 00	6 89E-04	6 89E-04	6 89E-04
Y-90	2 7870E+00	75.00	149 99	0 00E+00	2 09E+02	4 18E+02
Other Radionuclides					3 95E+02	7 89E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 949E+13
0 0250	6 291E+12
0 0375	5 614E+12
0 0575	5 644E+12
0 0850	3 577E+12
0 1250	2 854E+12
0.2250	2 962E+12
0.3750	1 438E+12
0.5750	1 743E+13
0.8500	8 438E+11
1.2500	4 075E+13
1 7500	1 438E+10
2.2500	4 116E+10
2.7500	2 335E+08
3.5000	2.578E+07
5 0000	5 411E+00
7 0000	6 051E-01
11 0000	6 841E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7 96E+00	1.59E+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	NONE	SST
BOL HM Constituents	U	U
BOL Enrichment %	48 34531901	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons
This fuel matches Pathfinder Template except enrichment and cladding (but substituting Stainless Steel is a good conservative assumption)

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		75.00
Bounding		149 99

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 40	
Bounding	0 81	

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 TARGET CANADA
SNF ID # 671
Fuel Units & Descr 5952 - PARTICULATE
Heavy Metal Mass BOL=492.23kg EOL=492.23kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 5 years

Estimated Canister usage
18"x10'
165 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	1 9667E-09	9,299 68	18,599.37	0 00E+00	1 83E-05	3 66E-05
Am-241	4 9468E-05	9,299 68	18,599 37	0 00E+00	4 60E-01	9.20E-01
Am-242m	9 7537E-09	9,299 68	18,599 37	0 00E+00	9 07E-05	1 81E-04
Am-243	9 8802E-10	9,299 68	18,599 37	0 00E+00	9 19E-06	1 84E-05
C-14	2 3095E-04	9,299 68	18,599 37	0 00E+00	2 15E+00	4 30E+00
Cl-36	1.2261E-06	9,299 68	18,599 37	0 00E+00	1 14E-02	2 28E-02
Cm-243	5.1581E-10	9,299 68	18,599 37	0 00E+00	4 80E-06	9 59E-06
Cm-244	7.3012E-09	9,299 68	18 599 37	0 00E+00	6.79E-05	1.36E-04
Co-60	3 6556E+00	9,299 68	18,599.37	0 00E+00	3 40E+04	6 80E+04
Cs-134	7.2063E-02	9,299 68	18,599 37	0 00E+00	6 70E+02	1.34E+03
Cs-135	3 0316E-05	9,299 68	18,599 37	0 00E+00	2 82E-01	5 64E-01
Cs-137	2 9002E+00	9,299 68	18,599 37	0 00E+00	2 70E+04	5 39E+04
Eu-154	7 5025E-03	9,299 68	18,599 37	0 00E+00	6 98E+01	1 40E+02
Eu-155	4 6123E-02	9,299 68	18,599 37	0 00E+00	4 29E+02	8 58E+02
Fe-55	3 6439E+00	9,299 68	18,599 37	0 00E+00	3 39E+04	6 78E+04
H-3	1.3524E-02	9,299 68	18,599 37	0 00E+00	1 26E+02	2 52E+02
I-129	7.3195E-07	9,299 68	18,599.37	0 00E+00	6 81E-03	1.36E-02
Kr-85	2 8686E-01	9,299 68	18,599 37	0 00E+00	2 67E+03	5.34E+03
Np-237	1 1478E-06	9,299 68	18,599 37	0 00E+00	1 07E-02	2 13E-02
Pa-231	1 0990E-08	9,299 68	18,599 37	0 00E+00	1 02E-04	2 04E-04
Pb-210	8 0782E-15	9,299 68	18,599 37	0 00E+00	7 51E-11	1 50E-10
Pm-147	3.2097E+00	9,299 68	18,599 37	0 00E+00	2 98E+04	5 97E+04
Pu-238	3 7404E-04	9,299 68	18,599 37	0 00E+00	3 48E+00	6 96E+00
Pu-239	6.6839E-04	9,299 68	18,599 37	0 00E+00	6 22E+00	1 24E+01
Pu-240	8 7121E-05	9,299 68	18,599.37	0 00E+00	8 10E-01	1 62E+00
Pu-241	3 0283E-03	9,299 68	18,599 37	0 00E+00	2 82E+01	5 63E+01
Pu-242	1 9717E-09	9,299 68	18,599 37	0 00E+00	1 83E-05	3 67E-05
Ra-226	7 3527E-14	9,299 68	18,599 37	0 00E+00	6 84E-10	1.37E-09
Ra-228	6 0965E-12	9,299 68	18,599 37	0 00E+00	5 67E-08	1 13E-07
Ru-106	1 6531E-01	9,299 68	18,599 37	0 00E+00	1 54E+03	3 07E+03
Se-79	1.3228E-05	9,299 68	18,599 37	0.00E+00	1.23E-01	2 46E-01
Sn-126	1.1494E-05	9,299 68	18,599 37	0 00E+00	1 07E-01	2.14E-01
Sr-90	2.7854E+00	9,299 68	18,599.37	0 00E+00	2 59E+04	5 18E+04
Tc-99	4 6656E-04	9,299 68	18,599.37	0 00E+00	4 34E+00	8 68E+00
Th-229	2 9368E-12	9,299 68	18,599 37	0 00E+00	2 73E-08	5 46E-08
Th-230	3 2662E-11	9,299 68	18,599 37	0 00E+00	3 04E-07	6 07E-07
Th-232	8 3045E-12	9,299 68	18,599 37	0 00E+00	7 72E-08	1 54E-07
Tl-208	2 6722E-08	9,299 68	18,599 37	0 00E+00	2 49E-04	4 97E-04
U-232	7 7720E-08	9,299 68	18,599 37	0 00E+00	7.23E-04	1 45E-03
U-233	2 9834E-09	9,299 68	18,599 37	0 00E+00	2 77E-05	5 55E-05
U-234	3 5275E-07	9,299 68	18,599.37	0 00E+00	3.28E-03	6.56E-03
U-235	-2 7761E-06	9,299 68	0 00	5 14E-01	4.88E-01	5 14E-01
U-236	1 6190E-05	9,299 68	18,599 37	0 00E+00	1.51E-01	3 01E-01
U-238	-2 8547E-09	9,299 68	0.00	8 55E-02	8 54E-02	8 55E-02
Y-90	2 7870E+00	9,299 68	18,599 37	0 00E+00	2 59E+04	5 18E+04
Other Radionuclides					4 89E+04	9 78E+04

Gamma Sources

Photon Energy Group (Avg MeV)	Total Photons/sec (bounding)
0 0150	3 657E+15
0 0250	7 801E+14
0 0375	6 961E+14
0 0575	6 998E+14
0 0850	4 435E+14
0 1250	3.539E+14
0.2250	3 673E+14
0.3750	1 783E+14
0 5750	2 161E+15
0 8500	1 046E+14
1.2500	5 053E+15
1 7500	1 784E+12
2.2500	5 104E+12
2.7500	2.896E+10
3.5000	3 197E+09
5 0000	6 710E+02
7 0000	7.503E+01
11 0000	8 483E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.87E+02	1.97E+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	NONE	SST
BOL HM Constituents	U	U
BOL Enrichment %	48.34531901	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons
This fuel matches Pathfinder Template except enrichment and cladding (but substituting Stainless Steel is a good conservative assumption).

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		9,299 68
Bounding		18 599 37

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 40	
Bounding	0 81	

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 TARGET INDONESIA
SNF ID #: 672
Fuel Units & Descr. 48 - PARTICULATE
Heavy Metal Mass: BOL=3 97kg; EOL=3.97kg
ROD Storage Site. SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage: 18"x10' 1 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 Inventones(Ci)
Ac-227	1 9667E-09	75 00	149 99	0 00E+00	1 47E-07	2 95E-07
Am-241	4 9468E-05	75 00	149 99	0 00E+00	3 71E-03	7 42E-03
Am-242m	9 7537E-09	75 00	149 99	0 00E+00	7 32E-07	1 46E-06
Am-243	9 8802E-10	75 00	149 99	0 00E+00	7.41E-08	1 48E-07
C-14	2 3095E-04	75 00	149 99	0 00E+00	1.73E-02	3 46E-02
Cl-36	1 2261E-06	75 00	149 99	0 00E+00	9.20E-05	1 84E-04
Cm-243	5 1581E-10	75 00	149 99	0.00E+00	3 87E-08	7.74E-08
Cm-244	7 3012E-09	75 00	149 99	0 00E+00	5 48E-07	1.10E-06
Co-60	3 6556E+00	75 00	149 99	0 00E+00	2 74E+02	5 48E+02
Cs-134	7 2063E-02	75 00	149.99	0 00E+00	5 40E+00	1 08E+01
Cs-135	3 0316E-05	75 00	149 99	0 00E+00	2 27E-03	4.55E-03
Cs-137	2 9002E+00	75.00	149 99	0 00E+00	2 18E+02	4 35E+02
Eu-154	7 5025E-03	75 00	149 99	0 00E+00	5 63E-01	1 13E+00
Eu-155	4 6123E-02	75 00	149 99	0 00E+00	3 46E+00	6 92E+00
Fe-55	3 6439E+00	75 00	149 99	0 00E+00	2 73E+02	5 47E+02
H-3	1.3524E-02	75 00	149 99	0 00E+00	1 01E+00	2 03E+00
I-129	7 3195E-07	75 00	149 99	0 00E+00	5 49E-05	1 10E-04
Kr-85	2 8686E-01	75 00	149 99	0 00E+00	2.15E+01	4 30E+01
Np-237	1 1478E-06	75 00	149 99	0 00E+00	8 61E-05	1 72E-04
Pa-231	1 0990E-08	75 00	149 99	0 00E+00	8.24E-07	1 65E-06
Pb-210	8 0782E-15	75 00	149 99	0.00E+00	6 06E-13	1 21E-12
Pm-147	3 2097E+00	75 00	149 99	0 00E+00	2 41E+02	4 81E+02
Pu-238	3 7404E-04	75 00	149 99	0 00E+00	2 81E-02	5 61E-02
Pu-239	6 6839E-04	75 00	149 99	0 00E+00	5 01E-02	1 00E-01
Pu-240	8 7121E-05	75 00	149.99	0 00E+00	6 53E-03	1.31E-02
Pu-241	3 0283E-03	75.00	149 99	0 00E+00	2.27E-01	4.54E-01
Pu-242	1 9717E-09	75 00	149 99	0 00E+00	1 48E-07	2.96E-07
Ra-226	7.3527E-14	75 00	149 99	0 00E+00	5 51E-12	1.10E-11
Ra-228	6 0965E-12	75 00	149 99	0 00E+00	4 57E-10	9.14E-10
Ru-106	1 6531E-01	75 00	149 99	0 00E+00	1 24E+01	2 48E+01
Se-79	1.3228E-05	75 00	149 99	0 00E+00	9 92E-04	1 98E-03
Sn-126	1.1494E-05	75 00	149 99	0 00E+00	8 62E-04	1 72E-03
Sr-90	2.7854E+00	75 00	149 99	0 00E+00	2.09E+02	4 18E+02
Tc-99	4 6656E-04	75 00	149 99	0 00E+00	3 50E-02	7 00E-02
Th-229	2 9368E-12	75 00	149 99	0 00E+00	2.20E-10	4 41E-10
Th-230	3 2662E-11	75 00	149 99	0 00E+00	2.45E-09	4 90E-09
Th-232	8 3045E-12	75 00	149 99	0 00E+00	6.23E-10	1 25E-09
Tl-208	2 6722E-08	75 00	149 99	0 00E+00	2.00E-06	4 01E-06
U-232	7 7720E-08	75 00	149.99	0 00E+00	5 83E-06	1 17E-05
U-233	2 9834E-09	75 00	149.99	0 00E+00	2.24E-07	4 47E-07
U-234	3 5275E-07	75 00	149.99	0 00E+00	2 65E-05	5.29E-05
U-235	-2 7761E-06	75 00	0 00	4 15E-03	3 94E-03	4.15E-03
U-236	1 6190E-05	75 00	149 99	0 00E+00	1.21E-03	2.43E-03
U-238	-2 8547E-09	75 00	0 00	6 89E-04	6 89E-04	6.89E-04
Y-90	2.7870E+00	75 00	149 99	0 00E+00	2 09E+02	4 18E+02
Other Radionuclides					3 95E+02	7 89E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2.949E+13
0 0250	6.291E+12
0 0375	5 614E+12
0 0575	5 644E+12
0 0850	3.577E+12
0 1250	2.854E+12
0.2250	2.962E+12
0 3750	1 438E+12
0 5750	1 743E+13
0 8500	8 438E+11
1 2500	4 075E+13
1 7500	1 438E+10
2.2500	4 116E+10
2 7500	2.335E+08
3.5000	2.578E+07
5 0000	5 411E+00
7 0000	6 051E-01
11 0000	6 841E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7 96E+00	1.59E+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	NONE	SST
BOL HM Constituents	U	U
BOL Enrichment %	48.34531901	60 to 100

Basis for Parameter Differences:
This Template was used for the following reasons
This fuel matches Pathfinder Template except enrichment and cladding (but substituting Stainless Steel is a good conservative assumption).

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		75 00
Bounding		149 99

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 40	
Bounding	0.81	

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 TUBES (U3Si2 LEU) DENMARK
SNF ID # 298
Fuel Units & Descr 184 - ASSEMBLY
Heavy Metal Mass BOL=165 6kg EOL=142 618kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of: 2010
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 5 years

Estimated Canister usage
18"x10'
5 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	1 7533E-10	21,843.20	43,686 40	0 00E+00	3 83E-06	7.66E-06
Am-241	1 2780E-02	21,843.20	43,686 40	0 00E+00	2 79E+02	5.58E+02
Am-242m	9 5467E-06	21,843.20	43,686 40	0 00E+00	2 09E-01	4 17E-01
Am-243	6 4100E-06	21,843.20	43,686 40	0 00E+00	1 40E-01	2 80E-01
C-14	2 9673E-08	21,843.20	43,686 40	0 00E+00	6 48E-04	1 30E-03
Cl-36	5 9513E-35	21,843 20	43,686 40	0 00E+00	1.30E-30	2 60E-30
Cm-243	3 1807E-06	21,843 20	43,686 40	0 00E+00	6.95E-02	1.39E-01
Cm-244	1 9540E-04	21,843 20	43,686 40	0 00E+00	4 27E+00	8 54E+00
Co-60	1 1753E-04	21,843.20	43,686 40	0 00E+00	2.57E+00	5 13E+00
Cs-134	3 3060E-01	21,843 20	43,686 40	0 00E+00	7.22E+03	1 44E+04
Cs-135	4 8607E-06	21,843.20	43,686 40	0 00E+00	1 06E-01	2 12E-01
Cs-137	2 8607E+00	21,843.20	43,686 40	0 00E+00	6.25E+04	1.25E+05
Eu-154	6 9933E-02	21,843.20	43,686 40	0 00E+00	1.53E+03	3 06E+03
Eu-155	3 3253E-02	21,843.20	43,686 40	0 00E+00	7.26E+02	1.45E+03
Fe-55	7.7267E-02	21,843 20	43,686 40	0 00E+00	1 69E+03	3 38E+03
H-3	1.0827E-02	21,843 20	43,686 40	0 00E+00	2 36E+02	4 73E+02
I-129	7.1600E-07	21,843 20	43,686 40	0 00E+00	1.56E-02	3 13E-02
Kr-85	2 7007E-01	21,843 20	43,686 40	0 00E+00	5 90E+03	1 18E+04
Np-237	3 6327E-06	21,843 20	43,686 40	0 00E+00	7.93E-02	1.59E-01
Pa-231	1 1267E-09	21,843 20	43,686 40	0 00E+00	2.46E-05	4 92E-05
Pb-210	1 9773E-15	21,843.20	43,686 40	0 00E+00	4 32E-11	8 64E-11
Pm-147	2 4367E+00	21,843.20	43,686 40	0 00E+00	5.32E+04	1.06E+05
Pu-238	6 2213E-03	21,843.20	43,686 40	0 00E+00	1.36E+02	2 72E+02
Pu-239	1 0320E-02	21,843.20	43,686 40	0 00E+00	2.25E+02	4 51E+02
Pu-240	5 4260E-03	21,843.20	43,686 40	0 00E+00	1 19E+02	2 37E+02
Pu-241	7.7333E-01	21,843 20	43,686 40	0 00E+00	1 69E+04	3 38E+04
Pu-242	3 0713E-06	21,843 20	43,686 40	0 00E+00	6 71E-02	1.34E-01
Ra-226	2.2027E-14	21,843 20	43,686 40	0 00E+00	4 81E-10	9 62E-10
Ra-228	2 6333E-15	21,843 20	43,686 40	0 00E+00	5 75E-11	1.15E-10
Ru-106	2 5580E-01	21,843 20	43,686 40	0 00E+00	5 59E+03	1.12E+04
Se-79	1 2540E-05	21,843 20	43,686 40	0 00E+00	2.74E-01	5 48E-01
Sn-126	1 1393E-05	21,843.20	43,686 40	0 00E+00	2 49E-01	4 98E-01
Sr-90	2 6293E+00	21,843.20	43,686 40	0 00E+00	5 74E+04	1 15E+05
Tc-99	4 3540E-04	21,843.20	43,686 40	0 00E+00	9 51E+00	1 90E+01
Th-229	1.3653E-13	21,843.20	43,686 40	0 00E+00	2 98E-09	5 96E-09
Th-230	1.2607E-11	21,843.20	43,686.40	0 00E+00	2 75E-07	5.51E-07
Th-232	6.7400E-15	21,843 20	43,686 40	0 00E+00	1 47E-10	2 94E-10
Tl-208	7.4667E-09	21,843 20	43,686 40	0 00E+00	1 63E-04	3.26E-04
U-232	2 1927E-08	21,843 20	43,686 40	0 00E+00	4.79E-04	9 58E-04
U-233	1 9920E-10	21,843 20	43,686 40	0 00E+00	4.35E-06	8 70E-06
U-234	2 2487E-07	21,843 20	43,686 40	0 00E+00	4 91E-03	9 82E-03
U-235	-2.5341E-06	21,843 20	0 00	7 16E-02	1 62E-02	7 16E-02
U-236	1.3000E-05	21,843.20	43,686 40	0 00E+00	2 84E-01	5 68E-01
U-238	-1.4207E-08	21,843.20	0 00	4 45E-02	4 42E-02	4 45E-02
Y-90	2 6300E+00	21,843.20	43,686 40	0 00E+00	5 74E+04	1 15E+05
Other Radionuclides					1 03E+05	2 06E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	7 926E+15
0 0250	1 708E+15
0 0375	1 556E+15
0 0575	1.554E+15
0 0850	9 785E+14
0 1250	8 170E+14
0.2250	8.344E+14
0.3750	4 046E+14
0.5750	5.587E+15
0.8500	5 926E+14
1.2500	1.310E+14
1 7500	6.234E+12
2 2500	1 084E+13
2.7500	9 808E+10
3 5000	1 162E+10
5 0000	1.137E+05
7 0000	1.295E+04
11 0000	1.480E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.03E+03	2 07E+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 %	20	10 to 20

Basis for Parameter Differences

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		21,843.20	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		43,686 40	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	3.01	
Bounding	6 02	

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 TUBES (U3Si2 LEU) GERMANY
SNF ID #: 673
Fuel Units & Descr: 135 - ASSEMBLY
Heavy Metal Mass: BOL=121 5kg EOL=109 35kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage: 18"x10" 3 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	1 7533E-10	11,548 15	23,096 29	0 00E+00	2 02E-06	4 05E-06
Am-241	1 2780E-02	11,548 15	23,096 29	0 00E+00	1 48E+02	2 95E+02
Am-242m	9 5467E-06	11,548 15	23,096 29	0 00E+00	1 10E-01	2 20E-01
Am-243	6 4100E-06	11,548 15	23,096 29	0 00E+00	7 40E-02	1 48E-01
C-14	2 9673E-08	11,548.15	23,096 29	0 00E+00	3 43E-04	6 85E-04
Cl-36	5 9513E-35	11,548.15	23,096 29	0 00E+00	6 87E-31	1 37E-30
Cm-243	3.1807E-06	11,548.15	23,096.29	0 00E+00	3 67E-02	7.35E-02
Cm-244	1 9540E-04	11,548 15	23,096.29	0 00E+00	2.26E+00	4 51E+00
Co-60	1 1753E-04	11,548 15	23,096.29	0 00E+00	1 36E+00	2 71E+00
Cs-134	3 3060E-01	11,548 15	23,096.29	0 00E+00	3 82E+03	7 64E+03
Cs-135	4 8607E-06	11,548 15	23,096.29	0 00E+00	5 61E-02	1 12E-01
Cs-137	2 8607E+00	11,548 15	23,096 29	0 00E+00	3 30E+04	6 61E+04
Eu-154	6 9933E-02	11,548 15	23,096 29	0 00E+00	8 08E+02	1 62E+03
Eu-155	3 3253E-02	11,548 15	23,096 29	0 00E+00	3 84E+02	7 68E+02
Fe-55	7.7267E-02	11,548 15	23,096 29	0 00E+00	8 92E+02	1.78E+03
H-3	1 0827E-02	11,548.15	23,096.29	0 00E+00	1.25E+02	2 50E+02
I-129	7.1600E-07	11,548.15	23,096.29	0 00E+00	8.27E-03	1 65E-02
Kr-85	2 7007E-01	11,548.15	23,096.29	0 00E+00	3 12E+03	6.24E+03
Np-237	3 6327E-06	11,548.15	23,096.29	0 00E+00	4 20E-02	8 39E-02
Pa-231	1 1267E-09	11,548 15	23,096.29	0 00E+00	1 30E-05	2 60E-05
Pb-210	1 9773E-15	11,548 15	23,096.29	0 00E+00	2 28E-11	4 57E-11
Pm-147	2 4367E+00	11,548 15	23,096 29	0 00E+00	2 81E+04	5 63E+04
Pu-238	6 2213E-03	11,548 15	23,096 29	0 00E+00	7.18E+01	1 44E+02
Pu-239	1 0320E-02	11,548 15	23,096 29	0 00E+00	1 19E+02	2.38E+02
Pu-240	5 4260E-03	11,548.15	23,096 29	0 00E+00	6.27E+01	1.25E+02
Pu-241	7.7333E-01	11,548.15	23,096.29	0 00E+00	8.93E+03	1 79E+04
Pu-242	3.0713E-06	11,548 15	23,096.29	0 00E+00	3.55E-02	7.09E-02
Ra-226	2.2027E-14	11,548.15	23,096.29	0 00E+00	2.54E-10	5 09E-10
Ra-228	2 6333E-15	11,548 15	23,096.29	0 00E+00	3 04E-11	6 08E-11
Ru-106	2 5580E-01	11,548 15	23,096.29	0 00E+00	2 95E+03	5 91E+03
Se-79	1 2540E-05	11,548 15	23,096 29	0 00E+00	1 45E-01	2 90E-01
Sn-126	1 1393E-05	11,548 15	23,096 29	0 00E+00	1 32E-01	2 63E-01
Sr-90	2 6293E+00	11,548 15	23,096 29	0 00E+00	3 04E+04	6 07E+04
Tc-99	4.3540E-04	11,548.15	23,096.29	0 00E+00	5 03E+00	1.01E+01
Th-229	1.3653E-13	11,548.15	23,096 29	0 00E+00	1.58E-09	3.15E-09
Th-230	1.2607E-11	11,548 15	23,096.29	0 00E+00	1.46E-07	2 91E-07
Th-232	6 7400E-15	11,548 15	23,096.29	0 00E+00	7.78E-11	1 56E-10
Tl-208	7 4667E-09	11,548 15	23,096.29	0 00E+00	8 62E-05	1.72E-04
U-232	2 1927E-08	11,548 15	23,096.29	0 00E+00	2 53E-04	5 06E-04
U-233	1 9920E-10	11,548 15	23,096 29	0 00E+00	2 30E-06	4 60E-06
U-234	2.2487E-07	11,548 15	23,096 29	0 00E+00	2 60E-03	5 19E-03
U-235	-2 5341E-06	11,548.15	0 00	5.25E-02	2 32E-02	5.25E-02
U-236	1.3000E-05	11,548.15	23,096.29	0 00E+00	1 50E-01	3 00E-01
U-238	-1 4207E-08	11,548 15	0 00	3 27E-02	3 25E-02	3.27E-02
Y-90	2 6300E+00	11,548 15	23,096.29	0 00E+00	3 04E+04	6 07E+04
Other Radionuclides					5 45E+04	1 09E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	4 190E+15
0.0250	9 029E+14
0.0375	8.228E+14
0 0575	8.214E+14
0 0850	5 173E+14
0 1250	4.319E+14
0.2250	4 412E+14
0 3750	2.139E+14
0 5750	2.954E+15
0 8500	3 133E+14
1.2500	6 924E+13
1 7500	3 296E+12
2.2500	5 732E+12
2.7500	5 185E+10
3.5000	6 143E+09
5 0000	6 013E+04
7 0000	6.851E+03
11 0000	7 825E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 47E+02	1 09E+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 %	20	10 to 20

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		11 548 15	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		23 096 29	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 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 TUBES (U3SI2 LEU) GERMANY
SNF ID #: 674
Fuel Units & Descr: 18 - ASSEMBLY
Heavy Metal Mass BOL=18kg EOL=16.2kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 5 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	1 7533E-10	1,710 84	3,421 67	0 00E+00	3 00E-07	6 00E-07
Am-241	1 2780E-02	1,710 84	3,421 67	0 00E+00	2 19E+01	4 37E+01
Am-242m	9 5467E-06	1,710 84	3,421 67	0 00E+00	1.63E-02	3 27E-02
Am-243	6 4100E-06	1,710 84	3,421 67	0 00E+00	1 10E-02	2 19E-02
C-14	2 9673E-08	1,710 84	3,421 67	0 00E+00	5 08E-05	1 02E-04
Cl-36	5 9513E-35	1,710 84	3,421 67	0 00E+00	1 02E-31	2.04E-31
Cm-243	3 1807E-06	1,710 84	3,421 67	0 00E+00	5 44E-03	1.09E-02
Cm-244	1.9540E-04	1,710 84	3,421 67	0 00E+00	3 34E-01	6 69E-01
Co-60	1.1753E-04	1,710 84	3,421 67	0 00E+00	2 01E-01	4 02E-01
Cs-134	3.3060E-01	1,710 84	3,421 67	0 00E+00	5 66E+02	1.13E+03
Cs-135	4 8607E-06	1,710 84	3,421 67	0 00E+00	8 32E-03	1 66E-02
Cs-137	2 8607E+00	1,710 84	3,421 67	0 00E+00	4 89E+03	9 79E+03
Eu-154	6 9933E-02	1,710 84	3,421 67	0 00E+00	1.20E+02	2.39E+02
Eu-155	3 3253E-02	1,710 84	3,421 67	0 00E+00	5 69E+01	1 14E+02
Fe-55	7 7267E-02	1,710 84	3,421.67	0 00E+00	1.32E+02	2 64E+02
H-3	1 0827E-02	1,710 84	3,421.67	0 00E+00	1.85E+01	3 70E+01
I-129	7 1600E-07	1,710 84	3,421.67	0 00E+00	1.22E-03	2 45E-03
Kr-85	2 7007E-01	1,710 84	3,421 67	0 00E+00	4 62E+02	9 24E+02
Np-237	3 6327E-06	1,710 84	3,421 67	0 00E+00	6 21E-03	1.24E-02
Pa-231	1.1267E-09	1,710 84	3,421 67	0 00E+00	1 93E-06	3 86E-06
Pb-210	1.9773E-15	1,710 84	3,421 67	0 00E+00	3 38E-12	6 77E-12
Pm-147	2.4367E+00	1,710 84	3,421 67	0 00E+00	4 17E+03	8.34E+03
Pu-238	6.2213E-03	1,710 84	3,421 67	0 00E+00	1 06E+01	2 13E+01
Pu-239	1 0320E-02	1,710 84	3,421 67	0 00E+00	1 77E+01	3 53E+01
Pu-240	5 4260E-03	1,710 84	3,421 67	0 00E+00	9.28E+00	1 86E+01
Pu-241	7.7333E-01	1,710 84	3,421 67	0 00E+00	1.32E+03	2 65E+03
Pu-242	3 0713E-06	1,710 84	3,421 67	0 00E+00	5.25E-03	1 05E-02
Ra-226	2 2027E-14	1,710 84	3,421.67	0 00E+00	3 77E-11	7.54E-11
Ra-228	2 6333E-15	1,710 84	3,421.67	0 00E+00	4 51E-12	9 01E-12
Ru-106	2 5580E-01	1,710 84	3,421 67	0 00E+00	4.38E+02	8 75E+02
Se-79	1.2540E-05	1,710 84	3,421 67	0 00E+00	2 15E-02	4.29E-02
Sn-126	1 1393E-05	1,710 84	3,421 67	0 00E+00	1 95E-02	3 90E-02
Sr-90	2 6293E+00	1,710 84	3,421 67	0 00E+00	4 50E+03	9 00E+03
Tc-99	4.3540E-04	1,710 84	3,421 67	0 00E+00	7 45E-01	1 49E+00
Th-229	1.3653E-13	1,710 84	3,421 67	0 00E+00	2.34E-10	4 67E-10
Th-230	1.2607E-11	1,710 84	3,421 67	0 00E+00	2.16E-08	4 31E-08
Th-232	6.7400E-15	1,710 84	3,421 67	0 00E+00	1.15E-11	2.31E-11
Tl-208	7.4667E-09	1,710 84	3,421 67	0 00E+00	1.28E-05	2.55E-05
U-232	2 1927E-08	1,710 84	3,421 67	0 00E+00	3 75E-05	7.50E-05
U-233	1 9920E-10	1,710 84	3,421 67	0 00E+00	3 41E-07	6 82E-07
U-234	2 2487E-07	1,710 84	3,421 67	0 00E+00	3 85E-04	7.69E-04
U-235	-2.5341E-06	1,710 84	0.00	7.78E-03	3 44E-03	7.78E-03
U-236	1 3000E-05	1,710 84	3,421 67	0 00E+00	2 22E-02	4 45E-02
U-238	-1.4207E-08	1,710 84	0 00	4.84E-03	4 82E-03	4 84E-03
Y-90	2 6300E+00	1,710 84	3,421 67	0 00E+00	4 50E+03	9 00E+03
Other Radionuclides					8 08E+03	1 62E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6.208E+14
0 0250	1 338E+14
0 0375	1.219E+14
0 0575	1.217E+14
0 0850	7 664E+13
0 1250	6.399E+13
0.2250	6.536E+13
0 3750	3 169E+13
0 5750	4 376E+14
0 8500	4 642E+13
1.2500	1 026E+13
1 7500	4.883E+11
2.2500	8 492E+11
2 7500	7 682E+09
3 5000	9 100E+08
5 0000	8 909E+03
7.0000	1 015E+03
11 0000	1 159E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 10E+01	1.62E+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	Basis for burnup used in estimate
Nominal		1,710 84	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		3 421 67	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 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 TUBES (U3Si2 LEU) GERMANY
SNF ID #: 675
Fuel Units & Descr: 135 - ASSEMBLY
Heavy Metal Mass: BOL=151 875kg; EOL=136 688kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage 18"x10'
3 75

II. Estimates

Radionuclide	m: C/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 7533E-10	14,435 18	28,870 37	0 00E+00	2 53E-06	5 06E-06
Am-241	1 2780E-02	14,435 18	28,870 37	0 00E+00	1 84E+02	3 69E+02
Am-242m	9 5467E-06	14,435 18	28,870 37	0 00E+00	1 38E-01	2.76E-01
Am-243	6 4100E-06	14,435 18	28,870 37	0 00E+00	9.25E-02	1.85E-01
C-14	2 9673E-08	14,435 18	28,870 37	0 00E+00	4.28E-04	8.57E-04
Cl-36	5 9513E-35	14,435 18	28,870 37	0.00E+00	8 59E-31	1.72E-30
Cm-243	3 1807E-06	14,435 18	28,870 37	0 00E+00	4 59E-02	9 18E-02
Cm-244	1 9540E-04	14,435 18	28,870 37	0 00E+00	2 82E+00	5 64E+00
Co-60	1.1753E-04	14,435.18	28,870 37	0 00E+00	1 70E+00	3 39E+00
Cs-134	3 3060E-01	14,435 18	28,870.37	0 00E+00	4 77E+03	9 54E+03
Cs-135	4 8607E-06	14,435 18	28,870.37	0 00E+00	7 02E-02	1 40E-01
Cs-137	2 8607E+00	14,435 18	28,870.37	0 00E+00	4 13E+04	8 26E+04
Eu-154	6 9933E-02	14,435 18	28,870 37	0 00E+00	1 01E+03	2 02E+03
Eu-155	3 3253E-02	14,435 18	28,870 37	0 00E+00	4 80E+02	9 60E+02
Fe-55	7 7267E-02	14,435 18	28,870 37	0 00E+00	1 12E+03	2.23E+03
H-3	1 0827E-02	14,435 18	28,870 37	0 00E+00	1 56E+02	3 13E+02
I-129	7 1600E-07	14,435 18	28,870 37	0 00E+00	1 03E-02	2 07E-02
Kr-85	2 7007E-01	14,435 18	28,870 37	0 00E+00	3 90E+03	7.80E+03
Np-237	3 6327E-06	14,435 18	28,870 37	0 00E+00	5 24E-02	1 05E-01
Pa-231	1 1267E-09	14,435 18	28,870 37	0 00E+00	1 63E-05	3.25E-05
Pb-210	1 9773E-15	14,435 18	28,870 37	0.00E+00	2.85E-11	5 71E-11
Pm-147	2 4367E+00	14,435.18	28,870.37	0 00E+00	3.52E+04	7 03E+04
Pu-238	6 2213E-03	14,435.18	28,870 37	0 00E+00	8 98E+01	1 80E+02
Pu-239	1 0320E-02	14,435.18	28,870 37	0 00E+00	1 49E+02	2 98E+02
Pu-240	5 4260E-03	14,435 18	28,870.37	0 00E+00	7 83E+01	1 57E+02
Pu-241	7.7333E-01	14,435 18	28,870.37	0 00E+00	1 12E+04	2 23E+04
Pu-242	3.0713E-06	14,435 18	28,870 37	0 00E+00	4 43E-02	8 87E-02
Ra-226	2.2027E-14	14,435 18	28,870 37	0 00E+00	3 18E-10	6 36E-10
Ra-228	2 6333E-15	14,435 18	28,870 37	0 00E+00	3 80E-11	7 60E-11
Ru-106	2 5580E-01	14,435 18	28,870 37	0 00E+00	3 69E+03	7.39E+03
Se-79	1 2540E-05	14,435 18	28,870 37	0 00E+00	1 81E-01	3 62E-01
Sn-126	1 1393E-05	14,435 18	28,870 37	0 00E+00	1 64E-01	3 29E-01
Sr-90	2 6293E+00	14,435 18	28 870 37	0 00E+00	3 80E+04	7 59E+04
Tc-99	4 3540E-04	14,435 18	28,870 37	0 00E+00	6.29E+00	1.26E+01
Th-229	1 3653E-13	14,435 18	28,870 37	0 00E+00	1 97E-09	3 94E-09
Th-230	1 2607E-11	14,435.18	28,870 37	0 00E+00	1 82E-07	3 64E-07
Th-232	6 7400E-15	14,435.18	28,870 37	0 00E+00	9 73E-11	1.95E-10
Tl-208	7 4667E-09	14,435.18	28,870 37	0 00E+00	1 08E-04	2.16E-04
U-232	2.1927E-08	14,435.18	28,870.37	0 00E+00	3.17E-04	6.33E-04
U-233	1.9920E-10	14,435 18	28,870.37	0 00E+00	2 88E-06	5.75E-06
U-234	2.2487E-07	14,435 18	28,870.37	0 00E+00	3.25E-03	6 49E-03
U-235	-2 5341E-06	14,435 18	0 00	6 56E-02	2 91E-02	6 56E-02
U-236	1 3000E-05	14,435 18	28,870 37	0 00E+00	1 88E-01	3 75E-01
U-238	-1 4207E-08	14,435 18	0 00	4 08E-02	4 06E-02	4 08E-02
Y-90	2 6300E+00	14,435 18	28,870 37	0 00E+00	3 80E+04	7 59E+04
Other Radionuclides					6 82E+04	1 36E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5.238E+15
0 0250	1 129E+15
0 0375	1 028E+15
0 0575	1 027E+15
0 0850	6 466E+14
0 1250	5.399E+14
0.2250	5 514E+14
0.3750	2 674E+14
0.5750	3 692E+15
0.8500	3 916E+14
1.2500	8 655E+13
1 7500	4 120E+12
2.2500	7 165E+12
2.7500	6 482E+10
3 5000	7 678E+09
5 0000	7 517E+04
7 0000	8.563E+03
11 0000	9 781E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.83E+02	1.37E+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 %	20	10 to 20

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		14 435 18	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		28,870.37	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 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 TUBES (UALX LEU) AUSTRALIA
SNF ID #: 299
Fuel Units & Descr: 289 - ASSEMBLY
Heavy Metal Mass: BOL=289kg EOL=260 1kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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: 5 years

Estimated Canister usage 18"x10'
8 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	1.7533E-10	27,468 45	54,936 90	0 00E+00	4 82E-06	9 63E-06
Am-241	1.2780E-02	27,468 45	54,936 90	0 00E+00	3 51E+02	7 02E+02
Am-242m	9 5467E-06	27,468 45	54,936 90	0 00E+00	2 62E-01	5 24E-01
Am-243	6 4100E-06	27,468 45	54,936 90	0 00E+00	1 76E-01	3 52E-01
C-14	2 9673E-08	27,468 45	54,936 90	0 00E+00	8 15E-04	1 63E-03
Cl-36	5 9513E-35	27,468 45	54,936 90	0 00E+00	1 63E-30	3.27E-30
Cm-243	3 1807E-06	27,468 45	54,936 90	0 00E+00	8 74E-02	1.75E-01
Cm-244	1 9540E-04	27,468 45	54,936 90	0.00E+00	5 37E+00	1.07E+01
Co-60	1.1753E-04	27,468.45	54,936 90	0 00E+00	3.23E+00	6 46E+00
Cs-134	3.3060E-01	27,468 45	54,936 90	0 00E+00	9 08E+03	1 82E+04
Cs-135	4 8607E-06	27,468 45	54,936 90	0 00E+00	1.34E-01	2 67E-01
Cs-137	2 8607E+00	27,468 45	54,936 90	0 00E+00	7 86E+04	1 57E+05
Eu-154	6 9933E-02	27,468 45	54,936 90	0 00E+00	1 92E+03	3 84E+03
Eu-155	3 3253E-02	27,468 45	54,936 90	0 00E+00	9 13E+02	1 83E+03
Fe-55	7 7267E-02	27,468 45	54,936 90	0 00E+00	2 12E+03	4.24E+03
H-3	1 0827E-02	27,468 45	54,936 90	0.00E+00	2 97E+02	5 95E+02
I-129	7.1600E-07	27,468 45	54,936 90	0 00E+00	1.97E-02	3 93E-02
Kr-85	2.7007E-01	27,468 45	54,936 90	0 00E+00	7.42E+03	1 48E+04
Np-237	3 6327E-06	27,468 45	54,936 90	0 00E+00	9 98E-02	2 00E-01
Pa-231	1 1267E-09	27,468 45	54,936 90	0 00E+00	3 09E-05	6 19E-05
Pb-210	1 9773E-15	27,468 45	54,936 90	0 00E+00	5 43E-11	1 09E-10
Pm-147	2 4367E+00	27,468 45	54,936 90	0 00E+00	6 69E+04	1.34E+05
Pu-238	6 2213E-03	27,468 45	54,936 90	0 00E+00	1 71E+02	3.42E+02
Pu-239	1 0320E-02	27,468 45	54,936 90	0 00E+00	2 83E+02	5 67E+02
Pu-240	5 4260E-03	27,468 45	54,936 90	0.00E+00	1 49E+02	2 98E+02
Pu-241	7.7333E-01	27,468 45	54,936 90	0 00E+00	2.12E+04	4.25E+04
Pu-242	3 0713E-06	27,468 45	54,936 90	0 00E+00	8 44E-02	1 69E-01
Ra-226	2.2027E-14	27,468 45	54,936 90	0 00E+00	6 05E-10	1 21E-09
Ra-228	2 6333E-15	27,468 45	54,936 90	0 00E+00	7.23E-11	1 45E-10
Ru-106	2 5580E-01	27,468 45	54,936 90	0 00E+00	7 03E+03	1 41E+04
Se-79	1 2540E-05	27,468 45	54,936 90	0 00E+00	3 44E-01	6 89E-01
Sn-126	1 1393E-05	27,468 45	54,936 90	0 00E+00	3 13E-01	6.26E-01
Sr-90	2 6293E+00	27,468 45	54,936 90	0 00E+00	7 22E+04	1.44E+05
Tc-99	4.3540E-04	27,468.45	54,936.90	0 00E+00	1.20E+01	2 39E+01
Th-229	1.3653E-13	27,468 45	54,936 90	0 00E+00	3 75E-09	7 50E-09
Th-230	1.2607E-11	27,468 45	54,936 90	0 00E+00	3 46E-07	6 93E-07
Th-232	6 7400E-15	27,468 45	54,936 90	0 00E+00	1 85E-10	3 70E-10
Tl-208	7.4667E-09	27,468 45	54,936 90	0 00E+00	2 05E-04	4.10E-04
U-232	2 1927E-08	27,468 45	54,936 90	0 00E+00	6 02E-04	1.20E-03
U-233	1 9920E-10	27,468 45	54,936 90	0 00E+00	5 47E-06	1 09E-05
U-234	2.2487E-07	27,468.45	54,936 90	0 00E+00	6 18E-03	1.24E-02
U-235	-2.5341E-06	27,468 45	0 00	1.25E-01	5.53E-02	1 25E-01
U-236	1.3000E-05	27,468 45	54,936 90	0 00E+00	3.57E-01	7 14E-01
U-238	-1 4207E-08	27,468 45	0 00	7 77E-02	7 73E-02	7 77E-02
Y-90	2 6300E+00	27,468 45	54,936 90	0 00E+00	7.22E+04	1 44E+05
Other Radionuclides					1.30E+05	2.59E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	9 968E+15
0 0250	2 148E+15
0 0375	1 957E+15
0 0575	1 954E+15
0 0850	1.230E+15
0 1250	1 027E+15
0.2250	1 049E+15
0.3750	5.088E+14
0 5750	7.026E+15
0 8500	7.452E+14
1 2500	1 647E+14
1 7500	7.840E+12
2.2500	1.363E+13
2 7500	1.233E+11
3.5000	1 461E+10
5 0000	1 430E+05
7 0000	1 629E+04
11 0000	1.861E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.30E+03	2.60E+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 %:	20 0000003	10 to 20

Basis for Parameter Differences:
This Template was used for the following reasons.
This fuel matches on all parameters

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		27 468 45
Bounding		54,936.90

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	2 17	
Bounding	4.34	

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 TUBES (UALX-HEU) AUSTRALIA
SNF ID #: 300
Fuel Units & Descr: 266 - ASSEMBLY
Heavy Metal Mass. BOL=38.251kg, EOL=22 025kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 5 years

Estimated Canister usage: 18"x10" 7 39

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 6950E-11	14,945 82	29,891 64	0 00E+00	1 00E-06	2 00E-06
Am-241	4 4557E-03	14,945 82	29,891 64	0 00E+00	6 66E+01	1 33E+02
Am-242m	1 4666E-06	14,945 82	29,891 64	0 00E+00	2 19E-02	4 38E-02
Am-243	3 7151E-05	14,945 82	29,891 64	0 00E+00	5 55E-01	1 11E+00
C-14	2 6513E-08	14,945 82	29,891 64	0 00E+00	3 96E-04	7 93E-04
Cl-36	4 4441E-31	14,945 82	29,891 64	0 00E+00	6 64E-27	1 33E-26
Cm-243	8 2139E-06	14,945 82	29,891 64	0 00E+00	1.23E-01	2 46E-01
Cm-244	8 2625E-03	14,945 82	29,891 64	0 00E+00	1.23E+02	2 47E+02
Co-60	3 4951E-04	14,945 82	29,891 64	0 00E+00	5 22E+00	1.04E+01
Cs-134	1 6409E+00	14,945 82	29,891 64	0 00E+00	2 45E+04	4 91E+04
Cs-135	4.2564E-06	14,945 82	29,891 64	0 00E+00	6 36E-02	1.27E-01
Cs-137	2 8791E+00	14,945 82	29,891 64	0 00E+00	4 30E+04	8 61E+04
Eu-154	1 7388E-01	14,945 82	29,891.64	0 00E+00	2 60E+03	5 20E+03
Eu-155	1 1616E-01	14,945 82	29,891 64	0 00E+00	1 74E+03	3 47E+03
Fe-55	7 3755E-02	14,945 82	29,891 64	0 00E+00	1 10E+03	2.20E+03
H-3	1 0729E-02	14,945 82	29,891 64	0 00E+00	1 60E+02	3 21E+02
I-129	6 6403E-07	14,945 82	29,891 64	0 00E+00	9 92E-03	1 98E-02
Kr-85	2 8487E-01	14,945 82	29,891 64	0 00E+00	4.26E+03	8 52E+03
Np-237	3 1507E-05	14,945 82	29,891 64	0 00E+00	4 71E-01	9 42E-01
Pa-231	4 1938E-10	14,945 82	29,891 64	0 00E+00	6.27E-06	1 25E-05
Pb-210	8 4083E-13	14,945 82	29,891 64	0 00E+00	1.26E-08	2 51E-08
Pm-147	1.2807E+00	14,945 82	29,891 64	0 00E+00	1 91E+04	3 83E+04
Pu-238	1 7290E-01	14,945 82	29,891 64	0 00E+00	2 58E+03	5 17E+03
Pu-239	6 9563E-04	14,945 82	29,891 64	0 00E+00	1 04E+01	2 08E+01
Pu-240	3 6865E-04	14,945 82	29,891 64	0 00E+00	5 51E+00	1.10E+01
Pu-241	2.7643E-01	14,945 82	29,891 64	0 00E+00	4 13E+03	8.26E+03
Pu-242	3.0911E-06	14,945 82	29,891.64	0 00E+00	4 62E-02	9.24E-02
Ra-226	8 6330E-12	14,945.82	29,891 64	0 00E+00	1 29E-07	2.58E-07
Ra-228	3.1817E-15	14,945 82	29,891 64	0 00E+00	4 76E-11	9.51E-11
Ru-106	2 1981E-01	14,945 82	29,891 64	0 00E+00	3 29E+03	6 57E+03
Se-79	1 2339E-05	14,945 82	29,891 64	0 00E+00	1 84E-01	3 69E-01
Sn-126	1 0194E-05	14,945 82	29,891 64	0 00E+00	1 52E-01	3 05E-01
Sr-90	2 7242E+00	14,945 82	29,891 64	0 00E+00	4 07E+04	8 14E+04
Tc-99	3 8056E-04	14,945 82	29,891 64	0 00E+00	5.69E+00	1 14E+01
Th-229	1 0413E-12	14,945 82	29,891 64	0 00E+00	1.56E-08	3 11E-08
Th-230	3 9648E-09	14,945 82	29,891 64	0 00E+00	5 93E-05	1 19E-04
Th-232	8.3536E-15	14,945 82	29,891 64	0 00E+00	1.25E-10	2 50E-10
Tl-208	4.3888E-08	14,945 82	29,891 64	0 00E+00	6.56E-04	1 31E-03
U-232	1.3645E-07	14,945 82	29,891 64	0 00E+00	2 04E-03	4 08E-03
U-233	1.7023E-09	14,945 82	29,891 64	0 00E+00	2 54E-05	5 09E-05
U-234	4 5389E-05	14,945 82	29,891 64	0 00E+00	6 78E-01	1.36E+00
U-235	-2.8661E-06	14,945 82	0 00	6 61E-02	2 33E-02	6 61E-02
U-236	1 6701E-05	14,945 82	29,891 64	0 00E+00	2 50E-01	4 99E-01
U-238	-9 4194E-09	14,945 82	0 00	2 57E-03	2 43E-03	2.57E-03
Y-90	2 7248E+00	14,945 82	29,891 64	0 00E+00	4 07E+04	8.14E+04
Other Radionuclides					7 95E+04	1 59E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	5 938E+15
0.0250	1.265E+15
0 0375	1.222E+15
0 0575	1 165E+15
0 0850	7 632E+14
0 1250	6 963E+14
0 2250	6.287E+14
0 3750	2 978E+14
0 5750	5.698E+15
0 8500	1 742E+15
1 2500	2.379E+14
1 7500	6.256E+12
2.2500	9 894E+12
2 7500	6 086E+10
3.5000	6 835E+09
5 0000	1 555E+06
7 0000	1 788E+05
11.0000	2 051E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.03E+03	2.07E+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 %	80 00000311	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal:		14,945.82	Nominal burnup calculated from the heavy metal mass destroyed
Bounding:		29 891 64	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 89	
Bounding	1 79	

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 TUBES (UALX-HEU) AUSTRALIA
SNF ID #. 684
Fuel Units & Descr: 169 - ASSEMBLY
Heavy Metal Mass BOL=47.878kg, EOL=32 651kg
ROD Storage Site SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 5 years

Estimated Canister usage 18"x10'
4 69

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 6950E-11	14,025.54	28,051 09	0 00E+00	9 39E-07	1 88E-06
Am-241	4 4557E-03	14,025 54	28,051 09	0 00E+00	6 25E+01	1.25E+02
Am-242m	1 4666E-06	14,025 54	28,051 09	0 00E+00	2 06E-02	4 11E-02
Am-243	3 7151E-05	14,025 54	28,051 09	0 00E+00	5 21E-01	1 04E+00
C-14	2 6513E-08	14,025 54	28,051 09	0 00E+00	3 72E-04	7 44E-04
Cl-36	4 4441E-31	14,025 54	28,051.09	0 00E+00	6.23E-27	1.25E-26
Cm-243	8.2139E-06	14,025.54	28,051 09	0 00E+00	1.15E-01	2 30E-01
Cm-244	8.2625E-03	14,025 54	28,051 09	0 00E+00	1.16E+02	2.32E+02
Co-60	3 4951E-04	14,025 54	28,051 09	0 00E+00	4 90E+00	9 80E+00
Cs-134	1 6409E+00	14,025 54	28,051 09	0 00E+00	2 30E+04	4 60E+04
Cs-135	4 2564E-06	14,025 54	28,051 09	0 00E+00	5 97E-02	1 19E-01
Cs-137	2 8791E+00	14,025 54	28,051 09	0 00E+00	4 04E+04	8 08E+04
Eu-154	1.7388E-01	14,025 54	28,051.09	0 00E+00	2 44E+03	4 88E+03
Eu-155	1 1616E-01	14,025.54	28 051 09	0 00E+00	1 63E+03	3.26E+03
Fe-55	7.3755E-02	14,025 54	28,051 09	0 00E+00	1.03E+03	2.07E+03
H-3	1 0729E-02	14,025 54	28,051 09	0 00E+00	1.50E+02	3 01E+02
I-129	6 6403E-07	14,025 54	28,051 09	0 00E+00	9 31E-03	1 86E-02
Kr-85	2 8487E-01	14,025 54	28,051 09	0 00E+00	4 00E+03	7 99E+03
Np-237	3 1507E-05	14,025 54	28,051 09	0 00E+00	4 42E-01	8 84E-01
Pa-231	4 1938E-10	14,025.54	28,051.09	0 00E+00	5 88E-06	1.18E-05
Pb-210	8 4083E-13	14,025.54	28,051.09	0 00E+00	1.18E-08	2.36E-08
Pm-147	1.2807E+00	14,025.54	28,051 09	0 00E+00	1.80E+04	3 59E+04
Pu-238	1 7290E-01	14,025 54	28,051 09	0 00E+00	2.43E+03	4 85E+03
Pu-239	6 9563E-04	14,025 54	28,051 09	0 00E+00	9 76E+00	1 95E+01
Pu-240	3 6865E-04	14,025 54	28,051 09	0 00E+00	5 17E+00	1 03E+01
Pu-241	2 7643E-01	14,025 54	28,051 09	0 00E+00	3 88E+03	7 75E+03
Pu-242	3 0911E-06	14,025 54	28,051 09	0 00E+00	4 34E-02	8 67E-02
Ra-226	8 6330E-12	14,025 54	28,051.09	0 00E+00	1.21E-07	2.42E-07
Ra-228	3 1817E-15	14,025.54	28,051 09	0 00E+00	4.46E-11	8 92E-11
Ru-106	2 1981E-01	14,025.54	28,051 09	0 00E+00	3 08E+03	6.17E+03
Se-79	1.2339E-05	14,025 54	28,051 09	0 00E+00	1 73E-01	3 46E-01
Sn-126	1 0194E-05	14,025 54	28,051 09	0 00E+00	1 43E-01	2 86E-01
Sr-90	2 7242E+00	14,025 54	28,051 09	0 00E+00	3 82E+04	7 64E+04
Tc-99	3 8056E-04	14,025 54	28,051 09	0 00E+00	5 34E+00	1 07E+01
Th-229	1 0413E-12	14,025 54	28,051.09	0 00E+00	1 46E-08	2.92E-08
Th-230	3.9648E-09	14,025 54	28,051.09	0 00E+00	5.56E-05	1.11E-04
Th-232	8.3536E-15	14,025.54	28,051 09	0 00E+00	1.17E-10	2 34E-10
Tl-208	4 3888E-08	14,025 54	28,051 09	0 00E+00	6 16E-04	1.23E-03
U-232	1 3645E-07	14,025 54	28,051 09	0 00E+00	1 91E-03	3 83E-03
U-233	- 1 7023E-09	14,025 54	28,051 09	0 00E+00	2 39E-05	4 78E-05
U-234	4 5389E-05	14,025 54	28,051 09	0 00E+00	6 37E-01	1 27E+00
U-235	-2 8661E-06	14,025 54	0 00	6.21E-02	2 19E-02	6.21E-02
U-236	1.6701E-05	14,025 54	28,051.09	0 00E+00	2.34E-01	4 68E-01
U-238	-9 4194E-09	14,025.54	0 00	6 44E-03	6 30E-03	6 44E-03
Y-90	2 7248E+00	14,025 54	28,051 09	0 00E+00	3 82E+04	7 64E+04
Other Radionuclides					7 46E+04	1 49E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5.573E+15
0 0250	1 187E+15
0 0375	1 146E+15
0.0575	1 093E+15
0 0850	7 162E+14
0 1250	6.534E+14
0.2250	5 900E+14
0 3750	2.794E+14
0 5750	5.347E+15
0 8500	1 635E+15
1.2500	2.233E+14
1 7500	5 871E+12
2.2500	9 285E+12
2 7500	5 712E+10
3.5000	6 414E+09
5 0000	1 460E+06
7 0000	1.678E+05
11 0000	1.925E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.69E+02	1.94E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences*
Reactor Moderator	HEAVY WATER	HEAVY WATER	
Fuel Cladding	ALUM	ALUM	
BOL HM Constituents	U	U	
BOL Enrichment %	60 00000706	40 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate*
Nominal		14,025.54	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		28 051.09	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 FRR TUBES (UALX-HEU) DENMARK
SNF ID #: 676
Fuel Units & Descr: 5 - ASSEMBLY
Heavy Metal Mass: BOL=0 64kg, EOL=0.336kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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 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	6 6950E-11	279 55	559 11	0 00E+00	1 87E-08	3.74E-08
Am-241	4 4557E-03	279 55	559.11	0 00E+00	1 25E+00	2 49E+00
Am-242m	1 4666E-06	279 55	559.11	0 00E+00	4 10E-04	8.20E-04
Am-243	3 7151E-05	279 55	559 11	0 00E+00	1 04E-02	2 08E-02
C-14	2 6513E-08	279 55	559 11	0 00E+00	7 41E-06	1 48E-05
Cl-36	4 4441E-31	279 55	559 11	0 00E+00	1 24E-28	2 48E-28
Cm-243	8.2139E-06	279 55	559 11	0 00E+00	2 30E-03	4 59E-03
Cm-244	8.2625E-03	279 55	559 11	0 00E+00	2.31E+00	4 62E+00
Co-60	3 4951E-04	279 55	559 11	0 00E+00	9 77E-02	1 95E-01
Cs-134	1 6409E+00	279 55	559 11	0 00E+00	4 59E+02	9 17E+02
Cs-135	4 2564E-06	279 55	559 11	0 00E+00	1.19E-03	2 38E-03
Cs-137	2 8791E+00	279 55	559 11	0 00E+00	8 05E+02	1.61E+03
Eu-154	1 7388E-01	279 55	559 11	0 00E+00	4 86E+01	9.72E+01
Eu-155	1 1616E-01	279.55	559.11	0 00E+00	3 25E+01	6 49E+01
Fe-55	7 3755E-02	279.55	559.11	0 00E+00	2 06E+01	4 12E+01
H-3	1 0729E-02	279 55	559 11	0 00E+00	3 00E+00	6 00E+00
I-129	6 6403E-07	279 55	559 11	0 00E+00	1 86E-04	3 71E-04
Kr-85	2 8487E-01	279 55	559 11	0 00E+00	7 96E+01	1 59E+02
Np-237	3 1507E-05	279 55	559 11	0 00E+00	8 81E-03	1 76E-02
Pa-231	4 1938E-10	279 55	559 11	0 00E+00	1 17E-07	2 34E-07
Pb-210	8 4083E-13	279 55	559 11	0 00E+00	2 35E-10	4 70E-10
Pm-147	1.2807E+00	279 55	559 11	0 00E+00	3.58E+02	7 16E+02
Pu-238	1.7290E-01	279 55	559 11	0 00E+00	4.83E+01	9 67E+01
Pu-239	6 9563E-04	279 55	559 11	0 00E+00	1.94E-01	3 89E-01
Pu-240	3 6865E-04	279 55	559 11	0 00E+00	1.03E-01	2 06E-01
Pu-241	2 7643E-01	279.55	559 11	0 00E+00	7 73E+01	1.55E+02
Pu-242	3 0911E-06	279.55	559 11	0 00E+00	8 64E-04	1 73E-03
Ra-226	8 6330E-12	279 55	559 11	0 00E+00	2 41E-09	4 83E-09
Ra-228	3 1817E-15	279 55	559 11	0 00E+00	8 89E-13	1.78E-12
Ru-106	2 1981E-01	279 55	559 11	0 00E+00	6 14E+01	1 23E+02
Se-79	1.2339E-05	279 55	559 11	0 00E+00	3 45E-03	6 90E-03
Sn-126	1 0194E-05	279 55	559 11	0 00E+00	2 85E-03	5 70E-03
Sr-90	2 7242E+00	279 55	559 11	0 00E+00	7.62E+02	1 52E+03
Tc-99	3 8056E-04	279 55	559 11	0 00E+00	1 06E-01	2 13E-01
Th-229	1.0413E-12	279 55	559 11	0 00E+00	2.91E-10	5 82E-10
Th-230	3.9648E-09	279 55	559 11	0 00E+00	1.11E-06	2 22E-06
Th-232	8 3536E-15	279 55	559 11	0 00E+00	2.34E-12	4 67E-12
Tl-208	4 3888E-08	279 55	559 11	0 00E+00	1.23E-05	2 45E-05
U-232	1 3645E-07	279.55	559 11	0 00E+00	3 81E-05	7 63E-05
U-233	1 7023E-09	279 55	559.11	0 00E+00	4 76E-07	9 52E-07
U-234	4 5389E-05	279 55	559.11	0 00E+00	1.27E-02	2 54E-02
U-235	-2 8661E-06	279 55	0 00	1.29E-03	4 85E-04	1.29E-03
U-236	1 6701E-05	279 55	559 11	0 00E+00	4 67E-03	9 34E-03
U-238	-9 4194E-09	279 55	0 00	1 51E-05	1.24E-05	1.51E-05
Y-90	2.7248E+00	279 55	559 11	0 00E+00	7 62E+02	1 52E+03
Other Radionuclides					1.49E+03	2 97E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 111E+14
0 0250	2 366E+13
0 0375	2.285E+13
0 0575	2.179E+13
0 0850	1 428E+13
0 1250	1.302E+13
0.2250	1 176E+13
0.3750	5 569E+12
0 5750	1 066E+14
0 8500	3.259E+13
1 2500	4 450E+12
1 7500	1 170E+11
2 2500	1 851E+11
2 7500	1 138E+09
3 5000	1.278E+08
5 0000	2.909E+04
7 0000	3 345E+03
11 0000	3.837E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.93E+01	3.86E+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 %	92.99999218	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		279 55	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		559 11	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 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 TUBES (UALX-HEU) DENMARK
SNF ID #: 678
Fuel Units & Descr: 5 - ASSEMBLY
Heavy Metal Mass BOL=0 79kg EOL=0 423kg
ROD Storage Site SRS

[1]Fuel decay start date: 2010
Estimates as of 2010
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: 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	6 6950E-11	338 51	677 01	0 00E+00	2 27E-08	4.53E-08
Am-241	4 4557E-03	338 51	677 01	0 00E+00	1 51E+00	3 02E+00
Am-242m	1 4666E-06	338 51	677.01	0 00E+00	4 96E-04	9 93E-04
Am-243	3 7151E-05	338 51	677.01	0 00E+00	1 26E-02	2 52E-02
C-14	2 6513E-08	338 51	677.01	0 00E+00	8 97E-06	1 79E-05
Cl-36	4 4441E-31	338 51	677 01	0 00E+00	1 50E-28	3 01E-28
Cm-243	8 2139E-06	338.51	677 01	0 00E+00	2.78E-03	5 56E-03
Cm-244	8 2625E-03	338.51	677 01	0 00E+00	2 80E+00	5 59E+00
Co-60	3 4951E-04	338 51	677 01	0 00E+00	1.18E-01	2 37E-01
Cs-134	1 6409E+00	338 51	677 01	0 00E+00	5 55E+02	1 11E+03
Cs-135	4 2564E-06	338 51	677 01	0.00E+00	1 44E-03	2 88E-03
Cs-137	2 8791E+00	338 51	677 01	0 00E+00	9 75E+02	1 95E+03
Eu-154	1.7388E-01	338 51	677 01	0 00E+00	5 89E+01	1.18E+02
Eu-155	1.1616E-01	338 51	677 01	0 00E+00	3 93E+01	7 86E+01
Fe-55	7.3755E-02	338 51	677.01	0 00E+00	2 50E+01	4.99E+01
H-3	1 0729E-02	338 51	677.01	0 00E+00	3 63E+00	7.26E+00
I-129	6 6403E-07	338 51	677.01	0 00E+00	2 25E-04	4.50E-04
Kr-85	2 8487E-01	338 51	677 01	0 00E+00	9 64E+01	1 93E+02
Np-237	3 1507E-05	338.51	677 01	0 00E+00	1 07E-02	2 13E-02
Pa-231	4 1938E-10	338 51	677 01	0 00E+00	1.42E-07	2 84E-07
Pb-210	8 4083E-13	338 51	677 01	0 00E+00	2.85E-10	5 69E-10
Pm-147	1.2807E+00	338 51	677 01	0 00E+00	4.34E+02	8 67E+02
Pu-238	1.7290E-01	338 51	677 01	0 00E+00	5 85E+01	1 17E+02
Pu-239	6 9563E-04	338 51	677 01	0.00E+00	2 35E-01	4 71E-01
Pu-240	3 6865E-04	338 51	677 01	0.00E+00	1.25E-01	2.50E-01
Pu-241	2 7643E-01	338 51	677 01	0 00E+00	9 36E+01	1 87E+02
Pu-242	3 0911E-06	338 51	677.01	0 00E+00	1 05E-03	2 09E-03
Ra-226	8 6330E-12	338 51	677.01	0 00E+00	2 92E-09	5 84E-09
Ra-228	3 1817E-15	338 51	677.01	0 00E+00	1 08E-12	2 15E-12
Ru-106	2 1981E-01	338 51	677 01	0 00E+00	7 44E+01	1 49E+02
Se-79	1 2339E-05	338 51	677 01	0 00E+00	4 18E-03	8 35E-03
Sn-126	1 0194E-05	338 51	677 01	0 00E+00	3 45E-03	6 90E-03
Sr-90	2 7242E+00	338.51	677 01	0 00E+00	9 22E+02	1 84E+03
Tc-99	3 8056E-04	338 51	677 01	0 00E+00	1.29E-01	2 58E-01
Th-229	1 0413E-12	338 51	677 01	0 00E+00	3.52E-10	7 05E-10
Th-230	3 9648E-09	338 51	677 01	0 00E+00	1.34E-06	2 68E-06
Th-232	8 3536E-15	338 51	677.01	0 00E+00	2 83E-12	5 66E-12
Tl-208	4.3888E-08	338 51	677 01	0.00E+00	1 49E-05	2 97E-05
U-232	1.3645E-07	338 51	677.01	0 00E+00	4 62E-05	9.24E-05
U-233	1 7023E-09	338 51	677.01	0 00E+00	5 76E-07	1 15E-06
U-234	4 5389E-05	338 51	677.01	0 00E+00	1 54E-02	3 07E-02
U-235	-2 8661E-06	338 51	0 00	1 59E-03	6 18E-04	1 59E-03
U-236	1 6701E-05	338 51	677 01	0 00E+00	5 65E-03	1 13E-02
U-238	-9 4194E-09	338.51	0 00	1 86E-05	1.54E-05	1 86E-05
Y-90	2 7248E+00	338 51	677 01	0 00E+00	9.22E+02	1 84E+03
Other Radionuclides					1 80E+03	3 60E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.345E+14
0.0250	2 865E+13
0.0375	2 767E+13
0 0575	2 639E+13
0 0850	1 729E+13
0 1250	1.577E+13
0.2250	1 424E+13
0 3750	6 744E+12
0 5750	1.291E+14
0 8500	3.946E+13
1.2500	5.388E+12
1 7500	1.417E+11
2.2500	2.241E+11
2.7500	1.378E+09
3.5000	1.548E+08
5 0000	3 523E+04
7 0000	4 051E+03
11 0000	4 646E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.34E+01	4 68E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences:
Reactor Moderator	HEAVY WATER	HEAVY WATER	
Fuel Cladding	ALUM	ALUM	
BOL HM Constituents	U	U	
BOL Enrichment %:	93 00000949	40 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		338 51	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		677 01	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 98	
Bounding	1 96	

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 TUBES (UALX-HEU) GERMANY	[1]Fuel decay start date:	2010
SNF ID #:	683	Estimates as of:	2010
Fuel Units & Descr:	105 - ASSEMBLY	Template:	HFBR (Heavy Water, Alum , 40 to 100%, U)
Heavy Metal Mass:	BOL=19 688kg EOL=13 388kg	[2]Template Burnup(MWd):	164 6
ROD Storage Site:	SRS	Template BOL Heavy Metal Mass (MT):	0 000377
		Template Decay Time:	5 years

Estimated Canister usage: 18"x10' 2 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	6 6950E-11	5,802 95	11,605 90	0 00E+00	3 89E-07	7.77E-07
Am-241	4 4557E-03	5,802 95	11,605 90	0 00E+00	2.59E+01	5 17E+01
Am-242m	1 4666E-06	5,802 95	11,605 90	0 00E+00	8 51E-03	1 70E-02
Am-243	3.7151E-05	5,802 95	11,605 90	0 00E+00	2 16E-01	4 31E-01
C-14	2 6513E-08	5,802 95	11,605 90	0 00E+00	1 54E-04	3 08E-04
Cl-36	4 4441E-31	5,802.95	11,605 90	0 00E+00	2 58E-27	5 16E-27
Cm-243	8.2139E-06	5,802.95	11,605 90	0 00E+00	4 77E-02	9 53E-02
Cm-244	8.2625E-03	5,802.95	11,605 90	0 00E+00	4 79E+01	9 59E+01
Co-60	3 4951E-04	5,802.95	11,605 90	0 00E+00	2 03E+00	4 06E+00
Cs-134	1 6409E+00	5,802.95	11,605 90	0 00E+00	9 52E+03	1 90E+04
Cs-135	4.2564E-06	5,802.95	11,605 90	0 00E+00	2.47E-02	4 94E-02
Cs-137	2 8791E+00	5,802 95	11,605 90	0 00E+00	1 67E+04	3 34E+04
Eu-154	1 7388E-01	5,802.95	11,605 90	0 00E+00	1 01E+03	2 02E+03
Eu-155	1 1616E-01	5,802 95	11,605 90	0 00E+00	6 74E+02	1 35E+03
Fe-55	7 3755E-02	5,802 95	11,605 90	0 00E+00	4 28E+02	8 56E+02
H-3	1 0729E-02	5,802 95	11,605 90	0 00E+00	6 23E+01	1.25E+02
I-129	6 6403E-07	5,802 95	11,605 90	0 00E+00	3 85E-03	7 71E-03
Kr-85	2 8487E-01	5,802 95	11,605 90	0 00E+00	1 65E+03	3 31E+03
Np-237	3 1507E-05	5,802 95	11,605.90	0 00E+00	1 83E-01	3 66E-01
Pa-231	4 1938E-10	5,802 95	11,605.90	0 00E+00	2 43E-06	4 87E-06
Pb-210	8 4083E-13	5,802 95	11,605 90	0 00E+00	4 88E-09	9 76E-09
Pm-147	1 2807E+00	5,802 95	11,605 90	0 00E+00	7 43E+03	1 49E+04
Pu-238	1 7290E-01	5,802 95	11,605 90	0 00E+00	1 00E+03	2 01E+03
Pu-239	6 9563E-04	5,802 95	11,605 90	0 00E+00	4 04E+00	8 07E+00
Pu-240	3 6865E-04	5,802 95	11,605 90	0 00E+00	2 14E+00	4.28E+00
Pu-241	2 7643E-01	5,802 95	11,605 90	0 00E+00	1 60E+03	3.21E+03
Pu-242	3 0911E-06	5,802 95	11,605 90	0 00E+00	1 79E-02	3 59E-02
Ra-226	8 6330E-12	5,802 95	11,605 90	0 00E+00	5 01E-08	1 00E-07
Ra-228	3 1817E-15	5,802 95	11,605 90	0 00E+00	1 85E-11	3 69E-11
Ru-106	2 1981E-01	5,802 95	11,605 90	0 00E+00	1.28E+03	2 55E+03
Se-79	1.2339E-05	5,802 95	11,605 90	0 00E+00	7 16E-02	1.43E-01
Sn-126	1 0194E-05	5,802 95	11,605 90	0 00E+00	5 92E-02	1.18E-01
Sr-90	2.7242E+00	5,802.95	11,605 90	0 00E+00	1.58E+04	3 16E+04
Tc-99	3 8056E-04	5,802 95	11,605 90	0 00E+00	2.21E+00	4 42E+00
Th-229	1.0413E-12	5,802.95	11,605 90	0 00E+00	6 04E-09	1.21E-08
Th-230	3.9648E-09	5,802.95	11,605 90	0 00E+00	2 30E-05	4 60E-05
Th-232	8.3536E-15	5,802.95	11 605 90	0 00E+00	4 85E-11	9 70E-11
Tl-208	4.3888E-08	5,802.95	11,605 90	0 00E+00	2.55E-04	5 09E-04
U-232	1.3645E-07	5,802 95	11,605 90	0 00E+00	7.92E-04	1 58E-03
U-233	1 7023E-09	5,802 95	11,605 90	0.00E+00	9 88E-06	1 98E-05
U-234	4 5389E-05	5,802 95	11,605 90	0.00E+00	2.63E-01	5.27E-01
U-235	-2 8661E-06	5,802 95	0 00	3.40E-02	1.74E-02	3 40E-02
U-236	1 6701E-05	5,802 95	11,605.90	0 00E+00	9 69E-02	1 94E-01
U-238	-9 4194E-09	5,802 95	0 00	1.32E-03	1.27E-03	1 32E-03
Y-90	2 7248E+00	5,802 95	11,605 90	0 00E+00	1 58E+04	3 16E+04
Other Radionuclides					3 09E+04	6 17E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2 306E+15
0 0250	4 912E+14
0 0375	4 743E+14
0 0575	4 523E+14
0 0850	2.963E+14
0 1250	2 703E+14
0.2250	2 441E+14
0.3750	1 156E+14
0.5750	2.212E+15
0.8500	6 765E+14
1.2500	9.237E+13
1 7500	2 429E+12
2.2500	3.841E+12
2.7500	2.363E+10
3.5000	2.654E+09
5 0000	6.039E+05
7.0000	6.944E+04
11 0000	7.965E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 01E+02	8.02E+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 %	80	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		5,802.95	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		11,605 90	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 68	
Bounding	1 35	

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 TUBES (UALX-HEU) GERMANY
SNF ID # 685
Fuel Units & Descr. 130 - ASSEMBLY
Heavy Metal Mass BOL=27 625kg EOL=18 785kg
ROD Storage Site: SRS

[1]Fuel decay start date 2010
Estimates as of 2010
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 5 years

Estimated Canister usage
18"x10'
3 61

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 6950E-11	8,142 55	16,285 10	0 00E+00	5.45E-07	1 09E-06
Am-241	4 4557E-03	8,142 55	16,285 10	0 00E+00	3 63E+01	7.26E+01
Am-242m	1 4666E-06	8,142 55	16,285 10	0 00E+00	1 19E-02	2 39E-02
Am-243	3 7151E-05	8,142 55	16,285 10	0.00E+00	3 03E-01	6 05E-01
C-14	2 6513E-08	8,142 55	16,285.10	0 00E+00	2 16E-04	4 32E-04
Cl-36	4 4441E-31	8,142 55	16,285.10	0 00E+00	3 62E-27	7.24E-27
Cm-243	8.2139E-06	8,142.55	16,285 10	0 00E+00	6 69E-02	1.34E-01
Cm-244	8.2625E-03	8,142.55	16,285 10	0 00E+00	6 73E+01	1.35E+02
Co-60	3 4951E-04	8,142 55	16,285 10	0 00E+00	2 85E+00	5 69E+00
Cs-134	1 6409E+00	8 142 55	16,285 10	0 00E+00	1.34E+04	2 67E+04
Cs-135	4 2564E-06	8,142 55	16,285 10	0 00E+00	3 47E-02	6 93E-02
Cs-137	2 8791E+00	8,142 55	16,285 10	0.00E+00	2 34E+04	4 69E+04
Eu-154	1 7388E-01	8,142 55	16,285.10	0 00E+00	1 42E+03	2 83E+03
Eu-155	1 1616E-01	8,142.55	16,285 10	0 00E+00	9 46E+02	1 89E+03
Fe-55	7.3755E-02	8,142.55	16,285 10	0 00E+00	6 01E+02	1.20E+03
H-3	1.0729E-02	8,142.55	16,285 10	0 00E+00	8 74E+01	1.75E+02
I-129	6 6403E-07	8,142 55	16,285 10	0 00E+00	5 41E-03	1 08E-02
Kr-85	2 8487E-01	8,142 55	16,285 10	0 00E+00	2.32E+03	4 64E+03
Np-237	3 1507E-05	8,142 55	16,285 10	0 00E+00	2 57E-01	5 13E-01
Pa-231	4 1938E-10	8,142 55	16,285.10	0 00E+00	3 41E-06	6 83E-06
Pb-210	8 4083E-13	8,142.55	16,285 10	0 00E+00	6 85E-09	1.37E-08
Pm-147	1.2807E+00	8,142.55	16,285 10	0 00E+00	1 04E+04	2 09E+04
Pu-238	1.7290E-01	8,142.55	16,285 10	0 00E+00	1 41E+03	2 82E+03
Pu-239	6.9563E-04	8,142.55	16,285 10	0 00E+00	5 66E+00	1 13E+01
Pu-240	3 6865E-04	8,142 55	16,285 10	0 00E+00	3 00E+00	6 00E+00
Pu-241	2 7643E-01	8,142 55	16,285 10	0 00E+00	2.25E+03	4 50E+03
Pu-242	3 0911E-06	8,142 55	16,285 10	0 00E+00	2 52E-02	5 03E-02
Ra-226	8 6330E-12	8,142 55	16,285 10	0 00E+00	7 03E-08	1.41E-07
Ra-228	3 1817E-15	8,142 55	16,285.10	0 00E+00	2 59E-11	5.18E-11
Ru-106	2.1981E-01	8,142 55	16,285 10	0 00E+00	1 79E+03	3.58E+03
Se-79	1.2339E-05	8,142.55	16,285 10	0 00E+00	1 00E-01	2 01E-01
Sn-126	1 0194E-05	8,142.55	16,285 10	0 00E+00	8 30E-02	1 66E-01
Sr-90	2.7242E+00	8,142 55	16,285 10	0 00E+00	2.22E+04	4 44E+04
Tc-99	3 8056E-04	8,142 55	16,285 10	0 00E+00	3.10E+00	6 20E+00
Th-229	1 0413E-12	8,142 55	16,285 10	0 00E+00	8 48E-09	1.70E-08
Th-230	3 9648E-09	8,142 55	16,285 10	0.00E+00	3 23E-05	6 46E-05
Th-232	8 3536E-15	8,142 55	16,285 10	0 00E+00	6 80E-11	1.36E-10
Tl-208	4.3888E-08	8,142.55	16,285 10	0 00E+00	3 57E-04	7.15E-04
U-232	1.3645E-07	8,142.55	16,285 10	0 00E+00	1.11E-03	2 22E-03
U-233	1.7023E-09	8,142 55	16,285 10	0 00E+00	1.39E-05	2 77E-05
U-234	4 5389E-05	8,142.55	16,285 10	0 00E+00	3 70E-01	7.39E-01
U-235	-2 8661E-06	8,142 55	0 00	4 78E-02	2 44E-02	4.78E-02
U-236	1 6701E-05	8,142 55	16,285.10	0 00E+00	1 36E-01	2 72E-01
U-238	-9 4194E-09	8,142 55	0 00	1.86E-03	1.78E-03	1 86E-03
Y-90	2 7248E+00	8,142 55	16,285 10	0 00E+00	2 22E+04	4 44E+04
Other Radionuclides					4 33E+04	8 66E+04

Gamma Sources

Photon Energy Group (Avg MeV)	Total Photons/sec (bounding)
0 0150	3.235E+15
0 0250	6 892E+14
0 0375	6 655E+14
0 0575	6 347E+14
0 0850	4 158E+14
0 1250	3 793E+14
0 2250	3 425E+14
0 3750	1 622E+14
0.5750	3 104E+15
0.8500	9 493E+14
1.2500	1.296E+14
1 7500	3 408E+12
2 2500	5.390E+12
2 7500	3.316E+10
3.5000	3 724E+09
5 0000	8 473E+05
7.0000	9 744E+04
11 0000	1 118E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.63E+02	1 13E+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 %	80	40 to 100

Basis for Parameter Differences

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		8 142.55
Bounding		16,285 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 68	
Bounding	1.35	

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	GCRE (1B SERIES)	[1]Fuel decay start date	1960
SNF ID #	745	Estimates as of:	2010
Fuel Units & Descr:	69 - 19 ROD ASSEMBLY	Template:	Pathfinder (Light Water, SST 60 to 100%, U)
Heavy Metal Mass	BOL=60.541kg; EOL=59.864kg	[2]Template Burnup(MWd).	6 01
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT):	0 00012882
		Template Decay Time:	50 years

Estimated Canister usage:

18"x10"
2 88

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	638 77	1,277.54	0 00E+00	2.19E-05	4.38E-05
Am-241	1 1458E-04	638 77	1,277.54	0 00E+00	7.32E-02	1.46E-01
Am-242m	7 9468E-09	638 77	1,277 54	0 00E+00	5 08E-06	1.02E-05
Am-243	9 8386E-10	638.77	1,277 54	0 00E+00	6.28E-07	1.26E-06
C-14	2.2978E-04	638.77	1,277 54	0 00E+00	1.47E-01	2 94E-01
Cl-36	1.2261E-06	638.77	1,277 54	0 00E+00	7 83E-04	1 57E-03
Cm-243	1 7271E-10	638.77	1,277 54	0 00E+00	1 10E-07	2 21E-07
Cm-244	1.3058E-09	638 77	1,277 54	0 00E+00	8 34E-07	1 67E-06
Co-60	9 8636E-03	638 77	1,277 54	0 00E+00	6 30E+00	1 26E+01
Cs-134	1.9617E-08	638 77	1,277 54	0 00E+00	1 25E-05	2 51E-05
Cs-135	3 0316E-05	638 77	1,277 54	0 00E+00	1 94E-02	3 87E-02
Cs-137	1 0263E+00	638 77	1,277 54	0 00E+00	6 56E+02	1 31E+03
Eu-154	2 0017E-04	638 77	1,277 54	0 00E+00	1 28E-01	2 56E-01
Eu-155	8 5957E-05	638 77	1,277.54	0 00E+00	5 49E-02	1 10E-01
Fe-55	2 2646E-05	638 77	1,277 54	0 00E+00	1 45E-02	2 89E-02
H-3	1 0835E-03	638 77	1,277.54	0 00E+00	6 92E-01	1 38E+00
I-129	7 3195E-07	638 77	1,277.54	0 00E+00	4 68E-04	9.35E-04
Kr-85	1 5661E-02	638 77	1,277 54	0 00E+00	1 00E+01	2 00E+01
Np-237	1 1494E-06	638 77	1,277 54	0 00E+00	7.34E-04	1 47E-03
Pa-231	5 8070E-08	638.77	1,277 54	0 00E+00	3 71E-05	7 42E-05
Pb-210	1 2985E-12	638.77	1,277 54	0 00E+00	8 29E-10	1 66E-09
Pm-147	2.2196E-05	638.77	1,277 54	0 00E+00	1 42E-02	2 84E-02
Pu-238	2 6223E-04	638 77	1,277 54	0 00E+00	1 68E-01	3 35E-01
Pu-239	6 6739E-04	638 77	1,277 54	0 00E+00	4 26E-01	8 53E-01
Pu-240	8 6705E-05	638 77	1,277 54	0 00E+00	5 54E-02	1 11E-01
Pu-241	3.4759E-04	638 77	1,277 54	0 00E+00	2 22E-01	4 44E-01
Pu-242	1.9717E-09	638 77	1,277.54	0 00E+00	1 26E-06	2 52E-06
Ra-226	3 0000E-12	638 77	1,277.54	0 00E+00	1 92E-09	3 83E-09
Ra-228	8 3328E-12	638 77	1,277 54	0 00E+00	5 32E-09	1.06E-08
Ru-106	6 1464E-15	638 77	1,277 54	0 00E+00	3 93E-12	7.85E-12
Se-79	1 3221E-05	638 77	1,277 54	0 00E+00	8 45E-03	1 69E-02
Sn-126	1 1491E-05	638 77	1,277 54	0 00E+00	7 34E-03	1 47E-02
Sr-90	9 5541E-01	638 77	1,277 54	0 00E+00	6 10E+02	1 22E+03
Tc-99	4 6656E-04	638.77	1,277 54	0 00E+00	2 98E-01	5 96E-01
Th-229	1 9085E-11	638.77	1,277 54	0 00E+00	1 22E-08	2 44E-08
Th-230	2 1913E-10	638 77	1,277 54	0 00E+00	1 40E-07	2 80E-07
Th-232	8 3478E-12	638 77	1,277 54	0 00E+00	5 33E-09	1 07E-08
Tl-208	1 8752E-08	638 77	1,277 54	0 00E+00	1 20E-05	2 40E-05
U-232	5 0782E-08	638 77	1,277 54	0 00E+00	3.24E-05	6 49E-05
U-233	3.2596E-09	638 77	1,277 54	0 00E+00	2 08E-06	4 16E-06
U-234	3.9817E-07	638 77	1,277.54	0 00E+00	2 54E-04	5 09E-04
U-235	-2 7761E-06	638 77	0 00	1 21E-01	1.19E-01	1.21E-01
U-236	1 6190E-05	638 77	1,277 54	0 00E+00	1.03E-02	2.07E-02
U-238	-2 8547E-09	638 77	0 00	1 59E-03	1 58E-03	1 59E-03
Y-90	9 5557E-01	638 77	1,277 54	0 00E+00	6 10E+02	1 22E+03
Other Radionuclides					7 79E+02	1 56E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6 662E+13
0 0250	1 384E+13
0 0375	1.200E+13
0.0575	1.291E+13
0.0850	7 798E+12
0 1250	5.060E+12
0.2250	6 723E+12
0 3750	2.931E+12
0 5750	4 881E+13
0 8500	4 819E+11
1 2500	1 097E+12
1 7500	1.241E+10
2 2500	6.288E+06
2 7500	8 566E+05
3 5000	8 688E+01
5 0000	3 597E+01
7 0000	3 986E+00
11 0000	4 482E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7 46E+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	HASTELLOY	SST
BOL HM Constituents	U	U
BOL Enrichment %	92 20234775	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		638.77
Bounding		1 277 54

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 45	

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 GCRE (1Z SERIES)
SNF ID # 916
Fuel Units & Descr. 3 - 4 CONCENTRIC TUBES
Heavy Metal Mass BOL=1 067kg EOL=1 018kg
ROD Storage Site INEEL

[1]Fuel decay start date: 1960
Estimates as of 2010
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'
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	3 4276E-08	46 19	92 39	0 00E+00	1 58E-06	3 17E-06
Am-241	1 1458E-04	46 19	92 39	0 00E+00	5 29E-03	1 06E-02
Am-242m	7 9468E-09	46 19	92 39	0 00E+00	3 67E-07	7 34E-07
Am-243	9 8386E-10	46 19	92 39	0 00E+00	4 54E-08	9 09E-08
C-14	2.2978E-04	46 19	92.39	0 00E+00	1 06E-02	2 12E-02
Cl-36	1.2261E-06	46 19	92.39	0 00E+00	5 66E-05	1 13E-04
Cm-243	1.7271E-10	46.19	92.39	0 00E+00	7.98E-09	1 60E-08
Cm-244	1.3058E-09	46.19	92 39	0 00E+00	6 03E-08	1.21E-07
Co-60	9 8636E-03	46.19	92 39	0 00E+00	4 56E-01	9 11E-01
Cs-134	1 9617E-08	46 19	92 39	0 00E+00	9 06E-07	1.81E-06
Cs-135	3 0316E-05	46 19	92 39	0 00E+00	1 40E-03	2 80E-03
Cs-137	1 0263E+00	46 19	92 39	0 00E+00	4 74E+01	9 48E+01
Eu-154	2 0017E-04	46 19	92 39	0 00E+00	9 25E-03	1 85E-02
Eu-155	8 5957E-05	46 19	92.39	0 00E+00	3 97E-03	7 94E-03
Fe-55	2.2646E-05	46 19	92.39	0 00E+00	1.05E-03	2 09E-03
H-3	1.0835E-03	46 19	92.39	0 00E+00	5 01E-02	1 00E-01
I-129	7.3195E-07	46 19	92.39	0 00E+00	3 38E-05	6 76E-05
Kr-85	1.5661E-02	46 19	92.39	0 00E+00	7.23E-01	1 45E+00
Np-237	1 1494E-06	46 19	92 39	0 00E+00	5 31E-05	1 06E-04
Pa-231	5 8070E-08	46 19	92 39	0 00E+00	2 68E-06	5 36E-06
Pb-210	1.2985E-12	46 19	92 39	0 00E+00	6 00E-11	1.20E-10
Pm-147	2 2196E-05	46 19	92 39	0.00E+00	1 03E-03	2 05E-03
Pu-238	2 6223E-04	46 19	92 39	0 00E+00	1.21E-02	2 42E-02
Pu-239	6 6739E-04	46 19	92.39	0 00E+00	3 08E-02	6 17E-02
Pu-240	8 6705E-05	46 19	92.39	0 00E+00	4 01E-03	8 01E-03
Pu-241	3 4759E-04	46 19	92.39	0 00E+00	1 61E-02	3.21E-02
Pu-242	1.9717E-09	46 19	92.39	0 00E+00	9 11E-08	1.82E-07
Ra-226	3 0000E-12	46.19	92 39	0 00E+00	1.39E-10	2 77E-10
Ra-228	8 3328E-12	46 19	92 39	0 00E+00	3 85E-10	7 70E-10
Ru-106	6 1464E-15	46 19	92 39	0 00E+00	2 84E-13	5 68E-13
Se-79	1.3221E-05	46 19	92 39	0 00E+00	6 11E-04	1 22E-03
Sn-126	1 1491E-05	46 19	92 39	0.00E+00	5 31E-04	1 06E-03
Sr-90	9 5541E-01	46 19	92.39	0 00E+00	4 41E+01	8 83E+01
Tc-99	4 6656E-04	46 19	92.39	0 00E+00	2.16E-02	4 31E-02
Th-229	1 9085E-11	46 19	92.39	0 00E+00	8 82E-10	1.76E-09
Th-230	2 1913E-10	46 19	92.39	0 00E+00	1 01E-08	2.02E-08
Th-232	8.3478E-12	46 19	92 39	0 00E+00	3 86E-10	7 71E-10
Tl-208	1.8752E-08	46.19	92 39	0 00E+00	8 66E-07	1 73E-06
U-232	5 0782E-08	46 19	92 39	0 00E+00	2 35E-06	4 69E-06
U-233	3.2596E-09	46 19	92 39	0 00E+00	1 51E-07	3 01E-07
U-234	3 9817E-07	46 19	92 39	0.00E+00	1.84E-05	3 68E-05
U-235	-2 7761E-06	46 19	0 00	2.16E-03	2 03E-03	2 16E-03
U-236	1 6190E-05	46 19	92.39	0 00E+00	7.48E-04	1.50E-03
U-238	-2.8547E-09	46 19	0 00	2.27E-05	2.26E-05	2.27E-05
Y-90	9 5557E-01	46 19	92.39	0 00E+00	4.41E+01	8 83E+01
Other Radionuclides					5 63E+01	1.13E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 817E+12
0 0250	1 001E+12
0 0375	8 680E+11
0 0575	9 336E+11
0 0850	5 639E+11
0 1250	3.659E+11
0.2250	4.860E+11
0 3750	2 120E+11
0 5750	3 529E+12
0 8500	3 485E+10
1.2500	7 937E+10
1 7500	8 972E+08
2.2500	4 547E+05
2 7500	6 194E+04
3.5000	5 571E+00
5 0000	2.301E+00
7 0000	2.543E-01
11 0000	2.855E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 39E-01	1.08E+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 %	93 671	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		46 19	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		92.39	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 93	
Bounding	1 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: GENTR
SNF ID #: 97
Fuel Units & Descr: 16 - STACKED DISKS
Heavy Metal Mass: BOL=3 992kg, EOL=3 984kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2035
Estimates as of: 2010
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: 5 years

Estimated Canister usage
18"x10"
0 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	1 4545E-10	7 58	15 15	0 00E+00	1 10E-09	2 20E-09
Am-241	1 1190E-03	7.58	15 15	0 00E+00	8 48E-03	1 70E-02
Am-242m	4 5425E-07	7.58	15 15	0 00E+00	3 44E-06	6 88E-06
Am-243	1 4921E-06	7 58	15 15	0 00E+00	1 13E-05	2 26E-05
C-14	5 7244E-09	7 58	15 15	0 00E+00	4 34E-08	8 67E-08
Cl-36	1 3124E-32	7 58	15.15	0 00E+00	9 94E-32	1 99E-31
Cm-243	2 3676E-07	7 58	15.15	0 00E+00	1 79E-06	3 59E-06
Cm-244	5 2042E-05	7 58	15 15	0 00E+00	3 94E-04	7.89E-04
Co-60	3 8208E-05	7 58	15 15	0 00E+00	2 89E-04	5.79E-04
Cs-134	4 8693E-01	7 58	15 15	0 00E+00	3 69E+00	7 38E+00
Cs-135	3 4477E-06	7 58	15 15	0 00E+00	2 61E-05	5.22E-05
Cs-137	2 8731E+00	7 58	15 15	0 00E+00	2.18E+01	4 35E+01
Eu-154	8 2053E-02	7.58	15 15	0 00E+00	6.22E-01	1 24E+00
Eu-155	3 9134E-02	7 58	15 15	0 00E+00	2.96E-01	5 93E-01
Fe-55	6 7429E-03	7 58	15 15	0 00E+00	5 11E-02	1 02E-01
H-3	1 0599E-02	7 58	15.15	0 00E+00	8 03E-02	1 61E-01
I-129	7 5300E-07	7 58	15.15	0 00E+00	5 70E-06	1 14E-05
Kr-85	2 8595E-01	7 58	15.15	0 00E+00	2 17E+00	4.33E+00
Np-237	9 5479E-06	7 58	15 15	0 00E+00	7 23E-05	1.45E-04
Pa-231	8 9297E-10	7 58	15 15	0 00E+00	6 77E-09	1.35E-08
Pb-210	3.7609E-12	7 58	15 15	0 00E+00	2 85E-11	5 70E-11
Pm-147	2 5452E+00	7.58	15 15	0 00E+00	1.93E+01	3 86E+01
Pu-238	2 0550E-02	7.58	15 15	0 00E+00	1 56E-01	3 11E-01
Pu-239	4.2838E-04	7 58	15 15	0 00E+00	3.25E-03	6 49E-03
Pu-240	2 4401E-04	7 58	15 15	0 00E+00	1 85E-03	3 70E-03
Pu-241	6 8764E-02	7 58	15.15	0 00E+00	5.21E-01	1.04E+00
Pu-242	3 6329E-07	7 58	15.15	0 00E+00	2 75E-06	5 50E-06
Ra-226	3 8045E-11	7 58	15 15	0 00E+00	2 88E-10	5 76E-10
Ra-228	2 9902E-15	7 58	15 15	0 00E+00	2 27E-14	4 53E-14
Ru-106	1 9055E-01	7 58	15 15	0 00E+00	1 44E+00	2 89E+00
Se-79	1.2936E-05	7.58	15 15	0 00E+00	9 80E-05	1 96E-04
Sn-126	1 1574E-05	7.58	15 15	0 00E+00	8 77E-05	1 75E-04
Sr-90	2 7505E+00	7 58	15 15	0 00E+00	2 08E+01	4 17E+01
Tc-99	4 2239E-04	7 58	15.15	0 00E+00	3.20E-03	6 40E-03
Th-229	1 8848E-12	7 58	15.15	0 00E+00	1 43E-11	2 86E-11
Th-230	1 7042E-08	7 58	15.15	0 00E+00	1 29E-07	2 58E-07
Th-232	7 8132E-15	7 58	15 15	0 00E+00	5 92E-14	1 18E-13
Tl-208	4 4063E-08	7 58	15 15	0 00E+00	3 34E-07	6 68E-07
U-232	1 3151E-07	7 58	15 15	0 00E+00	9 96E-07	1.99E-06
U-233	1 9564E-09	7.58	15 15	0 00E+00	1 48E-08	2 96E-08
U-234	1 8371E-04	7.58	15 15	0 00E+00	1 39E-03	2 78E-03
U-235	-2.7235E-06	7 58	0 00	8 10E-03	8 08E-03	8 10E-03
U-236	1 5493E-05	7 58	15 15	0 00E+00	1.17E-04	2 35E-04
U-238	-4.2851E-09	7 58	0 00	8 13E-05	8.13E-05	8 13E-05
Y-90	2 7505E+00	7 58	15.15	0 00E+00	2 08E+01	4 17E+01
Other Radionuclides					3 90E+01	7.79E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg_MeV	
0 0150	2 923E+12
0 0250	6 298E+11
0 0375	5 812E+11
0 0575	5 714E+11
0 0850	3 643E+11
0 1250	3 155E+11
0.2250	3 089E+11
0.3750	1 495E+11
0 5750	2.053E+12
0 8500	2.875E+11
1.2500	5.349E+10
1 7500	2.243E+09
2.2500	4 705E+09
2 7500	2.707E+07
3.5000	3 002E+06
5 0000	9.270E+00
7 0000	1 034E+00
11 0000	1 165E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.84E-01	7 68E-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 93787575	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		7 58
Bounding		15 15

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	GRR (UALX HEU) GREECE	[1]Fuel decay start date	1993
SNF ID #	440	Estimates as of	2010
Fuel Units & Descr	108 - MTR TYPE	Template	ATR (Light Water, Alum , 60 to 100% U)
Heavy Metal Mass	BOL=18 76kg EOL=14 72kg	[2]Template Burnup(MWd)	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0 00116689
		Template Decay Time	15 years

Estimated Canister usage 18"x10' 3 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	4 5861E-10	3,825 20	7,650 40	0 00E+00	1.75E-06	3 51E-06
Am-241	1 7832E-03	3,825 20	7,650 40	0 00E+00	6 82E+00	1.36E+01
Am-242m	4 3410E-07	3,825.20	7,650 40	0 00E+00	1 66E-03	3 32E-03
Am-243	1 4907E-06	3,825.20	7,650 40	0 00E+00	5 70E-03	1 14E-02
C-14	5 7162E-09	3,825.20	7,650 40	0 00E+00	2.19E-05	4 37E-05
Cl-36	1.3124E-32	3,825.20	7,650 40	0.00E+00	5 02E-29	1 00E-28
Cm-243	1 8568E-07	3,825.20	7,650 40	0 00E+00	7 10E-04	1 42E-03
Cm-244	3.5512E-05	3,825.20	7,650 40	0 00E+00	1.36E-01	2.72E-01
Co-60	1 0261E-05	3,825.20	7,650 40	0 00E+00	3 93E-02	7.85E-02
Cs-134	1 6931E-02	3,825 20	7,650 40	0 00E+00	6 48E+01	1.30E+02
Cs-135	3 4477E-06	3,825 20	7,650 40	0 00E+00	1.32E-02	2 64E-02
Cs-137	2 2800E+00	3,825 20	7,650 40	0 00E+00	8 72E+03	1 74E+04
Eu-154	3 6656E-02	3,825.20	7,650 40	0 00E+00	1 40E+02	2 80E+02
Eu-155	9 6841E-03	3,825.20	7,650 40	0 00E+00	3 70E+01	7 41E+01
Fe-55	4 6977E-04	3,825.20	7,650 40	0 00E+00	1 80E+00	3 59E+00
H-3	6 0485E-03	3,825.20	7,650 40	0 00E+00	2.31E+01	4 63E+01
I-129	7.5300E-07	3,825.20	7,650 40	0.00E+00	2 88E-03	5 76E-03
Kr-85	1 4989E-01	3,825.20	7,650 40	0 00E+00	5 73E+02	1 15E+03
Np-237	9 5534E-06	3,825 20	7,650 40	0 00E+00	3 65E-02	7.31E-02
Pa-231	1 6550E-09	3,825 20	7,650 40	0 00E+00	6 33E-06	1.27E-05
Pb-210	2 6631E-11	3,825 20	7,650 40	0 00E+00	1 02E-07	2 04E-07
Pm-147	1 8156E-01	3,825 20	7,650 40	0 00E+00	6 95E+02	1.39E+03
Pu-238	1 8990E-02	3,825.20	7,650 40	0 00E+00	7.26E+01	1 45E+02
Pu-239	4 2838E-04	3,825.20	7,650 40	0 00E+00	1 64E+00	3 28E+00
Pu-240	2 4379E-04	3,825.20	7,650 40	0 00E+00	9 33E-01	1 87E+00
Pu-241	4.2511E-02	3,825.20	7,650 40	0 00E+00	1.63E+02	3 25E+02
Pu-242	3 6329E-07	3,825.20	7,650 40	0 00E+00	1.39E-03	2.78E-03
Ra-226	1.4725E-10	3,825.20	7,650 40	0 00E+00	5 63E-07	1.13E-06
Ra-228	8.9760E-15	3,825.20	7,650 40	0 00E+00	3 43E-11	6 87E-11
Ru-106	1 9752E-04	3,825 20	7,650 40	0 00E+00	7 56E-01	1.51E+00
Se-79	1.2933E-05	3,825 20	7,650 40	0 00E+00	4 95E-02	9 89E-02
Sn-126	1 1574E-05	3,825 20	7,650 40	0 00E+00	4 43E-02	8 85E-02
Sr-90	2 1680E+00	3,825 20	7,650 40	0 00E+00	8 29E+03	1 66E+04
Tc-99	4 2239E-04	3,825.20	7,650 40	0 00E+00	1 62E+00	3 23E+00
Th-229	3 9270E-12	3,825.20	7,650 40	0 00E+00	1.50E-08	3 00E-08
Th-230	3 3578E-08	3,825.20	7,650 40	0 00E+00	1.28E-04	2.57E-04
Th-232	1.5452E-14	3,825.20	7,650 40	0.00E+00	5 91E-11	1.18E-10
Tl-208	4 6705E-08	3,825.20	7,650 40	0 00E+00	1 79E-04	3 57E-04
U-232	1.3045E-07	3,825.20	7,650 40	0 00E+00	4 99E-04	9 98E-04
U-233	2.3739E-09	3,825 20	7,650 40	0 00E+00	9 08E-06	1 82E-05
U-234	1 8423E-04	3,825 20	7,650 40	0 00E+00	7 05E-01	1 41E+00
U-235	-2 7235E-06	3,825 20	0 00	3 73E-02	2 69E-02	3 73E-02
U-236	1 5493E-05	3,825 20	7,650 40	0 00E+00	5.93E-02	1.19E-01
U-238	-4.2851E-09	3,825.20	0 00	5 08E-04	4 92E-04	5 08E-04
Y-90	2 1686E+00	3,825.20	7,650 40	0 00E+00	8.30E+03	1 66E+04
Other Radionuclides					8.32E+03	1 66E+04

Gamma Sources

Photon Energy Group (Avg MeV)	Total Photons/sec (bounding)
0 0150	9 126E+14
0 0250	1 903E+14
0 0375	1 662E+14
0 0575	1 772E+14
0 0850	1 073E+14
0 1250	7.359E+13
0 2250	9.248E+13
0 3750	4 051E+13
0.5750	6.576E+14
0.8500	1.562E+13
1.2500	7.890E+12
1 7500	3 306E+11
2.2500	4 136E+08
2 7500	2.486E+07
3 5000	1.580E+06
5 0000	3 655E+03
7 0000	4 048E+02
11.0000	4.545E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.04E+02	2.07E+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 93720219	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		3,825 20
Bounding		7 650 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 65	
Bounding	1.30	

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:	GRR (UALX HEU) GREECE	[1]Fuel decay start date.	1993
SNF ID #:	1069	Estimates as of:	2010
Fuel Units & Descr:	46 - MTR TYPE	Template:	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass:	BOL=7 99kg; EOL=6.27kg	[2]Template Burnup(MWd):	367.2
ROD Storage Site:	SRS	Template BOL Heavy Metal Mass (MT):	0 00116689
		Template Decay Time:	15 years

Estimated Canister usage:

18"x10"
1 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	4 5861E-10	1,629 25	3,258 50	0 00E+00	7 47E-07	1.49E-06
Am-241	1 7832E-03	1,629 25	3,258 50	0 00E+00	2 91E+00	5 81E+00
Am-242m	4 3410E-07	1,629 25	3,258 50	0 00E+00	7 07E-04	1 41E-03
Am-243	1 4907E-06	1,629 25	3,258 50	0 00E+00	2 43E-03	4 86E-03
C-14	5 7162E-09	1,629 25	3,258 50	0 00E+00	9 31E-06	1 86E-05
Cl-36	1 3124E-32	1,629.25	3,258 50	0 00E+00	2.14E-29	4.28E-29
Cm-243	1 8568E-07	1,629 25	3,258 50	0 00E+00	3 03E-04	6 05E-04
Cm-244	3 5512E-05	1,629 25	3,258 50	0 00E+00	5.79E-02	1 16E-01
Co-60	1 0261E-05	1,629.25	3,258 50	0 00E+00	1.67E-02	3 34E-02
Cs-134	1 6931E-02	1,629.25	3,258 50	0 00E+00	2.76E+01	5 52E+01
Cs-135	3 4477E-06	1,629.25	3,258 50	0 00E+00	5 62E-03	1 12E-02
Cs-137	2 2800E+00	1,629.25	3,258 50	0 00E+00	3 71E+03	7 43E+03
Eu-154	3 6656E-02	1,629.25	3,258 50	0 00E+00	5 97E+01	1 19E+02
Eu-155	9 6841E-03	1,629.25	3,258 50	0 00E+00	1 58E+01	3.16E+01
Fe-55	4 6977E-04	1,629.25	3,258.50	0 00E+00	7 65E-01	1 53E+00
H-3	6 0485E-03	1,629.25	3,258 50	0 00E+00	9 85E+00	1.97E+01
I-129	7 5300E-07	1,629.25	3,258 50	0 00E+00	1 23E-03	2 45E-03
Kr-85	1 4989E-01	1,629 25	3,258 50	0 00E+00	2 44E+02	4.88E+02
Np-237	9 5534E-06	1,629 25	3,258 50	0 00E+00	1 56E-02	3 11E-02
Pa-231	1 6550E-09	1,629 25	3,258 50	0 00E+00	2 70E-06	5.39E-06
Pb-210	2.6631E-11	1,629 25	3,258 50	0 00E+00	4 34E-08	8 68E-08
Pm-147	1 8156E-01	1,629 25	3,258 50	0 00E+00	2 96E+02	5 92E+02
Pu-238	1 8990E-02	1,629 25	3,258 50	0 00E+00	3 09E+01	6 19E+01
Pu-239	4.2838E-04	1,629 25	3,258 50	0 00E+00	6 98E-01	1 40E+00
Pu-240	2 4379E-04	1,629.25	3,258 50	0 00E+00	3 97E-01	7 94E-01
Pu-241	4.2511E-02	1,629.25	3,258 50	0 00E+00	6 93E+01	1 39E+02
Pu-242	3 6329E-07	1,629 25	3,258 50	0 00E+00	5 92E-04	1 18E-03
Ra-226	1 4725E-10	1,629.25	3,258 50	0 00E+00	2 40E-07	4 80E-07
Ra-228	8 9760E-15	1,629.25	3,258 50	0 00E+00	1 46E-11	2 92E-11
Ru-106	1 9752E-04	1,629.25	3,258 50	0 00E+00	3.22E-01	6 44E-01
Se-79	1 2933E-05	1,629.25	3,258 50	0 00E+00	2.11E-02	4 21E-02
Sn-126	1 1574E-05	1,629.25	3,258.50	0 00E+00	1 89E-02	3 77E-02
Sr-90	2 1680E+00	1,629.25	3,258.50	0 00E+00	3 53E+03	7 06E+03
Tc-99	4.2239E-04	1,629 25	3,258 50	0 00E+00	6 88E-01	1.38E+00
Th-229	3 9270E-12	1,629.25	3,258 50	0 00E+00	6 40E-09	1 28E-08
Th-230	3 3578E-08	1,629 25	3,258 50	0 00E+00	5 47E-05	1 09E-04
Th-232	1 5452E-14	1,629 25	3,258 50	0 00E+00	2 52E-11	5 04E-11
Tl-208	4 6705E-08	1,629.25	3,258 50	0 00E+00	7 61E-05	1 52E-04
U-232	1.3045E-07	1,629 25	3,258 50	0 00E+00	2 13E-04	4.25E-04
U-233	2.3739E-09	1,629 25	3,258 50	0 00E+00	3 87E-06	7.74E-06
U-234	1 8423E-04	1,629 25	3,258 50	0 00E+00	3 00E-01	6 00E-01
U-235	-2 7235E-06	1,629.25	0 00	1 59E-02	1 14E-02	1.59E-02
U-236	1 5493E-05	1,629.25	3,258 50	0 00E+00	2.52E-02	5.05E-02
U-238	-4.2851E-09	1,629.25	0 00	2 17E-04	2.10E-04	2 17E-04
Y-90	2 1686E+00	1,629.25	3,258 50	0 00E+00	3.53E+03	7 07E+03
Other Radionuclides					3.54E+03	7 09E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 887E+14
0 0250	8 107E+13
0 0375	7 079E+13
0 0575	7 548E+13
0 0850	4.572E+13
0 1250	3 135E+13
0 2250	3 939E+13
0 3750	1 726E+13
0 5750	2.801E+14
0 8500	6 653E+12
1.2500	3.361E+12
1 7500	1 408E+11
2.2500	1 762E+08
2 7500	1.059E+07
3 5000	6.729E+05
5 0000	1.557E+03
7 0000	1 724E+02
11 0000	1 936E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 41E+01	8 82E+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 %	91 93720219	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		1,629.25	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		3,258 50	Bounding burnup assumed to be twice nominal burnup

Checks

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

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: GTRR
SNF ID # 87
Fuel Units & Descr. 25 - ASSEMBLY
Heavy Metal Mass BOL=5 05kg EOL=4 47kg
ROD Storage Site SRS

[1]Fuel decay start date 1996
Estimates as of 2010
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 10 years

Estimated Canister usage 18"x10' 0 69

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	1.3262E-10	534.24	1,068 48	0 00E+00	7 09E-08	1 42E-07
Am-241	5 9611E-03	534.24	1,068 48	0 00E+00	3.18E+00	6 37E+00
Am-242m	1 4332E-06	534.24	1,068 48	0 00E+00	7 66E-04	1 53E-03
Am-243	3 7132E-05	534.24	1,068.48	0 00E+00	1 98E-02	3 97E-02
C-14	2 6501E-08	534 24	1,068 48	0 00E+00	1 42E-05	2.83E-05
Cl-36	4 4441E-31	534 24	1,068 48	0 00E+00	2 37E-28	4 75E-28
Cm-243	7.2722E-06	534 24	1,068 48	0 00E+00	3 89E-03	7 77E-03
Cm-244	6 8226E-03	534 24	1,068 48	0 00E+00	3 64E+00	7.29E+00
Co-60	1 8117E-04	534.24	1,068 48	0 00E+00	9 68E-02	1 94E-01
Cs-134	3 0595E-01	534 24	1,068 48	0 00E+00	1 63E+02	3 27E+02
Cs-135	4 2564E-06	534.24	1,068 48	0 00E+00	2.27E-03	4 55E-03
Cs-137	2 5650E+00	534.24	1,068 48	0 00E+00	1.37E+03	2 74E+03
Eu-154	1 1628E-01	534.24	1,068 48	0 00E+00	6 21E+01	1.24E+02
Eu-155	5 7776E-02	534 24	1,068 48	0 00E+00	3 09E+01	6.17E+01
Fe-55	1.9465E-02	534 24	1,068 48	0 00E+00	1 04E+01	2 08E+01
H-3	8 1045E-03	534 24	1,068 48	0 00E+00	4 33E+00	8 66E+00
I-129	6 6403E-07	534.24	1,068 48	0 00E+00	3 55E-04	7 10E-04
Kr-85	2 0620E-01	534.24	1,068 48	0 00E+00	1.10E+02	2 20E+02
Np-237	3 1513E-05	534.24	1,068 48	0 00E+00	1 68E-02	3 37E-02
Pa-231	6 0304E-10	534.24	1,068 48	0 00E+00	3 22E-07	6 44E-07
Pb-210	2 7017E-12	534.24	1,068 48	0 00E+00	1 44E-09	2.89E-09
Pm-147	3 4210E-01	534.24	1,068.48	0 00E+00	1 83E+02	3 66E+02
Pu-238	1 6622E-01	534 24	1,068 48	0.00E+00	8 88E+01	1.78E+02
Pu-239	6 9563E-04	534 24	1,068 48	0 00E+00	3 72E-01	7 43E-01
Pu-240	3 7169E-04	534 24	1,068 48	0 00E+00	1 99E-01	3 97E-01
Pu-241	2 1731E-01	534 24	1,068 48	0 00E+00	1.16E+02	2 32E+02
Pu-242	3 0911E-06	534.24	1,068 48	0 00E+00	1 65E-03	3 30E-03
Ra-226	1 9435E-11	534.24	1,068 48	0 00E+00	1 04E-08	2 08E-08
Ra-228	6 1725E-15	534.24	1,068 48	0 00E+00	3 30E-12	6 60E-12
Ru-106	7 0778E-03	534.24	1,068 48	0 00E+00	3 78E+00	7.56E+00
Se-79	1.2339E-05	534.24	1,068 48	0 00E+00	6 59E-03	1.32E-02
Sn-126	1.0194E-05	534 24	1,068 48	0.00E+00	5 45E-03	1 09E-02
Sr-90	2.4186E+00	534 24	1,068 48	0 00E+00	1.29E+03	2 58E+03
Tc-99	3 8056E-04	534.24	1,068 48	0 00E+00	2 03E-01	4 07E-01
Th-229	2 0097E-12	534.24	1,068 48	0 00E+00	1.07E-09	2 15E-09
Th-230	6 0577E-09	534.24	1,068 48	0 00E+00	3.24E-06	6 47E-06
Th-232	1 2473E-14	534.24	1,068 48	0 00E+00	6 66E-12	1.33E-11
Tl-208	4 8791E-08	534.24	1,068.48	0 00E+00	2 61E-05	5.21E-05
U-232	1.3821E-07	534.24	1,068 48	0 00E+00	7 38E-05	1 48E-04
U-233	2 3906E-09	534 24	1,068 48	0.00E+00	1.28E-06	2 55E-06
U-234	4.7697E-05	534 24	1,068 48	0 00E+00	2 55E-02	5 10E-02
U-235	-2 8661E-06	534.24	0 00	1 02E-02	8 63E-03	1 02E-02
U-236	1 6701E-05	534.24	1,068 48	0 00E+00	8 92E-03	1.78E-02
U-238	-9 4194E-09	534.24	0 00	1 18E-04	1 13E-04	1.18E-04
Y-90	2 4192E+00	534.24	1,068 48	0 00E+00	1.29E+03	2.58E+03
Other Radionuclides					1.34E+03	2 67E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	1.460E+14
0 0250	3 044E+13
0 0375	2 754E+13
0 0575	2.834E+13
0 0850	1 756E+13
0 1250	1 318E+13
0 2250	1 482E+13
0.3750	6.547E+12
0.5750	1 183E+14
0.8500	1.387E+13
1.2500	3 486E+12
1 7500	1.004E+11
2 2500	4.395E+09
2 7500	6 568E+07
3.5000	7 971E+06
5.0000	4 624E+04
7.0000	5.315E+03
11 0000	6.095E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.11E+01	4.22E+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 %	93 06930693	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		534 24
Bounding		1 068 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	0.24	
Bounding	0.48	

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: H B. ROBINSON
SNF ID #: 99
Fuel Units & Descr: 1 - CANISTER OF SCRAP
Heavy Metal Mass: BOL=0 547kg; EOL=0.52kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1966
Estimates as of: 2010
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"x15": 0 04

II. Estimates

Radionuclide	m: C/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	25 85	51 70	0 00E+00	5 96E-05	1 19E-04
Am-241	8 4448E+00	25 85	51 70	0 00E+00	2 18E+02	4 37E+02
Am-242m	1 6848E-02	25 85	51 70	0 00E+00	4 36E-01	8 71E-01
Am-243	1 6320E-02	25 85	51 70	0 00E+00	4 22E-01	8 44E-01
C-14	1.2090E-01	25 85	51 70	0 00E+00	3 13E+00	6.25E+00
Cl-36	2.2849E-03	25 85	51 70	0 00E+00	5 91E-02	1 18E-01
Cm-243	8 6624E-04	25 85	51 70	0 00E+00	2 24E-02	4 48E-02
Cm-244	1 6848E-01	25 85	51 70	0 00E+00	4 36E+00	8 71E+00
Co-60	2 8086E+01	25 85	51 70	0 00E+00	7 26E+02	1 45E+03
Cs-134	3 4148E-04	25 85	51 70	0 00E+00	8 83E-03	1 77E-02
Cs-135	4 3976E-04	25 85	51 70	0 00E+00	1 14E-02	2 27E-02
Cs-137	2 1049E+01	25 85	51 70	0 00E+00	5 44E+02	1 09E+03
Eu-154	1 2500E+00	25 85	51 70	0 00E+00	3.23E+01	6 46E+01
Eu-155	6 8986E-02	25 85	51 70	0 00E+00	1.78E+00	3 57E+00
Fe-55	2 9308E-01	25 85	51 70	0 00E+00	7 58E+00	1 52E+01
H-3	2 4311E-01	25 85	51.70	0 00E+00	6.28E+00	1.26E+01
I-129	1 0618E-05	25 85	51.70	0 00E+00	2.74E-04	5 49E-04
Kr-85	5 9882E-01	25 85	51.70	0 00E+00	1 55E+01	3 10E+01
Np-237	1 5668E-04	25 85	51.70	0 00E+00	4 05E-03	8.10E-03
Pa-231	2 8656E-06	25 85	51 70	0 00E+00	7 41E-05	1 48E-04
Pb-210	2 3918E-08	25 85	51.70	0 00E+00	6 18E-07	1.24E-06
Pm-147	1 6900E-02	25 85	51 70	0 00E+00	4 37E-01	8 74E-01
Pu-238	-8 6120E-01	25 85	0 00	7 03E+01	4 81E+01	7 03E+01
Pu-239	-4 8440E-02	25 85	0 00	8 51E+00	7 26E+00	8 51E+00
Pu-240	-3 0095E-01	25 85	0 00	1 09E+01	3 08E+00	1 09E+01
Pu-241	-1 0411E+02	25 85	0 00	2 80E+03	1 06E+02	2 80E+03
Pu-242	-1 1381E-04	25 85	0 00	4 70E-02	4 41E-02	4 70E-02
Ra-226	6 4400E-08	25 85	51 70	0 00E+00	1 66E-06	3 33E-06
Ra-228	5 9952E-07	25 85	51 70	0 00E+00	1 55E-05	3 10E-05
Ru-106	8 5526E-07	25 85	51 70	0 00E+00	2 21E-05	4 42E-05
Se-79	1 9181E-04	25 85	51 70	0 00E+00	4 96E-03	9 92E-03
Sn-126	1 6671E-04	25 85	51 70	0 00E+00	4 31E-03	8 62E-03
Sr-90	1 9799E+01	25 85	51 70	0 00E+00	5.12E+02	1 02E+03
Tc-99	6 7678E-03	25 85	51.70	0 00E+00	1.75E-01	3 50E-01
Th-229	1 7488E-06	25 85	51.70	0 00E+00	4.52E-05	9 04E-05
Th-230	5 8704E-06	25 85	51.70	0 00E+00	1.52E-04	3 03E-04
Th-232	6 0208E-07	25 85	51.70	0 00E+00	1 56E-05	3.11E-05
Tl-208	8 7573E-05	25 85	51 70	0 00E+00	2.26E-03	4.53E-03
U-232	2.3706E-04	25 85	51 70	0 00E+00	6.13E-03	1.23E-02
U-233	3 6128E-04	25 85	51 70	0 00E+00	9 34E-03	1 87E-02
U-234	1.2788E-02	25 85	51 70	0 00E+00	3 31E-01	6 61E-01
U-235	5 7486E-04	25 85	51 70	2 35E-04	1 51E-02	3 00E-02
U-236	2.3485E-04	25 85	51 70	0 00E+00	6 07E-03	1.21E-02
U-238	1.1581E-04	25 85	51 70	2 93E-05	3 02E-03	6 02E-03
Y-90	1 9804E+01	25 85	51 70	0 00E+00	5 12E+02	1 02E+03
Other Radionuclides					1 59E+03	3 19E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	6.381E+13
0 0250	1.261E+13
0 0375	1 101E+13
0 0575	1 733E+13
0 0850	6 763E+12
0 1250	5.301E+12
0.2250	5 859E+12
0.3750	2 506E+12
0 5750	4 075E+13
0 8500	1 557E+12
1.2500	1 089E+14
1 7500	4 815E+10
2.2500	5 709E+08
2.7500	1 609E+08
3 5000	1 370E+05
5 0000	5 818E+04
7 0000	6 657E+03
11 0000	7 615E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.74E+01	5 40E+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	ZIRC	SST/Inconel
BOL HM Constituents:	Pu and U	U, Th, & Pu
BOL Enrichment %	2 897	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		25.85
Bounding	16 42	51 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	1 41	
Bounding	2.82	3 15

Estimated EOL HM/Given EOL HM: 31.57

[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 HFBR
SNF ID #: 706
Fuel Units & Descr: 1050 - 18 CURVED PLATES
Heavy Metal Mass BOL=394 8kg EOL=282.24kg
ROD Storage Site SRS

[1]Fuel decay start date 1982
Estimates as of 2010
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'
29 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	5 4520E-10	103,679 35	207,358 71	0 00E+00	5 65E-05	1.13E-04
Am-241	9 2284E-03	103,679 35	207,358 71	0 00E+00	9 57E+02	1 91E+03
Am-242m	1.3390E-06	103,679 35	207,358 71	0 00E+00	1 39E-01	2.78E-01
Am-243	3.7084E-05	103,679 35	207,358 71	0 00E+00	3 84E+00	7.69E+00
C-14	2 6452E-08	103,679 35	207,358 71	0 00E+00	2 74E-03	5 49E-03
Cl-36	4 4441E-31	103,679 35	207,358 71	0 00E+00	4 61E-26	9 22E-26
Cm-243	5 0498E-06	103,679 35	207,358.71	0 00E+00	5.24E-01	1 05E+00
Cm-244	3 8451E-03	103,679 35	207,358 71	0 00E+00	3 99E+02	7 97E+02
Co-60	2 5225E-05	103,679 35	207,358 71	0 00E+00	2 62E+00	5 23E+00
Cs-134	1 9830E-03	103,679 35	207,358 71	0 00E+00	2 06E+02	4 11E+02
Cs-135	4.2564E-06	103,679 35	207,358 71	0 00E+00	4 41E-01	8 83E-01
Cs-137	1 8141E+00	103,679.35	207,358 71	0 00E+00	1 88E+05	3 76E+05
Eu-154	3 4733E-02	103,679.35	207,358 71	0 00E+00	3 60E+03	7.20E+03
Eu-155	7.1081E-03	103,679 35	207,358 71	0 00E+00	7.37E+02	1.47E+03
Fe-55	3 5790E-04	103,679 35	207,358 71	0 00E+00	3 71E+01	7 42E+01
H-3	3 4945E-03	103,679 35	207,358 71	0 00E+00	3 62E+02	7.25E+02
I-129	6 6403E-07	103,679 35	207,358.71	0 00E+00	6 88E-02	1 38E-01
Kr-85	7 8250E-02	103,679 35	207,358 71	0 00E+00	8 11E+03	1 62E+04
Np-237	3 1567E-05	103,679 35	207,358 71	0 00E+00	3.27E+00	6 55E+00
Pa-231	1 3372E-09	103,679 35	207,358 71	0 00E+00	1.39E-04	2 77E-04
Pb-210	3 0644E-11	103,679.35	207,358 71	0 00E+00	3 18E-06	6.35E-06
Pm-147	6 5188E-03	103,679.35	207,358 71	0 00E+00	6 76E+02	1.35E+03
Pu-238	1 4769E-01	103,679 35	207,358 71	0 00E+00	1.53E+04	3 06E+04
Pu-239	6 9502E-04	103,679 35	207,358 71	0 00E+00	7.21E+01	1.44E+02
Pu-240	3 7928E-04	103,679 35	207,358 71	0 00E+00	3 93E+01	7.86E+01
Pu-241	1 0565E-01	103,679 35	207,358 71	0 00E+00	1 10E+04	2.19E+04
Pu-242	3 0911E-06	103,679 35	207,358.71	0 00E+00	3.20E-01	6 41E-01
Ra-226	1 1081E-10	103,679 35	207,358.71	0 00E+00	1.15E-05	2 30E-05
Ra-228	2 1185E-14	103,679 35	207,358 71	0 00E+00	2.20E-09	4 39E-09
Ru-106	2 3621E-07	103,679 35	207,358 71	0 00E+00	2.45E-02	4 90E-02
Se-79	1.2339E-05	103,679 35	207,358 71	0 00E+00	1.28E+00	2 56E+00
Sn-126	1 0194E-05	103,679 35	207,358 71	0.00E+00	1 06E+00	2.11E+00
Sr-90	1 6932E+00	103,679.35	207,358 71	0 00E+00	1 76E+05	3.51E+05
Tc-99	3.8056E-04	103,679 35	207,358 71	0 00E+00	3 95E+01	7.89E+01
Th-229	9 1252E-12	103,679.35	207,358 71	0 00E+00	9 46E-07	1 89E-06
Th-230	1.5407E-08	103,679 35	207,358 71	0 00E+00	1 60E-03	3 19E-03
Th-232	2 8937E-14	103,679 35	207,358 71	0 00E+00	3 00E-09	6 00E-09
Tl-208	4 7272E-08	103,679 35	207,358 71	0 00E+00	4.90E-03	9 80E-03
U-232	1 2855E-07	103,679 35	207,358 71	0 00E+00	1.33E-02	2 67E-02
U-233	5 1470E-09	103,679 35	207,358 71	0 00E+00	5.34E-04	1.07E-03
U-234	5 6069E-05	103,679.35	207,358 71	0 00E+00	5 81E+00	1.16E+01
U-235	-2 8661E-06	103,679.35	0 00	7.94E-01	4 97E-01	7.94E-01
U-236	1 6701E-05	103,679 35	207,358 71	0 00E+00	1 73E+00	3 46E+00
U-238	-9 4194E-09	103,679 35	0.00	9 18E-03	8 20E-03	9 18E-03
Y-90	1.6932E+00	103,679 35	207,358 71	0 00E+00	1 76E+05	3 51E+05
Other Radionuclides					1 80E+05	3 60E+05

Gamma Sources

Photon Energy Group Avg MeV	Total Photons/sec (bounding)
0 0150	1 944E+16
0 0250	4 001E+15
0 0375	3 533E+15
0 0575	3 768E+15
0 0850	2.268E+15
0 1250	1.574E+15
0 2250	1 958E+15
0 3750	8.475E+14
0 5750	1 405E+16
0 8500	2 768E+14
1.2500	1.868E+14
1 7500	7 731E+12
2.2500	4 167E+08
2 7500	3 582E+08
3 5000	1.230E+07
5 0000	5.213E+06
7 0000	5.980E+05
11 0000	6 850E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 69E+03	5.38E+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 %	93 08510638	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		103,679 35
Bounding		207,358 71

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 60	
Bounding	1.20	

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: HFIR (INNER)
SNF ID #: 103
Fuel Units & Descr: 442 - 171 CURVED PLATES
Heavy Metal Mass: BOL=1234 506kg; EOL=823 667kg
ROD Storage Site: SRS

[1]**Fuel decay start date:** 1986
Estimates as of: 2010
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' 147 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	389,072 50	778,145 01	0 00E+00	2 58E-04	5 16E-04
Am-241	2 0060E-03	389,072 50	778,145 01	0 00E+00	7 80E+02	1 56E+03
Am-242m	4.2429E-07	389,072 50	778,145 01	0 00E+00	1 65E-01	3 30E-01
Am-243	1 4899E-06	389,072 50	778,145 01	0 00E+00	5 80E-01	1 16E+00
C-14	5 7135E-09	389,072 50	778,145 01	0 00E+00	2.22E-03	4 45E-03
Cl-36	1 3124E-32	389,072.50	778,145 01	0 00E+00	5 11E-27	1 02E-26
Cm-243	1 6443E-07	389,072 50	778,145 01	0 00E+00	6 40E-02	1 28E-01
Cm-244	2 9330E-05	389,072 50	778,145 01	0 00E+00	1 14E+01	2 28E+01
Co-60	5 3186E-06	389,072 50	778,145 01	0 00E+00	2 07E+00	4 14E+00
Cs-134	3 1563E-03	389,072 50	778,145 01	0 00E+00	1 23E+03	2 46E+03
Cs-135	3 4477E-06	389,072 50	778,145 01	0 00E+00	1 34E+00	2 68E+00
Cs-137	2 0313E+00	389,072 50	778,145 01	0 00E+00	7 90E+05	1 58E+06
Eu-154	2 4513E-02	389,072 50	778,145 01	0 00E+00	9 54E+03	1.91E+04
Eu-155	4 8175E-03	389,072 50	778,145 01	0 00E+00	1 87E+03	3.75E+03
Fe-55	1.2397E-04	389,072 50	778,145 01	0 00E+00	4 82E+01	9 65E+01
H-3	4 5697E-03	389,072 50	778,145 01	0 00E+00	1 78E+03	3 56E+03
I-129	7 5300E-07	389,072.50	778,145 01	0 00E+00	2 93E-01	5 86E-01
Kr-85	1 0850E-01	389,072 50	778,145 01	0 00E+00	4 22E+04	8 44E+04
Np-237	9 5561E-06	389,072.50	778,145 01	0 00E+00	3 72E+00	7 44E+00
Pa-231	2 0359E-09	389,072 50	778,145 01	0 00E+00	7 92E-04	1 58E-03
Pb-210	4 9728E-11	389,072 50	778,145 01	0 00E+00	1 93E-05	3 87E-05
Pm-147	4 8502E-02	389,072 50	778,145 01	0 00E+00	1 89E+04	3 77E+04
Pu-238	1 8254E-02	389,072 50	778,145 01	0 00E+00	7.10E+03	1 42E+04
Pu-239	4.2810E-04	389,072 50	778,145 01	0 00E+00	1 67E+02	3.33E+02
Pu-240	2 4368E-04	389,072 50	778,145 01	0 00E+00	9 48E+01	1 90E+02
Pu-241	3.3415E-02	389,072 50	778,145 01	0 00E+00	1 30E+04	2 60E+04
Pu-242	3 6329E-07	389,072.50	778,145 01	0 00E+00	1 41E-01	2 83E-01
Ra-226	2 2854E-10	389,072.50	778,145 01	0 00E+00	8 89E-05	1 78E-04
Ra-228	1 2426E-14	389,072 50	778,145 01	0 00E+00	4 83E-09	9 67E-09
Ru-106	6 3589E-06	389,072 50	778,145 01	0 00E+00	2 47E+00	4 95E+00
Se-79	1 2933E-05	389,072 50	778,145 01	0 00E+00	5 03E+00	1 01E+01
Sn-126	1 1574E-05	389,072 50	778,145 01	0 00E+00	4 50E+00	9 01E+00
Sr-90	1 9248E+00	389,072 50	778,145 01	0 00E+00	7.49E+05	1.50E+06
Tc-99	4.2239E-04	389,072 50	778,145 01	0 00E+00	1 64E+02	3.29E+02
Th-229	5 0953E-12	389,072 50	778,145 01	0 00E+00	1 98E-06	3 96E-06
Th-230	4.1885E-08	389,072 50	778,145.01	0 00E+00	1 63E-02	3.26E-02
Th-232	1 9270E-14	389,072.50	778,145 01	0 00E+00	7 50E-09	1 50E-08
Tl-208	4 6024E-08	389,072.50	778,145 01	0 00E+00	1 79E-02	3 58E-02
U-232	1 2582E-07	389 072 50	778,145 01	0 00E+00	4 90E-02	9 79E-02
U-233	2 5825E-09	389,072 50	778,145 01	0 00E+00	1 00E-03	2 01E-03
U-234	1 8450E-04	389,072 50	778,145 01	0 00E+00	7 18E+01	1 44E+02
U-235	-2 7235E-06	389,072 50	0 00	2.48E+00	1 42E+00	2 48E+00
U-236	1 5493E-05	389,072 50	778,145 01	0 00E+00	6 03E+00	1.21E+01
U-238	-4 2851E-09	389,072 50	0 00	2 92E-02	2.76E-02	2 92E-02
Y-90	1 9254E+00	389,072 50	778,145.01	0 00E+00	7 49E+05	1.50E+06
Other Radionuclides					7 52E+05	1 50E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8 214E+16
0 0250	1 708E+16
0 0375	1 490E+16
0 0575	1 596E+16
0 0850	9 643E+15
0 1250	6.525E+15
0.2250	8.320E+15
0.3750	3 622E+15
0 5750	5.908E+16
0 8500	9 988E+14
1 2500	5.703E+14
1 7500	2 618E+13
2 2500	2.296E+09
2 7500	1.298E+09
3.5000	5 963E+06
5 0000	3 372E+05
7 0000	3 722E+04
11 0000	4 172E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.28E+03	1 86E+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	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %.	92 954	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	283 936 38	389 072.50	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		778 145.01	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 00	1.37
Bounding	2 00	

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 HFIR (INNER)
SNF ID #. 1083
Fuel Units & Descr: 54 - 171 CURVED PLATES
Heavy Metal Mass BOL=148 446kg EOL=115.285kg
ROD Storage Site SRS

[1]Fuel decay start date 1986
Estimates as of. 2010
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'
18 00

II. Estimates

Radionuclide	m: C/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	34,142 58	68,285 16	0 00E+00	2.26E-05	4 53E-05
Am-241	2 0060E-03	34,142 58	68,285 16	0 00E+00	6 85E+01	1 37E+02
Am-242m	4.2429E-07	34,142 58	68,285 16	0 00E+00	1 45E-02	2.90E-02
Am-243	1 4899E-06	34,142.58	68,285 16	0 00E+00	5 09E-02	1 02E-01
C-14	5 7135E-09	34,142.58	68,285 16	0 00E+00	1 95E-04	3 90E-04
Cl-36	1 3124E-32	34,142.58	68,285 16	0 00E+00	4 48E-28	8 96E-28
Cm-243	1 6443E-07	34,142 58	68,285 16	0 00E+00	5 61E-03	1 12E-02
Cm-244	2 9330E-05	34,142 58	68,285 16	0 00E+00	1 00E+00	2 00E+00
Co-60	5 3186E-06	34,142 58	68,285 16	0 00E+00	1 82E-01	3 63E-01
Cs-134	3 1563E-03	34,142 58	68,285 16	0 00E+00	1 08E+02	2 16E+02
Cs-135	3 4477E-06	34,142 58	68,285 16	0 00E+00	1.18E-01	2 35E-01
Cs-137	2.0313E+00	34,142 58	68,285 16	0 00E+00	6 94E+04	1 39E+05
Eu-154	2 4513E-02	34,142.58	68 285 16	0 00E+00	8.37E+02	1 67E+03
Eu-155	4 8175E-03	34,142 58	68,285 16	0 00E+00	1 64E+02	3.29E+02
Fe-55	1.2397E-04	34,142 58	68,285 16	0.00E+00	4.23E+00	8 46E+00
H-3	4 5697E-03	34,142 58	68,285 16	0 00E+00	1 56E+02	3 12E+02
I-129	7 5300E-07	34,142 58	68,285 16	0 00E+00	2 57E-02	5 14E-02
Kr-85	1 0850E-01	34,142 58	68,285.16	0 00E+00	3 70E+03	7 41E+03
Np-237	9 5561E-06	34,142 58	68,285.16	0 00E+00	3.26E-01	6 53E-01
Pa-231	2 0359E-09	34,142 58	68,285 16	0 00E+00	6 95E-05	1.39E-04
Pb-210	4 9728E-11	34,142.58	68,285 16	0 00E+00	1 70E-06	3 40E-06
Pm-147	4 8502E-02	34,142.58	68,285 16	0 00E+00	1.66E+03	3.31E+03
Pu-238	1 8254E-02	34,142.58	68,285 16	0 00E+00	6.23E+02	1.25E+03
Pu-239	4 2810E-04	34,142 58	68,285 16	0 00E+00	1 46E+01	2 92E+01
Pu-240	2 4368E-04	34,142 58	68,285 16	0 00E+00	8 32E+00	1 66E+01
Pu-241	3 3415E-02	34,142 58	68,285 16	0 00E+00	1 14E+03	2 28E+03
Pu-242	3 6329E-07	34,142 58	68,285.16	0 00E+00	1.24E-02	2 48E-02
Ra-226	2.2854E-10	34,142 58	68,285 16	0 00E+00	7.80E-06	1 56E-05
Ra-228	1.2426E-14	34,142 58	68,285 16	0 00E+00	4.24E-10	8 49E-10
Ru-106	6.3589E-06	34,142.58	68,285 16	0 00E+00	2 17E-01	4.34E-01
Se-79	1.2933E-05	34,142.58	68,285 16	0 00E+00	4 42E-01	8 83E-01
Sn-126	1 1574E-05	34,142.58	68,285 16	0 00E+00	3 95E-01	7 90E-01
Sr-90	1 9248E+00	34,142.58	68,285 16	0 00E+00	6 57E+04	1.31E+05
Tc-99	4 2239E-04	34,142 58	68,285 16	0 00E+00	1 44E+01	2 88E+01
Th-229	5 0953E-12	34,142 58	68,285 16	0 00E+00	1 74E-07	3 48E-07
Th-230	4 1885E-08	34,142 58	68,285 16	0 00E+00	1 43E-03	2 86E-03
Th-232	1 9270E-14	34,142 58	68,285 16	0 00E+00	6.58E-10	1.32E-09
Tl-208	4 6024E-08	34,142 58	68,285 16	0 00E+00	1.57E-03	3.14E-03
U-232	1.2582E-07	34,142.58	68,285 16	0 00E+00	4 30E-03	8 59E-03
U-233	2.5825E-09	34,142.58	68,285 16	0 00E+00	8 82E-05	1 76E-04
U-234	1 8450E-04	34,142.58	68,285 16	0 00E+00	6 30E+00	1.26E+01
U-235	-2.7235E-06	34,142 58	0 00	2 99E-01	2 06E-01	2 99E-01
U-236	1 5493E-05	34,142 58	68,285 16	0 00E+00	5 29E-01	1 06E+00
U-238	-4.2851E-09	34,142 58	0 00	3 42E-03	3 28E-03	3 42E-03
Y-90	1 9254E+00	34,142 58	68,285.16	0 00E+00	6 57E+04	1.31E+05
Other Radionuclides					6 60E+04	1 32E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7.208E+15
0 0250	1 499E+15
0 0375	1.307E+15
0 0575	1.400E+15
0 0850	8.462E+14
0 1250	5 726E+14
0.2250	7.301E+14
0.3750	3 178E+14
0.5750	5 184E+15
0 8500	8 765E+13
1.2500	5 005E+13
1 7500	2.297E+12
2.2500	2.015E+08
2.7500	1 139E+08
3.5000	5.233E+05
5 0000	2.959E+04
7 0000	3.267E+03
11 0000	3 661E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 14E+02	1.63E+03
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 %	93 141	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	34,142.58	31,404 49	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		68,285 16	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 73	0 92
Bounding	1 46	

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: HFIR (OUTER)
SNF ID #: 707
Fuel Units & Descr: 54 - 369 CURVED PLATES
Heavy Metal Mass: BOL=388 687kg; EOL=322.364kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1986
Estimates as of: 2010
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:

24"x10"
18 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	89,397 92	178,795 84	0 00E+00	5 93E-05	1.19E-04
Am-241	2.0060E-03	89,397 92	178,795 84	0 00E+00	1.79E+02	3 59E+02
Am-242m	4.2429E-07	89,397 92	178,795 84	0 00E+00	3 79E-02	7 59E-02
Am-243	1 4899E-06	89,397 92	178,795 84	0 00E+00	1 33E-01	2 66E-01
C-14	5 7135E-09	89,397 92	178,795.84	0 00E+00	5 11E-04	1 02E-03
Cl-36	1.3124E-32	89,397 92	178,795 84	0 00E+00	1.17E-27	2 35E-27
Cm-243	1 6443E-07	89,397 92	178,795 84	0 00E+00	1 47E-02	2 94E-02
Cm-244	2 9330E-05	89,397.92	178,795 84	0 00E+00	2 62E+00	5 24E+00
Co-60	5 3186E-06	89,397.92	178,795 84	0 00E+00	4 75E-01	9 51E-01
Cs-134	3 1563E-03	89,397.92	178,795 84	0 00E+00	2 82E+02	5 64E+02
Cs-135	3 4477E-06	89,397.92	178,795 84	0 00E+00	3 08E-01	6 16E-01
Cs-137	2 0313E+00	89,397 92	178,795 84	0 00E+00	1 82E+05	3 63E+05
Eu-154	2 4513E-02	89,397 92	178,795 84	0 00E+00	2 19E+03	4 38E+03
Eu-155	4 8175E-03	89,397 92	178,795 84	0 00E+00	4 31E+02	8 61E+02
Fe-55	1 2397E-04	89,397 92	178,795 84	0 00E+00	1 11E+01	2.22E+01
H-3	4 5697E-03	89,397 92	178,795 84	0 00E+00	4 09E+02	8 17E+02
I-129	7 5300E-07	89,397 92	178,795 84	0 00E+00	6 73E-02	1 35E-01
Kr-85	1 0850E-01	89,397 92	178,795 84	0 00E+00	9 70E+03	1 94E+04
Np-237	9 5561E-06	89,397 92	178,795 84	0 00E+00	8 54E-01	1.71E+00
Pa-231	2 0359E-09	89,397 92	178,795 84	0 00E+00	1 82E-04	3 64E-04
Pb-210	4 9728E-11	89,397 92	178,795 84	0 00E+00	4 45E-06	8 89E-06
Pm-147	4 8502E-02	89,397 92	178,795 84	0 00E+00	4.34E+03	8 67E+03
Pu-238	1 8254E-02	89,397 92	178,795 84	0 00E+00	1 63E+03	3.26E+03
Pu-239	4.2810E-04	89,397 92	178,795 84	0 00E+00	3 83E+01	7 65E+01
Pu-240	2 4368E-04	89,397 92	178,795 84	0 00E+00	2.18E+01	4 36E+01
Pu-241	3.3415E-02	89,397 92	178,795 84	0.00E+00	2 99E+03	5 97E+03
Pu-242	3 6329E-07	89,397 92	178,795 84	0.00E+00	3.25E-02	6 50E-02
Ra-226	2 2854E-10	89,397.92	178,795 84	0 00E+00	2 04E-05	4 09E-05
Ra-228	1.2426E-14	89,397.92	178,795 84	0 00E+00	1 11E-09	2 22E-09
Ru-106	6 3589E-06	89,397.92	178,795 84	0 00E+00	5 68E-01	1 14E+00
Se-79	1 2933E-05	89,397.92	178,795 84	0 00E+00	1 16E+00	2 31E+00
Sn-126	1 1574E-05	89,397 92	178,795 84	0 00E+00	1 03E+00	2 07E+00
Sr-90	1 9248E+00	89,397 92	178,795 84	0 00E+00	1 72E+05	3 44E+05
Tc-99	4 2239E-04	89,397 92	178,795 84	0 00E+00	3 78E+01	7 55E+01
Th-229	5 0953E-12	89,397 92	178,795 84	0 00E+00	4 56E-07	9 11E-07
Th-230	4 1885E-08	89,397 92	178,795 84	0 00E+00	3 74E-03	7 49E-03
Th-232	1 9270E-14	89,397 92	178,795 84	0 00E+00	1 72E-09	3 45E-09
Tl-208	4 6024E-08	89,397 92	178,795 84	0 00E+00	4 11E-03	8.23E-03
U-232	1.2582E-07	89,397 92	178,795 84	0 00E+00	1 12E-02	2.25E-02
U-233	2 5825E-09	89,397 92	178,795 84	0 00E+00	2 31E-04	4 62E-04
U-234	1 8450E-04	89,397 92	178,795 84	0 00E+00	1 65E+01	3.30E+01
U-235	-2 7235E-06	89,397 92	0 00	7.82E-01	5.39E-01	7.82E-01
U-236	1.5493E-05	89,397 92	178,795 84	0 00E+00	1 39E+00	2.77E+00
U-238	-4.2851E-09	89,397 92	0 00	8 96E-03	8 58E-03	8 96E-03
Y-90	1 9254E+00	89,397.92	178,795 84	0 00E+00	1 72E+05	3 44E+05
Other Radionuclides					1 73E+05	3 46E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 887E+16
0 0250	3 925E+15
0 0375	3 423E+15
0 0575	3 666E+15
0 0850	2.216E+15
0 1250	1 499E+15
0 2250	1.912E+15
0 3750	8.322E+14
0 5750	1.357E+16
0 8500	2.295E+14
1 2500	1.310E+14
1 7500	6.015E+12
2.2500	5.276E+08
2 7500	2.983E+08
3 5000	1.370E+06
5 0000	7 748E+04
7 0000	8 553E+03
11 0000	9 586E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 13E+03	4.26E+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 %	93 141	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	89,397 92	62,808 98	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		178 795.84	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 73	0 70
Bounding	1 46	

Estimated EOL HM/Given EOL HM: 0 93

[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 HFIR (OUTER)
SNF ID #: 1084
Fuel Units & Descr: 442 - 369 CURVED PLATES
Heavy Metal Mass: BOL=3232.39kg EOL=2303 174kg
ROD Storage Site SRS

[1]Fuel decay start date: 1986
Estimates as of: 2010
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
24"x10'
147 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	879,986 15	1,759,972 29	0 00E+00	5 84E-04	1 17E-03
Am-241	2 0060E-03	879,986 15	1,759,972 29	0 00E+00	1 77E+03	3 53E+03
Am-242m	4.2429E-07	879,986 15	1,759,972 29	0 00E+00	3 73E-01	7 47E-01
Am-243	1 4899E-06	879,986 15	1,759,972.29	0 00E+00	1 31E+00	2 62E+00
C-14	5 7135E-09	879,986 15	1,759,972.29	0 00E+00	5 03E-03	1 01E-02
Cl-36	1 3124E-32	879,986 15	1,759,972.29	0 00E+00	1.15E-26	2.31E-26
Cm-243	1 6443E-07	879,986.15	1,759,972.29	0 00E+00	1.45E-01	2 89E-01
Cm-244	2 9330E-05	879,986.15	1,759,972 29	0 00E+00	2 58E+01	5 16E+01
Co-60	5 3186E-06	879,986 15	1,759,972 29	0 00E+00	4 68E+00	9 36E+00
Cs-134	3.1563E-03	879,986 15	1,759,972 29	0 00E+00	2.78E+03	5.56E+03
Cs-135	3 4477E-06	879,986 15	1,759,972 29	0 00E+00	3 03E+00	6.07E+00
Cs-137	2 0313E+00	879,986 15	1,759,972 29	0 00E+00	1 79E+06	3.58E+06
Eu-154	2 4513E-02	879,986 15	1,759,972.29	0 00E+00	2 16E+04	4.31E+04
Eu-155	4 8175E-03	879,986 15	1,759,972.29	0 00E+00	4 24E+03	8 48E+03
Fe-55	1 2397E-04	879,986 15	1,759,972.29	0 00E+00	1 09E+02	2 18E+02
H-3	4 5697E-03	879,986 15	1,759,972.29	0 00E+00	4 02E+03	8 04E+03
I-129	7 5300E-07	879,986.15	1,759,972.29	0 00E+00	6 63E-01	1 33E+00
Kr-85	1 0850E-01	879,986 15	1,759,972.29	0 00E+00	9 55E+04	1 91E+05
Np-237	9 5561E-06	879,986 15	1,759,972 29	0 00E+00	8 41E+00	1 68E+01
Pa-231	2.0359E-09	879,986 15	1,759,972 29	0 00E+00	1.79E-03	3 58E-03
Pb-210	4 9728E-11	879,986 15	1,759,972 29	0 00E+00	4 38E-05	8 75E-05
Pm-147	4 8502E-02	879,986 15	1,759,972 29	0 00E+00	4.27E+04	8 54E+04
Pu-238	1 8254E-02	879,986 15	1,759,972.29	0 00E+00	1 61E+04	3 21E+04
Pu-239	4.2810E-04	879,986 15	1,759,972.29	0 00E+00	3 77E+02	7 53E+02
Pu-240	2 4368E-04	879,986 15	1,759,972.29	0 00E+00	2 14E+02	4 29E+02
Pu-241	3 3415E-02	879,986 15	1,759,972.29	0 00E+00	2 94E+04	5 88E+04
Pu-242	3 6329E-07	879,986 15	1,759,972.29	0 00E+00	3 20E-01	6.39E-01
Ra-226	2.2854E-10	879,986.15	1,759,972.29	0 00E+00	2 01E-04	4.02E-04
Ra-228	1.2426E-14	879,986 15	1,759,972.29	0 00E+00	1.09E-08	2 19E-08
Ru-106	6 3589E-06	879,986 15	1,759,972.29	0 00E+00	5 60E+00	1.12E+01
Se-79	1.2933E-05	879,986 15	1,759,972 29	0 00E+00	1.14E+01	2.28E+01
Sn-126	1.1574E-05	879,986 15	1,759,972 29	0 00E+00	1 02E+01	2 04E+01
Sr-90	1.9248E+00	879,986 15	1,759,972 29	0 00E+00	1 69E+06	3 39E+06
Tc-99	4.2239E-04	879,986 15	1,759,972.29	0 00E+00	3 72E+02	7.43E+02
Th-229	5 0953E-12	879,986 15	1,759,972.29	0 00E+00	4 48E-06	8 97E-06
Th-230	4 1885E-08	879,986 15	1,759,972.29	0 00E+00	3 69E-02	7.37E-02
Th-232	1 9270E-14	879,986 15	1,759,972.29	0 00E+00	1 70E-08	3.39E-08
Tl-208	4 6024E-08	879,986.15	1,759,972.29	0 00E+00	4 05E-02	8 10E-02
U-232	1.2582E-07	879,986 15	1,759,972.29	0 00E+00	1.11E-01	2.21E-01
U-233	2.5825E-09	879,986 15	1,759,972 29	0 00E+00	2.27E-03	4 55E-03
U-234	1.8450E-04	879,986 15	1,759,972 29	0 00E+00	1.62E+02	3.25E+02
U-235	-2 7235E-06	879,986 15	0 00	6 49E+00	4 10E+00	6 49E+00

Gamma Sources

Photon Energy Group (Avg MeV)	Total Photons/sec (bounding)
0 0150	1 858E+17
0 0250	3 863E+16
0 0375	3.370E+16
0 0575	3 609E+16
0 0850	2 181E+16
0 1250	1 476E+16
0.2250	1.882E+16
0.3750	8 192E+15
0 5750	1.336E+17
0 8500	2.259E+15
1.2500	1.290E+15
1 7500	5 921E+13
2.2500	5 193E+09
2.7500	2 936E+09
3.5000	1.349E+07
5 0000	7 626E+05
7 0000	8.419E+04
11 0000	9 435E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name:	HIFAR (UALX-HEU) AUSTRALIA	[1]Fuel decay start date.	1998
SNF ID #:	680	Estimates as of.	2010
Fuel Units & Descr:	240 - 12 CURVED PLATES	Template:	HFBR (Heavy Water, Alum , 40 to 100%, U)
Heavy Metal Mass:	BOL=45.192kg, EOL=33 624kg	[2]Template Burnup(MWd).	164 6
ROD Storage Site:	SRS	Template BOL Heavy Metal Mass (MT):	0 000377
		Template Decay Time	10 years

Estimated Canister usage: 18"x10" 6 67

II. Estimates

Radionuclide	m: C/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 3262E-10	10,655 32	21,310 64	0 00E+00	1 41E-06	2 83E-06
Am-241	5 9611E-03	10,655 32	21,310 64	0 00E+00	6 35E+01	1 27E+02
Am-242m	1 4332E-06	10,655 32	21,310 64	0 00E+00	1.53E-02	3 05E-02
Am-243	3 7132E-05	10,655 32	21,310 64	0 00E+00	3.96E-01	7 91E-01
C-14	2 6501E-08	10,655 32	21,310 64	0 00E+00	2.82E-04	5 65E-04
Cl-36	4 4441E-31	10,655 32	21,310 64	0 00E+00	4.74E-27	9 47E-27
Cm-243	7 2722E-06	10,655 32	21,310 64	0 00E+00	7.75E-02	1 55E-01
Cm-244	6 8226E-03	10,655 32	21,310 64	0 00E+00	7 27E+01	1 45E+02
Co-60	1 8117E-04	10,655 32	21,310 64	0 00E+00	1 93E+00	3 86E+00
Cs-134	3 0595E-01	10,655 32	21,310 64	0 00E+00	3 26E+03	6 52E+03
Cs-135	4 2564E-06	10,655 32	21,310 64	0 00E+00	4 54E-02	9 07E-02
Cs-137	2 5650E+00	10,655 32	21,310 64	0 00E+00	2 73E+04	5 47E+04
Eu-154	1 1628E-01	10,655 32	21,310 64	0 00E+00	1 24E+03	2 48E+03
Eu-155	5 7776E-02	10,655 32	21,310 64	0 00E+00	6 16E+02	1.23E+03
Fe-55	1 9465E-02	10,655 32	21,310 64	0 00E+00	2 07E+02	4 15E+02
H-3	8 1045E-03	10,655 32	21,310 64	0 00E+00	8 64E+01	1.73E+02
I-129	6 6403E-07	10,655 32	21,310 64	0 00E+00	7 08E-03	1 42E-02
Kr-85	2 0620E-01	10,655 32	21,310 64	0 00E+00	2 20E+03	4 39E+03
Np-237	3 1513E-05	10,655.32	21,310 64	0 00E+00	3 36E-01	6 72E-01
Pa-231	6 0304E-10	10,655 32	21,310 64	0 00E+00	6 43E-06	1 29E-05
Pb-210	2 7017E-12	10,655 32	21,310 64	0 00E+00	2 88E-08	5 76E-08
Pm-147	3 4210E-01	10,655 32	21,310 64	0.00E+00	3 65E+03	7 29E+03
Pu-238	1 6622E-01	10,655 32	21,310 64	0 00E+00	1 77E+03	3 54E+03
Pu-239	6 9563E-04	10,655.32	21,310 64	0 00E+00	7 41E+00	1 48E+01
Pu-240	3.7169E-04	10,655.32	21,310 64	0 00E+00	3 96E+00	7.92E+00
Pu-241	2.1731E-01	10,655.32	21,310 64	0 00E+00	2 32E+03	4 63E+03
Pu-242	3 0911E-06	10 655.32	21,310 64	0 00E+00	3 29E-02	6 59E-02
Ra-226	1.9435E-11	10,655.32	21,310 64	0 00E+00	2 07E-07	4 14E-07
Ra-228	6.1725E-15	10,655.32	21,310 64	0 00E+00	6 58E-11	1.32E-10
Ru-106	7 0778E-03	10,655.32	21,310 64	0 00E+00	7.54E+01	1 51E+02
Se-79	1.2339E-05	10,655 32	21,310 64	0 00E+00	1 31E-01	2 63E-01
Sn-126	1 0194E-05	10,655 32	21,310 64	0 00E+00	1 09E-01	2 17E-01
Sr-90	2 4186E+00	10,655 32	21,310 64	0 00E+00	2.58E+04	5 15E+04
Tc-99	3 8056E-04	10,655 32	21,310 64	0 00E+00	4 05E+00	8 11E+00
Th-229	2 0097E-12	10,655 32	21,310 64	0 00E+00	2 14E-08	4 28E-08
Th-230	6 0577E-09	10,655 32	21,310 64	0 00E+00	6 45E-05	1 29E-04
Th-232	1.2473E-14	10,655 32	21,310 64	0 00E+00	1.33E-10	2 66E-10
Tl-208	4 8791E-08	10,655 32	21,310 64	0 00E+00	5.20E-04	1 04E-03
U-232	1 3821E-07	10,655 32	21,310 64	0 00E+00	1.47E-03	2 95E-03
U-233	2 3906E-09	10,655 32	21,310 64	0 00E+00	2.55E-05	5 09E-05
U-234	4 7697E-05	10,655 32	21,310 64	0 00E+00	5 08E-01	1 02E+00
U-235	-2 8661E-06	10,655 32	0 00	7 80E-02	4.74E-02	7 80E-02
U-236	1 6701E-05	10,655 32	21,310 64	0 00E+00	1.78E-01	3 56E-01
U-238	-9 4194E-09	10,655 32	0 00	3 06E-03	2 96E-03	3 06E-03
Y-90	2 4192E+00	10,655 32	21,310 64	0 00E+00	2 58E+04	5 16E+04
Other Radionuclides					2 67E+04	5.33E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2 913E+15
0 0250	6 071E+14
0.0375	5 493E+14
0.0575	5 652E+14
0.0850	3.502E+14
0 1250	2 629E+14
0.2250	2 956E+14
0.3750	1.306E+14
0.5750	2.359E+15
0 8500	2 767E+14
1.2500	6 953E+13
1 7500	2.003E+12
2.2500	8 766E+10
2.7500	1 310E+09
3.5000	1.590E+08
5 0000	9.223E+05
7 0000	1 060E+05
11 0000	1.216E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.20E+02	8.41E+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 82555621	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		10,655.32	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		21,310 64	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.54	
Bounding:	1 08	

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 HOR (NETHERLANDS)
SNF ID #: 713
Fuel Units & Descr: 33 - ASSEMBLY
Heavy Metal Mass: BOL=6.55kg EOL=4 01kg
ROD Storage Site SRS

[1]Fuel decay start date 1988
Estimates as of 2010
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	2,406 38	4,812 75	0 00E+00	1 60E-06	3 19E-06
Am-241	2 0060E-03	2,406 38	4,812 75	0 00E+00	4 83E+00	9 65E+00
Am-242m	4.2429E-07	2,406 38	4,812 75	0 00E+00	1 02E-03	2 04E-03
Am-243	1.4899E-06	2,406 38	4,812 75	0 00E+00	3 59E-03	7 17E-03
C-14	5 7135E-09	2,406 38	4,812 75	0 00E+00	1.37E-05	2 75E-05
Cl-36	1.3124E-32	2,406 38	4,812 75	0 00E+00	3 16E-29	6 32E-29
Cm-243	1 6443E-07	2,406.38	4,812 75	0 00E+00	3 96E-04	7 91E-04
Cm-244	2 9330E-05	2,406 38	4,812.75	0 00E+00	7 06E-02	1 41E-01
Co-60	5 3186E-06	2,406.38	4,812.75	0.00E+00	1.28E-02	2 56E-02
Cs-134	3 1563E-03	2,406 38	4,812.75	0 00E+00	7 60E+00	1 52E+01
Cs-135	3 4477E-06	2,406 38	4,812 75	0 00E+00	8 30E-03	1 66E-02
Cs-137	2.0313E+00	2,406 38	4,812 75	0 00E+00	4 89E+03	9 78E+03
Eu-154	2 4513E-02	2,406 38	4,812 75	0 00E+00	5 90E+01	1 18E+02
Eu-155	4 8175E-03	2,406 38	4,812 75	0 00E+00	1 16E+01	2 32E+01
Fe-55	1.2397E-04	2,406 38	4,812 75	0 00E+00	2 98E-01	5 97E-01
H-3	4 5697E-03	2,406 38	4,812 75	0 00E+00	1 10E+01	2.20E+01
I-129	7.5300E-07	2,406 38	4,812 75	0 00E+00	1 81E-03	3 62E-03
Kr-85	1 0850E-01	2,406.38	4,812 75	0 00E+00	2 61E+02	5.22E+02
Np-237	9 5561E-06	2,406.38	4,812 75	0 00E+00	2.30E-02	4 60E-02
Pa-231	2 0359E-09	2,406 38	4,812.75	0 00E+00	4 90E-06	9 80E-06
Pb-210	4 9728E-11	2,406 38	4,812.75	0 00E+00	1.20E-07	2 39E-07
Pm-147	4 8502E-02	2,406 38	4,812 75	0 00E+00	1 17E+02	2.33E+02
Pu-238	1 8254E-02	2,406 38	4,812.75	0 00E+00	4.39E+01	8 79E+01
Pu-239	4.2810E-04	2,406 38	4,812 75	0 00E+00	1 03E+00	2 06E+00
Pu-240	2 4368E-04	2,406 38	4,812 75	0 00E+00	5 86E-01	1 17E+00
Pu-241	3.3415E-02	2,406 38	4,812 75	0 00E+00	8 04E+01	1 61E+02
Pu-242	3 6329E-07	2,406 38	4,812 75	0 00E+00	8 74E-04	1 75E-03
Ra-226	2.2854E-10	2,406 38	4,812 75	0 00E+00	5 50E-07	1.10E-06
Ra-228	1.2426E-14	2,406 38	4,812 75	0 00E+00	2 99E-11	5 98E-11
Ru-106	6 3589E-06	2,406.38	4,812 75	0 00E+00	1.53E-02	3 06E-02
Se-79	1 2933E-05	2,406.38	4,812.75	0 00E+00	3.11E-02	6.22E-02
Sn-126	1 1574E-05	2,406 38	4,812.75	0 00E+00	2 79E-02	5 57E-02
Sr-90	1 9248E+00	2,406 38	4,812 75	0 00E+00	4.63E+03	9.26E+03
Tc-99	4 2239E-04	2,406 38	4,812 75	0 00E+00	1.02E+00	2 03E+00
Th-229	5 0953E-12	2,406 38	4,812 75	0 00E+00	1.23E-08	2 45E-08
Th-230	4 1885E-08	2,406 38	4,812 75	0 00E+00	1 01E-04	2 02E-04
Th-232	1.9270E-14	2,406 38	4,812 75	0 00E+00	4 64E-11	9 27E-11
Tl-208	4 6024E-08	2,406 38	4,812 75	0 00E+00	1 11E-04	2.22E-04
U-232	1.2582E-07	2,406.38	4,812 75	0 00E+00	3 03E-04	6 06E-04
U-233	2.5825E-09	2,406 38	4,812 75	0 00E+00	6 21E-06	1.24E-05
U-234	1 8450E-04	2,406.38	4,812 75	0 00E+00	4 44E-01	8.88E-01
U-235	-2 7235E-06	2,406.38	0 00	1.32E-02	6 63E-03	1.32E-02
U-236	1 5493E-05	2,406.38	4,812.75	0 00E+00	3.73E-02	7.46E-02
U-238	-4.2851E-09	2,406 38	0 00	1.51E-04	1 41E-04	1 51E-04
Y-90	1 9254E+00	2,406 38	4,812 75	0 00E+00	4 63E+03	9.27E+03
Other Radionuclides					4 65E+03	9 31E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5 080E+14
0 0250	1 056E+14
0 0375	9 214E+13
0 0575	9 869E+13
0 0850	5 964E+13
0 1250	4 036E+13
0.2250	5 146E+13
0 3750	2.240E+13
0 5750	3.654E+14
0 8500	6 177E+12
1.2500	3.527E+12
1 7500	1 619E+11
2.2500	1 420E+07
2 7500	8 029E+06
3.5000	3 688E+04
5 0000	2 085E+03
7 0000	2.302E+02
11 0000	2.580E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 74E+01	1.15E+02
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 13082871	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		2,406 38	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		4 812.75	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 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: HTRE (ANP)
SNF ID #: 105
Fuel Units & Descr: 13 - CANISTER OF SCRAP
Heavy Metal Mass. BOL=4 55kg, EOL=4.039kg
ROD Storage Site INEEL

[1]Fuel decay start date. 1961
Estimates as of 2010
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: 35 years

Estimated Canister usage. 18"x10'
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	2 3344E-08	482 62	965.24	0 00E+00	1 13E-05	2.25E-05
Am-241	1 1135E-04	482 62	965.24	0 00E+00	5 37E-02	1 07E-01
Am-242m	8 5075E-09	482 62	965 24	0 00E+00	4.11E-06	8.21E-06
Am-243	9 8519E-10	482.62	965.24	0 00E+00	4.75E-07	9 51E-07
C-14	2 3012E-04	482 62	965 24	0 00E+00	1.11E-01	2.22E-01
Cl-36	1.2261E-06	482 62	965 24	0 00E+00	5 92E-04	1.18E-03
Cm-243	2 4875E-10	482 62	965 24	0 00E+00	1.20E-07	2 40E-07
Cm-244	2.3178E-09	482 62	965 24	0 00E+00	1 12E-06	2.24E-06
Co-60	7 0849E-02	482 62	965 24	0 00E+00	3 42E+01	6 84E+01
Cs-134	3 0266E-06	482 62	965 24	0 00E+00	1 46E-03	2 92E-03
Cs-135	3 0316E-05	482 62	965 24	0 00E+00	1 46E-02	2 93E-02
Cs-137	1 4511E+00	482 62	965 24	0 00E+00	7 00E+02	1 40E+03
Eu-154	6 6955E-04	482 62	965 24	0 00E+00	3 23E-01	6 46E-01
Eu-155	6 9850E-04	482 62	965 24	0 00E+00	3 37E-01	6 74E-01
Fe-55	1.2318E-03	482 62	965.24	0 00E+00	5 94E-01	1 19E+00
H-3	2 5141E-03	482 62	965.24	0 00E+00	1 21E+00	2 43E+00
I-129	7 3195E-07	482 62	965.24	0 00E+00	3 53E-04	7 07E-04
Kr-85	4 1281E-02	482 62	965.24	0 00E+00	1 99E+01	3 98E+01
Np-237	1 1489E-06	482 62	965.24	0 00E+00	5 54E-04	1 11E-03
Pa-231	4 5241E-08	482 62	965 24	0 00E+00	2.18E-05	4 37E-05
Pb-210	6 4476E-13	482.62	965 24	0 00E+00	3 11E-10	6 22E-10
Pm-147	1 1651E-03	482.62	965 24	0 00E+00	5 62E-01	1.12E+00
Pu-238	2 9517E-04	482 62	965.24	0 00E+00	1 42E-01	2 85E-01
Pu-239	6 6772E-04	482 62	965 24	0 00E+00	3.22E-01	6 45E-01
Pu-240	8 6839E-05	482 62	965 24	0 00E+00	4.19E-02	8.38E-02
Pu-241	7 1514E-04	482 62	965 24	0 00E+00	3 45E-01	6 90E-01
Pu-242	1 9717E-09	482 62	965 24	0 00E+00	9 52E-07	1 90E-06
Ra-226	1 7654E-12	482 62	965 24	0 00E+00	8 52E-10	1 70E-09
Ra-228	8.2928E-12	482 62	965.24	0 00E+00	4 00E-09	8 00E-09
Ru-106	1.8419E-10	482 62	965.24	0 00E+00	8 89E-08	1 78E-07
Se-79	1.3223E-05	482 62	965.24	0 00E+00	6 38E-03	1.28E-02
Sn-126	1 1493E-05	482 62	965.24	0 00E+00	5 55E-03	1 11E-02
Sr-90	1.3649E+00	482 62	965.24	0 00E+00	6 59E+02	1 32E+03
Tc-99	4 6656E-04	482 62	965.24	0 00E+00	2 25E-01	4 50E-01
Th-229	1 4547E-11	482 62	965.24	0 00E+00	7 02E-09	1 40E-08
Th-230	1 6617E-10	482.62	965.24	0 00E+00	8 02E-08	1 60E-07
Th-232	8 3361E-12	482.62	965.24	0 00E+00	4 02E-09	8 05E-09
Tl-208	2 1664E-08	482 62	965.24	0 00E+00	1 05E-05	2 09E-05
U-232	5 8669E-08	482 62	965 24	0 00E+00	2.83E-05	5 66E-05
U-233	3 1847E-09	482 62	965 24	0 00E+00	1.54E-06	3 07E-06
U-234	3 8769E-07	482 62	965 24	0 00E+00	1.87E-04	3 74E-04
U-235	-2 7761E-06	482 62	0.00	9 16E-03	7.82E-03	9 16E-03
U-236	1 6190E-05	482 62	965 24	0 00E+00	7 81E-03	1.56E-02
U-238	-2 8547E-09	482 62	0 00	1 05E-04	1 03E-04	1.05E-04
Y-90	1 3652E+00	482 62	965.24	0 00E+00	6 59E+02	1 32E+03
Other Radionuclides					7 97E+02	1 59E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7.204E+13
0 0250	1 497E+13
0 0375	1.295E+13
0 0575	1 396E+13
0 0850	8 434E+12
0 1250	5.476E+12
0.2250	7.259E+12
0.3750	3 166E+12
0.5750	5 216E+13
0.8500	5 280E+11
1.2500	5.248E+12
1.7500	1.362E+10
2.2500	2.827E+07
2.7500	8 173E+05
3 5000	5.812E+01
5 0000	2.391E+01
7 0000	2.640E+00
11 0000	2.963E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 43E+00	1 69E+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	NICHROME	SST
BOL HM Constituents	U	U
BOL Enrichment %	93 15	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		482 62
Bounding		965.24

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	2.27	
Bounding	4 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: HWCTR 3EMT-2 (UMO)
SNF ID #: 118
Fuel Units & Descr: 7 - TUBE
Heavy Metal Mass BOL= , EOL=8 108kg
ROD Storage Site INEEL

[1]Fuel decay start date: 1964
Estimates as of: 2010
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: 35 years

Estimated Canister usage 18"x10': 0 16

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 6920E-09	7,772 05	7,772 05	0 00E+00	3 65E-05	3 65E-05
Am-241	2 2880E-02	7,772.05	7,772 05	0 00E+00	1 78E+02	1.78E+02
Am-242m	3 5400E-06	7,772 05	7,772 05	0 00E+00	2 75E-02	2 75E-02
Am-243	2 0580E-06	7,772 05	7,772 05	0 00E+00	1 60E-02	1 60E-02
C-14	1.1264E-03	7,772 05	7,772 05	0 00E+00	8 75E+00	8 75E+00
Cl-36	8.3760E-11	7,772 05	7,772 05	0 00E+00	6.51E-07	6 51E-07
Cm-243	5 0340E-07	7,772 05	7,772 05	0 00E+00	3 91E-03	3 91E-03
Cm-244	1 0450E-05	7,772 05	7,772 05	0 00E+00	8 12E-02	8 12E-02
Co-60	6 4420E-02	7,772 05	7,772 05	0 00E+00	5 01E+02	5 01E+02
Cs-134	7 9240E-06	7,772.05	7,772 05	0 00E+00	6 16E-02	6 16E-02
Cs-135	7 9140E-06	7,772 05	7,772 05	0 00E+00	6 15E-02	6 15E-02
Cs-137	1 4316E+00	7,772 05	7,772 05	0 00E+00	1 11E+04	1 11E+04
Eu-154	6.7900E-03	7,772 05	7,772 05	0 00E+00	5.28E+01	5 28E+01
Eu-155	6 2800E-04	7,772 05	7,772 05	0 00E+00	4 88E+00	4 88E+00
Fe-55	5 7480E-05	7,772 05	7,772 05	0 00E+00	4 47E-01	4 47E-01
H-3	2 3800E-02	7,772 05	7,772.05	0 00E+00	1 85E+02	1.85E+02
I-129	7 5020E-07	7,772.05	7,772.05	0 00E+00	5 83E-03	5 83E-03
Kr-85	3 8220E-02	7,772.05	7,772 05	0.00E+00	2 97E+02	2 97E+02
Np-237	5 5780E-06	7,772 05	7,772 05	0 00E+00	4 34E-02	4 34E-02
Pa-231	7.8820E-09	7,772 05	7,772 05	0 00E+00	6.13E-05	6.13E-05
Pb-210	4.3840E-09	7,772 05	7,772 05	0 00E+00	3 41E-05	3.41E-05
Pm-147	9 9500E-04	7,772 05	7,772 05	0 00E+00	7.73E+00	7.73E+00
Pu-238	6 4240E-03	7,772 05	7,772 05	0 00E+00	4 99E+01	4 99E+01
Pu-239	1 8744E-02	7,772 05	7,772.05	0 00E+00	1.46E+02	1 46E+02
Pu-240	8 3540E-03	7,772.05	7,772.05	0 00E+00	6 49E+01	6 49E+01
Pu-241	1 4606E-01	7,772.05	7,772 05	0.00E+00	1 14E+03	1 14E+03
Pu-242	2 0400E-06	7,772 05	7,772 05	0 00E+00	1 59E-02	1.59E-02
Ra-226	1 1804E-08	7,772 05	7,772 05	0 00E+00	9 17E-05	9 17E-05
Ra-228	1 1864E-09	7,772 05	7,772 05	0 00E+00	9.22E-06	9.22E-06
Ru-106	3.2580E-10	7,772 05	7,772 05	0 00E+00	2 53E-06	2 53E-06
Se-79	1 2524E-05	7,772 05	7,772 05	0 00E+00	9 73E-02	9 73E-02
Sn-126	1 2052E-05	7,772 05	7,772.05	0 00E+00	9 37E-02	9 37E-02
Sr-90	1.2638E+00	7,772 05	7,772 05	0 00E+00	9 82E+03	9 82E+03
Tc-99	4 4140E-04	7,772 05	7,772 05	0.00E+00	3 43E+00	3 43E+00
Th-229	4.3480E-09	7,772 05	7,772 05	0 00E+00	3 38E-05	3.38E-05
Th-230	1 0760E-06	7,772 05	7,772 05	0 00E+00	8.36E-03	8.36E-03
Th-232	1 1926E-09	7,772 05	7,772 05	0 00E+00	9 27E-06	9 27E-06
Tl-208	4 6200E-08	7,772 05	7,772 05	0 00E+00	3 59E-04	3 59E-04
U-232	1 2406E-07	7,772 05	7,772 05	0 00E+00	9 64E-04	9 64E-04
U-233	9 1620E-07	7,772.05	7,772.05	0 00E+00	7.12E-03	7.12E-03
U-234	2.3440E-03	7,772 05	7,772 05	0 00E+00	1 82E+01	1 82E+01
U-235	-2 3296E-06	7,772 05	0 00	1.75E-03	0 00E+00	1.75E-03
U-236	2.6620E-05	7,772 05	7,772 05	0 00E+00	2.07E-01	2.07E-01
U-238	-1 3291E-07	7,772 05	0 00	5 13E-03	4 09E-03	5 13E-03
Y-90	1 2642E+00	7,772 05	7,772 05	0 00E+00	9 83E+03	9 83E+03
Other Radionuclides					1 06E+04	1 06E+04

Gamma Sources

Photon Energy Group Avg MeV	Total Photons/sec (bounding)
0.0150	5 422E+14
0 0250	1.123E+14
0 0375	9.880E+13
0 0575	1.070E+14
0 0850	6.309E+13
0 1250	4 163E+13
0.2250	5 435E+13
0.3750	2.364E+13
0.5750	4 137E+14
0 8500	4 775E+12
1.2500	3.934E+13
1 7500	1.294E+11
2.2500	2 073E+08
2.7500	1 326E+07
3.5000	4 000E+04
5 0000	1 679E+04
7.0000	1.888E+03
11 0000	2.143E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.43E+02	1.43E+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		7,772.05
Bounding		7,772 05

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: HWCTR DRIVER (U-ZR) HEU
SNF ID #: 117
Fuel Units & Descr: 76 - TUBE
Heavy Metal Mass: BOL= , EOL=36 13kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1964
Estimates as of: 2010
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 35 years

Estimated Canister usage: 18"x15' 3 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	4 6920E-09	34,632 91	34,632 91	0 00E+00	1 62E-04	1 62E-04
Am-241	2 2880E-02	34,632 91	34,632 91	0 00E+00	7 92E+02	7 92E+02
Am-242m	3 5400E-06	34,632 91	34,632 91	0 00E+00	1.23E-01	1 23E-01
Am-243	2 0580E-06	34,632 91	34,632.91	0 00E+00	7.13E-02	7 13E-02
C-14	1 1264E-03	34,632 91	34,632 91	0 00E+00	3 90E+01	3 90E+01
Cl-36	8.3760E-11	34,632 91	34,632 91	0 00E+00	2 90E-06	2 90E-06
Cm-243	5 0340E-07	34,632 91	34,632 91	0.00E+00	1 74E-02	1 74E-02
Cm-244	1 0450E-05	34,632 91	34,632 91	0 00E+00	3 62E-01	3 62E-01
Co-60	6.4420E-02	34,632 91	34,632 91	0 00E+00	2.23E+03	2 23E+03
Cs-134	7 9240E-06	34,632 91	34,632 91	0 00E+00	2 74E-01	2.74E-01
Cs-135	7 9140E-06	34,632 91	34,632 91	0 00E+00	2 74E-01	2.74E-01
Cs-137	1 4316E+00	34,632 91	34,632 91	0 00E+00	4 96E+04	4 96E+04
Eu-154	6 7900E-03	34,632.91	34,632 91	0 00E+00	2 35E+02	2 35E+02
Eu-155	6 2800E-04	34,632.91	34,632 91	0 00E+00	2.17E+01	2 17E+01
Fe-55	5 7480E-05	34,632.91	34,632.91	0 00E+00	1 99E+00	1 99E+00
H-3	2 3800E-02	34,632 91	34,632.91	0 00E+00	8 24E+02	8.24E+02
I-129	7 5020E-07	34,632 91	34,632 91	0 00E+00	2 60E-02	2 60E-02
Kr-85	3 8220E-02	34,632 91	34,632 91	0 00E+00	1 32E+03	1.32E+03
Np-237	5.5780E-06	34,632 91	34,632 91	0 00E+00	1 93E-01	1 93E-01
Pa-231	7 8820E-09	34,632 91	34,632 91	0 00E+00	2 73E-04	2.73E-04
Pb-210	4 3840E-09	34,632 91	34,632 91	0 00E+00	1 52E-04	1.52E-04
Pm-147	9 9500E-04	34,632 91	34,632 91	0 00E+00	3 45E+01	3 45E+01
Pu-238	6 4240E-03	34,632 91	34,632 91	0 00E+00	2.22E+02	2 22E+02
Pu-239	1 8744E-02	34,632 91	34 632 91	0 00E+00	6 49E+02	6 49E+02
Pu-240	8 3540E-03	34,632.91	34,632.91	0 00E+00	2 89E+02	2 89E+02
Pu-241	1 4606E-01	34,632.91	34,632.91	0 00E+00	5 06E+03	5 06E+03
Pu-242	2 0400E-06	34,632 91	34,632 91	0.00E+00	7 07E-02	7 07E-02
Ra-226	1 1804E-08	34,632 91	34,632 91	0 00E+00	4 09E-04	4 09E-04
Ra-228	1.1864E-09	34,632 91	34,632 91	0 00E+00	4 11E-05	4.11E-05
Ru-106	3.2580E-10	34,632 91	34,632 91	0 00E+00	1.13E-05	1.13E-05
Se-79	1 2524E-05	34,632 91	34,632 91	0 00E+00	4 34E-01	4 34E-01
Sn-126	1.2052E-05	34,632 91	34,632 91	0 00E+00	4.17E-01	4 17E-01
Sr-90	1 2638E+00	34,632.91	34,632 91	0 00E+00	4 38E+04	4 38E+04
Tc-99	4 4140E-04	34,632 91	34,632 91	0 00E+00	1 53E+01	1 53E+01
Th-229	4 3480E-09	34,632.91	34,632 91	0 00E+00	1 51E-04	1 51E-04
Th-230	1 0760E-06	34,632 91	34,632.91	0 00E+00	3 73E-02	3 73E-02
Th-232	1 1926E-09	34,632.91	34,632.91	0.00E+00	4 13E-05	4 13E-05
Tl-208	4 6200E-08	34,632.91	34,632 91	0 00E+00	1 60E-03	1 60E-03
U-232	1.2406E-07	34,632 91	34,632 91	0 00E+00	4 30E-03	4.30E-03
U-233	9 1620E-07	34,632 91	34,632 91	0 00E+00	3 17E-02	3 17E-02
U-234	2 3440E-03	34,632 91	34,632 91	0 00E+00	8.12E+01	8.12E+01
U-235	-2.3296E-06	34,632 91	0 00	7 81E-03	0 00E+00	7.81E-03
U-236	2 6620E-05	34,632.91	34,632 91	0 00E+00	9.22E-01	9.22E-01
U-238	-1 3291E-07	34,632.91	0 00	2.28E-02	1 82E-02	2 28E-02
Y-90	1 2642E+00	34,632 91	34,632.91	0 00E+00	4 38E+04	4 38E+04
Other Radionuclides					4 72E+04	4 72E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 416E+15
0 0250	5 005E+14
0 0375	4 403E+14
0 0575	4 767E+14
0 0850	2.811E+14
0 1250	1.855E+14
0 2250	2 422E+14
0 3750	1 053E+14
0 5750	1 843E+15
0 8500	2 128E+13
1.2500	1 753E+14
1 7500	5 766E+11
2.2500	9.236E+08
2.7500	5 909E+07
3.5000	1 782E+05
5.0000	7 481E+04
7 0000	8.414E+03
11 0000	9.549E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.36E+02	6.36E+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		34,632 91
Bounding		34 632 91

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	HWCTR ETWO (U METAL) LEU	[1]Fuel decay start date	1964
SNF ID #	867	Estimates as of:	2010
Fuel Units & Descr	6 - TUBE	Template	HFBR (Heavy Water, Zirc , 0 to 5%, U)
Heavy Metal Mass	BOL= ; EOL=45.456kg	[2]Template Burnup(MWd)	5
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 00034251
		Template Decay Time	35 years

Estimated Canister usage 18"x15'
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	4 6920E-09	43,572 00	43,572 00	0 00E+00	2 04E-04	2 04E-04
Am-241	2 2880E-02	43,572 00	43,572 00	0 00E+00	9 97E+02	9 97E+02
Am-242m	3 5400E-06	43,572 00	43,572 00	0 00E+00	1 54E-01	1 54E-01
Am-243	2 0580E-06	43,572 00	43,572 00	0 00E+00	8 97E-02	8 97E-02
C-14	1 1264E-03	43,572 00	43,572 00	0 00E+00	4 91E+01	4 91E+01
Cl-36	8 3760E-11	43,572 00	43,572 00	0 00E+00	3 65E-06	3 65E-06
Cm-243	5 0340E-07	43,572 00	43,572.00	0 00E+00	2 19E-02	2.19E-02
Cm-244	1 0450E-05	43,572 00	43,572 00	0 00E+00	4 55E-01	4.55E-01
Co-60	6 4420E-02	43,572 00	43,572 00	0 00E+00	2 81E+03	2 81E+03
Cs-134	7 9240E-06	43,572 00	43,572 00	0.00E+00	3 45E-01	3 45E-01
Cs-135	7 9140E-06	43,572 00	43,572 00	0 00E+00	3 45E-01	3 45E-01
Cs-137	1 4316E+00	43,572 00	43,572 00	0 00E+00	6 24E+04	6.24E+04
Eu-154	6 7900E-03	43,572 00	43,572 00	0 00E+00	2 96E+02	2 96E+02
Eu-155	6 2800E-04	43,572 00	43,572 00	0 00E+00	2 74E+01	2 74E+01
Fe-55	5 7480E-05	43,572.00	43,572 00	0 00E+00	2 50E+00	2 50E+00
H-3	2.3800E-02	43,572 00	43,572.00	0 00E+00	1.04E+03	1 04E+03
I-129	7.5020E-07	43,572 00	43,572 00	0 00E+00	3 27E-02	3.27E-02
Kr-85	3 8220E-02	43,572 00	43,572 00	0 00E+00	1 67E+03	1.67E+03
Np-237	5 5780E-06	43,572 00	43,572 00	0 00E+00	2 43E-01	2 43E-01
Pa-231	7 8820E-09	43,572 00	43,572 00	0 00E+00	3 43E-04	3 43E-04
Pb-210	4 3840E-09	43,572 00	43,572 00	0 00E+00	1 91E-04	1 91E-04
Pm-147	9 9500E-04	43,572 00	43,572 00	0 00E+00	4 34E+01	4 34E+01
Pu-238	6 4240E-03	43,572.00	43,572 00	0 00E+00	2 80E+02	2 80E+02
Pu-239	1 8744E-02	43,572 00	43,572 00	0 00E+00	8 17E+02	8 17E+02
Pu-240	8 3540E-03	43,572 00	43,572 00	0 00E+00	3.64E+02	3 64E+02
Pu-241	1 4606E-01	43,572 00	43,572.00	0 00E+00	6.36E+03	6.36E+03
Pu-242	2.0400E-06	43,572 00	43,572.00	0 00E+00	8 89E-02	8 89E-02
Ra-226	1.1804E-08	43,572 00	43,572 00	0 00E+00	5 14E-04	5 14E-04
Ra-228	1 1864E-09	43,572 00	43,572 00	0 00E+00	5 17E-05	5 17E-05
Ru-106	3.2580E-10	43,572 00	43,572 00	0 00E+00	1 42E-05	1 42E-05
Se-79	1 2524E-05	43,572 00	43,572 00	0 00E+00	5 46E-01	5 46E-01
Sn-126	1 2052E-05	43,572 00	43,572 00	0 00E+00	5.25E-01	5.25E-01
Sr-90	1 2638E+00	43,572 00	43,572 00	0 00E+00	5 51E+04	5 51E+04
Tc-99	4 4140E-04	43,572.00	43,572 00	0 00E+00	1.92E+01	1 92E+01
Th-229	4 3480E-09	43,572 00	43,572 00	0 00E+00	1 89E-04	1.89E-04
Th-230	1 0760E-06	43,572 00	43,572.00	0 00E+00	4 69E-02	4 69E-02
Th-232	1.1926E-09	43,572 00	43,572 00	0 00E+00	5 20E-05	5 20E-05
Tl-208	4 6200E-08	43,572 00	43,572 00	0.00E+00	2 01E-03	2 01E-03
U-232	1.2406E-07	43,572 00	43,572 00	0 00E+00	5 41E-03	5 41E-03
U-233	9 1620E-07	43,572 00	43,572 00	0 00E+00	3 99E-02	3 99E-02
U-234	2 3440E-03	43,572 00	43,572 00	0 00E+00	1 02E+02	1 02E+02
U-235	-2.3296E-06	43,572 00	0 00	9 83E-03	0 00E+00	9 83E-03
U-236	2 6620E-05	43,572.00	43,572 00	0 00E+00	1.16E+00	1.16E+00
U-238	-1.3291E-07	43,572.00	0 00	2 87E-02	2.29E-02	2 87E-02
Y-90	1.2642E+00	43,572.00	43,572.00	0 00E+00	5.51E+04	5.51E+04
Other Radionuclides					5 94E+04	5 94E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 040E+15
0 0250	6 297E+14
0 0375	5.539E+14
0 0575	5.998E+14
0 0850	3.537E+14
0 1250	2.334E+14
0.2250	3 047E+14
0.3750	1.325E+14
0.5750	2.319E+15
0 8500	2 677E+13
1.2500	2.206E+14
1 7500	7.254E+11
2.2500	1 162E+09
2.7500	7 434E+07
3.5000	2.242E+05
5 0000	9 411E+04
7.0000	1.059E+04
11 0000	1.201E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 01E+02	8 01E+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		43,572 00
Bounding		43,572 00

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: HWCTR IMT (U METAL-SST) DU
SNF ID #: 113
Fuel Units & Descr: 82 - TUBE
Heavy Metal Mass: BOL= , EOL=92 775kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1964
Estimates as of: 2010
Template: HFBR (Heavy Water, SST, 0 to 5%, U)
[2]Template Burnup(MWd): 5
Template BOL Heavy Metal Mass (MT): 0.00034251
Template Decay Time 35 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	5 6840E-09	88,573 24	88,573 24	0 00E+00	5.03E-04	5 03E-04
Am-241	2 1380E-01	88,573 24	88,573 24	0 00E+00	1 89E+04	1 89E+04
Am-242m	1 0302E-04	88,573 24	88,573 24	0 00E+00	9 12E+00	9 12E+00
Am-243	5 2400E-05	88,573 24	88,573 24	0 00E+00	4 64E+00	4 64E+00
C-14	2 2160E-02	88,573.24	88,573 24	0 00E+00	1 96E+03	1.96E+03
Cl-36	4 1880E-04	88,573.24	88,573.24	0 00E+00	3 71E+01	3 71E+01
Cm-243	1 6766E-05	88 573.24	88,573.24	0 00E+00	1 49E+00	1 49E+00
Cm-244	7 3320E-04	88,573.24	88,573.24	0 00E+00	6 49E+01	6 49E+01
Co-60	5 1480E+00	88,573.24	88,573.24	0 00E+00	4 56E+05	4 56E+05
Cs-134	1 7300E-05	88,573.24	88,573.24	0 00E+00	1 53E+00	1 53E+00
Cs-135	3.7460E-06	88,573.24	88,573.24	0 00E+00	3 32E-01	3.32E-01
Cs-137	1 4426E+00	88,573.24	88,573.24	0 00E+00	1.28E+05	1 28E+05
Eu-154	9.2140E-03	88,573 24	88,573.24	0 00E+00	8.16E+02	8 16E+02
Eu-155	8.1360E-04	88,573 24	88,573 24	0 00E+00	7 21E+01	7 21E+01
Fe-55	5 3720E-02	88,573 24	88,573 24	0 00E+00	4 76E+03	4 76E+03
H-3	4 4560E-02	88,573 24	88,573 24	0 00E+00	3 95E+03	3 95E+03
I-129	9 1660E-07	88,573 24	88,573 24	0 00E+00	8 12E-02	8 12E-02
Kr-85	3 2380E-02	88,573.24	88,573 24	0 00E+00	2 87E+03	2 87E+03
Np-237	1 9674E-05	88,573 24	88,573 24	0 00E+00	1 74E+00	1 74E+00
Pa-231	9 3700E-09	88,573.24	88,573.24	0 00E+00	8 30E-04	8 30E-04
Pb-210	4 0520E-09	88,573.24	88,573.24	0 00E+00	3 59E-04	3 59E-04
Pm-147	7 8900E-04	88,573.24	88,573.24	0 00E+00	6 99E+01	6 99E+01
Pu-238	3 6340E-02	88,573.24	88,573.24	0 00E+00	3 22E+03	3 22E+03
Pu-239	6 5100E-02	88,573.24	88,573.24	0 00E+00	5 77E+03	5 77E+03
Pu-240	2 6700E-02	88,573.24	88,573 24	0 00E+00	2.36E+03	2 36E+03
Pu-241	1 3616E+00	88,573.24	88,573.24	0 00E+00	1.21E+05	1 21E+05
Pu-242	1 6742E-05	88,573.24	88,573.24	0 00E+00	1 48E+00	1 48E+00
Ra-226	1.0912E-08	88,573.24	88,573 24	0 00E+00	9 67E-04	9 67E-04
Ra-228	2.0780E-10	88,573 24	88,573 24	0 00E+00	1.84E-05	1 84E-05
Ru-106	7 4020E-10	88,573 24	88,573 24	0 00E+00	6.56E-05	6 56E-05
Se-79	2 8500E-05	88,573 24	88,573 24	0 00E+00	2 52E+00	2 52E+00
Sn-126	1 7794E-05	88,573 24	88,573 24	0 00E+00	1 58E+00	1 58E+00
Sr-90	1 0372E+00	88,573.24	88,573 24	0 00E+00	9 19E+04	9 19E+04
Tc-99	4 3360E-04	88,573.24	88,573 24	0 00E+00	3 84E+01	3 84E+01
Th-229	1 9490E-09	88,573 24	88,573.24	0 00E+00	1 73E-04	1 73E-04
Th-230	9 9520E-07	88,573.24	88,573.24	0 00E+00	8 81E-02	8 81E-02
Th-232	2 0900E-10	88,573.24	88,573.24	0 00E+00	1 85E-05	1 85E-05
Tl-208	1 5278E-07	88,573.24	88,573.24	0 00E+00	1 35E-02	1.35E-02
U-232	4 1360E-07	88,573.24	88,573.24	0 00E+00	3 66E-02	3 66E-02
U-233	4 1200E-07	88,573.24	88,573.24	0 00E+00	3 65E-02	3 65E-02
U-234	2.1700E-03	88,573.24	88,573 24	0 00E+00	1.92E+02	1 92E+02
U-235	-1 7036E-06	88,573 24	0 00	2 01E-02	0 00E+00	2.01E-02
U-236	2.6080E-05	88,573 24	88,573 24	0 00E+00	2.31E+00	2 31E+00
U-238	-5 1291E-07	88,573 24	0 00	5 87E-02	1 32E-02	5 87E-02
Y-90	1 0374E+00	88,573 24	88,573 24	0.00E+00	9 19E+04	9 19E+04
Other Radionuclides					7 62E+05	7 62E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	6.362E+15
0 0250	1.244E+15
0 0375	1.082E+15
0.0575	1.351E+15
0 0850	6.359E+14
0 1250	4 128E+14
0.2250	5 168E+14
0 3750	2.230E+14
0 5750	4 726E+15
0 8500	5.263E+13
1 2500	3.377E+16
1 7500	1 399E+12
2.2500	1 789E+11
2 7500	1 031E+09
3 5000	2 506E+06
5 0000	1 049E+06
7 0000	1 178E+05
11 0000	1 335E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.57E+03	9.57E+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	SST	SST
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		88,573.24
Bounding		88,573.24

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	32.70	
Bounding	32 70	

Estimated EOL HM/Given EOL HM: 2.27

[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 HWCTR IRO (UO2) LEU
SNF ID # 976
Fuel Units & Descr 2 - TUBE
Heavy Metal Mass BOL= , EOL=5 407kg
ROD Storage Site INEEL

[1]Fuel decay start date 1964
Estimates as of 2010
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 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	4 6920E-09	5,183 09	5,183 09	0 00E+00	2 43E-05	2 43E-05
Am-241	2 2880E-02	5,183 09	5,183 09	0 00E+00	1 19E+02	1 19E+02
Am-242m	3 5400E-06	5,183 09	5,183 09	0 00E+00	1 83E-02	1 83E-02
Am-243	2 0580E-06	5,183 09	5,183 09	0 00E+00	1.07E-02	1.07E-02
C-14	1.1264E-03	5,183 09	5,183 09	0 00E+00	5 84E+00	5 84E+00
Cl-36	8 3760E-11	5,183 09	5,183 09	0 00E+00	4.34E-07	4.34E-07
Cm-243	5 0340E-07	5,183 09	5,183 09	0 00E+00	2 61E-03	2 61E-03
Cm-244	1 0450E-05	5,183 09	5,183 09	0 00E+00	5 42E-02	5 42E-02
Co-60	6 4420E-02	5,183 09	5,183 09	0 00E+00	3 34E+02	3 34E+02
Cs-134	7 9240E-06	5,183 09	5,183 09	0 00E+00	4 11E-02	4 11E-02
Cs-135	7 9140E-06	5,183 09	5,183 09	0 00E+00	4 10E-02	4 10E-02
Cs-137	1 4316E+00	5,183 09	5,183 09	0 00E+00	7 42E+03	7 42E+03
Eu-154	6.7900E-03	5,183 09	5,183 09	0 00E+00	3 52E+01	3 52E+01
Eu-155	6.2800E-04	5,183 09	5,183 09	0 00E+00	3 25E+00	3.25E+00
Fe-55	5 7480E-05	5,183 09	5,183 09	0 00E+00	2.98E-01	2 98E-01
H-3	2 3800E-02	5,183 09	5,183 09	0 00E+00	1.23E+02	1.23E+02
I-129	7.5020E-07	5,183 09	5,183 09	0 00E+00	3 89E-03	3 89E-03
Kr-85	3 8220E-02	5,183 09	5,183 09	0 00E+00	1 98E+02	1 98E+02
Np-237	5 5780E-06	5,183 09	5,183 09	0 00E+00	2 89E-02	2 89E-02
Pa-231	7 8820E-09	5,183 09	5,183 09	0 00E+00	4 09E-05	4 09E-05
Pb-210	4 3840E-09	5,183 09	5,183.09	0 00E+00	2 27E-05	2.27E-05
Pm-147	9 9500E-04	5,183 09	5,183 09	0 00E+00	5 16E+00	5 16E+00
Pu-238	6.4240E-03	5,183 09	5,183 09	0 00E+00	3 33E+01	3 33E+01
Pu-239	1 8744E-02	5 183 09	5,183 09	0 00E+00	9 72E+01	9 72E+01
Pu-240	8 3540E-03	5,183 09	5,183 09	0 00E+00	4 33E+01	4.33E+01
Pu-241	1 4606E-01	5,183 09	5,183 09	0 00E+00	7.57E+02	7.57E+02
Pu-242	2 0400E-06	5,183 09	5,183 09	0 00E+00	1 06E-02	1 06E-02
Ra-226	1 1804E-08	5,183 09	5,183 09	0 00E+00	6 12E-05	6 12E-05
Ra-228	1 1864E-09	5,183 09	5,183 09	0 00E+00	6 15E-06	6 15E-06
Ru-106	3 2580E-10	5,183 09	5,183 09	0 00E+00	1 69E-06	1 69E-06
Se-79	1.2524E-05	5,183 09	5,183.09	0 00E+00	6 49E-02	6 49E-02
Sn-126	1.2052E-05	5,183 09	5,183 09	0 00E+00	6.25E-02	6.25E-02
Sr-90	1.2638E+00	5,183 09	5,183 09	0 00E+00	6 55E+03	6.55E+03
Tc-99	4 4140E-04	5,183 09	5,183 09	0 00E+00	2.29E+00	2.29E+00
Th-229	4 3480E-09	5,183.09	5,183 09	0 00E+00	2.25E-05	2 25E-05
Th-230	1 0760E-06	5,183 09	5,183 09	0 00E+00	5.58E-03	5 58E-03
Th-232	1 1926E-09	5,183 09	5,183 09	0 00E+00	6 18E-06	6 18E-06
Tl-208	4 6200E-08	5,183 09	5,183 09	0 00E+00	2 39E-04	2 39E-04
U-232	1 2406E-07	5,183 09	5,183 09	0 00E+00	6 43E-04	6 43E-04
U-233	9 1620E-07	5,183 09	5,183 09	0 00E+00	4 75E-03	4.75E-03
U-234	2.3440E-03	5,183 09	5,183 09	0 00E+00	1 21E+01	1.21E+01
U-235	-2 3296E-06	5,183 09	0 00	1.17E-03	0 00E+00	1 17E-03
U-236	2 6620E-05	5,183 09	5,183 09	0 00E+00	1.38E-01	1 38E-01
U-238	-1 3291E-07	5,183 09	0 00	3 42E-03	2.73E-03	3 42E-03
Y-90	1.2642E+00	5,183 09	5,183 09	0 00E+00	6 55E+03	6 55E+03
Other Radionuclides					7.07E+03	7 07E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 616E+14
0 0250	7.490E+13
0 0375	6 589E+13
0 0575	7 135E+13
0 0850	4 207E+13
0 1250	2.776E+13
0 2250	3 624E+13
0 3750	1.577E+13
0 5750	2 759E+14
0 8500	3 184E+12
1.2500	2 624E+13
1 7500	8 629E+10
2.2500	1.382E+08
2 7500	8 844E+06
3.5000	2 667E+04
5 0000	1 120E+04
7 0000	1.259E+03
11 0000	1 429E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9 52E+01	9.52E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	LIGHT 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		5,183 09
Bounding		5,183 09

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 HWCTR IS (U ZR) LEU
SNF ID #: 977
Fuel Units & Descr: 3 - TUBE
Heavy Metal Mass, BOL= , EOL=15 776kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1964
Estimates as of: 2010
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: 35 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	4 6920E-09	15,122 23	15,122.23	0 00E+00	7 10E-05	7 10E-05
Am-241	2 2880E-02	15,122 23	15,122 23	0 00E+00	3 46E+02	3.46E+02
Am-242m	3 5400E-06	15,122 23	15,122 23	0 00E+00	5 35E-02	5.35E-02
Am-243	2 0580E-06	15,122 23	15,122 23	0 00E+00	3 11E-02	3.11E-02
C-14	1 1264E-03	15,122 23	15,122 23	0 00E+00	1.70E+01	1 70E+01
Cl-36	8 3760E-11	15,122.23	15,122 23	0 00E+00	1.27E-06	1.27E-06
Cm-243	5 0340E-07	15,122 23	15,122 23	0 00E+00	7 61E-03	7 61E-03
Cm-244	1 0450E-05	15,122 23	15,122 23	0 00E+00	1 58E-01	1 58E-01
Co-60	6 4420E-02	15,122.23	15,122 23	0 00E+00	9 74E+02	9 74E+02
Cs-134	7 9240E-06	15,122 23	15,122 23	0 00E+00	1.20E-01	1 20E-01
Cs-135	7.9140E-06	15,122.23	15,122.23	0 00E+00	1.20E-01	1 20E-01
Cs-137	1.4316E+00	15,122 23	15,122.23	0 00E+00	2 16E+04	2 16E+04
Eu-154	6.7900E-03	15,122.23	15,122.23	0 00E+00	1 03E+02	1 03E+02
Eu-155	6.2800E-04	15,122 23	15,122 23	0 00E+00	9 50E+00	9 50E+00
Fe-55	5.7480E-05	15,122 23	15,122 23	0 00E+00	8 69E-01	8 69E-01
H-3	2 3800E-02	15,122 23	15,122.23	0 00E+00	3 60E+02	3 60E+02
I-129	7 5020E-07	15,122 23	15,122.23	0 00E+00	1 13E-02	1 13E-02
Kr-85	3 8220E-02	15,122 23	15,122 23	0 00E+00	5 78E+02	5.78E+02
Np-237	5 5780E-06	15,122 23	15,122 23	0 00E+00	8 44E-02	8 44E-02
Pa-231	7 8820E-09	15,122.23	15,122 23	0 00E+00	1 19E-04	1.19E-04
Pb-210	4 3840E-09	15,122.23	15,122 23	0 00E+00	6 63E-05	6 63E-05
Pm-147	9 9500E-04	15,122.23	15,122 23	0 00E+00	1.50E+01	1 50E+01
Pu-238	6 4240E-03	15,122.23	15,122 23	0 00E+00	9.71E+01	9 71E+01
Pu-239	1 8744E-02	15,122.23	15,122.23	0 00E+00	2 83E+02	2 83E+02
Pu-240	8.3540E-03	15,122.23	15,122.23	0 00E+00	1 26E+02	1 26E+02
Pu-241	1 4606E-01	15,122.23	15,122.23	0 00E+00	2 21E+03	2 21E+03
Pu-242	2 0400E-06	15,122.23	15,122.23	0 00E+00	3 08E-02	3 08E-02
Ra-226	1.1804E-08	15,122.23	15,122.23	0 00E+00	1.79E-04	1 79E-04
Ra-228	1.1864E-09	15,122 23	15,122.23	0.00E+00	1 79E-05	1 79E-05
Ru-106	3.2580E-10	15,122 23	15,122.23	0 00E+00	4 93E-06	4 93E-06
Se-79	1.2524E-05	15,122 23	15,122 23	0 00E+00	1 89E-01	1 89E-01
Sn-126	1 2052E-05	15,122 23	15,122 23	0 00E+00	1 82E-01	1 82E-01
Sr-90	1.2638E+00	15,122 23	15,122 23	0 00E+00	1 91E+04	1 91E+04
Tc-99	4 4140E-04	15,122 23	15,122 23	0 00E+00	6 67E+00	6 67E+00
Th-229	4 3480E-09	15,122.23	15,122 23	0 00E+00	6 58E-05	6 58E-05
Th-230	1 0760E-06	15,122.23	15,122 23	0 00E+00	1 63E-02	1 63E-02
Th-232	1 1926E-09	15,122.23	15,122.23	0 00E+00	1 80E-05	1 80E-05
Tl-208	4 6200E-08	15,122.23	15,122.23	0 00E+00	6.99E-04	6 99E-04
U-232	1.2406E-07	15,122.23	15,122.23	0 00E+00	1 88E-03	1 88E-03
U-233	9 1620E-07	15,122.23	15,122.23	0 00E+00	1.39E-02	1 39E-02
U-234	2.3440E-03	15,122.23	15,122.23	0 00E+00	3 54E+01	3 54E+01
U-235	-2 3296E-06	15,122.23	0 00	3 41E-03	0 00E+00	3 41E-03
U-236	2.6620E-05	15,122.23	15,122.23	0.00E+00	4 03E-01	4 03E-01
U-238	-1 3291E-07	15,122 23	0 00	9 97E-03	7 96E-03	9 97E-03
Y-90	1 2642E+00	15,122 23	15,122.23	0 00E+00	1 91E+04	1 91E+04
Other Radionuclides					2 06E+04	2 06E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 055E+15
0 0250	2.185E+14
0 0375	1 922E+14
0.0575	2.082E+14
0.0850	1 228E+14
0 1250	8 099E+13
0.2250	1 057E+14
0 3750	4 600E+13
0 5750	8 049E+14
0 8500	9.291E+12
1 2500	7 655E+13
1 7500	2.518E+11
2.2500	4 033E+08
2 7500	2.580E+07
3 5000	7 782E+04
5 0000	3.266E+04
7 0000	3.674E+03
11 0000	4 169E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.78E+02	2.78E+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		15 122.23
Bounding		15 122.23

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 HWCTR OT (UO2) LEU
SNF ID # 283
Fuel Units & Descr: 8 - TUBE
Heavy Metal Mass: BOL= ; EOL=139 532kg
ROD Storage Site: INEEL

[1]Fuel decay start date 1963
Estimates as of 2010
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"x15' 0 36

II. Estimates

Radionuclide	Ci/MWd From Template (m)	Nominal Fuel Burnup (MWd)[2] (x_n)	Bounding Fuel Burnup (MWd)[2] (x_b)	Initial Activity (Ci) (b)	Nominal Fuel Inventories(Ci) (y_n)	Bounding Fuel Inventories(Ci) (y_b)
Ac-227	8 7758E-10	209 63	209 63	0 00E+00	1.84E-07	1.84E-07
Am-241	1 4352E-01	209 63	209 63	0 00E+00	3 01E+01	3 01E+01
Am-242m	2 8698E-04	209 63	209 63	0 00E+00	6 02E-02	6 02E-02
Am-243	6 2565E-04	209 63	209 63	0 00E+00	1.31E-01	1.31E-01
C-14	4 7901E-05	209 63	209 63	0 00E+00	1 00E-02	1 00E-02
Cl-36	8 0297E-07	209 63	209 63	0 00E+00	1 68E-04	1 68E-04
Cm-243	2 5081E-04	209 63	209 63	0 00E+00	5 26E-02	5.26E-02
Cm-244	4 9015E-02	209 63	209 63	0 00E+00	1 03E+01	1 03E+01
Co-60	2 5581E-03	209 63	209 63	0 00E+00	5 36E-01	5 36E-01
Cs-134	4 0536E-05	209 63	209 63	0 00E+00	8 50E-03	8 50E-03
Cs-135	1 4433E-05	209 63	209 63	0 00E+00	3 03E-03	3 03E-03
Cs-137	1 3979E+00	209 63	209 63	0 00E+00	2 93E+02	2 93E+02
Eu-154	2 0203E-02	209 63	209 63	0 00E+00	4 24E+00	4 24E+00
Eu-155	1.7684E-03	209 63	209 63	0 00E+00	3 71E-01	3 71E-01
Fe-55	4 3136E-05	209 63	209 63	0 00E+00	9 04E-03	9 04E-03
H-3	2 0769E-02	209 63	209 63	0 00E+00	4 35E+00	4 35E+00
I-129	9 8288E-07	209 63	209 63	0 00E+00	2 06E-04	2 06E-04
Kr-85	2 8214E-02	209 63	209 63	0 00E+00	5 91E+00	5 91E+00
Np-237	1 1218E-05	209 63	209 63	0 00E+00	2.35E-03	2 35E-03
Pa-231	1.3036E-09	209 63	209 63	0 00E+00	2.73E-07	2.73E-07
Pb-210	8 5078E-11	209 63	209 63	0 00E+00	1.78E-08	1.78E-08
Pm-147	3 6531E-04	209 63	209 63	0 00E+00	7.66E-02	7.66E-02
Pu-238	7 4564E-02	209 63	209 63	0 00E+00	1.56E+01	1.56E+01
Pu-239	1 1623E-02	209 63	209 63	0 00E+00	2 44E+00	2 44E+00
Pu-240	1 5132E-02	209 63	209 63	0 00E+00	3 17E+00	3.17E+00
Pu-241	9 0036E-01	209 63	209 63	0 00E+00	1.89E+02	1.89E+02
Pu-242	6 4260E-05	209 63	209 63	0 00E+00	1 35E-02	1 35E-02
Ra-226	2 2804E-10	209 63	209 63	0 00E+00	4 78E-08	4 78E-08
Ra-228	5.2713E-12	209 63	209 63	0 00E+00	1 11E-09	1 11E-09
Ru-106	6 1160E-10	209 63	209 63	0 00E+00	1 28E-07	1 28E-07
Se-79	1.2377E-05	209 63	209 63	0 00E+00	2 59E-03	2 59E-03
Sn-126	2 5210E-05	209 63	209 63	0 00E+00	5 28E-03	5 28E-03
Sr-90	9 1667E-01	209 63	209 63	0 00E+00	1 92E+02	1 92E+02
Tc-99	3 9357E-04	209 63	209 63	0.00E+00	8 25E-02	8 25E-02
Th-229	1.2057E-10	209 63	209 63	0.00E+00	2 53E-08	2.53E-08
Th-230	2.1043E-08	209 63	209 63	0 00E+00	4 41E-06	4 41E-06
Th-232	5.2972E-12	209 63	209 63	0 00E+00	1.11E-09	1.11E-09
Tl-208	1.7474E-07	209 63	209 63	0 00E+00	3.66E-05	3 66E-05
U-232	4 7368E-07	209 63	209 63	0 00E+00	9 93E-05	9 93E-05
U-233	2 5097E-08	209 63	209 63	0 00E+00	5.26E-06	5.26E-06
U-234	5 0000E-05	209 63	209 63	0 00E+00	1.05E-02	1 05E-02
U-235	-1 4489E-06	209 63	0 00	9 66E-03	9 36E-03	9 66E-03
U-236	7 5824E-06	209 63	209 63	0 00E+00	1.59E-03	1.59E-03
U-238	-2 6129E-07	209 63	0 00	4 54E-02	4 54E-02	4 54E-02
Y-90	9 1699E-01	209 63	209 63	0 00E+00	1.92E+02	1 92E+02
Other Radionuclides					2 81E+02	2 81E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	1 128E+13
0 0250	2.274E+12
0.0375	2 169E+12
0 0575	2.506E+12
0 0850	1.262E+12
0 1250	8 758E+11
0.2250	1 082E+12
0 3750	4 654E+11
0.5750	1 082E+13
0 8500	1.497E+11
1 2500	1.471E+11
1 7500	4 405E+09
2 2500	7.097E+05
2 7500	1 453E+06
3.5000	1.499E+05
5 0000	6 407E+04
7 0000	7.385E+03
11.0000	8 482E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.82E+00	4 82E+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 %		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		209 63
Bounding		209 63

Basis for burnup used in estimate:
Nominal burnup set equal to bounding burnup
Bounding burnup taken from SFD and converted to MWd using BOL=139 752kg

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 04	
Bounding	0 04	

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: HWCTR RMT & SMT (U METAL) LEU
SNF ID #: 790
Fuel Units & Descr: 10 - TUBE
Heavy Metal Mass: BOL= ; EOL=63 746kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1964
Estimates as of: 2010
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: 35 years

Estimated Canister usage 18"x15'
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	4 6920E-09	61,103 94	61,103 94	0 00E+00	2 87E-04	2 87E-04
Am-241	2 2880E-02	61,103 94	61,103 94	0 00E+00	1 40E+03	1 40E+03
Am-242m	3 5400E-06	61,103 94	61,103 94	0 00E+00	2 16E-01	2 16E-01
Am-243	2 0580E-06	61,103 94	61,103 94	0 00E+00	1 26E-01	1.26E-01
C-14	1 1264E-03	61,103 94	61,103 94	0 00E+00	6 88E+01	6 88E+01
Cl-36	8 3760E-11	61,103 94	61,103 94	0 00E+00	5 12E-06	5 12E-06
Cm-243	5 0340E-07	61,103 94	61,103 94	0 00E+00	3 08E-02	3 08E-02
Cm-244	1 0450E-05	61,103 94	61,103.94	0 00E+00	6 39E-01	6.39E-01
Co-60	6 4420E-02	61,103 94	61,103.94	0 00E+00	3 94E+03	3 94E+03
Cs-134	7 9240E-06	61,103 94	61,103 94	0 00E+00	4 84E-01	4 84E-01
Cs-135	7 9140E-06	61,103.94	61,103 94	0 00E+00	4 84E-01	4 84E-01
Cs-137	1 4316E+00	61,103 94	61,103 94	0 00E+00	8.75E+04	8.75E+04
Eu-154	6 7900E-03	61,103.94	61,103 94	0 00E+00	4.15E+02	4 15E+02
Eu-155	6 2800E-04	61,103.94	61,103 94	0 00E+00	3 84E+01	3 84E+01
Fe-55	5 7480E-05	61,103 94	61,103 94	0 00E+00	3 51E+00	3 51E+00
H-3	2 3800E-02	61,103 94	61,103 94	0 00E+00	1 45E+03	1 45E+03
I-129	7 5020E-07	61,103 94	61,103 94	0 00E+00	4.58E-02	4 58E-02
Kr-85	3 8220E-02	61,103 94	61,103 94	0 00E+00	2 34E+03	2 34E+03
Np-237	5 5780E-06	61,103 94	61,103 94	0 00E+00	3 41E-01	3 41E-01
Pa-231	7 8820E-09	61,103 94	61,103 94	0 00E+00	4 82E-04	4 82E-04
Pb-210	4.3840E-09	61,103 94	61,103 94	0 00E+00	2 68E-04	2 68E-04
Pm-147	9 9500E-04	61,103 94	61,103 94	0 00E+00	6 08E+01	6 08E+01
Pu-238	6.4240E-03	61,103 94	61,103 94	0 00E+00	3 93E+02	3 93E+02
Pu-239	1 8744E-02	61,103 94	61,103 94	0 00E+00	1 15E+03	1 15E+03
Pu-240	8 3540E-03	61,103 94	61,103 94	0 00E+00	5 10E+02	5 10E+02
Pu-241	1 4606E-01	61,103 94	61,103 94	0 00E+00	8 92E+03	8 92E+03
Pu-242	2 0400E-06	61,103 94	61,103 94	0 00E+00	1 25E-01	1 25E-01
Ra-226	1 1804E-08	61,103 94	61,103 94	0 00E+00	7 21E-04	7.21E-04
Ra-228	1 1864E-09	61,103 94	61,103 94	0 00E+00	7 25E-05	7.25E-05
Ru-106	3.2580E-10	61,103 94	61,103 94	0 00E+00	1 99E-05	1 99E-05
Se-79	1 2524E-05	61,103 94	61,103 94	0 00E+00	7 65E-01	7 65E-01
Sn-126	1 2052E-05	61,103 94	61,103 94	0 00E+00	7 36E-01	7 36E-01
Sr-90	1 2638E+00	61,103 94	61,103.94	0 00E+00	7.72E+04	7.72E+04
Tc-99	4 4140E-04	61,103 94	61,103 94	0 00E+00	2.70E+01	2.70E+01
Th-229	4 3480E-09	61,103 94	61,103 94	0 00E+00	2 66E-04	2 66E-04
Th-230	1 0760E-06	61,103 94	61,103 94	0 00E+00	6 57E-02	6 57E-02
Th-232	1 1926E-09	61,103 94	61,103 94	0 00E+00	7.29E-05	7.29E-05
Tl-208	4 6200E-08	61,103.94	61,103 94	0 00E+00	2.82E-03	2.82E-03
U-232	1 2406E-07	61,103.94	61,103 94	0 00E+00	7.58E-03	7.58E-03
U-233	9 1620E-07	61,103.94	61,103 94	0.00E+00	5 60E-02	5 60E-02
U-234	2 3440E-03	61,103.94	61,103 94	0 00E+00	1 43E+02	1 43E+02
U-235	-2 3296E-06	61,103 94	0 00	1.38E-02	0 00E+00	1.38E-02
U-236	2 6620E-05	61,103.94	61,103 94	0.00E+00	1 63E+00	1 63E+00
U-238	-1 3291E-07	61,103 94	0 00	4 03E-02	3.22E-02	4 03E-02
Y-90	1.2642E+00	61,103 94	61,103 94	0 00E+00	7 72E+04	7 72E+04
Other Radionuclides					8 34E+04	8 34E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	4.263E+15
0 0250	8 830E+14
0 0375	7 768E+14
0 0575	8.411E+14
0 0850	4 960E+14
0 1250	3.273E+14
0.2250	4.273E+14
0 3750	1 859E+14
0 5750	3.252E+15
0 8500	3 754E+13
1.2500	3 093E+14
1 7500	1.017E+12
2.2500	1 630E+09
2 7500	1 043E+08
3.5000	3 144E+05
5.0000	1 320E+05
7 0000	1 485E+04
11 0000	1 685E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 12E+03	1 12E+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	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		61 103.94
Bounding		61 103.94

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 HWCTR SOT (UO2) LEU
SNF ID # 120
Fuel Units & Descr 96 - TUBE
Heavy Metal Mass BOL= ; EOL=249 725kg
ROD Storage Site: INEEL

[1]Fuel decay start date 1964
Estimates as of 2010
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 35 years

Estimated Canister usage
18"x10'
1 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	4 6920E-09	239,374 53	239,374 53	0 00E+00	1 12E-03	1 12E-03
Am-241	2 2880E-02	239,374 53	239,374 53	0 00E+00	5 48E+03	5 48E+03
Am-242m	3 5400E-06	239,374 53	239,374 53	0 00E+00	8 47E-01	8 47E-01
Am-243	2 0580E-06	239,374 53	239,374 53	0 00E+00	4 93E-01	4 93E-01
C-14	1 1264E-03	239,374 53	239,374 53	0 00E+00	2 70E+02	2 70E+02
Cl-36	8 3760E-11	239,374 53	239,374 53	0 00E+00	2 01E-05	2 01E-05
Cm-243	5 0340E-07	239,374 53	239,374 53	0 00E+00	1.21E-01	1.21E-01
Cm-244	1 0450E-05	239,374 53	239,374 53	0 00E+00	2 50E+00	2 50E+00
Co-60	6 4420E-02	239,374 53	239,374 53	0 00E+00	1 54E+04	1 54E+04
Cs-134	7.9240E-06	239,374 53	239,374 53	0 00E+00	1 90E+00	1 90E+00
Cs-135	7.9140E-06	239,374 53	239,374 53	0 00E+00	1 89E+00	1 89E+00
Cs-137	1.4316E+00	239,374.53	239,374.53	0 00E+00	3 43E+05	3 43E+05
Eu-154	6 7900E-03	239,374.53	239,374 53	0 00E+00	1.63E+03	1 63E+03
Eu-155	6.2800E-04	239,374 53	239,374 53	0 00E+00	1.50E+02	1.50E+02
Fe-55	5 7480E-05	239,374 53	239,374.53	0 00E+00	1.38E+01	1.38E+01
H-3	2 3800E-02	239,374.53	239,374.53	0.00E+00	5 70E+03	5 70E+03
I-129	7.5020E-07	239,374 53	239,374.53	0 00E+00	1 80E-01	1 80E-01
Kr-85	3 8220E-02	239,374 53	239,374.53	0 00E+00	9 15E+03	9 15E+03
Np-237	5 5780E-06	239,374 53	239,374.53	0 00E+00	1 34E+00	1 34E+00
Pa-231	7 8820E-09	239,374 53	239,374.53	0 00E+00	1 89E-03	1 89E-03
Pb-210	4 3840E-09	239,374 53	239,374 53	0 00E+00	1 05E-03	1 05E-03
Pm-147	9 9500E-04	239,374 53	239,374 53	0 00E+00	2 38E+02	2 38E+02
Pu-238	6 4240E-03	239,374 53	239,374 53	0 00E+00	1 54E+03	1 54E+03
Pu-239	1 8744E-02	239,374 53	239,374 53	0 00E+00	4 49E+03	4 49E+03
Pu-240	8 3540E-03	239,374 53	239,374 53	0 00E+00	2 00E+03	2 00E+03
Pu-241	1 4606E-01	239,374 53	239,374 53	0 00E+00	3 50E+04	3 50E+04
Pu-242	2 0400E-06	239,374 53	239,374 53	0 00E+00	4 88E-01	4 88E-01
Ra-226	1 1804E-08	239,374 53	239,374 53	0 00E+00	2.83E-03	2 83E-03
Ra-228	1.1864E-09	239,374 53	239,374 53	0 00E+00	2.84E-04	2.84E-04
Ru-106	3.2580E-10	239,374 53	239,374 53	0 00E+00	7.80E-05	7.80E-05
Se-79	1.2524E-05	239,374 53	239,374.53	0 00E+00	3 00E+00	3 00E+00
Sn-126	1.2052E-05	239,374.53	239,374 53	0 00E+00	2.88E+00	2.88E+00
Sr-90	1.2638E+00	239,374.53	239,374.53	0 00E+00	3.03E+05	3 03E+05
Tc-99	4 4140E-04	239,374 53	239,374.53	0 00E+00	1 06E+02	1 06E+02
Th-229	4.3480E-09	239,374.53	239,374.53	0 00E+00	1 04E-03	1 04E-03
Th-230	1 0760E-06	239,374.53	239,374.53	0 00E+00	2 58E-01	2 58E-01
Th-232	1 1926E-09	239,374 53	239,374.53	0 00E+00	2 85E-04	2 85E-04
Tl-208	4 6200E-08	239,374 53	239,374.53	0 00E+00	1 11E-02	1 11E-02
U-232	1.2406E-07	239,374 53	239,374 53	0 00E+00	2 97E-02	2 97E-02
U-233	9 1620E-07	239,374 53	239,374.53	0 00E+00	2 19E-01	2 19E-01
U-234	2 3440E-03	239,374 53	239,374 53	0 00E+00	5 61E+02	5 61E+02
U-235	-2.3296E-06	239,374 53	0 00	5 40E-02	0 00E+00	5 40E-02
U-236	2 6620E-05	239,374 53	239,374 53	0 00E+00	6 37E+00	6 37E+00
U-238	-1.3291E-07	239,374 53	0 00	1 58E-01	1.26E-01	1 58E-01
Y-90	1 2642E+00	239,374 53	239,374 53	0 00E+00	3 03E+05	3 03E+05
Other Radionuclides					3.27E+05	3.27E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 670E+16
0 0250	3 459E+15
0 0375	3 043E+15
0 0575	3.295E+15
0 0850	1 943E+15
0 1250	1.282E+15
0 2250	1 674E+15
0 3750	7.281E+14
0 5750	1.274E+16
0 8500	1.471E+14
1.2500	1.212E+15
1 7500	3 985E+12
2.2500	6.384E+09
2 7500	4 084E+08
3.5000	1.232E+06
5 0000	5 170E+05
7 0000	5 816E+04
11 0000	6 600E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.40E+03	4.40E+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	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		239,374.53
Bounding		239,374 53

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: HWCTR SPR (U-ZR) LEU
SNF ID #: 783
Fuel Units & Descr: 56 - TUBE
Heavy Metal Mass: BOL= ; EOL=437 679kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1964
Estimates as of: 2010
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: 35 years

Estimated Canister usage: 18"x15' 2 55

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 6920E-09	419,538 84	419,538 84	0 00E+00	1.97E-03	1 97E-03
Am-241	2 2880E-02	419,538 84	419,538 84	0 00E+00	9 60E+03	9 60E+03
Am-242m	3 5400E-06	419 538 84	419,538 84	0 00E+00	1 49E+00	1.49E+00
Am-243	2 0580E-06	419,538 84	419,538 84	0 00E+00	8 63E-01	8 63E-01
C-14	1 1264E-03	419,538 84	419,538 84	0 00E+00	4 73E+02	4.73E+02
Cl-36	8 3760E-11	419,538 84	419,538 84	0 00E+00	3 51E-05	3 51E-05
Cm-243	5 0340E-07	419,538 84	419,538 84	0 00E+00	2.11E-01	2 11E-01
Cm-244	1 0450E-05	419,538 84	419,538 84	0 00E+00	4 38E+00	4.38E+00
Co-60	6 4420E-02	419,538 84	419,538 84	0 00E+00	2 70E+04	2.70E+04
Cs-134	7 9240E-06	419,538 84	419,538 84	0 00E+00	3 32E+00	3.32E+00
Cs-135	7 9140E-06	419,538 84	419,538 84	0 00E+00	3 32E+00	3.32E+00
Cs-137	1 4316E+00	419,538 84	419,538 84	0 00E+00	6 01E+05	6.01E+05
Eu-154	6.7900E-03	419,538 84	419,538 84	0 00E+00	2 85E+03	2 85E+03
Eu-155	6 2800E-04	419,538 84	419,538 84	0 00E+00	2 63E+02	2 63E+02
Fe-55	5 7480E-05	419,538 84	419,538 84	0 00E+00	2 41E+01	2 41E+01
H-3	2 3800E-02	419,538 84	419,538 84	0 00E+00	9 99E+03	9 99E+03
I-129	7 5020E-07	419,538 84	419,538 84	0 00E+00	3.15E-01	3 15E-01
Kr-85	3 8220E-02	419,538 84	419,538 84	0 00E+00	1 60E+04	1 60E+04
Np-237	5 5780E-06	419,538 84	419,538 84	0 00E+00	2 34E+00	2 34E+00
Pa-231	7 8820E-09	419,538 84	419,538 84	0 00E+00	3 31E-03	3.31E-03
Pb-210	4 3840E-09	419,538 84	419,538 84	0 00E+00	1 84E-03	1.84E-03
Pm-147	9 9500E-04	419,538 84	419,538 84	0 00E+00	4 17E+02	4 17E+02
Pu-238	6 4240E-03	419,538 84	419,538 84	0 00E+00	2 70E+03	2 70E+03
Pu-239	1 8744E-02	419,538 84	419,538 84	0 00E+00	7 86E+03	7 86E+03
Pu-240	8 3540E-03	419,538.84	419,538 84	0 00E+00	3 50E+03	3 50E+03
Pu-241	1 4606E-01	419,538.84	419,538 84	0 00E+00	6.13E+04	6 13E+04
Pu-242	2 0400E-06	419,538.84	419,538 84	0 00E+00	8 56E-01	8 56E-01
Ra-226	1 1804E-08	419,538.84	419,538 84	0 00E+00	4 95E-03	4 95E-03
Ra-228	1 1864E-09	419,538 84	419,538 84	0 00E+00	4 98E-04	4 98E-04
Ru-106	3 2580E-10	419,538 84	419,538 84	0 00E+00	1 37E-04	1 37E-04
Se-79	1 2524E-05	419,538 84	419,538 84	0 00E+00	5.25E+00	5 25E+00
Sn-126	1 2052E-05	419,538 84	419,538.84	0 00E+00	5 06E+00	5 06E+00
Sr-90	1 2638E+00	419,538 84	419,538 84	0 00E+00	5.30E+05	5 30E+05
Tc-99	4 4140E-04	419,538 84	419,538 84	0.00E+00	1.85E+02	1 85E+02
Th-229	4 3480E-09	419,538 84	419,538.84	0 00E+00	1 82E-03	1 82E-03
Th-230	1 0760E-06	419,538 84	419,538.84	0 00E+00	4 51E-01	4 51E-01
Th-232	1 1926E-09	419,538 84	419,538.84	0 00E+00	5 00E-04	5 00E-04
Tl-208	4 6200E-08	419,538 84	419,538.84	0 00E+00	1 94E-02	1 94E-02
U-232	1 2406E-07	419,538 84	419,538 84	0 00E+00	5.20E-02	5 20E-02
U-233	9 1620E-07	419,538 84	419,538 84	0 00E+00	3 84E-01	3 84E-01
U-234	2 3440E-03	419,538 84	419,538 84	0 00E+00	9 83E+02	9 83E+02
U-235	-2 3296E-06	419,538 84	0 00	9 46E-02	0 00E+00	9 46E-02
U-236	2 6620E-05	419,538 84	419,538 84	0 00E+00	1.12E+01	1 12E+01
U-238	-1 3291E-07	419,538 84	0 00	2 77E-01	2.21E-01	2.77E-01
Y-90	1.2642E+00	419,538 84	419,538 84	0 00E+00	5 30E+05	5.30E+05
Other Radionuclides					5 72E+05	5 72E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 927E+16
0.0250	6 063E+15
0.0375	5.334E+15
0 0575	5 775E+15
0 0850	3 405E+15
0 1250	2.247E+15
0.2250	2.934E+15
0.3750	1.276E+15
0.5750	2.233E+16
0 8500	2.578E+14
1.2500	2 124E+15
1 7500	6 985E+12
2.2500	1 119E+10
2.7500	7 158E+08
3.5000	2.159E+06
5.0000	9 062E+05
7 0000	1.019E+05
11 0000	1 157E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.71E+03	7 71E+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	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		419,538.84
Bounding		419,538 84

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 HWCTR SPRO (U02) ALUM LEU
SNF ID # 115
Fuel Units & Descr: 3 - TUBE
Heavy Metal Mass BOL= , EOL=6 499kg
ROD Storage Site SRS

[1]Fuel decay start date 1964
Estimates as of 2010
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 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 6507E-09	6,176 98	6,176 98	0 00E+00	1 64E-05	1 64E-05
Am-241	2 8587E-02	6,176 98	6,176 98	0 00E+00	1 77E+02	1 77E+02
Am-242m	8 3267E-06	6,176 98	6,176 98	0 00E+00	5 14E-02	5 14E-02
Am-243	6 3920E-06	6,176 98	6,176 98	0 00E+00	3 95E-02	3 95E-02
C-14	2 9567E-08	6,176 98	6,176 98	0 00E+00	1.83E-04	1 83E-04
Cl-36	5 9507E-35	6,176 98	6,176 98	0 00E+00	3 68E-31	3 68E-31
Cm-243	1 5333E-06	6,176 98	6,176 98	0 00E+00	9 47E-03	9 47E-03
Cm-244	6 1980E-05	6,176 98	6,176 98	0 00E+00	3 83E-01	3 83E-01
Co-60	2 2720E-06	6,176 98	6,176 98	0 00E+00	1 40E-02	1 40E-02
Cs-134	1 3787E-05	6,176 98	6,176 98	0 00E+00	8 52E-02	8 52E-02
Cs-135	4 8607E-06	6,176 98	6,176 98	0.00E+00	3 00E-02	3 00E-02
Cs-137	1 4300E+00	6,176 98	6,176 98	0 00E+00	8 83E+03	8 83E+03
Eu-154	6.2340E-03	6,176 98	6,176 98	0 00E+00	3 85E+01	3 85E+01
Eu-155	5 0213E-04	6,176 98	6,176 98	0 00E+00	3.10E+00	3 10E+00
Fe-55	2 5980E-05	6,176 98	6,176 98	0 00E+00	1 60E-01	1 60E-01
H-3	2 0100E-03	6,176 98	6,176 98	0 00E+00	1 24E+01	1 24E+01
I-129	7 1600E-07	6,176 98	6,176 98	0 00E+00	4 42E-03	4.42E-03
Kr-85	3 8813E-02	6,176 98	6,176 98	0 00E+00	2 40E+02	2 40E+02
Np-237	3 9360E-06	6,176 98	6,176 98	0 00E+00	2.43E-02	2 43E-02
Pa-231	5.2460E-09	6,176.98	6,176 98	0 00E+00	3.24E-05	3 24E-05
Pb-210	4 8933E-13	6,176 98	6,176 98	0 00E+00	3 02E-09	3 02E-09
Pm-147	8 8000E-04	6,176 98	6,176 98	0 00E+00	5 44E+00	5 44E+00
Pu-238	4 9107E-03	6,176 98	6,176 98	0 00E+00	3 03E+01	3 03E+01
Pu-239	1 0313E-02	6,176 98	6,176.98	0 00E+00	6 37E+01	6 37E+01
Pu-240	5 4093E-03	6,176 98	6,176 98	0 00E+00	3 34E+01	3 34E+01
Pu-241	1 8253E-01	6,176 98	6,176 98	0 00E+00	1 13E+03	1.13E+03
Pu-242	3 0713E-06	6,176 98	6,176 98	0 00E+00	1.90E-02	1 90E-02
Ra-226	1.5867E-12	6,176.98	6,176 98	0 00E+00	9 80E-09	9 80E-09
Ra-228	2 6227E-14	6,176 98	6,176 98	0 00E+00	1 62E-10	1 62E-10
Ru-106	2 8093E-10	6,176 98	6,176 98	0 00E+00	1 74E-06	1 74E-06
Se-79	1 2533E-05	6,176 98	6,176 98	0 00E+00	7 74E-02	7.74E-02
Sn-126	1 1393E-05	6,176 98	6,176 98	0 00E+00	7 04E-02	7.04E-02
Sr-90	1.2873E+00	6,176 98	6,176 98	0.00E+00	7 95E+03	7.95E+03
Tc-99	4 3533E-04	6,176 98	6,176 98	0 00E+00	2 69E+00	2 69E+00
Th-229	2.1167E-12	6,176 98	6,176 98	0 00E+00	1.31E-08	1.31E-08
Th-230	2 0387E-10	6,176 98	6,176 98	0 00E+00	1.26E-06	1 26E-06
Th-232	3.2393E-14	6,176 98	6,176 98	0 00E+00	2 00E-10	2 00E-10
Tl-208	6 6553E-09	6,176 98	6,176 98	0 00E+00	4 11E-05	4 11E-05
U-232	1 8033E-08	6,176 98	6,176 98	0 00E+00	1 11E-04	1.11E-04
U-233	8 5800E-10	6,176 98	6,176 98	0 00E+00	5 30E-06	5.30E-06
U-234	8 0733E-07	6,176 98	6,176 98	0 00E+00	4 99E-03	4 99E-03
U-235	-2 5335E-06	6,176.98	0 00	4.21E-03	0 00E+00	4 21E-03
U-236	1.3007E-05	6,176 98	6,176 98	0 00E+00	8 03E-02	8 03E-02
U-238	-1 4207E-08	6,176 98	0 00	3 67E-03	3 58E-03	3 67E-03
Y-90	1 2873E+00	6,176 98	6,176.98	0 00E+00	7 95E+03	7 95E+03
Other Radionuclides					8 39E+03	8 39E+03

Gamma Sources

Photon Energy Group Avg MeV	Total Photons/sec (bounding)
0 0150	4.372E+14
0 0250	9 064E+13
0 0375	7.938E+13
0 0575	8 684E+13
0 0850	5 097E+13
0 1250	3 358E+13
0.2250	4 395E+13
0 3750	1 911E+13
0 5750	3.287E+14
0 8500	3 773E+12
1.2500	1 774E+12
1 7500	1 023E+11
2.2500	8 826E+06
2 7500	1 474E+06
3 5000	2 659E+04
5 0000	1 115E+04
7 0000	1.255E+03
11 0000	1.424E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.07E+02	1.07E+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 %		10 to 20

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		6 176 98
Bounding		6,176 98

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 85	
Bounding	10 85	

Estimated EOL HM/Given EOL HM
2 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. HWCTR SPRO (U02) SST LEU
SNF ID # 978
Fuel Units & Descr: 5 - TUBE
Heavy Metal Mass BOL= , EOL=89 362kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1964
Estimates as of. 2010
Template HFBR (Heavy Water, SST, 0 to 5%, U)
[2]Template Burnup(MWd). 5
Template BOL Heavy Metal Mass (MT). 0 00034251
Template Decay Time· 35 years

Estimated Canister usage
18"x10'
0 06

II. Estimates

Radionuclide	m: C/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 6840E-09	85,315 00	85,315 00	0 00E+00	4 85E-04	4 85E-04
Am-241	2 1380E-01	85,315 00	85,315 00	0 00E+00	1 82E+04	1 82E+04
Am-242m	1 0302E-04	85,315 00	85,315 00	0 00E+00	8 79E+00	8 79E+00
Am-243	5 2400E-05	85,315 00	85,315 00	0 00E+00	4 47E+00	4 47E+00
C-14	2 2160E-02	85,315 00	85,315 00	0 00E+00	1 89E+03	1 89E+03
Cl-36	4 1880E-04	85,315 00	85,315 00	0 00E+00	3 57E+01	3 57E+01
Cm-243	1 6766E-05	85,315 00	85,315 00	0 00E+00	1 43E+00	1 43E+00
Cm-244	7 3320E-04	85,315 00	85,315 00	0 00E+00	6.26E+01	6 26E+01
Co-60	5 1480E+00	85,315 00	85,315 00	0 00E+00	4 39E+05	4.39E+05
Cs-134	1 7300E-05	85,315 00	85,315 00	0 00E+00	1 48E+00	1 48E+00
Cs-135	3 7460E-06	85,315 00	85,315 00	0 00E+00	3.20E-01	3.20E-01
Cs-137	1 4426E+00	85,315 00	85,315 00	0 00E+00	1 23E+05	1.23E+05
Eu-154	9 2140E-03	85,315 00	85,315 00	0 00E+00	7 86E+02	7 86E+02
Eu-155	8 1360E-04	85,315 00	85,315 00	0 00E+00	6 94E+01	6 94E+01
Fe-55	5 3720E-02	85,315 00	85,315 00	0 00E+00	4 58E+03	4 58E+03
H-3	4 4560E-02	85,315 00	85,315 00	0 00E+00	3 80E+03	3 80E+03
I-129	9 1660E-07	85,315 00	85,315 00	0 00E+00	7 82E-02	7 82E-02
Kr-85	3 2380E-02	85,315 00	85,315 00	0 00E+00	2.76E+03	2 76E+03
Np-237	1 9674E-05	85,315 00	85,315 00	0 00E+00	1 68E+00	1 68E+00
Pa-231	9.3700E-09	85,315 00	85,315 00	0 00E+00	7.99E-04	7 99E-04
Pb-210	4 0520E-09	85,315 00	85,315 00	0 00E+00	3 46E-04	3 46E-04
Pm-147	7 8900E-04	85,315 00	85,315.00	0 00E+00	6 73E+01	6.73E+01
Pu-238	3 6340E-02	85,315 00	85,315 00	0 00E+00	3 10E+03	3.10E+03
Pu-239	6 5100E-02	85,315.00	85,315 00	0 00E+00	5 55E+03	5 55E+03
Pu-240	2 6700E-02	85,315 00	85,315 00	0 00E+00	2 28E+03	2.28E+03
Pu-241	1 3616E+00	85,315 00	85,315 00	0 00E+00	1 16E+05	1 16E+05
Pu-242	1 6742E-05	85,315 00	85,315 00	0 00E+00	1 43E+00	1 43E+00
Ra-226	1 0912E-08	85,315 00	85,315 00	0 00E+00	9 31E-04	9 31E-04
Ra-228	2 0780E-10	85,315 00	85,315 00	0 00E+00	1 77E-05	1 77E-05
Ru-106	7 4020E-10	85,315 00	85,315 00	0 00E+00	6 32E-05	6 32E-05
Se-79	2.8500E-05	85,315 00	85,315 00	0 00E+00	2 43E+00	2 43E+00
Sn-126	1.7794E-05	85,315 00	85,315.00	0 00E+00	1 52E+00	1.52E+00
Sr-90	1 0372E+00	85,315 00	85,315.00	0 00E+00	8 85E+04	8.85E+04
Tc-99	4 3360E-04	85,315 00	85,315 00	0 00E+00	3 70E+01	3.70E+01
Th-229	1 9490E-09	85,315.00	85,315 00	0 00E+00	1 66E-04	1 66E-04
Th-230	9 9520E-07	85,315 00	85,315 00	0 00E+00	8 49E-02	8.49E-02
Th-232	2 0900E-10	85,315 00	85,315 00	0 00E+00	1 78E-05	1 78E-05
Tl-208	1 5278E-07	85,315 00	85,315 00	0 00E+00	1 30E-02	1 30E-02
U-232	4 1360E-07	85,315 00	85,315 00	0 00E+00	3 53E-02	3 53E-02
U-233	4 1200E-07	85,315 00	85,315 00	0 00E+00	3 51E-02	3 51E-02
U-234	2.1700E-03	85,315 00	85,315 00	0 00E+00	1.85E+02	1 85E+02
U-235	-1.7036E-06	85,315 00	0 00	1.93E-02	0 00E+00	1 93E-02
U-236	2.6080E-05	85,315 00	85,315.00	0 00E+00	2.23E+00	2.23E+00
U-238	-5 1291E-07	85,315.00	0 00	5 65E-02	1.27E-02	5 65E-02
Y-90	1 0374E+00	85,315 00	85,315 00	0 00E+00	8 85E+04	8.85E+04
Other Radionuclides					7 34E+05	7.34E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0.0150	6 128E+15
0.0250	1 199E+15
0 0375	1 042E+15
0 0575	1 301E+15
0 0850	6 126E+14
0 1250	3 976E+14
0 2250	4 978E+14
0 3750	2 148E+14
0.5750	4.552E+15
0 8500	5 070E+13
1.2500	3.253E+16
1 7500	1.347E+12
2.2500	1 724E+11
2.7500	9 934E+08
3.5000	2.413E+06
5 0000	1 010E+06
7 0000	1 135E+05
11 0000	1 286E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.22E+03	9.22E+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	SST	SST
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		85,315 00
Bounding		85 315 00

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	32.70	
Bounding	32.70	

Estimated EOL HM/Given EOL HM: 2.27

[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: HWCTR SPRO (UO2) ZR LEU
SNF ID #: 772
Fuel Units & Descr: 48 - TUBE
Heavy Metal Mass BOL= , EOL=180 922kg
ROD Storage Site INEEL

[1]Fuel decay start date 1964
Estimates as of 2010
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 35 years

Estimated Canister usage 18"x10' 0 55

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 6920E-09	173,423 00	173,423 00	0 00E+00	8 14E-04	8 14E-04
Am-241	2 2880E-02	173,423 00	173,423 00	0 00E+00	3 97E+03	3 97E+03
Am-242m	3 5400E-06	173,423 00	173,423 00	0 00E+00	6 14E-01	6 14E-01
Am-243	2 0580E-06	173,423 00	173,423 00	0 00E+00	3 57E-01	3 57E-01
C-14	1 1264E-03	173,423 00	173,423 00	0 00E+00	1 95E+02	1 95E+02
Cl-36	8.3760E-11	173,423 00	173,423 00	0 00E+00	1 45E-05	1.45E-05
Cm-243	5 0340E-07	173,423 00	173,423 00	0 00E+00	8.73E-02	8 73E-02
Cm-244	1 0450E-05	173,423 00	173,423 00	0 00E+00	1.81E+00	1.81E+00
Co-60	6 4420E-02	173,423 00	173,423 00	0 00E+00	1 12E+04	1 12E+04
Cs-134	7 9240E-06	173,423 00	173,423 00	0 00E+00	1.37E+00	1.37E+00
Cs-135	7 9140E-06	173,423 00	173,423.00	0 00E+00	1.37E+00	1 37E+00
Cs-137	1 4316E+00	173,423 00	173,423 00	0 00E+00	2 48E+05	2 48E+05
Eu-154	6 7900E-03	173,423 00	173,423 00	0 00E+00	1 18E+03	1 18E+03
Eu-155	6.2800E-04	173,423 00	173,423 00	0 00E+00	1 09E+02	1 09E+02
Fe-55	5 7480E-05	173,423.00	173,423 00	0 00E+00	9 97E+00	9 97E+00
H-3	2 3800E-02	173,423 00	173,423 00	0 00E+00	4 13E+03	4 13E+03
I-129	7 5020E-07	173 423 00	173,423 00	0 00E+00	1.30E-01	1 30E-01
Kr-85	3 8220E-02	173,423 00	173,423.00	0 00E+00	6 63E+03	6 63E+03
Np-237	5 5780E-06	173,423 00	173,423 00	0 00E+00	9 67E-01	9 67E-01
Pa-231	7.8820E-09	173,423 00	173,423 00	0 00E+00	1.37E-03	1.37E-03
Pb-210	4.3840E-09	173,423 00	173,423 00	0 00E+00	7.60E-04	7 60E-04
Pm-147	9 9500E-04	173,423 00	173,423 00	0 00E+00	1.73E+02	1.73E+02
Pu-238	6 4240E-03	173,423 00	173,423 00	0 00E+00	1.11E+03	1.11E+03
Pu-239	1 8744E-02	173,423 00	173,423 00	0 00E+00	3.25E+03	3 25E+03
Pu-240	8 3540E-03	173,423 00	173,423.00	0 00E+00	1 45E+03	1 45E+03
Pu-241	1 4606E-01	173,423 00	173,423 00	0 00E+00	2 53E+04	2 53E+04
Pu-242	2 0400E-06	173,423 00	173,423 00	0 00E+00	3 54E-01	3 54E-01
Ra-226	1 1804E-08	173,423 00	173,423 00	0 00E+00	2.05E-03	2 05E-03
Ra-228	1 1864E-09	173,423 00	173,423 00	0 00E+00	2 06E-04	2 06E-04
Ru-106	3 2580E-10	173,423.00	173,423 00	0 00E+00	5 65E-05	5 65E-05
Se-79	1 2524E-05	173,423 00	173,423 00	0 00E+00	2 17E+00	2 17E+00
Sn-126	1.2052E-05	173,423 00	173,423.00	0 00E+00	2 09E+00	2 09E+00
Sr-90	1.2638E+00	173,423 00	173,423 00	0 00E+00	2 19E+05	2 19E+05
Tc-99	4 4140E-04	173,423 00	173,423 00	0 00E+00	7 65E+01	7.65E+01
Th-229	4.3480E-09	173,423 00	173,423 00	0 00E+00	7.54E-04	7 54E-04
Th-230	1 0760E-06	173,423.00	173,423 00	0 00E+00	1 87E-01	1 87E-01
Th-232	1 1926E-09	173,423 00	173,423 00	0 00E+00	2 07E-04	2 07E-04
Tl-208	4 6200E-08	173,423 00	173,423 00	0 00E+00	8 01E-03	8 01E-03
U-232	1.2406E-07	173,423 00	173,423 00	0 00E+00	2 15E-02	2.15E-02
U-233	9 1620E-07	173,423 00	173,423 00	0 00E+00	1 59E-01	1.59E-01
U-234	2.3440E-03	173,423 00	173,423 00	0 00E+00	4 07E+02	4.07E+02
U-235	-2 3296E-06	173,423 00	0 00	3 91E-02	0 00E+00	3 91E-02
U-236	2 6620E-05	173,423.00	173,423 00	0 00E+00	4 62E+00	4 62E+00
U-238	-1.3291E-07	173,423.00	0 00	1 14E-01	9 13E-02	1 14E-01
Y-90	1 2642E+00	173,423 00	173,423 00	0 00E+00	2 19E+05	2 19E+05
Other Radionuclides					2 37E+05	2 37E+05

Gamma Sources

Photon Energy Group (Avg MeV)	Total Photons/sec (bounding)
0 0150	1.210E+16
0 0250	2 506E+15
0 0375	2.205E+15
0 0575	2.387E+15
0 0850	1 408E+15
0 1250	9.288E+14
0.2250	1.213E+15
0.3750	5.275E+14
0 5750	9.231E+15
0 8500	1 065E+14
1.2500	8 779E+14
1 7500	2.887E+12
2.2500	4 625E+09
2 7500	2.959E+08
3.5000	8 924E+05
5 0000	3 746E+05
7 0000	4 213E+04
11 0000	4 781E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.19E+03	3 19E+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	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		173,423.00
Bounding		173,423 00

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: HWCTR TFEN (U-ZR) LEU
SNF ID #: 880
Fuel Units & Descr: 11 - TUBE
Heavy Metal Mass: BOL= ; EOL=162.082kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1964
Estimates as of: 2010
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: 35 years

Estimated Canister usage 18"x15': 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	4 6920E-09	155,363 95	155,363 95	0 00E+00	7.29E-04	7 29E-04
Am-241	2.2880E-02	155,363 95	155,363 95	0 00E+00	3 55E+03	3 55E+03
Am-242m	3.5400E-06	155,363 95	155,363 95	0 00E+00	5.50E-01	5 50E-01
Am-243	2 0580E-06	155,363 95	155,363 95	0 00E+00	3.20E-01	3 20E-01
C-14	1 1264E-03	155,363 95	155,363.95	0 00E+00	1 75E+02	1 75E+02
Cl-36	8 3760E-11	155,363 95	155,363 95	0 00E+00	1 30E-05	1 30E-05
Cm-243	5 0340E-07	155,363 95	155,363 95	0 00E+00	7 82E-02	7 82E-02
Cm-244	1 0450E-05	155,363 95	155,363 95	0 00E+00	1 62E+00	1 62E+00
Co-60	6 4420E-02	155,363 95	155,363 95	0 00E+00	1 00E+04	1 00E+04
Cs-134	7 9240E-06	155,363.95	155,363 95	0 00E+00	1.23E+00	1 23E+00
Cs-135	7 9140E-06	155,363 95	155,363 95	0 00E+00	1.23E+00	1.23E+00
Cs-137	1 4316E+00	155,363.95	155,363 95	0 00E+00	2.22E+05	2 22E+05
Eu-154	6 7900E-03	155,363 95	155,363 95	0 00E+00	1.05E+03	1 05E+03
Eu-155	6 2800E-04	155,363 95	155,363 95	0 00E+00	9 76E+01	9 76E+01
Fe-55	5 7480E-05	155,363 95	155,363 95	0 00E+00	8 93E+00	8 93E+00
H-3	2 3800E-02	155,363 95	155,363 95	0 00E+00	3 70E+03	3 70E+03
I-129	7.5020E-07	155,363 95	155,363 95	0 00E+00	1 17E-01	1 17E-01
Kr-85	3 8220E-02	155,363 95	155,363 95	0 00E+00	5 94E+03	5 94E+03
Np-237	5.5780E-06	155,363 95	155,363.95	0 00E+00	8 67E-01	8 67E-01
Pa-231	7 8820E-09	155,363 95	155,363 95	0 00E+00	1 22E-03	1 22E-03
Pb-210	4 3840E-09	155,363 95	155,363 95	0 00E+00	6 81E-04	6 81E-04
Pm-147	9 9500E-04	155,363 95	155,363 95	0 00E+00	1 55E+02	1.55E+02
Pu-238	6 4240E-03	155,363 95	155,363 95	0 00E+00	9 98E+02	9 98E+02
Pu-239	1 8744E-02	155,363 95	155,363 95	0 00E+00	2.91E+03	2 91E+03
Pu-240	8 3540E-03	155,363.95	155,363 95	0 00E+00	1.30E+03	1 30E+03
Pu-241	1 4606E-01	155,363 95	155,363 95	0 00E+00	2.27E+04	2 27E+04
Pu-242	2 0400E-06	155,363 95	155,363 95	0 00E+00	3.17E-01	3 17E-01
Ra-226	1 1804E-08	155,363 95	155,363 95	0 00E+00	1 83E-03	1 83E-03
Ra-228	1 1864E-09	155,363 95	155,363 95	0 00E+00	1 84E-04	1 84E-04
Ru-106	3.2580E-10	155,363 95	155,363 95	0 00E+00	5 06E-05	5 06E-05
Se-79	1.2524E-05	155,363 95	155,363.95	0 00E+00	1 95E+00	1 95E+00
Sn-126	1.2052E-05	155,363 95	155,363 95	0 00E+00	1 87E+00	1.87E+00
Sr-90	1.2638E+00	155,363 95	155,363 95	0 00E+00	1 96E+05	1 96E+05
Tc-99	4 4140E-04	155,363 95	155,363 95	0 00E+00	6 86E+01	6 86E+01
Th-229	4 3480E-09	155,363 95	155,363 95	0 00E+00	6 76E-04	6.76E-04
Th-230	1 0760E-06	155,363.95	155,363 95	0 00E+00	1 67E-01	1 67E-01
Th-232	1 1926E-09	155,363 95	155,363 95	0 00E+00	1 85E-04	1 85E-04
Tl-208	4 6200E-08	155,363 95	155,363 95	0 00E+00	7.18E-03	7 18E-03
U-232	1 2406E-07	155,363 95	155,363 95	0 00E+00	1.93E-02	1 93E-02
U-233	9 1620E-07	155,363 95	155,363 95	0 00E+00	1.42E-01	1 42E-01
U-234	2 3440E-03	155,363 95	155,363 95	0 00E+00	3 64E+02	3 64E+02
U-235	-2 3296E-06	155,363 95	0 00	3 50E-02	0 00E+00	3 50E-02
U-236	2 6620E-05	155,363 95	155,363.95	0 00E+00	4 14E+00	4 14E+00
U-238	-1 3291E-07	155,363 95	0 00	1 02E-01	8 18E-02	1 02E-01
Y-90	1.2642E+00	155,363 95	155,363 95	0 00E+00	1 96E+05	1 96E+05
Other Radionuclides					2.12E+05	2.12E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 084E+16
0 0250	2.245E+15
0 0375	1 975E+15
0 0575	2.139E+15
0 0850	1.261E+15
0 1250	8.321E+14
0.2250	1 086E+15
0 3750	4 726E+14
0.5750	8 270E+15
0 8500	9 545E+13
1.2500	7 865E+14
1 7500	2.587E+12
2.2500	4 144E+09
2.7500	2 651E+08
3 5000	7.995E+05
5 0000	3.356E+05
7 0000	3 775E+04
11 0000	4.284E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.85E+03	2.85E+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	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		155 363 95
Bounding		155 363 95

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 HWCTR TMT-1-2 & 1-3 (U/TH)
SNF ID # 112
Fuel Units & Descr 2 - TUBE
Heavy Metal Mass BOL= ; EOL=77.91kg
ROD Storage Site: INEEL

[1]Fuel decay start date 1964
Estimates as of: 2010
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"x15' 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	2 3072E-06	273 69	547.39	0 00E+00	6 31E-04	1.26E-03
Am-241	8 4448E+00	273 69	547.39	0 00E+00	2 31E+03	4 62E+03
Am-242m	1 6848E-02	273 69	547 39	0 00E+00	4 61E+00	9 22E+00
Am-243	1 6320E-02	273 69	547 39	0 00E+00	4 47E+00	8 93E+00
C-14	1.2090E-01	273 69	547 39	0 00E+00	3.31E+01	6 62E+01
Cl-36	2.2849E-03	273 69	547.39	0 00E+00	6 25E-01	1 25E+00
Cm-243	8 6624E-04	273 69	547.39	0 00E+00	2 37E-01	4.74E-01
Cm-244	1 6848E-01	273 69	547.39	0 00E+00	4 61E+01	9 22E+01
Co-60	2 8086E+01	273 69	547.39	0 00E+00	7 69E+03	1.54E+04
Cs-134	3 4148E-04	273 69	547.39	0 00E+00	9 35E-02	1 87E-01
Cs-135	4 3976E-04	273 69	547.39	0 00E+00	1.20E-01	2 41E-01
Cs-137	2 1049E+01	273 69	547.39	0 00E+00	5 76E+03	1 15E+04
Eu-154	1.2500E+00	273 69	547.39	0 00E+00	3 42E+02	6 84E+02
Eu-155	6 8986E-02	273 69	547 39	0 00E+00	1.89E+01	3 78E+01
Fe-55	2.9308E-01	273 69	547.39	0 00E+00	8 02E+01	1 60E+02
H-3	2 4311E-01	273 69	547.39	0 00E+00	6 65E+01	1 33E+02
I-129	1 0618E-05	273 69	547.39	0 00E+00	2 91E-03	5 81E-03
Kr-85	5 9882E-01	273 69	547.39	0 00E+00	1 64E+02	3.28E+02
Np-237	1 5668E-04	273 69	547.39	0.00E+00	4 29E-02	8.58E-02
Pa-231	2 8656E-06	273 69	547.39	0 00E+00	7.84E-04	1.57E-03
Pb-210	2 3918E-08	273 69	547.39	0 00E+00	6 55E-06	1.31E-05
Pm-147	1 6900E-02	273 69	547.39	0 00E+00	4 63E+00	9.25E+00
Pu-238	2 9808E+00	273 69	547 39	0 00E+00	8 16E+02	1 63E+03
Pu-239	4 1648E-01	273 69	547 39	0 00E+00	1.14E+02	2 28E+02
Pu-240	2 9264E-01	273 69	547 39	0 00E+00	8 01E+01	1 60E+02
Pu-241	4 8704E+01	273 69	547.39	0 00E+00	1.33E+04	2 67E+04
Pu-242	2 4560E-03	273 69	547.39	0 00E+00	6 72E-01	1.34E+00
Ra-226	6 4400E-08	273 69	547.39	0.00E+00	1 76E-05	3.53E-05
Ra-228	5 9952E-07	273 69	547.39	0 00E+00	1 64E-04	3.28E-04
Ru-106	8 5526E-07	273 69	547.39	0 00E+00	2 34E-04	4 68E-04
Se-79	1 9181E-04	273 69	547.39	0 00E+00	5.25E-02	1 05E-01
Sn-126	1 6671E-04	273 69	547 39	0 00E+00	4.56E-02	9 13E-02
Sr-90	1.9799E+01	273 69	547 39	0 00E+00	5 42E+03	1 08E+04
Tc-99	6 7678E-03	273 69	547 39	0 00E+00	1.85E+00	3 70E+00
Th-229	1 7488E-06	273 69	547.39	0 00E+00	4 79E-04	9 57E-04
Th-230	5 8704E-06	273 69	547.39	0 00E+00	1 61E-03	3.21E-03
Th-232	-4 2431E-09	273 69	0 00	1.59E-03	1 58E-03	1.59E-03
Tl-208	8 7573E-05	273 69	547.39	0.00E+00	2 40E-02	4.79E-02
U-232	2 3706E-04	273 69	547.39	0 00E+00	6 49E-02	1.30E-01
U-233	3 6128E-04	273 69	547.39	0 00E+00	9 89E-02	1 98E-01
U-234	1.2788E-02	273 69	547.39	0 00E+00	3 50E+00	7 00E+00
U-235	5.7486E-04	273.69	547 39	3 36E-02	1.91E-01	3 48E-01
U-236	2.3485E-04	273 69	547 39	0 00E+00	6 43E-02	1.29E-01
U-238	1.1581E-04	273 69	547.39	4 19E-03	3 59E-02	6 76E-02
Y-90	1 9804E+01	273 69	547.39	0 00E+00	5 42E+03	1 08E+04
Other Radionuclides					1 69E+04	3 38E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	6.812E+14
0 0250	1.335E+14
0 0375	1 166E+14
0 0575	1.835E+14
0 0850	7 161E+13
0 1250	5 613E+13
0.2250	6 204E+13
0 3750	2 653E+13
0 5750	4 315E+14
0 8500	1 649E+13
1 2500	1.153E+15
1 7500	5.099E+11
2.2500	6.045E+09
2 7500	1 704E+09
3.5000	1.548E+06
5.0000	6.566E+05
7.0000	7.506E+04
11 0000	8 582E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.03E+02	6 06E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used
Reactor Moderator	HEAVY WATER	(Worst Case)
Fuel Cladding	ZIRC	SST/Inconel
BOL HM Constituents	Th 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		273 69
Bounding		547.39

Basis for burnup used in estimate

Nominal burnup taken from SFD and converted to MWd using BOL=78.198kg

Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 10	
Bounding	0.21	

Estimated EOL HM/Given EOL HM: 2 74

[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: HWCTR TWNT (U METAL) LEU
SNF ID #: 791
Fuel Units & Descr: 15 - TUBE
Heavy Metal Mass: BOL= ; EOL=321.82kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1964
Estimates as of: 2010
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: 35 years

Estimated Canister usage: 18"x15": 0 68

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 6920E-09	308,482 10	308,482 10	0 00E+00	1 45E-03	1.45E-03
Am-241	2 2880E-02	308,482 10	308,482 10	0 00E+00	7 06E+03	7 06E+03
Am-242m	3 5400E-06	308,482 10	308,482 10	0 00E+00	1 09E+00	1 09E+00
Am-243	2 0580E-06	308,482.10	308,482 10	0 00E+00	6 35E-01	6.35E-01
C-14	1 1264E-03	308,482.10	308,482 10	0 00E+00	3 47E+02	3 47E+02
Cl-36	8 3760E-11	308,482.10	308,482 10	0 00E+00	2.58E-05	2.58E-05
Cm-243	5 0340E-07	308,482.10	308,482 10	0 00E+00	1 55E-01	1 55E-01
Cm-244	1 0450E-05	308,482.10	308,482 10	0 00E+00	3 22E+00	3 22E+00
Co-60	6 4420E-02	308,482.10	308,482 10	0 00E+00	1 99E+04	1 99E+04
Cs-134	7 9240E-06	308,482.10	308,482 10	0 00E+00	2 44E+00	2 44E+00
Cs-135	7.9140E-06	308,482.10	308,482.10	0 00E+00	2 44E+00	2 44E+00
Cs-137	1 4316E+00	308,482.10	308,482.10	0 00E+00	4 42E+05	4 42E+05
Eu-154	6.7900E-03	308,482 10	308,482 10	0 00E+00	2 09E+03	2 09E+03
Eu-155	6.2800E-04	308,482 10	308,482.10	0 00E+00	1 94E+02	1 94E+02
Fe-55	5 7480E-05	308,482 10	308,482.10	0 00E+00	1 77E+01	1 77E+01
H-3	2.3800E-02	308,482 10	308,482.10	0 00E+00	7 34E+03	7 34E+03
I-129	7 5020E-07	308,482 10	308,482.10	0 00E+00	2 31E-01	2 31E-01
Kr-85	3 8220E-02	308,482 10	308,482.10	0 00E+00	1.18E+04	1.18E+04
Np-237	5 5780E-06	308,482 10	308,482.10	0 00E+00	1.72E+00	1.72E+00
Pa-231	7 8820E-09	308,482 10	308,482.10	0 00E+00	2 43E-03	2 43E-03
Pb-210	4 3840E-09	308,482 10	308,482 10	0 00E+00	1 35E-03	1 35E-03
Pm-147	9 9500E-04	308,482 10	308,482 10	0 00E+00	3.07E+02	3.07E+02
Pu-238	6 4240E-03	308,482 10	308,482 10	0 00E+00	1 98E+03	1 98E+03
Pu-239	1 8744E-02	308,482 10	308,482 10	0 00E+00	5 78E+03	5 78E+03
Pu-240	8 3540E-03	308,482 10	308,482 10	0 00E+00	2 58E+03	2 58E+03
Pu-241	1 4606E-01	308,482.10	308,482 10	0 00E+00	4 51E+04	4 51E+04
Pu-242	2 0400E-06	308,482 10	308,482 10	0 00E+00	6 29E-01	6.29E-01
Ra-226	1 1804E-08	308,482 10	308,482 10	0 00E+00	3 64E-03	3 64E-03
Ra-228	1 1864E-09	308,482.10	308,482 10	0 00E+00	3 66E-04	3 66E-04
Ru-106	3 2580E-10	308,482.10	308,482 10	0 00E+00	1 01E-04	1 01E-04
Se-79	1 2524E-05	308,482.10	308,482 10	0 00E+00	3 86E+00	3 86E+00
Sn-126	1.2052E-05	308,482.10	308,482 10	0 00E+00	3 72E+00	3 72E+00
Sr-90	1.2638E+00	308,482.10	308,482 10	0 00E+00	3 90E+05	3 90E+05
Tc-99	4 4140E-04	308,482.10	308,482 10	0 00E+00	1 36E+02	1 36E+02
Th-229	4 3480E-09	308,482.10	308,482 10	0 00E+00	1 34E-03	1 34E-03
Th-230	1 0760E-06	308,482 10	308,482.10	0 00E+00	3 32E-01	3 32E-01
Th-232	1.1926E-09	308,482 10	308,482.10	0 00E+00	3 68E-04	3 68E-04
Tl-208	4 6200E-08	308,482.10	308,482.10	0.00E+00	1 43E-02	1 43E-02
U-232	1.2406E-07	308,482 10	308,482 10	0 00E+00	3 83E-02	3 83E-02
U-233	9.1620E-07	308,482.10	308,482.10	0 00E+00	2 83E-01	2 83E-01
U-234	2 3440E-03	308,482 10	308,482.10	0 00E+00	7.23E+02	7.23E+02
U-235	-2.3296E-06	308,482 10	0 00	6 96E-02	0 00E+00	6 96E-02
U-236	2 6620E-05	308,482 10	308,482.10	0 00E+00	8.21E+00	8.21E+00
U-238	-1.3291E-07	308,482 10	0 00	2 03E-01	1 62E-01	2.03E-01
Y-90	1.2642E+00	308,482 10	308,482 10	0 00E+00	3 90E+05	3 90E+05
Other Radionuclides					4 21E+05	4.21E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2.152E+16
0 0250	4 458E+15
0 0375	3.922E+15
0 0575	4.246E+15
0 0850	2.504E+15
0 1250	1 652E+15
0.2250	2.157E+15
0.3750	9 383E+14
0.5750	1 642E+16
0.8500	1 895E+14
1.2500	1 562E+15
1 7500	5 136E+12
2.2500	8 227E+09
2.7500	5 263E+08
3.5000	1 587E+06
5.0000	6 663E+05
7.0000	7 495E+04
11 0000	8 505E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 67E+03	5 67E+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:	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		308 482 10
Bounding		308 482 10

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 IAN-R1 (COLUMBIA)
SNF ID # 596
Fuel Units & Descr 16 - MTR TYPE
Heavy Metal Mass BOL=2.536kg EOL=2 426kg
ROD Storage Site. SRS

[1]Fuel decay start date 1994
Estimates as of. 2010
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 15 years

Estimated Canister usage 18"x10' 0 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	4 5861E-10	104.55	209 10	0 00E+00	4 79E-08	9 59E-08
Am-241	1 7832E-03	104 55	209 10	0 00E+00	1 86E-01	3 73E-01
Am-242m	4 3410E-07	104 55	209 10	0 00E+00	4 54E-05	9 08E-05
Am-243	1.4907E-06	104 55	209 10	0 00E+00	1.56E-04	3 12E-04
C-14	5 7162E-09	104 55	209 10	0 00E+00	5.98E-07	1.20E-06
Cl-36	1.3124E-32	104 55	209 10	0 00E+00	1.37E-30	2 74E-30
Cm-243	1 8568E-07	104 55	209 10	0 00E+00	1 94E-05	3 88E-05
Cm-244	3 5512E-05	104 55	209 10	0 00E+00	3 71E-03	7.43E-03
Co-60	1 0261E-05	104 55	209 10	0 00E+00	1 07E-03	2 15E-03
Cs-134	1 6931E-02	104 55	209 10	0 00E+00	1 77E+00	3 54E+00
Cs-135	3 4477E-06	104 55	209.10	0 00E+00	3 60E-04	7 21E-04
Cs-137	2.2800E+00	104 55	209 10	0 00E+00	2 38E+02	4 77E+02
Eu-154	3 6656E-02	104 55	209 10	0 00E+00	3 83E+00	7 66E+00
Eu-155	9 6841E-03	104.55	209 10	0 00E+00	1 01E+00	2 02E+00
Fe-55	4 6977E-04	104.55	209 10	0 00E+00	4 91E-02	9 82E-02
H-3	6 0485E-03	104.55	209 10	0 00E+00	6 32E-01	1.26E+00
I-129	7 5300E-07	104.55	209 10	0 00E+00	7 87E-05	1.57E-04
Kr-85	1 4989E-01	104 55	209 10	0 00E+00	1 57E+01	3 13E+01
Np-237	9 5534E-06	104 55	209 10	0 00E+00	9 99E-04	2 00E-03
Pa-231	1 6550E-09	104 55	209 10	0 00E+00	1 73E-07	3 46E-07
Pb-210	2 6631E-11	104 55	209 10	0 00E+00	2.78E-09	5 57E-09
Pm-147	1.8156E-01	104 55	209 10	0 00E+00	1 90E+01	3 80E+01
Pu-238	1 8990E-02	104.55	209 10	0 00E+00	1.99E+00	3 97E+00
Pu-239	4.2838E-04	104.55	209 10	0 00E+00	4 48E-02	8 96E-02
Pu-240	2 4379E-04	104 55	209 10	0 00E+00	2 55E-02	5 10E-02
Pu-241	4 2511E-02	104.55	209 10	0 00E+00	4 44E+00	8 89E+00
Pu-242	3 6329E-07	104 55	209 10	0.00E+00	3 80E-05	7 60E-05
Ra-226	1 4725E-10	104 55	209 10	0 00E+00	1 54E-08	3 08E-08
Ra-228	8 9760E-15	104 55	209 10	0 00E+00	9 38E-13	1 88E-12
Ru-106	1 9752E-04	104 55	209 10	0 00E+00	2 07E-02	4 13E-02
Se-79	1.2933E-05	104 55	209 10	0 00E+00	1.35E-03	2 70E-03
Sn-126	1 1574E-05	104.55	209 10	0 00E+00	1.21E-03	2 42E-03
Sr-90	2 1680E+00	104.55	209 10	0 00E+00	2.27E+02	4.53E+02
Tc-99	4.2239E-04	104.55	209 10	0 00E+00	4 42E-02	8 83E-02
Th-229	3 9270E-12	104 55	209 10	0 00E+00	4 11E-10	8 21E-10
Th-230	3 3578E-08	104 55	209 10	0 00E+00	3 51E-06	7 02E-06
Th-232	1.5452E-14	104 55	209 10	0 00E+00	1 62E-12	3 23E-12
Tl-208	4 6705E-08	104 55	209 10	0 00E+00	4 88E-06	9 77E-06
U-232	1.3045E-07	104 55	209 10	0 00E+00	1.36E-05	2.73E-05
U-233	2.3739E-09	104.55	209 10	0 00E+00	2.48E-07	4.96E-07
U-234	1 8423E-04	104 55	209 10	0 00E+00	1 93E-02	3 85E-02
U-235	-2.7235E-06	104 55	0 00	5.11E-03	4 82E-03	5 11E-03
U-236	1 5493E-05	104.55	209.10	0.00E+00	1 62E-03	3 24E-03
U-238	-4.2851E-09	104 55	0 00	5 79E-05	5 75E-05	5 79E-05
Y-90	2 1686E+00	104 55	209 10	0 00E+00	2 27E+02	4 53E+02
Other Radionuclides					2 27E+02	4 55E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2.494E+13
0 0250	5.202E+12
0 0375	4.542E+12
0 0575	4 844E+12
0 0850	2 934E+12
0 1250	2 012E+12
0.2250	2.528E+12
0.3750	1 107E+12
0.5750	1 797E+13
0 8500	4.269E+11
1.2500	2 157E+11
1 7500	9 037E+09
2.2500	1 131E+07
2.7500	6 794E+05
3 5000	4 318E+04
5 0000	1 001E+02
7.0000	1 108E+01
11 0000	1.244E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.83E+00	5 66E+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 %	93.20235261	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		104 55	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		209 10	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 13	
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: IAN-R1 (COLUMBIA)
SNF ID #: 803
Fuel Units & Descr: 5 - MTR TYPE
Heavy Metal Mass: BOL=0 685kg; EOL=0 685kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1996
Estimates as of: 2010
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: 10 years

Estimated Canister usage 18"x10': 0 21

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 8404E-10	12 97	25 95	0 00E+00	3 69E-09	7 37E-09
Am-241	1 4935E-03	12 97	25 95	0 00E+00	1 94E-02	3 88E-02
Am-242m	4 4390E-07	12 97	25 95	0 00E+00	5 76E-06	1 15E-05
Am-243	1 4913E-06	12 97	25 95	0 00E+00	1 93E-05	3 87E-05
C-14	5 7217E-09	12 97	25.95	0 00E+00	7 42E-08	1 48E-07
Cl-36	1.3124E-32	12 97	25 95	0 00E+00	1 70E-31	3 41E-31
Cm-243	2 0967E-07	12 97	25 95	0 00E+00	2 72E-06	5 44E-06
Cm-244	4.3001E-05	12 97	25 95	0 00E+00	5 58E-04	1 12E-03
Co-60	1.9798E-05	12 97	25 95	0 00E+00	2 57E-04	5 14E-04
Cs-134	9 0795E-02	12 97	25 95	0 00E+00	1 18E+00	2.36E+00
Cs-135	3.4477E-06	12.97	25 95	0 00E+00	4 47E-05	8 95E-05
Cs-137	2 5588E+00	12.97	25 95	0 00E+00	3 32E+01	6 64E+01
Eu-154	5 4847E-02	12.97	25 95	0 00E+00	7 12E-01	1 42E+00
Eu-155	1 9469E-02	12.97	25 95	0 00E+00	2 53E-01	5 05E-01
Fe-55	1 7797E-03	12.97	25 95	0 00E+00	2 31E-02	4 62E-02
H-3	8 0065E-03	12.97	25 95	0 00E+00	1 04E-01	2.08E-01
I-129	7 5300E-07	12 97	25 95	0 00E+00	9 77E-06	1 95E-05
Kr-85	2 0705E-01	12.97	25 95	0 00E+00	2 69E+00	5 37E+00
Np-237	9 5507E-06	12 97	25 95	0 00E+00	1 24E-04	2 48E-04
Pa-231	1 2740E-09	12 97	25 95	0 00E+00	1 65E-08	3 31E-08
Pb-210	1 1838E-11	12 97	25 95	0 00E+00	1 54E-10	3 07E-10
Pm-147	6 7974E-01	12 97	25 95	0 00E+00	8 82E+00	1 76E+01
Pu-238	1 9755E-02	12 97	25 95	0 00E+00	2 56E-01	5 13E-01
Pu-239	4 2838E-04	12 97	25 95	0 00E+00	5 56E-03	1 11E-02
Pu-240	2 4390E-04	12 97	25 95	0 00E+00	3 16E-03	6 33E-03
Pu-241	5 4058E-02	12 97	25 95	0 00E+00	7.01E-01	1 40E+00
Pu-242	3 6329E-07	12 97	25 95	0 00E+00	4.71E-06	9 43E-06
Ra-226	8 3742E-11	12 97	25 95	0 00E+00	1 09E-09	2 17E-09
Ra-228	5 7734E-15	12 97	25 95	0 00E+00	7 49E-14	1 50E-13
Ru-106	6 1356E-03	12 97	25 95	0 00E+00	7 96E-02	1 59E-01
Se-79	1.2936E-05	12 97	25 95	0 00E+00	1 68E-04	3 36E-04
Sn-126	1.1574E-05	12 97	25 95	0 00E+00	1 50E-04	3 00E-04
Sr-90	2 4417E+00	12 97	25 95	0 00E+00	3 17E+01	6.34E+01
Tc-99	4.2239E-04	12 97	25 95	0 00E+00	5 48E-03	1 10E-02
Th-229	2.8568E-12	12 97	25 95	0 00E+00	3 71E-11	7 41E-11
Th-230	2.5310E-08	12.97	25 95	0 00E+00	3 28E-07	6 57E-07
Th-232	1 1631E-14	12.97	25 95	0 00E+00	1 51E-13	3 02E-13
Tl-208	4 6705E-08	12 97	25 95	0 00E+00	6 06E-07	1.21E-06
U-232	1.3151E-07	12.97	25 95	0 00E+00	1 71E-06	3 41E-06
U-233	2 1650E-09	12 97	25 95	0 00E+00	2 81E-08	5 62E-08
U-234	1 8399E-04	12 97	25 95	0 00E+00	2 39E-03	4 77E-03
U-235	-2.7235E-06	12 97	0 00	1 38E-03	1 34E-03	1.38E-03
U-236	1 5493E-05	12 97	25 95	0 00E+00	2 01E-04	4.02E-04
U-238	-4.2851E-09	12 97	0 00	1 62E-05	1 62E-05	1 62E-05
Y-90	2 4423E+00	12 97	25 95	0 00E+00	3.17E+01	6 34E+01
Other Radionuclides					3.23E+01	6 45E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 529E+12
0 0250	7 427E+11
0 0375	6 475E+11
0 0575	6 840E+11
0 0850	4 162E+11
0 1250	2 911E+11
0 2250	3 574E+11
0 3750	1 602E+11
0 5750	2 600E+12
0 8500	1.268E+11
1.2500	4 128E+10
1 7500	1.507E+09
2.2500	9 966E+07
2 7500	1.391E+06
3.5000	1 656E+05
5 0000	1.381E+01
7 0000	1 534E+00
11 0000	1 726E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 11E-01	8.21E-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 95939437	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		12.97	Nominal burnup assumed to be 2% of BOL heavy metal mass
Bounding		25 95	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: IEA-R1 (UALX HEU) BRAZIL
SNF ID #: 954
Fuel Units & Descr: 43 - ASSEMBLY
Heavy Metal Mass: BOL=8.295kg EOL=4.975kg
ROD Storage Site SRS

[1]Fuel decay start date: 1998
Estimates as of: 2010
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: 10 years

Estimated Canister usage 18"x10'
1 19

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 8404E-10	3,143 73	6,287.45	0 00E+00	8 93E-07	1 79E-06
Am-241	1 4935E-03	3,143 73	6,287 45	0 00E+00	4 70E+00	9 39E+00
Am-242m	4 4390E-07	3,143 73	6,287.45	0 00E+00	1 40E-03	2 79E-03
Am-243	1.4913E-06	3,143 73	6,287.45	0 00E+00	4 69E-03	9 38E-03
C-14	5 7217E-09	3,143 73	6,287.45	0 00E+00	1.80E-05	3 60E-05
Cl-36	1.3124E-32	3,143 73	6,287.45	0 00E+00	4.13E-29	8 25E-29
Cm-243	2.0967E-07	3,143.73	6,287.45	0 00E+00	6.59E-04	1 32E-03
Cm-244	4.3001E-05	3,143 73	6,287.45	0 00E+00	1.35E-01	2 70E-01
Co-60	1.9798E-05	3,143.73	6,287.45	0 00E+00	6.22E-02	1 24E-01
Cs-134	9 0795E-02	3,143 73	6,287.45	0 00E+00	2 85E+02	5 71E+02
Cs-135	3.4477E-06	3,143 73	6,287 45	0 00E+00	1.08E-02	2 17E-02
Cs-137	2.5588E+00	3,143.73	6,287 45	0 00E+00	8 04E+03	1 61E+04
Eu-154	5 4847E-02	3,143 73	6,287 45	0 00E+00	1 72E+02	3 45E+02
Eu-155	1 9469E-02	3,143 73	6,287 45	0 00E+00	6 12E+01	1 22E+02
Fe-55	1 7797E-03	3,143 73	6,287 45	0 00E+00	5 59E+00	1 12E+01
H-3	8 0065E-03	3,143 73	6,287 45	0 00E+00	2 52E+01	5 03E+01
I-129	7.5300E-07	3,143 73	6,287 45	0 00E+00	2.37E-03	4 73E-03
Kr-85	2 0705E-01	3,143 73	6,287 45	0 00E+00	6 51E+02	1 30E+03
Np-237	9 5507E-06	3,143 73	6,287 45	0 00E+00	3 00E-02	6 00E-02
Pa-231	1.2740E-09	3,143 73	6,287 45	0 00E+00	4 00E-06	8 01E-06
Pb-210	1 1838E-11	3,143 73	6,287 45	0 00E+00	3 72E-08	7.44E-08
Pm-147	6 7974E-01	3,143 73	6,287 45	0 00E+00	2.14E+03	4 27E+03
Pu-238	1 9755E-02	3,143 73	6,287 45	0 00E+00	6.21E+01	1 24E+02
Pu-239	4 2838E-04	3,143 73	6,287 45	0 00E+00	1.35E+00	2 69E+00
Pu-240	2 4390E-04	3,143 73	6,287 45	0 00E+00	7 67E-01	1 53E+00
Pu-241	5 4058E-02	3,143 73	6,287 45	0.00E+00	1 70E+02	3 40E+02
Pu-242	3 6329E-07	3,143 73	6,287 45	0 00E+00	1 14E-03	2.28E-03
Ra-226	8 3742E-11	3,143 73	6,287 45	0 00E+00	2 63E-07	5.27E-07
Ra-228	5 7734E-15	3,143 73	6,287 45	0 00E+00	1 82E-11	3 63E-11
Ru-106	6 1356E-03	3,143 73	6,287 45	0 00E+00	1.93E+01	3 86E+01
Se-79	1 2936E-05	3,143 73	6,287 45	0 00E+00	4 07E-02	8.13E-02
Sn-126	1 1574E-05	3,143 73	6,287 45	0 00E+00	3 64E-02	7.28E-02
Sr-90	2 4417E+00	3,143 73	6,287 45	0 00E+00	7 68E+03	1.54E+04
Tc-99	4 2239E-04	3,143 73	6,287 45	0 00E+00	1.33E+00	2 66E+00
Th-229	2 8568E-12	3,143 73	6,287 45	0 00E+00	8 98E-09	1.80E-08
Th-230	2 5310E-08	3,143 73	6,287 45	0 00E+00	7 96E-05	1.59E-04
Th-232	1 1631E-14	3,143 73	6,287 45	0 00E+00	3 66E-11	7.31E-11
Tl-208	4 6705E-08	3,143 73	6,287.45	0 00E+00	1 47E-04	2.94E-04
U-232	1.3151E-07	3,143 73	6,287.45	0 00E+00	4 13E-04	8.27E-04
U-233	2 1650E-09	3,143 73	6,287 45	0 00E+00	6 81E-06	1.36E-05
U-234	1 8399E-04	3,143 73	6,287.45	0 00E+00	5 78E-01	1.16E+00
U-235	-2.7235E-06	3,143 73	0 00	1 67E-02	8 13E-03	1 67E-02
U-236	1.5493E-05	3,143 73	6,287.45	0 00E+00	4 87E-02	9 74E-02
U-238	-4.2851E-09	3,143 73	0.00	1 92E-04	1 79E-04	1 92E-04
Y-90	2 4423E+00	3,143 73	6,287.45	0 00E+00	7 68E+03	1.54E+04
Other Radionuclides					7 81E+03	1.56E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8.551E+14
0 0250	1.800E+14
0 0375	1.569E+14
0 0575	1 657E+14
0 0850	1.008E+14
0 1250	7.054E+13
0.2250	8 660E+13
0.3750	3.881E+13
0 5750	6.301E+14
0 8500	3.074E+13
1.2500	1 000E+13
1 7500	3 652E+11
2.2500	2 415E+10
2 7500	3.369E+08
3 5000	4 012E+07
5 0000	3.333E+03
7 0000	3 703E+02
11 0000	4 166E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9 95E+01	1.99E+02
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 10655847	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		3 143 73	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		6,287 45	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.20	
Bounding	2 41	

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: IEA-R1 (UALX LEU) BRAZIL
SNF ID #: 545
Fuel Units & Descr: 84 - ASSEMBLY
Heavy Metal Mass: BOL=63 554kg EOL=61 732kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1998
Estimates as of: 2010
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: 10 years

Estimated Canister usage: 18"x10' 3 50

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 8404E-10	1,726 23	3,452 45	0.00E+00	4 90E-07	9 81E-07
Am-241	1 4935E-03	1,726 23	3,452 45	0 00E+00	2 58E+00	5 16E+00
Am-242m	4 4390E-07	1,726 23	3,452 45	0 00E+00	7 66E-04	1.53E-03
Am-243	1 4913E-06	1,726 23	3,452 45	0 00E+00	2.57E-03	5.15E-03
C-14	5 7217E-09	1,726 23	3,452 45	0 00E+00	9 88E-06	1 98E-05
Cl-36	1 3124E-32	1,726 23	3,452 45	0 00E+00	2 27E-29	4.53E-29
Cm-243	2 0967E-07	1,726 23	3,452 45	0 00E+00	3 62E-04	7.24E-04
Cm-244	4.3001E-05	1,726 23	3,452 45	0 00E+00	7.42E-02	1.48E-01
Co-60	1 9798E-05	1,726.23	3,452 45	0 00E+00	3 42E-02	6 84E-02
Cs-134	9 0795E-02	1,726.23	3,452 45	0 00E+00	1 57E+02	3 13E+02
Cs-135	3 4477E-06	1,726 23	3,452 45	0 00E+00	5 95E-03	1.19E-02
Cs-137	2.5588E+00	1,726.23	3,452 45	0 00E+00	4 42E+03	8 83E+03
Eu-154	5 4847E-02	1,726 23	3,452 45	0 00E+00	9 47E+01	1 89E+02
Eu-155	1 9469E-02	1,726.23	3,452 45	0 00E+00	3 36E+01	6 72E+01
Fe-55	1 7797E-03	1,726.23	3,452 45	0 00E+00	3 07E+00	6 14E+00
H-3	8 0065E-03	1,726.23	3,452 45	0 00E+00	1 38E+01	2 76E+01
I-129	7 5300E-07	1,726.23	3,452 45	0 00E+00	1.30E-03	2.60E-03
Kr-85	2 0705E-01	1,726.23	3,452 45	0 00E+00	3 57E+02	7 15E+02
Np-237	9 5507E-06	1,726.23	3,452 45	0 00E+00	1 65E-02	3.30E-02
Pa-231	1.2740E-09	1,726.23	3,452 45	0 00E+00	2.20E-06	4 40E-06
Pb-210	1 1838E-11	1,726.23	3,452 45	0 00E+00	2.04E-08	4 09E-08
Pm-147	6 7974E-01	1,726.23	3,452 45	0 00E+00	1 17E+03	2 35E+03
Pu-238	1 9755E-02	1,726.23	3,452 45	0 00E+00	3.41E+01	6 82E+01
Pu-239	4 2838E-04	1,726.23	3,452 45	0 00E+00	7.39E-01	1 48E+00
Pu-240	2 4390E-04	1,726.23	3,452 45	0 00E+00	4.21E-01	8 42E-01
Pu-241	5 4058E-02	1,726.23	3,452 45	0 00E+00	9.33E+01	1 87E+02
Pu-242	3 6329E-07	1,726.23	3,452 45	0 00E+00	6.27E-04	1.25E-03
Ra-226	8 3742E-11	1,726.23	3,452 45	0 00E+00	1 45E-07	2 89E-07
Ra-228	5 7734E-15	1,726.23	3,452 45	0 00E+00	9 97E-12	1 99E-11
Ru-106	6 1356E-03	1,726.23	3,452 45	0 00E+00	1 06E+01	2.12E+01
Se-79	1 2936E-05	1,726.23	3,452 45	0 00E+00	2.23E-02	4 47E-02
Sn-126	1 1574E-05	1,726.23	3,452 45	0 00E+00	2 00E-02	4 00E-02
Sr-90	2 4417E+00	1,726.23	3,452 45	0 00E+00	4.21E+03	8 43E+03
Tc-99	4 2239E-04	1,726.23	3,452 45	0 00E+00	7.29E-01	1 46E+00
Th-229	2 8568E-12	1,726.23	3,452 45	0 00E+00	4 93E-09	9 86E-09
Th-230	2 5310E-08	1,726.23	3,452 45	0 00E+00	4 37E-05	8 74E-05
Th-232	1 1631E-14	1,726.23	3,452 45	0 00E+00	2 01E-11	4 02E-11
Tl-208	4 6705E-08	1,726.23	3,452 45	0 00E+00	8 06E-05	1 61E-04
U-232	1 3151E-07	1,726.23	3,452 45	0 00E+00	2.27E-04	4 54E-04
U-233	2 1650E-09	1,726.23	3,452 45	0 00E+00	3 74E-06	7 47E-06
U-234	1 8399E-04	1,726.23	3,452 45	0 00E+00	3 18E-01	6 35E-01
U-235	-2.7235E-06	1,726.23	0 00	2.70E-02	2.23E-02	2.70E-02
U-236	1 5493E-05	1,726.23	3,452 45	0 00E+00	2 67E-02	5 35E-02
U-238	-4 2851E-09	1,726.23	0 00	1 72E-02	1 72E-02	1 72E-02
Y-90	2 4423E+00	1,726.23	3,452 45	0 00E+00	4.22E+03	8 43E+03
Other Radionuclides					4.29E+03	8 58E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	4 695E+14
0 0250	9.882E+13
0 0375	8 615E+13
0 0575	9 101E+13
0 0850	5.537E+13
0 1250	3 873E+13
0 2250	4 755E+13
0 3750	2 131E+13
0 5750	3 460E+14
0 8500	1 688E+13
1 2500	5 493E+12
1 7500	2 006E+11
2.2500	1 326E+10
2.7500	1 850E+08
3 5000	2.203E+07
5 0000	1 869E+03
7 0000	2 079E+02
11 0000	2 340E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 46E+01	1 09E+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 66156126	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		1,726.23
Bounding		3 452 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 09	
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 IEA-R1 (UALX LEU) BRAZIL
SNF ID # 1076 -
Fuel Units & Descr 39 - ASSEMBLY
Heavy Metal Mass BOL=29 507kg EOL=28 661kg
ROD Storage Site SRS

[1]Fuel decay start date 1998
Estimates as of 2010
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 10 years

Estimated Canister usage: 18"x10' 1 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 8404E-10	801 46	1,602 93	0 00E+00	2.28E-07	4 55E-07
Am-241	1 4935E-03	801 46	1,602 93	0 00E+00	1.20E+00	2 39E+00
Am-242m	4 4390E-07	801.46	1,602.93	0 00E+00	3 56E-04	7 12E-04
Am-243	1 4913E-06	801.46	1,602 93	0 00E+00	1 20E-03	2 39E-03
C-14	5 7217E-09	801 46	1,602 93	0 00E+00	4 59E-06	9.17E-06
Cl-36	1.3124E-32	801 46	1,602 93	0 00E+00	1 05E-29	2.10E-29
Cm-243	2 0967E-07	801 46	1,602 93	0 00E+00	1 68E-04	3.36E-04
Cm-244	4 3001E-05	801 46	1,602 93	0 00E+00	3 45E-02	6 89E-02
Co-60	1 9798E-05	801 46	1,602 93	0 00E+00	1 59E-02	3 17E-02
Cs-134	9 0795E-02	801 46	1,602 93	0 00E+00	7.28E+01	1 46E+02
Cs-135	3 4477E-06	801 46	1,602 93	0 00E+00	2 76E-03	5 53E-03
Cs-137	2 5588E+00	801.46	1,602 93	0 00E+00	2 05E+03	4 10E+03
Eu-154	5 4847E-02	801.46	1,602.93	0 00E+00	4 40E+01	8 79E+01
Eu-155	1 9469E-02	801 46	1,602 93	0 00E+00	1 56E+01	3 12E+01
Fe-55	1 7797E-03	801 46	1,602 93	0 00E+00	1 43E+00	2 85E+00
H-3	8 0065E-03	801 46	1,602 93	0 00E+00	6 42E+00	1.28E+01
I-129	7.5300E-07	801 46	1,602 93	0 00E+00	6 03E-04	1.21E-03
Kr-85	2.0705E-01	801 46	1,602 93	0 00E+00	1 66E+02	3.32E+02
Np-237	9 5507E-06	801 46	1,602 93	0 00E+00	7 65E-03	1.53E-02
Pa-231	1.2740E-09	801 46	1,602 93	0 00E+00	1 02E-06	2 04E-06
Pb-210	1 1838E-11	801.46	1,602 93	0 00E+00	9 49E-09	1 90E-08
Pm-147	6 7974E-01	801.46	1,602.93	0 00E+00	5 45E+02	1 09E+03
Pu-238	1 9755E-02	801.46	1,602 93	0 00E+00	1 58E+01	3 17E+01
Pu-239	4 2838E-04	801 46	1,602 93	0 00E+00	3 43E-01	6 87E-01
Pu-240	2 4390E-04	801 46	1,602 93	0 00E+00	1 95E-01	3 91E-01
Pu-241	5 4058E-02	801 46	1,602 93	0 00E+00	4 33E+01	8 67E+01
Pu-242	3 6329E-07	801 46	1,602 93	0 00E+00	2 91E-04	5 82E-04
Ra-226	8.3742E-11	801 46	1,602 93	0 00E+00	6 71E-08	1.34E-07
Ra-228	5 7734E-15	801 46	1,602 93	0 00E+00	4 63E-12	9 25E-12
Ru-106	6 1356E-03	801 46	1,602 93	0 00E+00	4 92E+00	9 83E+00
Se-79	1.2936E-05	801 46	1,602 93	0 00E+00	1 04E-02	2 07E-02
Sn-126	1 1574E-05	801.46	1,602.93	0 00E+00	9 28E-03	1 86E-02
Sr-90	2 4417E+00	801.46	1,602.93	0 00E+00	1 96E+03	3 91E+03
Tc-99	4 2239E-04	801.46	1,602 93	0 00E+00	3 39E-01	6 77E-01
Th-229	2 8568E-12	801.46	1,602 93	0 00E+00	2 29E-09	4.58E-09
Th-230	2 5310E-08	801 46	1,602 93	0 00E+00	2 03E-05	4 06E-05
Th-232	1.1631E-14	801 46	1,602 93	0 00E+00	9.32E-12	1 86E-11
Tl-208	4 6705E-08	801 46	1,602 93	0 00E+00	3 74E-05	7 49E-05
U-232	1.3151E-07	801 46	1,602 93	0 00E+00	1.05E-04	2.11E-04
U-233	2 1650E-09	801 46	1,602 93	0 00E+00	1 74E-06	3 47E-06
U-234	1 8399E-04	801 46	1,602 93	0 00E+00	1 47E-01	2 95E-01
U-235	-2 7235E-06	801.46	0 00	1.25E-02	1 04E-02	1.25E-02
U-236	1.5493E-05	801.46	1,602 93	0 00E+00	1 24E-02	2 48E-02
U-238	-4.2851E-09	801 46	0 00	7 97E-03	7 96E-03	7.97E-03
Y-90	2 4423E+00	801 46	1,602 93	0 00E+00	1 96E+03	3 91E+03
Other Radionuclides					1 99E+03	3 98E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 180E+14
0 0250	4 588E+13
0.0375	4 000E+13
0 0575	4.226E+13
0 0850	2.571E+13
0 1250	1 798E+13
0.2250	2.208E+13
0 3750	9.895E+12
0 5750	1 606E+14
0 8500	7.836E+12
1.2500	2.550E+12
1.7500	9 312E+10
2.2500	6 156E+09
2.7500	8 590E+07
3.5000	1 023E+07
5 0000	8 679E+02
7 0000	9 651E+01
11 0000	1 086E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.54E+01	5 07E+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 66156126	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		801 46
Bounding		1,602.93

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 09	
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: IOWA ST. UNIV (HEU UALX)
SNF ID #: 792
Fuel Units & Descr: 22 - FLAT PLATES IN CAN
Heavy Metal Mass: BOL=3 478kg; EOL=3 474kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1996
Estimates as of: 2010
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: 10 years

Estimated Canister usage: 18"x10' — 0 61

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	2 8404E-10	4 17	8 33	0 00E+00	1 18E-09	2 37E-09
Am-241	1 4935E-03	4 17	8 33	0 00E+00	6 22E-03	1.24E-02
Am-242m	4 4390E-07	4 17	8 33	0 00E+00	1 85E-06	3 70E-06
Am-243	1 4913E-06	4.17	8 33	0 00E+00	6 21E-06	1.24E-05
C-14	5.7217E-09	4.17	8 33	0 00E+00	2 38E-08	4.77E-08
Cl-36	1.3124E-32	4.17	8 33	0 00E+00	5 47E-32	1.09E-31
Cm-243	2.0967E-07	4.17	8 33	0 00E+00	8 74E-07	1.75E-06
Cm-244	4 3001E-05	4 17	8.33	0 00E+00	1 79E-04	3 58E-04
Co-60	1 9798E-05	4 17	8.33	0 00E+00	8.25E-05	1 65E-04
Cs-134	9 0795E-02	4 17	8.33	0 00E+00	3 78E-01	7 57E-01
Cs-135	3 4477E-06	4 17	8.33	0 00E+00	1.44E-05	2 87E-05
Cs-137	2 5588E+00	4 17	8.33	0.00E+00	1 07E+01	2 13E+01
Eu-154	5 4847E-02	4 17	8.33	0 00E+00	2.29E-01	4 57E-01
Eu-155	1 9469E-02	4 17	8 33	0 00E+00	8.11E-02	1 62E-01
Fe-55	1 7797E-03	4 17	8 33	0 00E+00	7 42E-03	1 48E-02
H-3	8 0065E-03	4 17	8 33	0 00E+00	3 34E-02	6 67E-02
I-129	7 5300E-07	4 17	8 33	0 00E+00	3 14E-06	6 28E-06
Kr-85	2 0705E-01	4 17	8 33	0 00E+00	8 63E-01	1 73E+00
Np-237	9 5507E-06	4 17	8 33	0 00E+00	3 98E-05	7 96E-05
Pa-231	1 2740E-09	4 17	8 33	0 00E+00	5 31E-09	1 06E-08
Pb-210	1 1838E-11	4 17	8 33	0 00E+00	4 93E-11	9 87E-11
Pm-147	6 7974E-01	4 17	8 33	0 00E+00	2 83E+00	5 66E+00
Pu-238	1 9755E-02	4 17	8 33	0 00E+00	8 23E-02	1 65E-01
Pu-239	4.2838E-04	4 17	8 33	0 00E+00	1 78E-03	3 57E-03
Pu-240	2 4390E-04	4 17	8 33	0 00E+00	1 02E-03	2.03E-03
Pu-241	5 4058E-02	4.17	8.33	0 00E+00	2 25E-01	4.51E-01
Pu-242	3 6329E-07	4.17	8.33	0 00E+00	1 51E-06	3 03E-06
Ra-226	8.3742E-11	4.17	8.33	0 00E+00	3 49E-10	6 98E-10
Ra-228	5.7734E-15	4.17	8.33	0 00E+00	2.41E-14	4 81E-14
Ru-106	6.1356E-03	4 17	8.33	0.00E+00	2.56E-02	5 11E-02
Se-79	1.2936E-05	4 17	8.33	0.00E+00	5.39E-05	1 08E-04
Sn-126	1 1574E-05	4 17	8.33	0 00E+00	4 82E-05	9 65E-05
Sr-90	2 4417E+00	4 17	8 33	0 00E+00	1 02E+01	2 03E+01
Tc-99	4.2239E-04	4 17	8 33	0 00E+00	1 76E-03	3 52E-03
Th-229	2 8568E-12	4 17	8 33	0 00E+00	1.19E-11	2 38E-11
Th-230	2 5310E-08	4 17	8 33	0 00E+00	1 05E-07	2 11E-07
Th-232	1 1631E-14	4 17	8 33	0 00E+00	4 85E-14	9 69E-14
Tl-208	4 6705E-08	4 17	8 33	0 00E+00	1 95E-07	3 89E-07
U-232	1 3151E-07	4 17	8 33	0 00E+00	5 48E-07	1 10E-06
U-233	2 1650E-09	4 17	8 33	0 00E+00	9 02E-09	1 80E-08
U-234	1 8399E-04	4 17	8 33	0 00E+00	7 67E-04	1 53E-03
U-235	-2 7235E-06	4 17	0 00	7 01E-03	7 00E-03	7 01E-03
U-236	1.5493E-05	4 17	8 33	0 00E+00	6 46E-05	1.29E-04
U-238	-4 2851E-09	4 17	0 00	7 82E-05	7 82E-05	7.82E-05
Y-90	2.4423E+00	4.17	8 33	0 00E+00	1 02E+01	2 04E+01
Other Radionuclides					1.04E+01	2 07E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 134E+12
0 0250	2.385E+11
0 0375	2 080E+11
0 0575	2.197E+11
0 0850	1 337E+11
0 1250	9 354E+10
0.2250	1 149E+11
0 3750	5 144E+10
0 5750	8 352E+11
0 8500	4 074E+10
1.2500	1.326E+10
1 7500	4 841E+08
2.2500	3.201E+07
2.7500	4 466E+05
3.5000	5 317E+04
5.0000	4 691E+00
7 0000	5.217E-01
11 0000	5 872E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.32E-01	2.64E-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 %	93.30981127	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		4 17	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		8.33	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 IOWA STATE UNIVERSITY (U3SI2 LEU)
SNF ID # 953
Fuel Units & Descr 24 - 24 FLAT PLATES
Heavy Metal Mass BOL=19 205kg EOL=19 195kg
ROD Storage Site SRS

[1]Fuel decay start date 1998
Estimates as of 2010
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 10 years

Estimated Canister usage
18"x10'
0 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	2 8404E-10	9 09	18 18	0 00E+00	2 58E-09	5 16E-09
Am-241	1.4935E-03	9 09	18 18	0 00E+00	1.36E-02	2 72E-02
Am-242m	4 4390E-07	9 09	18 18	0 00E+00	4.04E-06	8 07E-06
Am-243	1 4913E-06	9 09	18 18	0 00E+00	1.36E-05	2 71E-05
C-14	5 7217E-09	9 09	18.18	0 00E+00	5.20E-08	1.04E-07
Cl-36	1 3124E-32	9 09	18 18	0 00E+00	1 19E-31	2.39E-31
Cm-243	2 0967E-07	9 09	18 18	0 00E+00	1 91E-06	3 81E-06
Cm-244	4 3001E-05	9 09	18 18	0 00E+00	3 91E-04	7 82E-04
Co-60	1 9798E-05	9 09	18 18	0 00E+00	1 80E-04	3 60E-04
Cs-134	9 0795E-02	9 09	18 18	0 00E+00	8 25E-01	1 65E+00
Cs-135	3 4477E-06	9 09	18 18	0 00E+00	3 13E-05	6 27E-05
Cs-137	2 5588E+00	9 09	18 18	0 00E+00	2 33E+01	4 65E+01
Eu-154	5 4847E-02	9 09	18 18	0 00E+00	4 99E-01	9 97E-01
Eu-155	1 9469E-02	9 09	18.18	0 00E+00	1.77E-01	3.54E-01
Fe-55	1 7797E-03	9 09	18 18	0 00E+00	1 62E-02	3.24E-02
H-3	8 0065E-03	9 09	18 18	0 00E+00	7.28E-02	1.46E-01
I-129	7 5300E-07	9 09	18 18	0 00E+00	6 85E-06	1.37E-05
Kr-85	2 0705E-01	9 09	18 18	0 00E+00	1 88E+00	3 76E+00
Np-237	9 5507E-06	9 09	18 18	0 00E+00	8 68E-05	1 74E-04
Pa-231	1.2740E-09	9 09	18 18	0 00E+00	1 16E-08	2 32E-08
Pb-210	1.1838E-11	9 09	18 18	0 00E+00	1 08E-10	2.15E-10
Pm-147	6 7974E-01	9 09	18 18	0 00E+00	6 18E+00	1 24E+01
Pu-238	1 9755E-02	9 09	18 18	0 00E+00	1 80E-01	3 59E-01
Pu-239	4 2838E-04	9 09	18.18	0 00E+00	3.89E-03	7.79E-03
Pu-240	2 4390E-04	9 09	18 18	0 00E+00	2.22E-03	4.43E-03
Pu-241	5 4058E-02	9 09	18 18	0 00E+00	4 91E-01	9 83E-01
Pu-242	3 6329E-07	9 09	18 18	0 00E+00	3 30E-06	6 61E-06
Ra-226	8 3742E-11	9 09	18 18	0 00E+00	7 61E-10	1 52E-09
Ra-228	5 7734E-15	9 09	18 18	0 00E+00	5 25E-14	1 05E-13
Ru-106	6 1356E-03	9 09	18 18	0 00E+00	5 58E-02	1 12E-01
Se-79	1.2936E-05	9 09	18 18	0 00E+00	1 18E-04	2 35E-04
Sn-126	1.1574E-05	9 09	18 18	0 00E+00	1 05E-04	2 10E-04
Sr-90	2 4417E+00	9 09	18.18	0 00E+00	2 22E+01	4 44E+01
Tc-99	4.2239E-04	9 09	18 18	0 00E+00	3 84E-03	7.68E-03
Th-229	2 8568E-12	9 09	18 18	0 00E+00	2.60E-11	5.19E-11
Th-230	2 5310E-08	9 09	18 18	0 00E+00	2.30E-07	4 60E-07
Th-232	1 1631E-14	9 09	18 18	0 00E+00	1 06E-13	2 11E-13
Tl-208	4 6705E-08	9 09	18 18	0 00E+00	4.25E-07	8 49E-07
U-232	1 3151E-07	9 09	18 18	0 00E+00	1.20E-06	2 39E-06
U-233	2 1650E-09	9 09	18 18	0 00E+00	1 97E-08	3 94E-08
U-234	1.8399E-04	9 09	18 18	0 00E+00	1 67E-03	3.35E-03
U-235	-2 7235E-06	9 09	0 00	8.20E-03	8.18E-03	8.20E-03
U-236	1.5493E-05	9 09	18.18	0 00E+00	1.41E-04	2.82E-04
U-238	-4 2851E-09	9 09	0 00	5 18E-03	5 18E-03	5 18E-03
Y-90	2 4423E+00	9 09	18 18	0 00E+00	2.22E+01	4 44E+01
Other Radionuclides					2.26E+01	4.52E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	2 473E+12
0 0250	5.204E+11
0 0375	4 537E+11
0 0575	4 793E+11
0 0850	2.916E+11
0 1250	2 040E+11
0 2250	2.506E+11
0 3750	1 122E+11
0 5750	1.822E+12
0.8500	8 889E+10
1.2500	2 893E+10
1 7500	1 056E+09
2.2500	6 983E+07
2 7500	9 745E+05
3 5000	1.160E+05
5 0000	2.161E+01
7 0000	2 449E+00
11 0000	2.789E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.88E-01	5 76E-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 76527712	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	0 02	9 09
Bounding		18 18

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	473 39
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: JEN-1 (HEU UALX) SPAIN
SNF ID #: 795
Fuel Units & Descr: 23 - 16 CURVED PLATES
Heavy Metal Mass: BOL=4 002kg, EOL=3 783kg
ROD Storage Site SRS

[1]Fuel decay start date: 1995
Estimates as of: 2010
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: 15 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	4 5861E-10	206 92	413 85	0 00E+00	9 49E-08	1 90E-07
Am-241	1.7832E-03	206.92	413 85	0 00E+00	3 69E-01	7 38E-01
Am-242m	4 3410E-07	206.92	413 85	0 00E+00	8 98E-05	1 80E-04
Am-243	1 4907E-06	206 92	413 85	0 00E+00	3 08E-04	6 17E-04
C-14	5 7162E-09	206 92	413 85	0 00E+00	1 18E-06	2 37E-06
Cl-36	1 3124E-32	206 92	413 85	0 00E+00	2 72E-30	5 43E-30
Cm-243	1 8568E-07	206 92	413 85	0 00E+00	3 84E-05	7 68E-05
Cm-244	3 5512E-05	206 92	413 85	0 00E+00	7 35E-03	1 47E-02
Co-60	1 0261E-05	206 92	413 85	0 00E+00	2 12E-03	4.25E-03
Cs-134	1 6931E-02	206 92	413 85	0 00E+00	3 50E+00	7 01E+00
Cs-135	3 4477E-06	206 92	413 85	0 00E+00	7.13E-04	1 43E-03
Cs-137	2 2800E+00	206 92	413 85	0 00E+00	4.72E+02	9 44E+02
Eu-154	3 6656E-02	206 92	413 85	0 00E+00	7.58E+00	1 52E+01
Eu-155	9 6841E-03	206 92	413 85	0 00E+00	2 00E+00	4 01E+00
Fe-55	4 6977E-04	206 92	413 85	0 00E+00	9.72E-02	1 94E-01
H-3	6 0485E-03	206 92	413 85	0 00E+00	1 25E+00	2 50E+00
I-129	7 5300E-07	206 92	413 85	0 00E+00	1.56E-04	3 12E-04
Kr-85	1 4989E-01	206 92	413 85	0 00E+00	3 10E+01	6 20E+01
Np-237	9.5534E-06	206 92	413 85	0 00E+00	1 98E-03	3 95E-03
Pa-231	1 6550E-09	206 92	413 85	0 00E+00	3 42E-07	6 85E-07
Pb-210	2 6631E-11	206 92	413 85	0 00E+00	5 51E-09	1 10E-08
Pm-147	1 8156E-01	206 92	413 85	0 00E+00	3 76E+01	7.51E+01
Pu-238	1 8990E-02	206 92	413.85	0 00E+00	3 93E+00	7 86E+00
Pu-239	4 2838E-04	206 92	413.85	0 00E+00	8 86E-02	1.77E-01
Pu-240	2 4379E-04	206 92	413 85	0 00E+00	5 04E-02	1 01E-01
Pu-241	4 2511E-02	206 92	413 85	0 00E+00	8 80E+00	1 76E+01
Pu-242	3 6329E-07	206 92	413 85	0 00E+00	7 52E-05	1 50E-04
Ra-226	1 4725E-10	206 92	413 85	0 00E+00	3 05E-08	6 09E-08
Ra-228	8 9760E-15	206 92	413 85	0 00E+00	1 86E-12	3.71E-12
Ru-106	1 9752E-04	206 92	413 85	0 00E+00	4 09E-02	8 17E-02
Se-79	1.2933E-05	206.92	413 85	0 00E+00	2 68E-03	5 35E-03
Sn-126	1 1574E-05	206.92	413 85	0 00E+00	2 39E-03	4 79E-03
Sr-90	2.1680E+00	206 92	413 85	0 00E+00	4 49E+02	8 97E+02
Tc-99	4.2239E-04	206 92	413 85	0 00E+00	8 74E-02	1 75E-01
Th-229	3 9270E-12	206 92	413 85	0 00E+00	8 13E-10	1 63E-09
Th-230	3 3578E-08	206 92	413.85	0 00E+00	6 95E-06	1 39E-05
Th-232	1 5452E-14	206 92	413 85	0 00E+00	3 20E-12	6 39E-12
Tl-208	4 6705E-08	206 92	413 85	0 00E+00	9 66E-06	1.93E-05
U-232	1 3045E-07	206 92	413 85	0 00E+00	2 70E-05	5 40E-05
U-233	2 3739E-09	206 92	413 85	0 00E+00	4 91E-07	9 82E-07
U-234	1 8423E-04	206 92	413 85	0 00E+00	3 81E-02	7 62E-02
U-235	-2 7235E-06	206 92	0 00	6.71E-03	6 15E-03	6.71E-03
U-236	1 5493E-05	206 92	413 85	0 00E+00	3.21E-03	6 41E-03
U-238	-4 2851E-09	206 92	0 00	3 01E-04	3 01E-04	3 01E-04
Y-90	2 1686E+00	206 92	413 85	0 00E+00	4 49E+02	8 97E+02
Other Radionuclides					4 50E+02	9 00E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 937E+13
0 0250	1 030E+13
0 0375	8 990E+12
0 0575	9 586E+12
0 0850	5 807E+12
0 1250	3 981E+12
0.2250	5 003E+12
0 3750	2 192E+12
0.5750	3.557E+13
0.8500	8 450E+11
1.2500	4.268E+11
1 7500	1 789E+10
2.2500	2.237E+07
2.7500	1.345E+06
3 5000	8 547E+04
5 0000	1 984E+02
7 0000	2.198E+01
11 0000	2.468E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 60E+00	1.12E+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 %	77 58892697	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		206 92	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		413 85	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 16	
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 JEN-1 (UALX LEU) SPAIN
SNF ID # 749
Fuel Units & Descr 18 - 16 CURVED PLATES
Heavy Metal Mass. BOL=12.64kg EOL=12 447kg
ROD Storage Site SRS

[1]Fuel decay start date 1995
Estimates as of 2010
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 15 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	4 5861E-10	182 40	364 79	0 00E+00	8 36E-08	1 67E-07
Am-241	1.7832E-03	182 40	364 79	0 00E+00	3 25E-01	6 51E-01
Am-242m	4.3410E-07	182 40	364 79	0 00E+00	7 92E-05	1 58E-04
Am-243	1 4907E-06	182 40	364 79	0 00E+00	2.72E-04	5.44E-04
C-14	5 7162E-09	182 40	364 79	0 00E+00	1 04E-06	2 09E-06
Cl-36	1 3124E-32	182 40	364 79	0 00E+00	2.39E-30	4 79E-30
Cm-243	1 8568E-07	182 40	364 79	0 00E+00	3 39E-05	6 77E-05
Cm-244	3 5512E-05	182 40	364 79	0 00E+00	6 48E-03	1 30E-02
Co-60	1.0261E-05	182 40	364 79	0 00E+00	1 87E-03	3 74E-03
Cs-134	1 6931E-02	182 40	364 79	0 00E+00	3 09E+00	6 18E+00
Cs-135	3 4477E-06	182 40	364 79	0 00E+00	6.29E-04	1.26E-03
Cs-137	2 2800E+00	182 40	364 79	0 00E+00	4.16E+02	8.32E+02
Eu-154	3 6656E-02	182.40	364 79	0 00E+00	6 69E+00	1.34E+01
Eu-155	9 6841E-03	182.40	364 79	0 00E+00	1 77E+00	3 53E+00
Fe-55	4 6977E-04	182 40	364 79	0 00E+00	8 57E-02	1 71E-01
H-3	6.0485E-03	182 40	364 79	0 00E+00	1 10E+00	2 21E+00
I-129	7.5300E-07	182 40	364 79	0 00E+00	1.37E-04	2 75E-04
Kr-85	1 4989E-01	182 40	364.79	0 00E+00	2 73E+01	5 47E+01
Np-237	9 5534E-06	182 40	364 79	0 00E+00	1 74E-03	3.48E-03
Pa-231	1 6550E-09	182.40	364 79	0 00E+00	3 02E-07	6 04E-07
Pb-210	2 6631E-11	182.40	364 79	0 00E+00	4 86E-09	9 71E-09
Pm-147	1 8156E-01	182 40	364 79	0 00E+00	3 31E+01	6 62E+01
Pu-238	1.8990E-02	182 40	364 79	0 00E+00	3 46E+00	6 93E+00
Pu-239	4.2838E-04	182 40	364 79	0 00E+00	7 81E-02	1 56E-01
Pu-240	2 4379E-04	182 40	364 79	0 00E+00	4.45E-02	8 89E-02
Pu-241	4 2511E-02	182 40	364 79	0 00E+00	7.75E+00	1.55E+01
Pu-242	3 6329E-07	182.40	364 79	0 00E+00	6 63E-05	1.33E-04
Ra-226	1 4725E-10	182.40	364 79	0 00E+00	2 69E-08	5 37E-08
Ra-228	8 9760E-15	182 40	364 79	0 00E+00	1 64E-12	3 27E-12
Ru-106	1.9752E-04	182 40	364 79	0 00E+00	3 60E-02	7.21E-02
Se-79	1.2933E-05	182 40	364 79	0 00E+00	2 36E-03	4.72E-03
Sn-126	1 1574E-05	182 40	364.79	0 00E+00	2.11E-03	4.22E-03
Sr-90	2 1680E+00	182 40	364 79	0 00E+00	3.95E+02	7.91E+02
Tc-99	4 2239E-04	182 40	364 79	0 00E+00	7 70E-02	1.54E-01
Th-229	3 9270E-12	182.40	364 79	0 00E+00	7 16E-10	1 43E-09
Th-230	3 3578E-08	182 40	364 79	0 00E+00	6 12E-06	1 22E-05
Th-232	1.5452E-14	182 40	364 79	0 00E+00	2 82E-12	5 64E-12
Tl-208	4.6705E-08	182 40	364 79	0 00E+00	8 52E-06	1.70E-05
U-232	1.3045E-07	182 40	364.79	0.00E+00	2.38E-05	4.76E-05
U-233	2 3739E-09	182 40	364 79	0 00E+00	4.33E-07	8 66E-07
U-234	1 8423E-04	182 40	364 79	0 00E+00	3 36E-02	6 72E-02
U-235	-2.7235E-06	182 40	0 00	5 25E-03	4 75E-03	5 25E-03
U-236	1.5493E-05	182.40	364 79	0 00E+00	2 83E-03	5 65E-03
U-238	-4.2851E-09	182 40	0 00	3 43E-03	3 43E-03	3 43E-03
Y-90	2.1686E+00	182 40	364 79	0 00E+00	3 96E+02	7 91E+02
Other Radionuclides					3 97E+02	7 93E+02

Gamma Sources

Photon Energy Group (Avg MeV)	Total Photons/sec (bounding)
0 0150	4.352E+13
0 0250	9 076E+12
0 0375	7 925E+12
0 0575	8 450E+12
0.0850	5 118E+12
0 1250	3 509E+12
0.2250	4 410E+12
0 3750	1 932E+12
0 5750	3 136E+13
0 8500	7.448E+11
1.2500	3 762E+11
1.7500	1.577E+10
2.2500	1 972E+07
2 7500	1 185E+06
3.5000	7.536E+04
5 0000	1.821E+02
7 0000	2.020E+01
11 0000	2.271E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 94E+00	9.87E+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 %	19 22438767	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		182.40
Bounding		364 79

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 05	
Bounding	0 09	

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: JMTR
SNF ID #: 507
Fuel Units & Descr: 574 - ASSEMBLY
Heavy Metal Mass: BOL=1176 7kg; EOL=1106 098kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1983
Estimates as of: 2010
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' 23 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	1 1465E-09	66,861 47	133,722 93	0 00E+00	7 67E-05	1 53E-04
Am-241	2 3056E-03	66,861 47	133,722 93	0 00E+00	1 54E+02	3 08E+02
Am-242m	4 1476E-07	66,861.47	133,722 93	0 00E+00	2.77E-02	5 55E-02
Am-243	1 4894E-06	66,861 47	133,722.93	0 00E+00	9 96E-02	1 99E-01
C-14	5 7108E-09	66,861 47	133,722 93	0 00E+00	3 82E-04	7 64E-04
Cl-36	1 3124E-32	66,861 47	133,722 93	0 00E+00	8.77E-28	1 75E-27
Cm-243	1 4562E-07	66,861 47	133,722 93	0 00E+00	9 74E-03	1 95E-02
Cm-244	2 4221E-05	66,861 47	133,722 93	0 00E+00	1 62E+00	3.24E+00
Co-60	2 7560E-06	66,861 47	133,722 93	0 00E+00	1 84E-01	3 69E-01
Cs-134	5 8851E-04	66,861 47	133,722 93	0 00E+00	3 93E+01	7 87E+01
Cs-135	3 4477E-06	66,861 47	133,722 93	0 00E+00	2 31E-01	4 61E-01
Cs-137	1 8099E+00	66,861 47	133,722 93	0 00E+00	1 21E+05	2 42E+05
Eu-154	1 6386E-02	66,861 47	133,722 93	0 00E+00	1 10E+03	2.19E+03
Eu-155	2 3957E-03	66,861 47	133,722 93	0 00E+00	1 60E+02	3 20E+02
Fe-55	3.2707E-05	66,861 47	133,722 93	0 00E+00	2 19E+00	4 37E+00
H-3	3 4504E-03	66,861 47	133,722 93	0 00E+00	2 31E+02	4 61E+02
I-129	7 5300E-07	66,861 47	133,722 93	0 00E+00	5 03E-02	1 01E-01
Kr-85	7.8540E-02	66,861 47	133,722 93	0 00E+00	5.25E+03	1 05E+04
Np-237	9.5615E-06	66,861 47	133,722.93	0 00E+00	6 39E-01	1 28E+00
Pa-231	2.7968E-09	66 861 47	133,722 93	0 00E+00	1 87E-04	3 74E-04
Pb-210	1.2612E-10	66,861 47	133,722 93	0 00E+00	8 43E-06	1 69E-05
Pm-147	1.2952E-02	66,861.47	133,722.93	0 00E+00	8.66E+02	1 73E+03
Pu-238	1 7549E-02	66,861.47	133,722.93	0 00E+00	1 17E+03	2 35E+03
Pu-239	4 2810E-04	66,861.47	133,722.93	0 00E+00	2 86E+01	5 72E+01
Pu-240	2 4357E-04	66,861 47	133,722 93	0 00E+00	1 63E+01	3.26E+01
Pu-241	2 6277E-02	66,861 47	133,722 93	0 00E+00	1 76E+03	3 51E+03
Pu-242	3 6329E-07	66,861 47	133,722.93	0 00E+00	2 43E-02	4 86E-02
Ra-226	4 4444E-10	66,861 47	133,722 93	0 00E+00	2 97E-05	5 94E-05
Ra-228	1 9714E-14	66,861 47	133,722 93	0 00E+00	1 32E-09	2 64E-09
Ru-106	2 0477E-07	66,861 47	133,722 93	0 00E+00	1 37E-02	2.74E-02
Se-79	1 2933E-05	66,861 47	133,722 93	0 00E+00	8 65E-01	1 73E+00
Sn-126	1 1574E-05	66,861 47	133,722 93	0 00E+00	7 74E-01	1 55E+00
Sr-90	1 7092E+00	66,861 47	133,722 93	0 00E+00	1 14E+05	2.29E+05
Tc-99	4.2239E-04	66,861 47	133,722 93	0 00E+00	2 82E+01	5 65E+01
Th-229	7 7260E-12	66,861 47	133,722 93	0 00E+00	5 17E-07	1 03E-06
Th-230	5 8497E-08	66,861 47	133,722 93	0 00E+00	3 91E-03	7 82E-03
Th-232	2 6906E-14	66,861 47	133,722 93	0 00E+00	1 80E-09	3 60E-09
Tl-208	4 4336E-08	66,861 47	133,722.93	0.00E+00	2 96E-03	5 93E-03
U-232	1.2037E-07	66,861 47	133,722.93	0 00E+00	8 05E-03	1 61E-02
U-233	3 0011E-09	66,861 47	133,722 93	0 00E+00	2 01E-04	4 01E-04
U-234	1 8497E-04	66,861.47	133,722 93	0 00E+00	1.24E+01	2 47E+01
U-235	-2.7235E-06	66,861.47	0 00	5 09E-01	3.26E-01	5 09E-01
U-236	1 5493E-05	66,861.47	133,722 93	0 00E+00	1 04E+00	2 07E+00
U-238	-4.2851E-09	66,861 47	0 00	3 16E-01	3.16E-01	3 16E-01
Y-90	1 7094E+00	66,861 47	133,722 93	0 00E+00	1 14E+05	2.29E+05
Other Radionuclides					1 15E+05	2 30E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	1.251E+16
0 0250	2.600E+15
0 0375	2.264E+15
0 0575	2 431E+15
0 0850	1 467E+15
0 1250	9 825E+14
0.2250	1.266E+15
0 3750	5 506E+14
0 5750	9 026E+15
0 8500	1 301E+14
1 2500	7 233E+13
1 7500	3 573E+12
2.2500	2.547E+08
2 7500	2 085E+08
3 5000	1 590E+05
5 0000	5 365E+04
7 0000	5 906E+03
11 0000	6 610E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 41E+03	2.83E+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 00000029	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		66,861 47
Bounding		133 722.93

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 18	
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: JMTR (UALX 45% MEU) JAPAN
SNF ID #: 886
Fuel Units & Descr: 570 - MTR TYPE
Heavy Metal Mass: BOL=349 353kg EOL=323 646kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1989
Estimates as of: 2010
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' — 15 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	6 6313E-10	24,345 03	48,690 06	0 00E+00	1 61E-05	3.23E-05
Am-241	2 0060E-03	24,345 03	48,690 06	0 00E+00	4 88E+01	9 77E+01
Am-242m	4 2429E-07	24,345 03	48,690 06	0 00E+00	1.03E-02	2.07E-02
Am-243	1 4899E-06	24,345 03	48,690 06	0 00E+00	3 63E-02	7.25E-02
C-14	5 7135E-09	24,345 03	48,690 06	0 00E+00	1.39E-04	2 78E-04
Cl-36	1.3124E-32	24,345 03	48,690 06	0 00E+00	3 19E-28	6 39E-28
Cm-243	1 6443E-07	24,345 03	48,690 06	0 00E+00	4 00E-03	8 01E-03
Cm-244	2 9330E-05	24,345 03	48,690 06	0 00E+00	7 14E-01	1 43E+00
Co-60	5.3186E-06	24,345 03	48,690 06	0 00E+00	1 29E-01	2 59E-01
Cs-134	3 1563E-03	24,345 03	48,690 06	0 00E+00	7 68E+01	1 54E+02
Cs-135	3 4477E-06	24,345 03	48,690 06	0 00E+00	8.39E-02	1.68E-01
Cs-137	2 0313E+00	24,345 03	48,690 06	0 00E+00	4 95E+04	9 89E+04
Eu-154	2 4513E-02	24,345 03	48,690 06	0 00E+00	5 97E+02	1.19E+03
Eu-155	4 8175E-03	24,345 03	48,690 06	0 00E+00	1.17E+02	2.35E+02
Fe-55	1.2397E-04	24,345 03	48,690 06	0 00E+00	3 02E+00	6 04E+00
H-3	4.5697E-03	24,345 03	48,690 06	0 00E+00	1 11E+02	2 22E+02
I-129	7.5300E-07	24,345 03	48,690 06	0 00E+00	1 83E-02	3 67E-02
Kr-85	1.0850E-01	24,345 03	48,690 06	0 00E+00	2 64E+03	5 28E+03
Np-237	9 5561E-06	24,345 03	48,690 06	0 00E+00	2 33E-01	4 65E-01
Pa-231	2 0359E-09	24,345 03	48,690 06	0 00E+00	4 96E-05	9 91E-05
Pb-210	4 9728E-11	24,345 03	48,690 06	0 00E+00	1.21E-06	2 42E-06
Pm-147	4 8502E-02	24,345 03	48,690 06	0 00E+00	1.18E+03	2.36E+03
Pu-238	1 8254E-02	24,345 03	48,690 06	0 00E+00	4 44E+02	8 89E+02
Pu-239	4.2810E-04	24,345 03	48,690 06	0 00E+00	1 04E+01	2 08E+01
Pu-240	2 4368E-04	24,345 03	48,690 06	0 00E+00	5 93E+00	1 19E+01
Pu-241	3.3415E-02	24,345 03	48,690 06	0 00E+00	8 13E+02	1 63E+03
Pu-242	3 6329E-07	24,345 03	48,690 06	0 00E+00	8 84E-03	1.77E-02
Ra-226	2.2854E-10	24,345 03	48,690 06	0 00E+00	5 56E-06	1.11E-05
Ra-228	1.2426E-14	24,345 03	48,690 06	0 00E+00	3.03E-10	6 05E-10
Ru-106	6 3589E-06	24,345 03	48,690 06	0 00E+00	1.55E-01	3 10E-01
Se-79	1 2933E-05	24,345 03	48,690 06	0 00E+00	3 15E-01	6 30E-01
Sn-126	1 1574E-05	24,345 03	48,690 06	0 00E+00	2 82E-01	5 64E-01
Sr-90	1 9248E+00	24,345 03	48,690 06	0 00E+00	4 69E+04	9 37E+04
Tc-99	4.2239E-04	24,345 03	48,690 06	0 00E+00	1 03E+01	2 06E+01
Th-229	5 0953E-12	24,345 03	48,690 06	0 00E+00	1 24E-07	2.48E-07
Th-230	4.1885E-08	24,345 03	48,690 06	0 00E+00	1 02E-03	2 04E-03
Th-232	1 9270E-14	24,345 03	48,690 06	0 00E+00	4 69E-10	9.38E-10
Tl-208	4 6024E-08	24,345 03	48,690 06	0 00E+00	1.12E-03	2.24E-03
U-232	1.2582E-07	24,345 03	48,690 06	0 00E+00	3 06E-03	6 13E-03
U-233	2 5825E-09	24,345 03	48,690 06	0 00E+00	6.29E-05	1 26E-04
U-234	1 8450E-04	24,345 03	48,690 06	0 00E+00	4 49E+00	8 98E+00
U-235	-2.7235E-06	24,345 03	0 00	3 40E-01	2 74E-01	3 40E-01
U-236	1.5493E-05	24,345 03	48,690 06	0 00E+00	3 77E-01	7.54E-01
U-238	-4.2851E-09	24,345 03	0 00	6 46E-02	6 45E-02	6 46E-02
Y-90	1.9254E+00	24,345 03	48,690 06	0 00E+00	4 69E+04	9.37E+04
Other Radionuclides					4 71E+04	9 42E+04

Gamma Sources

Photon Energy Group (Avg MeV)	Total Photons/sec (bounding)
0 0150	5 140E+15
0 0250	1.069E+15
0 0375	9.322E+14
0 0575	9 984E+14
0 0850	6 034E+14
0 1250	4 083E+14
0 2250	5 206E+14
0 3750	2.266E+14
0 5750	3 697E+15
0 8500	6.250E+13
1.2500	3.569E+13
1 7500	1 638E+12
2.2500	1 437E+08
2 7500	8 123E+07
3 5000	3 735E+05
5 0000	2.124E+04
7 0000	2.346E+03
11 0000	2.630E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.80E+02	1 16E+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 %:	45 011	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		24,345 03
Bounding		48 690 06

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: JMTR (UALX HEU) JAPAN
SNF ID #: 123
Fuel Units & Descr: 152 - MTR TYPE
Heavy Metal Mass: BOL=44 384kg; EOL=37.21kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1989
Estimates as of: 2010
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'
4 22

II. Estimates

Radionuclide	m: C/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	6 794 30	13,588 59	0 00E+00	4 51E-06	9 01E-06
Am-241	2 0060E-03	6,794 30	13,588 59	0 00E+00	1 36E+01	2 73E+01
Am-242m	4.2429E-07	6,794 30	13,588 59	0.00E+00	2 88E-03	5 77E-03
Am-243	1 4899E-06	6,794 30	13,588 59	0 00E+00	1 01E-02	2 02E-02
C-14	5 7135E-09	6,794.30	13,588 59	0 00E+00	3 88E-05	7 76E-05
Cl-36	1.3124E-32	6,794.30	13,588 59	0 00E+00	8 92E-29	1 78E-28
Cm-243	1 6443E-07	6,794.30	13,588 59	0 00E+00	1 12E-03	2 23E-03
Cm-244	2 9330E-05	6,794.30	13,588 59	0 00E+00	1 99E-01	3 99E-01
Co-60	5 3186E-06	6,794.30	13,588 59	0 00E+00	3 61E-02	7.23E-02
Cs-134	3 1563E-03	6,794 30	13,588 59	0 00E+00	2.14E+01	4.29E+01
Cs-135	3 4477E-06	6,794.30	13,588 59	0 00E+00	2.34E-02	4 68E-02
Cs-137	2 0313E+00	6,794 30	13,588 59	0 00E+00	1 38E+04	2.76E+04
Eu-154	2 4513E-02	6,794 30	13,588.59	0 00E+00	1 67E+02	3 33E+02
Eu-155	4 8175E-03	6,794 30	13,588.59	0 00E+00	3.27E+01	6 55E+01
Fe-55	1 2397E-04	6,794 30	13,588.59	0 00E+00	8.42E-01	1 68E+00
H-3	4 5697E-03	6,794 30	13,588 59	0 00E+00	3 10E+01	6 21E+01
I-129	7 5300E-07	6,794 30	13,588 59	0 00E+00	5 12E-03	1 02E-02
Kr-85	1 0850E-01	6,794 30	13,588 59	0 00E+00	7 37E+02	1 47E+03
Np-237	9 5561E-06	6,794.30	13,588 59	0 00E+00	6 49E-02	1 30E-01
Pa-231	2.0359E-09	6,794.30	13,588 59	0 00E+00	1 38E-05	2 77E-05
Pb-210	4 9728E-11	6,794 30	13,588 59	0 00E+00	3 38E-07	6 76E-07
Pm-147	4 8502E-02	6,794 30	13,588 59	0 00E+00	3 30E+02	6 59E+02
Pu-238	1 8254E-02	6,794 30	13,588 59	0 00E+00	1.24E+02	2 48E+02
Pu-239	4.2810E-04	6,794 30	13,588 59	0 00E+00	2.91E+00	5 82E+00
Pu-240	2 4368E-04	6,794 30	13,588 59	0 00E+00	1 66E+00	3.31E+00
Pu-241	3 3415E-02	6,794 30	13,588 59	0 00E+00	2.27E+02	4.54E+02
Pu-242	3 6329E-07	6,794 30	13,588.59	0 00E+00	2.47E-03	4 94E-03
Ra-226	2 2854E-10	6,794 30	13,588.59	0 00E+00	1 55E-06	3.11E-06
Ra-228	1 2426E-14	6,794.30	13,588 59	0 00E+00	8 44E-11	1 69E-10
Ru-106	6 3589E-06	6,794 30	13,588 59	0 00E+00	4 32E-02	8 64E-02
Se-79	1 2933E-05	6,794 30	13,588 59	0 00E+00	8 79E-02	1 76E-01
Sn-126	1 1574E-05	6,794.30	13,588 59	0 00E+00	7 86E-02	1 57E-01
Sr-90	1 9248E+00	6,794.30	13,588 59	0 00E+00	1 31E+04	2 62E+04
Tc-99	4.2239E-04	6,794.30	13,588 59	0 00E+00	2 87E+00	5 74E+00
Th-229	5 0953E-12	6,794 30	13,588 59	0 00E+00	3 46E-08	6 92E-08
Th-230	4 1885E-08	6,794 30	13,588 59	0 00E+00	2 85E-04	5 69E-04
Th-232	1 9270E-14	6,794 30	13,588 59	0 00E+00	1.31E-10	2 62E-10
Tl-208	4 6024E-08	6,794 30	13,588 59	0 00E+00	3 13E-04	6 25E-04
U-232	1.2582E-07	6,794 30	13,588 59	0 00E+00	8 55E-04	1 71E-03
U-233	2 5825E-09	6,794 30	13,588.59	0 00E+00	1.75E-05	3 51E-05
U-234	1 8450E-04	6,794 30	13,588.59	0 00E+00	1.25E+00	2.51E+00
U-235	-2.7235E-06	6,794 30	0 00	8 94E-02	7.09E-02	8 94E-02
U-236	1 5493E-05	6,794.30	13,588 59	0.00E+00	1 05E-01	2.11E-01
U-238	-4.2851E-09	6,794.30	0 00	1 02E-03	9 87E-04	1 02E-03
Y-90	1 9254E+00	6,794.30	13,588 59	0 00E+00	1 31E+04	2 62E+04
Other Radionuclides					1 31E+04	2 63E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 434E+15
0 0250	2.983E+14
0 0375	2.602E+14
0 0575	2.786E+14
0 0850	1 684E+14
0 1250	1 139E+14
0.2250	1 453E+14
0.3750	6 325E+13
0.5750	1 032E+15
0.8500	1 744E+13
1.2500	9 959E+12
1 7500	4.571E+11
2.2500	4.010E+07
2.7500	2.267E+07
3.5000	1 041E+05
5 0000	5 889E+03
7 0000	6.502E+02
11 0000	7.287E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.62E+02	3.24E+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 18522593	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal:		6,794.30
Bounding:		13 588.59

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 49	
Bounding	0 97	

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. JRR-2 (UALX-HEU 45%) JAPAN
SNF ID #: 885
Fuel Units & Descr: 144 - 12 CURVED PLATES
Heavy Metal Mass: BOL=70.229kg EOL=62.496kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1989
Estimates as of: 2010
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: 20 years

Estimated Canister usage 18"x10': 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	3 1355E-10	7,122 71	14,245 41	0 00E+00	2 23E-06	4 47E-06
Am-241	8 0194E-03	7,122 71	14,245 41	0 00E+00	5 71E+01	1 14E+02
Am-242m	1 3694E-06	7,122 71	14,245 41	0 00E+00	9 75E-03	1 95E-02
Am-243	3 7096E-05	7,122.71	14,245 41	0 00E+00	2 64E-01	5 28E-01
C-14	2 6464E-08	7,122 71	14,245 41	0 00E+00	1.88E-04	3 77E-04
Cl-36	4 4441E-31	7,122 71	14,245 41	0 00E+00	3 17E-27	6 33E-27
Cm-243	5 7029E-06	7,122 71	14,245 41	0 00E+00	4 06E-02	8 12E-02
Cm-244	4 6555E-03	7,122 71	14,245 41	0 00E+00	3 32E+01	6 63E+01
Co-60	4 8663E-05	7,122 71	14,245 41	0 00E+00	3 47E-01	6 93E-01
Cs-134	1 0638E-02	7,122 71	14,245 41	0 00E+00	7 58E+01	1 52E+02
Cs-135	4 2564E-06	7,122.71	14,245 41	0 00E+00	3 03E-02	6 06E-02
Cs-137	2 0358E+00	7,122 71	14,245 41	0 00E+00	1 45E+04	2 90E+04
Eu-154	5 1956E-02	7,122 71	14,245 41	0 00E+00	3 70E+02	7 40E+02
Eu-155	1.4295E-02	7,122 71	14,245 41	0 00E+00	1.02E+02	2 04E+02
Fe-55	1.3560E-03	7,122 71	14,245 41	0 00E+00	9 66E+00	1.93E+01
H-3	4 6258E-03	7,122 71	14,245 41	0 00E+00	3 29E+01	6.59E+01
I-129	6 6403E-07	7,122 71	14,245 41	0 00E+00	4 73E-03	9 46E-03
Kr-85	1 0808E-01	7,122.71	14,245 41	0 00E+00	7 70E+02	1 54E+03
Np-237	3 1537E-05	7,122.71	14,245 41	0 00E+00	2.25E-01	4 49E-01
Pa-231	9 7023E-10	7,122 71	14,245 41	0 00E+00	6 91E-06	1.38E-05
Pb-210	1 1731E-11	7,122 71	14,245 41	0 00E+00	8 36E-08	1.67E-07
Pm-147	2 4405E-02	7,122 71	14,245 41	0 00E+00	1 74E+02	3 48E+02
Pu-238	1 5358E-01	7,122 71	14,245 41	0 00E+00	1 09E+03	2.19E+03
Pu-239	6 9502E-04	7,122 71	14,245 41	0 00E+00	4 95E+00	9 90E+00
Pu-240	3 7631E-04	7,122 71	14,245 41	0 00E+00	2 68E+00	5 36E+00
Pu-241	1.3433E-01	7,122.71	14,245 41	0 00E+00	9 57E+02	1 91E+03
Pu-242	3 0911E-06	7,122 71	14,245.41	0 00E+00	2.20E-02	4 40E-02
Ra-226	5.5079E-11	7,122 71	14,245 41	0 00E+00	3 92E-07	7.85E-07
Ra-228	1.3335E-14	7,122 71	14,245 41	0 00E+00	9 50E-11	1 90E-10
Ru-106	7.3390E-06	7,122 71	14,245 41	0 00E+00	5 23E-02	1 05E-01
Se-79	1 2339E-05	7,122 71	14,245 41	0 00E+00	8 79E-02	1 76E-01
Sn-126	1 0194E-05	7,122 71	14,245 41	0 00E+00	7.26E-02	1 45E-01
Sr-90	1 9064E+00	7,122 71	14,245 41	0.00E+00	1 36E+04	2 72E+04
Tc-99	3 8056E-04	7,122.71	14,245 41	0 00E+00	2 71E+00	5 42E+00
Th-229	4 9198E-12	7,122 71	14,245 41	0 00E+00	3 50E-08	7.01E-08
Th-230	1 0547E-08	7,122 71	14,245 41	0 00E+00	7 51E-05	1.50E-04
Th-232	2 0705E-14	7,122 71	14,245 41	0 00E+00	1 47E-10	2 95E-10
Tl-208	4 8827E-08	7,122 71	14,245 41	0 00E+00	3 48E-04	6 96E-04
U-232	1 3414E-07	7,122.71	14,245 41	0 00E+00	9 55E-04	1 91E-03
U-233	3 7679E-09	7,122.71	14,245 41	0 00E+00	2 68E-05	5.37E-05
U-234	5.2047E-05	7,122 71	14,245 41	0 00E+00	3 71E-01	7.41E-01
U-235	-2 8661E-06	7,122 71	0 00	6 82E-02	4 78E-02	6.82E-02
U-236	1 6701E-05	7,122 71	14,245 41	0 00E+00	1 19E-01	2.38E-01
U-238	-9 4194E-09	7,122 71	0 00	1 30E-02	1 29E-02	1 30E-02
Y-90	1 9070E+00	7,122 71	14,245 41	0 00E+00	1 36E+04	2 72E+04
Other Radionuclides					1 39E+04	2 77E+04

Gamma Sources

Photon Energy Group (Avg MeV)	Total Photons/sec (bounding)
0 0150	1 506E+15
0 0250	3 104E+14
0 0375	2 758E+14
0 0575	2.920E+14
0.0850	1 768E+14
0 1250	1.252E+14
0.2250	1.521E+14
0 3750	6 585E+13
0 5750	1 090E+15
0 8500	2.854E+13
1.2500	1.830E+13
1 7500	7 051E+11
2.2500	4.509E+07
2 7500	2 638E+07
3 5000	1 115E+06
5 0000	4 286E+05
7 0000	4 920E+04
11.0000	5.638E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.06E+02	4 12E+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 %	44 93930164	40 to 100

Basis for Parameter Differences

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		7,122 71	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		14 245 41	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. JRR-2 (UALX-HEU) JAPAN
SNF ID #. 606
Fuel Units & Descr: 34 - 17 FLAT PLATES
Heavy Metal Mass: BOL=6 943kg, EOL=5.222kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1989
Estimates as of. 2010
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 20 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 Inventones(Ci)	y_b Bounding Fuel Inventones(Ci)
Ac-227	3 1355E-10	1,584 67	3,169 33	0 00E+00	4 97E-07	9 94E-07
Am-241	8 0194E-03	1,584 67	3,169 33	0 00E+00	1 27E+01	2 54E+01
Am-242m	1 3694E-06	1,584 67	3,169 33	0 00E+00	2.17E-03	4 34E-03
Am-243	3 7096E-05	1,584 67	3,169 33	0 00E+00	5 88E-02	1 18E-01
C-14	2 6464E-08	1,584 67	3,169 33	0 00E+00	4 19E-05	8 39E-05
Cl-36	4 4441E-31	1,584 67	3,169 33	0 00E+00	7 04E-28	1 41E-27
Cm-243	5 7029E-06	1,584 67	3,169 33	0 00E+00	9 04E-03	1 81E-02
Cm-244	4 6555E-03	1,584 67	3,169.33	0 00E+00	7 38E+00	1 48E+01
Co-60	4 8663E-05	1,584 67	3,169 33	0 00E+00	7 71E-02	1 54E-01
Cs-134	1 0638E-02	1,584 67	3,169.33	0 00E+00	1 69E+01	3.37E+01
Cs-135	4 2564E-06	1,584 67	3,169.33	0 00E+00	6 74E-03	1 35E-02
Cs-137	2 0358E+00	1,584 67	3,169 33	0 00E+00	3 23E+03	6.45E+03
Eu-154	5 1956E-02	1,584 67	3,169.33	0 00E+00	8 23E+01	1 65E+02
Eu-155	1 4295E-02	1,584 67	3,169.33	0 00E+00	2 27E+01	4 53E+01
Fe-55	1 3560E-03	1,584 67	3,169.33	0 00E+00	2 15E+00	4 30E+00
H-3	4 6258E-03	1,584 67	3,169 33	0 00E+00	7 33E+00	1 47E+01
I-129	6 6403E-07	1,584 67	3,169.33	0 00E+00	1 05E-03	2.10E-03
Kr-85	1 0808E-01	1,584 67	3,169.33	0 00E+00	1 71E+02	3 43E+02
Np-237	3 1537E-05	1,584 67	3,169.33	0 00E+00	5 00E-02	1.00E-01
Pa-231	9 7023E-10	1,584 67	3,169 33	0.00E+00	1 54E-06	3 07E-06
Pb-210	1 1731E-11	1,584 67	3,169 33	0 00E+00	1 86E-08	3.72E-08
Pm-147	2 4405E-02	1,584 67	3,169.33	0 00E+00	3 87E+01	7 73E+01
Pu-238	1 5358E-01	1,584 67	3,169 33	0 00E+00	2 43E+02	4 87E+02
Pu-239	6 9502E-04	1,584 67	3,169 33	0 00E+00	1.10E+00	2 20E+00
Pu-240	3 7631E-04	1,584 67	3,169 33	0 00E+00	5 96E-01	1 19E+00
Pu-241	1 3433E-01	1,584 67	3,169 33	0 00E+00	2.13E+02	4 26E+02
Pu-242	3 0911E-06	1,584 67	3,169 33	0 00E+00	4 90E-03	9 80E-03
Ra-226	5 5079E-11	1,584 67	3,169 33	0 00E+00	8.73E-08	1 75E-07
Ra-228	1.3335E-14	1,584 67	3,169 33	0 00E+00	2.11E-11	4.23E-11
Ru-106	7.3390E-06	1,584 67	3,169 33	0 00E+00	1.16E-02	2 33E-02
Se-79	1.2339E-05	1,584 67	3,169 33	0 00E+00	1.96E-02	3 91E-02
Sn-126	1 0194E-05	1,584 67	3,169 33	0 00E+00	1 62E-02	3 23E-02
Sr-90	1 9064E+00	1,584 67	3,169 33	0 00E+00	3 02E+03	6 04E+03
Tc-99	3 8056E-04	1,584 67	3,169 33	0 00E+00	6 03E-01	1 21E+00
Th-229	4 9198E-12	1,584 67	3,169 33	0 00E+00	7 80E-09	1 56E-08
Th-230	1 0547E-08	1,584 67	3,169 33	0 00E+00	1 67E-05	3 34E-05
Th-232	2 0705E-14	1,584 67	3,169 33	0 00E+00	3.28E-11	6 56E-11
Tl-208	4 8827E-08	1,584 67	3,169 33	0 00E+00	7 74E-05	1 55E-04
U-232	1 3414E-07	1,584 67	3,169.33	0 00E+00	2 13E-04	4 25E-04
U-233	3 7679E-09	1,584 67	3,169 33	0 00E+00	5 97E-06	1 19E-05
U-234	5 2047E-05	1,584 67	3,169 33	0 00E+00	8.25E-02	1 65E-01
U-235	-2.8661E-06	1,584 67	0 00	1 40E-02	9 41E-03	1 40E-02
U-236	1 6701E-05	1,584 67	3,169 33	0 00E+00	2 65E-02	5 29E-02
U-238	-9 4194E-09	1,584 67	0 00	1 63E-04	1 48E-04	1 63E-04
Y-90	1 9070E+00	1,584 67	3,169 33	0 00E+00	3 02E+03	6 04E+03
Other Radionuclides					3 09E+03	6.17E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 351E+14
0 0250	6 906E+13
0 0375	6 136E+13
0 0575	6 497E+13
0 0850	3.932E+13
0 1250	2 785E+13
0 2250	3.385E+13
0 3750	1 465E+13
0 5750	2 425E+14
0 8500	6.350E+12
1 2500	4 071E+12
1 7500	1.569E+11
2.2500	1.003E+07
2.7500	5.870E+06
3 5000	2.480E+05
5 0000	9.535E+04
7 0000	1.095E+04
11 0000	1.254E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.58E+01	9 17E+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 %	93 01903552	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		1,584 67	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		3,169 33	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 52	
Bounding	1 05	

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: JRR-3M (ULAX LEU)
SNF ID #: 1056
Fuel Units & Descr: 111 - 20 FLAT PLATES
Heavy Metal Mass: BOL=165 701kg EOL=157 043kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1989
Estimates as of: 2010
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 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	8.5333E-10	8,229 12	16,458 25	0 00E+00	7 02E-06	1 40E-05
Am-241	2.2753E-02	8,229 12	16,458 25	0 00E+00	1 87E+02	3 74E+02
Am-242m	8 9133E-06	8,229 12	16,458 25	0.00E+00	7.33E-02	1.47E-01
Am-243	6 4007E-06	8,229 12	16,458 25	0 00E+00	5.27E-02	1.05E-01
C-14	2 9620E-08	8,229 12	16,458.25	0 00E+00	2 44E-04	4 87E-04
Cl-36	5 9513E-35	8,229 12	16,458.25	0 00E+00	4 90E-31	9 79E-31
Cm-243	2 2087E-06	8,229 12	16,458.25	0 00E+00	1 82E-02	3 64E-02
Cm-244	1 1007E-04	8,229 12	16,458.25	0 00E+00	9 06E-01	1 81E+00
Co-60	1 6340E-05	8,229 12	16,458.25	0 00E+00	1 34E-01	2 69E-01
Cs-134	2.1353E-03	8,229.12	16,458.25	0 00E+00	1 76E+01	3 51E+01
Cs-135	4 8607E-06	8,229 12	16,458 25	0 00E+00	4 00E-02	8 00E-02
Cs-137	2.0227E+00	8,229 12	16,458 25	0 00E+00	1 66E+04	3 33E+04
Eu-154	2 0887E-02	8,229 12	16,458 25	0 00E+00	1 72E+02	3 44E+02
Eu-155	4 0867E-03	8,229 12	16,458 25	0.00E+00	3 36E+01	6 73E+01
Fe-55	1 4167E-03	8,229 12	16,458.25	0.00E+00	1 17E+01	2.33E+01
H-3	4 6653E-03	8,229 12	16,458.25	0 00E+00	3 84E+01	7.68E+01
I-129	7.1600E-07	8,229 12	16,458.25	0 00E+00	5 89E-03	1 18E-02
Kr-85	1 0240E-01	8,229 12	16,458.25	0 00E+00	8 43E+02	1.69E+03
Np-237	3 7227E-06	8,229 12	16,458.25	0 00E+00	3 06E-02	6 13E-02
Pa-231	2 6727E-09	8,229 12	16,458.25	0 00E+00	2 20E-05	4 40E-05
Pb-210	4.3313E-14	8,229 12	16,458.25	0 00E+00	3 56E-10	7 13E-10
Pm-147	4 6307E-02	8,229 12	16,458.25	0 00E+00	3 81E+02	7 62E+02
Pu-238	5.5273E-03	8,229 12	16,458 25	0 00E+00	4 55E+01	9 10E+01
Pu-239	1 0313E-02	8,229 12	16,458 25	0 00E+00	8 49E+01	1.70E+02
Pu-240	5 4180E-03	8,229 12	16,458 25	0 00E+00	4 46E+01	8 92E+01
Pu-241	3 7573E-01	8,229 12	16,458 25	0 00E+00	3 09E+03	6 18E+03
Pu-242	3 0713E-06	8,229 12	16,458.25	0 00E+00	2.53E-02	5 05E-02
Ra-226	2 3807E-13	8,229 12	16,458.25	0 00E+00	1.96E-09	3 92E-09
Ra-228	1 0607E-14	8,229 12	16,458.25	0 00E+00	8 73E-11	1 75E-10
Ru-106	8 4800E-06	8,229 12	16,458.25	0 00E+00	6 98E-02	1 40E-01
Se-79	1.2533E-05	8,229 12	16,458.25	0 00E+00	1 03E-01	2 06E-01
Sn-126	1 1393E-05	8,229.12	16,458.25	0 00E+00	9 38E-02	1 88E-01
Sr-90	1 8400E+00	8,229.12	16,458.25	0 00E+00	1.51E+04	3 03E+04
Tc-99	4.3533E-04	8,229 12	16,458 25	0 00E+00	3 58E+00	7 16E+00
Th-229	5 8947E-13	8,229 12	16,458 25	0 00E+00	4 85E-09	9 70E-09
Th-230	5 9500E-11	8,229 12	16,458 25	0 00E+00	4 90E-07	9.79E-07
Th-232	1 6360E-14	8,229 12	16,458 25	0 00E+00	1.35E-10	2.69E-10
Tl-208	7 6000E-09	8,229 12	16,458 25	0 00E+00	6.25E-05	1.25E-04
U-232	2 0747E-08	8,229 12	16,458.25	0 00E+00	1.71E-04	3 41E-04
U-233	4 4013E-10	8,229 12	16,458.25	0 00E+00	3 62E-06	7.24E-06
U-234	4 6500E-07	8,229 12	16,458.25	0 00E+00	3 83E-03	7 65E-03
U-235	-2.5335E-06	8,229 12	0 00	7.10E-02	5 02E-02	7.10E-02
U-236	1.3000E-05	8,229 12	16,458.25	0 00E+00	1 07E-01	2.14E-01
U-238	-1 4207E-08	8,229 12	0 00	4 46E-02	4 45E-02	4 46E-02
Y-90	1.8400E+00	8,229 12	16,458 25	0 00E+00	1 51E+04	3 03E+04
Other Radionuclides					1 58E+04	3.16E+04

Gamma Sources

Photon Energy Group (Avg MeV)	Total Photons/sec (bounding)
0 0150	1.668E+15
0 0250	3 464E+14
0 0375	3 043E+14
0 0575	3.278E+14
0 0850	1 951E+14
0 1250	1 314E+14
0.2250	1 682E+14
0 3750	7 320E+13
0.5750	1 242E+15
0 8500	1 898E+13
1.2500	1 069E+13
1 7500	5.047E+11
2.2500	4 733E+07
2 7500	5 600E+06
3.5000	2.270E+05
5.0000	3 452E+04
7.0000	3 906E+03
11 0000	4 445E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.97E+02	3 94E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences:
Reactor Moderator	HEAVY WATER	HEAVY WATER	
Fuel Cladding	ALUM	ALUM	
BOL HM Constituents	U	U	
BOL Enrichment %	19.837	10 to 20	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		8,229 12	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		16 458.25	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: JRR-4 (U3Si2 LEU)
SNF ID #: 1071
Fuel Units & Descr: 47 - ASSEMBLY
Heavy Metal Mass: BOL=47kg, EOL=44 655kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1989
Estimates as of: 2010
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 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	2,221 04	4,442 09	0 00E+00	1 47E-06	2 95E-06
Am-241	2 0060E-03	2,221 04	4,442 09	0 00E+00	4 46E+00	8 91E+00
Am-242m	4.2429E-07	2,221 04	4,442 09	0 00E+00	9 42E-04	1 88E-03
Am-243	1 4899E-06	2,221 04	4,442 09	0 00E+00	3 31E-03	6 62E-03
C-14	5 7135E-09	2,221 04	4,442 09	0 00E+00	1.27E-05	2 54E-05
Cl-36	1.3124E-32	2,221 04	4,442 09	0 00E+00	2 91E-29	5 83E-29
Cm-243	1 6443E-07	2,221 04	4,442 09	0 00E+00	3 65E-04	7 30E-04
Cm-244	2 9330E-05	2,221 04	4,442 09	0 00E+00	6 51E-02	1.30E-01
Co-60	5.3186E-06	2,221 04	4,442 09	0 00E+00	1.18E-02	2 36E-02
Cs-134	3.1563E-03	2,221 04	4,442 09	0 00E+00	7 01E+00	1.40E+01
Cs-135	3 4477E-06	2,221 04	4,442 09	0 00E+00	7.66E-03	1 53E-02
Cs-137	2 0313E+00	2,221 04	4,442 09	0 00E+00	4 51E+03	9 02E+03
Eu-154	2 4513E-02	2,221 04	4,442 09	0 00E+00	5 44E+01	1 09E+02
Eu-155	4 8175E-03	2,221 04	4,442 09	0 00E+00	1 07E+01	2 14E+01
Fe-55	1.2397E-04	2,221 04	4,442 09	0 00E+00	2.75E-01	5 51E-01
H-3	4 5697E-03	2,221 04	4,442 09	0 00E+00	1 01E+01	2 03E+01
I-129	7 5300E-07	2,221 04	4,442 09	0 00E+00	1 67E-03	3.34E-03
Kr-85	1 0850E-01	2,221 04	4,442 09	0 00E+00	2 41E+02	4 82E+02
Np-237	9 5561E-06	2,221 04	4,442 09	0 00E+00	2 12E-02	4.24E-02
Pa-231	2 0359E-09	2,221.04	4,442 09	0 00E+00	4 52E-06	9 04E-06
Pb-210	4 9728E-11	2,221.04	4,442 09	0 00E+00	1 10E-07	2.21E-07
Pm-147	4 8502E-02	2,221.04	4,442 09	0 00E+00	1 08E+02	2 15E+02
Pu-238	1 8254E-02	2,221.04	4,442 09	0 00E+00	4 05E+01	8 11E+01
Pu-239	4 2810E-04	2,221.04	4 442.09	0 00E+00	9 51E-01	1 90E+00
Pu-240	2 4368E-04	2,221.04	4,442 09	0 00E+00	5 41E-01	1 08E+00
Pu-241	3 3415E-02	2,221 04	4,442.09	0 00E+00	7 42E+01	1 48E+02
Pu-242	3 6329E-07	2,221 04	4,442.09	0 00E+00	8 07E-04	1 61E-03
Ra-226	2 2854E-10	2,221 04	4,442 09	0 00E+00	5 08E-07	1 02E-06
Ra-228	1 2426E-14	2,221 04	4,442 09	0 00E+00	2 76E-11	5 52E-11
Ru-106	6 3589E-06	2,221 04	4,442 09	0 00E+00	1 41E-02	2 82E-02
Se-79	1 2933E-05	2,221 04	4,442 09	0 00E+00	2 87E-02	5 74E-02
Sn-126	1 1574E-05	2,221 04	4,442 09	0 00E+00	2 57E-02	5 14E-02
Sr-90	1 9248E+00	2,221 04	4,442 09	0 00E+00	4.28E+03	8 55E+03
Tc-99	4 2239E-04	2,221 04	4,442 09	0 00E+00	9 38E-01	1 88E+00
Th-229	5 0953E-12	2,221 04	4,442 09	0 00E+00	1.13E-08	2 26E-08
Th-230	4 1885E-08	2,221 04	4,442 09	0 00E+00	9 30E-05	1 86E-04
Th-232	1 9270E-14	2,221 04	4,442 09	0 00E+00	4 28E-11	8 56E-11
Tl-208	4 6024E-08	2,221 04	4,442 09	0 00E+00	1.02E-04	2 04E-04
U-232	1.2582E-07	2,221 04	4,442 09	0 00E+00	2.79E-04	5 59E-04
U-233	2.5825E-09	2,221 04	4,442 09	0 00E+00	5.74E-06	1 15E-05
U-234	1 8450E-04	2,221 04	4,442 09	0 00E+00	4.10E-01	8 20E-01
U-235	-2 7235E-06	2,221 04	0 00	2 03E-02	1 43E-02	2 03E-02
U-236	1.5493E-05	2,221 04	4,442 09	0 00E+00	3 44E-02	6 88E-02
U-238	-4.2851E-09	2,221 04	0 00	1 26E-02	1.26E-02	1.26E-02
Y-90	1 9254E+00	2,221 04	4,442 09	0 00E+00	4 28E+03	8 55E+03
Other Radionuclides					4 30E+03	8 59E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	4 689E+14
0 0250	9 751E+13
0 0375	8 505E+13
0 0575	9 109E+13
0.0850	5 504E+13
0 1250	3 725E+13
0.2250	4 750E+13
0.3750	2 068E+13
0 5750	3.373E+14
0 8500	5 702E+12
1.2500	3.256E+12
1 7500	1 494E+11
2.2500	1 311E+07
2.7500	7 411E+06
3 5000	3 411E+04
5 0000	1 953E+03
7 0000	2.158E+02
11 0000	2.419E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.29E+01	1 06E+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		2,221 04
Bounding		4,442 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 15	
Bounding	0 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: JRR-4 (UALX HEU)
SNF ID #: 505
Fuel Units & Descr: 43 - ASSEMBLY
Heavy Metal Mass: BOL=7 676kg, EOL=6.338kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1989
Estimates as of: 2010
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 19

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	1,266.45	2,532 90	0 00E+00	8 40E-07	1 68E-06
Am-241	2 0060E-03	1,266 45	2,532 90	0 00E+00	2.54E+00	5 08E+00
Am-242m	4 2429E-07	1,266 45	2,532 90	0 00E+00	5 37E-04	1 07E-03
Am-243	1 4899E-06	1,266 45	2,532 90	0 00E+00	1 89E-03	3 77E-03
C-14	5 7135E-09	1,266 45	2,532 90	0 00E+00	7 24E-06	1 45E-05
Cl-36	1.3124E-32	1,266 45	2,532 90	0 00E+00	1 66E-29	3.32E-29
Cm-243	1 6443E-07	1,266 45	2,532.90	0 00E+00	2.08E-04	4 16E-04
Cm-244	2 9330E-05	1,266 45	2,532.90	0 00E+00	3 71E-02	7 43E-02
Co-60	5 3186E-06	1,266 45	2,532 90	0 00E+00	6 74E-03	1.35E-02
Cs-134	3 1563E-03	1,266 45	2,532 90	0 00E+00	4 00E+00	7 99E+00
Cs-135	3 4477E-06	1,266 45	2,532 90	0 00E+00	4 37E-03	8 73E-03
Cs-137	2 0313E+00	1,266 45	2,532 90	0 00E+00	2 57E+03	5 15E+03
Eu-154	2.4513E-02	1,266 45	2,532.90	0 00E+00	3 10E+01	6.21E+01
Eu-155	4 8175E-03	1,266 45	2,532 90	0 00E+00	6 10E+00	1.22E+01
Fe-55	1 2397E-04	1,266.45	2,532.90	0 00E+00	1.57E-01	3 14E-01
H-3	4 5697E-03	1,266 45	2,532 90	0 00E+00	5 79E+00	1 16E+01
I-129	7 5300E-07	1,266 45	2,532 90	0 00E+00	9 54E-04	1 91E-03
Kr-85	1 0850E-01	1,266 45	2,532 90	0 00E+00	1.37E+02	2 75E+02
Np-237	9 5561E-06	1,266 45	2,532 90	0 00E+00	1 21E-02	2 42E-02
Pa-231	2.0359E-09	1,266 45	2,532 90	0 00E+00	2 58E-06	5 16E-06
Pb-210	4 9728E-11	1,266 45	2,532 90	0 00E+00	6.30E-08	1.26E-07
Pm-147	4 8502E-02	1,266 45	2,532.90	0 00E+00	6.14E+01	1.23E+02
Pu-238	1 8254E-02	1,266 45	2,532 90	0 00E+00	2.31E+01	4 62E+01
Pu-239	4 2810E-04	1,266 45	2,532 90	0 00E+00	5 42E-01	1 08E+00
Pu-240	2 4368E-04	1,266 45	2,532 90	0 00E+00	3 09E-01	6.17E-01
Pu-241	3.3415E-02	1,266 45	2,532 90	0 00E+00	4 23E+01	8 46E+01
Pu-242	3 6329E-07	1,266 45	2,532 90	0 00E+00	4 60E-04	9.20E-04
Ra-226	2.2854E-10	1,266 45	2,532 90	0 00E+00	2.89E-07	5 79E-07
Ra-228	1.2426E-14	1,266 45	2,532.90	0 00E+00	1.57E-11	3 15E-11
Ru-106	6 3589E-06	1,266 45	2,532 90	0 00E+00	8 05E-03	1 61E-02
Se-79	1 2933E-05	1,266 45	2,532 90	0.00E+00	1 64E-02	3.28E-02
Sn-126	1 1574E-05	1,266 45	2,532 90	0 00E+00	1 47E-02	2.93E-02
Sr-90	1 9248E+00	1,266 45	2,532 90	0 00E+00	2 44E+03	4.88E+03
Tc-99	4.2239E-04	1,266 45	2,532 90	0 00E+00	5.35E-01	1.07E+00
Th-229	5 0953E-12	1,266 45	2,532.90	0 00E+00	6 45E-09	1 29E-08
Th-230	4 1885E-08	1,266.45	2,532.90	0 00E+00	5.30E-05	1 06E-04
Th-232	1 9270E-14	1,266 45	2,532 90	0 00E+00	2 44E-11	4 88E-11
Tl-208	4 6024E-08	1,266 45	2,532 90	0 00E+00	5 83E-05	1.17E-04
U-232	1.2582E-07	1,266 45	2,532 90	0 00E+00	1 59E-04	3 19E-04
U-233	2.5825E-09	1,266 45	2,532 90	0 00E+00	3.27E-06	6 54E-06
U-234	1.8450E-04	1,266 45	2,532 90	0 00E+00	2.34E-01	4 67E-01
U-235	-2 7235E-06	1,266 45	0 00	1 54E-02	1.20E-02	1 54E-02
U-236	1.5493E-05	1,266.45	2,532.90	0 00E+00	1 96E-02	3 92E-02
U-238	-4.2851E-09	1,266 45	0 00	1.80E-04	1 74E-04	1.80E-04
Y-90	1 9254E+00	1,266 45	2,532 90	0 00E+00	2 44E+03	4.88E+03
Other Radionuclides					2 45E+03	4 90E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 674E+14
0 0250	5 560E+13
0 0375	4 849E+13
0 0575	5 194E+13
0 0850	3 139E+13
0 1250	2 124E+13
0.2250	2 708E+13
0.3750	1 179E+13
0.5750	1 923E+14
0 8500	3.251E+12
1.2500	1.856E+12
1 7500	8.521E+10
2.2500	7.474E+06
2 7500	4.226E+06
3.5000	1 941E+04
5 0000	1 098E+03
7 0000	1.212E+02
11 0000	1.358E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 02E+01	6 04E+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 03204799	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		1,266 45
Bounding		2 532.90

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 52	
Bounding	1 05	

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: JRR-4 (UALX HEU)
SNF ID #: 1070
Fuel Units & Descr: 11 - ASSEMBLY
Heavy Metal Mass: BOL=1 964kg; EOL=1 621kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1989
Estimates as of: 2010
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 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	6 6313E-10	323 98	647 95	0.00E+00	2.15E-07	4.30E-07
Am-241	2 0060E-03	323 98	647 95	0 00E+00	6.50E-01	1 30E+00
Am-242m	4 2429E-07	323 98	647 95	0 00E+00	1 37E-04	2 75E-04
Am-243	1 4899E-06	323 98	647 95	0 00E+00	4 83E-04	9 65E-04
C-14	5 7135E-09	323 98	647 95	0 00E+00	1 85E-06	3 70E-06
Cl-36	1 3124E-32	323 98	647 95	0 00E+00	4 25E-30	8 50E-30
Cm-243	1 6443E-07	323 98	647 95	0 00E+00	5 33E-05	1 07E-04
Cm-244	2 9330E-05	323 98	647 95	0 00E+00	9 50E-03	1 90E-02
Co-60	5 3186E-06	323 98	647 95	0 00E+00	1.72E-03	3 45E-03
Cs-134	3 1563E-03	323.98	647 95	0 00E+00	1.02E+00	2.05E+00
Cs-135	3 4477E-06	323 98	647 95	0 00E+00	1.12E-03	2.23E-03
Cs-137	2 0313E+00	323 98	647.95	0 00E+00	6.58E+02	1.32E+03
Eu-154	2.4513E-02	323 98	647.95	0 00E+00	7 94E+00	1 59E+01
Eu-155	4 8175E-03	323 98	647 95	0 00E+00	1 56E+00	3.12E+00
Fe-55	1.2397E-04	323 98	647 95	0 00E+00	4 02E-02	8 03E-02
H-3	4 5697E-03	323 98	647 95	0 00E+00	1 48E+00	2 96E+00
I-129	7 5300E-07	323 98	647 95	0 00E+00	2 44E-04	4 88E-04
Kr-85	1 0850E-01	323 98	647 95	0 00E+00	3 52E+01	7 03E+01
Np-237	9 5561E-06	323 98	647 95	0 00E+00	3 10E-03	6 19E-03
Pa-231	2 0359E-09	323 98	647 95	0 00E+00	6 60E-07	1 32E-06
Pb-210	4 9728E-11	323 98	647 95	0 00E+00	1 61E-08	3.22E-08
Pm-147	4 8502E-02	323 98	647 95	0 00E+00	1.57E+01	3.14E+01
Pu-238	1 8254E-02	323 98	647 95	0 00E+00	5 91E+00	1.18E+01
Pu-239	4.2810E-04	323 98	647.95	0 00E+00	1.39E-01	2.77E-01
Pu-240	2 4368E-04	323 98	647 95	0 00E+00	7.89E-02	1.58E-01
Pu-241	3.3415E-02	323 98	647 95	0 00E+00	1 08E+01	2.17E+01
Pu-242	3 6329E-07	323 98	647 95	0 00E+00	1.18E-04	2.35E-04
Ra-226	2.2854E-10	323 98	647 95	0 00E+00	7 40E-08	1 48E-07
Ra-228	1.2426E-14	323 98	647 95	0 00E+00	4 03E-12	8 05E-12
Ru-106	6 3589E-06	323 98	647 95	0 00E+00	2 06E-03	4 12E-03
Se-79	1 2933E-05	323 98	647 95	0 00E+00	4 19E-03	8 38E-03
Sn-126	1 1574E-05	323.98	647 95	0 00E+00	3 75E-03	7 50E-03
Sr-90	1 9248E+00	323.98	647 95	0 00E+00	6.24E+02	1.25E+03
Tc-99	4 2239E-04	323 98	647.95	0 00E+00	1 37E-01	2.74E-01
Th-229	5 0953E-12	323 98	647.95	0 00E+00	1.65E-09	3.30E-09
Th-230	4 1885E-08	323 98	647.95	0 00E+00	1 36E-05	2.71E-05
Th-232	1 9270E-14	323 98	647 95	0 00E+00	6.24E-12	1.25E-11
Tl-208	4 6024E-08	323 98	647 95	0 00E+00	1 49E-05	2 98E-05
U-232	1.2582E-07	323 98	647 95	0 00E+00	4 08E-05	8.15E-05
U-233	2.5825E-09	323 98	647 95	0 00E+00	8 37E-07	1 67E-06
U-234	1 8450E-04	323 98	647 95	0 00E+00	5 98E-02	1 20E-01
U-235	-2.7235E-06	323.98	0 00	3 95E-03	3 07E-03	3 95E-03
U-236	1 5493E-05	323.98	647 95	0 00E+00	5 02E-03	1 00E-02
U-238	-4.2851E-09	323.98	0 00	4 60E-05	4 46E-05	4 60E-05
Y-90	1 9254E+00	323 98	647.95	0 00E+00	6.24E+02	1.25E+03
Other Radionuclides					6 27E+02	1.25E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	6.840E+13
0 0250	1.422E+13
0 0375	1.241E+13
0 0575	1 329E+13
0 0850	8 029E+12
0 1250	5 433E+12
0.2250	6 928E+12
0 3750	3 016E+12
0 5750	4 919E+13
0 8500	8 317E+11
1.2500	4 749E+11
1 7500	2 180E+10
2.2500	1 912E+06
2.7500	1 081E+06
3.5000	4 966E+03
5 0000	2.808E+02
7 0000	3.100E+01
11 0000	3.475E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.72E+00	1.54E+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 %	93.03204799	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		323 98
Bounding		647 95

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	1.05	

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 KURR (UALX-HEU) JAPAN
SNF ID # 601
Fuel Units & Descr 240 - 18 CURVED PLATES
Heavy Metal Mass BOL=40 824kg EOL=33 48kg
ROD Storage Site SRS

[1]Fuel decay start date 2006
Estimates as of 2010
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: 5 years

Estimated Canister usage

18"x10'
6 67

II. Estimates

Radionuclide	m: C/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 4545E-10	6,954 91	13,909 82	0 00E+00	1 01E-06	2 02E-06
Am-241	1.1190E-03	6,954 91	13,909 82	0 00E+00	7 78E+00	1 56E+01
Am-242m	4.5425E-07	6,954 91	13,909 82	0 00E+00	3.16E-03	6.32E-03
Am-243	1 4921E-06	6,954 91	13,909 82	0 00E+00	1.04E-02	2 08E-02
C-14	5 7244E-09	6,954 91	13,909 82	0 00E+00	3 98E-05	7 96E-05
Cl-36	1 3124E-32	6,954 91	13,909 82	0 00E+00	9 13E-29	1 83E-28
Cm-243	2 3676E-07	6,954 91	13,909 82	0 00E+00	1 65E-03	3.29E-03
Cm-244	5.2042E-05	6,954 91	13,909 82	0 00E+00	3 62E-01	7.24E-01
Co-60	3 8208E-05	6,954 91	13,909 82	0 00E+00	2 66E-01	5.31E-01
Cs-134	4 8693E-01	6,954 91	13,909 82	0 00E+00	3 39E+03	6 77E+03
Cs-135	3 4477E-06	6,954 91	13,909 82	0 00E+00	2 40E-02	4 80E-02
Cs-137	2 8731E+00	6,954 91	13,909 82	0 00E+00	2 00E+04	4 00E+04
Eu-154	8 2053E-02	6,954 91	13,909 82	0 00E+00	5 71E+02	1 14E+03
Eu-155	3 9134E-02	6,954 91	13,909 82	0 00E+00	2 72E+02	5 44E+02
Fe-55	6 7429E-03	6,954 91	13,909 82	0 00E+00	4 69E+01	9 38E+01
H-3	1 0599E-02	6,954 91	13,909 82	0 00E+00	7 37E+01	1.47E+02
I-129	7.5300E-07	6,954 91	13,909 82	0 00E+00	5.24E-03	1 05E-02
Kr-85	2 8595E-01	6,954 91	13,909 82	0 00E+00	1 99E+03	3 98E+03
Np-237	9 5479E-06	6,954 91	13,909 82	0 00E+00	6 64E-02	1.33E-01
Pa-231	8 9297E-10	6,954 91	13,909 82	0 00E+00	6 21E-06	1.24E-05
Pb-210	3.7609E-12	6,954 91	13,909 82	0 00E+00	2 62E-08	5.23E-08
Pm-147	2 5452E+00	6,954 91	13,909 82	0 00E+00	1 77E+04	3.54E+04
Pu-238	2 0550E-02	6,954 91	13,909 82	0 00E+00	1 43E+02	2 86E+02
Pu-239	4 2838E-04	6,954 91	13,909 82	0 00E+00	2.98E+00	5 96E+00
Pu-240	2 4401E-04	6,954 91	13,909 82	0 00E+00	1 70E+00	3 39E+00
Pu-241	6 8764E-02	6,954 91	13,909 82	0 00E+00	4 78E+02	9 56E+02
Pu-242	3 6329E-07	6,954 91	13,909 82	0 00E+00	2 53E-03	5 05E-03
Ra-226	3 8045E-11	6,954 91	13,909 82	0 00E+00	2 65E-07	5.29E-07
Ra-228	2 9902E-15	6,954 91	13,909 82	0 00E+00	2 08E-11	4 16E-11
Ru-106	1 9055E-01	6,954 91	13,909 82	0 00E+00	1.33E+03	2 65E+03
Se-79	1 2936E-05	6,954 91	13,909 82	0 00E+00	9 00E-02	1 80E-01
Sn-126	1 1574E-05	6,954 91	13,909 82	0 00E+00	8 05E-02	1.61E-01
Sr-90	2.7505E+00	6,954 91	13,909 82	0 00E+00	1 91E+04	3 83E+04
Tc-99	4.2239E-04	6,954.91	13,909 82	0 00E+00	2 94E+00	5 88E+00
Th-229	1 8848E-12	6,954 91	13,909 82	0 00E+00	1.31E-08	2 62E-08
Th-230	1 7042E-08	6,954 91	13,909 82	0 00E+00	1 19E-04	2 37E-04
Th-232	7 8132E-15	6,954 91	13,909 82	0 00E+00	5 43E-11	1 09E-10
Tl-208	4 4063E-08	6,954 91	13,909 82	0.00E+00	3 06E-04	6.13E-04
U-232	1.3151E-07	6,954 91	13,909 82	0 00E+00	9 15E-04	1.83E-03
U-233	1.9564E-09	6,954 91	13,909 82	0 00E+00	1.36E-05	2 72E-05
U-234	1 8371E-04	6,954 91	13,909 82	0 00E+00	1.28E+00	2 56E+00
U-235	-2 7235E-06	6,954 91	0 00	8.22E-02	6 33E-02	8.22E-02
U-236	1 5493E-05	6,954 91	13,909 82	0 00E+00	1 08E-01	2.16E-01
U-238	-4.2851E-09	6,954 91	0 00	9.36E-04	9 07E-04	9.36E-04
Y-90	2 7505E+00	6,954 91	13,909 82	0 00E+00	1 91E+04	3 83E+04
Other Radionuclides					3 58E+04	7 15E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 684E+15
0 0250	5 781E+14
0 0375	5.335E+14
0.0575	5 246E+14
0 0850	3.344E+14
0 1250	2.896E+14
0.2250	2.834E+14
0.3750	1.372E+14
0.5750	1.885E+15
0.8500	2 639E+14
1.2500	4 910E+13
1 7500	2.059E+12
2.2500	4.319E+12
2.7500	2 485E+10
3.5000	2 756E+09
5 0000	8.241E+03
7.0000	9 187E+02
11 0000	1 036E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.53E+02	7 05E+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 %:	93 175	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		6,954 91	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		13,909 82	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 54	
Bounding	1 08	

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: LWR SAMPLES
SNF ID #: 134
Fuel Units & Descr: 5 - ROD
Heavy Metal Mass: BOL= , EOL=12.74kg
ROD Storage Site. INEEL

[1]Fuel decay start date. 1966
Estimates as of: 2010
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"x15'
0 18

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 3072E-06	12,107 49	12,107 49	0 00E+00	2 79E-02	2 79E-02
Am-241	8.4448E+00	12,107 49	12,107 49	0 00E+00	1 02E+05	1 02E+05
Am-242m	1 6848E-02	12,107.49	12,107 49	0 00E+00	2 04E+02	2 04E+02
Am-243	1 6320E-02	12,107 49	12,107 49	0 00E+00	1 98E+02	1 98E+02
C-14	1 2090E-01	12,107 49	12,107 49	0 00E+00	1 46E+03	1 46E+03
Cl-36	2 2849E-03	12,107 49	12,107 49	0.00E+00	2 77E+01	2 77E+01
Cm-243	8 6624E-04	12,107 49	12,107 49	0 00E+00	1 05E+01	1 05E+01
Cm-244	1 6848E-01	12,107 49	12,107.49	0 00E+00	2.04E+03	2 04E+03
Co-60	2 8086E+01	12,107 49	12,107.49	0 00E+00	3 40E+05	3 40E+05
Cs-134	3 4148E-04	12,107 49	12,107 49	0 00E+00	4 13E+00	4.13E+00
Cs-135	4.3976E-04	12,107.49	12,107 49	0 00E+00	5 32E+00	5.32E+00
Cs-137	2 1049E+01	12,107 49	12,107 49	0 00E+00	2 55E+05	2 55E+05
Eu-154	1.2500E+00	12,107 49	12,107 49	0 00E+00	1 51E+04	1 51E+04
Eu-155	6 8986E-02	12,107 49	12,107 49	0 00E+00	8 35E+02	8 35E+02
Fe-55	2 9308E-01	12,107 49	12,107 49	0 00E+00	3 55E+03	3 55E+03
H-3	2 4311E-01	12,107 49	12,107.49	0 00E+00	2.94E+03	2 94E+03
I-129	1 0618E-05	12,107 49	12,107.49	0 00E+00	1.29E-01	1 29E-01
Kr-85	5 9882E-01	12,107 49	12,107 49	0 00E+00	7.25E+03	7.25E+03
Np-237	1.5668E-04	12,107.49	12,107 49	0 00E+00	1 90E+00	1 90E+00
Pa-231	2 8656E-06	12,107.49	12,107 49	0 00E+00	3 47E-02	3 47E-02
Pb-210	2 3918E-08	12,107 49	12,107 49	0.00E+00	2 90E-04	2 90E-04
Pm-147	1 6900E-02	12,107 49	12,107 49	0 00E+00	2 05E+02	2 05E+02
Pu-238	-8 6120E-01	12,107 49	0 00	3.27E+03	0 00E+00	3 27E+03
Pu-239	-4 8440E-02	12,107 49	0 00	3 96E+02	0 00E+00	3 96E+02
Pu-240	-3 0095E-01	12,107 49	0 00	5 06E+02	0 00E+00	5 06E+02
Pu-241	-1 0411E+02	12,107.49	0 00	1 30E+05	0 00E+00	1.30E+05
Pu-242	-1 1381E-04	12,107 49	0 00	2.19E+00	8 12E-01	2 19E+00
Ra-226	6.4400E-08	12,107 49	12,107 49	0.00E+00	7 80E-04	7 80E-04
Ra-228	5 9952E-07	12,107 49	12,107 49	0 00E+00	7 26E-03	7.26E-03
Ru-106	8 5526E-07	12,107 49	12,107.49	0 00E+00	1 04E-02	1 04E-02
Se-79	1 9181E-04	12,107 49	12,107 49	0 00E+00	2.32E+00	2 32E+00
Sn-126	1 6671E-04	12,107 49	12,107 49	0 00E+00	2 02E+00	2 02E+00
Sr-90	1 9799E+01	12,107 49	12,107 49	0 00E+00	2 40E+05	2.40E+05
Tc-99	6 7678E-03	12,107.49	12,107 49	0 00E+00	8 19E+01	8 19E+01
Th-229	1 7488E-06	12,107 49	12,107 49	0.00E+00	2 12E-02	2.12E-02
Th-230	5.8704E-06	12,107 49	12,107 49	0 00E+00	7 11E-02	7 11E-02
Th-232	6.0208E-07	12,107 49	12,107 49	0 00E+00	7 29E-03	7.29E-03
Tl-208	8 7573E-05	12,107 49	12,107.49	0 00E+00	1.06E+00	1 06E+00
U-232	2 3706E-04	12,107 49	12,107 49	0 00E+00	2.87E+00	2 87E+00
U-233	3 6128E-04	12,107 49	12,107 49	0 00E+00	4 37E+00	4.37E+00
U-234	1 2788E-02	12,107.49	12,107 49	0 00E+00	1 55E+02	1.55E+02
U-235	5 7486E-04	12,107.49	12,107 49	1.10E-02	6 97E+00	6 97E+00
U-236	2.3485E-04	12,107 49	12,107 49	0 00E+00	2 84E+00	2 84E+00
U-238	1 1581E-04	12,107 49	12,107 49	1 36E-03	1 40E+00	1 40E+00
Y-90	1 9804E+01	12,107 49	12,107.49	0 00E+00	2.40E+05	2 40E+05
Other Radionuclides					7 47E+05	7 47E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 484E+16
0 0250	2.952E+15
0 0375	2.579E+15
0.0575	4 058E+15
0 0850	1 584E+15
0 1250	1.241E+15
0.2250	1 372E+15
0 3750	5.869E+14
0 5750	9.544E+15
0 8500	3.647E+14
1.2500	2.549E+16
1 7500	1 128E+13
2.2500	1 337E+11
2.7500	3 768E+10
3.5000	3 015E+07
5 0000	1.280E+07
7 0000	1 466E+06
11 0000	1 678E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.19E+04	1.21E+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 OR SST	SST/Inconel
BOL HM Constituents:	Pu and U	U, Th & Pu
BOL Enrichment %		0 to 100

Basis for Parameter Drfferences:

This fuel didn't closely match any existing templates, therefore the worst case template was used.

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		12,107 49
Bounding		12 107 49

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 MIT
SNF ID # 135
Fuel Units & Descr 525 - 15 FLAT PLATES
Heavy Metal Mass BOL=286 02kg EOL=232.68kg
ROD Storage Site SRS

[1]Fuel decay start date 2035
Estimates as of. 2010
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 5 years

Estimated Canister usage
18"x10'
17.50

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	1.4545E-10	95,816.70	191,633 40	0 00E+00	1.39E-05	2 79E-05
Am-241	1.1190E-03	95,816 70	191,633 40	0 00E+00	1 07E+02	2 14E+02
Am-242m	4.5425E-07	95,816 70	191,633 40	0 00E+00	4 35E-02	8 70E-02
Am-243	1 4921E-06	95,816 70	191,633 40	0 00E+00	1 43E-01	2 86E-01
C-14	5 7244E-09	95,816 70	191,633 40	0 00E+00	5 48E-04	1.10E-03
Cl-36	1 3124E-32	95,816 70	191,633 40	0 00E+00	1.26E-27	2 51E-27
Cm-243	2 3676E-07	95,816 70	191,633 40	0 00E+00	2.27E-02	4 54E-02
Cm-244	5.2042E-05	95,816 70	191,633 40	0.00E+00	4 99E+00	9 97E+00
Co-60	3 8208E-05	95,816 70	191,633 40	0 00E+00	3 66E+00	7 32E+00
Cs-134	4 8693E-01	95,816 70	191,633 40	0 00E+00	4 67E+04	9 33E+04
Cs-135	3 4477E-06	95,816 70	191,633 40	0 00E+00	3.30E-01	6 61E-01
Cs-137	2 8731E+00	95,816 70	191,633 40	0 00E+00	2.75E+05	5.51E+05
Eu-154	8.2053E-02	95,816 70	191,633 40	0 00E+00	7.86E+03	1 57E+04
Eu-155	3 9134E-02	95,816 70	191,633 40	0 00E+00	3 75E+03	7 50E+03
Fe-55	6 7429E-03	95,816 70	191,633 40	0 00E+00	6 46E+02	1 29E+03
H-3	1 0599E-02	95,816 70	191,633 40	0 00E+00	1 02E+03	2 03E+03
I-129	7 5300E-07	95,816 70	191,633 40	0 00E+00	7.21E-02	1.44E-01
Kr-85	2 8595E-01	95,816 70	191,633 40	0 00E+00	2.74E+04	5 48E+04
Np-237	9.5479E-06	95,816 70	191,633 40	0 00E+00	9 15E-01	1 83E+00
Pa-231	8 9297E-10	95,816 70	191,633 40	0 00E+00	8 56E-05	1 71E-04
Pb-210	3 7609E-12	95,816 70	191,633 40	0 00E+00	3 60E-07	7.21E-07
Pm-147	2 5452E+00	95,816 70	191,633 40	0 00E+00	2 44E+05	4 88E+05
Pu-238	2 0550E-02	95,816 70	191,633 40	0 00E+00	1 97E+03	3 94E+03
Pu-239	4.2838E-04	95,816 70	191,633 40	0 00E+00	4.10E+01	8.21E+01
Pu-240	2.4401E-04	95,816 70	191,633 40	0.00E+00	2.34E+01	4 68E+01
Pu-241	6 8764E-02	95,816 70	191,633 40	0 00E+00	6 59E+03	1 32E+04
Pu-242	3 6329E-07	95,816 70	191,633 40	0 00E+00	3 48E-02	6 96E-02
Ra-226	3 8045E-11	95,816 70	191,633 40	0 00E+00	3 65E-06	7.29E-06
Ra-228	2 9902E-15	95,816 70	191,633 40	0 00E+00	2 87E-10	5 73E-10
Ru-106	1 9055E-01	95,816 70	191,633.40	0 00E+00	1.83E+04	3 65E+04
Se-79	1.2936E-05	95,816.70	191,633 40	0.00E+00	1.24E+00	2 48E+00
Sn-126	1 1574E-05	95,816 70	191,633 40	0 00E+00	1 11E+00	2 22E+00
Sr-90	2 7505E+00	95,816 70	191,633 40	0 00E+00	2 64E+05	5 27E+05
Tc-99	4 2239E-04	95,816 70	191,633 40	0 00E+00	4 05E+01	8.09E+01
Th-229	1 8848E-12	95,816 70	191,633 40	0 00E+00	1 81E-07	3 61E-07
Th-230	1 7042E-08	95,816 70	191,633 40	0 00E+00	1 63E-03	3 27E-03
Th-232	7.8132E-15	95,816 70	191,633 40	0 00E+00	7 49E-10	1 50E-09
Tl-208	4 4063E-08	95,816 70	191,633 40	0 00E+00	4.22E-03	8 44E-03
U-232	1.3151E-07	95,816 70	191,633 40	0 00E+00	1.26E-02	2.52E-02
U-233	1 9564E-09	95,816 70	191,633 40	0 00E+00	1.87E-04	3 75E-04
U-234	1 8371E-04	95,816 70	191,633.40	0 00E+00	1.76E+01	3 52E+01
U-235	-2 7235E-06	95,816 70	0 00	5.76E-01	3 15E-01	5 76E-01
U-236	1.5493E-05	95,816 70	191,633 40	0 00E+00	1 48E+00	2 97E+00
U-238	-4 2851E-09	95,816 70	0 00	6 61E-03	6 20E-03	6 61E-03
Y-90	2 7505E+00	95,816 70	191,633 40	0 00E+00	2 64E+05	5.27E+05
Other Radionuclides					4 93E+05	9 86E+05

Gamma Sources

Photon Energy Group Avg MeV	Total Photons/sec (bounding)
0 0150	3.697E+16
0 0250	7.965E+15
0 0375	7.350E+15
0 0575	7.227E+15
0 0850	4 607E+15
0 1250	3 990E+15
0 2250	3.905E+15
0.3750	1.890E+15
0 5750	2.596E+16
0.8500	3 636E+15
1.2500	6 765E+14
1 7500	2.837E+13
2.2500	5.950E+13
2.7500	3 423E+11
3.5000	3 797E+10
5 0000	1 135E+05
7 0000	1.265E+04
11 0000	1.426E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.86E+03	9.72E+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 %	93 1245618	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	95,816 70	50,514 01	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		191 633 40	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 06	0.53
Bounding	2 13	

Estimated EOL HM/Given EOL HM: 0 82

[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: MIT
SNF ID #: 136
Fuel Units & Descr: 120 - 15 FLAT PLATES
Heavy Metal Mass: BOL=65 46kg, EOL=43.032kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1994
Estimates as of: 2010
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: 15 years

Estimated Canister usage 18"x10': 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 Inventones(Ci)
Ac-227	4 5861E-10	21,239.75	42,479.50	0 00E+00	9 74E-06	1 95E-05
Am-241	1 7832E-03	21,239.75	42,479 50	0 00E+00	3 79E+01	7 58E+01
Am-242m	4 3410E-07	21,239 75	42,479 50	0 00E+00	9 22E-03	1 84E-02
Am-243	1 4907E-06	21,239 75	42,479 50	0 00E+00	3 17E-02	6 33E-02
C-14	5 7162E-09	21,239 75	42,479 50	0 00E+00	1 21E-04	2 43E-04
Cl-36	1 3124E-32	21,239 75	42,479 50	0 00E+00	2 79E-28	5 57E-28
Cm-243	1 8568E-07	21,239 75	42,479 50	0 00E+00	3 94E-03	7 89E-03
Cm-244	3.5512E-05	21,239 75	42,479 50	0 00E+00	7 54E-01	1 51E+00
Co-60	1 0261E-05	21,239 75	42,479 50	0 00E+00	2.18E-01	4 36E-01
Cs-134	1 6931E-02	21,239 75	42,479 50	0 00E+00	3 60E+02	7.19E+02
Cs-135	3 4477E-06	21,239 75	42,479 50	0 00E+00	7.32E-02	1 46E-01
Cs-137	2.2800E+00	21,239 75	42,479 50	0 00E+00	4 84E+04	9 69E+04
Eu-154	3 6656E-02	21,239.75	42,479 50	0 00E+00	7 79E+02	1.56E+03
Eu-155	9 6841E-03	21,239 75	42,479 50	0 00E+00	2 06E+02	4 11E+02
Fe-55	4 6977E-04	21,239 75	42,479 50	0 00E+00	9 98E+00	2 00E+01
H-3	6 0485E-03	21,239 75	42,479 50	0 00E+00	1 28E+02	2 57E+02
I-129	7 5300E-07	21,239 75	42,479 50	0 00E+00	1 60E-02	3.20E-02
Kr-85	1 4989E-01	21,239 75	42,479 50	0 00E+00	3 18E+03	6 37E+03
Np-237	9 5534E-06	21,239 75	42,479 50	0 00E+00	2 03E-01	4 06E-01
Pa-231	1 6550E-09	21,239 75	42,479 50	0 00E+00	3 52E-05	7 03E-05
Pb-210	2 6631E-11	21,239 75	42,479 50	0 00E+00	5 66E-07	1 13E-06
Pm-147	1 8156E-01	21,239 75	42,479 50	0 00E+00	3 86E+03	7.71E+03
Pu-238	1 8990E-02	21,239 75	42,479 50	0 00E+00	4 03E+02	8 07E+02
Pu-239	4 2838E-04	21,239.75	42,479 50	0 00E+00	9 10E+00	1 82E+01
Pu-240	2 4379E-04	21,239 75	42,479 50	0 00E+00	5 18E+00	1 04E+01
Pu-241	4 2511E-02	21,239 75	42,479 50	0.00E+00	9 03E+02	1 81E+03
Pu-242	3 6329E-07	21,239 75	42,479 50	0 00E+00	7 72E-03	1.54E-02
Ra-226	1 4725E-10	21,239 75	42,479 50	0 00E+00	3 13E-06	6.26E-06
Ra-228	8 9760E-15	21,239 75	42,479 50	0 00E+00	1 91E-10	3 81E-10
Ru-106	1 9752E-04	21,239 75	42,479 50	0 00E+00	4.20E+00	8 39E+00
Se-79	1.2933E-05	21,239 75	42,479 50	0 00E+00	2.75E-01	5 49E-01
Sn-126	1.1574E-05	21,239 75	42,479.50	0 00E+00	2 46E-01	4 92E-01
Sr-90	2.1680E+00	21,239 75	42,479.50	0 00E+00	4 60E+04	9.21E+04
Tc-99	4.2239E-04	21,239.75	42,479 50	0 00E+00	8 97E+00	1.79E+01
Th-229	3 9270E-12	21,239 75	42,479 50	0 00E+00	8 34E-08	1 67E-07
Th-230	3 3578E-08	21,239 75	42,479 50	0 00E+00	7 13E-04	1 43E-03
Th-232	1 5452E-14	21,239 75	42,479 50	0 00E+00	3 28E-10	6.56E-10
Tl-208	4 6705E-08	21,239 75	42,479 50	0 00E+00	9 92E-04	1 98E-03
U-232	1 3045E-07	21,239 75	42,479 50	0 00E+00	2 77E-03	5 54E-03
U-233	2 3739E-09	21,239 75	42,479 50	0 00E+00	5 04E-05	1 01E-04
U-234	1 8423E-04	21,239 75	42,479 50	0 00E+00	3 91E+00	7 83E+00
U-235	-2 7235E-06	21,239 75	0 00	1 32E-01	7.39E-02	1 32E-01
U-236	1 5493E-05	21,239 75	42,479.50	0 00E+00	3.29E-01	6 58E-01
U-238	-4.2851E-09	21,239 75	0 00	1 51E-03	1 42E-03	1.51E-03
Y-90	2 1686E+00	21,239.75	42,479 50	0 00E+00	4 61E+04	9.21E+04
Other Radionuclides					4 62E+04	9.24E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5 067E+15
0 0250	1 057E+15
0 0375	9.228E+14
0 0575	9.840E+14
0 0850	5 960E+14
0 1250	4 086E+14
0.2250	5.135E+14
0.3750	2.250E+14
0.5750	3 651E+15
0 8500	8 673E+13
1.2500	4 381E+13
1 7500	1 836E+12
2 2500	2.297E+09
2 7500	1.380E+08
3.5000	8 773E+06
5 0000	2.029E+04
7 0000	2.247E+03
11 0000	2 523E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 75E+02	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	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %.	93 145832	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		21,239 75
Bounding		42,479 50

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	
Bounding	2.06	

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: ML-1 (GCRE)
SNF ID #: 137
Fuel Units & Descr 67 - 19 ROD ASSEMBLY
Heavy Metal Mass BOL=58 625kg EOL=58.29kg
ROD Storage Site INEEL

[1]Fuel decay start date 1965
Estimates as of 2010
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 35 years

Estimated Canister usage 18"x10"
3 72

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	2.3344E-08	316 46	632 91	0 00E+00	7.39E-06	1 48E-05
Am-241	1 1135E-04	316 46	632 91	0 00E+00	3 52E-02	7 05E-02
Am-242m	8 5075E-09	316 46	632.91	0 00E+00	2 69E-06	5 38E-06
Am-243	9 8519E-10	316 46	632.91	0 00E+00	3 12E-07	6.24E-07
C-14	2 3012E-04	316 46	632 91	0 00E+00	7 28E-02	1 46E-01
Cl-36	1 2261E-06	316 46	632 91	0 00E+00	3 88E-04	7.76E-04
Cm-243	2 4875E-10	316 46	632 91	0 00E+00	7 87E-08	1.57E-07
Cm-244	2 3178E-09	316 46	632 91	0 00E+00	7 33E-07	1 47E-06
Co-60	7 0849E-02	316 46	632 91	0 00E+00	2.24E+01	4 48E+01
Cs-134	3 0266E-06	316 46	632 91	0 00E+00	9 58E-04	1 92E-03
Cs-135	3 0316E-05	316 46	632 91	0.00E+00	9 59E-03	1 92E-02
Cs-137	1.4511E+00	316 46	632 91	0 00E+00	4 59E+02	9 18E+02
Eu-154	6 6955E-04	316 46	632.91	0 00E+00	2.12E-01	4 24E-01
Eu-155	6 9850E-04	316 46	632.91	0 00E+00	2.21E-01	4 42E-01
Fe-55	1.2318E-03	316 46	632.91	0 00E+00	3.90E-01	7 80E-01
H-3	2 5141E-03	316 46	632 91	0 00E+00	7.96E-01	1 59E+00
I-129	7 3195E-07	316 46	632 91	0 00E+00	2.32E-04	4 63E-04
Kr-85	4 1281E-02	316 46	632 91	0 00E+00	1.31E+01	2 61E+01
Np-237	1 1489E-06	316 46	632 91	0 00E+00	3 64E-04	7.27E-04
Pa-231	4 5241E-08	316 46	632 91	0 00E+00	1 43E-05	2.86E-05
Pb-210	6 4476E-13	316.46	632 91	0 00E+00	2 04E-10	4 08E-10
Pm-147	1.1651E-03	316 46	632 91	0 00E+00	3 69E-01	7.37E-01
Pu-238	2.9517E-04	316.46	632 91	0 00E+00	9 34E-02	1.87E-01
Pu-239	6 6772E-04	316 46	632 91	0 00E+00	2 11E-01	4 23E-01
Pu-240	8 6839E-05	316 46	632.91	0 00E+00	2 75E-02	5 50E-02
Pu-241	7 1514E-04	316 46	632.91	0 00E+00	2.26E-01	4 53E-01
Pu-242	1 9717E-09	316 46	632 91	0 00E+00	6.24E-07	1 25E-06
Ra-226	1 7654E-12	316 46	632 91	0 00E+00	5.59E-10	1 12E-09
Ra-228	8 2928E-12	316 46	632 91	0 00E+00	2 62E-09	5.25E-09
Ru-106	1 8419E-10	316 46	632 91	0 00E+00	5 83E-08	1.17E-07
Se-79	1 3223E-05	316 46	632 91	0 00E+00	4 18E-03	8.37E-03
Sn-126	1 1493E-05	316 46	632 91	0 00E+00	3 64E-03	7.27E-03
Sr-90	1.3649E+00	316 46	632 91	0 00E+00	4 32E+02	8 64E+02
Tc-99	4 6656E-04	316 46	632 91	0 00E+00	1 48E-01	2 95E-01
Th-229	1.4547E-11	316 46	632.91	0 00E+00	4 60E-09	9 21E-09
Th-230	1 6617E-10	316 46	632.91	0 00E+00	5.26E-08	1 05E-07
Th-232	8 3361E-12	316 46	632.91	0 00E+00	2 64E-09	5 28E-09
Tl-208	2 1664E-08	316 46	632 91	0 00E+00	6 86E-06	1.37E-05
U-232	5 8669E-08	316 46	632 91	0 00E+00	1.86E-05	3 71E-05
U-233	3 1847E-09	316 46	632 91	0 00E+00	1.01E-06	2 02E-06
U-234	3 8769E-07	316 46	632 91	0 00E+00	1.23E-04	2 45E-04
U-235	-2.7761E-06	316 46	0 00	1.18E-01	1 17E-01	1.18E-01
U-236	1 6190E-05	316 46	632 91	0 00E+00	5 12E-03	1.02E-02
U-238	-2 8547E-09	316 46	0.00	1.35E-03	1 35E-03	1.35E-03
Y-90	1 3652E+00	316 46	632 91	0 00E+00	4 32E+02	8 64E+02
Other Radionuclides					5 22E+02	1 04E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 724E+13
0 0250	9 817E+12
0 0375	8 491E+12
0 0575	9 152E+12
0 0850	5.530E+12
0 1250	3 591E+12
0.2250	4 762E+12
0 3750	2.076E+12
0 5750	3.420E+13
0.8500	3 462E+11
1.2500	3 441E+12
1 7500	8 929E+09
2.2500	1.854E+07
2 7500	5.359E+05
3.5000	4 872E+01
5 0000	2 014E+01
7 0000	2.234E+00
11 0000	2 514E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.53E+00	1.11E+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	HASTELLOY	SST
BOL HM Constituents	U	U
BOL Enrichment %	93 143	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		316 46
Bounding		632.91

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 12	
Bounding	0.23	

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: MNR (UALX-HEU) CANADA
SNF ID #: 614
Fuel Units & Descr: 83 - 18 CURVED PLATES
Heavy Metal Mass: BOL=14 782kg; EOL=10 433kg
ROD Storage Site SRS

[1]Fuel decay start date: 2006
Estimates as of: 2010
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: 5 years

Estimated Canister usage: 18"x10' 2 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	1 4545E-10	4,118.78	8,237 55	0 00E+00	5 99E-07	1 20E-06
Am-241	1.1190E-03	4,118.78	8,237.55	0 00E+00	4 61E+00	9 22E+00
Am-242m	4 5425E-07	4,118.78	8,237 55	0 00E+00	1 87E-03	3 74E-03
Am-243	1 4921E-06	4,118.78	8,237 55	0 00E+00	6.15E-03	1 23E-02
C-14	5 7244E-09	4,118.78	8,237 55	0 00E+00	2 36E-05	4 72E-05
Cl-36	1 3124E-32	4,118.78	8,237 55	0 00E+00	5 41E-29	1 08E-28
Cm-243	2 3676E-07	4,118.78	8,237 55	0 00E+00	9 75E-04	1 95E-03
Cm-244	5 2042E-05	4,118.78	8,237 55	0 00E+00	2.14E-01	4.29E-01
Co-60	3 8208E-05	4,118.78	8,237 55	0 00E+00	1 57E-01	3 15E-01
Cs-134	4 8693E-01	4,118.78	8,237 55	0 00E+00	2 01E+03	4 01E+03
Cs-135	3 4477E-06	4,118 78	8,237 55	0 00E+00	1 42E-02	2 84E-02
Cs-137	2 8731E+00	4,118 78	8,237 55	0 00E+00	1 18E+04	2 37E+04
Eu-154	8 2053E-02	4,118 78	8,237 55	0 00E+00	3 38E+02	6 76E+02
Eu-155	3 9134E-02	4,118 78	8,237 55	0 00E+00	1 61E+02	3 22E+02
Fe-55	6 7429E-03	4,118 78	8,237 55	0 00E+00	2 78E+01	5 55E+01
H-3	1 0599E-02	4,118 78	8,237 55	0 00E+00	4 37E+01	8 73E+01
I-129	7 5300E-07	4,118.78	8,237 55	0 00E+00	3 10E-03	6.20E-03
Kr-85	2 8595E-01	4,118 78	8,237 55	0 00E+00	1 18E+03	2 36E+03
Np-237	9 5479E-06	4,118 78	8,237 55	0 00E+00	3 93E-02	7 87E-02
Pa-231	8 9297E-10	4,118 78	8,237 55	0 00E+00	3 68E-06	7 36E-06
Pb-210	3 7609E-12	4,118 78	8,237 55	0 00E+00	1.55E-08	3.10E-08
Pm-147	2 5452E+00	4,118 78	8,237 55	0 00E+00	1 05E+04	2 10E+04
Pu-238	2 0550E-02	4,118 78	8,237 55	0 00E+00	8 46E+01	1 69E+02
Pu-239	4 2838E-04	4,118 78	8,237 55	0 00E+00	1 76E+00	3 53E+00
Pu-240	2 4401E-04	4,118 78	8,237 55	0 00E+00	1 01E+00	2 01E+00
Pu-241	6 8764E-02	4,118 78	8,237 55	0 00E+00	2 83E+02	5 66E+02
Pu-242	3 6329E-07	4,118 78	8,237 55	0 00E+00	1 50E-03	2.99E-03
Ra-226	3 8045E-11	4,118.78	8,237 55	0 00E+00	1 57E-07	3 13E-07
Ra-228	2 9902E-15	4,118 78	8,237 55	0 00E+00	1.23E-11	2 46E-11
Ru-106	1 9055E-01	4,118 78	8,237 55	0 00E+00	7 85E+02	1 57E+03
Se-79	1 2936E-05	4,118 78	8,237 55	0 00E+00	5 33E-02	1 07E-01
Sn-126	1 1574E-05	4,118 78	8,237 55	0 00E+00	4 77E-02	9 53E-02
Sr-90	2 7505E+00	4,118 78	8,237 55	0 00E+00	1 13E+04	2 27E+04
Tc-99	4 2239E-04	4,118 78	8,237 55	0 00E+00	1 74E+00	3 48E+00
Th-229	1 8848E-12	4,118 78	8,237 55	0 00E+00	7 76E-09	1 55E-08
Th-230	1 7042E-08	4,118 78	8,237 55	0 00E+00	7 02E-05	1 40E-04
Th-232	7 8132E-15	4,118 78	8,237 55	0 00E+00	3.22E-11	6 44E-11
Tl-208	4 4063E-08	4,118 78	8,237 55	0 00E+00	1 81E-04	3 63E-04
U-232	1 3151E-07	4,118 78	8,237 55	0 00E+00	5 42E-04	1 08E-03
U-233	1 9564E-09	4,118 78	8,237 55	0 00E+00	8 06E-06	1 61E-05
U-234	1 8371E-04	4,118 78	8,237 55	0 00E+00	7.57E-01	1 51E+00
U-235	-2.7235E-06	4,118 78	0 00	2.97E-02	1 85E-02	2.97E-02
U-236	1 5493E-05	4,118 78	8,237 55	0 00E+00	6.38E-02	1.28E-01
U-238	-4.2851E-09	4,118 78	0 00	3.42E-04	3.24E-04	3 42E-04
Y-90	2 7505E+00	4,118 78	8,237 55	0 00E+00	1.13E+04	2 27E+04
Other Radionuclides					2 12E+04	4 24E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 589E+15
0 0250	3 424E+14
0 0375	3 159E+14
0 0575	3 107E+14
0 0850	1 981E+14
0 1250	1 715E+14
0 2250	1 679E+14
0 3750	8 125E+13
0 5750	1 116E+15
0 8500	1 563E+14
1.2500	2.908E+13
1 7500	1.219E+12
2.2500	2.558E+12
2.7500	1 472E+10
3.5000	1 632E+09
5 0000	4 880E+03
7 0000	5 440E+02
11 0000	6 132E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.09E+02	4 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 %	93 11672336	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		4,118 78	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		8 237 55	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 89	
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 MNR (UALX-HEU) CANADA
SNF ID # 1064
Fuel Units & Descr 11 - 18 CURVED PLATES
Heavy Metal Mass BOL=1.959kg EOL=1 383kg
ROD Storage Site SRS

[1]Fuel decay start date 2006
Estimates as of. 2010
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 5 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	1.4545E-10	545 86	1,091 72	0 00E+00	7 94E-08	1 59E-07
Am-241	1.1190E-03	545 86	1,091 72	0 00E+00	6 11E-01	1 22E+00
Am-242m	4 5425E-07	545 86	1,091 72	0 00E+00	2.48E-04	4 96E-04
Am-243	1 4921E-06	545 86	1,091 72	0 00E+00	8 14E-04	1 63E-03
C-14	5 7244E-09	545 86	1,091 72	0 00E+00	3 12E-06	6.25E-06
Cl-36	1 3124E-32	545 86	1,091.72	0 00E+00	7 16E-30	1.43E-29
Cm-243	2.3676E-07	545 86	1,091.72	0 00E+00	1 29E-04	2 58E-04
Cm-244	5.2042E-05	545 86	1,091 72	0 00E+00	2 84E-02	5 68E-02
Co-60	3.8208E-05	545.86	1,091 72	0 00E+00	2 09E-02	4 17E-02
Cs-134	4 8693E-01	545 86	1,091 72	0 00E+00	2 66E+02	5 32E+02
Cs-135	3 4477E-06	545 86	1,091 72	0 00E+00	1.88E-03	3 76E-03
Cs-137	2 8731E+00	545 86	1,091 72	0 00E+00	1.57E+03	3 14E+03
Eu-154	8 2053E-02	545 86	1,091 72	0 00E+00	4 48E+01	8 96E+01
Eu-155	3 9134E-02	545 86	1,091 72	0 00E+00	2 14E+01	4 27E+01
Fe-55	6 7429E-03	545 86	1,091.72	0 00E+00	3 68E+00	7.36E+00
H-3	1 0599E-02	545 86	1,091.72	0 00E+00	5 79E+00	1.16E+01
I-129	7.5300E-07	545 86	1,091 72	0 00E+00	4 11E-04	8 22E-04
Kr-85	2.8595E-01	545 86	1,091 72	0 00E+00	1 56E+02	3 12E+02
Np-237	9 5479E-06	545 86	1,091 72	0 00E+00	5.21E-03	1 04E-02
Pa-231	8 9297E-10	545 86	1,091 72	0 00E+00	4 87E-07	9 75E-07
Pb-210	3 7609E-12	545 86	1,091 72	0 00E+00	2 05E-09	4 11E-09
Pm-147	2 5452E+00	545 86	1,091 72	0 00E+00	1.39E+03	2 78E+03
Pu-238	2 0550E-02	545 86	1,091 72	0 00E+00	1 12E+01	2.24E+01
Pu-239	4 2838E-04	545 86	1,091.72	0 00E+00	2 34E-01	4 68E-01
Pu-240	2 4401E-04	545 86	1,091.72	0 00E+00	1 33E-01	2.66E-01
Pu-241	6 8764E-02	545.86	1,091 72	0 00E+00	3 75E+01	7.51E+01
Pu-242	3 6329E-07	545 86	1,091 72	0 00E+00	1 98E-04	3 97E-04
Ra-226	3 8045E-11	545 86	1,091 72	0 00E+00	2 08E-08	4 15E-08
Ra-228	2 9902E-15	545 86	1,091 72	0 00E+00	1.63E-12	3 26E-12
Ru-106	1 9055E-01	545 86	1,091 72	0 00E+00	1.04E+02	2 08E+02
Se-79	1.2936E-05	545 86	1,091 72	0 00E+00	7 06E-03	1 41E-02
Sn-126	1 1574E-05	545 86	1,091 72	0 00E+00	6.32E-03	1.26E-02
Sr-90	2 7505E+00	545 86	1,091.72	0 00E+00	1.50E+03	3 00E+03
Tc-99	4.2239E-04	545 86	1,091.72	0 00E+00	2 31E-01	4 61E-01
Th-229	1 8848E-12	545 86	1,091 72	0 00E+00	1 03E-09	2 06E-09
Th-230	1.7042E-08	545 86	1,091 72	0 00E+00	9 30E-06	1 86E-05
Th-232	7.8132E-15	545 86	1,091 72	0 00E+00	4.26E-12	8 53E-12
Tl-208	4 4063E-08	545 86	1,091 72	0 00E+00	2.41E-05	4 81E-05
U-232	1.3151E-07	545 86	1,091.72	0 00E+00	7 18E-05	1 44E-04
U-233	1 9564E-09	545 86	1,091 72	0 00E+00	1 07E-06	2.14E-06
U-234	1 8371E-04	545 86	1,091.72	0 00E+00	1 00E-01	2.01E-01
U-235	-2.7235E-06	545 86	0.00	3 94E-03	2 46E-03	3 94E-03
U-236	1.5493E-05	545.86	1,091.72	0 00E+00	8 46E-03	1 69E-02
U-238	-4.2851E-09	545 86	0 00	4 53E-05	4.30E-05	4 53E-05
Y-90	2.7505E+00	545 86	1,091 72	0.00E+00	1.50E+03	3 00E+03
Other Radionuclides					2 81E+03	5 61E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 106E+14
0.0250	4 538E+13
0.0375	4 187E+13
0 0575	4 117E+13
0 0850	2.625E+13
0 1250	2.273E+13
0.2250	2.225E+13
0 3750	1.077E+13
0 5750	1 479E+14
0 8500	2 071E+13
1.2500	3 854E+12
1 7500	1 616E+11
2.2500	3.390E+11
2 7500	1 950E+09
3 5000	2 163E+08
5 0000	6 467E+02
7 0000	7.209E+01
11 0000	8 126E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.77E+01	5.54E+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 11672336	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		545.86	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		1 091 72	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 89	
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. MURR (UALX) COLUMBIA
SNF ID #: 144
Fuel Units & Descr: 972 - 24 CURVED PLATES
Heavy Metal Mass: BOL=807 732kg; EOL=704.311kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2035
Estimates as of 2010
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 5 years

Estimated Canister usage
18"x10'
40 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	1 4545E-10	97,941 50	195 883 01	0 00E+00	1 42E-05	2 85E-05
Am-241	1 1190E-03	97,941 50	195,883 01	0 00E+00	1.10E+02	2 19E+02
Am-242m	4 5425E-07	97,941 50	195,883 01	0 00E+00	4 45E-02	8 90E-02
Am-243	1 4921E-06	97,941 50	195,883 01	0 00E+00	1 46E-01	2 92E-01
C-14	5 7244E-09	97,941 50	195,883 01	0 00E+00	5 61E-04	1 12E-03
Cl-36	1 3124E-32	97,941 50	195,883 01	0 00E+00	1 29E-27	2 57E-27
Cm-243	2 3676E-07	97,941 50	195,883 01	0 00E+00	2 32E-02	4 64E-02
Cm-244	5 2042E-05	97,941 50	195,883 01	0 00E+00	5 10E+00	1 02E+01
Co-60	3 8208E-05	97,941 50	195,883 01	0 00E+00	3 74E+00	7 48E+00
Cs-134	4 8693E-01	97,941 50	195,883 01	0 00E+00	4 77E+04	9 54E+04
Cs-135	3 4477E-06	97,941 50	195,883.01	0 00E+00	3 38E-01	6 75E-01
Cs-137	2 8731E+00	97,941 50	195,883 01	0 00E+00	2.81E+05	5 63E+05
Eu-154	8.2053E-02	97,941.50	195,883 01	0 00E+00	8.04E+03	1 61E+04
Eu-155	3 9134E-02	97,941.50	195,883 01	0 00E+00	3 83E+03	7 67E+03
Fe-55	6.7429E-03	97,941.50	195,883 01	0 00E+00	6 60E+02	1 32E+03
H-3	1 0599E-02	97,941.50	195,883 01	0 00E+00	1 04E+03	2 08E+03
I-129	7 5300E-07	97,941.50	195,883 01	0 00E+00	7 37E-02	1 47E-01
Kr-85	2 8595E-01	97,941.50	195,883 01	0 00E+00	2 80E+04	5 60E+04
Np-237	9 5479E-06	97,941 50	195,883 01	0 00E+00	9 35E-01	1 87E+00
Pa-231	8 9297E-10	97,941 50	195,883 01	0.00E+00	8 75E-05	1 75E-04
Pb-210	3 7609E-12	97,941 50	195,883 01	0.00E+00	3 68E-07	7 37E-07
Pm-147	2 5452E+00	97,941 50	195,883 01	0 00E+00	2 49E+05	4 99E+05
Pu-238	2 0550E-02	97,941 50	195,883 01	0 00E+00	2 01E+03	4 03E+03
Pu-239	4 2838E-04	97,941 50	195,883 01	0 00E+00	4.20E+01	8 39E+01
Pu-240	2 4401E-04	97,941 50	195,883 01	0 00E+00	2 39E+01	4 78E+01
Pu-241	6 8764E-02	97,941 50	195,883 01	0 00E+00	6 73E+03	1 35E+04
Pu-242	3 6329E-07	97,941 50	195,883 01	0 00E+00	3 56E-02	7 12E-02
Ra-226	3 8045E-11	97,941 50	195,883 01	0 00E+00	3 73E-06	7 45E-06
Ra-228	2 9902E-15	97,941 50	195,883 01	0 00E+00	2 93E-10	5 86E-10
Ru-106	1 9055E-01	97,941 50	195,883 01	0 00E+00	1 87E+04	3.73E+04
Se-79	1.2936E-05	97,941.50	195,883 01	0 00E+00	1.27E+00	2.53E+00
Sn-126	1.1574E-05	97,941.50	195,883 01	0 00E+00	1.13E+00	2.27E+00
Sr-90	2.7505E+00	97,941.50	195,883 01	0 00E+00	2 69E+05	5.39E+05
Tc-99	4.2239E-04	97,941.50	195,883 01	0 00E+00	4 14E+01	8.27E+01
Th-229	1 8848E-12	97,941 50	195,883 01	0 00E+00	1 85E-07	3 69E-07
Th-230	1 7042E-08	97,941 50	195,883 01	0 00E+00	1 67E-03	3 34E-03
Th-232	7 8132E-15	97,941 50	195,883 01	0 00E+00	7 65E-10	1 53E-09
Tl-208	4 4063E-08	97,941 50	195,883 01	0 00E+00	4 32E-03	8 63E-03
U-232	1 3151E-07	97,941 50	195,883 01	0 00E+00	1 29E-02	2 58E-02
U-233	1 9564E-09	97,941 50	195,883 01	0 00E+00	1 92E-04	3 83E-04
U-234	1 8371E-04	97,941 50	195,883 01	0 00E+00	1 80E+01	3 60E+01
U-235	-2.7235E-06	97,941 50	0 00	1 63E+00	1.36E+00	1 63E+00
U-236	1 5493E-05	97,941 50	195,883.01	0 00E+00	1.52E+00	3 03E+00
U-238	-4 2851E-09	97,941 50	0 00	1 83E-02	1 79E-02	1 83E-02
Y-90	2 7505E+00	97,941 50	195,883 01	0 00E+00	2 69E+05	5 39E+05
Other Radionuclides					5 04E+05	1.01E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	3 779E+16
0.0250	8 142E+15
0 0375	7.513E+15
0 0575	7.387E+15
0 0850	4 710E+15
0 1250	4 078E+15
0 2250	3 992E+15
0 3750	1 932E+15
0 5750	2.654E+16
0 8500	3.717E+15
1.2500	6 915E+14
1 7500	2 900E+13
2.2500	6 082E+13
2 7500	3 499E+11
3 5000	3.881E+10
5 0000	1 161E+05
7 0000	1.294E+04
11.0000	1 458E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.97E+03	9.93E+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 %	93.26113117	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		97,941.50
Bounding		195,883.01

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	
Bounding:	0 77	

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 MURR (ULAX HEU) COLUMBIA
SNF ID # 143
Fuel Units & Descr: 312 - 24 CURVED PLATES
Heavy Metal Mass BOL=259 022kg EOL=213 065kg
ROD Storage Site SRS

[1]Fuel decay start date 1990
Estimates as of 2010
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'
13 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	43,522 74	87,045 48	0 00E+00	2 89E-05	5 77E-05
Am-241	2 0060E-03	43,522 74	87,045 48	0 00E+00	8 73E+01	1 75E+02
Am-242m	4 2429E-07	43,522 74	87,045 48	0 00E+00	1.85E-02	3 69E-02
Am-243	1 4899E-06	43,522 74	87,045 48	0 00E+00	6.48E-02	1 30E-01
C-14	5 7135E-09	43,522 74	87,045 48	0 00E+00	2.49E-04	4 97E-04
Cl-36	1.3124E-32	43,522.74	87,045 48	0 00E+00	5.71E-28	1 14E-27
Cm-243	1.6443E-07	43,522 74	87,045 48	0 00E+00	7 16E-03	1 43E-02
Cm-244	2 9330E-05	43,522 74	87,045 48	0 00E+00	1.28E+00	2 55E+00
Co-60	5.3186E-06	43,522 74	87,045 48	0 00E+00	2 31E-01	4 63E-01
Cs-134	3 1563E-03	43,522 74	87,045 48	0 00E+00	1.37E+02	2 75E+02
Cs-135	3 4477E-06	43,522 74	87,045 48	0 00E+00	1 50E-01	3.00E-01
Cs-137	2 0313E+00	43,522 74	87,045 48	0 00E+00	8 84E+04	1.77E+05
Eu-154	2 4513E-02	43,522 74	87,045 48	0 00E+00	1 07E+03	2.13E+03
Eu-155	4 8175E-03	43,522 74	87,045 48	0 00E+00	2 10E+02	4 19E+02
Fe-55	1.2397E-04	43,522 74	87,045 48	0 00E+00	5 40E+00	1.08E+01
H-3	4 5697E-03	43,522 74	87,045 48	0 00E+00	1 99E+02	3 98E+02
I-129	7 5300E-07	43,522 74	87,045 48	0 00E+00	3 28E-02	6 55E-02
Kr-85	1 0850E-01	43,522 74	87,045 48	0 00E+00	4 72E+03	9 44E+03
Np-237	9 5561E-06	43,522 74	87,045 48	0 00E+00	4 16E-01	8 32E-01
Pa-231	2 0359E-09	43,522 74	87,045 48	0 00E+00	8 86E-05	1 77E-04
Pb-210	4 9728E-11	43,522.74	87,045 48	0 00E+00	2.16E-06	4 33E-06
Pm-147	4 8502E-02	43,522.74	87,045 48	0 00E+00	2 11E+03	4 22E+03
Pu-238	1 8254E-02	43,522.74	87,045 48	0 00E+00	7.94E+02	1 59E+03
Pu-239	4.2810E-04	43,522 74	87,045 48	0 00E+00	1.86E+01	3 73E+01
Pu-240	2 4368E-04	43,522 74	87,045 48	0 00E+00	1.06E+01	2.12E+01
Pu-241	3 3415E-02	43,522 74	87,045 48	0 00E+00	1.45E+03	2 91E+03
Pu-242	3 6329E-07	43,522 74	87,045 48	0 00E+00	1.58E-02	3.16E-02
Ra-226	2.2854E-10	43,522 74	87,045 48	0 00E+00	9 95E-06	1.99E-05
Ra-228	1.2426E-14	43,522 74	87,045 48	0 00E+00	5 41E-10	1 08E-09
Ru-106	6.3589E-06	43,522 74	87,045 48	0 00E+00	2 77E-01	5 54E-01
Se-79	1.2933E-05	43,522 74	87,045 48	0 00E+00	5 63E-01	1.13E+00
Sn-126	1 1574E-05	43,522 74	87,045 48	0 00E+00	5 04E-01	1 01E+00
Sr-90	1 9248E+00	43,522 74	87,045 48	0 00E+00	8 38E+04	1 68E+05
Tc-99	4.2239E-04	43,522 74	87,045 48	0 00E+00	1 84E+01	3 68E+01
Th-229	5 0953E-12	43,522 74	87,045.48	0 00E+00	2.22E-07	4 44E-07
Th-230	4 1885E-08	43,522.74	87,045 48	0 00E+00	1 82E-03	3 65E-03
Th-232	1 9270E-14	43,522 74	87,045 48	0 00E+00	8 39E-10	1 68E-09
Tl-208	4 6024E-08	43,522.74	87,045 48	0 00E+00	2 00E-03	4 01E-03
U-232	1 2582E-07	43,522.74	87,045 48	0 00E+00	5 48E-03	1.10E-02
U-233	2 5825E-09	43,522.74	87,045 48	0 00E+00	1.12E-04	2.25E-04
U-234	1 8450E-04	43,522 74	87,045 48	0 00E+00	8 03E+00	1 61E+01
U-235	-2.7235E-06	43,522 74	0 00	5.21E-01	4 03E-01	5.21E-01
U-236	1.5493E-05	43,522 74	87,045 48	0 00E+00	6 74E-01	1.35E+00
U-238	-4.2851E-09	43,522 74	0 00	5 97E-03	5 79E-03	5 97E-03
Y-90	1 9254E+00	43,522 74	87,045 48	0 00E+00	8.38E+04	1.68E+05
Other Radionuclides					8.42E+04	1.68E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	9 188E+15
0 0250	1 911E+15
0 0375	1 667E+15
0 0575	1 785E+15
0 0850	1 079E+15
0 1250	7.299E+14
0.2250	9.307E+14
0.3750	4.051E+14
0.5750	6 609E+15
0 8500	1 117E+14
1.2500	6 380E+13
1 7500	2 928E+12
2.2500	2.569E+08
2 7500	1 452E+08
3 5000	6 671E+05
5 0000	3 772E+04
7 0000	4 165E+03
11 0000	4 668E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.04E+03	2.08E+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 %	93 137	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		43,522.74	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		87,045 48	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 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.	N S SAVANNAH (UO2)	[1]Fuel decay start date	1963
SNF ID #	854	Estimates as of:	2010
Fuel Units & Descr	12 - UNKNOWN	Template:	PWR (Light Water, Zirc 0 to 5%. U)
Heavy Metal Mass:	BOL= , EOL=21 09kg	[2]Template Burnup(MWd):	61 92
ROD Storage Site.	INEEL	Template BOL Heavy Metal Mass (MT):	0 00176911
		Template Decay Time:	35 years

Estimated Canister usage

18"x10'
12 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	8 7758E-10	31 68	31 68	0 00E+00	2 78E-08	2 78E-08
Am-241	1 4352E-01	31 68	31 68	0 00E+00	4 55E+00	4 55E+00
Am-242m	2 8698E-04	31 68	31 68	0 00E+00	9 09E-03	9 09E-03
Am-243	6 2565E-04	31 68	31 68	0 00E+00	1 98E-02	1 98E-02
C-14	4 7901E-05	31 68	31 68	0 00E+00	1 52E-03	1 52E-03
Cl-36	8 0297E-07	31 68	31 68	0 00E+00	2 54E-05	2.54E-05
Cm-243	2 5081E-04	31 68	31 68	0 00E+00	7 95E-03	7.95E-03
Cm-244	4 9015E-02	31 68	31 68	0 00E+00	1 55E+00	1.55E+00
Co-60	2 5581E-03	31 68	31 68	0 00E+00	8 11E-02	8.11E-02
Cs-134	4 0536E-05	31 68	31 68	0 00E+00	1 28E-03	1.28E-03
Cs-135	1 4433E-05	31 68	31 68	0 00E+00	4 57E-04	4 57E-04
Cs-137	1 3979E+00	31 68	31 68	0 00E+00	4 43E+01	4 43E+01
Eu-154	2 0203E-02	31 68	31.68	0 00E+00	6 40E-01	6 40E-01
Eu-155	1 7684E-03	31 68	31 68	0 00E+00	5 60E-02	5 60E-02
Fe-55	4 3136E-05	31 68	31 68	0 00E+00	1 37E-03	1.37E-03
H-3	2 0769E-02	31.68	31 68	0 00E+00	6 58E-01	6.58E-01
I-129	9 8288E-07	31.68	31 68	0 00E+00	3 11E-05	3.11E-05
Kr-85	2 8214E-02	31.68	31 68	0 00E+00	8 94E-01	8 94E-01
Np-237	1 1218E-05	31 68	31 68	0 00E+00	3 55E-04	3 55E-04
Pa-231	1 3036E-09	31 68	31 68	0 00E+00	4 13E-08	4 13E-08
Pb-210	8 5078E-11	31 68	31 68	0 00E+00	2.70E-09	2 70E-09
Pm-147	3 6531E-04	31 68	31 68	0 00E+00	1.16E-02	1 16E-02
Pu-238	7 4564E-02	31 68	31 68	0.00E+00	2 36E+00	2 36E+00
Pu-239	1 1623E-02	31 68	31 68	0 00E+00	3 68E-01	3 68E-01
Pu-240	1 5132E-02	31 68	31 68	0 00E+00	4 79E-01	4 79E-01
Pu-241	9 0036E-01	31 68	31 68	0 00E+00	2 85E+01	2 85E+01
Pu-242	6 4260E-05	31 68	31 68	0 00E+00	2 04E-03	2 04E-03
Ra-226	2.2804E-10	31 68	31 68	0 00E+00	7.23E-09	7 23E-09
Ra-228	5.2713E-12	31 68	31 68	0 00E+00	1 67E-10	1 67E-10
Ru-106	6.1160E-10	31 68	31 68	0 00E+00	1 94E-08	1 94E-08
Se-79	1.2377E-05	31 68	31 68	0 00E+00	3 92E-04	3 92E-04
Sn-126	2.5210E-05	31 68	31 68	0 00E+00	7 99E-04	7 99E-04
Sr-90	9 1667E-01	31 68	31 68	0 00E+00	2 90E+01	2.90E+01
Tc-99	3.9357E-04	31 68	31 68	0 00E+00	1 25E-02	1.25E-02
Th-229	1.2057E-10	31 68	31 68	0 00E+00	3 82E-09	3 82E-09
Th-230	2.1043E-08	31 68	31 68	0 00E+00	6 67E-07	6 67E-07
Th-232	5.2972E-12	31 68	31 68	0 00E+00	1 68E-10	1 68E-10
Tl-208	1 7474E-07	31 68	31.68	0 00E+00	5 54E-06	5 54E-06
U-232	4 7368E-07	31 68	31.68	0 00E+00	1 50E-05	1.50E-05
U-233	2 5097E-08	31 68	31 68	0 00E+00	7 95E-07	7.95E-07
U-234	5 0000E-05	31 68	31 68	0 00E+00	1 58E-03	1.58E-03
U-235	-1 4489E-06	31 68	0 00	1 46E-03	1 41E-03	1.46E-03
U-236	7 5824E-06	31 68	31 68	0 00E+00	2.40E-04	2 40E-04
U-238	-2 6129E-07	31.68	0 00	6 87E-03	6 86E-03	6 87E-03
Y-90	9 1699E-01	31 68	31 68	0 00E+00	2 91E+01	2 91E+01
Other Radionuclides					4.25E+01	4 25E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 705E+12
0 0250	3 438E+11
0 0375	3.279E+11
0 0575	3 789E+11
0 0850	1 908E+11
0 1250	1 324E+11
0 2250	1 636E+11
0 3750	7 034E+10
0 5750	1 636E+12
0 8500	2.263E+10
1 2500	2.223E+10
1 7500	6 658E+08
2 2500	1 073E+05
2.7500	2.197E+05
3 5000	2.265E+04
5 0000	9 684E+03
7 0000	1 116E+03
11 0000	1.282E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.29E-01	7.29E-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		31 68
Bounding		31 68

Basis for burnup used in estimate:

Nominal burnup set equal to bounding burnup

Bounding burnup taken from SFD and converted to MWd using BOL=21 123kg

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 04	
Bounding	0 04	

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: NEREIDE (FRANCE)
SNF ID #: 751
Fuel Units & Descr: 46 - 12 CURVED PLATES
Heavy Metal Mass BOL= ; EOL=35 42kg
ROD Storage Site SRS

[1]Fuel decay start date: 1982
Estimates as of: 2010
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'
1 92

II. Estimates

Radionuclide	m: C/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	21.27	42.53	0 00E+00	2 44E-08	4 88E-08
Am-241	2 3056E-03	21.27	42 53	0 00E+00	4 90E-02	9 81E-02
Am-242m	4 1476E-07	21.27	42 53	0 00E+00	8 82E-06	1.76E-05
Am-243	1 4894E-06	21.27	42 53	0 00E+00	3 17E-05	6.33E-05
C-14	5 7108E-09	21.27	42 53	0 00E+00	1.21E-07	2 43E-07
Cl-36	1.3124E-32	21 27	42 53	0 00E+00	2 79E-31	5 58E-31
Cm-243	1 4562E-07	21 27	42.53	0 00E+00	3 10E-06	6 19E-06
Cm-244	2 4221E-05	21 27	42.53	0 00E+00	5 15E-04	1 03E-03
Co-60	2 7560E-06	21.27	42.53	0 00E+00	5 86E-05	1 17E-04
Cs-134	5 8851E-04	21.27	42 53	0 00E+00	1 25E-02	2 50E-02
Cs-135	3 4477E-06	21.27	42 53	0 00E+00	7.33E-05	1.47E-04
Cs-137	1 8099E+00	21.27	42 53	0 00E+00	3 85E+01	7 70E+01
Eu-154	1 6386E-02	21.27	42 53	0 00E+00	3 48E-01	6 97E-01
Eu-155	2.3957E-03	21.27	42 53	0 00E+00	5 09E-02	1 02E-01
Fe-55	3.2707E-05	21 27	42.53	0 00E+00	6 96E-04	1.39E-03
H-3	3 4504E-03	21 27	42.53	0 00E+00	7.34E-02	1 47E-01
I-129	7 5300E-07	21 27	42.53	0 00E+00	1 60E-05	3 20E-05
Kr-85	7 8540E-02	21.27	42 53	0 00E+00	1 67E+00	3 34E+00
Np-237	9 5615E-06	21.27	42 53	0 00E+00	2 03E-04	4 07E-04
Pa-231	2 7968E-09	21.27	42 53	0.00E+00	5 95E-08	1.19E-07
Pb-210	1.2612E-10	21.27	42 53	0 00E+00	2 68E-09	5.36E-09
Pm-147	1.2952E-02	21.27	42 53	0 00E+00	2.75E-01	5 51E-01
Pu-238	1 7549E-02	21 27	42.53	0 00E+00	3 73E-01	7 46E-01
Pu-239	4 2810E-04	21 27	42.53	0 00E+00	9 10E-03	1 82E-02
Pu-240	2 4357E-04	21 27	42 53	0 00E+00	5 18E-03	1 04E-02
Pu-241	2 6277E-02	21.27	42 53	0 00E+00	5 59E-01	1 12E+00
Pu-242	3 6329E-07	21.27	42 53	0 00E+00	7.73E-06	1.55E-05
Ra-226	4 4444E-10	21.27	42 53	0 00E+00	9 45E-09	1 89E-08
Ra-228	1 9714E-14	21.27	42 53	0 00E+00	4.19E-13	8.38E-13
Ru-106	2 0477E-07	21.27	42 53	0 00E+00	4.35E-06	8.71E-06
Se-79	1.2933E-05	21.27	42 53	0 00E+00	2.75E-04	5 50E-04
Sn-126	1.1574E-05	21 27	42.53	0 00E+00	2 46E-04	4 92E-04
Sr-90	1 7092E+00	21 27	42.53	0 00E+00	3 63E+01	7.27E+01
Tc-99	4 2239E-04	21.27	42 53	0 00E+00	8 98E-03	1 80E-02
Th-229	7 7260E-12	21.27	42 53	0 00E+00	1 64E-10	3 29E-10
Th-230	5 8497E-08	21.27	42 53	0 00E+00	1 24E-06	2 49E-06
Th-232	2 6906E-14	21.27	42 53	0.00E+00	5 72E-13	1.14E-12
Tl-208	4.4336E-08	21.27	42.53	0 00E+00	9 43E-07	1.89E-06
U-232	1.2037E-07	21.27	42.53	0 00E+00	2.56E-06	5 12E-06
U-233	3 0011E-09	21 27	42.53	0 00E+00	6 38E-08	1.28E-07
U-234	1 8497E-04	21 27	42 53	0 00E+00	3 93E-03	7 87E-03
U-235	-2 7235E-06	21.27	0.00	7 06E-02	7 05E-02	7 06E-02
U-236	1 5493E-05	21.27	42 53	0 00E+00	3 29E-04	6 59E-04
U-238	-4.2851E-09	21.27	0 00	7.14E-04	7 14E-04	7.14E-04
Y-90	1 7094E+00	21.27	42 53	0.00E+00	3 64E+01	7.27E+01
Other Radionuclides					3 66E+01	7.33E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 981E+12
0 0250	8.268E+11
0 0375	7.200E+11
0 0575	7 732E+11
0 0850	4 667E+11
0 1250	3 129E+11
0.2250	4 042E+11
0.3750	1 751E+11
0 5750	2.871E+12
0 8500	4 137E+10
1.2500	2.300E+10
1 7500	1 137E+09
2.2500	8 102E+04
2.7500	6 633E+04
3.5000	5 622E+01
5 0000	1 943E+01
7 0000	2 144E+00
11 0000	2.403E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4 52E-01	9 01E-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		21.27
Bounding		42.53

Basis for burnup used in estimate

Nominal burnup taken from SFD and converted to MWd using BOL=35.442kg
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: 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: NIST
SNF ID #: 154
Fuel Units & Descr: 980 - 17 CURVED PLATES
Heavy Metal Mass: BOL=367 5kg, EOL=159 74kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1997
Estimates as of: 2010
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: 10 years

Estimated Canister usage 18"x10'
27 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	1.3262E-10	191,368 36	338,505 35	0 00E+00	2 54E-05	4 49E-05
Am-241	5 9611E-03	191,368 36	338,505 35	0 00E+00	1.14E+03	2 02E+03
Am-242m	1 4332E-06	191,368 36	338,505 35	0 00E+00	2.74E-01	4 85E-01
Am-243	3 7132E-05	191,368 36	338,505 35	0 00E+00	7.11E+00	1.26E+01
C-14	2 6501E-08	191,368 36	338,505 35	0 00E+00	5 07E-03	8 97E-03
Cl-36	4 4441E-31	191,368.36	338,505 35	0 00E+00	8 50E-26	1 50E-25
Cm-243	7.2722E-06	191,368.36	338,505 35	0 00E+00	1.39E+00	2 46E+00
Cm-244	6 8226E-03	191,368.36	338,505 35	0 00E+00	1 31E+03	2.31E+03
Co-60	1 8117E-04	191,368.36	338,505 35	0 00E+00	3 47E+01	6.13E+01
Cs-134	3 0595E-01	191,368.36	338,505 35	0 00E+00	5 85E+04	1 04E+05
Cs-135	4 2564E-06	191,368.36	338,505 35	0 00E+00	8.15E-01	1 44E+00
Cs-137	2 5650E+00	191,368 36	338,505 35	0 00E+00	4 91E+05	8 68E+05
Eu-154	1 1628E-01	191,368 36	338,505 35	0 00E+00	2 23E+04	3 94E+04
Eu-155	5 7776E-02	191,368 36	338,505 35	0 00E+00	1 11E+04	1 96E+04
Fe-55	1 9465E-02	191,368 36	338,505.35	0 00E+00	3 73E+03	6 59E+03
H-3	8 1045E-03	191,368 36	338,505.35	0 00E+00	1 55E+03	2 74E+03
I-129	6 6403E-07	191,368 36	338,505.35	0 00E+00	1 27E-01	2.25E-01
Kr-85	2 0620E-01	191,368 36	338,505.35	0 00E+00	3 95E+04	6 98E+04
Np-237	3 1513E-05	191,368 36	338,505 35	0 00E+00	6 03E+00	1 07E+01
Pa-231	6 0304E-10	191,368 36	338,505 35	0 00E+00	1 15E-04	2 04E-04
Pb-210	2 7017E-12	191,368 36	338,505 35	0 00E+00	5 17E-07	9 15E-07
Pm-147	3 4210E-01	191,368 36	338,505 35	0 00E+00	6 55E+04	1 16E+05
Pu-238	1 6622E-01	191,368 36	338,505 35	0 00E+00	3 18E+04	5 63E+04
Pu-239	6 9563E-04	191,368 36	338,505 35	0 00E+00	1 33E+02	2 35E+02
Pu-240	3.7169E-04	191,368 36	338,505 35	0 00E+00	7.11E+01	1.26E+02
Pu-241	2.1731E-01	191,368 36	338,505 35	0 00E+00	4 16E+04	7 36E+04
Pu-242	3.0911E-06	191,368 36	338,505 35	0 00E+00	5 92E-01	1 05E+00
Ra-226	1 9435E-11	191,368 36	338,505 35	0 00E+00	3 72E-06	6 58E-06
Ra-228	6.1725E-15	191,368.36	338,505 35	0 00E+00	1.18E-09	2 09E-09
Ru-106	7 0778E-03	191,368.36	338,505 35	0 00E+00	1.35E+03	2 40E+03
Se-79	1.2339E-05	191,368.36	338,505 35	0 00E+00	2 36E+00	4.18E+00
Sn-126	1 0194E-05	191,368.36	338,505.35	0 00E+00	1 95E+00	3 45E+00
Sr-90	2 4186E+00	191,368.36	338,505.35	0 00E+00	4 63E+05	8 19E+05
Tc-99	3 8056E-04	191,368.36	338,505.35	0 00E+00	7 28E+01	1.29E+02
Th-229	2 0097E-12	191,368.36	338,505.35	0 00E+00	3 85E-07	6.80E-07
Th-230	6 0577E-09	191,368 36	338,505.35	0 00E+00	1 16E-03	2.05E-03
Th-232	1 2473E-14	191,368 36	338,505.35	0 00E+00	2 39E-09	4.22E-09
Tl-208	4 8791E-08	191,368 36	338,505.35	0 00E+00	9 34E-03	1 65E-02
U-232	1 3821E-07	191,368 36	338,505 35	0 00E+00	2 64E-02	4 68E-02
U-233	2 3906E-09	191,368 36	338,505 35	0 00E+00	4 57E-04	8 09E-04
U-234	4 7697E-05	191,368 36	338,505 35	0 00E+00	9 13E+00	1 61E+01
U-235	-2 8661E-06	191,368 36	0 00	7 41E-01	1 93E-01	7 41E-01
U-236	1 6701E-05	191,368 36	338,505 35	0 00E+00	3.20E+00	5 65E+00
U-238	-9 4194E-09	191,368 36	0.00	8.23E-03	6 43E-03	8 23E-03
Y-90	2.4192E+00	191,368 36	338,505 35	0 00E+00	4 63E+05	8 19E+05
Other Radionuclides					4 79E+05	8 47E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	4 627E+16
0 0250	9 643E+15
0 0375	8 725E+15
0 0575	8 979E+15
0 0850	5.562E+15
0 1250	4 176E+15
0.2250	4 695E+15
0.3750	2 074E+15
0 5750	3 747E+16
0.8500	4.395E+15
1.2500	1 104E+15
1 7500	3 181E+13
2.2500	1.392E+12
2.7500	2 081E+10
3 5000	2.525E+09
5 0000	1 465E+07
7 0000	1 684E+06
11 0000	1 931E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.55E+03	1.34E+04
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 %	93.33333333	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		191,368 36	Nominal burnup calculated from the heavy metal mass destroyed
Bounding	190 365 00	338,505.35	Bounding burnup calculated assuming all BOL heavy metal burned

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 19	
Bounding	2.11	1 78

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 NIST (U308 HEU)
SNF ID # 752
Fuel Units & Descr 420 - 17 CURVED PLATES
Heavy Metal Mass BOL=72 156kg EOL=33 894kg
ROD Storage Site SRS

[1]Fuel decay start date 1997
Estimates as of: 2010
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 10 years

Estimated Canister usage 18"x10' 11 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	1.3262E-10	35,243.24	66,463 11	0 00E+00	4 67E-06	8 81E-06
Am-241	5 9611E-03	35,243.24	66,463 11	0 00E+00	2 10E+02	3 96E+02
Am-242m	1.4332E-06	35,243.24	66,463 11	0 00E+00	5 05E-02	9.53E-02
Am-243	3 7132E-05	35,243 24	66,463.11	0 00E+00	1.31E+00	2 47E+00
C-14	2 6501E-08	35,243 24	66,463.11	0 00E+00	9 34E-04	1.76E-03
Cl-36	4 4441E-31	35,243 24	66,463 11	0 00E+00	1 57E-26	2 95E-26
Cm-243	7 2722E-06	35,243 24	66,463 11	0 00E+00	2 56E-01	4 83E-01
Cm-244	6 8226E-03	35,243.24	66,463 11	0 00E+00	2 40E+02	4 53E+02
Co-60	1 8117E-04	35,243.24	66 463 11	0 00E+00	6 38E+00	1 20E+01
Cs-134	3 0595E-01	35,243.24	66,463 11	0 00E+00	1 08E+04	2 03E+04
Cs-135	4.2564E-06	35,243.24	66,463 11	0.00E+00	1.50E-01	2 83E-01
Cs-137	2 5650E+00	35,243 24	66,463 11	0 00E+00	9 04E+04	1 70E+05
Eu-154	1 1628E-01	35,243.24	66,463.11	0 00E+00	4 10E+03	7 73E+03
Eu-155	5 7776E-02	35,243 24	66,463.11	0 00E+00	2 04E+03	3 84E+03
Fe-55	1 9465E-02	35,243 24	66,463 11	0 00E+00	6 86E+02	1.29E+03
H-3	8 1045E-03	35,243 24	66,463 11	0 00E+00	2 86E+02	5.39E+02
I-129	6 6403E-07	35,243 24	66,463 11	0 00E+00	2 34E-02	4 41E-02
Kr-85	2 0620E-01	35,243.24	66,463 11	0 00E+00	7 27E+03	1.37E+04
Np-237	3 1513E-05	35,243.24	66,463 11	0 00E+00	1.11E+00	2 09E+00
Pa-231	6 0304E-10	35,243.24	66,463 11	0 00E+00	2.13E-05	4 01E-05
Pb-210	2 7017E-12	35,243.24	66,463 11	0 00E+00	9 52E-08	1 80E-07
Pm-147	3 4210E-01	35,243 24	66,463 11	0 00E+00	1.21E+04	2 27E+04
Pu-238	1 6622E-01	35,243 24	66,463 11	0 00E+00	5 86E+03	1 10E+04
Pu-239	6 9563E-04	35,243 24	66,463 11	0 00E+00	2 45E+01	4 62E+01
Pu-240	3 7169E-04	35,243 24	66,463 11	0 00E+00	1 31E+01	2 47E+01
Pu-241	2 1731E-01	35,243 24	66,463 11	0 00E+00	7 66E+03	1.44E+04
Pu-242	3 0911E-06	35,243 24	66,463 11	0 00E+00	1 09E-01	2 05E-01
Ra-226	1 9435E-11	35,243.24	66,463 11	0 00E+00	6 85E-07	1 29E-06
Ra-228	6 1725E-15	35,243.24	66,463 11	0 00E+00	2.18E-10	4 10E-10
Ru-106	7 0778E-03	35,243.24	66,463 11	0 00E+00	2 49E+02	4 70E+02
Se-79	1.2339E-05	35,243.24	66,463 11	0 00E+00	4.35E-01	8.20E-01
Sn-126	1.0194E-05	35,243.24	66,463 11	0 00E+00	3 59E-01	6 78E-01
Sr-90	2 4186E+00	35,243 24	66,463.11	0 00E+00	8 52E+04	1 61E+05
Tc-99	3 8056E-04	35,243 24	66,463.11	0 00E+00	1.34E+01	2 53E+01
Th-229	2 0097E-12	35,243 24	66,463 11	0 00E+00	7 08E-08	1.34E-07
Th-230	6 0577E-09	35,243 24	66,463 11	0 00E+00	2 13E-04	4 03E-04
Th-232	1 2473E-14	35,243.24	66,463 11	0 00E+00	4 40E-10	8.29E-10
Tl-208	4 8791E-08	35,243.24	66,463 11	0 00E+00	1.72E-03	3.24E-03
U-232	1.3821E-07	35,243.24	66,463 11	0 00E+00	4.87E-03	9 19E-03
U-233	2.3906E-09	35,243.24	66,463 11	0 00E+00	8 43E-05	1 59E-04
U-234	4 7697E-05	35,243 24	66,463 11	0.00E+00	1.68E+00	3 17E+00
U-235	-2 8661E-06	35,243.24	0 00	1.45E-01	4 43E-02	1 45E-01
U-236	1 6701E-05	35,243 24	66,463.11	0 00E+00	5 89E-01	1 11E+00
U-238	-9 4194E-09	35,243 24	0 00	1 66E-03	1 32E-03	1 66E-03
Y-90	2 4192E+00	35,243 24	66,463 11	0 00E+00	8 53E+04	1 61E+05
Other Radionuclides					8 81E+04	1 66E+05

Gamma Sources

Photon Energy Group (Avg MeV)	Total Photons/sec (bounding)
0 0150	9 084E+15
0 0250	1.893E+15
0 0375	1 713E+15
0 0575	1 763E+15
0 0850	1 092E+15
0 1250	8 199E+14
0.2250	9 219E+14
0 3750	4 073E+14
0 5750	7.358E+15
0.8500	8 629E+14
1.2500	2 169E+14
1 7500	6.245E+12
2.2500	2 734E+11
2 7500	4 085E+09
3.5000	4 958E+08
5 0000	2.877E+06
7 0000	3 306E+05
11 0000	3 791E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.39E+03	2.62E+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 %	93 17430199	40 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	43.29	35 243.24	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		66 463 11	Bounding burnup calculated assuming all BOL heavy metal burned.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 12	814 05
Bounding	2 11	

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: OHIO STATE (HEU)
SNF ID #: 157
Fuel Units & Descr: 24 - 18 FLAT PLATES
Heavy Metal Mass: BOL=3 41kg, EOL=3 41kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1995
Estimates as of: 2010
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: 15 years

Estimated Canister usage: 18"x10' 0 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	4.5861E-10	64 59	129 19	0 00E+00	2 96E-08	5 92E-08
Am-241	1 7832E-03	64 59	129.19	0 00E+00	1 15E-01	2 30E-01
Am-242m	4 3410E-07	64 59	129.19	0 00E+00	2 80E-05	5 61E-05
Am-243	1 4907E-06	64 59	129 19	0 00E+00	9 63E-05	1 93E-04
C-14	5 7162E-09	64.59	129 19	0 00E+00	3 69E-07	7 38E-07
Cl-36	1 3124E-32	64.59	129 19	0 00E+00	8 48E-31	1 70E-30
Cm-243	1 8568E-07	64.59	129 19	0 00E+00	1 20E-05	2 40E-05
Cm-244	3 5512E-05	64.59	129 19	0 00E+00	2 29E-03	4 59E-03
Co-60	1 0261E-05	64.59	129 19	0 00E+00	6 63E-04	1.33E-03
Cs-134	1 6931E-02	64 59	129 19	0 00E+00	1 09E+00	2 19E+00
Cs-135	3 4477E-06	64 59	129 19	0 00E+00	2.23E-04	4 45E-04
Cs-137	2 2800E+00	64 59	129 19	0 00E+00	1 47E+02	2 95E+02
Eu-154	3 6656E-02	64 59	129 19	0 00E+00	2 37E+00	4 74E+00
Eu-155	9 6841E-03	64 59	129 19	0 00E+00	6 26E-01	1 25E+00
Fe-55	4 6977E-04	64 59	129 19	0 00E+00	3 03E-02	6 07E-02
H-3	6 0485E-03	64 59	129 19	0 00E+00	3 91E-01	7 81E-01
I-129	7.5300E-07	64 59	129 19	0 00E+00	4 86E-05	9 73E-05
Kr-85	1 4989E-01	64 59	129.19	0 00E+00	9 68E+00	1 94E+01
Np-237	9 5534E-06	64 59	129.19	0 00E+00	6 17E-04	1 23E-03
Pa-231	1 6550E-09	64 59	129 19	0 00E+00	1 07E-07	2 14E-07
Pb-210	2 6631E-11	64 59	129 19	0 00E+00	1 72E-09	3 44E-09
Pm-147	1 8156E-01	64 59	129 19	0 00E+00	1.17E+01	2.35E+01
Pu-238	1 8990E-02	64 59	129 19	0 00E+00	1.23E+00	2 45E+00
Pu-239	4 2838E-04	64.59	129 19	0 00E+00	2.77E-02	5 53E-02
Pu-240	2 4379E-04	64.59	129 19	0.00E+00	1 57E-02	3 15E-02
Pu-241	4 2511E-02	64.59	129 19	0 00E+00	2 75E+00	5 49E+00
Pu-242	3 6329E-07	64 59	129 19	0 00E+00	2.35E-05	4 69E-05
Ra-226	1 4725E-10	64 59	129 19	0 00E+00	9 51E-09	1 90E-08
Ra-228	8 9760E-15	64 59	129 19	0 00E+00	5 80E-13	1 16E-12
Ru-106	1 9752E-04	64 59	129 19	0 00E+00	1.28E-02	2 55E-02
Se-79	1.2933E-05	64 59	129.19	0 00E+00	8 35E-04	1 67E-03
Sn-126	1.1574E-05	64 59	129.19	0 00E+00	7 48E-04	1 50E-03
Sr-90	2.1680E+00	64 59	129 19	0 00E+00	1 40E+02	2 80E+02
Tc-99	4.2239E-04	64 59	129 19	0 00E+00	2 73E-02	5 46E-02
Th-229	3.9270E-12	64 59	129 19	0 00E+00	2 54E-10	5 07E-10
Th-230	3 3578E-08	64 59	129 19	0 00E+00	2 17E-06	4 34E-06
Th-232	1 5452E-14	64 59	129 19	0 00E+00	9 98E-13	2 00E-12
Tl-208	4 6705E-08	64 59	129 19	0 00E+00	3 02E-06	6 03E-06
U-232	1 3045E-07	64 59	129 19	0.00E+00	8 43E-06	1 69E-05
U-233	2 3739E-09	64.59	129 19	0 00E+00	1.53E-07	3 07E-07
U-234	1 8423E-04	64 59	129 19	0 00E+00	1.19E-02	2.38E-02
U-235	-2.7235E-06	64 59	0 00	6 87E-03	6.70E-03	6 87E-03
U-236	1 5493E-05	64 59	129 19	0 00E+00	1 00E-03	2.00E-03
U-238	-4 2851E-09	64 59	0 00	7 73E-05	7 70E-05	7.73E-05
Y-90	2 1686E+00	64 59	129 19	0 00E+00	1 40E+02	2 80E+02
Other Radionuclides					1 40E+02	2 81E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 541E+13
0 0250	3 214E+12
0 0375	2 806E+12
0 0575	2 993E+12
0.0850	1.813E+12
0 1250	1.243E+12
0.2250	1.562E+12
0 3750	6.841E+11
0 5750	1.110E+13
0 8500	2.638E+11
1.2500	1 332E+11
1 7500	5 583E+09
2.2500	6 985E+06
2 7500	4 198E+05
3 5000	2 668E+04
5 0000	6 196E+01
7 0000	6 862E+00
11 0000	7 706E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 75E+00	3.50E+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 %.	93.25425219	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		64 59
Bounding		129 19

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	OHIO STATE (LEU)	[1]Fuel decay start date	2035
SNF ID #	158	Estimates as of	2010
Fuel Units & Descr	30 - 18 FLAT PLATES	Template	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass	BOL=26 151kg EOL=26 151kg	[2]Template Burnup(MWd):	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0 00116689
		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	1.4545E-10	495 31	990 62	0 00E+00	7 20E-08	1 44E-07
Am-241	1 1190E-03	495 31	990 62	0 00E+00	5 54E-01	1 11E+00
Am-242m	4 5425E-07	495 31	990 62	0 00E+00	2.25E-04	4 50E-04
Am-243	1 4921E-06	495 31	990 62	0 00E+00	7.39E-04	1 48E-03
C-14	5 7244E-09	495 31	990 62	0 00E+00	2 84E-06	5 67E-06
Cl-36	1 3124E-32	495 31	990 62	0 00E+00	6.50E-30	1 30E-29
Cm-243	2 3676E-07	495 31	990 62	0 00E+00	1.17E-04	2 35E-04
Cm-244	5 2042E-05	495 31	990 62	0 00E+00	2 58E-02	5 16E-02
Co-60	3 8208E-05	495 31	990 62	0 00E+00	1 89E-02	3 78E-02
Cs-134	4 8693E-01	495.31	990 62	0 00E+00	2.41E+02	4 82E+02
Cs-135	3 4477E-06	495.31	990 62	0 00E+00	1 71E-03	3.42E-03
Cs-137	2 8731E+00	495.31	990 62	0 00E+00	1 42E+03	2 85E+03
Eu-154	8 2053E-02	495 31	990 62	0 00E+00	4 06E+01	8.13E+01
Eu-155	3 9134E-02	495.31	990 62	0 00E+00	1 94E+01	3 88E+01
Fe-55	6 7429E-03	495 31	990 62	0.00E+00	3 34E+00	6 68E+00
H-3	1 0599E-02	495 31	990 62	0 00E+00	5 25E+00	1 05E+01
I-129	7.5300E-07	495 31	990 62	0 00E+00	3 73E-04	7 46E-04
Kr-85	2 8595E-01	495 31	990 62	0 00E+00	1 42E+02	2 83E+02
Np-237	9.5479E-06	495 31	990 62	0 00E+00	4 73E-03	9 46E-03
Pa-231	8.9297E-10	495 31	990 62	0 00E+00	4 42E-07	8 85E-07
Pb-210	3 7609E-12	495 31	990 62	0 00E+00	1.86E-09	3 73E-09
Pm-147	2 5452E+00	495 31	990 62	0 00E+00	1.26E+03	2 52E+03
Pu-238	2 0550E-02	495 31	990 62	0 00E+00	1 02E+01	2 04E+01
Pu-239	4 2838E-04	495 31	990 62	0 00E+00	2.12E-01	4.24E-01
Pu-240	2 4401E-04	495 31	990 62	0 00E+00	1.21E-01	2.42E-01
Pu-241	6 8764E-02	495.31	990 62	0 00E+00	3 41E+01	6 81E+01
Pu-242	3 6329E-07	495.31	990 62	0 00E+00	1 80E-04	3 60E-04
Ra-226	3 8045E-11	495.31	990 62	0 00E+00	1 88E-08	3 77E-08
Ra-228	2 9902E-15	495.31	990 62	0 00E+00	1 48E-12	2 96E-12
Ru-106	1 9055E-01	495.31	990 62	0 00E+00	9 44E+01	1 89E+02
Se-79	1.2936E-05	495.31	990 62	0 00E+00	6 41E-03	1 28E-02
Sn-126	1 1574E-05	495 31	990 62	0 00E+00	5 73E-03	1 15E-02
Sr-90	2 7505E+00	495 31	990 62	0.00E+00	1 36E+03	2 72E+03
Tc-99	4.2239E-04	495 31	990 62	0 00E+00	2 09E-01	4 18E-01
Th-229	1.8848E-12	495 31	990 62	0 00E+00	9 34E-10	1 87E-09
Th-230	1.7042E-08	495 31	990 62	0 00E+00	8 44E-06	1 69E-05
Th-232	7.8132E-15	495 31	990 62	0 00E+00	3 87E-12	7.74E-12
Tl-208	4 4063E-08	495 31	990 62	0 00E+00	2.18E-05	4.36E-05
U-232	1.3151E-07	495 31	990 62	0 00E+00	6.51E-05	1.30E-04
U-233	1 9564E-09	495 31	990 62	0 00E+00	9 69E-07	1.94E-06
U-234	1 8371E-04	495 31	990 62	0 00E+00	9 10E-02	1 82E-01
U-235	-2 7235E-06	495 31	0 00	1 12E-02	9 82E-03	1 12E-02
U-236	1 5493E-05	495.31	990 62	0 00E+00	7 67E-03	1 53E-02
U-238	-4 2851E-09	495 31	0.00	7 05E-03	7 05E-03	7 05E-03
Y-90	2 7505E+00	495 31	990 62	0 00E+00	1.36E+03	2 72E+03
Other Radionuclides					2 55E+03	5 09E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 911E+14
0 0250	4 117E+13
0 0375	3 799E+13
0 0575	3 736E+13
0 0850	2.382E+13
0 1250	2.063E+13
0 2250	2.019E+13
0 3750	9 771E+12
0 5750	1.342E+14
0 8500	1.880E+13
1.2500	3.497E+12
1 7500	1.466E+11
2.2500	3 076E+11
2 7500	1 770E+09
3.5000	1 963E+08
5 0000	6 030E+02
7 0000	6 728E+01
11 0000	7 588E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 51E+01	5.02E+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 76578383	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		495.31
Bounding		990 62

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: OMEGA WEST (204)
SNF ID #: 406
Fuel Units & Descr: 16 - 18 OR 19 FLAT PLATES
Heavy Metal Mass: BOL=3.264kg EOL=2 525kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1992
Estimates as of: 2010
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: 15 years

Estimated Canister usage: 18"x10" 0 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	4 5861E-10	848 64	1,021 63	0 00E+00	3 89E-07	4 69E-07
Am-241	1 7832E-03	848 64	1,021 63	0 00E+00	1 51E+00	1 82E+00
Am-242m	4 3410E-07	848 64	1,021 63	0 00E+00	3 68E-04	4 43E-04
Am-243	1 4907E-06	848 64	1,021 63	0 00E+00	1.27E-03	1 52E-03
C-14	5 7162E-09	848 64	1,021 63	0 00E+00	4 85E-06	5 84E-06
Cl-36	1 3124E-32	848 64	1,021.63	0 00E+00	1 11E-29	1 34E-29
Cm-243	1 8568E-07	848 64	1,021 63	0 00E+00	1 58E-04	1 90E-04
Cm-244	3 5512E-05	848 64	1,021 63	0 00E+00	3 01E-02	3 63E-02
Co-60	1 0261E-05	848 64	1,021 63	0 00E+00	8 71E-03	1 05E-02
Cs-134	1 6931E-02	848 64	1,021 63	0 00E+00	1 44E+01	1 73E+01
Cs-135	3 4477E-06	848 64	1,021 63	0 00E+00	2 93E-03	3 52E-03
Cs-137	2.2800E+00	848 64	1,021 63	0 00E+00	1 93E+03	2 33E+03
Eu-154	3 6656E-02	848 64	1,021 63	0 00E+00	3 11E+01	3 74E+01
Eu-155	9 6841E-03	848 64	1,021 63	0 00E+00	8 22E+00	9 89E+00
Fe-55	4 6977E-04	848 64	1,021 63	0 00E+00	3 99E-01	4 80E-01
H-3	6 0485E-03	848 64	1,021 63	0 00E+00	5 13E+00	6 18E+00
I-129	7 5300E-07	848 64	1,021 63	0 00E+00	6 39E-04	7 69E-04
Kr-85	1 4989E-01	848 64	1,021 63	0 00E+00	1 27E+02	1 53E+02
Np-237	9 5534E-06	848 64	1,021 63	0 00E+00	8 11E-03	9 76E-03
Pa-231	1 6550E-09	848 64	1,021 63	0 00E+00	1 40E-06	1 69E-06
Pb-210	2 6631E-11	848 64	1,021 63	0 00E+00	2 26E-08	2 72E-08
Pm-147	1 8156E-01	848 64	1,021 63	0 00E+00	1 54E+02	1 85E+02
Pu-238	1 8990E-02	848 64	1,021 63	0 00E+00	1 61E+01	1 94E+01
Pu-239	4.2838E-04	848 64	1,021 63	0 00E+00	3 64E-01	4 38E-01
Pu-240	2.4379E-04	848 64	1,021 63	0 00E+00	2 07E-01	2 49E-01
Pu-241	4.2511E-02	848 64	1,021 63	0 00E+00	3 61E+01	4.34E+01
Pu-242	3.6329E-07	848 64	1,021 63	0 00E+00	3 08E-04	3 71E-04
Ra-226	1 4725E-10	848 64	1,021 63	0 00E+00	1 25E-07	1 50E-07
Ra-228	8 9760E-15	848 64	1,021 63	0 00E+00	7 62E-12	9 17E-12
Ru-106	1 9752E-04	848 64	1,021 63	0 00E+00	1 68E-01	2 02E-01
Se-79	1.2933E-05	848 64	1,021 63	0 00E+00	1 10E-02	1.32E-02
Sn-126	1 1574E-05	848 64	1,021 63	0 00E+00	9 82E-03	1.18E-02
Sr-90	2 1680E+00	848 64	1,021 63	0 00E+00	1 84E+03	2.21E+03
Tc-99	4.2239E-04	848 64	1,021 63	0 00E+00	3 58E-01	4.32E-01
Th-229	3 9270E-12	848 64	1,021 63	0 00E+00	3 33E-09	4 01E-09
Th-230	3 3578E-08	848 64	1,021 63	0 00E+00	2 85E-05	3 43E-05
Th-232	1 5452E-14	848 64	1,021 63	0.00E+00	1 31E-11	1.58E-11
Tl-208	4 6705E-08	848 64	1,021 63	0.00E+00	3 96E-05	4.77E-05
U-232	1 3045E-07	848 64	1,021 63	0.00E+00	1.11E-04	1.33E-04
U-233	2 3739E-09	848 64	1,021 63	0 00E+00	2 01E-06	2 43E-06
U-234	1 8423E-04	848 64	1,021 63	0.00E+00	1 56E-01	1.88E-01
U-235	-2.7235E-06	848.64	0 00	6.57E-03	4.26E-03	6.57E-03
U-236	1 5493E-05	848 64	1,021 63	0 00E+00	1.31E-02	1.58E-02
U-238	-4.2851E-09	848 64	0 00	7.53E-05	7.16E-05	7.53E-05
Y-90	2 1686E+00	848 64	1,021 63	0 00E+00	1 84E+03	2.22E+03
Other Radionuclides					1 85E+03	2.22E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 219E+14
0 0250	2.542E+13
0 0375	2.219E+13
0 0575	2.367E+13
0 0850	1 433E+13
0 1250	9 828E+12
0 2250	1 235E+13
0.3750	5 410E+12
0 5750	8 782E+13
0 8500	2 086E+12
1.2500	1 054E+12
1 7500	4 415E+10
2.2500	5 523E+07
2.7500	3 320E+06
3 5000	2 110E+05
5 0000	4 881E+02
7 0000	5 406E+01
11 0000	6 070E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.30E+01	2.76E+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 %:	93.1372549	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal:	848 64	700.04	Nominal burnup taken directly from SFD (converted to MWd).
Bounding	1,021 63	1 400 07	Bounding burnup taken directly from SFD (converted to MWd)

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0.83	0 82
Bounding	0 99	1 37

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: OMEGA WEST (236)
SNF ID # 407
Fuel Units & Descr. 44 - 18 OR 19 FLAT PLATES
Heavy Metal Mass BOL=10.384kg, EOL=7.264kg
ROD Storage Site SRS

[1]Fuel decay start date 1992
Estimates as of 2010
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 15 years

Estimated Canister usage 18"x10'
1 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	4 5861E-10	3,665 55	4,475 50	0 00E+00	1 68E-06	2 05E-06
Am-241	1 7832E-03	3,665 55	4,475 50	0 00E+00	6 54E+00	7.98E+00
Am-242m	4.3410E-07	3,665.55	4,475 50	0 00E+00	1.59E-03	1 94E-03
Am-243	1.4907E-06	3,665 55	4,475 50	0 00E+00	5 46E-03	6 67E-03
C-14	5 7162E-09	3,665 55	4,475 50	0 00E+00	2 10E-05	2 56E-05
Cl-36	1.3124E-32	3,665 55	4,475 50	0 00E+00	4 81E-29	5 87E-29
Cm-243	1 8568E-07	3,665 55	4,475 50	0 00E+00	6 81E-04	8 31E-04
Cm-244	3 5512E-05	3,665 55	4,475.50	0 00E+00	1 30E-01	1.59E-01
Co-60	1 0261E-05	3,665 55	4,475.50	0 00E+00	3 76E-02	4 59E-02
Cs-134	1 6931E-02	3,665 55	4,475.50	0 00E+00	6 21E+01	7 58E+01
Cs-135	3 4477E-06	3,665 55	4,475 50	0 00E+00	1.26E-02	1.54E-02
Cs-137	2 2800E+00	3,665 55	4,475.50	0 00E+00	8 36E+03	1 02E+04
Eu-154	3 6656E-02	3,665 55	4,475 50	0 00E+00	1 34E+02	1 64E+02
Eu-155	9 6841E-03	3,665.55	4,475 50	0 00E+00	3 55E+01	4.33E+01
Fe-55	4 6977E-04	3,665.55	4,475 50	0 00E+00	1 72E+00	2.10E+00
H-3	6 0485E-03	3,665.55	4,475 50	0 00E+00	2.22E+01	2 71E+01
I-129	7.5300E-07	3,665 55	4,475.50	0 00E+00	2 76E-03	3 37E-03
Kr-85	1 4989E-01	3,665.55	4,475 50	0 00E+00	5 49E+02	6 71E+02
Np-237	9 5534E-06	3,665 55	4,475.50	0 00E+00	3 50E-02	4 28E-02
Pa-231	1 6550E-09	3,665 55	4,475.50	0 00E+00	6 07E-06	7 41E-06
Pb-210	2 6631E-11	3,665 55	4,475.50	0 00E+00	9 76E-08	1.19E-07
Pm-147	1 8156E-01	3,665 55	4,475 50	0 00E+00	6 66E+02	8 13E+02
Pu-238	1 8990E-02	3,665 55	4,475.50	0 00E+00	6 96E+01	8.50E+01
Pu-239	4 2838E-04	3,665.55	4,475 50	0 00E+00	1 57E+00	1 92E+00
Pu-240	2 4379E-04	3,665.55	4,475 50	0 00E+00	8 94E-01	1.09E+00
Pu-241	4.2511E-02	3,665.55	4,475 50	0 00E+00	1 56E+02	1.90E+02
Pu-242	3.6329E-07	3,665.55	4,475 50	0 00E+00	1.33E-03	1 63E-03
Ra-226	1.4725E-10	3,665 55	4,475 50	0 00E+00	5 40E-07	6 59E-07
Ra-228	8 9760E-15	3,665.55	4,475 50	0 00E+00	3.29E-11	4 02E-11
Ru-106	1 9752E-04	3,665 55	4,475 50	0 00E+00	7.24E-01	8 84E-01
Se-79	1.2933E-05	3,665 55	4,475 50	0 00E+00	4 74E-02	5 79E-02
Sn-126	1 1574E-05	3,665 55	4,475.50	0 00E+00	4 24E-02	5 18E-02
Sr-90	2 1680E+00	3,665 55	4,475.50	0 00E+00	7 95E+03	9 70E+03
Tc-99	4 2239E-04	3,665 55	4,475 50	0 00E+00	1 55E+00	1 89E+00
Th-229	3 9270E-12	3,665 55	4,475.50	0 00E+00	1 44E-08	1.76E-08
Th-230	3 3578E-08	3,665 55	4,475 50	0.00E+00	1.23E-04	1.50E-04
Th-232	1.5452E-14	3,665 55	4,475 50	0.00E+00	5 66E-11	6 92E-11
Tl-208	4.6705E-08	3,665.55	4,475 50	0 00E+00	1.71E-04	2 09E-04
U-232	1.3045E-07	3,665 55	4,475 50	0 00E+00	4 78E-04	5 84E-04
U-233	2.3739E-09	3,665 55	4,475 50	0 00E+00	8 70E-06	1 06E-05
U-234	1 8423E-04	3,665 55	4,475 50	0 00E+00	6 75E-01	8 25E-01
U-235	-2 7235E-06	3,665 55	0 00	2 09E-02	1 09E-02	2 09E-02
U-236	1 5493E-05	3,665 55	4,475.50	0 00E+00	5 68E-02	6 93E-02
U-238	-4.2851E-09	3,665 55	0 00	2.37E-04	2 21E-04	2 37E-04
Y-90	2 1686E+00	3,665 55	4,475.50	0 00E+00	7 95E+03	9 71E+03
Other Radionuclides					7 97E+03	9 73E+03

Gamma Sources

Photon Energy Group Avg MeV	Total Photons/sec (bounding)
0 0150	5.339E+14
0 0250	1 113E+14
0 0375	9 722E+13
0.0575	1 037E+14
0 0850	6 279E+13
0 1250	4 305E+13
0.2250	5.410E+13
0 3750	2.370E+13
0 5750	3.847E+14
0 8500	9 138E+12
1.2500	4.616E+12
1 7500	1.934E+11
2.2500	2.420E+08
2.7500	1 454E+07
3 5000	9.243E+05
5.0000	2 138E+03
7.0000	2.368E+02
11 0000	2 659E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9 92E+01	1.21E+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 %	93.22033898	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	3 665.55	2,954.32	Nominal burnup taken directly from SFD (converted to MWd)
Bounding	4 475 50	5 908 64	Bounding burnup taken directly from SFD (converted to MWd)

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 12	0 81
Bounding	1.37	1 32

Estimated EOL HM/Given EOL HM: 0 93

[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: OMEGA WEST (250)
SNF ID #: 408
Fuel Units & Descr: 27 - 18 OR 19 FLAT PLATES
Heavy Metal Mass: BOL=6 75kg EOL=5.2kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1992
Estimates as of: 2010
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: 15 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	4 5861E-10	1,559 25	2,949 75	0 00E+00	7.15E-07	1 35E-06
Am-241	1 7832E-03	1,559 25	2,949 75	0 00E+00	2 78E+00	5.26E+00
Am-242m	4 3410E-07	1,559 25	2,949 75	0 00E+00	6 77E-04	1 28E-03
Am-243	1 4907E-06	1,559 25	2,949 75	0 00E+00	2 32E-03	4 40E-03
C-14	5 7162E-09	1,559 25	2,949 75	0 00E+00	8 91E-06	1.69E-05
Cl-36	1 3124E-32	1,559 25	2,949 75	0 00E+00	2 05E-29	3 87E-29
Cm-243	1 8568E-07	1,559 25	2,949 75	0 00E+00	2 90E-04	5 48E-04
Cm-244	3 5512E-05	1,559 25	2,949 75	0 00E+00	5 54E-02	1.05E-01
Co-60	1 0261E-05	1,559 25	2,949 75	0 00E+00	1 60E-02	3 03E-02
Cs-134	1 6931E-02	1,559 25	2,949 75	0 00E+00	2 64E+01	4 99E+01
Cs-135	3 4477E-06	1,559 25	2,949 75	0 00E+00	5 38E-03	1 02E-02
Cs-137	2 2800E+00	1,559 25	2,949 75	0 00E+00	3 56E+03	6 73E+03
Eu-154	3 6656E-02	1,559 25	2,949 75	0 00E+00	5 72E+01	1 08E+02
Eu-155	9 6841E-03	1,559 25	2,949 75	0 00E+00	1 51E+01	2 86E+01
Fe-55	4 6977E-04	1,559 25	2,949 75	0 00E+00	7 32E-01	1 39E+00
H-3	6 0485E-03	1,559 25	2,949 75	0 00E+00	9 43E+00	1 78E+01
I-129	7 5300E-07	1,559.25	2,949 75	0.00E+00	1 17E-03	2 22E-03
Kr-85	1 4989E-01	1,559 25	2,949 75	0 00E+00	2.34E+02	4 42E+02
Np-237	9 5534E-06	1,559.25	2,949 75	0 00E+00	1 49E-02	2 82E-02
Pa-231	1 6550E-09	1,559.25	2,949 75	0 00E+00	2 58E-06	4 88E-06
Pb-210	2 6631E-11	1,559 25	2,949 75	0 00E+00	4 15E-08	7 86E-08
Pm-147	1 8156E-01	1,559.25	2,949.75	0 00E+00	2 83E+02	5 36E+02
Pu-238	1 8990E-02	1,559.25	2,949.75	0 00E+00	2 96E+01	5 60E+01
Pu-239	4 2838E-04	1,559.25	2,949.75	0 00E+00	6 68E-01	1.26E+00
Pu-240	2 4379E-04	1,559.25	2,949 75	0 00E+00	3.80E-01	7 19E-01
Pu-241	4.2511E-02	1,559.25	2,949 75	0 00E+00	6 63E+01	1.25E+02
Pu-242	3 6329E-07	1,559.25	2,949 75	0 00E+00	5 66E-04	1 07E-03
Ra-226	1 4725E-10	1,559.25	2,949 75	0 00E+00	2 30E-07	4 34E-07
Ra-228	8 9760E-15	1,559.25	2,949 75	0 00E+00	1 40E-11	2 65E-11
Ru-106	1 9752E-04	1,559 25	2,949 75	0 00E+00	3 08E-01	5 83E-01
Se-79	1.2933E-05	1,559.25	2,949 75	0 00E+00	2 02E-02	3 81E-02
Sn-126	1.1574E-05	1,559.25	2,949 75	0 00E+00	1 80E-02	3 41E-02
Sr-90	2.1680E+00	1,559.25	2,949 75	0 00E+00	3 38E+03	6 40E+03
Tc-99	4.2239E-04	1,559.25	2,949 75	0 00E+00	6 59E-01	1.25E+00
Th-229	3.9270E-12	1,559.25	2,949 75	0 00E+00	6 12E-09	1 16E-08
Th-230	3.3578E-08	1,559 25	2,949 75	0 00E+00	5 24E-05	9.90E-05
Th-232	1 5452E-14	1,559 25	2,949 75	0 00E+00	2 41E-11	4.56E-11
Tl-208	4 6705E-08	1,559 25	2,949 75	0 00E+00	7 28E-05	1 38E-04
U-232	1 3045E-07	1,559 25	2,949 75	0 00E+00	2 03E-04	3 85E-04
U-233	2 3739E-09	1,559 25	2,949 75	0 00E+00	3 70E-06	7 00E-06
U-234	1 8423E-04	1,559 25	2,949 75	0 00E+00	2 87E-01	5 43E-01
U-235	-2.7235E-06	1,559 25	0 00	1 36E-02	9 33E-03	1 36E-02
U-236	1 5493E-05	1,559 25	2,949 75	0 00E+00	2 42E-02	4 57E-02
U-238	-4.2851E-09	1,559 25	0 00	1.58E-04	1 51E-04	1 58E-04
Y-90	2 1686E+00	1,559 25	2,949 75	0 00E+00	3.38E+03	6 40E+03
Other Radionuclides					3.39E+03	6 42E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	3 519E+14
0 0250	7 339E+13
0 0375	6 408E+13
0 0575	6 833E+13
0 0850	4 139E+13
0 1250	2.838E+13
0.2250	3.566E+13
0.3750	1.562E+13
0 5750	2.535E+14
0.8500	6 023E+12
1.2500	3.042E+12
1 7500	1.275E+11
2.2500	1.595E+08
2.7500	9 584E+06
3.5000	6 092E+05
5.0000	1 409E+03
7 0000	1.561E+02
11 0000	1 752E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.22E+01	7 98E+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 %	93 048	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	1,559.25	1,467 69	Nominal burnup taken directly from SFD (converted to MWd).
Bounding	2,949 75	2 935 38	Bounding burnup taken directly from SFD (converted to MWd)

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 73	0 94
Bounding	1 39	1 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 ORR (U308 HEU)
SNF ID # 903
Fuel Units & Descr: 97 - 19 CURVED PLATES
Heavy Metal Mass: BOL=29 643kg EOL=20 777kg
ROD Storage Site SRS

[1]Fuel decay start date 1966
Estimates as of 2010
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'
2 69

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	8,396 08	16,792 17	0 00E+00	1 68E-05	3 37E-05
Am-241	2 5251E-03	8,396 08	16,792 17	0 00E+00	2 12E+01	4 24E+01
Am-242m	3 9624E-07	8,396 08	16,792 17	0 00E+00	3 33E-03	6 65E-03
Am-243	1 4880E-06	8,396 08	16,792 17	0 00E+00	1.25E-02	2.50E-02
C-14	5 7053E-09	8,396 08	16,792.17	0 00E+00	4 79E-05	9.58E-05
Cl-36	1.3124E-32	8,396 08	16,792.17	0 00E+00	1 10E-28	2.20E-28
Cm-243	1.1419E-07	8,396 08	16,792 17	0 00E+00	9 59E-04	1 92E-03
Cm-244	1 6522E-05	8,396 08	16,792 17	0 00E+00	1 39E-01	2 77E-01
Co-60	7 4047E-07	8,396 08	16,792 17	0 00E+00	6 22E-03	1 24E-02
Cs-134	2 0455E-05	8,396 08	16,792 17	0 00E+00	1 72E-01	3 43E-01
Cs-135	3 4477E-06	8,396 08	16,792 17	0 00E+00	2 89E-02	5 79E-02
Cs-137	1 4365E+00	8,396 08	16,792 17	0 00E+00	1.21E+04	2 41E+04
Eu-154	7.3230E-03	8,396 08	16,792.17	0 00E+00	6 15E+01	1.23E+02
Eu-155	5 9259E-04	8,396 08	16,792 17	0 00E+00	4 98E+00	9 95E+00
Fe-55	2.2791E-06	8,396 08	16,792 17	0 00E+00	1 91E-02	3 83E-02
H-3	1 9698E-03	8,396 08	16,792 17	0 00E+00	1 65E+01	3 31E+01
I-129	7.5300E-07	8,396 08	16,792 17	0 00E+00	6 32E-03	1 26E-02
Kr-85	4 1176E-02	8,396 08	16,792 17	0 00E+00	3 46E+02	6 91E+02
Np-237	9 5752E-06	8,396 08	16,792 17	0 00E+00	8 04E-02	1 61E-01
Pa-231	3 9379E-09	8,396 08	16,792.17	0 00E+00	3.31E-05	6.61E-05
Pb-210	3 3115E-10	8,396 08	16,792.17	0 00E+00	2 78E-06	5 56E-06
Pm-147	9.2402E-04	8,396 08	16,792 17	0 00E+00	7.76E+00	1.55E+01
Pu-238	1.6217E-02	8,396.08	16,792 17	0 00E+00	1.36E+02	2 72E+02
Pu-239	4.2810E-04	8,396 08	16,792 17	0 00E+00	3 59E+00	7 19E+00
Pu-240	2 4333E-04	8,396 08	16,792 17	0 00E+00	2 04E+00	4 09E+00
Pu-241	1 6242E-02	8,396 08	16,792 17	0 00E+00	1 36E+02	2 73E+02
Pu-242	3 6329E-07	8,396 08	16,792 17	0 00E+00	3 05E-03	6.10E-03
Ra-226	9 0114E-10	8,396 08	16,792.17	0 00E+00	7.57E-06	1.51E-05
Ra-228	3 1019E-14	8,396 08	16,792 17	0 00E+00	2 60E-10	5.21E-10
Ru-106	2 1225E-10	8,396 08	16,792 17	0 00E+00	1 78E-06	3 56E-06
Se-79	1.2930E-05	8,396 08	16,792 17	0 00E+00	1 09E-01	2 17E-01
Sn-126	1.1571E-05	8,396 08	16,792 17	0 00E+00	9 72E-02	1 94E-01
Sr-90	1.3472E+00	8,396 08	16,792 17	0 00E+00	1 13E+04	2 26E+04
Tc-99	4.2239E-04	8,396 08	16,792 17	0 00E+00	3 55E+00	7 09E+00
Th-229	1.2407E-11	8,396 08	16,792.17	0 00E+00	1.04E-07	2.08E-07
Th-230	8 3497E-08	8,396 08	16,792.17	0 00E+00	7.01E-04	1 40E-03
Th-232	3 8371E-14	8,396 08	16,792.17	0 00E+00	3.22E-10	6 44E-10
Tl-208	4 0414E-08	8,396 08	16,792 17	0 00E+00	3 39E-04	6 79E-04
U-232	1.0948E-07	8,396 08	16,792 17	0 00E+00	9 19E-04	1 84E-03
U-233	3.6275E-09	8,396 08	16,792 17	0 00E+00	3 05E-05	6 09E-05
U-234	1 8562E-04	8,396 08	16,792 17	0 00E+00	1 56E+00	3 12E+00
U-235	-2 7235E-06	8,396 08	0 00	5 97E-02	3 68E-02	5.97E-02
U-236	1 5493E-05	8,396 08	16,792.17	0 00E+00	1.30E-01	2.60E-01
U-238	-4.2851E-09	8,396 08	0 00	6 82E-04	6 46E-04	6 82E-04
Y-90	1.3475E+00	8,396 08	16,792 17	0 00E+00	1 13E+04	2.26E+04
Other Radionuclides					1.15E+04	2 30E+04

Gamma Sources

Photon Energy Group Avg MeV	Total Photons/sec (bounding)
0 0150	1.237E+15
0 0250	2.568E+14
0 0375	2.232E+14
0 0575	2 403E+14
0 0850	1 448E+14
0 1250	9 562E+13
0.2250	1.250E+14
0 3750	5 437E+13
0 5750	8 986E+14
0 8500	1.098E+13
1.2500	5.309E+12
1 7500	2.988E+11
2.2500	2 498E+07
2 7500	2 384E+07
3 5000	1 381E+04
5 0000	5 645E+03
7 0000	6 177E+02
11 0000	6 887E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.41E+02	2.81E+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 15626243	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		8,396 08	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		16,792 17	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 90	
Bounding	1.80	

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: ORR (U3O8 HEU)
SNF ID #: 753
Fuel Units & Descr: 4 - 19 CURVED PLATES
Heavy Metal Mass: BOL=0 716kg; EOL=0.308kg
ROD Storage Site SRS

[1]Fuel decay start date: 1966
Estimates as of 2010
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 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	2 0068E-09	386 76	678 07	0 00E+00	7.76E-07	1.36E-06
Am-241	2 5251E-03	386 76	678 07	0 00E+00	9.77E-01	1 71E+00
Am-242m	3 9624E-07	386 76	678 07	0 00E+00	1 53E-04	2 69E-04
Am-243	1 4880E-06	386 76	678 07	0 00E+00	5 76E-04	1 01E-03
C-14	5 7053E-09	386 76	678 07	0 00E+00	2 21E-06	3 87E-06
Cl-36	1 3124E-32	386 76	678 07	0 00E+00	5 08E-30	8 90E-30
Cm-243	1 1419E-07	386.76	678 07	0 00E+00	4 42E-05	7 74E-05
Cm-244	1 6522E-05	386.76	678 07	0 00E+00	6 39E-03	1 12E-02
Co-60	7 4047E-07	386.76	678 07	0 00E+00	2 86E-04	5 02E-04
Cs-134	2 0455E-05	386.76	678.07	0 00E+00	7 91E-03	1 39E-02
Cs-135	3 4477E-06	386.76	678 07	0 00E+00	1 33E-03	2 34E-03
Cs-137	1 4365E+00	386.76	678.07	0 00E+00	5 56E+02	9 74E+02
Eu-154	7 3230E-03	386 76	678 07	0 00E+00	2 83E+00	4 97E+00
Eu-155	5 9259E-04	386 76	678 07	0 00E+00	2 29E-01	4 02E-01
Fe-55	2.2791E-06	386 76	678 07	0.00E+00	8 81E-04	1 55E-03
H-3	1 9698E-03	386 76	678 07	0 00E+00	7 62E-01	1 34E+00
I-129	7 5300E-07	386 76	678 07	0 00E+00	2 91E-04	5 11E-04
Kr-85	4 1176E-02	386 76	678 07	0 00E+00	1.59E+01	2.79E+01
Np-237	9 5752E-06	386 76	678 07	0 00E+00	3 70E-03	6 49E-03
Pa-231	3 9379E-09	386 76	678 07	0 00E+00	1 52E-06	2 67E-06
Pb-210	3.3115E-10	386 76	678 07	0 00E+00	1.28E-07	2.25E-07
Pm-147	9.2402E-04	386 76	678 07	0 00E+00	3 57E-01	6 27E-01
Pu-238	1 6217E-02	386 76	678 07	0 00E+00	6.27E+00	1.10E+01
Pu-239	4 2810E-04	386 76	678 07	0 00E+00	1 66E-01	2.90E-01
Pu-240	2 4333E-04	386 76	678 07	0 00E+00	9 41E-02	1 65E-01
Pu-241	1 6242E-02	386 76	678 07	0 00E+00	6 28E+00	1 10E+01
Pu-242	3 6329E-07	386 76	678 07	0 00E+00	1 41E-04	2 46E-04
Ra-226	9 0114E-10	386.76	678 07	0 00E+00	3 49E-07	6 11E-07
Ra-228	3 1019E-14	386.76	678.07	0 00E+00	1 20E-11	2 10E-11
Ru-106	2 1225E-10	386.76	678.07	0 00E+00	8 21E-08	1 44E-07
Se-79	1 2930E-05	386.76	678.07	0.00E+00	5 00E-03	8 77E-03
Sn-126	1 1571E-05	386 76	678 07	0 00E+00	4 48E-03	7 85E-03
Sr-90	1 3472E+00	386 76	678 07	0 00E+00	5.21E+02	9 14E+02
Tc-99	4 2239E-04	386 76	678 07	0 00E+00	1 63E-01	2 86E-01
Th-229	1 2407E-11	386 76	678 07	0 00E+00	4 80E-09	8 41E-09
Th-230	8 3497E-08	386 76	678 07	0 00E+00	3.23E-05	5 66E-05
Th-232	3 8371E-14	386 76	678 07	0 00E+00	1 48E-11	2 60E-11
Tl-208	4 0414E-08	386 76	678 07	0 00E+00	1.56E-05	2.74E-05
U-232	1.0948E-07	386 76	678 07	0 00E+00	4.23E-05	7 42E-05
U-233	3.6275E-09	386 76	678 07	0 00E+00	1.40E-06	2.46E-06
U-234	1.8562E-04	386 76	678 07	0 00E+00	7.18E-02	1 26E-01
U-235	-2.7235E-06	386 76	0 00	1 44E-03	3 90E-04	1.44E-03
U-236	1.5493E-05	386 76	678 07	0 00E+00	5 99E-03	1.05E-02
U-238	-4.2851E-09	386.76	0 00	1 61E-05	1 45E-05	1 61E-05
Y-90	1.3475E+00	386.76	678 07	0 00E+00	5 21E+02	9 14E+02
Other Radionuclides					5 29E+02	9 28E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	4 994E+13
0 0250	1 037E+13
0 0375	9 014E+12
0 0575	9 702E+12
0 0850	5.846E+12
0 1250	3 861E+12
0.2250	5 047E+12
0 3750	2 196E+12
0.5750	3 629E+13
0 8500	4 432E+11
1.2500	2 144E+11
1 7500	1.207E+10
2.2500	1.009E+06
2.7500	9 629E+05
3.5000	5.577E+02
5 0000	2.279E+02
7 0000	2.494E+01
11 0000	2.781E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.47E+00	1 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 %:	93 29608939	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		386 76	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		678 07	Bounding burnup calculated assuming all BOL heavy metal burned.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 72	
Bounding	3 01	

Estimated EOL HM/Given EOL HM: 1 08

[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 ORR (U3Si2 LEU)
SNF ID #: 165
Fuel Units & Descr: 52 - 19 CURVED PLATES
Heavy Metal Mass BOL=87.953kg EOL=83.294kg
ROD Storage Site SRS

[1]Fuel decay start date 1987
Estimates as of 2010
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 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	6 6313E-10	4,412.35	8,824 71	0 00E+00	2 93E-06	5 85E-06
Am-241	2 0060E-03	4,412.35	8,824 71	0 00E+00	8 85E+00	1.77E+01
Am-242m	4.2429E-07	4,412.35	8,824 71	0 00E+00	1 87E-03	3 74E-03
Am-243	1.4899E-06	4,412.35	8,824 71	0 00E+00	6 57E-03	1 31E-02
C-14	5 7135E-09	4,412.35	8,824 71	0 00E+00	2 52E-05	5 04E-05
Cl-36	1.3124E-32	4,412.35	8,824 71	0 00E+00	5 79E-29	1 16E-28
Cm-243	1 6443E-07	4,412.35	8,824 71	0 00E+00	7.26E-04	1 45E-03
Cm-244	2 9330E-05	4,412 35	8,824 71	0 00E+00	1.29E-01	2 59E-01
Co-60	5 3186E-06	4,412 35	8,824 71	0 00E+00	2.35E-02	4 69E-02
Cs-134	3 1563E-03	4,412 35	8,824 71	0 00E+00	1.39E+01	2 79E+01
Cs-135	3 4477E-06	4,412 35	8,824 71	0 00E+00	1.52E-02	3 04E-02
Cs-137	2 0313E+00	4,412.35	8,824 71	0 00E+00	8 96E+03	1 79E+04
Eu-154	2 4513E-02	4,412 35	8,824 71	0 00E+00	1 08E+02	2 16E+02
Eu-155	4 8175E-03	4,412 35	8,824 71	0 00E+00	2.13E+01	4 25E+01
Fe-55	1 2397E-04	4,412 35	8,824 71	0 00E+00	5 47E-01	1 09E+00
H-3	4 5697E-03	4,412 35	8,824 71	0 00E+00	2 02E+01	4 03E+01
I-129	7 5300E-07	4,412 35	8,824 71	0 00E+00	3 32E-03	6 64E-03
Kr-85	1 0850E-01	4,412 35	8,824 71	0 00E+00	4 79E+02	9 57E+02
Np-237	9 5561E-06	4,412 35	8,824 71	0 00E+00	4.22E-02	8 43E-02
Pa-231	2 0359E-09	4,412 35	8,824 71	0 00E+00	8 98E-06	1 80E-05
Pb-210	4 9728E-11	4,412 35	8,824 71	0 00E+00	2 19E-07	4 39E-07
Pm-147	4 8502E-02	4,412 35	8,824 71	0 00E+00	2 14E+02	4 28E+02
Pu-238	1 8254E-02	4,412 35	8,824 71	0 00E+00	8 05E+01	1 61E+02
Pu-239	4 2810E-04	4,412 35	8,824 71	0 00E+00	1 89E+00	3 78E+00
Pu-240	2 4368E-04	4,412 35	8,824 71	0 00E+00	1 08E+00	2 15E+00
Pu-241	3 3415E-02	4,412 35	8,824 71	0 00E+00	1 47E+02	2 95E+02
Pu-242	3 6329E-07	4,412 35	8,824 71	0 00E+00	1 60E-03	3.21E-03
Ra-226	2.2854E-10	4,412 35	8,824 71	0 00E+00	1 01E-06	2.02E-06
Ra-228	1 2426E-14	4,412 35	8,824 71	0 00E+00	5 48E-11	1.10E-10
Ru-106	6 3589E-06	4,412 35	8,824 71	0 00E+00	2 81E-02	5 61E-02
Se-79	1.2933E-05	4,412 35	8,824 71	0 00E+00	5 71E-02	1.14E-01
Sn-126	1 1574E-05	4,412 35	8,824.71	0 00E+00	5 11E-02	1.02E-01
Sr-90	1 9248E+00	4,412 35	8,824 71	0 00E+00	8 49E+03	1.70E+04
Tc-99	4.2239E-04	4,412 35	8,824 71	0 00E+00	1 86E+00	3 73E+00
Th-229	5 0953E-12	4,412.35	8,824.71	0 00E+00	2 25E-08	4 50E-08
Th-230	4.1885E-08	4,412.35	8,824 71	0 00E+00	1 85E-04	3 70E-04
Th-232	1.9270E-14	4,412.35	8,824.71	0 00E+00	8 50E-11	1 70E-10
Tl-208	4 6024E-08	4,412.35	8,824 71	0 00E+00	2 03E-04	4 06E-04
U-232	1.2582E-07	4,412.35	8,824 71	0 00E+00	5 55E-04	1 11E-03
U-233	2.5825E-09	4,412.35	8,824 71	0 00E+00	1.14E-05	2 28E-05
U-234	1 8450E-04	4,412.35	8,824 71	0 00E+00	8 14E-01	1 63E+00
U-235	-2 7235E-06	4,412.35	0 00	3 81E-02	2 61E-02	3 81E-02
U-236	1.5493E-05	4,412.35	8,824 71	0 00E+00	6 84E-02	1 37E-01
U-238	-4 2851E-09	4,412.35	0 00	2.36E-02	2.36E-02	2 36E-02
Y-90	1 9254E+00	4,412.35	8,824 71	0 00E+00	8 50E+03	1 70E+04
Other Radionuclides					8 53E+03	1 71E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	9 315E+14
0 0250	1.937E+14
0 0375	1 690E+14
0 0575	1.810E+14
0 0850	1 094E+14
0 1250	7 400E+13
0.2250	9 436E+13
0 3750	4 107E+13
0 5750	6 700E+14
0 8500	1 133E+13
1.2500	6 468E+12
1 7500	2 969E+11
2.2500	2 604E+07
2 7500	1 472E+07
3.5000	6 775E+04
5 0000	3 877E+03
7.0000	4.283E+02
11.0000	4.802E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.05E+02	2.10E+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 03831236	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		4,412.35
Bounding		8 824 71

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 16	
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: ORR (U3Si2 LEU)
SNF ID #: 850
Fuel Units & Descr: 11 - ASSEMBLY
Heavy Metal Mass: BOL=11 076kg, EOL=9 908kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1966
Estimates as of: 2010
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": 0.31

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	2 0068E-09	1,106 31	2,212 62	0 00E+00	2 22E-06	4 44E-06
Am-241	2 5251E-03	1,106 31	2,212 62	0 00E+00	2 79E+00	5 59E+00
Am-242m	3 9624E-07	1,106 31	2,212.62	0 00E+00	4 38E-04	8.77E-04
Am-243	1 4880E-06	1,106 31	2,212 62	0 00E+00	1 65E-03	3.29E-03
C-14	5 7053E-09	1,106 31	2,212 62	0 00E+00	6 31E-06	1.26E-05
Cl-36	1 3124E-32	1,106 31	2,212 62	0 00E+00	1 45E-29	2 90E-29
Cm-243	1 1419E-07	1,106 31	2,212 62	0 00E+00	1 26E-04	2 53E-04
Cm-244	1 6522E-05	1,106.31	2,212 62	0 00E+00	1 83E-02	3 66E-02
Co-60	7 4047E-07	1,106 31	2,212 62	0 00E+00	8 19E-04	1 64E-03
Cs-134	2 0455E-05	1,106 31	2,212 62	0 00E+00	2 26E-02	4 53E-02
Cs-135	3 4477E-06	1,106 31	2,212 62	0 00E+00	3 81E-03	7 63E-03
Cs-137	1 4365E+00	1,106 31	2,212 62	0 00E+00	1 59E+03	3 18E+03
Eu-154	7.3230E-03	1,106 31	2,212 62	0 00E+00	8 10E+00	1 62E+01
Eu-155	5 9259E-04	1,106 31	2,212 62	0 00E+00	6 56E-01	1 31E+00
Fe-55	2.2791E-06	1,106 31	2,212 62	0 00E+00	2 52E-03	5 04E-03
H-3	1 9698E-03	1,106 31	2,212 62	0 00E+00	2 18E+00	4 36E+00
I-129	7.5300E-07	1,106 31	2,212 62	0 00E+00	8 33E-04	1 67E-03
Kr-85	4 1176E-02	1,106 31	2,212 62	0 00E+00	4 56E+01	9 11E+01
Np-237	9 5752E-06	1,106 31	2,212 62	0 00E+00	1 06E-02	2.12E-02
Pa-231	3 9379E-09	1,106 31	2,212 62	0 00E+00	4 36E-06	8.71E-06
Pb-210	3.3115E-10	1,106 31	2,212 62	0 00E+00	3 66E-07	7.33E-07
Pm-147	9.2402E-04	1,106 31	2,212 62	0 00E+00	1 02E+00	2 04E+00
Pu-238	1 6217E-02	1,106 31	2,212 62	0 00E+00	1.79E+01	3 59E+01
Pu-239	4.2810E-04	1,106 31	2,212 62	0 00E+00	4 74E-01	9 47E-01
Pu-240	2 4333E-04	1,106 31	2,212 62	0 00E+00	2 69E-01	5.38E-01
Pu-241	1 6242E-02	1,106 31	2,212 62	0 00E+00	1 80E+01	3 59E+01
Pu-242	3 6329E-07	1,106 31	2,212 62	0 00E+00	4 02E-04	8 04E-04
Ra-226	9 0114E-10	1,106 31	2,212 62	0 00E+00	9 97E-07	1 99E-06
Ra-228	3.1019E-14	1,106 31	2,212 62	0 00E+00	3 43E-11	6 86E-11
Ru-106	2 1225E-10	1,106 31	2,212 62	0 00E+00	2 35E-07	4.70E-07
Se-79	1.2930E-05	1,106 31	2,212 62	0 00E+00	1 43E-02	2 86E-02
Sn-126	1 1571E-05	1,106 31	2,212.62	0 00E+00	1 28E-02	2 56E-02
Sr-90	1 3472E+00	1,106 31	2,212 62	0 00E+00	1 49E+03	2 98E+03
Tc-99	4.2239E-04	1,106 31	2,212.62	0 00E+00	4 67E-01	9.35E-01
Th-229	1.2407E-11	1,106 31	2,212.62	0 00E+00	1 37E-08	2.75E-08
Th-230	8 3497E-08	1,106 31	2,212 62	0 00E+00	9 24E-05	1 85E-04
Th-232	3 8371E-14	1,106 31	2,212.62	0 00E+00	4.25E-11	8 49E-11
Tl-208	4 0414E-08	1,106 31	2,212.62	0 00E+00	4 47E-05	8 94E-05
U-232	1 0948E-07	1,106 31	2,212.62	0 00E+00	1.21E-04	2 42E-04
U-233	3 6275E-09	1,106 31	2,212.62	0 00E+00	4 01E-06	8 03E-06
U-234	1 8562E-04	1,106 31	2,212.62	0 00E+00	2 05E-01	4 11E-01
U-235	-2.7235E-06	1,106 31	0 00	4 74E-03	1 73E-03	4 74E-03
U-236	1.5493E-05	1,106 31	2,212.62	0 00E+00	1 71E-02	3 43E-02
U-238	-4.2851E-09	1,106 31	0 00	2 99E-03	2.98E-03	2 99E-03
Y-90	1 3475E+00	1,106 31	2,212 62	0 00E+00	1 49E+03	2 98E+03
Other Radionuclides					1.51E+03	3 03E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 630E+14
0 0250	3 384E+13
0 0375	2.941E+13
0 0575	3 166E+13
0 0850	1 908E+13
0 1250	1.260E+13
0.2250	1 647E+13
0 3750	7 164E+12
0 5750	1 184E+14
0 8500	1 446E+12
1.2500	6 995E+11
1 7500	3 937E+10
2.2500	3.292E+06
2 7500	3 142E+06
3 5000	1 836E+03
5 0000	7 504E+02
7 0000	8.216E+01
11 0000	9 163E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.85E+01	3 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 %	19.81328831	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		1 106.31
Bounding		2,212.62

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	0.32	
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: ORR (U3Si2 LEU)
SNF ID #: 944
Fuel Units & Descr: 33 - 19 CURVED PLATES
Heavy Metal Mass BOL=56.539kg EOL=53 655kg
ROD Storage Site SRS

[1]Fuel decay start date. 1987
Estimates as of 2010
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	2,731.39	5,462 79	0 00E+00	1.81E-06	3 62E-06
Am-241	2 0060E-03	2,731.39	5,462 79	0 00E+00	5 48E+00	1 10E+01
Am-242m	4 2429E-07	2,731.39	5,462 79	0 00E+00	1.16E-03	2.32E-03
Am-243	1 4899E-06	2,731.39	5,462 79	0 00E+00	4 07E-03	8 14E-03
C-14	5 7135E-09	2,731.39	5,462 79	0 00E+00	1.56E-05	3 12E-05
Cl-36	1 3124E-32	2,731.39	5,462 79	0 00E+00	3 58E-29	7.17E-29
Cm-243	1 6443E-07	2,731.39	5,462.79	0 00E+00	4 49E-04	8 98E-04
Cm-244	2 9330E-05	2,731.39	5,462.79	0 00E+00	8 01E-02	1 60E-01
Co-60	5 3186E-06	2,731.39	5,462.79	0 00E+00	1 45E-02	2 91E-02
Cs-134	3.1563E-03	2,731.39	5,462 79	0 00E+00	8 62E+00	1 72E+01
Cs-135	3 4477E-06	2,731.39	5,462.79	0 00E+00	9 42E-03	1 88E-02
Cs-137	2.0313E+00	2,731 39	5,462 79	0 00E+00	5 55E+03	1 11E+04
Eu-154	2.4513E-02	2,731 39	5,462 79	0 00E+00	6 70E+01	1 34E+02
Eu-155	4 8175E-03	2,731 39	5,462 79	0 00E+00	1 32E+01	2 63E+01
Fe-55	1.2397E-04	2,731 39	5,462 79	0 00E+00	3.39E-01	6 77E-01
H-3	4 5697E-03	2,731 39	5,462 79	0 00E+00	1 25E+01	2 50E+01
I-129	7 5300E-07	2,731 39	5,462 79	0 00E+00	2 06E-03	4.11E-03
Kr-85	1 0850E-01	2,731.39	5,462 79	0 00E+00	2 96E+02	5 93E+02
Np-237	9 5561E-06	2,731.39	5,462 79	0 00E+00	2 61E-02	5.22E-02
Pa-231	2 0359E-09	2,731.39	5,462 79	0 00E+00	5.56E-06	1 11E-05
Pb-210	4 9728E-11	2,731.39	5,462 79	0 00E+00	1.36E-07	2 72E-07
Pm-147	4 8502E-02	2,731.39	5,462 79	0 00E+00	1.32E+02	2 65E+02
Pu-238	1 8254E-02	2,731.39	5,462.79	0 00E+00	4 99E+01	9 97E+01
Pu-239	4.2810E-04	2,731.39	5,462.79	0 00E+00	1.17E+00	2 34E+00
Pu-240	2 4368E-04	2,731.39	5,462.79	0 00E+00	6 66E-01	1.33E+00
Pu-241	3.3415E-02	2,731.39	5,462 79	0 00E+00	9 13E+01	1 83E+02
Pu-242	3 6329E-07	2,731.39	5,462 79	0 00E+00	9 92E-04	1 98E-03
Ra-226	2.2854E-10	2,731.39	5,462 79	0 00E+00	6 24E-07	1.25E-06
Ra-228	1.2426E-14	2,731.39	5,462 79	0 00E+00	3 39E-11	6 79E-11
Ru-106	6 3589E-06	2,731 39	5,462 79	0 00E+00	1.74E-02	3 47E-02
Se-79	1.2933E-05	2,731 39	5,462 79	0.00E+00	3 53E-02	7.07E-02
Sn-126	1 1574E-05	2,731 39	5,462 79	0 00E+00	3 16E-02	6.32E-02
Sr-90	1 9248E+00	2,731 39	5,462 79	0 00E+00	5 26E+03	1.05E+04
Tc-99	4 2239E-04	2,731.39	5,462 79	0 00E+00	1 15E+00	2.31E+00
Th-229	5 0953E-12	2,731.39	5,462 79	0 00E+00	1.39E-08	2 78E-08
Th-230	4 1885E-08	2,731.39	5,462 79	0 00E+00	1.14E-04	2 29E-04
Th-232	1 9270E-14	2,731.39	5,462 79	0 00E+00	5.26E-11	1 05E-10
Tl-208	4 6024E-08	2,731.39	5,462.79	0 00E+00	1.26E-04	2 51E-04
U-232	1.2582E-07	2,731.39	5,462.79	0 00E+00	3 44E-04	6 87E-04
U-233	2.5825E-09	2,731.39	5,462.79	0 00E+00	7 05E-06	1.41E-05
U-234	1.8450E-04	2,731.39	5,462 79	0 00E+00	5 04E-01	1 01E+00
U-235	-2 7235E-06	2,731.39	0.00	2 42E-02	1 68E-02	2 42E-02
U-236	1.5493E-05	2,731.39	5,462 79	0 00E+00	4 23E-02	8 46E-02
U-238	-4 2851E-09	2,731.39	0 00	1.52E-02	1 52E-02	1.52E-02
Y-90	1.9254E+00	2,731.39	5,462 79	0 00E+00	5 26E+03	1 05E+04
Other Radionuclides					5 28E+03	1.06E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5 766E+14
0 0250	1 199E+14
0 0375	1 046E+14
0 0575	1 120E+14
0 0850	6 769E+13
0 1250	4 581E+13
0 2250	5 841E+13
0 3750	2 543E+13
0 5750	4 147E+14
0 8500	7 012E+12
1.2500	4 004E+12
1 7500	1.838E+11
2.2500	1 612E+07
2 7500	9 113E+06
3 5000	4 195E+04
5 0000	2 401E+03
7 0000	2 653E+02
11 0000	2.974E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6 51E+01	1.30E+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 %	19 818	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		2,731 39
Bounding		5 462.79

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 31	

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 ORR SPECIAL
SNF ID # 163
Fuel Units & Descr: 11 - 19 CURVED PLATES
Heavy Metal Mass. BOL=22.045kg; EOL=18.48kg
ROD Storage Site SRS

[1]Fuel decay start date: 1966
Estimates as of. 2010
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 31

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	3,376.22	6,752 44	0 00E+00	6.78E-06	1 36E-05
Am-241	2 5251E-03	3,376.22	6,752 44	0 00E+00	8 53E+00	1 71E+01
Am-242m	3 9624E-07	3 376.22	6,752 44	0 00E+00	1.34E-03	2 68E-03
Am-243	1 4880E-06	3,376.22	6,752 44	0 00E+00	5 02E-03	1 00E-02
C-14	5 7053E-09	3,376.22	6,752 44	0 00E+00	1 93E-05	3 85E-05
Cl-36	1 3124E-32	3,376.22	6,752 44	0 00E+00	4 43E-29	8 86E-29
Cm-243	1 1419E-07	3,376.22	6,752 44	0 00E+00	3 86E-04	7 71E-04
Cm-244	1 6522E-05	3,376.22	6,752 44	0 00E+00	5 58E-02	1 12E-01
Co-60	7 4047E-07	3,376.22	6,752 44	0 00E+00	2 50E-03	5 00E-03
Cs-134	2 0455E-05	3,376.22	6,752 44	0 00E+00	6 91E-02	1 38E-01
Cs-135	3 4477E-06	3,376.22	6,752 44	0 00E+00	1 16E-02	2 33E-02
Cs-137	1 4365E+00	3,376.22	6,752 44	0 00E+00	4 85E+03	9 70E+03
Eu-154	7 3230E-03	3,376.22	6,752 44	0 00E+00	2 47E+01	4 94E+01
Eu-155	5 9259E-04	3,376.22	6,752 44	0 00E+00	2 00E+00	4 00E+00
Fe-55	2 2791E-06	3,376.22	6,752 44	0 00E+00	7 69E-03	1 54E-02
H-3	1 9698E-03	3,376.22	6,752 44	0 00E+00	6 65E+00	1 33E+01
I-129	7 5300E-07	3,376.22	6,752 44	0 00E+00	2 54E-03	5 08E-03
Kr-85	4 1176E-02	3,376.22	6,752 44	0 00E+00	1 39E+02	2.78E+02
Np-237	9 5752E-06	3,376.22	6,752 44	0 00E+00	3 23E-02	6 47E-02
Pa-231	3 9379E-09	3,376.22	6,752 44	0 00E+00	1 33E-05	2 66E-05
Pb-210	3 3115E-10	3,376.22	6,752 44	0 00E+00	1.12E-06	2.24E-06
Pm-147	9 2402E-04	3,376.22	6,752 44	0 00E+00	3 12E+00	6.24E+00
Pu-238	1 6217E-02	3,376.22	6,752 44	0 00E+00	5 48E+01	1 10E+02
Pu-239	4 2810E-04	3,376.22	6,752 44	0 00E+00	1 45E+00	2 89E+00
Pu-240	2 4333E-04	3,376.22	6,752 44	0 00E+00	8 22E-01	1 64E+00
Pu-241	1 6242E-02	3,376.22	6,752 44	0 00E+00	5 48E+01	1.10E+02
Pu-242	3 6329E-07	3,376.22	6,752 44	0 00E+00	1 23E-03	2 45E-03
Ra-226	9 0114E-10	3,376 22	6,752 44	0 00E+00	3 04E-06	6 08E-06
Ra-228	3 1019E-14	3,376.22	6,752 44	0 00E+00	1 05E-10	2 09E-10
Ru-106	2 1225E-10	3,376.22	6,752 44	0.00E+00	7 17E-07	1 43E-06
Se-79	1.2930E-05	3,376.22	6,752 44	0 00E+00	4 37E-02	8 73E-02
Sn-126	1 1571E-05	3,376.22	6,752 44	0 00E+00	3 91E-02	7 81E-02
Sr-90	1.3472E+00	3,376.22	6,752 44	0 00E+00	4 55E+03	9.10E+03
Tc-99	4.2239E-04	3,376.22	6,752 44	0 00E+00	1 43E+00	2 85E+00
Th-229	1.2407E-11	3,376.22	6,752 44	0 00E+00	4 19E-08	8.38E-08
Th-230	8 3497E-08	3,376.22	6,752 44	0.00E+00	2 82E-04	5 64E-04
Th-232	3.8371E-14	3,376.22	6,752 44	0 00E+00	1.30E-10	2.59E-10
Tl-208	4 0414E-08	3,376.22	6,752 44	0 00E+00	1.36E-04	2.73E-04
U-232	1.0948E-07	3,376.22	6,752 44	0 00E+00	3 70E-04	7.39E-04
U-233	3.6275E-09	3,376 22	6,752 44	0 00E+00	1 22E-05	2.45E-05
U-234	1 8562E-04	3,376.22	6,752 44	0 00E+00	6 27E-01	1.25E+00
U-235	-2.7235E-06	3,376.22	0 00	1 13E-02	2 07E-03	1.13E-02
U-236	1.5493E-05	3,376 22	6,752 44	0 00E+00	5.23E-02	1.05E-01
U-238	-4 2851E-09	3,376 22	0 00	5 66E-03	5 64E-03	5 66E-03
Y-90	1 3475E+00	3,376 22	6,752 44	0 00E+00	4.55E+03	9 10E+03
Other Radionuclides					4 62E+03	9.24E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 973E+14
0 0250	1 033E+14
0 0375	8 976E+13
0 0575	9 662E+13
0 0850	5 821E+13
0 1250	3 845E+13
0 2250	5 026E+13
0 3750	2.186E+13
0 5750	3 613E+14
0 8500	4 414E+12
1 2500	2 135E+12
1 7500	1.202E+11
2.2500	1 005E+07
2 7500	9 589E+06
3 5000	5 583E+03
5 0000	2.282E+03
7 0000	2 498E+02
11 0000	2 786E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5 65E+01	1.13E+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 %	23 64708607	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		3,376.22
Bounding		6 752 44

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 49	
Bounding	0 97	

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 ORR-BW-1 (MOX)
SNF ID #: 160
Fuel Units & Descr 1 - 19 CURVED PLATES
Heavy Metal Mass BOL= , EOL=0 07kg
ROD Storage Site INEEL

[1]Fuel decay start date 1966
Estimates as of 2010
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 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	2.3072E-06	66 52	66 52	0 00E+00	1.53E-04	1.53E-04
Am-241	8 4448E+00	66 52	66 52	0 00E+00	5 62E+02	5 62E+02
Am-242m	1 6848E-02	66 52	66 52	0 00E+00	1 12E+00	1.12E+00
Am-243	1 6320E-02	66 52	66 52	0 00E+00	1 09E+00	1.09E+00
C-14	1 2090E-01	66 52	66 52	0 00E+00	8 04E+00	8 04E+00
Cl-36	2 2849E-03	66 52	66.52	0 00E+00	1 52E-01	1 52E-01
Cm-243	8 6624E-04	66 52	66 52	0 00E+00	5 76E-02	5 76E-02
Cm-244	1 6848E-01	66.52	66 52	0 00E+00	1 12E+01	1 12E+01
Co-60	2 8086E+01	66.52	66 52	0.00E+00	1 87E+03	1 87E+03
Cs-134	3 4148E-04	66.52	66 52	0 00E+00	2.27E-02	2.27E-02
Cs-135	4.3976E-04	66 52	66 52	0 00E+00	2 93E-02	2.93E-02
Cs-137	2 1049E+01	66 52	66 52	0 00E+00	1.40E+03	1 40E+03
Eu-154	1.2500E+00	66 52	66.52	0 00E+00	8 32E+01	8.32E+01
Eu-155	6 8986E-02	66 52	66 52	0 00E+00	4 59E+00	4 59E+00
Fe-55	2 9308E-01	66 52	66.52	0 00E+00	1 95E+01	1 95E+01
H-3	2 4311E-01	66 52	66.52	0 00E+00	1 62E+01	1 62E+01
I-129	1 0618E-05	66 52	66 52	0 00E+00	7 06E-04	7 06E-04
Kr-85	5 9882E-01	66 52	66 52	0 00E+00	3 98E+01	3 98E+01
Np-237	1.5668E-04	66.52	66 52	0 00E+00	1.04E-02	1.04E-02
Pa-231	2 8656E-06	66.52	66 52	0 00E+00	1.91E-04	1.91E-04
Pb-210	2.3918E-08	66 52	66 52	0 00E+00	1.59E-06	1.59E-06
Pm-147	1 6900E-02	66 52	66 52	0 00E+00	1 12E+00	1.12E+00
Pu-238	-8 6120E-01	66 52	0 00	1 80E+01	0 00E+00	1 80E+01
Pu-239	-4 8440E-02	66 52	0 00	2 18E+00	0 00E+00	2 18E+00
Pu-240	-3 0095E-01	66 52	0 00	2 78E+00	0 00E+00	2 78E+00
Pu-241	-1.0411E+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	6 4400E-08	66 52	66 52	0.00E+00	4.28E-06	4.28E-06
Ra-228	5 9952E-07	66 52	66 52	0 00E+00	3.99E-05	3 99E-05
Ru-106	8.5526E-07	66.52	66 52	0 00E+00	5 69E-05	5 69E-05
Se-79	1 9181E-04	66.52	66 52	0 00E+00	1.28E-02	1.28E-02
Sn-126	1 6671E-04	66 52	66 52	0 00E+00	1 11E-02	1 11E-02
Sr-90	1 9799E+01	66 52	66 52	0 00E+00	1.32E+03	1.32E+03
Tc-99	6 7678E-03	66 52	66 52	0 00E+00	4 50E-01	4 50E-01
Th-229	1 7488E-06	66 52	66 52	0 00E+00	1 16E-04	1 16E-04
Th-230	5 8704E-06	66 52	66.52	0 00E+00	3 91E-04	3 91E-04
Th-232	6 0208E-07	66 52	66 52	0 00E+00	4 01E-05	4 01E-05
Tl-208	8 7573E-05	66 52	66 52	0 00E+00	5.83E-03	5.83E-03
U-232	2.3706E-04	66 52	66 52	0 00E+00	1.58E-02	1.58E-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 9804E+01	66 52	66 52	0 00E+00	1 32E+03	1 32E+03
Other Radionuclides					4 10E+03	4 10E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8 152E+13
0 0250	1 622E+13
0 0375	1 417E+13
0 0575	2 230E+13
0 0850	8 703E+12
0 1250	6 821E+12
0.2250	7.539E+12
0.3750	3.225E+12
0.5750	5.244E+13
0 8500	2 004E+12
1 2500	1.401E+14
1 7500	6 196E+10
2.2500	7.346E+08
2.7500	2 070E+08
3 5000	1 657E+05
5.0000	7 036E+04
7.0000	8 057E+03
11 0000	9.219E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.56E+01	6.63E+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: PRR-1 (UALX-HEU) PHILIPPIINES
SNF ID #: 638
Fuel Units & Descr: 21 - 18 FLAT PLATES
Heavy Metal Mass: BOL=3.286kg, EOL=3.286kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1998
Estimates as of: 2010
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: 10 years

Estimated Canister usage: 18"x10' 0 88

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 2892E-09	62 74	125 48	0 00E+00	8 09E-08	1.62E-07
Am-241	2 9429E-03	62 74	125 48	0 00E+00	1 85E-01	3 69E-01
Am-242m	1 9489E-06	62 74	125 48	0 00E+00	1.22E-04	2.45E-04
Am-243	2 3308E-07	62 74	125 48	0 00E+00	1.46E-05	2 92E-05
C-14	4 3278E-05	62 74	125 48	0 00E+00	2.72E-03	5 43E-03
Cl-36	4 3023E-08	62 74	125 48	0 00E+00	2.70E-06	5 40E-06
Cm-243	2 4286E-07	62 74	125 48	0 00E+00	1 52E-05	3 05E-05
Cm-244	2 6015E-06	62 74	125 48	0 00E+00	1 63E-04	3 26E-04
Co-60	1 6075E-02	62.74	125 48	0 00E+00	1 01E+00	2 02E+00
Cs-134	1.9323E-02	62.74	125 48	0 00E+00	1 21E+00	2 42E+00
Cs-135	3.1549E-05	62.74	125 48	0 00E+00	1 98E-03	3 96E-03
Cs-137	2 4556E+00	62.74	125 48	0 00E+00	1 54E+02	3 08E+02
Eu-154	9 0180E-01	62.74	125 48	0 00E+00	5 66E+01	1 13E+02
Eu-155	2.1820E-01	62 74	125 48	0 00E+00	1 37E+01	2.74E+01
Fe-55	2.2902E-03	62 74	125 48	0 00E+00	1 44E-01	2 87E-01
H-3	8.1609E-03	62 74	125 48	0 00E+00	5 12E-01	1.02E+00
I-129	7 3805E-07	62 74	125 48	0 00E+00	4 63E-05	9 26E-05
Kr-85	1 8256E-01	62 74	125 48	0.00E+00	1.15E+01	2.29E+01
Np-237	1 4505E-06	62 74	125.48	0 00E+00	9 10E-05	1 82E-04
Pa-231	4 5564E-09	62 74	125 48	0 00E+00	2 86E-07	5.72E-07
Pb-210	1 8842E-14	62 74	125 48	0 00E+00	1.18E-12	2.36E-12
Pm-147	5 5459E-01	62 74	125 48	0 00E+00	3 48E+01	6 96E+01
Pu-238	1 2992E-03	62 74	125 48	0 00E+00	8.15E-02	1 63E-01
Pu-239	5 6932E-03	62 74	125 48	0 00E+00	3 57E-01	7 14E-01
Pu-240	2 2632E-03	62.74	125 48	0 00E+00	1 42E-01	2 84E-01
Pu-241	9 8857E-02	62.74	125 48	0 00E+00	6 20E+00	1 24E+01
Pu-242	3 0602E-07	62.74	125 48	0 00E+00	1 92E-05	3 84E-05
Ra-226	1 0823E-13	62 74	125 48	0 00E+00	6 79E-12	1 36E-11
Ra-228	2.0406E-10	62 74	125 48	0 00E+00	1 28E-08	2 56E-08
Ru-106	3 0180E-03	62 74	125 48	0 00E+00	1 89E-01	3 79E-01
Se-79	1.2937E-05	62 74	125 48	0 00E+00	8 12E-04	1 62E-03
Sn-126	1.2238E-05	62 74	125 48	0 00E+00	7 68E-04	1 54E-03
Sr-90	2 3098E+00	62 74	125.48	0.00E+00	1 45E+02	2 90E+02
Tc-99	4 4120E-04	62 74	125 48	0 00E+00	2.77E-02	5 54E-02
Th-229	2 0932E-10	62 74	125 48	0 00E+00	1.31E-08	2.63E-08
Th-230	2 7744E-11	62.74	125 48	0 00E+00	1.74E-09	3.48E-09
Th-232	2 3744E-10	62.74	125 48	0 00E+00	1 49E-08	2.98E-08
Tl-208	1 9459E-08	62.74	125 48	0 00E+00	1.22E-06	2.44E-06
U-232	5 3850E-08	62.74	125 48	0 00E+00	3 38E-06	6.76E-06
U-233	1 3135E-07	62.74	125 48	0 00E+00	8 24E-06	1 65E-05
U-234	1 9143E-07	62.74	125 48	0 00E+00	1 20E-05	2 40E-05
U-235	-2 6159E-06	62.74	0 00	6 62E-03	6 45E-03	6 62E-03
U-236	1.2719E-05	62.74	125 48	0 00E+00	7 98E-04	1 60E-03
U-238	-3 8857E-08	62.74	0 00	7.57E-05	7 33E-05	7 57E-05
Y-90	2.3098E+00	62.74	125 48	0.00E+00	1 45E+02	2 90E+02
Other Radionuclides					1.66E+02	3 31E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 687E+13
0 0250	3.528E+12
0 0375	4 166E+12
0 0575	3 445E+12
0 0850	2.239E+12
0 1250	3 099E+12
0.2250	1 966E+12
0.3750	8 090E+11
0.5750	1.205E+13
0.8500	2 196E+12
1.2500	2 414E+12
1 7500	6 922E+10
2.2500	1 647E+08
2.7500	3.229E+06
3 5000	3 939E+05
5 0000	7 136E+01
7 0000	8.066E+00
11 0000	9 180E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.33E+00	4 65E+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 %:	93 14680552	10 to 20 1

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		62.74
Bounding		125 48

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 52	
Bounding	1 03	

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	PRR-1 (UALX-LEU) PHILLIPPINES	[1]Fuel decay start date	1998
SNF ID #	558	Estimates as of	2010
Fuel Units & Descr	30 - 17 FLAT PLATES	Template	TRIGA-Al (LW/U-Zrx, Alum , 10 to 20%, U)
Heavy Metal Mass	BOL=20.328kg EOL=19 713kg	[2]Template Burnup(MWd)	6 65
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0 00018
		Template Decay Time	10 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	1 2892E-09	587 03	1,174 06	0 00E+00	7.57E-07	1 51E-06
Am-241	2 9429E-03	587 03	1,174 06	0 00E+00	1 73E+00	3 46E+00
Am-242m	1 9489E-06	587 03	1,174 06	0 00E+00	1 14E-03	2 29E-03
Am-243	2 3308E-07	587 03	1,174 06	0 00E+00	1.37E-04	2 74E-04
C-14	4 3278E-05	587 03	1,174 06	0 00E+00	2 54E-02	5 08E-02
Cl-36	4 3023E-08	587 03	1,174 06	0 00E+00	2 53E-05	5 05E-05
Cm-243	2 4286E-07	587 03	1,174 06	0 00E+00	1 43E-04	2 85E-04
Cm-244	2 6015E-06	587 03	1,174 06	0 00E+00	1 53E-03	3 05E-03
Co-60	1 6075E-02	587 03	1,174 06	0 00E+00	9 44E+00	1 89E+01
Cs-134	1 9323E-02	587 03	1,174 06	0 00E+00	1 13E+01	2 27E+01
Cs-135	3 1549E-05	587 03	1,174 06	0 00E+00	1 85E-02	3 70E-02
Cs-137	2 4556E+00	587 03	1,174 06	0 00E+00	1 44E+03	2 88E+03
Eu-154	9 0180E-01	587.03	1,174 06	0 00E+00	5 29E+02	1 06E+03
Eu-155	2.1820E-01	587 03	1,174 06	0 00E+00	1 28E+02	2 56E+02
Fe-55	2.2902E-03	587.03	1,174.06	0 00E+00	1 34E+00	2 69E+00
H-3	8 1609E-03	587.03	1,174.06	0 00E+00	4 79E+00	9 58E+00
I-129	7.3805E-07	587.03	1,174.06	0 00E+00	4 33E-04	8 67E-04
Kr-85	1.8256E-01	587.03	1,174 06	0 00E+00	1 07E+02	2 14E+02
Np-237	1.4505E-06	587.03	1,174 06	0 00E+00	8 52E-04	1.70E-03
Pa-231	4.5564E-09	587.03	1,174 06	0 00E+00	2 67E-06	5.35E-06
Pb-210	1.8842E-14	587.03	1,174 06	0 00E+00	1.11E-11	2.21E-11
Pm-147	5 5459E-01	587 03	1,174 06	0 00E+00	3 26E+02	6.51E+02
Pu-238	1.2992E-03	587 03	1,174 06	0 00E+00	7 63E-01	1.53E+00
Pu-239	5 6932E-03	587 03	1,174 06	0 00E+00	3 34E+00	6.68E+00
Pu-240	2.2632E-03	587 03	1,174 06	0 00E+00	1 33E+00	2 66E+00
Pu-241	9 8857E-02	587 03	1,174 06	0 00E+00	5 80E+01	1 16E+02
Pu-242	3 0602E-07	587 03	1,174 06	0 00E+00	1.80E-04	3 59E-04
Ra-226	1 0823E-13	587 03	1,174 06	0 00E+00	6.35E-11	1.27E-10
Ra-228	2 0406E-10	587 03	1,174 06	0 00E+00	1.20E-07	2 40E-07
Ru-106	3 0180E-03	587 03	1,174 06	0 00E+00	1.77E+00	3 54E+00
Se-79	1.2937E-05	587 03	1,174 06	0 00E+00	7.59E-03	1 52E-02
Sn-126	1 2238E-05	587.03	1,174 06	0 00E+00	7 18E-03	1 44E-02
Sr-90	2 3098E+00	587 03	1,174 06	0 00E+00	1.36E+03	2 71E+03
Tc-99	4 4120E-04	587 03	1,174 06	0 00E+00	2 59E-01	5 18E-01
Th-229	2 0932E-10	587 03	1,174 06	0 00E+00	1.23E-07	2 46E-07
Th-230	2 7744E-11	587 03	1,174 06	0 00E+00	1 63E-08	3 26E-08
Th-232	2 3744E-10	587 03	1,174 06	0 00E+00	1 39E-07	2 79E-07
Tl-208	1 9459E-08	587 03	1,174 06	0 00E+00	1 14E-05	2.28E-05
U-232	5 3850E-08	587 03	1,174 06	0 00E+00	3 16E-05	6.32E-05
U-233	1 3135E-07	587 03	1,174.06	0 00E+00	7 71E-05	1.54E-04
U-234	1 9143E-07	587.03	1,174.06	0 00E+00	1 12E-04	2.25E-04
U-235	-2.6159E-06	587.03	0 00	8 73E-03	7.20E-03	8.73E-03
U-236	1.2719E-05	587.03	1,174 06	0 00E+00	7 47E-03	1.49E-02
U-238	-3 8857E-08	587.03	0 00	5 47E-03	5 45E-03	5 47E-03
Y-90	2 3098E+00	587.03	1,174 06	0 00E+00	1 36E+03	2.71E+03
Other Radionuclides					1 55E+03	3.10E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 578E+14
0 0250	3 301E+13
0 0375	3 898E+13
0 0575	3 224E+13
0 0850	2.095E+13
0 1250	2 900E+13
0 2250	1 839E+13
0 3750	7 570E+12
0 5750	1 128E+14
0 8500	2 055E+13
1.2500	2.259E+13
1 7500	6 477E+11
2.2500	1.541E+09
2.7500	3 021E+07
3.5000	3 686E+06
5 0000	6 778E+02
7 0000	7 665E+01
11.0000	8 725E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 18E+01	4.35E+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 87821382	10 to 20 1

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated
Nominal		587.03
Bounding		1,174 06

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 78	
Bounding	1.56	

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: PURDUE UNIVERSITY (U-ALX HEU)
SNF ID #: 177
Fuel Units & Descr: 124 - ELEMENT
Heavy Metal Mass: BOL=2.22kg, EOL=2.22kg
ROD Storage Site. SRS

[1]Fuel decay start date: 2035
Estimates as of: 2010
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: 5 years

Estimated Canister usage: 18"x10" 3 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 Inventones(Ci)
Ac-227	1 4545E-10	42 04	84 08	0 00E+00	6.11E-09	1 22E-08
Am-241	1 1190E-03	42 04	84 08	0 00E+00	4.70E-02	9 41E-02
Am-242m	4 5425E-07	42 04	84 08	0 00E+00	1.91E-05	3 82E-05
Am-243	1 4921E-06	42 04	84 08	0 00E+00	6.27E-05	1 25E-04
C-14	5 7244E-09	42 04	84 08	0 00E+00	2 41E-07	4 81E-07
Cl-36	1 3124E-32	42 04	84 08	0 00E+00	5 52E-31	1 10E-30
Cm-243	2 3676E-07	42 04	84 08	0 00E+00	9 95E-06	1 99E-05
Cm-244	5 2042E-05	42 04	84 08	0 00E+00	2 19E-03	4 38E-03
Co-60	3 8208E-05	42.04	84 08	0 00E+00	1 61E-03	3 21E-03
Cs-134	4 8693E-01	42 04	84 08	0 00E+00	2.05E+01	4 09E+01
Cs-135	3.4477E-06	42.04	84 08	0.00E+00	1 45E-04	2 90E-04
Cs-137	2 8731E+00	42.04	84 08	0 00E+00	1.21E+02	2 42E+02
Eu-154	8.2053E-02	42 04	84 08	0 00E+00	3 45E+00	6 90E+00
Eu-155	3.9134E-02	42.04	84 08	0 00E+00	1.65E+00	3 29E+00
Fe-55	6.7429E-03	42 04	84 08	0 00E+00	2 83E-01	5 67E-01
H-3	1 0599E-02	42 04	84 08	0 00E+00	4 46E-01	8 91E-01
I-129	7 5300E-07	42.04	84 08	0 00E+00	3 17E-05	6 33E-05
Kr-85	2 8595E-01	42 04	84 08	0 00E+00	1 20E+01	2 40E+01
Np-237	9.5479E-06	42 04	84 08	0 00E+00	4 01E-04	8 03E-04
Pa-231	8 9297E-10	42 04	84 08	0 00E+00	3 75E-08	7 51E-08
Pb-210	3.7609E-12	42.04	84 08	0 00E+00	1 58E-10	3 16E-10
Pm-147	2.5452E+00	42 04	84 08	0 00E+00	1 07E+02	2 14E+02
Pu-238	2 0550E-02	42 04	84.08	0 00E+00	8 64E-01	1 73E+00
Pu-239	4.2838E-04	42 04	84 08	0 00E+00	1 80E-02	3 60E-02
Pu-240	2 4401E-04	42 04	84.08	0 00E+00	1 03E-02	2 05E-02
Pu-241	6 8764E-02	42 04	84.08	0 00E+00	2 89E+00	5 78E+00
Pu-242	3 6329E-07	42 04	84 08	0 00E+00	1 53E-05	3 05E-05
Ra-226	3 8045E-11	42 04	84 08	0 00E+00	1 60E-09	3 20E-09
Ra-228	2.9902E-15	42 04	84 08	0 00E+00	1 26E-13	2 51E-13
Ru-106	1 9055E-01	42.04	84.08	0 00E+00	8 01E+00	1 60E+01
Se-79	1.2936E-05	42 04	84.08	0 00E+00	5 44E-04	1 09E-03
Sn-126	1.1574E-05	42 04	84.08	0 00E+00	4 87E-04	9 73E-04
Sr-90	2.7505E+00	42 04	84 08	0 00E+00	1 16E+02	2 31E+02
Tc-99	4.2239E-04	42 04	84 08	0 00E+00	1 78E-02	3 55E-02
Th-229	1 8848E-12	42 04	84.08	0 00E+00	7 92E-11	1 58E-10
Th-230	1 7042E-08	42 04	84 08	0 00E+00	7 16E-07	1 43E-06
Th-232	7 8132E-15	42 04	84 08	0 00E+00	3 28E-13	6 57E-13
Tl-208	4 4063E-08	42 04	84 08	0 00E+00	1 85E-06	3 70E-06
U-232	1.3151E-07	42 04	84 08	0 00E+00	5 53E-06	1 11E-05
U-233	1 9564E-09	42 04	84 08	0 00E+00	8 22E-08	1 64E-07
U-234	1 8371E-04	42 04	84 08	0 00E+00	7 72E-03	1 54E-02
U-235	-2 7235E-06	42 04	0 00	4 41E-03	4 30E-03	4 41E-03
U-236	1 5493E-05	42 04	84 08	0 00E+00	6 51E-04	1 30E-03
U-238	-4 2851E-09	42 04	0 00	5 97E-05	5 95E-05	5 97E-05
Y-90	2.7505E+00	42 04	84 08	0 00E+00	1 16E+02	2 31E+02
Other Radionuclides					2 16E+02	4 32E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 622E+13
0 0250	3 495E+12
0 0375	3.225E+12
0 0575	3 171E+12
0 0850	2 022E+12
0 1250	1 751E+12
0.2250	1 713E+12
0.3750	8.293E+11
0 5750	1 139E+13
0 8500	1 595E+12
1.2500	2 968E+11
1 7500	1.245E+10
2.2500	2 611E+10
2.7500	1 502E+08
3.5000	1 666E+07
5.0000	4 999E+01
7 0000	5 573E+00
11.0000	6.282E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.13E+00	4.26E+00
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 %:	92 00045093	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		42.04	Nominal burnup assumed to be 2% of BOL heavy metal mass
Bounding		84 08	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	PURDUE UNIVERSITY-MTR-SI	[1]Fuel decay start date.	2035
SNF ID #	178	Estimates as of	2010
Fuel Units & Descr.	16 - 10 FLAT PLATES	Template	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass	BOL=18 182kg EOL=18 182kg	[2]Template Burnup(MWd):	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0 00116689
		Template Decay Time	5 years

Estimated Canister usage 18"x10' 0 44

II. Estimates

Radionuclide	m: C/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	1.4545E-10	344 38	688.76	0 00E+00	5 01E-08	1 00E-07
Am-241	1.1190E-03	344 38	688 76	0 00E+00	3 85E-01	7.71E-01
Am-242m	4.5425E-07	344 38	688 76	0 00E+00	1.56E-04	3 13E-04
Am-243	1.4921E-06	344 38	688 76	0 00E+00	5 14E-04	1.03E-03
C-14	5 7244E-09	344 38	688 76	0 00E+00	1 97E-06	3 94E-06
Cl-36	1.3124E-32	344 38	688 76	0 00E+00	4 52E-30	9 04E-30
Cm-243	2 3676E-07	344 38	688 76	0 00E+00	8 15E-05	1.63E-04
Cm-244	5.2042E-05	344 38	688 76	0 00E+00	1.79E-02	3.58E-02
Co-60	3 8208E-05	344 38	688 76	0 00E+00	1.32E-02	2.63E-02
Cs-134	4 8693E-01	344 38	688 76	0 00E+00	1 68E+02	3 35E+02
Cs-135	3 4477E-06	344 38	688 76	0.00E+00	1.19E-03	2.37E-03
Cs-137	2 8731E+00	344 38	688 76	0 00E+00	9 89E+02	1.98E+03
Eu-154	8 2053E-02	344 38	688 76	0 00E+00	2 83E+01	5 65E+01
Eu-155	3 9134E-02	344 38	688 76	0 00E+00	1.35E+01	2.70E+01
Fe-55	6 7429E-03	344 38	688 76	0 00E+00	2.32E+00	4 64E+00
H-3	1 0599E-02	344 38	688 76	0 00E+00	3 65E+00	7.30E+00
I-129	7 5300E-07	344.38	688 76	0 00E+00	2.59E-04	5 19E-04
Kr-85	2 8595E-01	344.38	688 76	0 00E+00	9 85E+01	1 97E+02
Np-237	9 5479E-06	344 38	688 76	0 00E+00	3 29E-03	6 58E-03
Pa-231	8 9297E-10	344.38	688 76	0 00E+00	3 08E-07	6 15E-07
Pb-210	3 7609E-12	344.38	688 76	0 00E+00	1.30E-09	2 59E-09
Pm-147	2 5452E+00	344.38	688 76	0 00E+00	8 77E+02	1 75E+03
Pu-238	2 0550E-02	344.38	688 76	0 00E+00	7 08E+00	1 42E+01
Pu-239	4 2838E-04	344.38	688 76	0 00E+00	1 48E-01	2 95E-01
Pu-240	2 4401E-04	344 38	688 76	0 00E+00	8 40E-02	1 68E-01
Pu-241	6 8764E-02	344 38	688 76	0 00E+00	2.37E+01	4 74E+01
Pu-242	3 6329E-07	344 38	688 76	0 00E+00	1 25E-04	2 50E-04
Ra-226	3 8045E-11	344 38	688 76	0 00E+00	1 31E-08	2 62E-08
Ra-228	2 9902E-15	344 38	688 76	0 00E+00	1 03E-12	2 06E-12
Ru-106	1 9055E-01	344 38	688 76	0 00E+00	6 56E+01	1 31E+02
Se-79	1.2936E-05	344 38	688 76	0 00E+00	4 45E-03	8 91E-03
Sn-126	1 1574E-05	344 38	688 76	0 00E+00	3 99E-03	7.97E-03
Sr-90	2.7505E+00	344 38	688 76	0 00E+00	9 47E+02	1.89E+03
Tc-99	4.2239E-04	344 38	688 76	0 00E+00	1 45E-01	2.91E-01
Th-229	1 8848E-12	344 38	688 76	0 00E+00	6 49E-10	1.30E-09
Th-230	1 7042E-08	344 38	688.76	0 00E+00	5 87E-06	1.17E-05
Th-232	7.8132E-15	344 38	688 76	0 00E+00	2 69E-12	5.38E-12
Tl-208	4.4063E-08	344 38	688.76	0.00E+00	1.52E-05	3 03E-05
U-232	1.3151E-07	344 38	688.76	0 00E+00	4.53E-05	9 06E-05
U-233	1.9564E-09	344 38	688.76	0 00E+00	6.74E-07	1.35E-06
U-234	1.8371E-04	344 38	688.76	0 00E+00	6.33E-02	1 27E-01
U-235	-2.7235E-06	344 38	0 00	7 47E-03	6.53E-03	7 47E-03
U-236	1.5493E-05	344 38	688 76	0 00E+00	5.34E-03	1 07E-02
U-238	-4.2851E-09	344 38	0 00	4 95E-03	4 95E-03	4 95E-03
Y-90	2.7505E+00	344 38	688 76	0 00E+00	9 47E+02	1 89E+03
Other Radionuclides					1.77E+03	3 54E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 329E+14
0 0250	2 863E+13
0 0375	2 642E+13
0 0575	2.598E+13
0 0850	1 656E+13
0 1250	1 434E+13
0.2250	1 404E+13
0 3750	6 794E+12
0 5750	9 332E+13
0 8500	1.307E+13
1.2500	2.431E+12
1 7500	1 020E+11
2.2500	2 139E+11
2.7500	1.230E+09
3 5000	1.365E+08
5 0000	4 193E+02
7 0000	4 679E+01
11.0000	5.277E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 75E+01	3.49E+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 %.	19 0001402	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		344.38
Bounding		688 76

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: R-2 SVTR (U3Si2 LEU) SWEDEN
SNF ID #: 942
Fuel Units & Descr: 183 - MTR TYPE
Heavy Metal Mass: BOL=351 47kg, EOL=308 977kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1996
Estimates as of: 2010
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: 10 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	2 8404E-10	40,241 32	80,482 63	0 00E+00	1 14E-05	2.29E-05
Am-241	1 4935E-03	40,241.32	80,482 63	0 00E+00	6 01E+01	1 20E+02
Am-242m	4 4390E-07	40,241 32	80,482 63	0 00E+00	1 79E-02	3 57E-02
Am-243	1 4913E-06	40,241 32	80,482 63	0 00E+00	6 00E-02	1.20E-01
C-14	5 7217E-09	40,241 32	80,482 63	0 00E+00	2 30E-04	4 60E-04
Cl-36	1.3124E-32	40,241 32	80,482 63	0 00E+00	5 28E-28	1 06E-27
Cm-243	2 0967E-07	40,241 32	80,482 63	0 00E+00	8 44E-03	1 69E-02
Cm-244	4.3001E-05	40,241.32	80,482 63	0 00E+00	1 73E+00	3 46E+00
Co-60	1 9798E-05	40,241 32	80,482 63	0 00E+00	7 97E-01	1 59E+00
Cs-134	9 0795E-02	40,241 32	80,482 63	0 00E+00	3 65E+03	7 31E+03
Cs-135	3 4477E-06	40,241 32	80,482 63	0 00E+00	1 39E-01	2.77E-01
Cs-137	2 5588E+00	40,241 32	80,482 63	0 00E+00	1 03E+05	2 06E+05
Eu-154	5 4847E-02	40,241 32	80,482 63	0 00E+00	2 21E+03	4 41E+03
Eu-155	1 9469E-02	40,241 32	80,482.63	0 00E+00	7 83E+02	1 57E+03
Fe-55	1 7797E-03	40,241 32	80,482.63	0 00E+00	7 16E+01	1 43E+02
H-3	8 0065E-03	40,241 32	80,482.63	0 00E+00	3 22E+02	6 44E+02
I-129	7 5300E-07	40,241 32	80,482.63	0 00E+00	3 03E-02	6 06E-02
Kr-85	2 0705E-01	40,241 32	80,482.63	0 00E+00	8 33E+03	1 67E+04
Np-237	9 5507E-06	40,241 32	80,482 63	0 00E+00	3 84E-01	7 69E-01
Pa-231	1 2740E-09	40,241 32	80,482 63	0 00E+00	5 13E-05	1 03E-04
Pb-210	1 1838E-11	40,241 32	80,482 63	0 00E+00	4 76E-07	9 53E-07
Pm-147	6 7974E-01	40,241 32	80,482 63	0 00E+00	2 74E+04	5 47E+04
Pu-238	1 9755E-02	40,241 32	80,482 63	0 00E+00	7 95E+02	1 59E+03
Pu-239	4 2838E-04	40,241 32	80,482 63	0 00E+00	1 72E+01	3 45E+01
Pu-240	2 4390E-04	40,241 32	80,482 63	0 00E+00	9 81E+00	1 96E+01
Pu-241	5 4058E-02	40,241 32	80,482.63	0 00E+00	2 18E+03	4.35E+03
Pu-242	3 6329E-07	40,241 32	80 482 63	0 00E+00	1 46E-02	2 92E-02
Ra-226	8 3742E-11	40,241 32	80,482 63	0 00E+00	3 37E-06	6 74E-06
Ra-228	5 7734E-15	40,241 32	80,482 63	0 00E+00	2 32E-10	4 65E-10
Ru-106	6 1356E-03	40,241 32	80,482 63	0 00E+00	2 47E+02	4 94E+02
Se-79	1 2936E-05	40,241 32	80,482 63	0 00E+00	5 21E-01	1.04E+00
Sn-126	1 1574E-05	40,241 32	80,482 63	0 00E+00	4 66E-01	9 32E-01
Sr-90	2 4417E+00	40,241 32	80,482 63	0 00E+00	9 83E+04	1.97E+05
Tc-99	4 2239E-04	40,241 32	80,482 63	0 00E+00	1 70E+01	3 40E+01
Th-229	2 8568E-12	40,241 32	80,482 63	0 00E+00	1 15E-07	2 30E-07
Th-230	2 5310E-08	40,241 32	80,482 63	0 00E+00	1 02E-03	2 04E-03
Th-232	1 1631E-14	40,241 32	80,482 63	0 00E+00	4 68E-10	9 36E-10
Tl-208	4 6705E-08	40,241 32	80,482 63	0 00E+00	1 88E-03	3 76E-03
U-232	1 3151E-07	40,241 32	80,482 63	0 00E+00	5 29E-03	1 06E-02
U-233	2 1650E-09	40,241 32	80,482 63	0 00E+00	8 71E-05	1 74E-04
U-234	1 8399E-04	40,241 32	80,482 63	0 00E+00	7 40E+00	1 48E+01
U-235	-2.7235E-06	40,241 32	0.00	1 51E-01	4.11E-02	1 51E-01
U-236	1 5493E-05	40,241.32	80,482 63	0 00E+00	6.23E-01	1.25E+00
U-238	-4.2851E-09	40,241 32	0 00	9 47E-02	9 45E-02	9 47E-02
Y-90	2 4423E+00	40,241.32	80,482 63	0 00E+00	9 83E+04	1 97E+05
Other Radionuclides					1 00E+05	2 00E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	1 095E+16
0 0250	2.304E+15
0 0375	2 008E+15
0 0575	2 122E+15
0 0850	1.291E+15
0 1250	9 030E+14
0.2250	1 108E+15
0.3750	4 968E+14
0 5750	8 066E+15
0.8500	3 934E+14
1.2500	1.280E+14
1 7500	4 675E+12
2.2500	3 091E+11
2 7500	4.313E+09
3.5000	5 135E+08
5 0000	4.287E+04
7 0000	4 764E+03
11 0000	5.360E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.27E+03	2.55E+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 %	19 84262055	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		40,241 32
Bounding		80 482 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 36	
Bounding	0 73	

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 R-2 SVTR (UALX HEU) SWEDEN
SNF ID # 801
Fuel Units & Descr 450 - MTR TYPE
Heavy Metal Mass BOL=111 015kg EOL=59.85kg
ROD Storage Site SRS

[1]Fuel decay start date 1996
Estimates as of 2010
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 10 years

Estimated Canister usage
18"x10'
12 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 8404E-10	48,454.25	96,908 50	0 00E+00	1.38E-05	2 75E-05
Am-241	1 4935E-03	48,454.25	96,908 50	0.00E+00	7.24E+01	1 45E+02
Am-242m	4 4390E-07	48,454.25	96,908 50	0 00E+00	2.15E-02	4 30E-02
Am-243	1 4913E-06	48,454.25	96,908 50	0 00E+00	7.23E-02	1 45E-01
C-14	5 7217E-09	48,454.25	96,908 50	0 00E+00	2 77E-04	5 54E-04
Cl-36	1 3124E-32	48,454.25	96,908 50	0 00E+00	6 36E-28	1 27E-27
Cm-243	2 0967E-07	48,454 25	96,908.50	0 00E+00	1 02E-02	2 03E-02
Cm-244	4 3001E-05	48,454 25	96,908.50	0 00E+00	2 08E+00	4 17E+00
Co-60	1 9798E-05	48,454 25	96,908 50	0 00E+00	9 59E-01	1 92E+00
Cs-134	9 0795E-02	48,454 25	96,908 50	0 00E+00	4 40E+03	8 80E+03
Cs-135	3.4477E-06	48,454 25	96,908 50	0 00E+00	1 67E-01	3 34E-01
Cs-137	2.5588E+00	48,454.25	96,908 50	0 00E+00	1 24E+05	2 48E+05
Eu-154	5 4847E-02	48,454.25	96,908 50	0 00E+00	2 66E+03	5 32E+03
Eu-155	1 9469E-02	48,454.25	96,908 50	0 00E+00	9 43E+02	1 89E+03
Fe-55	1 7797E-03	48,454.25	96,908 50	0 00E+00	8 62E+01	1.72E+02
H-3	8 0065E-03	48,454.25	96,908 50	0 00E+00	3 88E+02	7.76E+02
I-129	7 5300E-07	48,454.25	96,908 50	0 00E+00	3 65E-02	7.30E-02
Kr-85	2 0705E-01	48,454.25	96,908 50	0.00E+00	1 00E+04	2 01E+04
Np-237	9 5507E-06	48,454.25	96,908 50	0.00E+00	4 63E-01	9.26E-01
Pa-231	1 2740E-09	48,454.25	96,908 50	0 00E+00	6 17E-05	1.23E-04
Pb-210	1 1838E-11	48,454 25	96,908.50	0 00E+00	5 74E-07	1 15E-06
Pm-147	6 7974E-01	48,454 25	96,908 50	0 00E+00	3.29E+04	6 59E+04
Pu-238	1 9755E-02	48,454 25	96,908 50	0 00E+00	9 57E+02	1 91E+03
Pu-239	4.2838E-04	48,454.25	96,908 50	0 00E+00	2 08E+01	4 15E+01
Pu-240	2 4390E-04	48,454.25	96,908 50	0 00E+00	1 18E+01	2 36E+01
Pu-241	5 4058E-02	48,454.25	96,908 50	0 00E+00	2 62E+03	5 24E+03
Pu-242	3 6329E-07	48,454.25	96,908 50	0 00E+00	1 76E-02	3 52E-02
Ra-226	8.3742E-11	48,454.25	96,908 50	0 00E+00	4 06E-06	8 12E-06
Ra-228	5 7734E-15	48,454.25	96,908 50	0 00E+00	2 80E-10	5.59E-10
Ru-106	6 1356E-03	48,454.25	96,908 50	0 00E+00	2 97E+02	5 95E+02
Se-79	1 2936E-05	48,454.25	96,908 50	0 00E+00	6 27E-01	1.25E+00
Sn-126	1 1574E-05	48,454.25	96,908 50	0 00E+00	5 61E-01	1.12E+00
Sr-90	2 4417E+00	48,454.25	96,908 50	0 00E+00	1 18E+05	2.37E+05
Tc-99	4 2239E-04	48,454.25	96,908 50	0 00E+00	2 05E+01	4 09E+01
Th-229	2 8568E-12	48,454 25	96,908 50	0 00E+00	1.38E-07	2 77E-07
Th-230	2 5310E-08	48,454 25	96,908.50	0.00E+00	1.23E-03	2 45E-03
Th-232	1 1631E-14	48,454 25	96,908 50	0 00E+00	5 64E-10	1 13E-09
Tl-208	4 6705E-08	48,454.25	96,908 50	0 00E+00	2.26E-03	4 53E-03
U-232	1.3151E-07	48,454.25	96,908 50	0 00E+00	6 37E-03	1 27E-02
U-233	2 1650E-09	48,454.25	96,908 50	0 00E+00	1 05E-04	2 10E-04
U-234	1 8399E-04	48,454.25	96,908 50	0 00E+00	8 91E+00	1 78E+01
U-235	-2 7235E-06	48,454.25	0 00	2 22E-01	9 00E-02	2.22E-01
U-236	1.5493E-05	48,454.25	96,908 50	0 00E+00	7 51E-01	1.50E+00
U-238	-4 2851E-09	48,454.25	0 00	2 79E-03	2 58E-03	2.79E-03
Y-90	2 4423E+00	48,454.25	96,908 50	0 00E+00	1 18E+05	2.37E+05
Other Radionuclides					1 20E+05	2 41E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.318E+16
0 0250	2.774E+15
0 0375	2.418E+15
0 0575	2.555E+15
0 0850	1.554E+15
0 1250	1.087E+15
0.2250	1.335E+15
0 3750	5.982E+14
0 5750	9 712E+15
0 8500	4 737E+14
1.2500	1.542E+14
1 7500	5 630E+12
2.2500	3 722E+11
2 7500	5 193E+09
3.5000	6 183E+08
5.0000	5 137E+04
7.0000	5 707E+03
11 0000	6 421E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.53E+03	3.07E+03
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 %	92.5168132	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		48 454.25	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		96 908.50	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.39	
Bounding	2.77	

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: RA-3 (UALX-HEU) (ARGENTINA)
SNF ID #: 634
Fuel Units & Descr. 32 - 19 CURVED PLATES
Heavy Metal Mass BOL=5 722kg, EOL=4 595kg
ROD Storage Site SRS

[1]Fuel decay start date: 1987
Estimates as of: 2010
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' 1.33

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	1,066 72	2,133 45	0 00E+00	7.07E-07	1 41E-06
Am-241	2 0060E-03	1,066 72	2,133 45	0 00E+00	2 14E+00	4.28E+00
Am-242m	4.2429E-07	1,066 72	2,133 45	0 00E+00	4.53E-04	9 05E-04
Am-243	1 4899E-06	1,066 72	2,133 45	0 00E+00	1.59E-03	3 18E-03
C-14	5 7135E-09	1,066 72	2,133 45	0 00E+00	6.09E-06	1 22E-05
Cl-36	1 3124E-32	1,066 72	2,133 45	0 00E+00	1.40E-29	2 80E-29
Cm-243	1 6443E-07	1,066 72	2,133 45	0 00E+00	1.75E-04	3 51E-04
Cm-244	2 9330E-05	1,066 72	2,133 45	0 00E+00	3.13E-02	6 26E-02
Co-60	5 3186E-06	1,066 72	2,133 45	0 00E+00	5 67E-03	1 13E-02
Cs-134	3 1563E-03	1,066 72	2,133 45	0 00E+00	3.37E+00	6 73E+00
Cs-135	3 4477E-06	1 066 72	2,133 45	0 00E+00	3 68E-03	7 36E-03
Cs-137	2 0313E+00	1,066 72	2,133 45	0 00E+00	2.17E+03	4 33E+03
Eu-154	2 4513E-02	1,066 72	2,133.45	0 00E+00	2 61E+01	5 23E+01
Eu-155	4 8175E-03	1,066 72	2,133 45	0 00E+00	5.14E+00	1 03E+01
Fe-55	1 2397E-04	1,066 72	2,133 45	0 00E+00	1 32E-01	2 64E-01
H-3	4 5697E-03	1,066 72	2,133 45	0 00E+00	4 87E+00	9 75E+00
I-129	7 5300E-07	1,066 72	2,133.45	0.00E+00	8 03E-04	1 61E-03
Kr-85	1 0850E-01	1,066 72	2,133.45	0 00E+00	1.16E+02	2 31E+02
Np-237	9 5561E-06	1,066 72	2,133 45	0 00E+00	1 02E-02	2 04E-02
Pa-231	2 0359E-09	1,066 72	2,133 45	0 00E+00	2.17E-06	4 34E-06
Pb-210	4 9728E-11	1,066 72	2,133 45	0 00E+00	5 30E-08	1 06E-07
Pm-147	4 8502E-02	1,066 72	2,133 45	0 00E+00	5 17E+01	1 03E+02
Pu-238	1 8254E-02	1,066 72	2,133 45	0 00E+00	1 95E+01	3 89E+01
Pu-239	4.2810E-04	1,066 72	2,133 45	0 00E+00	4 57E-01	9 13E-01
Pu-240	2 4368E-04	1,066 72	2,133 45	0 00E+00	2 60E-01	5.20E-01
Pu-241	3 3415E-02	1,066 72	2,133 45	0 00E+00	3 56E+01	7 13E+01
Pu-242	3 6329E-07	1,066 72	2,133 45	0 00E+00	3 88E-04	7 75E-04
Ra-226	2 2854E-10	1,066 72	2,133 45	0 00E+00	2 44E-07	4 88E-07
Ra-228	1.2426E-14	1,066 72	2,133 45	0 00E+00	1 33E-11	2 65E-11
Ru-106	6 3589E-06	1,066 72	2,133 45	0 00E+00	6 78E-03	1 36E-02
Se-79	1.2933E-05	1,066 72	2,133 45	0 00E+00	1 38E-02	2 76E-02
Sn-126	1 1574E-05	1,066.72	2,133 45	0 00E+00	1 23E-02	2 47E-02
Sr-90	1 9248E+00	1,066.72	2,133 45	0 00E+00	2 05E+03	4 11E+03
Tc-99	4 2239E-04	1,066 72	2,133 45	0 00E+00	4 51E-01	9 01E-01
Th-229	5 0953E-12	1,066 72	2,133 45	0 00E+00	5 44E-09	1.09E-08
Th-230	4 1885E-08	1,066.72	2,133 45	0 00E+00	4 47E-05	8.94E-05
Th-232	1 9270E-14	1,066.72	2,133 45	0 00E+00	2 06E-11	4.11E-11
Tl-208	4 6024E-08	1,066.72	2,133 45	0 00E+00	4 91E-05	9 82E-05
U-232	1.2582E-07	1,066.72	2,133 45	0 00E+00	1 34E-04	2 68E-04
U-233	2 5825E-09	1,066.72	2,133 45	0 00E+00	2 75E-06	5.51E-06
U-234	1 8450E-04	1,066.72	2,133 45	0 00E+00	1 97E-01	3 94E-01
U-235	-2 7235E-06	1,066.72	0 00	1 11E-02	8 22E-03	1.11E-02
U-236	1.5493E-05	1,066.72	2,133 45	0 00E+00	1 65E-02	3.31E-02
U-238	-4 2851E-09	1,066 72	0 00	1 93E-04	1 88E-04	1 93E-04
Y-90	1.9254E+00	1,066.72	2,133 45	0 00E+00	2 05E+03	4.11E+03
Other Radionuclides					2 06E+03	4 13E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.252E+14
0 0250	4 683E+13
0 0375	4 085E+13
0 0575	4.375E+13
0 0850	2 644E+13
0 1250	1 789E+13
0.2250	2.281E+13
0.3750	9 930E+12
0 5750	1 620E+14
0 8500	2 738E+12
1.2500	1 564E+12
1 7500	7 177E+10
2.2500	6.296E+06
2 7500	3 559E+06
3.5000	1 635E+04
5.0000	9.247E+02
7 0000	1 021E+02
11.0000	1 144E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.54E+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 %	89 96321383	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		1,066 72	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		2,133 45	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 59	
Bounding	1 18	

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	RA-3 (UALX-HEU) (ARGENTINA)	[1]Fuel decay start date	1987
SNF ID #	636	Estimates as of	2010
Fuel Units & Descr	207 - 19 CURVED PLATES	Template	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass	BOL=37.84kg; EOL=30 139kg	[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' 8 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	6 6313E-10	7,292 43	14,584 86	0 00E+00	4 84E-06	9 67E-06
Am-241	2 0060E-03	7,292 43	14,584 86	0 00E+00	1 46E+01	2 93E+01
Am-242m	4 2429E-07	7,292 43	14,584 86	0 00E+00	3 09E-03	6 19E-03
Am-243	1 4899E-06	7,292 43	14,584 86	0 00E+00	1 09E-02	2.17E-02
C-14	5 7135E-09	7,292.43	14,584 86	0 00E+00	4 17E-05	8.33E-05
Cl-36	1 3124E-32	7,292 43	14,584 86	0 00E+00	9 57E-29	1 91E-28
Cm-243	1 6443E-07	7,292 43	14,584 86	0 00E+00	1 20E-03	2 40E-03
Cm-244	2 9330E-05	7,292 43	14,584 86	0 00E+00	2 14E-01	4.28E-01
Co-60	5 3186E-06	7,292 43	14,584 86	0 00E+00	3 88E-02	7 76E-02
Cs-134	3 1563E-03	7,292 43	14,584 86	0 00E+00	2 30E+01	4 60E+01
Cs-135	3.4477E-06	7,292 43	14,584 86	0 00E+00	2 51E-02	5 03E-02
Cs-137	2 0313E+00	7,292 43	14,584 86	0 00E+00	1 48E+04	2 96E+04
Eu-154	2 4513E-02	7,292 43	14,584 86	0 00E+00	1 79E+02	3 58E+02
Eu-155	4 8175E-03	7,292 43	14,584 86	0 00E+00	3 51E+01	7 03E+01
Fe-55	1.2397E-04	7,292 43	14,584 86	0 00E+00	9 04E-01	1 81E+00
H-3	4 5697E-03	7,292 43	14,584 86	0 00E+00	3.33E+01	6 66E+01
I-129	7 5300E-07	7,292 43	14,584 86	0.00E+00	5 49E-03	1.10E-02
Kr-85	1 0850E-01	7,292 43	14,584 86	0 00E+00	7 91E+02	1.58E+03
Np-237	9 5561E-06	7,292 43	14,584 86	0 00E+00	6 97E-02	1.39E-01
Pa-231	2 0359E-09	7,292 43	14,584.86	0 00E+00	1 48E-05	2 97E-05
Pb-210	4 9728E-11	7,292 43	14,584.86	0 00E+00	3 63E-07	7 25E-07
Pm-147	4 8502E-02	7,292 43	14,584 86	0 00E+00	3 54E+02	7 07E+02
Pu-238	1 8254E-02	7,292 43	14,584 86	0 00E+00	1 33E+02	2 66E+02
Pu-239	4.2810E-04	7,292 43	14,584 86	0 00E+00	3 12E+00	6.24E+00
Pu-240	2.4368E-04	7,292 43	14,584 86	0 00E+00	1 78E+00	3 55E+00
Pu-241	3.3415E-02	7,292 43	14,584 86	0 00E+00	2 44E+02	4 87E+02
Pu-242	3 6329E-07	7,292 43	14,584 86	0 00E+00	2.65E-03	5 30E-03
Ra-226	2.2854E-10	7,292 43	14,584 86	0 00E+00	1.67E-06	3 33E-06
Ra-228	1.2426E-14	7,292 43	14,584 86	0.00E+00	9 06E-11	1 81E-10
Ru-106	6 3589E-06	7,292 43	14,584 86	0.00E+00	4 64E-02	9.27E-02
Se-79	1.2933E-05	7,292 43	14,584 86	0 00E+00	9 43E-02	1 89E-01
Sn-126	1 1574E-05	7,292.43	14,584 86	0 00E+00	8 44E-02	1 69E-01
Sr-90	1 9248E+00	7,292 43	14,584 86	0 00E+00	1 40E+04	2.81E+04
Tc-99	4 2239E-04	7,292 43	14,584.86	0 00E+00	3 08E+00	6 16E+00
Th-229	5 0953E-12	7,292 43	14,584 86	0 00E+00	3 72E-08	7 43E-08
Th-230	4 1885E-08	7,292 43	14,584 86	0 00E+00	3 05E-04	6 11E-04
Th-232	1 9270E-14	7,292 43	14,584 86	0 00E+00	1 41E-10	2 81E-10
Tl-208	4 6024E-08	7,292 43	14,584 86	0 00E+00	3.36E-04	6 71E-04
U-232	1.2582E-07	7,292 43	14,584 86	0 00E+00	9 18E-04	1 84E-03
U-233	2.5825E-09	7,292 43	14,584 86	0 00E+00	1.88E-05	3 77E-05
U-234	1 8450E-04	7,292 43	14,584 86	0.00E+00	1.35E+00	2 69E+00
U-235	-2 7235E-06	7,292 43	0.00	7.36E-02	5 37E-02	7.36E-02
U-236	1.5493E-05	7,292 43	14,584 86	0 00E+00	1.13E-01	2.26E-01
U-238	-4 2851E-09	7,292.43	0 00	1.27E-03	1 24E-03	1.27E-03
Y-90	1 9254E+00	7,292 43	14,584 86	0 00E+00	1 40E+04	2.81E+04
Other Radionuclides					1 41E+04	2 82E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.540E+15
0 0250	3.201E+14
0 0375	2 792E+14
0 0575	2 991E+14
0 0850	1 807E+14
0 1250	1 223E+14
0.2250	1 559E+14
0 3750	6 788E+13
0 5750	1 107E+15
0 8500	1.872E+13
1.2500	1 069E+13
1 7500	4.906E+11
2.2500	4.304E+07
2.7500	2 433E+07
3 5000	1 118E+05
5 0000	6.321E+03
7.0000	6 979E+02
11.0000	7 821E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 74E+02	3.48E+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 %	89 97773401	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		7,292.43	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		14,584.86	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 61	
Bounding	1.22	

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: RECH-1 (CHILE)
SNF ID #: 708
Fuel Units & Descr: 58 - MTR TYPE
Heavy Metal Mass: BOL=11 873kg, EOL=7 998kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1999
Estimates as of: 2010
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: 10 years

Estimated Canister usage 18"x10'
2 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	2 8404E-10	3,669 13	7,338 26	0 00E+00	1 04E-06	2 08E-06
Am-241	1 4935E-03	3,669 13	7,338 26	0 00E+00	5 48E+00	1 10E+01
Am-242m	4 4390E-07	3,669 13	7,338 26	0 00E+00	1 63E-03	3 26E-03
Am-243	1 4913E-06	3,669 13	7,338 26	0 00E+00	5 47E-03	1 09E-02
C-14	5 7217E-09	3,669 13	7,338 26	0 00E+00	2.10E-05	4.20E-05
Cl-36	1 3124E-32	3,669 13	7,338 26	0 00E+00	4 82E-29	9 63E-29
Cm-243	2 0967E-07	3,669 13	7,338 26	0 00E+00	7.69E-04	1 54E-03
Cm-244	4 3001E-05	3,669 13	7,338 26	0 00E+00	1 58E-01	3 16E-01
Co-60	1 9798E-05	3,669 13	7,338 26	0 00E+00	7.26E-02	1 45E-01
Cs-134	9 0795E-02	3,669 13	7,338 26	0 00E+00	3 33E+02	6 66E+02
Cs-135	3 4477E-06	3,669 13	7,338 26	0 00E+00	1.27E-02	2 53E-02
Cs-137	2 5588E+00	3,669 13	7,338 26	0 00E+00	9 39E+03	1 88E+04
Eu-154	5 4847E-02	3,669 13	7,338 26	0 00E+00	2 01E+02	4 02E+02
Eu-155	1 9469E-02	3,669 13	7,338 26	0 00E+00	7 14E+01	1 43E+02
Fe-55	1 7797E-03	3 669 13	7,338 26	0 00E+00	6 53E+00	1 31E+01
H-3	8 0065E-03	3,669 13	7,338 26	0 00E+00	2 94E+01	5 88E+01
I-129	7 5300E-07	3,669 13	7,338 26	0 00E+00	2.76E-03	5 53E-03
Kr-85	2 0705E-01	3,669 13	7,338 26	0 00E+00	7 60E+02	1 52E+03
Np-237	9 5507E-06	3,669 13	7,338 26	0 00E+00	3 50E-02	7 01E-02
Pa-231	1 2740E-09	3,669 13	7,338 26	0 00E+00	4 67E-06	9 35E-06
Pb-210	1 1838E-11	3,669 13	7,338 26	0 00E+00	4 34E-08	8 69E-08
Pm-147	6 7974E-01	3,669 13	7,338 26	0 00E+00	2 49E+03	4 99E+03
Pu-238	1 9755E-02	3,669 13	7,338 26	0 00E+00	7.25E+01	1 45E+02
Pu-239	4 2838E-04	3,669 13	7,338 26	0 00E+00	1 57E+00	3 14E+00
Pu-240	2 4390E-04	3,669 13	7,338 26	0 00E+00	8.95E-01	1 79E+00
Pu-241	5 4058E-02	3,669 13	7,338.26	0 00E+00	1 98E+02	3 97E+02
Pu-242	3 6329E-07	3,669 13	7,338 26	0 00E+00	1.33E-03	2 67E-03
Ra-226	8 3742E-11	3,669 13	7,338.26	0 00E+00	3 07E-07	6 15E-07
Ra-228	5 7734E-15	3,669 13	7,338 26	0 00E+00	2.12E-11	4 24E-11
Ru-106	6 1356E-03	3 669 13	7,338 26	0 00E+00	2 25E+01	4 50E+01
Se-79	1 2936E-05	3,669 13	7,338.26	0 00E+00	4.75E-02	9 49E-02
Sn-126	1 1574E-05	3 669 13	7,338.26	0 00E+00	4.25E-02	8 49E-02
Sr-90	2 4417E+00	3,669 13	7,338.26	0 00E+00	8 96E+03	1 79E+04
Tc-99	4 2239E-04	3,669 13	7,338.26	0 00E+00	1 55E+00	3 10E+00
Th-229	2 8568E-12	3,669 13	7,338.26	0 00E+00	1 05E-08	2 10E-08
Th-230	2 5310E-08	3,669 13	7,338.26	0 00E+00	9 29E-05	1 86E-04
Th-232	1 1631E-14	3,669.13	7,338.26	0 00E+00	4.27E-11	8 54E-11
Tl-208	4 6705E-08	3,669.13	7,338.26	0 00E+00	1.71E-04	3 43E-04
U-232	1 3151E-07	3,669.13	7,338.26	0 00E+00	4 83E-04	9 65E-04
U-233	2 1650E-09	3,669.13	7,338.26	0 00E+00	7 94E-06	1 59E-05
U-234	1 8399E-04	3,669.13	7,338.26	0 00E+00	6 75E-01	1.35E+00
U-235	-2.7235E-06	3,669.13	0 00	2 05E-02	1 05E-02	2 05E-02
U-236	1 5493E-05	3,669.13	7,338.26	0 00E+00	5 68E-02	1.14E-01
U-238	-4 2851E-09	3,669 13	0 00	7 98E-04	7 83E-04	7 98E-04
Y-90	2 4423E+00	3,669 13	7,338.26	0 00E+00	8 96E+03	1.79E+04
Other Radionuclides					9 12E+03	1 82E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	9 980E+14
0 0250	2 100E+14
0 0375	1 831E+14
0 0575	1 934E+14
0 0850	1 177E+14
0 1250	8 233E+13
0.2250	1 011E+14
0 3750	4 530E+13
0 5750	7 354E+14
0 8500	3 587E+13
1.2500	1 168E+13
1 7500	4 263E+11
2.2500	2.818E+10
2 7500	3 933E+08
3 5000	4 682E+07
5 0000	3 891E+03
7 0000	4 323E+02
11 0000	4 864E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 16E+02	2.32E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences[1]
Reactor Moderator	LIGHT WATER	LIGHT WATER	
Fuel Cladding	ALUM	ALUM	
BOL HM Constituents	U	U	
BOL Enrichment %	79 9939132	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		3,669 13	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		7,338.26	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 98		1 03
Bounding	1 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 RHF (FRANCE)
SNF ID # 179
Fuel Units & Descr: 4 - 2 CONCENTRIC TUBES
Heavy Metal Mass: BOL=36 9kg, EOL=25.51kg
ROD Storage Site SRS

[1]Fuel decay start date: 1989
Estimates as of: 2010
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 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	6 6313E-10	10,786 55	21,573 10	0 00E+00	7 15E-06	1 43E-05
Am-241	2 0060E-03	10,786 55	21,573 10	0 00E+00	2 16E+01	4.33E+01
Am-242m	4 2429E-07	10,786 55	21,573 10	0 00E+00	4 58E-03	9 15E-03
Am-243	1 4899E-06	10,786 55	21,573 10	0 00E+00	1 61E-02	3 21E-02
C-14	5 7135E-09	10,786 55	21,573 10	0 00E+00	6 16E-05	1 23E-04
Cl-36	1 3124E-32	10,786 55	21,573 10	0 00E+00	1 42E-28	2 83E-28
Cm-243	1 6443E-07	10,786 55	21,573 10	0 00E+00	1.77E-03	3 55E-03
Cm-244	2 9330E-05	10,786.55	21,573 10	0 00E+00	3.16E-01	6 33E-01
Co-60	5 3186E-06	10,786 55	21,573.10	0 00E+00	5.74E-02	1.15E-01
Cs-134	3 1563E-03	10,786 55	21,573 10	0 00E+00	3 40E+01	6 81E+01
Cs-135	3 4477E-06	10,786 55	21,573 10	0 00E+00	3 72E-02	7.44E-02
Cs-137	2.0313E+00	10,786 55	21,573 10	0 00E+00	2 19E+04	4.38E+04
Eu-154	2 4513E-02	10,786 55	21,573 10	0 00E+00	2 64E+02	5.29E+02
Eu-155	4 8175E-03	10,786 55	21,573 10	0 00E+00	5.20E+01	1 04E+02
Fe-55	1.2397E-04	10,786 55	21,573 10	0.00E+00	1 34E+00	2 67E+00
H-3	4 5697E-03	10,786 55	21,573 10	0 00E+00	4 93E+01	9 86E+01
I-129	7 5300E-07	10,786 55	21,573 10	0 00E+00	8 12E-03	1 62E-02
Kr-85	1 0850E-01	10,786 55	21,573 10	0 00E+00	1 17E+03	2 34E+03
Np-237	9 5561E-06	10,786.55	21,573 10	0 00E+00	1.03E-01	2 06E-01
Pa-231	2 0359E-09	10,786.55	21,573.10	0 00E+00	2.20E-05	4.39E-05
Pb-210	4 9728E-11	10,786 55	21,573.10	0 00E+00	5.36E-07	1.07E-06
Pm-147	4 8502E-02	10,786 55	21,573.10	0 00E+00	5 23E+02	1.05E+03
Pu-238	1.8254E-02	10,786 55	21,573 10	0 00E+00	1.97E+02	3 94E+02
Pu-239	4.2810E-04	10,786 55	21,573 10	0 00E+00	4 62E+00	9.24E+00
Pu-240	2 4368E-04	10,786 55	21,573 10	0 00E+00	2 63E+00	5.26E+00
Pu-241	3 3415E-02	10,786 55	21,573 10	0 00E+00	3 60E+02	7.21E+02
Pu-242	3 6329E-07	10,786 55	21,573 10	0 00E+00	3 92E-03	7 84E-03
Ra-226	2 2854E-10	10,786 55	21,573 10	0.00E+00	2 47E-06	4 93E-06
Ra-228	1 2426E-14	10,786 55	21,573 10	0 00E+00	1.34E-10	2 68E-10
Ru-106	6 3589E-06	10,786 55	21,573 10	0 00E+00	6 86E-02	1.37E-01
Se-79	1 2933E-05	10,786 55	21,573 10	0 00E+00	1.40E-01	2.79E-01
Sn-126	1 1574E-05	10,786 55	21,573.10	0 00E+00	1.25E-01	2.50E-01
Sr-90	1 9248E+00	10,786 55	21,573 10	0 00E+00	2 08E+04	4 15E+04
Tc-99	4.2239E-04	10,786 55	21,573 10	0 00E+00	4 56E+00	9 11E+00
Th-229	5 0953E-12	10,786 55	21,573 10	0 00E+00	5 50E-08	1 10E-07
Th-230	4 1885E-08	10,786 55	21,573 10	0 00E+00	4 52E-04	9 04E-04
Th-232	1.9270E-14	10,786 55	21,573 10	0 00E+00	2 08E-10	4 16E-10
Tl-208	4 6024E-08	10,786 55	21,573 10	0 00E+00	4 96E-04	9 93E-04
U-232	1.2582E-07	10,786 55	21,573 10	0.00E+00	1 36E-03	2 71E-03
U-233	2 5825E-09	10,786 55	21,573 10	0 00E+00	2 79E-05	5.57E-05
U-234	1 8450E-04	10,786 55	21,573 10	0 00E+00	1 99E+00	3 98E+00
U-235	-2.7235E-06	10,786 55	0 00	7.41E-02	4.48E-02	7.41E-02
U-236	1 5493E-05	10,786.55	21,573 10	0 00E+00	1 67E-01	3.34E-01
U-238	-4.2851E-09	10,786.55	0 00	8 72E-04	8.26E-04	8 72E-04
Y-90	1 9254E+00	10,786 55	21,573 10	0 00E+00	2 08E+04	4.15E+04
Other Radionuclides					2.09E+04	4 17E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.277E+15
0 0250	4 735E+14
0.0375	4 130E+14
0 0575	4 424E+14
0 0850	2 673E+14
0 1250	1 809E+14
0.2250	2.307E+14
0 3750	1 004E+14
0.5750	1 638E+15
0 8500	2.769E+13
1.2500	1.581E+13
1 7500	7.257E+11
2.2500	6.366E+07
2.7500	3.599E+07
3.5000	1 653E+05
5.0000	9 347E+03
7.0000	1 032E+03
11.0000	1 157E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.57E+02	5 14E+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 %	92.97	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal		10,786.55	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		21,573 10	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 93	
Bounding	1 86	

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: RINSC
SNF ID #: 181
Fuel Units & Descr: 44 - 18 FLAT PLATES
Heavy Metal Mass: BOL=61 12kg; EOL=60 465kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2035
Estimates as of: 2010
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 5 years

Estimated Canister usage: 18"x10' 1 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	1 4545E-10	620 87	1,241.73	0 00E+00	9 03E-08	1 81E-07
Am-241	1 1190E-03	620 87	1,241.73	0 00E+00	6 95E-01	1 39E+00
Am-242m	4 5425E-07	620 87	1,241.73	0 00E+00	2 82E-04	5 64E-04
Am-243	1 4921E-06	620 87	1,241.73	0 00E+00	9 26E-04	1 85E-03
C-14	5 7244E-09	620 87	1,241.73	0 00E+00	3 55E-06	7 11E-06
Cl-36	1 3124E-32	620 87	1,241.73	0 00E+00	8 15E-30	1 63E-29
Cm-243	2 3676E-07	620 87	1,241.73	0 00E+00	1 47E-04	2 94E-04
Cm-244	5 2042E-05	620 87	1,241.73	0 00E+00	3 23E-02	6 46E-02
Co-60	3 8208E-05	620 87	1,241.73	0 00E+00	2 37E-02	4 74E-02
Cs-134	4 8693E-01	620 87	1,241.73	0 00E+00	3 02E+02	6 05E+02
Cs-135	3 4477E-06	620 87	1,241.73	0 00E+00	2.14E-03	4 28E-03
Cs-137	2 8731E+00	620 87	1,241.73	0 00E+00	1 78E+03	3 57E+03
Eu-154	8 2053E-02	620 87	1,241.73	0 00E+00	5 09E+01	1 02E+02
Eu-155	3 9134E-02	620 87	1,241.73	0 00E+00	2.43E+01	4 86E+01
Fe-55	6 7429E-03	620 87	1,241.73	0 00E+00	4 19E+00	8 37E+00
H-3	1 0599E-02	620 87	1,241.73	0 00E+00	6.58E+00	1 32E+01
I-129	7 5300E-07	620 87	1,241.73	0 00E+00	4 68E-04	9 35E-04
Kr-85	2 8595E-01	620 87	1,241.73	0 00E+00	1 78E+02	3 55E+02
Np-237	9 5479E-06	620 87	1,241.73	0 00E+00	5 93E-03	1 19E-02
Pa-231	8 9297E-10	620 87	1,241.73	0 00E+00	5 54E-07	1 11E-06
Pb-210	3 7609E-12	620 87	1,241.73	0 00E+00	2 34E-09	4 67E-09
Pm-147	2 5452E+00	620 87	1,241 73	0 00E+00	1.58E+03	3 16E+03
Pu-238	2 0550E-02	620 87	1,241.73	0 00E+00	1.28E+01	2 55E+01
Pu-239	4 2838E-04	620 87	1,241 73	0 00E+00	2 66E-01	5 32E-01
Pu-240	2 4401E-04	620 87	1,241 73	0 00E+00	1 51E-01	3 03E-01
Pu-241	6 8764E-02	620 87	1,241 73	0 00E+00	4.27E+01	8 54E+01
Pu-242	3 6329E-07	620 87	1,241 73	0 00E+00	2.26E-04	4 51E-04
Ra-226	3 8045E-11	620 87	1,241 73	0 00E+00	2 36E-08	4 72E-08
Ra-228	2 9902E-15	620 87	1,241 73	0 00E+00	1 86E-12	3 71E-12
Ru-106	1 9055E-01	620 87	1,241 73	0 00E+00	1 18E+02	2.37E+02
Se-79	1 2936E-05	620 87	1,241 73	0 00E+00	8 03E-03	1 61E-02
Sn-126	1 1574E-05	620 87	1,241 73	0 00E+00	7.19E-03	1 44E-02
Sr-90	2 7505E+00	620 87	1,241 73	0 00E+00	1 71E+03	3 42E+03
Tc-99	4 2239E-04	620 87	1,241 73	0 00E+00	2.62E-01	5 24E-01
Th-229	1 8848E-12	620 87	1,241 73	0 00E+00	1.17E-09	2 34E-09
Th-230	1 7042E-08	620 87	1,241.73	0 00E+00	1 06E-05	2 12E-05
Th-232	7 8132E-15	620 87	1,241 73	0 00E+00	4 85E-12	9 70E-12
Tl-208	4 4063E-08	620 87	1,241 73	0 00E+00	2.74E-05	5 47E-05
U-232	1 3151E-07	620 87	1,241 73	0 00E+00	8.16E-05	1 63E-04
U-233	1 9564E-09	620 87	1,241 73	0 00E+00	1.21E-06	2 43E-06
U-234	1 8371E-04	620 87	1,241 73	0 00E+00	1.14E-01	2 28E-01
U-235	-2 7235E-06	620 87	0 00	2 61E-02	2.44E-02	2 61E-02
U-236	1 5493E-05	620 87	1,241 73	0 00E+00	9 62E-03	1 92E-02
U-238	-4 2851E-09	620 87	0 00	1 65E-02	1.65E-02	1 65E-02
Y-90	2.7505E+00	620 87	1,241 73	0 00E+00	1 71E+03	3 42E+03
Other Radionuclides					3 19E+03	6.39E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.396E+14
0 0250	5 161E+13
0 0375	4 763E+13
0 0575	4 683E+13
0 0850	2 985E+13
0 1250	2 585E+13
0.2250	2.530E+13
0 3750	1.225E+13
0 5750	1 682E+14
0 8500	2.356E+13
1.2500	4.383E+12
1 7500	1 838E+11
2.2500	3.855E+11
2.7500	2.218E+09
3 5000	2 460E+08
5 0000	7 735E+02
7 0000	8 636E+01
11 0000	9 745E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 15E+01	6.30E+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 7728395	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		620 87
Bounding		1,241 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 03	
Bounding	0 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: RINSC
SNF ID #: 180
Fuel Units & Descr: 70 - 18 FLAT PLATES
Heavy Metal Mass BOL=9 366kg EOL=8 498kg
ROD Storage Site SRS

[1]Fuel decay start date 1992
Estimates as of 2010
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: 15 years

Estimated Canister usage 18"x10' 1 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 5861E-10	822 01	1,644 03	0 00E+00	3 77E-07	7 54E-07
Am-241	1 7832E-03	822 01	1,644 03	0 00E+00	1 47E+00	2 93E+00
Am-242m	4 3410E-07	822.01	1,644 03	0 00E+00	3 57E-04	7 14E-04
Am-243	1 4907E-06	822.01	1,644 03	0 00E+00	1 23E-03	2 45E-03
C-14	5 7162E-09	822 01	1,644 03	0 00E+00	4 70E-06	9 40E-06
Cl-36	1.3124E-32	822 01	1,644 03	0 00E+00	1 08E-29	2.16E-29
Cm-243	1.8568E-07	822 01	1,644 03	0 00E+00	1 53E-04	3 05E-04
Cm-244	3 5512E-05	822 01	1,644 03	0 00E+00	2 92E-02	5 84E-02
Co-60	1 0261E-05	822 01	1,644 03	0 00E+00	8 44E-03	1 69E-02
Cs-134	1 6931E-02	822 01	1,644 03	0 00E+00	1.39E+01	2 78E+01
Cs-135	3 4477E-06	822 01	1,644 03	0 00E+00	2 83E-03	5 67E-03
Cs-137	2 2800E+00	822 01	1,644 03	0 00E+00	1 87E+03	3 75E+03
Eu-154	3 6656E-02	822 01	1,644 03	0 00E+00	3 01E+01	6 03E+01
Eu-155	9 6841E-03	822.01	1,644 03	0 00E+00	7 96E+00	1 59E+01
Fe-55	4 6977E-04	822.01	1,644 03	0 00E+00	3 86E-01	7.72E-01
H-3	6 0485E-03	822 01	1,644 03	0 00E+00	4 97E+00	9 94E+00
I-129	7.5300E-07	822 01	1,644 03	0 00E+00	6 19E-04	1.24E-03
Kr-85	1 4989E-01	822 01	1,644 03	0 00E+00	1 23E+02	2 46E+02
Np-237	9 5534E-06	822 01	1,644 03	0 00E+00	7 85E-03	1.57E-02
Pa-231	1 6550E-09	822 01	1,644 03	0 00E+00	1.36E-06	2 72E-06
Pb-210	2 6631E-11	822 01	1,644 03	0 00E+00	2.19E-08	4 38E-08
Pm-147	1 8156E-01	822 01	1,644 03	0 00E+00	1.49E+02	2 98E+02
Pu-238	1 8990E-02	822 01	1,644 03	0 00E+00	1.56E+01	3 12E+01
Pu-239	4 2838E-04	822 01	1,644 03	0 00E+00	3 52E-01	7 04E-01
Pu-240	2 4379E-04	822.01	1,644 03	0 00E+00	2 00E-01	4 01E-01
Pu-241	4.2511E-02	822.01	1,644 03	0 00E+00	3 49E+01	6 99E+01
Pu-242	3 6329E-07	822 01	1,644 03	0 00E+00	2 99E-04	5.97E-04
Ra-226	1 4725E-10	822 01	1,644 03	0 00E+00	1.21E-07	2.42E-07
Ra-228	8 9760E-15	822 01	1,644 03	0 00E+00	7.38E-12	1.48E-11
Ru-106	1.9752E-04	822 01	1,644 03	0 00E+00	1 62E-01	3.25E-01
Se-79	1.2933E-05	822 01	1,644 03	0 00E+00	1.06E-02	2.13E-02
Sn-126	1 1574E-05	822 01	1,644 03	0.00E+00	9 51E-03	1 90E-02
Sr-90	2.1680E+00	822 01	1,644 03	0 00E+00	1.78E+03	3 56E+03
Tc-99	4 2239E-04	822 01	1,644 03	0 00E+00	3 47E-01	6 94E-01
Th-229	3 9270E-12	822 01	1,644 03	0 00E+00	3 23E-09	6 46E-09
Th-230	3 3578E-08	822.01	1,644 03	0 00E+00	2 76E-05	5 52E-05
Th-232	1.5452E-14	822.01	1,644 03	0 00E+00	1 27E-11	2.54E-11
Tl-208	4 6705E-08	822.01	1,644 03	0 00E+00	3 84E-05	7.68E-05
U-232	1.3045E-07	822 01	1,644 03	0 00E+00	1.07E-04	2.14E-04
U-233	2.3739E-09	822 01	1,644 03	0 00E+00	1.95E-06	3 90E-06
U-234	1 8423E-04	822 01	1,644 03	0.00E+00	1.51E-01	3 03E-01
U-235	-2 7235E-06	822 01	0.00	1 89E-02	1.66E-02	1 89E-02
U-236	1 5493E-05	822 01	1,644 03	0 00E+00	1.27E-02	2 55E-02
U-238	-4.2851E-09	822 01	0 00	2 16E-04	2 13E-04	2 16E-04
Y-90	2 1686E+00	822 01	1,644 03	0 00E+00	1 78E+03	3 57E+03
Other Radionuclides					1 79E+03	3 58E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 961E+14
0 0250	4 090E+13
0 0375	3 571E+13
0 0575	3 808E+13
0 0850	2.307E+13
0 1250	1.581E+13
0.2250	1 987E+13
0.3750	8 706E+12
0.5750	1 413E+14
0 8500	3.357E+12
1.2500	1 696E+12
1 7500	7 105E+10
2.2500	8 888E+07
2 7500	5 342E+06
3 5000	3 395E+05
5 0000	7 858E+02
7.0000	8 703E+01
11.0000	9 772E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.22E+01	4 45E+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 13598185	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		822 01	Nominal burnup calculated from the heavy metal mass destroyed
Bounding	37 46	1 644 03	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 28	
Bounding	0 56	43.88

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: RPI (UALX-LEU) PORTUGAL
SNF ID #: 943
Fuel Units & Descr: 39 - ASSEMBLY
Heavy Metal Mass: BOL=30 381kg, EOL=29.23kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1998
Estimates as of: 2010
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: 10 years

Estimated Canister usage 18"x10' 1 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 8404E-10	1,089 55	2,179 09	0 00E+00	3 09E-07	6 19E-07
Am-241	1 4935E-03	1,089 55	2,179 09	0 00E+00	1 63E+00	3 25E+00
Am-242m	4 4390E-07	1,089 55	2,179 09	0 00E+00	4 84E-04	9 67E-04
Am-243	1 4913E-06	1,089 55	2,179 09	0 00E+00	1 62E-03	3 25E-03
C-14	5 7217E-09	1,089 55	2,179 09	0 00E+00	6 23E-06	1 25E-05
Cl-36	1.3124E-32	1,089 55	2,179 09	0 00E+00	1 43E-29	2 86E-29
Cm-243	2 0967E-07	1,089 55	2,179 09	0 00E+00	2.28E-04	4 57E-04
Cm-244	4 3001E-05	1,089 55	2,179 09	0 00E+00	4 69E-02	9 37E-02
Co-60	1 9798E-05	1,089 55	2,179 09	0 00E+00	2.16E-02	4 31E-02
Cs-134	9 0795E-02	1,089 55	2,179 09	0 00E+00	9 89E+01	1 98E+02
Cs-135	3 4477E-06	1,089 55	2,179 09	0 00E+00	3.76E-03	7 51E-03
Cs-137	2 5588E+00	1,089 55	2,179 09	0 00E+00	2 79E+03	5 58E+03
Eu-154	5 4847E-02	1,089 55	2,179 09	0 00E+00	5 98E+01	1.20E+02
Eu-155	1 9469E-02	1,089.55	2,179 09	0 00E+00	2 12E+01	4.24E+01
Fe-55	1 7797E-03	1,089.55	2,179 09	0 00E+00	1 94E+00	3 88E+00
H-3	8 0065E-03	1,089 55	2,179 09	0 00E+00	8 72E+00	1 74E+01
I-129	7 5300E-07	1,089 55	2,179 09	0 00E+00	8 20E-04	1 64E-03
Kr-85	2 0705E-01	1,089 55	2,179 09	0 00E+00	2 26E+02	4 51E+02
Np-237	9 5507E-06	1,089 55	2,179 09	0 00E+00	1 04E-02	2.08E-02
Pa-231	1 2740E-09	1,089 55	2,179 09	0 00E+00	1 39E-06	2.78E-06
Pb-210	1 1838E-11	1,089 55	2,179 09	0 00E+00	1 29E-08	2.58E-08
Pm-147	6 7974E-01	1,089 55	2,179 09	0 00E+00	7 41E+02	1 48E+03
Pu-238	1 9755E-02	1,089 55	2,179 09	0 00E+00	2.15E+01	4 30E+01
Pu-239	4 2838E-04	1,089 55	2,179 09	0 00E+00	4 67E-01	9 33E-01
Pu-240	2 4390E-04	1,089 55	2,179 09	0 00E+00	2 66E-01	5 31E-01
Pu-241	5 4058E-02	1,089 55	2,179.09	0 00E+00	5 89E+01	1 18E+02
Pu-242	3 6329E-07	1,089 55	2,179 09	0 00E+00	3 96E-04	7 92E-04
Ra-226	8.3742E-11	1,089 55	2,179 09	0 00E+00	9.12E-08	1 82E-07
Ra-228	5.7734E-15	1,089 55	2,179 09	0 00E+00	6.29E-12	1 26E-11
Ru-106	6.1356E-03	1,089 55	2,179 09	0 00E+00	6 69E+00	1 34E+01
Se-79	1.2936E-05	1,089 55	2,179 09	0 00E+00	1 41E-02	2 82E-02
Sn-126	1.1574E-05	1,089.55	2,179 09	0 00E+00	1.26E-02	2 52E-02
Sr-90	2 4417E+00	1,089.55	2,179 09	0 00E+00	2 66E+03	5.32E+03
Tc-99	4.2239E-04	1,089.55	2,179 09	0 00E+00	4 60E-01	9.20E-01
Th-229	2 8568E-12	1,089.55	2,179 09	0 00E+00	3 11E-09	6.23E-09
Th-230	2 5310E-08	1,089 55	2,179 09	0 00E+00	2 76E-05	5 52E-05
Th-232	1 1631E-14	1,089 55	2,179 09	0 00E+00	1 27E-11	2.53E-11
Tl-208	4 6705E-08	1,089 55	2,179 09	0 00E+00	5 09E-05	1.02E-04
U-232	1 3151E-07	1,089 55	2,179 09	0 00E+00	1 43E-04	2.87E-04
U-233	2 1650E-09	1,089 55	2,179 09	0 00E+00	2 36E-06	4.72E-06
U-234	1 8399E-04	1,089 55	2,179 09	0 00E+00	2 00E-01	4 01E-01
U-235	-2.7235E-06	1,089 55	0.00	1.30E-02	1 01E-02	1.30E-02
U-236	1 5493E-05	1,089 55	2,179 09	0 00E+00	1 69E-02	3.38E-02
U-238	-4 2851E-09	1,089 55	0.00	8.19E-03	8 18E-03	8.19E-03
Y-90	2 4423E+00	1,089 55	2,179 09	0 00E+00	2 66E+03	5 32E+03
Other Radionuclides					2 71E+03	5 42E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2 964E+14
0 0250	6.237E+13
0 0375	5 438E+13
0.0575	5 744E+13
0 0850	3.495E+13
0 1250	2.445E+13
0.2250	3 001E+13
0 3750	1.345E+13
0 5750	2 184E+14
0 8500	1 065E+13
1.2500	3 467E+12
1 7500	1.266E+11
2.2500	8.369E+09
2.7500	1 168E+08
3 5000	1 390E+07
5 0000	1 174E+03
7 0000	1 305E+02
11 0000	1 469E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.45E+01	6 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 %	19 83094182	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		1 089 55
Bounding		2 179 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 11	
Bounding	0 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 RSG-GAS (U308 LEU) INDONESIA
SNF ID #. 288
Fuel Units & Descr: 47 - ASSEMBLY
Heavy Metal Mass: BOL=56 188kg, EOL=51 479kg
ROD Storage Site SRS

[1]Fuel decay start date 1999
Estimates as of 2010
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 10 years

Estimated Canister usage
18"x10'
1 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	2 8404E-10	4,459 89	8,919 79	0 00E+00	1.27E-06	2 53E-06
Am-241	1 4935E-03	4,459 89	8,919 79	0 00E+00	6 66E+00	1 33E+01
Am-242m	4 4390E-07	4,459 89	8,919 79	0 00E+00	1.98E-03	3 96E-03
Am-243	1 4913E-06	4,459 89	8,919 79	0 00E+00	6 65E-03	1.33E-02
C-14	5 7217E-09	4,459 89	8,919 79	0 00E+00	2.55E-05	5 10E-05
Cl-36	1.3124E-32	4,459 89	8,919 79	0 00E+00	5 85E-29	1 17E-28
Cm-243	2 0967E-07	4,459 89	8,919 79	0 00E+00	9 35E-04	1 87E-03
Cm-244	4 3001E-05	4,459 89	8,919.79	0 00E+00	1 92E-01	3 84E-01
Co-60	1.9798E-05	4,459 89	8,919 79	0 00E+00	8 83E-02	1 77E-01
Cs-134	9 0795E-02	4,459 89	8,919 79	0 00E+00	4 05E+02	8 10E+02
Cs-135	3 4477E-06	4,459 89	8,919 79	0 00E+00	1 54E-02	3 08E-02
Cs-137	2 5588E+00	4,459 89	8,919 79	0 00E+00	1 14E+04	2 28E+04
Eu-154	5.4847E-02	4,459 89	8,919 79	0 00E+00	2 45E+02	4 89E+02
Eu-155	1 9469E-02	4,459 89	8,919 79	0 00E+00	8 68E+01	1 74E+02
Fe-55	1 7797E-03	4,459 89	8,919 79	0 00E+00	7 94E+00	1 59E+01
H-3	8 0065E-03	4,459 89	8,919 79	0 00E+00	3 57E+01	7 14E+01
I-129	7 5300E-07	4,459 89	8,919 79	0 00E+00	3 36E-03	6 72E-03
Kr-85	2 0705E-01	4,459 89	8,919 79	0 00E+00	9 23E+02	1.85E+03
Np-237	9 5507E-06	4,459 89	8,919 79	0 00E+00	4.26E-02	8 52E-02
Pa-231	1.2740E-09	4,459 89	8,919 79	0 00E+00	5 68E-06	1 14E-05
Pb-210	1 1838E-11	4,459 89	8,919 79	0 00E+00	5.28E-08	1 06E-07
Pm-147	6 7974E-01	4,459 89	8,919 79	0 00E+00	3 03E+03	6 06E+03
Pu-238	1 9755E-02	4,459 89	8,919.79	0 00E+00	8 81E+01	1 76E+02
Pu-239	4.2838E-04	4,459 89	8,919 79	0 00E+00	1 91E+00	3 82E+00
Pu-240	2.4390E-04	4,459 89	8,919 79	0 00E+00	1 09E+00	2 18E+00
Pu-241	5 4058E-02	4,459 89	8,919 79	0 00E+00	2 41E+02	4 82E+02
Pu-242	3 6329E-07	4,459 89	8,919 79	0 00E+00	1 62E-03	3.24E-03
Ra-226	8 3742E-11	4,459 89	8,919 79	0 00E+00	3 73E-07	7 47E-07
Ra-228	5 7734E-15	4,459 89	8,919 79	0 00E+00	2 57E-11	5 15E-11
Ru-106	6 1356E-03	4,459 89	8,919 79	0 00E+00	2 74E+01	5 47E+01
Se-79	1.2936E-05	4,459 89	8,919 79	0 00E+00	5 77E-02	1 15E-01
Sn-126	1 1574E-05	4,459 89	8,919 79	0 00E+00	5.16E-02	1 03E-01
Sr-90	2 4417E+00	4,459 89	8,919 79	0 00E+00	1 09E+04	2.18E+04
Tc-99	4.2239E-04	4,459 89	8,919 79	0 00E+00	1 88E+00	3 77E+00
Th-229	2 8568E-12	4,459 89	8,919 79	0 00E+00	1.27E-08	2 55E-08
Th-230	2.5310E-08	4,459 89	8,919 79	0 00E+00	1 13E-04	2 26E-04
Th-232	1.1631E-14	4,459 89	8,919 79	0 00E+00	5 19E-11	1 04E-10
Tl-208	4 6705E-08	4,459 89	8,919 79	0 00E+00	2 08E-04	4 17E-04
U-232	1.3151E-07	4,459 89	8,919 79	0 00E+00	5 87E-04	1.17E-03
U-233	2 1650E-09	4,459 89	8,919 79	0 00E+00	9 66E-06	1.93E-05
U-234	1 8399E-04	4,459 89	8,919 79	0 00E+00	8 21E-01	1 64E+00
U-235	-2 7235E-06	4,459 89	0 00	2.39E-02	1 18E-02	2.39E-02
U-236	1.5493E-05	4,459 89	8,919 79	0.00E+00	6 91E-02	1.38E-01
U-238	-4.2851E-09	4,459 89	0 00	1.52E-02	1.51E-02	1 52E-02
Y-90	2 4423E+00	4,459 89	8,919 79	0 00E+00	1 09E+04	2 18E+04
Other Radionuclides					1 11E+04	2.22E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.213E+15
0 0250	2.553E+14
0 0375	2.226E+14
0 0575	2.351E+14
0 0850	1 431E+14
0 1250	1 001E+14
0.2250	1.229E+14
0.3750	5 506E+13
0 5750	8 939E+14
0 8500	4 360E+13
1.2500	1 419E+13
1 7500	5 182E+11
2.2500	3 426E+10
2.7500	4 780E+08
3.5000	5 691E+07
5.0000	4 762E+03
7.0000	5.293E+02
11 0000	5 955E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.41E+02	2.82E+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 68299334	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		4,459 89
Bounding		8 919 79

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: RU-1 (UALX LEU) URAGUAY
SNF ID #: 557
Fuel Units & Descr: 4 - ASSEMBLY
Heavy Metal Mass: BOL=2 112kg, EOL=2.11kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1998
Estimates as of: 2010
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: 10 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	2 8404E-10	1 89	3 79	0 00E+00	5 38E-10	1 08E-09
Am-241	1 4935E-03	1 89	3 79	0 00E+00	2 83E-03	5 66E-03
Am-242m	4 4390E-07	1 89	3 79	0 00E+00	8 41E-07	1 68E-06
Am-243	1 4913E-06	1 89	3 79	0 00E+00	2 82E-06	5 65E-06
C-14	5 7217E-09	1 89	3 79	0 00E+00	1.08E-08	2.17E-08
Cl-36	1 3124E-32	1 89	3.79	0 00E+00	2.49E-32	4 97E-32
Cm-243	2 0967E-07	1 89	3.79	0 00E+00	3.97E-07	7 94E-07
Cm-244	4 3001E-05	1 89	3.79	0 00E+00	8.14E-05	1.63E-04
Co-60	1 9798E-05	1 89	3 79	0 00E+00	3.75E-05	7.50E-05
Cs-134	9 0795E-02	1 89	3 79	0 00E+00	1 72E-01	3.44E-01
Cs-135	3 4477E-06	1 89	3 79	0 00E+00	6 53E-06	1.31E-05
Cs-137	2 5588E+00	1 89	3 79	0 00E+00	4 85E+00	9 69E+00
Eu-154	5 4847E-02	1 89	3 79	0 00E+00	1 04E-01	2 08E-01
Eu-155	1 9469E-02	1 89	3 79	0 00E+00	3 69E-02	7 37E-02
Fe-55	1 7797E-03	1 89	3 79	0 00E+00	3 37E-03	6.74E-03
H-3	8 0065E-03	1 89	3 79	0 00E+00	1 52E-02	3 03E-02
I-129	7 5300E-07	1 89	3 79	0.00E+00	1 43E-06	2 85E-06
Kr-85	2 0705E-01	1 89	3 79	0 00E+00	3 92E-01	7 84E-01
Np-237	9 5507E-06	1 89	3 79	0.00E+00	1 81E-05	3 62E-05
Pa-231	1 2740E-09	1 89	3 79	0 00E+00	2 41E-09	4 83E-09
Pb-210	1 1838E-11	1 89	3 79	0 00E+00	2 24E-11	4 48E-11
Pm-147	6 7974E-01	1 89	3 79	0 00E+00	1 29E+00	2 57E+00
Pu-238	1 9755E-02	1 89	3 79	0 00E+00	3 74E-02	7 48E-02
Pu-239	4.2838E-04	1 89	3 79	0 00E+00	8 11E-04	1 62E-03
Pu-240	2 4390E-04	1 89	3 79	0 00E+00	4 62E-04	9 24E-04
Pu-241	5 4058E-02	1 89	3 79	0 00E+00	1 02E-01	2 05E-01
Pu-242	3 6329E-07	1 89	3 79	0 00E+00	6 88E-07	1 38E-06
Ra-226	8.3742E-11	1 89	3 79	0 00E+00	1 59E-10	3 17E-10
Ra-228	5.7734E-15	1 89	3 79	0 00E+00	1 09E-14	2.19E-14
Ru-106	6.1356E-03	1.89	3 79	0 00E+00	1.16E-02	2 32E-02
Se-79	1.2936E-05	1 89	3 79	0 00E+00	2 45E-05	4 90E-05
Sn-126	1 1574E-05	1 89	3 79	0 00E+00	2.19E-05	4 38E-05
Sr-90	2 4417E+00	1 89	3.79	0 00E+00	4 62E+00	9.25E+00
Tc-99	4.2239E-04	1 89	3.79	0 00E+00	8 00E-04	1 60E-03
Th-229	2 8568E-12	1 89	3.79	0 00E+00	5.41E-12	1 08E-11
Th-230	2 5310E-08	1 89	3.79	0 00E+00	4.79E-08	9.59E-08
Th-232	1 1631E-14	1 89	3 79	0 00E+00	2.20E-14	4.41E-14
Tl-208	4 6705E-08	1 89	3 79	0 00E+00	8 85E-08	1.77E-07
U-232	1 3151E-07	1 89	3 79	0 00E+00	2 49E-07	4.98E-07
U-233	2 1650E-09	1 89	3 79	0 00E+00	4 10E-09	8.20E-09
U-234	1 8399E-04	1 89	3 79	0 00E+00	3 48E-04	6 97E-04
U-235	-2.7235E-06	1 89	0 00	9 04E-04	8 99E-04	9.04E-04
U-236	1 5493E-05	1 89	3 79	0 00E+00	2 93E-05	5.87E-05
U-238	-4.2851E-09	1 89	0 00	5 69E-04	5 69E-04	5 69E-04
Y-90	2 4423E+00	1 89	3 79	0 00E+00	4 63E+00	9 25E+00
Other Radionuclides					4 71E+00	9 42E+00

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	5.152E+11
0 0250	1 084E+11
0 0375	9 453E+10
0 0575	9 986E+10
0 0850	6 076E+10
0 1250	4 250E+10
0.2250	5.219E+10
0.3750	2.338E+10
0 5750	3 796E+11
0.8500	1 852E+10
1.2500	6 027E+09
1 7500	2 201E+08
2.2500	1 455E+07
2 7500	2.030E+05
3.5000	2 417E+04
5 0000	3 324E+00
7 0000	3 745E-01
11.0000	4.251E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6 00E-02	1.20E-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 81060606	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	0 00	1 89
Bounding		3.79

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	448 40
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 RU-1 (UALX LEU) URAGUAY
SNF ID # 1073
Fuel Units & Descr 15 - ASSEMBLY
Heavy Metal Mass BOL=7 92kg, EOL=7 912kg
ROD Storage Site SRS

[1]Fuel decay start date 1998
Estimates as of: 2010
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 10 years

Estimated Canister usage
18"x10'
0 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	2 8404E-10	7 10	14.21	0 00E+00	2 02E-09	4 03E-09
Am-241	1 4935E-03	7 10	14.21	0 00E+00	1 06E-02	2 12E-02
Am-242m	4 4390E-07	7 10	14.21	0 00E+00	3 15E-06	6 31E-06
Am-243	1 4913E-06	7.10	14.21	0 00E+00	1 06E-05	2 12E-05
C-14	5 7217E-09	7.10	14.21	0 00E+00	4 06E-08	8 13E-08
Cl-36	1 3124E-32	7.10	14.21	0 00E+00	9 32E-32	1 86E-31
Cm-243	2 0967E-07	7.10	14 21	0 00E+00	1 49E-06	2 98E-06
Cm-244	4 3001E-05	7.10	14 21	0 00E+00	3 05E-04	6.11E-04
Co-60	1 9798E-05	7.10	14 21	0.00E+00	1.41E-04	2.81E-04
Cs-134	9 0795E-02	7 10	14 21	0.00E+00	6 45E-01	1.29E+00
Cs-135	3 4477E-06	7 10	14 21	0 00E+00	2 45E-05	4 90E-05
Cs-137	2.5588E+00	7 10	14.21	0 00E+00	1 82E+01	3 63E+01
Eu-154	5 4847E-02	7 10	14.21	0 00E+00	3 90E-01	7 79E-01
Eu-155	1 9469E-02	7 10	14.21	0 00E+00	1 38E-01	2 77E-01
Fe-55	1 7797E-03	7 10	14.21	0 00E+00	1 26E-02	2 53E-02
H-3	8 0065E-03	7 10	14.21	0 00E+00	5 69E-02	1 14E-01
I-129	7.5300E-07	7 10	14.21	0 00E+00	5 35E-06	1 07E-05
Kr-85	2 0705E-01	7.10	14.21	0 00E+00	1 47E+00	2 94E+00
Np-237	9 5507E-06	7.10	14.21	0 00E+00	6 78E-05	1.36E-04
Pa-231	1 2740E-09	7.10	14 21	0 00E+00	9 05E-09	1.81E-08
Pb-210	1 1838E-11	7 10	14 21	0 00E+00	8 41E-11	1.68E-10
Pm-147	6 7974E-01	7 10	14 21	0 00E+00	4 83E+00	9 66E+00
Pu-238	1 9755E-02	7 10	14 21	0 00E+00	1.40E-01	2.81E-01
Pu-239	4.2838E-04	7 10	14 21	0 00E+00	3 04E-03	6 09E-03
Pu-240	2 4390E-04	7 10	14.21	0 00E+00	1 73E-03	3 46E-03
Pu-241	5 4058E-02	7 10	14.21	0 00E+00	3 84E-01	7 68E-01
Pu-242	3.6329E-07	7 10	14.21	0 00E+00	2 58E-06	5 16E-06
Ra-226	8.3742E-11	7 10	14.21	0 00E+00	5 95E-10	1 19E-09
Ra-228	5 7734E-15	7 10	14.21	0 00E+00	4 10E-14	8 20E-14
Ru-106	6 1356E-03	7.10	14.21	0 00E+00	4.36E-02	8 72E-02
Se-79	1.2936E-05	7.10	14.21	0 00E+00	9 19E-05	1.84E-04
Sn-126	1 1574E-05	7.10	14 21	0 00E+00	8.22E-05	1.64E-04
Sr-90	2 4417E+00	7.10	14 21	0.00E+00	1 73E+01	3 47E+01
Tc-99	4 2239E-04	7.10	14 21	0 00E+00	3.00E-03	6 00E-03
Th-229	2 8568E-12	7 10	14 21	0 00E+00	2.03E-11	4 06E-11
Th-230	2 5310E-08	7 10	14 21	0 00E+00	1 80E-07	3 60E-07
Th-232	1 1631E-14	7 10	14.21	0 00E+00	8.26E-14	1 65E-13
Tl-208	4 6705E-08	7 10	14.21	0 00E+00	3 32E-07	6 63E-07
U-232	1.3151E-07	7.10	14.21	0 00E+00	9 34E-07	1 87E-06
U-233	2.1650E-09	7 10	14.21	0 00E+00	1 54E-08	3 08E-08
U-234	1.8399E-04	7 10	14.21	0 00E+00	1 31E-03	2 61E-03
U-235	-2 7235E-06	7.10	0 00	3 39E-03	3 37E-03	3.39E-03
U-236	1.5493E-05	7.10	14.21	0 00E+00	1.10E-04	2.20E-04
U-238	-4 2851E-09	7 10	0 00	2 13E-03	2.13E-03	2.13E-03
Y-90	2 4423E+00	7.10	14.21	0 00E+00	1 73E+01	3 47E+01
Other Radionuclides					1.77E+01	3.53E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.932E+12
0 0250	4 066E+11
0 0375	3.545E+11
0 0575	3 745E+11
0 0850	2.278E+11
0 1250	1.594E+11
0 2250	1 957E+11
0 3750	8 769E+10
0 5750	1 424E+12
0 8500	6 944E+10
1.2500	2.260E+10
1 7500	8.252E+08
2.2500	5 456E+07
2 7500	7 613E+05
3.5000	9 065E+04
5 0000	1.246E+01
7 0000	1.405E+00
11 0000	1.594E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.25E-01	4.50E-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 %	19 81060606	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	0 02	7.10
Bounding		14.21

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	0.00	448 40
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: RV-1 (UALX LEU) VENEZUELA
SNF ID #: 816
Fuel Units & Descr: 56 - MTR TYPE
Heavy Metal Mass: BOL=39 698kg; EOL=38 713kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1997
Estimates as of: 2010
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: 10 years

Estimated Canister usage: 18"x10": 2 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	2 8404E-10	933 38	1,866 76	0 00E+00	2 65E-07	5 30E-07
Am-241	1 4935E-03	933 38	1,866 76	0 00E+00	1 39E+00	2.79E+00
Am-242m	4 4390E-07	933 38	1,866 76	0 00E+00	4.14E-04	8 29E-04
Am-243	1 4913E-06	933 38	1,866 76	0 00E+00	1.39E-03	2 78E-03
C-14	5 7217E-09	933 38	1,866 76	0 00E+00	5.34E-06	1 07E-05
Cl-36	1.3124E-32	933 38	1,866 76	0 00E+00	1.22E-29	2 45E-29
Cm-243	2 0967E-07	933 38	1,866 76	0 00E+00	1 96E-04	3 91E-04
Cm-244	4.3001E-05	933 38	1,866 76	0 00E+00	4 01E-02	8 03E-02
Co-60	1 9798E-05	933 38	1,866 76	0 00E+00	1 85E-02	3 70E-02
Cs-134	9 0795E-02	933 38	1,866 76	0 00E+00	8 47E+01	1 69E+02
Cs-135	3 4477E-06	933 38	1,866 76	0 00E+00	3.22E-03	6 44E-03
Cs-137	2 5588E+00	933 38	1,866 76	0 00E+00	2 39E+03	4.78E+03
Eu-154	5 4847E-02	933 38	1,866 76	0 00E+00	5 12E+01	1.02E+02
Eu-155	1 9469E-02	933 38	1,866 76	0 00E+00	1 82E+01	3.63E+01
Fe-55	1 7797E-03	933 38	1,866 76	0 00E+00	1 66E+00	3.32E+00
H-3	8 0065E-03	933 38	1,866 76	0 00E+00	7 47E+00	1 49E+01
I-129	7.5300E-07	933 38	1,866 76	0 00E+00	7 03E-04	1 41E-03
Kr-85	2 0705E-01	933 38	1,866 76	0 00E+00	1 93E+02	3.87E+02
Np-237	9 5507E-06	933 38	1,866 76	0 00E+00	8 91E-03	1 78E-02
Pa-231	1.2740E-09	933 38	1,866 76	0 00E+00	1.19E-06	2 38E-06
Pb-210	1 1838E-11	933 38	1,866 76	0 00E+00	1.10E-08	2.21E-08
Pm-147	6 7974E-01	933 38	1,866 76	0 00E+00	6 34E+02	1.27E+03
Pu-238	1 9755E-02	933 38	1,866 76	0 00E+00	1 84E+01	3 69E+01
Pu-239	4.2838E-04	933 38	1,866 76	0 00E+00	4 00E-01	8 00E-01
Pu-240	2 4390E-04	933 38	1,866 76	0 00E+00	2.28E-01	4 55E-01
Pu-241	5 4058E-02	933 38	1,866 76	0 00E+00	5 05E+01	1.01E+02
Pu-242	3 6329E-07	933 38	1,866 76	0 00E+00	3.39E-04	6 78E-04
Ra-226	8.3742E-11	933 38	1 866 76	0 00E+00	7 82E-08	1 56E-07
Ra-228	5 7734E-15	933 38	1,866 76	0 00E+00	5.39E-12	1 08E-11
Ru-106	6.1356E-03	933 38	1,866 76	0 00E+00	5 73E+00	1.15E+01
Se-79	1.2936E-05	933 38	1,866 76	0 00E+00	1.21E-02	2 41E-02
Sn-126	1.1574E-05	933 38	1,866.76	0 00E+00	1 08E-02	2.16E-02
Sr-90	2 4417E+00	933 38	1,866 76	0 00E+00	2 28E+03	4 56E+03
Tc-99	4.2239E-04	933 38	1,866 76	0 00E+00	3 94E-01	7 88E-01
Th-229	2 8568E-12	933 38	1,866 76	0 00E+00	2 67E-09	5 33E-09
Th-230	2.5310E-08	933 38	1,866.76	0 00E+00	2.36E-05	4 72E-05
Th-232	1.1631E-14	933 38	1,866.76	0 00E+00	1 09E-11	2.17E-11
Tl-208	4 6705E-08	933 38	1,866 76	0 00E+00	4.36E-05	8 72E-05
U-232	1.3151E-07	933 38	1,866.76	0 00E+00	1.23E-04	2 45E-04
U-233	2.1650E-09	933 38	1,866.76	0 00E+00	2 02E-06	4 04E-06
U-234	1.8399E-04	933 38	1,866.76	0 00E+00	1 72E-01	3 43E-01
U-235	-2 7235E-06	933 38	0.00	1 64E-02	1 39E-02	1 64E-02
U-236	1.5493E-05	933.38	1,866.76	0 00E+00	1 45E-02	2 89E-02
U-238	-4.2851E-09	933 38	0 00	1 08E-02	1 08E-02	1 08E-02
Y-90	2.4423E+00	933.38	1,866.76	0 00E+00	2 28E+03	4 56E+03
Other Radionuclides					2 32E+03	4 64E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.539E+14
0 0250	5 343E+13
0 0375	4 658E+13
0 0575	4 921E+13
0 0850	2 994E+13
0 1250	2 094E+13
0 2250	2.571E+13
0 3750	1 152E+13
0 5750	1 871E+14
0 8500	9 126E+12
1.2500	2.970E+12
1 7500	1 084E+11
2 2500	7 170E+09
2 7500	1 000E+08
3 5000	1 191E+07
5 0000	1 014E+03
7 0000	1 128E+02
11 0000	1.270E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.95E+01	5 91E+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 1126847	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		933 38
Bounding		1 866 76

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 07	
Bounding	0 15	

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: SAPHIR U3Si2-LEU (SWITZERLAND)
SNF ID #: 443
Fuel Units & Descr: 39 - MTR TYPE
Heavy Metal Mass: BOL=79 732kg EOL=71 191kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1993
Estimates as of: 2010
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: 15 years

Estimated Canister usage: 18"x10' — 1 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	4 5861E-10	8,088 49	16,176 99	0 00E+00	3 71E-06	7 42E-06
Am-241	1 7832E-03	8,088 49	16,176 99	0 00E+00	1 44E+01	2 88E+01
Am-242m	4 3410E-07	8,088 49	16,176 99	0 00E+00	3 51E-03	7 02E-03
Am-243	1 4907E-06	8,088 49	16,176 99	0 00E+00	1 21E-02	2 41E-02
C-14	5 7162E-09	8,088 49	16,176 99	0 00E+00	4 62E-05	9 25E-05
Cl-36	1.3124E-32	8,088 49	16,176 99	0 00E+00	1 06E-28	2 12E-28
Cm-243	1.8568E-07	8,088 49	16,176.99	0 00E+00	1 50E-03	3 00E-03
Cm-244	3.5512E-05	8,088 49	16,176 99	0 00E+00	2 87E-01	5 74E-01
Co-60	1.0261E-05	8,088 49	16,176 99	0 00E+00	8 30E-02	1 66E-01
Cs-134	1.6931E-02	8,088 49	16,176 99	0 00E+00	1.37E+02	2 74E+02
Cs-135	3 4477E-06	8,088 49	16,176 99	0 00E+00	2 79E-02	5.58E-02
Cs-137	2.2800E+00	8,088 49	16,176 99	0 00E+00	1 84E+04	3 69E+04
Eu-154	3 6656E-02	8,088 49	16,176 99	0 00E+00	2 96E+02	5 93E+02
Eu-155	9 6841E-03	8,088 49	16,176 99	0 00E+00	7 83E+01	1.57E+02
Fe-55	4 6977E-04	8,088 49	16,176 99	0 00E+00	3 80E+00	7.60E+00
H-3	6 0485E-03	8,088 49	16,176 99	0 00E+00	4.89E+01	9.78E+01
I-129	7 5300E-07	8,088 49	16,176 99	0 00E+00	6 09E-03	1.22E-02
Kr-85	1 4989E-01	8,088 49	16,176 99	0 00E+00	1.21E+03	2.42E+03
Np-237	9 5534E-06	8,088 49	16,176 99	0 00E+00	7 73E-02	1 55E-01
Pa-231	1 6550E-09	8,088 49	16,176 99	0 00E+00	1.34E-05	2 68E-05
Pb-210	2 6631E-11	8,088 49	16,176 99	0 00E+00	2 15E-07	4 31E-07
Pm-147	1 8156E-01	8,088 49	16,176 99	0 00E+00	1 47E+03	2 94E+03
Pu-238	1 8990E-02	8,088 49	16,176 99	0 00E+00	1.54E+02	3 07E+02
Pu-239	4 2838E-04	8,088 49	16,176 99	0 00E+00	3 46E+00	6 93E+00
Pu-240	2 4379E-04	8,088 49	16,176.99	0 00E+00	1 97E+00	3 94E+00
Pu-241	4.2511E-02	8,088 49	16,176 99	0 00E+00	3 44E+02	6 88E+02
Pu-242	3.6329E-07	8,088 49	16,176 99	0 00E+00	2 94E-03	5 88E-03
Ra-226	1.4725E-10	8,088 49	16,176 99	0 00E+00	1.19E-06	2.38E-06
Ra-228	8 9760E-15	8,088 49	16,176 99	0 00E+00	7.26E-11	1.45E-10
Ru-106	1 9752E-04	8,088 49	16,176 99	0 00E+00	1 60E+00	3.20E+00
Se-79	1.2933E-05	8,088 49	16,176 99	0 00E+00	1.05E-01	2 09E-01
Sn-126	1 1574E-05	8,088 49	16,176 99	0 00E+00	9.36E-02	1.87E-01
Sr-90	2 1680E+00	8,088 49	16,176 99	0 00E+00	1 75E+04	3.51E+04
Tc-99	4.2239E-04	8,088 49	16,176 99	0 00E+00	3 42E+00	6 83E+00
Th-229	3 9270E-12	8,088 49	16,176 99	0 00E+00	3 18E-08	6.35E-08
Th-230	3 3578E-08	8,088 49	16,176 99	0 00E+00	2 72E-04	5 43E-04
Th-232	1 5452E-14	8,088 49	16,176 99	0 00E+00	1.25E-10	2 50E-10
Tl-208	4 6705E-08	8,088 49	16,176 99	0 00E+00	3 78E-04	7 56E-04
U-232	1 3045E-07	8,088 49	16,176 99	0 00E+00	1 06E-03	2 11E-03
U-233	2 3739E-09	8,088 49	16,176 99	0 00E+00	1 92E-05	3 84E-05
U-234	1 8423E-04	8,088 49	16,176 99	0 00E+00	1 49E+00	2 98E+00
U-235	-2.7235E-06	8,088 49	0 00	3 42E-02	1.22E-02	3 42E-02
U-236	1.5493E-05	8,088 49	16,176.99	0 00E+00	1.25E-01	2.51E-01
U-238	-4.2851E-09	8,088 49	0 00	2 15E-02	2 14E-02	2.15E-02
Y-90	2 1686E+00	8,088 49	16,176 99	0 00E+00	1 75E+04	3 51E+04
Other Radionuclides					1 76E+04	3.52E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 930E+15
0 0250	4 025E+14
0 0375	3 514E+14
0 0575	3 747E+14
0 0850	2.270E+14
0 1250	1.556E+14
0.2250	1 955E+14
0.3750	8 567E+13
0 5750	1 391E+15
0 8500	3 303E+13
1.2500	1 668E+13
1 7500	6 991E+11
2.2500	8 746E+08
2.7500	5.256E+07
3 5000	3.341E+06
5 0000	7.775E+03
7 0000	8.612E+02
11.0000	9 672E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.19E+02	4.38E+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 83740991	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		8 088 49
Bounding		16,176 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	0.32	
Bounding	0 64	

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: SAPHIR UALX-HEU (SWITZERLAND)
SNF ID #: 444
Fuel Units & Descr. 76 - MTR TYPE
Heavy Metal Mass: BOL=21 447kg, EOL=12kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1993
Estimates as of 2010
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: 15 years

Estimated Canister usage 18"x10' 3 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	4.5861E-10	8,946 30	17,892 61	0 00E+00	4 10E-06	8 21E-06
Am-241	1 7832E-03	8,946 30	17,892 61	0 00E+00	1 60E+01	3 19E+01
Am-242m	4.3410E-07	8,946 30	17,892 61	0 00E+00	3 88E-03	7 77E-03
Am-243	1 4907E-06	8,946 30	17,892 61	0 00E+00	1 33E-02	2 67E-02
C-14	5 7162E-09	8,946 30	17,892 61	0 00E+00	5 11E-05	1 02E-04
Cl-36	1 3124E-32	8,946 30	17,892 61	0 00E+00	1 17E-28	2 35E-28
Cm-243	1 8568E-07	8,946 30	17,892 61	0 00E+00	1 66E-03	3 32E-03
Cm-244	3 5512E-05	8,946 30	17,892.61	0 00E+00	3 18E-01	6 35E-01
Co-60	1 0261E-05	8,946 30	17,892.61	0 00E+00	9 18E-02	1 84E-01
Cs-134	1 6931E-02	8,946 30	17,892.61	0 00E+00	1 51E+02	3 03E+02
Cs-135	3 4477E-06	8,946 30	17,892 61	0 00E+00	3 08E-02	6 17E-02
Cs-137	2.2800E+00	8,946 30	17,892 61	0 00E+00	2 04E+04	4 08E+04
Eu-154	3 6656E-02	8,946 30	17,892 61	0 00E+00	3 28E+02	6 56E+02
Eu-155	9 6841E-03	8,946 30	17,892 61	0 00E+00	8 66E+01	1 73E+02
Fe-55	4 6977E-04	8,946 30	17,892 61	0 00E+00	4 20E+00	8 41E+00
H-3	6 0485E-03	8,946 30	17,892 61	0 00E+00	5 41E+01	1 08E+02
I-129	7 5300E-07	8,946 30	17,892 61	0 00E+00	6 74E-03	1 35E-02
Kr-85	1 4989E-01	8,946 30	17,892 61	0 00E+00	1 34E+03	2 68E+03
Np-237	9 5534E-06	8,946 30	17,892 61	0 00E+00	8 55E-02	1 71E-01
Pa-231	1 6550E-09	8,946 30	17,892 61	0 00E+00	1 48E-05	2 96E-05
Pb-210	2 6631E-11	8,946 30	17,892 61	0 00E+00	2 38E-07	4 77E-07
Pm-147	1 8156E-01	8,946 30	17,892 61	0 00E+00	1 62E+03	3.25E+03
Pu-238	1 8990E-02	8,946 30	17,892 61	0 00E+00	1.70E+02	3 40E+02
Pu-239	4 2838E-04	8,946 30	17,892 61	0 00E+00	3.83E+00	7 66E+00
Pu-240	2 4379E-04	8,946 30	17,892 61	0 00E+00	2 18E+00	4 36E+00
Pu-241	4 2511E-02	8,946.30	17,892 61	0 00E+00	3 80E+02	7 61E+02
Pu-242	3 6329E-07	8,946.30	17,892 61	0 00E+00	3.25E-03	6 50E-03
Ra-226	1 4725E-10	8,946.30	17,892 61	0 00E+00	1.32E-06	2 63E-06
Ra-228	8 9760E-15	8,946.30	17,892 61	0 00E+00	8.03E-11	1 61E-10
Ru-106	1 9752E-04	8,946.30	17,892 61	0 00E+00	1 77E+00	3 53E+00
Se-79	1.2933E-05	8,946.30	17,892 61	0 00E+00	1.16E-01	2.31E-01
Sn-126	1 1574E-05	8,946.30	17,892 61	0 00E+00	1 04E-01	2.07E-01
Sr-90	2 1680E+00	8,946.30	17,892 61	0 00E+00	1 94E+04	3 88E+04
Tc-99	4.2239E-04	8,946 30	17,892.61	0 00E+00	3 78E+00	7 56E+00
Th-229	3 9270E-12	8,946.30	17,892 61	0 00E+00	3 51E-08	7.03E-08
Th-230	3.3578E-08	8,946 30	17,892.61	0 00E+00	3 00E-04	6 01E-04
Th-232	1.5452E-14	8,946 30	17,892 61	0 00E+00	1 38E-10	2.76E-10
Tl-208	4 6705E-08	8,946 30	17,892 61	0 00E+00	4 18E-04	8.36E-04
U-232	1.3045E-07	8,946 30	17,892 61	0 00E+00	1.17E-03	2.33E-03
U-233	2.3739E-09	8,946 30	17,892 61	0 00E+00	2 12E-05	4.25E-05
U-234	1 8423E-04	8,946 30	17,892 61	0 00E+00	1 65E+00	3 30E+00
U-235	-2 7235E-06	8,946 30	0 00	4 20E-02	1 76E-02	4 20E-02
U-236	1 5493E-05	8,946 30	17,892 61	0 00E+00	1 39E-01	2.77E-01
U-238	-4.2851E-09	8,946 30	0 00	6 76E-04	6 38E-04	6 76E-04
Y-90	2.1686E+00	8,946 30	17,892 61	0 00E+00	1 94E+04	3 88E+04
Other Radionuclides					1 95E+04	3 89E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.134E+15
0 0250	4 451E+14
0 0375	3 887E+14
0 0575	4 145E+14
0 0850	2 510E+14
0 1250	1 721E+14
0.2250	2 163E+14
0 3750	9 475E+13
0.5750	1 538E+15
0 8500	3 653E+13
1.2500	1 845E+13
1 7500	7 733E+11
2.2500	9 674E+08
2 7500	5.814E+07
3.5000	3 695E+06
5.0000	8.546E+03
7 0000	9 465E+02
11 0000	1 063E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.42E+02	4.84E+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 %:	90 62318257	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		8,946.30	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		17 892.61	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1 33	
Bounding	2 65	

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	SAPHIR ULAX MEU (SWITZERLAND)	[1]Fuel decay start date:	1993
SNF ID #	945	Estimates as of	2010
Fuel Units & Descr	52 - MTR TYPE	Template	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass	BOL=35 984kg EOL=28.808kg	[2]Template Burnup(MWd)	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0 00116689
		Template Decay Time	15 years

Estimated Canister usage

18"x10'
2 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	4 5861E-10	6,795 81	13,591.62	0 00E+00	3.12E-06	6.23E-06
Am-241	1 7832E-03	6,795 81	13,591 62	0 00E+00	1.21E+01	2 42E+01
Am-242m	4 3410E-07	6,795 81	13,591 62	0 00E+00	2.95E-03	5 90E-03
Am-243	1 4907E-06	6,795 81	13,591 62	0 00E+00	1 01E-02	2 03E-02
C-14	5 7162E-09	6,795 81	13,591 62	0 00E+00	3 88E-05	7 77E-05
Cl-36	1.3124E-32	6,795 81	13,591 62	0 00E+00	8 92E-29	1 78E-28
Cm-243	1.8568E-07	6,795 81	13,591 62	0 00E+00	1.26E-03	2 52E-03
Cm-244	3 5512E-05	6,795 81	13,591 62	0 00E+00	2 41E-01	4 83E-01
Co-60	1.0261E-05	6,795 81	13,591 62	0 00E+00	6 97E-02	1 39E-01
Cs-134	1.6931E-02	6,795 81	13,591 62	0 00E+00	1 15E+02	2 30E+02
Cs-135	3 4477E-06	6,795 81	13,591 62	0 00E+00	2 34E-02	4 69E-02
Cs-137	2.2800E+00	6,795 81	13,591 62	0 00E+00	1.55E+04	3 10E+04
Eu-154	3 6656E-02	6,795 81	13,591 62	0 00E+00	2 49E+02	4 98E+02
Eu-155	9 6841E-03	6,795 81	13,591 62	0 00E+00	6 58E+01	1 32E+02
Fe-55	4 6977E-04	6,795 81	13,591 62	0 00E+00	3 19E+00	6 38E+00
H-3	6 0485E-03	6,795 81	13,591 62	0 00E+00	4 11E+01	8 22E+01
I-129	7.5300E-07	6,795 81	13,591 62	0 00E+00	5 12E-03	1 02E-02
Kr-85	1 4989E-01	6,795 81	13,591.62	0 00E+00	1 02E+03	2 04E+03
Np-237	9 5534E-06	6,795 81	13,591.62	0 00E+00	6 49E-02	1.30E-01
Pa-231	1 6550E-09	6,795 81	13,591.62	0 00E+00	1.12E-05	2.25E-05
Pb-210	2 6631E-11	6,795 81	13,591.62	0 00E+00	1 81E-07	3 62E-07
Pm-147	1 8156E-01	6,795 81	13,591.62	0 00E+00	1.23E+03	2.47E+03
Pu-238	1 8990E-02	6,795 81	13,591.62	0 00E+00	1 29E+02	2.58E+02
Pu-239	4 2838E-04	6,795 81	13,591.62	0 00E+00	2 91E+00	5.82E+00
Pu-240	2 4379E-04	6,795 81	13,591 62	0 00E+00	1 66E+00	3.31E+00
Pu-241	4 2511E-02	6,795 81	13,591 62	0 00E+00	2 89E+02	5 78E+02
Pu-242	3 6329E-07	6,795 81	13,591 62	0 00E+00	2 47E-03	4 94E-03
Ra-226	1 4725E-10	6,795 81	13,591 62	0 00E+00	1.00E-06	2 00E-06
Ra-228	8 9760E-15	6,795 81	13,591 62	0 00E+00	6 10E-11	1.22E-10
Ru-106	1 9752E-04	6,795 81	13,591 62	0 00E+00	1.34E+00	2 68E+00
Se-79	1.2933E-05	6,795 81	13,591 62	0 00E+00	8 79E-02	1 76E-01
Sn-126	1.1574E-05	6,795 81	13,591 62	0 00E+00	7 87E-02	1 57E-01
Sr-90	2.1680E+00	6,795 81	13,591 62	0 00E+00	1.47E+04	2 95E+04
Tc-99	4.2239E-04	6,795 81	13,591 62	0 00E+00	2.87E+00	5 74E+00
Th-229	3.9270E-12	6,795 81	13,591 62	0 00E+00	2 67E-08	5 34E-08
Th-230	3.3578E-08	6,795 81	13,591 62	0 00E+00	2 28E-04	4 56E-04
Th-232	1.5452E-14	6,795 81	13,591 62	0 00E+00	1 05E-10	2 10E-10
Tl-208	4 6705E-08	6,795 81	13,591 62	0 00E+00	3 17E-04	6 35E-04
U-232	1.3045E-07	6,795 81	13,591 62	0 00E+00	8 86E-04	1.77E-03
U-233	2.3739E-09	6,795 81	13,591 62	0 00E+00	1 61E-05	3.23E-05
U-234	1 8423E-04	6,795 81	13,591 62	0 00E+00	1 25E+00	2 50E+00
U-235	-2.7235E-06	6,795.81	0 00	3 50E-02	1 65E-02	3.50E-02
U-236	1.5493E-05	6,795.81	13,591.62	0 00E+00	1 05E-01	2.11E-01
U-238	-4.2851E-09	6,795 81	0 00	6 64E-03	6 61E-03	6 64E-03
Y-90	2.1686E+00	6,795 81	13,591.62	0 00E+00	1 47E+04	2.95E+04
Other Radionuclides					1 48E+04	2 96E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 621E+15
0 0250	3.381E+14
0 0375	2.953E+14
0 0575	3 148E+14
0.0850	1 907E+14
0 1250	1.307E+14
0.2250	1 643E+14
0.3750	7 198E+13
0.5750	1 168E+15
0 8500	2.775E+13
1.2500	1 402E+13
1 7500	5.874E+11
2.2500	7.348E+08
2 7500	4 416E+07
3 5000	2.807E+06
5 0000	6.506E+03
7 0000	7.206E+02
11 0000	8 092E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.84E+02	3 68E+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 %	45.07146122	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		6 795 81
Bounding		13,591.62

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 60	
Bounding	1.20	

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: SAXTON (MOX SST)
SNF ID #: 883
Fuel Units & Descr: 25 - ELEMENT
Heavy Metal Mass: BOL= ; EOL=95.588kg
ROD Storage Site. INEEL

[1]Fuel decay start date: 1972
Estimates as of: 2010
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 78

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	95 69	95 69	0 00E+00	2 21E-04	2.21E-04
Am-241	8 4448E+00	95 69	95 69	0 00E+00	8 08E+02	8 08E+02
Am-242m	1 6848E-02	95 69	95 69	0 00E+00	1 61E+00	1 61E+00
Am-243	1 6320E-02	95 69	95 69	0 00E+00	1 56E+00	1 56E+00
C-14	1 2090E-01	95 69	95 69	0 00E+00	1 16E+01	1 16E+01
Cl-36	2 2849E-03	95 69	95 69	0 00E+00	2 19E-01	2 19E-01
Cm-243	8 6624E-04	95 69	95 69	0 00E+00	8 29E-02	8.29E-02
Cm-244	1 6848E-01	95 69	95 69	0 00E+00	1 61E+01	1 61E+01
Co-60	2 8086E+01	95 69	95 69	0 00E+00	2 69E+03	2 69E+03
Cs-134	3 4148E-04	95 69	95 69	0 00E+00	3 27E-02	3.27E-02
Cs-135	4 3976E-04	95 69	95 69	0 00E+00	4 21E-02	4 21E-02
Cs-137	2 1049E+01	95 69	95 69	0 00E+00	2 01E+03	2 01E+03
Eu-154	1 2500E+00	95 69	95 69	0 00E+00	1 20E+02	1 20E+02
Eu-155	6 8986E-02	95 69	95 69	0 00E+00	6 60E+00	6 60E+00
Fe-55	2 9308E-01	95 69	95 69	0 00E+00	2 80E+01	2 80E+01
H-3	2 4311E-01	95 69	95 69	0 00E+00	2 33E+01	2 33E+01
I-129	1 0618E-05	95 69	95 69	0 00E+00	1 02E-03	1 02E-03
Kr-85	5 9882E-01	95 69	95 69	0 00E+00	5 73E+01	5 73E+01
Np-237	1 5668E-04	95 69	95 69	0 00E+00	1 50E-02	1 50E-02
Pa-231	2 8656E-06	95 69	95 69	0 00E+00	2 74E-04	2.74E-04
Pb-210	2 3918E-08	95 69	95 69	0 00E+00	2 29E-06	2.29E-06
Pm-147	1 6900E-02	95 69	95 69	0 00E+00	1 62E+00	1 62E+00
Pu-238	-8 6120E-01	95 69	0 00	1 23E+04	1.22E+04	1 23E+04
Pu-239	-4 8440E-02	95 69	0 00	1 49E+03	1 48E+03	1 49E+03
Pu-240	-3 0095E-01	95 69	0 00	1 90E+03	1 87E+03	1 90E+03
Pu-241	-1 0411E+02	95 69	0 00	4 89E+05	4.79E+05	4 89E+05
Pu-242	-1 1381E-04	95 69	0 00	8 22E+00	8.21E+00	8 22E+00
Ra-226	6 4400E-08	95 69	95 69	0 00E+00	6 16E-06	6 16E-06
Ra-228	5 9952E-07	95 69	95 69	0 00E+00	5 74E-05	5 74E-05
Ru-106	8 5526E-07	95 69	95 69	0 00E+00	8 18E-05	8 18E-05
Se-79	1 9181E-04	95 69	95 69	0 00E+00	1 84E-02	1 84E-02
Sn-126	1 6671E-04	95 69	95 69	0 00E+00	1 60E-02	1 60E-02
Sr-90	1 9799E+01	95 69	95 69	0 00E+00	1.89E+03	1 89E+03
Tc-99	6 7678E-03	95 69	95 69	0 00E+00	6 48E-01	6 48E-01
Th-229	1 7488E-06	95 69	95 69	0 00E+00	1 67E-04	1 67E-04
Th-230	5 8704E-06	95 69	95 69	0 00E+00	5 62E-04	5 62E-04
Th-232	6 0208E-07	95 69	95 69	0 00E+00	5 76E-05	5 76E-05
Tl-208	8.7573E-05	95 69	95 69	0 00E+00	8 38E-03	8 38E-03
U-232	2.3706E-04	95 69	95 69	0 00E+00	2.27E-02	2 27E-02
U-233	3 6128E-04	95 69	95 69	0 00E+00	3 46E-02	3 46E-02
U-234	1.2788E-02	95 69	95 69	0 00E+00	1.22E+00	1 22E+00
U-235	5.7486E-04	95 69	95 69	4 12E-02	9 62E-02	9 62E-02
U-236	2.3485E-04	95 69	95 69	0 00E+00	2.25E-02	2 25E-02
U-238	1.1581E-04	95 69	95 69	5.12E-03	1 62E-02	1 62E-02
Y-90	1 9804E+01	95 69	95 69	0 00E+00	1 89E+03	1 89E+03
Other Radionuclides					5 90E+03	5 90E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	2.160E+14
0.0250	2 333E+13
0 0375	2 059E+13
0 0575	3.211E+13
0.0850	1.256E+13
0 1250	9 820E+12
0.2250	1 085E+13
0.3750	4 642E+12
0 5750	7 543E+13
0.8500	2 883E+12
1.2500	2 015E+14
1.7500	8 913E+10
2.2500	1 060E+09
2.7500	2 998E+08
3.5000	2 044E+06
5.0000	8 631E+05
7 0000	9 777E+04
11 0000	1 114E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.18E+02	6.22E+02
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		95 69
Bounding		95 69

Basis for burnup used in estimate:

Nominal burnup set equal to bounding burnup

Bounding burnup taken from SFD and converted to MWd using BOL=95.688kg

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 03	
Bounding	0 03	

Estimated EOL HM/Given EOL HM: 1 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: SAXTON (MOX ZR)
SNF ID #: 787
Fuel Units & Descr: 43 - ELEMENT
Heavy Metal Mass BOL= , EOL=239 88kg
ROD Storage Site INEEL

[1]Fuel decay start date 1972
Estimates as of 2010
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' 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 3072E-06	240.13	240 13	0 00E+00	5 54E-04	5 54E-04
Am-241	8 4448E+00	240.13	240 13	0 00E+00	2 03E+03	2 03E+03
Am-242m	1 6848E-02	240 13	240 13	0 00E+00	4 05E+00	4 05E+00
Am-243	1 6320E-02	240 13	240 13	0 00E+00	3.92E+00	3 92E+00
C-14	1.2090E-01	240 13	240 13	0 00E+00	2.90E+01	2 90E+01
Cl-36	2.2849E-03	240 13	240.13	0 00E+00	5 49E-01	5 49E-01
Cm-243	8 6624E-04	240 13	240.13	0 00E+00	2 08E-01	2 08E-01
Cm-244	1 6848E-01	240 13	240.13	0 00E+00	4 05E+01	4 05E+01
Co-60	2 8086E+01	240 13	240.13	0 00E+00	6 74E+03	6 74E+03
Cs-134	3 4148E-04	240 13	240 13	0 00E+00	8.20E-02	8 20E-02
Cs-135	4.3976E-04	240 13	240 13	0 00E+00	1 06E-01	1 06E-01
Cs-137	2.1049E+01	240 13	240 13	0.00E+00	5 05E+03	5 05E+03
Eu-154	1.2500E+00	240 13	240 13	0 00E+00	3 00E+02	3 00E+02
Eu-155	6.8986E-02	240 13	240 13	0.00E+00	1 66E+01	1 66E+01
Fe-55	2.9308E-01	240 13	240 13	0.00E+00	7 04E+01	7 04E+01
H-3	2.4311E-01	240 13	240 13	0 00E+00	5 84E+01	5 84E+01
I-129	1.0618E-05	240 13	240 13	0 00E+00	2 55E-03	2 55E-03
Kr-85	5 9882E-01	240 13	240 13	0 00E+00	1 44E+02	1 44E+02
Np-237	1.5668E-04	240 13	240 13	0 00E+00	3 76E-02	3 76E-02
Pa-231	2 8656E-06	240 13	240 13	0 00E+00	6 88E-04	6 88E-04
Pb-210	2.3918E-08	240 13	240 13	0 00E+00	5 74E-06	5 74E-06
Pm-147	1 6900E-02	240 13	240 13	0 00E+00	4 06E+00	4 06E+00
Pu-238	-8 6120E-01	240 13	0 00	3 09E+04	3 07E+04	3 09E+04
Pu-239	-4 8440E-02	240 13	0 00	3 73E+03	3 72E+03	3 73E+03
Pu-240	-3 0095E-01	240 13	0 00	4 77E+03	4 70E+03	4 77E+03
Pu-241	-1 0411E+02	240 13	0 00	1.23E+06	1 20E+06	1 23E+06
Pu-242	-1 1381E-04	240 13	0 00	2 06E+01	2 06E+01	2 06E+01
Ra-226	6 4400E-08	240 13	240 13	0 00E+00	1 55E-05	1.55E-05
Ra-228	5 9952E-07	240 13	240 13	0 00E+00	1 44E-04	1 44E-04
Ru-106	8 5526E-07	240 13	240 13	0 00E+00	2 05E-04	2 05E-04
Se-79	1 9181E-04	240 13	240 13	0 00E+00	4 61E-02	4 61E-02
Sn-126	1 6671E-04	240 13	240 13	0 00E+00	4 00E-02	4 00E-02
Sr-90	1 9799E+01	240 13	240 13	0 00E+00	4 75E+03	4 75E+03
Tc-99	6 7678E-03	240 13	240 13	0 00E+00	1 63E+00	1 63E+00
Th-229	1 7488E-06	240 13	240 13	0 00E+00	4.20E-04	4.20E-04
Th-230	5 8704E-06	240 13	240 13	0 00E+00	1 41E-03	1.41E-03
Th-232	6 0208E-07	240 13	240 13	0 00E+00	1 45E-04	1.45E-04
Tl-208	8 7573E-05	240 13	240 13	0 00E+00	2.10E-02	2.10E-02
U-232	2 3706E-04	240 13	240 13	0 00E+00	5 69E-02	5 69E-02
U-233	3 6128E-04	240 13	240 13	0 00E+00	8 68E-02	8.68E-02
U-234	1 2788E-02	240 13	240 13	0 00E+00	3 07E+00	3 07E+00
U-235	5 7486E-04	240 13	240 13	1 03E-01	2.41E-01	2.41E-01
U-236	2 3485E-04	240 13	240 13	0 00E+00	5 64E-02	5 64E-02
U-238	1 1581E-04	240 13	240 13	1.29E-02	4.07E-02	4 07E-02
Y-90	1 9804E+01	240 13	240 13	0 00E+00	4 76E+03	4 76E+03
Other Radionuclides					1 48E+04	1.48E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5 419E+14
0 0250	5 856E+13
0 0375	5 167E+13
0 0575	8 058E+13
0 0850	3 152E+13
0 1250	2 464E+13
0.2250	2 723E+13
0.3750	1 165E+13
0.5750	1.893E+14
0.8500	7.234E+12
1.2500	5 056E+14
1 7500	2.237E+11
2.2500	2 660E+09
2 7500	7.524E+08
3.5000	5 129E+06
5 0000	2 166E+06
7 0000	2 453E+05
11 0000	2.796E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.55E+03	1.56E+03
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 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		240 13
Bounding		240 13

Basis for burnup used in estimate:
Nominal burnup set equal to bounding burnup
Bounding burnup taken from SFD and converted to MWd using BOL=240 132kg

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 03	
Bounding	0 03	

Estimated EOL HM/Given EOL HM: 1 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: SAXTON (UO2 SST)
SNF ID #: 882
Fuel Units & Descr. 20 - ELEMENT
Heavy Metal Mass: BOL= , EOL=10 402kg
ROD Storage Site: INEEL

[1]Fuel decay start date: 1972
Estimates as of: 2010
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 35 years

Estimated Canister usage: 18"x10' 0 69

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	2.3344E-08	16 67	16 67	0 00E+00	3 89E-07	3 89E-07
Am-241	1.1135E-04	16 67	16 67	0 00E+00	1 86E-03	1 86E-03
Am-242m	8 5075E-09	16 67	16 67	0 00E+00	1.42E-07	1 42E-07
Am-243	9 8519E-10	16 67	16 67	0 00E+00	1 64E-08	1 64E-08
C-14	2 3012E-04	16 67	16 67	0 00E+00	3 84E-03	3 84E-03
Cl-36	1.2261E-06	16 67	16 67	0 00E+00	2 04E-05	2 04E-05
Cm-243	2.4875E-10	16 67	16 67	0 00E+00	4 15E-09	4 15E-09
Cm-244	2.3178E-09	16 67	16 67	0 00E+00	3 86E-08	3 86E-08
Co-60	7.0849E-02	16 67	16 67	0 00E+00	1 18E+00	1 18E+00
Cs-134	3 0266E-06	16 67	16 67	0 00E+00	5 05E-05	5 05E-05
Cs-135	3 0316E-05	16 67	16 67	0 00E+00	5 05E-04	5 05E-04
Cs-137	1.4511E+00	16 67	16 67	0 00E+00	2 42E+01	2 42E+01
Eu-154	6 6955E-04	16 67	16 67	0 00E+00	1 12E-02	1 12E-02
Eu-155	6 9850E-04	16 67	16 67	0 00E+00	1 16E-02	1.16E-02
Fe-55	1 2318E-03	16 67	16 67	0 00E+00	2 05E-02	2 05E-02
H-3	2 5141E-03	16 67	16 67	0 00E+00	4 19E-02	4 19E-02
I-129	7.3195E-07	16 67	16 67	0 00E+00	1 22E-05	1.22E-05
Kr-85	4 1281E-02	16 67	16 67	0 00E+00	6 88E-01	6 88E-01
Np-237	1.1489E-06	16 67	16 67	0 00E+00	1 92E-05	1 92E-05
Pa-231	4.5241E-08	16 67	16 67	0 00E+00	7 54E-07	7.54E-07
Pb-210	6 4476E-13	16 67	16.67	0 00E+00	1 07E-11	1 07E-11
Pm-147	1.1651E-03	16 67	16 67	0 00E+00	1 94E-02	1 94E-02
Pu-238	2.9517E-04	16 67	16.67	0 00E+00	4 92E-03	4 92E-03
Pu-239	6 6772E-04	16 67	16 67	0 00E+00	1 11E-02	1 11E-02
Pu-240	8.6839E-05	16 67	16.67	0 00E+00	1 45E-03	1 45E-03
Pu-241	7.1514E-04	16 67	16 67	0 00E+00	1 19E-02	1 19E-02
Pu-242	1.9717E-09	16 67	16.67	0 00E+00	3.29E-08	3.29E-08
Ra-226	1.7654E-12	16 67	16 67	0 00E+00	2 94E-11	2 94E-11
Ra-228	8.2928E-12	16 67	16 67	0 00E+00	1 38E-10	1 38E-10
Ru-106	1 8419E-10	16 67	16 67	0 00E+00	3 07E-09	3 07E-09
Se-79	1.3223E-05	16 67	16 67	0 00E+00	2 20E-04	2.20E-04
Sn-126	1.1493E-05	16 67	16 67	0.00E+00	1 92E-04	1 92E-04
Sr-90	1.3649E+00	16 67	16 67	0 00E+00	2 28E+01	2 28E+01
Tc-99	4 6656E-04	16 67	16 67	0 00E+00	7 78E-03	7 78E-03
Th-229	1 4547E-11	16 67	16 67	0 00E+00	2 43E-10	2 43E-10
Th-230	1 6617E-10	16 67	16 67	0 00E+00	2 77E-09	2 77E-09
Th-232	8 3361E-12	16 67	16 67	0 00E+00	1 39E-10	1 39E-10
Tl-208	2.1664E-08	16 67	16 67	0 00E+00	3 61E-07	3 61E-07
U-232	5 8669E-08	16 67	16 67	0.00E+00	9 78E-07	9 78E-07
U-233	3.1847E-09	16 67	16 67	0 00E+00	5 31E-08	5 31E-08
U-234	3 8769E-07	16 67	16 67	0 00E+00	6 46E-06	6 46E-06
U-235	-2.7761E-06	16 67	0 00	2 10E-02	2 10E-02	2.10E-02
U-236	1 6190E-05	16 67	16 67	0 00E+00	2 70E-04	2.70E-04
U-238	-2 8547E-09	16 67	0 00	2 28E-04	2 27E-04	2 28E-04
Y-90	1 3652E+00	16 67	16 67	0 00E+00	2 28E+01	2 28E+01
Other Radionuclides					2.75E+01	2 75E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.245E+12
0 0250	2 586E+11
0.0375	2.237E+11
0.0575	2 411E+11
0.0850	1 457E+11
0 1250	9 469E+10
0.2250	1.258E+11
0.3750	5 469E+10
0.5750	9 009E+11
0.8500	9 119E+09
1.2500	9 064E+10
1 7500	2 352E+08
2.2500	4 883E+05
2 7500	1 412E+04
3.5000	2 911E+00
5.0000	1.214E+00
7 0000	1 358E-01
11 0000	1.536E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.92E-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	SST	SST
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		16 67
Bounding		16 67

Basis for burnup used in estimate:
Nominal burnup set equal to bounding burnup
Bounding burnup taken from SFD and converted to MWd using BOL=10 42kg

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 03	
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	SAXTON (UO2 ZR)	[1]Fuel decay start date	1972
SNF ID #	788	Estimates as of	2010
Fuel Units & Descr	9 - ELEMENT	Template	PWR (Light Water, Zirc, 0 to 5%, U)
Heavy Metal Mass	BOL= , EOL=41.482kg	[2]Template Burnup(MWd)	61.92
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0.00176911
		Template Decay Time	35 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	8.7758E-10	66.48	66.48	0.00E+00	5.83E-08	5.83E-08
Am-241	1.4352E-01	66.48	66.48	0.00E+00	9.54E+00	9.54E+00
Am-242m	2.8698E-04	66.48	66.48	0.00E+00	1.91E-02	1.91E-02
Am-243	6.2565E-04	66.48	66.48	0.00E+00	4.16E-02	4.16E-02
C-14	4.7901E-05	66.48	66.48	0.00E+00	3.18E-03	3.18E-03
Cl-36	8.0297E-07	66.48	66.48	0.00E+00	5.34E-05	5.34E-05
Cm-243	2.5081E-04	66.48	66.48	0.00E+00	1.67E-02	1.67E-02
Cm-244	4.9015E-02	66.48	66.48	0.00E+00	3.26E+00	3.26E+00
Co-60	2.5581E-03	66.48	66.48	0.00E+00	1.70E-01	1.70E-01
Cs-134	4.0536E-05	66.48	66.48	0.00E+00	2.69E-03	2.69E-03
Cs-135	1.4433E-05	66.48	66.48	0.00E+00	9.60E-04	9.60E-04
Cs-137	1.3979E+00	66.48	66.48	0.00E+00	9.29E+01	9.29E+01
Eu-154	2.0203E-02	66.48	66.48	0.00E+00	1.34E+00	1.34E+00
Eu-155	1.7684E-03	66.48	66.48	0.00E+00	1.18E-01	1.18E-01
Fe-55	4.3136E-05	66.48	66.48	0.00E+00	2.87E-03	2.87E-03
H-3	2.0769E-02	66.48	66.48	0.00E+00	1.38E+00	1.38E+00
I-129	9.8288E-07	66.48	66.48	0.00E+00	6.53E-05	6.53E-05
Kr-85	2.8214E-02	66.48	66.48	0.00E+00	1.88E+00	1.88E+00
Np-237	1.1218E-05	66.48	66.48	0.00E+00	7.46E-04	7.46E-04
Pa-231	1.3036E-09	66.48	66.48	0.00E+00	8.67E-08	8.67E-08
Pb-210	8.5078E-11	66.48	66.48	0.00E+00	5.66E-09	5.66E-09
Pm-147	3.6531E-04	66.48	66.48	0.00E+00	2.43E-02	2.43E-02
Pu-238	7.4564E-02	66.48	66.48	0.00E+00	4.96E+00	4.96E+00
Pu-239	1.1623E-02	66.48	66.48	0.00E+00	7.73E-01	7.73E-01
Pu-240	1.5132E-02	66.48	66.48	0.00E+00	1.01E+00	1.01E+00
Pu-241	9.0036E-01	66.48	66.48	0.00E+00	5.99E+01	5.99E+01
Pu-242	6.4260E-05	66.48	66.48	0.00E+00	4.27E-03	4.27E-03
Ra-226	2.2804E-10	66.48	66.48	0.00E+00	1.52E-08	1.52E-08
Ra-228	5.2713E-12	66.48	66.48	0.00E+00	3.50E-10	3.50E-10
Ru-106	6.1160E-10	66.48	66.48	0.00E+00	4.07E-08	4.07E-08
Se-79	1.2377E-05	66.48	66.48	0.00E+00	8.23E-04	8.23E-04
Sn-126	2.5210E-05	66.48	66.48	0.00E+00	1.68E-03	1.68E-03
Sr-90	9.1667E-01	66.48	66.48	0.00E+00	6.09E+01	6.09E+01
Tc-99	3.9357E-04	66.48	66.48	0.00E+00	2.62E-02	2.62E-02
Th-229	1.2057E-10	66.48	66.48	0.00E+00	8.02E-09	8.02E-09
Th-230	2.1043E-08	66.48	66.48	0.00E+00	1.40E-06	1.40E-06
Th-232	5.2972E-12	66.48	66.48	0.00E+00	3.52E-10	3.52E-10
Tl-208	1.7474E-07	66.48	66.48	0.00E+00	1.16E-05	1.16E-05
U-232	4.7368E-07	66.48	66.48	0.00E+00	3.15E-05	3.15E-05
U-233	2.5097E-08	66.48	66.48	0.00E+00	1.67E-06	1.67E-06
U-234	5.0000E-05	66.48	66.48	0.00E+00	3.32E-03	3.32E-03
U-235	-1.4489E-06	66.48	0.00	2.87E-03	2.78E-03	2.87E-03
U-236	7.5824E-06	66.48	66.48	0.00E+00	5.04E-04	5.04E-04
U-238	-2.6129E-07	66.48	0.00	1.35E-02	1.35E-02	1.35E-02
Y-90	9.1699E-01	66.48	66.48	0.00E+00	6.10E+01	6.10E+01
Other Radionuclides					8.92E+01	8.92E+01

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	3.577E+12
0.0250	7.213E+11
0.0375	6.880E+11
0.0575	7.949E+11
0.0850	4.003E+11
0.1250	2.778E+11
0.2250	3.433E+11
0.3750	1.476E+11
0.5750	3.433E+12
0.8500	4.749E+10
1.2500	4.665E+10
1.7500	1.397E+09
2.2500	2.251E+05
2.7500	4.609E+05
3.5000	4.752E+04
5.0000	2.032E+04
7.0000	2.342E+03
11.0000	2.690E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.53E+00	1.53E+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 %		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	Basis for burnup used in estimate:
Nominal		66.48	Nominal burnup set equal to bounding burnup
Bounding		66.48	Bounding burnup taken from SFD and converted to MWd using BOL=41.552kg

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	SHIPPINGPORT PWR C1 BLKT (RODS)	[1]Fuel decay start date:	1959
SNF ID #	189	Estimates as of	2010
Fuel Units & Descr	2 - ROD	Template	PWR (Light Water, Zirc, 0 to 5%, U)
Heavy Metal Mass	BOL=16 891kg; EOL=16 108kg	[2]Template Burnup(MWd):	61 92
ROD Storage Site.	INEEL	Template BOL Heavy Metal Mass (MT)	0 00176911
		Template Decay Time	50 years

Estimated Canister usage 18"x15' 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	1 0733E-09	744 60	1,489 19	0 00E+00	7.99E-07	1 60E-06
Am-241	1 4751E-01	744 60	1,489 19	0 00E+00	1 10E+02	2 20E+02
Am-242m	2 6809E-04	744 60	1,489 19	0 00E+00	2 00E-01	3 99E-01
Am-243	6 2484E-04	744 60	1,489 19	0 00E+00	4 65E-01	9 31E-01
C-14	4.7820E-05	744 60	1,489 19	0 00E+00	3 56E-02	7 12E-02
Cl-36	8 0297E-07	744 60	1,489 19	0 00E+00	5 98E-04	1 20E-03
Cm-243	1.7426E-04	744 60	1 489 19	0 00E+00	1.30E-01	2 60E-01
Cm-244	2.7616E-02	744 60	1,489 19	0 00E+00	2 06E+01	4 11E+01
Co-60	3 5610E-04	744 60	1,489 19	0 00E+00	2 65E-01	5 30E-01
Cs-134	2.6260E-07	744 60	1,489 19	0 00E+00	1 96E-04	3 91E-04
Cs-135	1 4433E-05	744 60	1,489 19	0 00E+00	1.07E-02	2 15E-02
Cs-137	9 8870E-01	744 60	1,489 19	0 00E+00	7 36E+02	1 47E+03
Eu-154	6 0320E-03	744 60	1,489 19	0 00E+00	4 49E+00	8 98E+00
Eu-155	2.1770E-04	744 60	1,489 19	0 00E+00	1 62E-01	3 24E-01
Fe-55	7 9296E-07	744 60	1,489 19	0 00E+00	5 90E-04	1 18E-03
H-3	8 9486E-03	744 60	1,489 19	0 00E+00	6 66E+00	1 33E+01
I-129	9 8288E-07	744 60	1,489 19	0 00E+00	7.32E-04	1 46E-03
Kr-85	1 0707E-02	744 60	1,489 19	0 00E+00	7 97E+00	1 59E+01
Np-237	1.1927E-05	744 60	1,489 19	0.00E+00	8 88E-03	1 78E-02
Pa-231	1 4703E-09	744 60	1,489 19	0 00E+00	1 09E-06	2 19E-06
Pb-210	1 6828E-10	744 60	1,489 19	0 00E+00	1.25E-07	2 51E-07
Pm-147	6 9606E-06	744 60	1,489 19	0 00E+00	5 18E-03	1 04E-02
Pu-238	6 6263E-02	744 60	1,489 19	0 00E+00	4 93E+01	9 87E+01
Pu-239	1 1618E-02	744 60	1,489 19	0 00E+00	8 65E+00	1 73E+01
Pu-240	1 5142E-02	744 60	1,489 19	0 00E+00	1 13E+01	2.25E+01
Pu-241	4 3766E-01	744 60	1,489 19	0 00E+00	3 26E+02	6 52E+02
Pu-242	6 4260E-05	744 60	1,489 19	0 00E+00	4 78E-02	9 57E-02
Ra-226	3 8501E-10	744 60	1,489 19	0 00E+00	2 87E-07	5 73E-07
Ra-228	5 2955E-12	744 60	1,489 19	0 00E+00	3 94E-09	7 89E-09
Ru-106	2 0413E-14	744 60	1,489 19	0 00E+00	1 52E-11	3 04E-11
Se-79	1 2376E-05	744 60	1,489 19	0 00E+00	9 21E-03	1 84E-02
Sn-126	2 5210E-05	744 60	1,489 19	0 00E+00	1 88E-02	3 75E-02
Sr-90	6 4163E-01	744 60	1,489 19	0 00E+00	4 78E+02	9 56E+02
Tc-99	3 9357E-04	744 60	1,489.19	0 00E+00	2 93E-01	5 86E-01
Th-229	1 5644E-10	744 60	1,489 19	0 00E+00	1.16E-07	2 33E-07
Th-230	2 7972E-08	744 60	1,489 19	0 00E+00	2 08E-05	4 17E-05
Th-232	5 3036E-12	744 60	1,489 19	0 00E+00	3 95E-09	7 90E-09
Tl-208	1 5136E-07	744 60	1,489 19	0 00E+00	1 13E-04	2.25E-04
U-232	4 1005E-07	744 60	1,489 19	0 00E+00	3 05E-04	6.11E-04
U-233	2 5856E-08	744 60	1,489 19	0 00E+00	1 93E-05	3 85E-05
U-234	5 2665E-05	744 60	1,489 19	0 00E+00	3 92E-02	7 84E-02
U-235	-1 4487E-06	744 60	0 00	2 60E-04	0 00E+00	2 60E-04
U-236	7 5888E-06	744 60	1,489 19	0 00E+00	5 65E-03	1 13E-02
U-238	-2 6129E-07	744 60	0 00	5 64E-03	5 44E-03	5 64E-03
Y-90	6 4180E-01	744.60	1,489 19	0 00E+00	4.78E+02	9 56E+02
Other Radionuclides					7 10E+02	1 42E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	5 666E+13
0 0250	1 136E+13
0 0375	1.070E+13
0 0575	1.339E+13
0 0850	6.256E+12
0 1250	4 162E+12
0.2250	5.341E+12
0.3750	2.307E+12
0.5750	5 432E+13
0 8500	5.304E+11
1.2500	3.375E+11
1 7500	1 484E+10
2.2500	2.439E+06
2 7500	8.597E+06
3.5000	6.133E+05
5 0000	2 621E+05
7 0000	3.020E+04
11 0000	3 467E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.35E+01	2 69E+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 710999907	0 to 5	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		744 60	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding	304 04	1 489 19	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	1.26	
Bounding	2.52	4 90

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	SLOWPOKE (HEU) CANADA	[1]Fuel decay start date	2010
SNF ID #	296	Estimates as of	2010
Fuel Units & Descr	1 - 297 ROD ARRAY	Template	ATR (Light Water, Alum., 60 to 100%, U)
Heavy Metal Mass	BOL=0.875kg EOL=0 87kg	[2]Template Burnup(MWd)	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0 00116689
		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	1.4545E-10	12.53	25 06	0 00E+00	1 82E-09	3 64E-09
Am-241	1 1190E-03	12.53	25 06	0 00E+00	1 40E-02	2 80E-02
Am-242m	4.5425E-07	12.53	25 06	0 00E+00	5 69E-06	1 14E-05
Am-243	1.4921E-06	12.53	25 06	0 00E+00	1 87E-05	3 74E-05
C-14	5 7244E-09	12.53	25 06	0 00E+00	7 17E-08	1 43E-07
Cl-36	1.3124E-32	12.53	25 06	0 00E+00	1 64E-31	3 29E-31
Cm-243	2.3676E-07	12.53	25 06	0 00E+00	2 97E-06	5 93E-06
Cm-244	5.2042E-05	12.53	25 06	0 00E+00	6 52E-04	1 30E-03
Co-60	3 8208E-05	12.53	25 06	0 00E+00	4 79E-04	9 57E-04
Cs-134	4 8693E-01	12.53	25 06	0 00E+00	6 10E+00	1 22E+01
Cs-135	3 4477E-06	12.53	25 06	0 00E+00	4 32E-05	8 64E-05
Cs-137	2 8731E+00	12.53	25 06	0 00E+00	3 60E+01	7 20E+01
Eu-154	8 2053E-02	12 53	25 06	0 00E+00	1 03E+00	2 06E+00
Eu-155	3 9134E-02	12 53	25 06	0 00E+00	4 90E-01	9 81E-01
Fe-55	6 7429E-03	12 53	25 06	0 00E+00	8 45E-02	1 69E-01
H-3	1 0599E-02	12 53	25 06	0 00E+00	1.33E-01	2 66E-01
I-129	7 5300E-07	12 53	25 06	0 00E+00	9 43E-06	1 89E-05
Kr-85	2 8595E-01	12 53	25 06	0 00E+00	3 58E+00	7 16E+00
Np-237	9 5479E-06	12 53	25 06	0 00E+00	1.20E-04	2.39E-04
Pa-231	8 9297E-10	12 53	25 06	0 00E+00	1 12E-08	2.24E-08
Pb-210	3 7609E-12	12 53	25 06	0 00E+00	4 71E-11	9 42E-11
Pm-147	2 5452E+00	12 53	25 06	0 00E+00	3.19E+01	6 38E+01
Pu-238	2 0550E-02	12 53	25 06	0 00E+00	2 57E-01	5 15E-01
Pu-239	4.2838E-04	12 53	25 06	0.00E+00	5 37E-03	1 07E-02
Pu-240	2 4401E-04	12 53	25 06	0 00E+00	3 06E-03	6 11E-03
Pu-241	6 8764E-02	12 53	25 06	0 00E+00	8 61E-01	1.72E+00
Pu-242	3 6329E-07	12 53	25 06	0 00E+00	4 55E-06	9 10E-06
Ra-226	3 8045E-11	12 53	25 06	0 00E+00	4 77E-10	9 53E-10
Ra-228	2.9902E-15	12 53	25 06	0 00E+00	3 75E-14	7 49E-14
Ru-106	1.9055E-01	12 53	25 06	0 00E+00	2 39E+00	4 77E+00
Se-79	1.2936E-05	12 53	25 06	0 00E+00	1 62E-04	3 24E-04
Sn-126	1.1574E-05	12 53	25 06	0 00E+00	1 45E-04	2 90E-04
Sr-90	2.7505E+00	12 53	25 06	0 00E+00	3 45E+01	6 89E+01
Tc-99	4.2239E-04	12.53	25 06	0 00E+00	5 29E-03	1 06E-02
Th-229	1 8848E-12	12 53	25 06	0 00E+00	2 36E-11	4 72E-11
Th-230	1.7042E-08	12.53	25.06	0 00E+00	2 14E-07	4.27E-07
Th-232	7 8132E-15	12.53	25 06	0 00E+00	9 79E-14	1 96E-13
Tl-208	4 4063E-08	12.53	25 06	0 00E+00	5 52E-07	1.10E-06
U-232	1.3151E-07	12.53	25.06	0 00E+00	1 65E-06	3 30E-06
U-233	1 9564E-09	12.53	25 06	0 00E+00	2 45E-08	4 90E-08
U-234	1 8371E-04	12.53	25 06	0 00E+00	2 30E-03	4 60E-03
U-235	-2.7235E-06	12.53	0 00	1 78E-03	1.75E-03	1.78E-03
U-236	1 5493E-05	12.53	25 06	0 00E+00	1.94E-04	3 88E-04
U-238	-4.2851E-09	12.53	0.00	1 68E-05	1 68E-05	1.68E-05
Y-90	2 7505E+00	12.53	25 06	0 00E+00	3 45E+01	6 89E+01
Other Radionuclides					6 44E+01	1.29E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 834E+12
0 0250	1 041E+12
0 0375	9 610E+11
0 0575	9 450E+11
0 0850	6 024E+11
0 1250	5.217E+11
0.2250	5 106E+11
0 3750	2.472E+11
0.5750	3.395E+12
0 8500	4 754E+11
1.2500	8 845E+10
1 7500	3 709E+09
2.2500	7.780E+09
2.7500	4 476E+07
3.5000	4 964E+06
5.0000	1 490E+01
7.0000	1.661E+00
11 0000	1.873E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.35E-01	1.27E+00
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 %	94.28571429	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	12.53	4 74	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		25 06	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 05	0 38	0 99
Bounding	0 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: SLOWPOKE (HEU) CANADA
SNF ID #: 1065
Fuel Units & Descr: 1 - 297 ROD ARRAY
Heavy Metal Mass: BOL=0 875kg; EOL=0.87kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2010
Estimates as of: 2010
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: 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	1 4545E-10	12 53	25 06	0 00E+00	1 82E-09	3 64E-09
Am-241	1 1190E-03	12 53	25 06	0 00E+00	1 40E-02	2 80E-02
Am-242m	4 5425E-07	12 53	25 06	0 00E+00	5 69E-06	1 14E-05
Am-243	1 4921E-06	12 53	25 06	0 00E+00	1.87E-05	3 74E-05
C-14	5 7244E-09	12 53	25 06	0 00E+00	7 17E-08	1 43E-07
Cl-36	1 3124E-32	12 53	25 06	0 00E+00	1 64E-31	3.29E-31
Cm-243	2 3676E-07	12 53	25 06	0 00E+00	2.97E-06	5 93E-06
Cm-244	5 2042E-05	12 53	25 06	0 00E+00	6 52E-04	1 30E-03
Co-60	3 8208E-05	12 53	25 06	0 00E+00	4.79E-04	9 57E-04
Cs-134	4 8693E-01	12 53	25 06	0 00E+00	6 10E+00	1.22E+01
Cs-135	3 4477E-06	12 53	25 06	0 00E+00	4.32E-05	8 64E-05
Cs-137	2 8731E+00	12 53	25 06	0 00E+00	3 60E+01	7.20E+01
Eu-154	8 2053E-02	12 53	25 06	0 00E+00	1 03E+00	2.06E+00
Eu-155	3 9134E-02	12 53	25 06	0 00E+00	4 90E-01	9 81E-01
Fe-55	6 7429E-03	12 53	25 06	0 00E+00	8 45E-02	1 69E-01
H-3	1 0599E-02	12 53	25 06	0 00E+00	1 33E-01	2 66E-01
I-129	7 5300E-07	12.53	25 06	0 00E+00	9 43E-06	1 89E-05
Kr-85	2 8595E-01	12 53	25 06	0 00E+00	3 58E+00	7.16E+00
Np-237	9 5479E-06	12 53	25 06	0 00E+00	1.20E-04	2.39E-04
Pa-231	8 9297E-10	12 53	25 06	0 00E+00	1 12E-08	2.24E-08
Pb-210	3 7609E-12	12 53	25 06	0 00E+00	4 71E-11	9 42E-11
Pm-147	2 5452E+00	12 53	25 06	0 00E+00	3 19E+01	6.38E+01
Pu-238	2 0550E-02	12.53	25 06	0 00E+00	2 57E-01	5 15E-01
Pu-239	4.2838E-04	12 53	25 06	0 00E+00	5 37E-03	1 07E-02
Pu-240	2 4401E-04	12 53	25 06	0 00E+00	3 06E-03	6 11E-03
Pu-241	6 8764E-02	12.53	25 06	0 00E+00	8 61E-01	1 72E+00
Pu-242	3 6329E-07	12.53	25 06	0 00E+00	4 55E-06	9 10E-06
Ra-226	3 8045E-11	12.53	25 06	0 00E+00	4 77E-10	9.53E-10
Ra-228	2 9902E-15	12.53	25 06	0 00E+00	3 75E-14	7.49E-14
Ru-106	1 9055E-01	12.53	25 06	0 00E+00	2 39E+00	4 77E+00
Se-79	1.2936E-05	12.53	25 06	0 00E+00	1 62E-04	3.24E-04
Sn-126	1.1574E-05	12.53	25.06	0 00E+00	1 45E-04	2.90E-04
Sr-90	2.7505E+00	12 53	25 06	0 00E+00	3 45E+01	6 89E+01
Tc-99	4.2239E-04	12 53	25.06	0 00E+00	5 29E-03	1.06E-02
Th-229	1 8848E-12	12 53	25.06	0 00E+00	2 36E-11	4.72E-11
Th-230	1 7042E-08	12 53	25.06	0 00E+00	2 14E-07	4.27E-07
Th-232	7 8132E-15	12.53	25 06	0 00E+00	9 79E-14	1 96E-13
Tl-208	4 4063E-08	12.53	25.06	0 00E+00	5 52E-07	1.10E-06
U-232	1.3151E-07	12 53	25 06	0 00E+00	1 65E-06	3.30E-06
U-233	1.9564E-09	12 53	25 06	0 00E+00	2 45E-08	4 90E-08
U-234	1 8371E-04	12 53	25 06	0 00E+00	2 30E-03	4 60E-03
U-235	-2 7235E-06	12.53	0 00	1.78E-03	1.75E-03	1 78E-03
U-236	1.5493E-05	12 53	25 06	0 00E+00	1 94E-04	3 88E-04
U-238	-4 2851E-09	12.53	0 00	1 68E-05	1 68E-05	1 68E-05
Y-90	2.7505E+00	12 53	25 06	0 00E+00	3 45E+01	6 89E+01
Other Radionuclides					6 44E+01	1 29E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 834E+12
0 0250	1 041E+12
0 0375	9 610E+11
0 0575	9.450E+11
0 0850	6 024E+11
0 1250	5.217E+11
0.2250	5 106E+11
0 3750	2 472E+11
0 5750	3.395E+12
0 8500	4 754E+11
1.2500	8.845E+10
1 7500	3 709E+09
2.2500	7 780E+09
2.7500	4 476E+07
3 5000	4 964E+06
5 0000	1 490E+01
7 0000	1 661E+00
11 0000	1 873E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.35E-01	1.27E+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 %	94.28571429	60 to 100

Basis for Parameter Drifferences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate
Nominal	12.53	4 74	Nominal burnup taken directly from SFD (converted to MWd)
Bounding		25 06	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 05	0.38
Bounding	0 09	

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	SPERT-III	[1]Fuel decay start date	1966
SNF ID #	209	Estimates as of	2010
Fuel Units & Descr	3 - CANISTER OF SCRAP	Template	PWR (Light Water, Zirc, 0 to 5%, U)
Heavy Metal Mass	BOL= ; EOL=9 74kg	[2]Template Burnup(MWd)	61 92
ROD Storage Site	INEEL	Template BOL Heavy Metal Mass (MT)	0 00176911
		Template Decay Time	35 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	8 7758E-10	9,262 37	9,262 37	0 00E+00	8.13E-06	8 13E-06
Am-241	1 4352E-01	9,262 37	9,262 37	0 00E+00	1 33E+03	1.33E+03
Am-242m	2 8698E-04	9,262 37	9,262 37	0.00E+00	2 66E+00	2 66E+00
Am-243	6.2565E-04	9,262.37	9,262 37	0 00E+00	5 79E+00	5 79E+00
C-14	4 7901E-05	9,262.37	9,262 37	0.00E+00	4.44E-01	4 44E-01
Cl-36	8 0297E-07	9,262.37	9,262 37	0 00E+00	7.44E-03	7.44E-03
Cm-243	2 5081E-04	9,262.37	9,262 37	0 00E+00	2.32E+00	2.32E+00
Cm-244	4 9015E-02	9,262.37	9,262 37	0 00E+00	4.54E+02	4.54E+02
Co-60	2 5581E-03	9,262.37	9,262 37	0 00E+00	2.37E+01	2.37E+01
Cs-134	4 0536E-05	9,262.37	9,262 37	0 00E+00	3 75E-01	3 75E-01
Cs-135	1 4433E-05	9,262.37	9,262 37	0 00E+00	1.34E-01	1.34E-01
Cs-137	1 3979E+00	9,262.37	9,262 37	0 00E+00	1.29E+04	1.29E+04
Eu-154	2 0203E-02	9,262 37	9,262 37	0 00E+00	1.87E+02	1.87E+02
Eu-155	1 7684E-03	9,262 37	9,262.37	0 00E+00	1.64E+01	1.64E+01
Fe-55	4 3136E-05	9,262.37	9,262.37	0 00E+00	4 00E-01	4 00E-01
H-3	2 0769E-02	9,262.37	9,262.37	0 00E+00	1.92E+02	1.92E+02
I-129	9 8288E-07	9,262 37	9,262.37	0 00E+00	9 10E-03	9 10E-03
Kr-85	2 8214E-02	9,262 37	9,262.37	0 00E+00	2 61E+02	2 61E+02
Np-237	1 1218E-05	9,262 37	9,262.37	0 00E+00	1 04E-01	1 04E-01
Pa-231	1.3036E-09	9,262 37	9,262.37	0 00E+00	1 21E-05	1 21E-05
Pb-210	8 5078E-11	9,262 37	9,262.37	0 00E+00	7 88E-07	7 88E-07
Pm-147	3 6531E-04	9,262 37	9,262.37	0 00E+00	3 38E+00	3.38E+00
Pu-238	7 4564E-02	9,262 37	9,262.37	0 00E+00	6 91E+02	6 91E+02
Pu-239	1.1623E-02	9,262 37	9,262.37	0 00E+00	1 08E+02	1 08E+02
Pu-240	1.5132E-02	9,262 37	9,262.37	0 00E+00	1 40E+02	1 40E+02
Pu-241	9 0036E-01	9,262 37	9,262.37	0 00E+00	8 34E+03	8 34E+03
Pu-242	6 4260E-05	9,262 37	9,262.37	0 00E+00	5 95E-01	5 95E-01
Ra-226	2.2804E-10	9,262.37	9,262.37	0 00E+00	2 11E-06	2.11E-06
Ra-228	5.2713E-12	9,262.37	9,262.37	0 00E+00	4 88E-08	4 88E-08
Ru-106	6.1160E-10	9,262.37	9,262.37	0 00E+00	5 66E-06	5 66E-06
Se-79	1.2377E-05	9,262 37	9,262 37	0 00E+00	1.15E-01	1.15E-01
Sn-126	2.5210E-05	9,262.37	9,262.37	0 00E+00	2 34E-01	2.34E-01
Sr-90	9 1667E-01	9,262.37	9,262 37	0 00E+00	8 49E+03	8 49E+03
Tc-99	3 9357E-04	9,262 37	9,262 37	0 00E+00	3 65E+00	3 65E+00
Th-229	1.2057E-10	9,262.37	9,262 37	0 00E+00	1.12E-06	1.12E-06
Th-230	2 1043E-08	9,262.37	9,262 37	0 00E+00	1.95E-04	1.95E-04
Th-232	5.2972E-12	9,262.37	9,262 37	0 00E+00	4.91E-08	4 91E-08
Tl-208	1 7474E-07	9,262.37	9,262 37	0 00E+00	1.62E-03	1.62E-03
U-232	4 7368E-07	9,262.37	9,262 37	0 00E+00	4.39E-03	4.39E-03
U-233	2 5097E-08	9,262.37	9,262 37	0 00E+00	2.32E-04	2.32E-04
U-234	5 0000E-05	9,262.37	9,262.37	0 00E+00	4 63E-01	4 63E-01
U-235	-1 4489E-06	9,262.37	0 00	1.35E-03	0 00E+00	1.35E-03
U-236	7 5824E-06	9,262 37	9,262.37	0 00E+00	7.02E-02	7 02E-02
U-238	-2 6129E-07	9,262 37	0 00	6.33E-03	3 91E-03	6.33E-03
Y-90	9 1699E-01	9,262 37	9,262.37	0 00E+00	8.49E+03	8.49E+03
Other Radionuclides					1.24E+04	1.24E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 984E+14
0 0250	1 005E+14
0 0375	9 585E+13
0 0575	1 107E+14
0 0850	5 576E+13
0 1250	3 870E+13
0.2250	4 782E+13
0.3750	2 056E+13
0.5750	4 782E+14
0.8500	6 616E+12
1.2500	6 499E+12
1 7500	1 946E+11
2.2500	3 134E+07
2 7500	6 420E+07
3.5000	6 611E+06
5 0000	2.826E+06
7.0000	3.258E+05
11 0000	3 742E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 13E+02	2 13E+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 %		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		9,262.37
Bounding		9,262.37

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	13.58	
Bounding	13.58	

Estimated EOL HM/Given EOL HM: 1.58

[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: THOR (UALX-HEU) TAIWAN
SNF ID #: 629
Fuel Units & Descr: 35 - MTR TYPE
Heavy Metal Mass: BOL=5 061kg; EOL=4 098kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1997
Estimates as of: 2010
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: 10 years

Estimated Canister usage: 18"x10' 1 46

II. Estimates

Radionuclide	m: C/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 2892E-09	918 72	1,837.45	0 00E+00	1 18E-06	2.37E-06
Am-241	2 9429E-03	918 72	1,837.45	0 00E+00	2 70E+00	5 41E+00
Am-242m	1 9489E-06	918 72	1,837.45	0 00E+00	1.79E-03	3.58E-03
Am-243	2 3308E-07	918 72	1,837 45	0 00E+00	2 14E-04	4.28E-04
C-14	4 3278E-05	918 72	1,837 45	0 00E+00	3 98E-02	7 95E-02
Cl-36	4 3023E-08	918 72	1,837 45	0 00E+00	3 95E-05	7 91E-05
Cm-243	2 4286E-07	918 72	1,837 45	0 00E+00	2 23E-04	4 46E-04
Cm-244	2 6015E-06	918 72	1,837 45	0 00E+00	2 39E-03	4 78E-03
Co-60	1 6075E-02	918 72	1,837 45	0 00E+00	1.48E+01	2 95E+01
Cs-134	1 9323E-02	918 72	1,837 45	0 00E+00	1.78E+01	3 55E+01
Cs-135	3 1549E-05	918 72	1,837 45	0 00E+00	2 90E-02	5 80E-02
Cs-137	2 4556E+00	918 72	1,837 45	0 00E+00	2.26E+03	4 51E+03
Eu-154	9 0180E-01	918 72	1,837 45	0 00E+00	8.29E+02	1 66E+03
Eu-155	2.1820E-01	918 72	1,837 45	0 00E+00	2.00E+02	4 01E+02
Fe-55	2.2902E-03	918 72	1,837 45	0 00E+00	2 10E+00	4 21E+00
H-3	8.1609E-03	918 72	1,837 45	0 00E+00	7 50E+00	1 50E+01
I-129	7.3805E-07	918 72	1,837 45	0 00E+00	6.78E-04	1 36E-03
Kr-85	1.8256E-01	918 72	1,837 45	0 00E+00	1 68E+02	3 35E+02
Np-237	1 4505E-06	918 72	1,837 45	0 00E+00	1.33E-03	2 67E-03
Pa-231	4 5564E-09	918 72	1,837 45	0 00E+00	4.19E-06	8 37E-06
Pb-210	1 8842E-14	918 72	1,837 45	0 00E+00	1.73E-11	3 46E-11
Pm-147	5.5459E-01	918 72	1,837 45	0 00E+00	5 10E+02	1 02E+03
Pu-238	1.2992E-03	918 72	1,837 45	0 00E+00	1 19E+00	2.39E+00
Pu-239	5 6932E-03	918 72	1,837 45	0 00E+00	5 23E+00	1 05E+01
Pu-240	2.2632E-03	918.72	1,837 45	0 00E+00	2 08E+00	4.16E+00
Pu-241	9 8857E-02	918.72	1,837 45	0 00E+00	9 08E+01	1.82E+02
Pu-242	3 0602E-07	918.72	1,837 45	0 00E+00	2 81E-04	5 62E-04
Ra-226	1 0823E-13	918.72	1,837 45	0 00E+00	9 94E-11	1 99E-10
Ra-228	2 0406E-10	918.72	1,837.45	0 00E+00	1 87E-07	3 75E-07
Ru-106	3 0180E-03	918.72	1,837 45	0 00E+00	2 77E+00	5 55E+00
Se-79	1 2937E-05	918.72	1,837.45	0 00E+00	1 19E-02	2.38E-02
Sn-126	1 2238E-05	918 72	1,837.45	0 00E+00	1 12E-02	2.25E-02
Sr-90	2 3098E+00	918 72	1,837.45	0 00E+00	2 12E+03	4 24E+03
Tc-99	4 4120E-04	918 72	1,837 45	0 00E+00	4 05E-01	8.11E-01
Th-229	2 0932E-10	918 72	1,837 45	0 00E+00	1 92E-07	3.85E-07
Th-230	2 7744E-11	918 72	1,837 45	0 00E+00	2 55E-08	5.10E-08
Th-232	2 3744E-10	918 72	1,837 45	0 00E+00	2 18E-07	4.36E-07
Tl-208	1 9459E-08	918 72	1,837 45	0 00E+00	1.79E-05	3.58E-05
U-232	5 3850E-08	918 72	1,837 45	0 00E+00	4 95E-05	9 89E-05
U-233	1 3135E-07	918 72	1,837 45	0 00E+00	1.21E-04	2 41E-04
U-234	1 9143E-07	918 72	1,837 45	0 00E+00	1 76E-04	3 52E-04
U-235	-2 6159E-06	918 72	0 00	1.02E-02	7 79E-03	1 02E-02
U-236	1.2719E-05	918 72	1,837 45	0.00E+00	1.17E-02	2 34E-02
U-238	-3 8857E-08	918 72	0 00	1.16E-04	8 06E-05	1 16E-04
Y-90	2 3098E+00	918 72	1,837 45	0 00E+00	2.12E+03	4 24E+03
Other Radionuclides					2 42E+03	4 85E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2 470E+14
0 0250	5 166E+13
0 0375	6 101E+13
0 0575	5.045E+13
0 0850	3.279E+13
0 1250	4.538E+13
0.2250	2.879E+13
0.3750	1 185E+13
0 5750	1 765E+14
0 8500	3.215E+13
1 2500	3.535E+13
1 7500	1 014E+12
2.2500	2 411E+09
2.7500	4 728E+07
3 5000	5 768E+06
5 0000	1 041E+03
7 0000	1 177E+02
11 0000	1 340E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 41E+01	6 82E+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 %	93 16330608	10 to 20 1

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
Nominal		918 72
Bounding		1,837 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	4 91	
Bounding	9 83	

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 TRR-1 (UALX-HEU) THAILAND
SNF ID # 633
Fuel Units & Descr 31 - MTR TYPE
Heavy Metal Mass BOL=5.295kg EOL=4 771kg
ROD Storage Site SRS

[1]Fuel decay start date: 1998
Estimates as of 2010
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 10 years

Estimated Canister usage
18"x10'
1 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	1.2892E-09	500 07	1,000.14	0 00E+00	6 45E-07	1.29E-06
Am-241	2 9429E-03	500 07	1,000 14	0 00E+00	1 47E+00	2 94E+00
Am-242m	1 9489E-06	500 07	1,000 14	0 00E+00	9.75E-04	1.95E-03
Am-243	2 3308E-07	500 07	1,000.14	0 00E+00	1.17E-04	2.33E-04
C-14	4.3278E-05	500 07	1,000 14	0 00E+00	2.16E-02	4.33E-02
Cl-36	4 3023E-08	500 07	1,000.14	0 00E+00	2.15E-05	4.30E-05
Cm-243	2 4286E-07	500 07	1,000.14	0 00E+00	1.21E-04	2 43E-04
Cm-244	2 6015E-06	500 07	1,000.14	0 00E+00	1.30E-03	2 60E-03
Co-60	1 6075E-02	500 07	1,000.14	0 00E+00	8 04E+00	1 61E+01
Cs-134	1 9323E-02	500 07	1,000 14	0 00E+00	9 66E+00	1.93E+01
Cs-135	3 1549E-05	500 07	1,000 14	0 00E+00	1.58E-02	3 16E-02
Cs-137	2 4556E+00	500 07	1,000 14	0 00E+00	1.23E+03	2.46E+03
Eu-154	9 0180E-01	500 07	1,000 14	0 00E+00	4.51E+02	9 02E+02
Eu-155	2 1820E-01	500 07	1,000 14	0.00E+00	1.09E+02	2.18E+02
Fe-55	2.2902E-03	500 07	1,000 14	0 00E+00	1.15E+00	2.29E+00
H-3	8 1609E-03	500 07	1,000 14	0 00E+00	4 08E+00	8 16E+00
I-129	7.3805E-07	500 07	1,000 14	0.00E+00	3 69E-04	7.38E-04
Kr-85	1 8256E-01	500 07	1,000 14	0.00E+00	9 13E+01	1 83E+02
Np-237	1 4505E-06	500 07	1,000 14	0 00E+00	7 25E-04	1 45E-03
Pa-231	4 5564E-09	500 07	1,000 14	0 00E+00	2.28E-06	4 56E-06
Pb-210	1 8842E-14	500 07	1,000 14	0 00E+00	9 42E-12	1 88E-11
Pm-147	5 5459E-01	500 07	1,000 14	0 00E+00	2 77E+02	5 55E+02
Pu-238	1.2992E-03	500 07	1,000 14	0 00E+00	6 50E-01	1 30E+00
Pu-239	5 6932E-03	500 07	1,000 14	0 00E+00	2 85E+00	5 69E+00
Pu-240	2 2632E-03	500 07	1,000 14	0 00E+00	1.13E+00	2 26E+00
Pu-241	9 8857E-02	500 07	1,000 14	0 00E+00	4 94E+01	9 89E+01
Pu-242	3 0602E-07	500 07	1,000 14	0 00E+00	1 53E-04	3 06E-04
Ra-226	1 0823E-13	500 07	1,000 14	0 00E+00	5 41E-11	1 08E-10
Ra-228	2 0406E-10	500 07	1,000 14	0 00E+00	1 02E-07	2 04E-07
Ru-106	3 0180E-03	500 07	1,000 14	0 00E+00	1 51E+00	3 02E+00
Se-79	1 2937E-05	500 07	1,000 14	0 00E+00	6 47E-03	1.29E-02
Sn-126	1 2238E-05	500 07	1,000 14	0 00E+00	6 12E-03	1.22E-02
Sr-90	2 3098E+00	500.07	1,000 14	0 00E+00	1 16E+03	2 31E+03
Tc-99	4 4120E-04	500 07	1,000 14	0 00E+00	2.21E-01	4 41E-01
Th-229	2 0932E-10	500 07	1,000 14	0 00E+00	1 05E-07	2 09E-07
Th-230	2 7744E-11	500 07	1,000 14	0 00E+00	1.39E-08	2.77E-08
Th-232	2 3744E-10	500 07	1,000 14	0 00E+00	1.19E-07	2.37E-07
Tl-208	1 9459E-08	500 07	1,000.14	0 00E+00	9 73E-06	1.95E-05
U-232	5 3850E-08	500 07	1,000 14	0 00E+00	2 69E-05	5.39E-05
U-233	1.3135E-07	500 07	1,000 14	0 00E+00	6.57E-05	1.31E-04
U-234	1.9143E-07	500 07	1,000 14	0 00E+00	9.57E-05	1.91E-04
U-235	-2 6159E-06	500 07	0.00	1 03E-02	8.98E-03	1 03E-02
U-236	1.2719E-05	500 07	1,000 14	0 00E+00	6.36E-03	1.27E-02
U-238	-3 8857E-08	500 07	0 00	1 80E-04	1.60E-04	1 80E-04
Y-90	2.3098E+00	500 07	1,000 14	0 00E+00	1.16E+03	2.31E+03
Other Radionuclides					1.32E+03	2 64E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.345E+14
0 0250	2.812E+13
0 0375	3.321E+13
0 0575	2 746E+13
0 0850	1 785E+13
0 1250	2.470E+13
0.2250	1.567E+13
0 3750	6 448E+12
0.5750	9 606E+13
0 8500	1 750E+13
1.2500	1 924E+13
1 7500	5 517E+11
2.2500	1.313E+09
2 7500	2.574E+07
3 5000	3 140E+06
5 0000	5 672E+02
7 0000	6 411E+01
11 0000	7.297E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.85E+01	3 71E+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 %	89 90758798	10 to 20 1

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		500 07
Bounding		1,000 14

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	2.56	
Bounding	5 11	

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: UMRR (HEU) ROLLA
SNF ID #: 881
Fuel Units & Descr: 28 - 24 CURVED PLATES
Heavy Metal Mass: BOL=5.096kg, EOL=4 771kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1996
Estimates as of: 2010
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: 10 years

Estimated Canister usage: 18"x10" 1 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	2 8404E-10	307 59	615 18	0 00E+00	8.74E-08	1 75E-07
Am-241	1 4935E-03	307 59	615 18	0 00E+00	4 59E-01	9 19E-01
Am-242m	4 4390E-07	307 59	615 18	0 00E+00	1.37E-04	2 73E-04
Am-243	1 4913E-06	307 59	615 18	0 00E+00	4.59E-04	9 17E-04
C-14	5 7217E-09	307 59	615 18	0 00E+00	1.76E-06	3 52E-06
Cl-36	1 3124E-32	307 59	615 18	0 00E+00	4 04E-30	8 07E-30
Cm-243	2 0967E-07	307 59	615 18	0 00E+00	6 45E-05	1 29E-04
Cm-244	4 3001E-05	307 59	615 18	0 00E+00	1.32E-02	2 65E-02
Co-60	1 9798E-05	307 59	615 18	0 00E+00	6.09E-03	1 22E-02
Cs-134	9 0795E-02	307 59	615 18	0 00E+00	2 79E+01	5 59E+01
Cs-135	3 4477E-06	307 59	615 18	0 00E+00	1 06E-03	2 12E-03
Cs-137	2 5588E+00	307 59	615 18	0 00E+00	7 87E+02	1 57E+03
Eu-154	5 4847E-02	307 59	615 18	0 00E+00	1 69E+01	3 37E+01
Eu-155	1 9469E-02	307 59	615 18	0 00E+00	5 99E+00	1 20E+01
Fe-55	1 7797E-03	307 59	615 18	0 00E+00	5 47E-01	1 09E+00
H-3	8 0065E-03	307 59	615 18	0 00E+00	2 46E+00	4 93E+00
I-129	7 5300E-07	307 59	615 18	0 00E+00	2 32E-04	4 63E-04
Kr-85	2 0705E-01	307 59	615 18	0 00E+00	6 37E+01	1 27E+02
Np-237	9 5507E-06	307 59	615 18	0 00E+00	2 94E-03	5 88E-03
Pa-231	1.2740E-09	307 59	615 18	0 00E+00	3.92E-07	7 84E-07
Pb-210	1 1838E-11	307 59	615 18	0 00E+00	3.64E-09	7 28E-09
Pm-147	6 7974E-01	307 59	615 18	0 00E+00	2 09E+02	4 18E+02
Pu-238	1 9755E-02	307 59	615 18	0 00E+00	6 08E+00	1 22E+01
Pu-239	4 2838E-04	307 59	615.18	0.00E+00	1 32E-01	2 64E-01
Pu-240	2 4390E-04	307 59	615 18	0 00E+00	7 50E-02	1 50E-01
Pu-241	5 4058E-02	307 59	615.18	0.00E+00	1 66E+01	3 33E+01
Pu-242	3 6329E-07	307 59	615 18	0 00E+00	1 12E-04	2 23E-04
Ra-226	8 3742E-11	307 59	615.18	0 00E+00	2 58E-08	5 15E-08
Ra-228	5 7734E-15	307 59	615.18	0 00E+00	1 78E-12	3 55E-12
Ru-106	6 1356E-03	307 59	615 18	0 00E+00	1 89E+00	3 77E+00
Se-79	1 2936E-05	307 59	615 18	0 00E+00	3 98E-03	7 96E-03
Sn-126	1 1574E-05	307 59	615.18	0 00E+00	3 56E-03	7 12E-03
Sr-90	2 4417E+00	307.59	615 18	0 00E+00	7 51E+02	1 50E+03
Tc-99	4 2239E-04	307.59	615.18	0 00E+00	1 30E-01	2 60E-01
Th-229	2 8568E-12	307.59	615 18	0 00E+00	8 79E-10	1 76E-09
Th-230	2 5310E-08	307 59	615 18	0 00E+00	7 79E-06	1 56E-05
Th-232	1 1631E-14	307 59	615 18	0 00E+00	3 58E-12	7 16E-12
Tl-208	4 6705E-08	307 59	615 18	0 00E+00	1 44E-05	2 87E-05
U-232	1 3151E-07	307 59	615 18	0 00E+00	4 05E-05	8 09E-05
U-233	2.1650E-09	307 59	615 18	0 00E+00	6 66E-07	1 33E-06
U-234	1 8399E-04	307 59	615 18	0 00E+00	5 66E-02	1 13E-01
U-235	-2.7235E-06	307 59	0 00	1 03E-02	9 45E-03	1 03E-02
U-236	1 5493E-05	307.59	615 18	0 00E+00	4 77E-03	9 53E-03
U-238	-4.2851E-09	307.59	0 00	1 13E-04	1 12E-04	1 13E-04
Y-90	2 4423E+00	307.59	615 18	0 00E+00	7 51E+02	1 50E+03
Other Radionuclides					7 65E+02	1 53E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8.367E+13
0 0250	1 761E+13
0 0375	1 535E+13
0 0575	1 622E+13
0 0850	9 867E+12
0 1250	6 902E+12
0.2250	8 473E+12
0 3750	3.798E+12
0 5750	6 165E+13
0 8500	3 007E+12
1 2500	9 788E+11
1 7500	3.574E+10
2.2500	2.363E+09
2.7500	3.297E+07
3 5000	3 925E+06
5 0000	3.264E+02
7 0000	3 627E+01
11 0000	4 080E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.73E+00	1 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 %	93.40659341	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		307 59	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		615 18	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 19	
Bounding	0.38	

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	UMRR (LEU) ROLLA	[1]Fuel decay start date	2035
SNF ID #	146	Estimates as of	2010
Fuel Units & Descr	28 - 24 CURVED PLATES	Template	ATR (Light Water, Alum., 60 to 100%, U)
Heavy Metal Mass	BOL=31 898kg, EOL=26 46kg	[2]Template Burnup(MWd):	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0 00116689
		Template Decay Time	5 years

Estimated Canister usage
18"x10'
0 78

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 4545E-10	5,149 51	10,299 02	0 00E+00	7 49E-07	1 50E-06
Am-241	1 1190E-03	5,149 51	10,299 02	0 00E+00	5 76E+00	1 15E+01
Am-242m	4 5425E-07	5,149 51	10,299 02	0 00E+00	2.34E-03	4 68E-03
Am-243	1 4921E-06	5,149 51	10,299 02	0 00E+00	7.68E-03	1 54E-02
C-14	5 7244E-09	5,149 51	10,299 02	0 00E+00	2.95E-05	5 90E-05
Cl-36	1 3124E-32	5,149 51	10,299 02	0 00E+00	6.76E-29	1 35E-28
Cm-243	2 3676E-07	5,149 51	10,299 02	0 00E+00	1.22E-03	2 44E-03
Cm-244	5 2042E-05	5,149 51	10,299 02	0 00E+00	2 68E-01	5 36E-01
Co-60	3 8208E-05	5,149 51	10,299 02	0 00E+00	1 97E-01	3 94E-01
Cs-134	4 8693E-01	5,149 51	10,299 02	0 00E+00	2.51E+03	5 01E+03
Cs-135	3 4477E-06	5,149 51	10,299 02	0 00E+00	1 78E-02	3 55E-02
Cs-137	2 8731E+00	5,149 51	10,299 02	0 00E+00	1.48E+04	2 96E+04
Eu-154	8.2053E-02	5,149 51	10,299 02	0 00E+00	4.23E+02	8 45E+02
Eu-155	3 9134E-02	5,149 51	10,299 02	0 00E+00	2 02E+02	4 03E+02
Fe-55	6.7429E-03	5,149 51	10,299 02	0 00E+00	3 47E+01	6 94E+01
H-3	1 0599E-02	5,149 51	10,299 02	0 00E+00	5 46E+01	1 09E+02
I-129	7.5300E-07	5,149 51	10,299 02	0 00E+00	3 88E-03	7.76E-03
Kr-85	2 8595E-01	5,149 51	10,299 02	0 00E+00	1 47E+03	2 94E+03
Np-237	9 5479E-06	5,149.51	10,299 02	0 00E+00	4 92E-02	9 83E-02
Pa-231	8 9297E-10	5,149 51	10,299 02	0 00E+00	4 60E-06	9.20E-06
Pb-210	3 7609E-12	5,149 51	10,299 02	0 00E+00	1 94E-08	3 87E-08
Pm-147	2 5452E+00	5,149 51	10,299 02	0 00E+00	1 31E+04	2.62E+04
Pu-238	2 0550E-02	5,149 51	10,299 02	0 00E+00	1 06E+02	2.12E+02
Pu-239	4.2838E-04	5,149 51	10,299 02	0 00E+00	2 21E+00	4 41E+00
Pu-240	2 4401E-04	5,149 51	10,299 02	0 00E+00	1.26E+00	2 51E+00
Pu-241	6 8764E-02	5,149 51	10,299 02	0 00E+00	3 54E+02	7 08E+02
Pu-242	3 6329E-07	5,149 51	10,299.02	0 00E+00	1.87E-03	3 74E-03
Ra-226	3 8045E-11	5,149 51	10,299 02	0 00E+00	1.96E-07	3 92E-07
Ra-228	2 9902E-15	5,149 51	10,299 02	0 00E+00	1.54E-11	3 08E-11
Ru-106	1 9055E-01	5,149 51	10,299 02	0 00E+00	9 81E+02	1 96E+03
Se-79	1.2936E-05	5,149 51	10,299 02	0 00E+00	6 66E-02	1.33E-01
Sn-126	1 1574E-05	5,149 51	10,299 02	0 00E+00	5 96E-02	1 19E-01
Sr-90	2 7505E+00	5,149 51	10,299 02	0 00E+00	1.42E+04	2 83E+04
Tc-99	4 2239E-04	5,149 51	10,299 02	0 00E+00	2 18E+00	4 35E+00
Th-229	1 8848E-12	5,149 51	10,299 02	0 00E+00	9 71E-09	1.94E-08
Th-230	1 7042E-08	5,149 51	10,299 02	0 00E+00	8 78E-05	1.76E-04
Th-232	7 8132E-15	5,149 51	10,299 02	0 00E+00	4 02E-11	8.05E-11
Tl-208	4 4063E-08	5,149 51	10,299 02	0 00E+00	2 27E-04	4.54E-04
U-232	1.3151E-07	5,149 51	10,299 02	0 00E+00	6 77E-04	1.35E-03
U-233	1.9564E-09	5,149 51	10,299 02	0 00E+00	1 01E-05	2 01E-05
U-234	1.8371E-04	5,149.51	10,299 02	0 00E+00	9 46E-01	1.89E+00
U-235	-2 7235E-06	5,149.51	0 00	1.36E-02	0 00E+00	1.36E-02
U-236	1.5493E-05	5,149 51	10,299 02	0 00E+00	7 98E-02	1 60E-01
U-238	-4 2851E-09	5,149 51	0 00	8 60E-03	8.58E-03	8 60E-03
Y-90	2 7505E+00	5,149 51	10,299 02	0 00E+00	1 42E+04	2 83E+04
Other Radionuclides					2 65E+04	5 30E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0.0150	1.987E+15
0 0250	4.281E+14
0 0375	3 950E+14
0 0575	3 884E+14
0 0850	2 476E+14
0 1250	2 144E+14
0.2250	2 099E+14
0.3750	1 016E+14
0.5750	1 395E+15
0 8500	1 954E+14
1.2500	3 636E+13
1 7500	1.525E+12
2.2500	3 198E+12
2.7500	1.840E+10
3 5000	2.040E+09
5 0000	6 119E+03
7 0000	6.822E+02
11 0000	7.690E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 61E+02	5.22E+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 7500078	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		5 149 51
Bounding		10,299 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 51	
Bounding	1 03	

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	UNIV OF FLORIDA (ARGONAUT) HEU	[1]Fuel decay start date:	2035
SNF ID #:	272	Estimates as of:	2010
Fuel Units & Descr:	259 - ELEMENT	Template:	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass	BOL=4 144kg; EOL=4 092kg	[2]Template Burnup(MWd)	367 2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT):	0 00116689
		Template Decay Time:	5 years

Estimated Canister usage: 18"x10' — 7 19

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 4545E-10	49 06	98.11	0 00E+00	7.14E-09	1 43E-08
Am-241	1 1190E-03	49 06	98.11	0 00E+00	5 49E-02	1 10E-01
Am-242m	4 5425E-07	49 06	98.11	0 00E+00	2 23E-05	4 46E-05
Am-243	1 4921E-06	49 06	98 11	0 00E+00	7 32E-05	1 46E-04
C-14	5 7244E-09	49 06	98.11	0 00E+00	2 81E-07	5 62E-07
Cl-36	1 3124E-32	49 06	98.11	0 00E+00	6 44E-31	1.29E-30
Cm-243	2 3676E-07	49 06	98.11	0 00E+00	1 16E-05	2 32E-05
Cm-244	5 2042E-05	49 06	98 11	0 00E+00	2 55E-03	5 11E-03
Co-60	3 8208E-05	49 06	98 11	0 00E+00	1 87E-03	3 75E-03
Cs-134	4 8693E-01	49 06	98 11	0 00E+00	2 39E+01	4 78E+01
Cs-135	3 4477E-06	49 06	98 11	0 00E+00	1 69E-04	3 38E-04
Cs-137	2 8731E+00	49 06	98 11	0 00E+00	1 41E+02	2 82E+02
Eu-154	8 2053E-02	49 06	98 11	0 00E+00	4 03E+00	8 05E+00
Eu-155	3 9134E-02	49 06	98 11	0 00E+00	1 92E+00	3 84E+00
Fe-55	6 7429E-03	49 06	98 11	0 00E+00	3 31E-01	6 62E-01
H-3	1 0599E-02	49 06	98 11	0 00E+00	5 20E-01	1 04E+00
I-129	7 5300E-07	49 06	98 11	0 00E+00	3 69E-05	7 39E-05
Kr-85	2 8595E-01	49 06	98 11	0 00E+00	1 40E+01	2 81E+01
Np-237	9 5479E-06	49 06	98 11	0 00E+00	4 68E-04	9 37E-04
Pa-231	8 9297E-10	49 06	98 11	0 00E+00	4 38E-08	8 76E-08
Pb-210	3 7609E-12	49 06	98 11	0 00E+00	1 84E-10	3 69E-10
Pm-147	2 5452E+00	49 06	98 11	0 00E+00	1.25E+02	2 50E+02
Pu-238	2 0550E-02	49 06	98 11	0 00E+00	1 01E+00	2 02E+00
Pu-239	4 2838E-04	49 06	98 11	0 00E+00	2 10E-02	4 20E-02
Pu-240	2.4401E-04	49 06	98 11	0 00E+00	1 20E-02	2 39E-02
Pu-241	6 8764E-02	49 06	98 11	0.00E+00	3 37E+00	6 75E+00
Pu-242	3 6329E-07	49 06	98 11	0 00E+00	1 78E-05	3 56E-05
Ra-226	3 8045E-11	49 06	98 11	0 00E+00	1 87E-09	3 73E-09
Ra-228	2 9902E-15	49 06	98 11	0 00E+00	1 47E-13	2 93E-13
Ru-106	1 9055E-01	49 06	98 11	0 00E+00	9.35E+00	1 87E+01
Se-79	1.2936E-05	49 06	98 11	0 00E+00	6 35E-04	1 27E-03
Sn-126	1 1574E-05	49 06	98 11	0 00E+00	5 68E-04	1 14E-03
Sr-90	2 7505E+00	49 06	98 11	0 00E+00	1.35E+02	2.70E+02
Tc-99	4.2239E-04	49 06	98 11	0 00E+00	2 07E-02	4 14E-02
Th-229	1 8848E-12	49 06	98 11	0 00E+00	9.25E-11	1 85E-10
Th-230	1.7042E-08	49 06	98 11	0 00E+00	8 36E-07	1 67E-06
Th-232	7 8132E-15	49 06	98 11	0 00E+00	3 83E-13	7 67E-13
Tl-208	4 4063E-08	49 06	98 11	0 00E+00	2.16E-06	4 32E-06
U-232	1.3151E-07	49 06	98.11	0 00E+00	6.45E-06	1.29E-05
U-233	1 9564E-09	49 06	98 11	0 00E+00	9 60E-08	1 92E-07
U-234	1.8371E-04	49 06	98 11	0 00E+00	9 01E-03	1 80E-02
U-235	-2.7235E-06	49 06	0.00	8 34E-03	8.21E-03	8 34E-03
U-236	1.5493E-05	49 06	98.11	0 00E+00	7 60E-04	1 52E-03
U-238	-4.2851E-09	49 06	0 00	9 54E-05	9 52E-05	9 54E-05
Y-90	2.7505E+00	49 06	98.11	0 00E+00	1 35E+02	2.70E+02
Other Radionuclides					2 52E+02	5 05E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 893E+13
0 0250	4 078E+12
0 0375	3 763E+12
0 0575	3 700E+12
0 0850	2.359E+12
0 1250	2 043E+12
0.2250	1 999E+12
0.3750	9 677E+11
0 5750	1.329E+13
0 8500	1.862E+12
1.2500	3.463E+11
1 7500	1 452E+10
2.2500	3 046E+10
2.7500	1 753E+08
3 5000	1.944E+07
5 0000	5.844E+01
7 0000	6.515E+00
11 0000	7 344E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.49E+00	4.97E+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 15	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	28 18	49 06	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding		98 11	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 04	1.74	1 00
Bounding	0 08		

[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	UNIV OF FLORIDA (ARGONAUT) LEU	[1]Fuel decay start date	2035
SNF ID #	273	Estimates as of	2010
Fuel Units & Descr	14 - ELEMENT	Template	ATR (Light Water Alum , 60 to 100%, U)
Heavy Metal Mass	BOL=0 995kg EOL=0 995kg	[2]Template Burnup(MWd):	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0 00116689
		Template Decay Time	5 years

Estimated Canister usage 18"x10' = 0 58

II. Estimates

Radionuclide	m: C/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 4545E-10	0 60	1 19	0 00E+00	8 69E-11	1 74E-10
Am-241	1.1190E-03	0 60	1.19	0 00E+00	6 68E-04	1.34E-03
Am-242m	4 5425E-07	0 60	1 19	0 00E+00	2 71E-07	5 43E-07
Am-243	1.4921E-06	0 60	1 19	0 00E+00	8 91E-07	1.78E-06
C-14	5 7244E-09	0 60	1 19	0 00E+00	3 42E-09	6 84E-09
Cl-36	1.3124E-32	0 60	1 19	0 00E+00	7 84E-33	1.57E-32
Cm-243	2 3676E-07	0 60	1 19	0 00E+00	1 41E-07	2.83E-07
Cm-244	5.2042E-05	0 60	1 19	0 00E+00	3 11E-05	6.22E-05
Co-60	3 8208E-05	0 60	1.19	0 00E+00	2.28E-05	4.56E-05
Cs-134	4 8693E-01	0 60	1 19	0 00E+00	2 91E-01	5.82E-01
Cs-135	3 4477E-06	0 60	1 19	0 00E+00	2 06E-06	4.12E-06
Cs-137	2 8731E+00	0 60	1.19	0 00E+00	1 72E+00	3 43E+00
Eu-154	8.2053E-02	0 60	1 19	0 00E+00	4 90E-02	9 80E-02
Eu-155	3 9134E-02	0 60	1 19	0 00E+00	2.34E-02	4.67E-02
Fe-55	6 7429E-03	0 60	1.19	0 00E+00	4 03E-03	8 05E-03
H-3	1 0599E-02	0 60	1.19	0 00E+00	6 33E-03	1.27E-02
I-129	7.5300E-07	0 60	1.19	0 00E+00	4 50E-07	8 99E-07
Kr-85	2 8595E-01	0 60	1.19	0 00E+00	1.71E-01	3 42E-01
Np-237	9 5479E-06	0 60	1.19	0 00E+00	5.70E-06	1 14E-05
Pa-231	8 9297E-10	0 60	1.19	0 00E+00	5.33E-10	1 07E-09
Pb-210	3 7609E-12	0 60	1.19	0 00E+00	2.25E-12	4 49E-12
Pm-147	2 5452E+00	0 60	1.19	0 00E+00	1 52E+00	3 04E+00
Pu-238	2 0550E-02	0 60	1.19	0 00E+00	1.23E-02	2 45E-02
Pu-239	4 2838E-04	0 60	1.19	0.00E+00	2.56E-04	5 12E-04
Pu-240	2 4401E-04	0 60	1.19	0 00E+00	1.46E-04	2 91E-04
Pu-241	6 8764E-02	0 60	1.19	0 00E+00	4 11E-02	8 21E-02
Pu-242	3 6329E-07	0 60	1.19	0.00E+00	2 17E-07	4 34E-07
Ra-226	3 8045E-11	0 60	1.19	0.00E+00	2.27E-11	4 54E-11
Ra-228	2 9902E-15	0 60	1.19	0 00E+00	1 79E-15	3 57E-15
Ru-106	1 9055E-01	0 60	1.19	0 00E+00	1 14E-01	2 28E-01
Se-79	1 2936E-05	0 60	1.19	0 00E+00	7.73E-06	1 55E-05
Sn-126	1 1574E-05	0 60	1.19	0 00E+00	6 91E-06	1.38E-05
Sr-90	2 7505E+00	0 60	1.19	0 00E+00	1 64E+00	3 29E+00
Tc-99	4 2239E-04	0 60	1.19	0.00E+00	2 52E-04	5 05E-04
Th-229	1 8848E-12	0 60	1 19	0 00E+00	1 13E-12	2.25E-12
Th-230	1 7042E-08	0 60	1.19	0 00E+00	1 02E-08	2.04E-08
Th-232	7 8132E-15	0 60	1 19	0 00E+00	4 67E-15	9 33E-15
Tl-208	4 4063E-08	0 60	1.19	0 00E+00	2 63E-08	5.26E-08
U-232	1 3151E-07	0 60	1 19	0 00E+00	7 85E-08	1.57E-07
U-233	1 9564E-09	0 60	1 19	0 00E+00	1 17E-09	2.34E-09
U-234	1 8371E-04	0 60	1 19	0 00E+00	1 10E-04	2.19E-04
U-235	-2.7235E-06	0 60	0 00	4 27E-04	4 25E-04	4.27E-04
U-236	-1 5493E-05	0 60	1 19	0 00E+00	9 25E-06	1.85E-05
U-238	-4.2851E-09	0 60	0 00	2 68E-04	2 68E-04	2.68E-04
Y-90	2 7505E+00	0 60	1 19	0 00E+00	1 64E+00	3.29E+00
Other Radionuclides					3 07E+00	6 14E+00

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.305E+11
0 0250	4 965E+10
0 0375	4 581E+10
0 0575	4 505E+10
0 0850	2.872E+10
0 1250	2.487E+10
0.2250	2.435E+10
0 3750	1 178E+10
0.5750	1 618E+11
0 8500	2.266E+10
1.2500	4.217E+09
1 7500	1 768E+08
2.2500	3 709E+08
2 7500	2 134E+06
3 5000	2.366E+05
5 0000	1.327E+00
7 0000	1.502E-01
11 0000	1 710E-02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3 03E-02	6 06E-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 8359342	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	0.60	
Bounding		1 19

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	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. UNIV OF MASS-LOWELL (HEU)
SNF ID #: 274
Fuel Units & Descr: 34 - 18 FLAT PLATES
Heavy Metal Mass. BOL=4 784kg, EOL=4 498kg
ROD Storage Site: SRS

[1]Fuel decay start date. 2035
Estimates as of: 2010
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 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 Inventones(Ci)
Ac-227	1 4545E-10	270 47	540 94	0 00E+00	3 93E-08	7 87E-08
Am-241	1 1190E-03	270 47	540 94	0 00E+00	3 03E-01	6 05E-01
Am-242m	4 5425E-07	270 47	540 94	0 00E+00	1.23E-04	2 46E-04
Am-243	1 4921E-06	270 47	540 94	0 00E+00	4 04E-04	8 07E-04
C-14	5 7244E-09	270 47	540 94	0 00E+00	1.55E-06	3 10E-06
Cl-36	1 3124E-32	270 47	540 94	0 00E+00	3 55E-30	7 10E-30
Cm-243	2 3676E-07	270 47	540 94	0 00E+00	6 40E-05	1 28E-04
Cm-244	5 2042E-05	270 47	540 94	0 00E+00	1 41E-02	2 82E-02
Co-60	3 8208E-05	270 47	540 94	0 00E+00	1.03E-02	2 07E-02
Cs-134	4 8693E-01	270 47	540 94	0 00E+00	1 32E+02	2 63E+02
Cs-135	3 4477E-06	270 47	540 94	0 00E+00	9.32E-04	1 86E-03
Cs-137	2 8731E+00	270 47	540 94	0 00E+00	7 77E+02	1 55E+03
Eu-154	8 2053E-02	270 47	540 94	0 00E+00	2 22E+01	4 44E+01
Eu-155	3 9134E-02	270 47	540 94	0 00E+00	1 06E+01	2 12E+01
Fe-55	6 7429E-03	270 47	540 94	0 00E+00	1 82E+00	3 65E+00
H-3	1 0599E-02	270 47	540 94	0 00E+00	2 87E+00	5 73E+00
I-129	7 5300E-07	270 47	540 94	0 00E+00	2 04E-04	4 07E-04
Kr-85	2 8595E-01	270 47	540 94	0 00E+00	7 73E+01	1 55E+02
Np-237	9 5479E-06	270 47	540 94	0 00E+00	2 58E-03	5 16E-03
Pa-231	8 9297E-10	270 47	540 94	0 00E+00	2 42E-07	4 83E-07
Pb-210	3 7609E-12	270 47	540 94	0 00E+00	1 02E-09	2 03E-09
Pm-147	2 5452E+00	270 47	540 94	0 00E+00	6 88E+02	1 38E+03
Pu-238	2 0550E-02	270 47	540 94	0 00E+00	5 56E+00	1 11E+01
Pu-239	4 2838E-04	270 47	540 94	0 00E+00	1 16E-01	2 32E-01
Pu-240	2 4401E-04	270 47	540 94	0 00E+00	6 60E-02	1 32E-01
Pu-241	6 8764E-02	270 47	540 94	0 00E+00	1 86E+01	3 72E+01
Pu-242	3 6329E-07	270 47	540 94	0 00E+00	9 83E-05	1 97E-04
Ra-226	3 8045E-11	270 47	540 94	0 00E+00	1 03E-08	2 06E-08
Ra-228	2 9902E-15	270 47	540 94	0 00E+00	8 09E-13	1 62E-12
Ru-106	1 9055E-01	270 47	540 94	0 00E+00	5 15E+01	1 03E+02
Se-79	1 2936E-05	270 47	540 94	0 00E+00	3 50E-03	7 00E-03
Sn-126	1 1574E-05	270 47	540 94	0 00E+00	3 13E-03	6 26E-03
Sr-90	2 7505E+00	270 47	540 94	0 00E+00	7 44E+02	1 49E+03
Tc-99	4 2239E-04	270 47	540 94	0 00E+00	1 14E-01	2 28E-01
Th-229	1 8848E-12	270 47	540 94	0 00E+00	5 10E-10	1 02E-09
Th-230	1 7042E-08	270 47	540 94	0.00E+00	4 61E-06	9 22E-06
Th-232	7 8132E-15	270 47	540 94	0 00E+00	2 11E-12	4 23E-12
Tl-208	4 4063E-08	270 47	540 94	0 00E+00	1 19E-05	2 38E-05
U-232	1 3151E-07	270 47	540 94	0 00E+00	3 56E-05	7 11E-05
U-233	1 9564E-09	270 47	540 94	0 00E+00	5 29E-07	1 06E-06
U-234	1 8371E-04	270 47	540 94	0 00E+00	4 97E-02	9 94E-02
U-235	-2.7235E-06	270 47	0 00	9 63E-03	8 89E-03	9 63E-03
U-236	1 5493E-05	270 47	540 94	0 00E+00	4 19E-03	8 38E-03
U-238	-4.2851E-09	270 47	0 00	1 10E-04	1 09E-04	1 10E-04
Y-90	2 7505E+00	270 47	540 94	0 00E+00	7 44E+02	1 49E+03
Other Radionuclides					1 39E+03	2 78E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 044E+14
0 0250	2 248E+13
0 0375	2 075E+13
0 0575	2 040E+13
0 0850	1 301E+13
0 1250	1 126E+13
0.2250	1 102E+13
0.3750	5 336E+12
0 5750	7 329E+13
0 8500	1 026E+13
1.2500	1 910E+12
1 7500	8 008E+10
2.2500	1 680E+11
2 7500	9 663E+08
3.5000	1 072E+08
5 0000	3.207E+02
7 0000	3 576E+01
11 0000	4 030E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.37E+01	2 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 16325044	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal		270 47	Nominal burnup calculated from the heavy metal mass destroyed
Bounding		540 94	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal	0 18	
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	UNIV OF MASS-LOWELL (LEU)	[1]Fuel decay start date	2035
SNF ID #	275	Estimates as of	2010
Fuel Units & Descr	41 - 18 FLAT PLATES	Template	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass	BOL=14.321kg EOL=14.321kg	[2]Template Burnup(MWd)	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT):	0 00116689
		Template Decay Time	5 years

Estimated Canister usage 18"x10' 1.14

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	1 4545E-10	271.25	542 50	0 00E+00	3 95E-08	7 89E-08
Am-241	1 1190E-03	271.25	542.50	0 00E+00	3 04E-01	6 07E-01
Am-242m	4 5425E-07	271.25	542 50	0 00E+00	1 23E-04	2 46E-04
Am-243	1 4921E-06	271.25	542 50	0 00E+00	4 05E-04	8 09E-04
C-14	5 7244E-09	271.25	542 50	0 00E+00	1 55E-06	3.11E-06
Cl-36	1 3124E-32	271.25	542 50	0 00E+00	3 56E-30	7.12E-30
Cm-243	2 3676E-07	271.25	542 50	0 00E+00	6 42E-05	1.28E-04
Cm-244	5 2042E-05	271.25	542 50	0 00E+00	1 41E-02	2.82E-02
Co-60	3 8208E-05	271.25	542 50	0 00E+00	1 04E-02	2 07E-02
Cs-134	4 8693E-01	271.25	542 50	0 00E+00	1 32E+02	2.64E+02
Cs-135	3 4477E-06	271.25	542 50	0.00E+00	9 35E-04	1 87E-03
Cs-137	2 8731E+00	271 25	542 50	0 00E+00	7 79E+02	1.56E+03
Eu-154	8.2053E-02	271 25	542 50	0 00E+00	2 23E+01	4 45E+01
Eu-155	3.9134E-02	271 25	542 50	0 00E+00	1 06E+01	2 12E+01
Fe-55	6 7429E-03	271 25	542.50	0 00E+00	1 83E+00	3 66E+00
H-3	1.0599E-02	271 25	542.50	0 00E+00	2 88E+00	5 75E+00
I-129	7.5300E-07	271 25	542 50	0 00E+00	2.04E-04	4 09E-04
Kr-85	2 8595E-01	271.25	542.50	0 00E+00	7.76E+01	1 55E+02
Np-237	9 5479E-06	271 25	542.50	0 00E+00	2.59E-03	5 18E-03
Pa-231	8 9297E-10	271.25	542.50	0 00E+00	2 42E-07	4 84E-07
Pb-210	3 7609E-12	271.25	542.50	0 00E+00	1 02E-09	2.04E-09
Pm-147	2 5452E+00	271.25	542.50	0 00E+00	6 90E+02	1.38E+03
Pu-238	2 0550E-02	271.25	542.50	0 00E+00	5.57E+00	1.11E+01
Pu-239	4 2838E-04	271.25	542.50	0 00E+00	1 16E-01	2.32E-01
Pu-240	2 4401E-04	271.25	542 50	0 00E+00	6 62E-02	1.32E-01
Pu-241	6 8764E-02	271.25	542.50	0 00E+00	1 87E+01	3.73E+01
Pu-242	3 6329E-07	271.25	542 50	0 00E+00	9 85E-05	1 97E-04
Ra-226	3 8045E-11	271.25	542 50	0 00E+00	1 03E-08	2 06E-08
Ra-228	2 9902E-15	271.25	542 50	0 00E+00	8 11E-13	1 62E-12
Ru-106	1.9055E-01	271.25	542 50	0.00E+00	5 17E+01	1 03E+02
Se-79	1.2936E-05	271.25	542 50	0 00E+00	3 51E-03	7 02E-03
Sn-126	1.1574E-05	271.25	542 50	0 00E+00	3.14E-03	6 28E-03
Sr-90	2.7505E+00	271.25	542 50	0 00E+00	7 46E+02	1 49E+03
Tc-99	4.2239E-04	271.25	542 50	0 00E+00	1.15E-01	2 29E-01
Th-229	1 8848E-12	271.25	542 50	0 00E+00	5.11E-10	1 02E-09
Th-230	1 7042E-08	271 25	542 50	0 00E+00	4 62E-06	9.25E-06
Th-232	7 8132E-15	271 25	542 50	0 00E+00	2 12E-12	4.24E-12
Tl-208	4 4063E-08	271.25	542.50	0 00E+00	1.20E-05	2.39E-05
U-232	1 3151E-07	271.25	542.50	0 00E+00	3 57E-05	7.13E-05
U-233	1 9564E-09	271.25	542.50	0 00E+00	5 31E-07	1 06E-06
U-234	1 8371E-04	271.25	542.50	0 00E+00	4 98E-02	9 97E-02
U-235	-2.7235E-06	271.25	0 00	6 10E-03	5 36E-03	6 10E-03
U-236	1 5493E-05	271.25	542.50	0 00E+00	4 20E-03	8 40E-03
U-238	-4.2851E-09	271.25	0 00	3 86E-03	3 86E-03	3 86E-03
Y-90	2 7505E+00	271.25	542.50	0 00E+00	7 46E+02	1 49E+03
Other Radionuclides					1 40E+03	2 79E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.047E+14
0 0250	2.255E+13
0 0375	2.081E+13
0 0575	2.046E+13
0 0850	1.304E+13
0 1250	1 130E+13
0 2250	1 105E+13
0 3750	5.351E+12
0 5750	7.350E+13
0 8500	1 029E+13
1.2500	1 915E+12
1 7500	8 031E+10
2.2500	1 684E+11
2.7500	9 691E+08
3 5000	1 075E+08
5.0000	3.302E+02
7.0000	3 684E+01
11.0000	4 155E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.38E+01	2 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 %	19 71401492	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		271.25
Bounding		542.50

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: UNIV OF MICHIGAN
SNF ID #: 276
Fuel Units & Descr: 130 - 18 CURVED PLATES
Heavy Metal Mass: BOL=100 854kg; EOL=89 882kg
ROD Storage Site: SRS

[1]Fuel decay start date: 1992
Estimates as of: 2010
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: 15 years

Estimated Canister usage: 18"x10' 5 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	4 5861E-10	10,390 70	20,781 39	0 00E+00	4 77E-06	9 53E-06
Am-241	1 7832E-03	10,390 70	20,781 39	0 00E+00	1 85E+01	3 71E+01
Am-242m	4 3410E-07	10,390 70	20,781 39	0 00E+00	4 51E-03	9 02E-03
Am-243	1 4907E-06	10,390 70	20,781 39	0 00E+00	1 55E-02	3 10E-02
C-14	5 7162E-09	10,390 70	20,781 39	0 00E+00	5 94E-05	1 19E-04
Cl-36	1 3124E-32	10,390 70	20,781 39	0 00E+00	1.36E-28	2 73E-28
Cm-243	1 8568E-07	10,390 70	20,781.39	0 00E+00	1 93E-03	3 86E-03
Cm-244	3 5512E-05	10,390 70	20,781.39	0 00E+00	3 69E-01	7 38E-01
Co-60	1 0261E-05	10,390 70	20,781.39	0 00E+00	1 07E-01	2 13E-01
Cs-134	1 6931E-02	10,390 70	20,781.39	0 00E+00	1 76E+02	3 52E+02
Cs-135	3 4477E-06	10,390 70	20,781.39	0 00E+00	3 58E-02	7 16E-02
Cs-137	2.2800E+00	10,390 70	20,781.39	0 00E+00	2 37E+04	4 74E+04
Eu-154	3.6656E-02	10,390 70	20,781.39	0 00E+00	3 81E+02	7 62E+02
Eu-155	9 6841E-03	10,390 70	20,781 39	0 00E+00	1 01E+02	2 01E+02
Fe-55	4 6977E-04	10,390 70	20,781 39	0 00E+00	4 88E+00	9 76E+00
H-3	6 0485E-03	10,390 70	20,781 39	0 00E+00	6 28E+01	1.26E+02
I-129	7 5300E-07	10,390.70	20,781 39	0 00E+00	7 82E-03	1 56E-02
Kr-85	1 4989E-01	10,390.70	20,781 39	0 00E+00	1 56E+03	3.11E+03
Np-237	9 5534E-06	10,390.70	20,781 39	0 00E+00	9 93E-02	1 99E-01
Pa-231	1 6550E-09	10,390 70	20,781 39	0 00E+00	1 72E-05	3 44E-05
Pb-210	2 6631E-11	10,390 70	20,781 39	0 00E+00	2 77E-07	5 53E-07
Pm-147	1 8156E-01	10,390 70	20,781 39	0 00E+00	1 89E+03	3.77E+03
Pu-238	1 8990E-02	10,390 70	20,781 39	0 00E+00	1.97E+02	3 95E+02
Pu-239	4 2838E-04	10,390 70	20,781 39	0.00E+00	4 45E+00	8 90E+00
Pu-240	2 4379E-04	10,390 70	20,781 39	0 00E+00	2.53E+00	5 07E+00
Pu-241	4 2511E-02	10,390 70	20,781 39	0 00E+00	4 42E+02	8 83E+02
Pu-242	3 6329E-07	10,390 70	20,781 39	0 00E+00	3 77E-03	7 55E-03
Ra-226	1 4725E-10	10,390 70	20,781.39	0 00E+00	1.53E-06	3 06E-06
Ra-228	8 9760E-15	10,390 70	20,781.39	0 00E+00	9.33E-11	1 87E-10
Ru-106	1 9752E-04	10,390 70	20,781.39	0 00E+00	2 05E+00	4 10E+00
Se-79	1.2933E-05	10,390 70	20,781.39	0 00E+00	1.34E-01	2 69E-01
Sn-126	1 1574E-05	10,390 70	20,781.39	0 00E+00	1.20E-01	2 41E-01
Sr-90	2 1680E+00	10,390 70	20,781.39	0 00E+00	2 25E+04	4 51E+04
Tc-99	4.2239E-04	10,390 70	20,781.39	0 00E+00	4 39E+00	8 78E+00
Th-229	3 9270E-12	10,390 70	20,781 39	0 00E+00	4 08E-08	8 16E-08
Th-230	3.3578E-08	10,390 70	20,781 39	0 00E+00	3 49E-04	6 98E-04
Th-232	1.5452E-14	10,390 70	20,781.39	0 00E+00	1 61E-10	3 21E-10
Tl-208	4 6705E-08	10,390 70	20,781 39	0 00E+00	4 85E-04	9 71E-04
U-232	1 3045E-07	10,390 70	20,781 39	0 00E+00	1 36E-03	2 71E-03
U-233	2.3739E-09	10,390 70	20,781 39	0 00E+00	2 47E-05	4 93E-05
U-234	1 8423E-04	10,390 70	20,781 39	0 00E+00	1 91E+00	3 83E+00
U-235	-2 7235E-06	10,390.70	0 00	4.31E-02	1 48E-02	4.31E-02
U-236	1 5493E-05	10,390.70	20,781.39	0 00E+00	1 61E-01	3.22E-01
U-238	-4.2851E-09	10,390 70	0 00	2 72E-02	2 71E-02	2.72E-02
Y-90	2.1686E+00	10,390 70	20,781 39	0 00E+00	2.25E+04	4 51E+04
Other Radionuclides					2.26E+04	4 52E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	2 479E+15
0 0250	5 170E+14
0 0375	4.514E+14
0 0575	4 814E+14
0 0850	2.916E+14
0 1250	1 999E+14
0.2250	2.512E+14
0 3750	1 101E+14
0.5750	1 786E+15
0 8500	4.243E+13
1.2500	2.143E+13
1 7500	8 981E+11
2.2500	1 124E+09
2.7500	6 752E+07
3.5000	4 292E+06
5 0000	9 967E+03
7 0000	1 106E+03
11 0000	1 242E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.81E+02	5 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	ALUM	ALUM
BOL HM Constituents	U	U
BOL Enrichment %	19 7909823	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		10,390 70
Bounding		20 781 39

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 33	
Bounding	0 65	

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	UNIV OF MICHIGAN (CONTROL)	[1]Fuel decay start date	2035
SNF ID #	1005	Estimates as of	2010
Fuel Units & Descr	82 - 9 CURVED PLATES	Template	ATR (Light Water, Alum , 60 to 100%, U)
Heavy Metal Mass	BOL=34 67kg EOL=32.866kg	[2]Template Burnup(MWd)	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT)	0 00116689
		Template Decay Time	5 years

Estimated Canister usage 18"x10' 3.42

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 4545E-10	1,708 42	3,416 85	0 00E+00	2 48E-07	4 97E-07
Am-241	1.1190E-03	1,708 42	3,416 85	0 00E+00	1 91E+00	3 82E+00
Am-242m	4.5425E-07	1,708 42	3,416 85	0 00E+00	7 76E-04	1 55E-03
Am-243	1 4921E-06	1,708 42	3,416 85	0 00E+00	2 55E-03	5 10E-03
C-14	5.7244E-09	1,708 42	3,416 85	0 00E+00	9 78E-06	1 96E-05
Cl-36	1.3124E-32	1,708 42	3,416 85	0 00E+00	2.24E-29	4 48E-29
Cm-243	2.3676E-07	1,708 42	3,416 85	0 00E+00	4 04E-04	8 09E-04
Cm-244	5.2042E-05	1,708 42	3,416 85	0 00E+00	8 89E-02	1 78E-01
Co-60	3 8208E-05	1,708 42	3,416 85	0 00E+00	6 53E-02	1.31E-01
Cs-134	4 8693E-01	1,708 42	3,416 85	0 00E+00	8 32E+02	1 66E+03
Cs-135	3 4477E-06	1,708 42	3,416 85	0 00E+00	5 89E-03	1.18E-02
Cs-137	2 8731E+00	1,708 42	3,416 85	0 00E+00	4 91E+03	9 82E+03
Eu-154	8 2053E-02	1,708 42	3,416.85	0 00E+00	1 40E+02	2 80E+02
Eu-155	3 9134E-02	1,708 42	3,416 85	0 00E+00	6 69E+01	1.34E+02
Fe-55	6 7429E-03	1,708 42	3,416 85	0 00E+00	1.15E+01	2 30E+01
H-3	1 0599E-02	1,708 42	3,416 85	0.00E+00	1.81E+01	3 62E+01
I-129	7 5300E-07	1,708 42	3,416 85	0 00E+00	1.29E-03	2.57E-03
Kr-85	2 8595E-01	1,708 42	3,416 85	0 00E+00	4 89E+02	9 77E+02
Np-237	9 5479E-06	1,708 42	3,416 85	0 00E+00	1 63E-02	3.26E-02
Pa-231	8 9297E-10	1,708 42	3,416 85	0 00E+00	1 53E-06	3 05E-06
Pb-210	3.7609E-12	1,708 42	3,416 85	0 00E+00	6 43E-09	1 29E-08
Pm-147	2 5452E+00	1,708 42	3,416 85	0 00E+00	4 35E+03	8 70E+03
Pu-238	2 0550E-02	1,708 42	3,416 85	0 00E+00	3 51E+01	7 02E+01
Pu-239	4.2838E-04	1,708 42	3,416 85	0 00E+00	7 32E-01	1 46E+00
Pu-240	2 4401E-04	1,708 42	3,416 85	0 00E+00	4 17E-01	8 34E-01
Pu-241	6 8764E-02	1,708 42	3,416 85	0 00E+00	1 17E+02	2 35E+02
Pu-242	3 6329E-07	1,708 42	3,416 85	0 00E+00	6 21E-04	1.24E-03
Ra-226	3 8045E-11	1,708 42	3,416 85	0 00E+00	6 50E-08	1.30E-07
Ra-228	2 9902E-15	1,708 42	3,416 85	0 00E+00	5 11E-12	1 02E-11
Ru-106	1 9055E-01	1,708 42	3,416 85	0 00E+00	3 26E+02	6 51E+02
Se-79	1.2936E-05	1,708 42	3,416 85	0 00E+00	2.21E-02	4 42E-02
Sn-126	1 1574E-05	1,708 42	3,416.85	0 00E+00	1.98E-02	3 95E-02
Sr-90	2 7505E+00	1,708 42	3,416.85	0 00E+00	4 70E+03	9 40E+03
Tc-99	4 2239E-04	1,708 42	3,416 85	0 00E+00	7.22E-01	1 44E+00
Th-229	1 8848E-12	1,708 42	3,416 85	0 00E+00	3.22E-09	6 44E-09
Th-230	1 7042E-08	1,708 42	3,416 85	0 00E+00	2 91E-05	5.82E-05
Th-232	7 8132E-15	1,708 42	3,416 85	0.00E+00	1.33E-11	2 67E-11
Tl-208	4 4063E-08	1,708 42	3,416 85	0 00E+00	7 53E-05	1.51E-04
U-232	1.3151E-07	1,708.42	3,416 85	0 00E+00	2.25E-04	4 49E-04
U-233	1 9564E-09	1,708 42	3,416 85	0 00E+00	3 34E-06	6 68E-06
U-234	1 8371E-04	1,708.42	3,416 85	0 00E+00	3 14E-01	6 28E-01
U-235	-2 7235E-06	1,708 42	0 00	1 48E-02	1 01E-02	1 48E-02
U-236	1.5493E-05	1,708 42	3,416 85	0 00E+00	2 65E-02	5 29E-02
U-238	-4.2851E-09	1,708 42	0 00	9 35E-03	9 34E-03	9 35E-03
Y-90	2.7505E+00	1,708 42	3,416 85	0 00E+00	4 70E+03	9 40E+03
Other Radionuclides					8 79E+03	1 76E+04

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg_MeV	
0 0150	6 592E+14
0 0250	1 420E+14
0 0375	1 311E+14
0 0575	1.289E+14
0 0850	8.215E+13
0 1250	7 114E+13
0.2250	6 963E+13
0 3750	3.370E+13
0 5750	4 629E+14
0 8500	6 483E+13
1 2500	1.206E+13
1 7500	5 058E+11
2.2500	1.061E+12
2 7500	6 104E+09
3.5000	6 769E+08
5 0000	2 045E+03
7 0000	2.281E+02
11.0000	2.571E+01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 66E+01	1 73E+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 74999113	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		1,708 42
Bounding		3 416.85

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 16	
Bounding	0 31	

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: UNIV OF MICHIGAN (REG)
SNF ID #: 277
Fuel Units & Descr: 225 - 18 CURVED PLATES
Heavy Metal Mass: BOL=190.26kg, EOL=174 082kg
ROD Storage Site: SRS

[1]Fuel decay start date: 2035
Estimates as of: 2010
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: 5 years

Estimated Canister usage: 18"x10" 9 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	1 4545E-10	15,320 41	30,640 81	0 00E+00	2 23E-06	4 46E-06
Am-241	1 1190E-03	15,320 41	30,640 81	0 00E+00	1 71E+01	3 43E+01
Am-242m	4 5425E-07	15,320 41	30,640 81	0 00E+00	6 96E-03	1 39E-02
Am-243	1 4921E-06	15,320 41	30,640 81	0 00E+00	2 29E-02	4 57E-02
C-14	5 7244E-09	15,320 41	30,640 81	0 00E+00	8 77E-05	1 75E-04
Cl-36	1 3124E-32	15,320 41	30,640 81	0 00E+00	2 01E-28	4 02E-28
Cm-243	2 3676E-07	15,320 41	30,640 81	0 00E+00	3 63E-03	7 25E-03
Cm-244	5 2042E-05	15,320 41	30,640 81	0 00E+00	7 97E-01	1 59E+00
Co-60	3 8208E-05	15,320 41	30,640 81	0 00E+00	5 85E-01	1 17E+00
Cs-134	4 8693E-01	15,320 41	30,640 81	0 00E+00	7 46E+03	1 49E+04
Cs-135	3 4477E-06	15,320 41	30,640 81	0 00E+00	5.28E-02	1 06E-01
Cs-137	2 8731E+00	15,320 41	30 640 81	0 00E+00	4 40E+04	8 80E+04
Eu-154	8 2053E-02	15,320 41	30,640 81	0 00E+00	1.26E+03	2 51E+03
Eu-155	3 9134E-02	15,320 41	30,640 81	0 00E+00	6 00E+02	1.20E+03
Fe-55	6 7429E-03	15,320 41	30,640 81	0 00E+00	1 03E+02	2 07E+02
H-3	1 0599E-02	15,320 41	30,640 81	0 00E+00	1 62E+02	3 25E+02
I-129	7 5300E-07	15,320 41	30,640 81	0 00E+00	1.15E-02	2 31E-02
Kr-85	2 8595E-01	15,320 41	30,640 81	0 00E+00	4 38E+03	8.76E+03
Np-237	9 5479E-06	15,320 41	30,640 81	0 00E+00	1.46E-01	2 93E-01
Pa-231	8 9297E-10	15,320 41	30,640 81	0 00E+00	1.37E-05	2 74E-05
Pb-210	3 7609E-12	15,320 41	30,640 81	0 00E+00	5.76E-08	1 15E-07
Pm-147	2 5452E+00	15,320 41	30,640 81	0 00E+00	3 90E+04	7 80E+04
Pu-238	2 0550E-02	15,320 41	30,640 81	0 00E+00	3 15E+02	6 30E+02
Pu-239	4.2838E-04	15,320 41	30,640 81	0 00E+00	6 56E+00	1 31E+01
Pu-240	2 4401E-04	15,320 41	30,640 81	0 00E+00	3 74E+00	7 48E+00
Pu-241	6 8764E-02	15,320 41	30,640 81	0 00E+00	1 05E+03	2.11E+03
Pu-242	3 6329E-07	15,320 41	30,640 81	0 00E+00	5 57E-03	1 11E-02
Ra-226	3 8045E-11	15,320 41	30,640 81	0 00E+00	5 83E-07	1 17E-06
Ra-228	2 9902E-15	15,320 41	30,640 81	0 00E+00	4 58E-11	9 16E-11
Ru-106	1 9055E-01	15,320 41	30,640 81	0 00E+00	2 92E+03	5 84E+03
Se-79	1 2936E-05	15,320.41	30,640 81	0 00E+00	1 98E-01	3 96E-01
Sn-126	1 1574E-05	15,320.41	30,640 81	0 00E+00	1 77E-01	3 55E-01
Sr-90	2 7505E+00	15,320 41	30,640 81	0 00E+00	4 21E+04	8.43E+04
Tc-99	4.2239E-04	15,320 41	30,640 81	0 00E+00	6 47E+00	1.29E+01
Th-229	1 8848E-12	15,320 41	30,640 81	0 00E+00	2 89E-08	5 78E-08
Th-230	1.7042E-08	15,320 41	30,640 81	0 00E+00	2 61E-04	5.22E-04
Th-232	7.8132E-15	15,320 41	30,640 81	0 00E+00	1 20E-10	2.39E-10
Tl-208	4.4063E-08	15,320 41	30,640 81	0 00E+00	6 75E-04	1.35E-03
U-232	1.3151E-07	15,320 41	30,640 81	0 00E+00	2 01E-03	4 03E-03
U-233	1.9564E-09	15,320 41	30,640 81	0 00E+00	3 00E-05	5 99E-05
U-234	1 8371E-04	15,320 41	30,640 81	0 00E+00	2 81E+00	5 63E+00
U-235	-2 7235E-06	15,320 41	0 00	8 12E-02	3 95E-02	8.12E-02
U-236	1.5493E-05	15,320 41	30,640 81	0 00E+00	2 37E-01	4.75E-01
U-238	-4.2851E-09	15,320 41	0 00	5 13E-02	5 13E-02	5.13E-02
Y-90	2.7505E+00	15,320 41	30,640 81	0 00E+00	4.21E+04	8 43E+04
Other Radionuclides					7 88E+04	1 58E+05

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	5.911E+15
0 0250	1 274E+15
0 0375	1 175E+15
0 0575	1 156E+15
0 0850	7 367E+14
0 1250	6.380E+14
0.2250	6.244E+14
0 3750	3 022E+14
0 5750	4 151E+15
0.8500	5.814E+14
1.2500	1 082E+14
1 7500	4 536E+12
2.2500	9 514E+12
2 7500	5 474E+10
3.5000	6 070E+09
5 0000	1 826E+04
7.0000	2 037E+03
11 0000	2.296E+02

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7 77E+02	1.55E+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 %:	19 74999113	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		15,320 41
Bounding		30 640 81

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	0.26	
Bounding	0.51	

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 UNIV OF VIRGINIA (U3SI2 LEU)
SNF ID # 952
Fuel Units & Descr: 20 - 22 FLAT PLATES
Heavy Metal Mass. BOL=24.31kg. EOL=23 964kg
ROD Storage Site SRS

[1]Fuel decay start date 1993
Estimates as of 2010
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. 15 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	4 5861E-10	327 67	655 34	0 00E+00	1.50E-07	3 01E-07
Am-241	1 7832E-03	327 67	655 34	0 00E+00	5 84E-01	1.17E+00
Am-242m	4 3410E-07	327.67	655 34	0 00E+00	1 42E-04	2 84E-04
Am-243	1 4907E-06	327.67	655 34	0 00E+00	4 88E-04	9 77E-04
C-14	5 7162E-09	327 67	655 34	0 00E+00	1 87E-06	3 75E-06
Cl-36	1 3124E-32	327 67	655 34	0 00E+00	4 30E-30	8 60E-30
Cm-243	1 8568E-07	327 67	655 34	0 00E+00	6 08E-05	1.22E-04
Cm-244	3 5512E-05	327 67	655 34	0 00E+00	1 16E-02	2 33E-02
Co-60	1 0261E-05	327 67	655 34	0 00E+00	3 36E-03	6 72E-03
Cs-134	1 6931E-02	327 67	655.34	0 00E+00	5 55E+00	1.11E+01
Cs-135	3 4477E-06	327 67	655 34	0 00E+00	1 13E-03	2 26E-03
Cs-137	2.2800E+00	327 67	655.34	0 00E+00	7 47E+02	1 49E+03
Eu-154	3.6656E-02	327 67	655.34	0 00E+00	1 20E+01	2 40E+01
Eu-155	9 6841E-03	327 67	655.34	0 00E+00	3 17E+00	6 35E+00
Fe-55	4 6977E-04	327 67	655.34	0 00E+00	1 54E-01	3 08E-01
H-3	6 0485E-03	327 67	655 34	0 00E+00	1 98E+00	3 96E+00
I-129	7.5300E-07	327.67	655.34	0 00E+00	2.47E-04	4 93E-04
Kr-85	1 4989E-01	327.67	655.34	0 00E+00	4 91E+01	9 82E+01
Np-237	9 5534E-06	327.67	655 34	0 00E+00	3 13E-03	6.26E-03
Pa-231	1 6550E-09	327 67	655 34	0 00E+00	5 42E-07	1 08E-06
Pb-210	2 6631E-11	327 67	655 34	0 00E+00	8 73E-09	1 75E-08
Pm-147	1 8156E-01	327 67	655 34	0 00E+00	5 95E+01	1.19E+02
Pu-238	1 8990E-02	327 67	655 34	0 00E+00	6.22E+00	1.24E+01
Pu-239	4 2838E-04	327 67	655 34	0 00E+00	1 40E-01	2 81E-01
Pu-240	2 4379E-04	327 67	655 34	0 00E+00	7 99E-02	1 60E-01
Pu-241	4.2511E-02	327 67	655 34	0 00E+00	1.39E+01	2 79E+01
Pu-242	3.6329E-07	327 67	655 34	0 00E+00	1 19E-04	2 38E-04
Ra-226	1 4725E-10	327 67	655.34	0 00E+00	4 82E-08	9 65E-08
Ra-228	8.9760E-15	327 67	655.34	0 00E+00	2 94E-12	5 88E-12
Ru-106	1 9752E-04	327 67	655.34	0 00E+00	6 47E-02	1.29E-01
Se-79	1.2933E-05	327 67	655.34	0 00E+00	4.24E-03	8 48E-03
Sn-126	1 1574E-05	327 67	655.34	0 00E+00	3 79E-03	7.58E-03
Sr-90	2 1680E+00	327 67	655.34	0 00E+00	7 10E+02	1 42E+03
Tc-99	4.2239E-04	327.67	655 34	0 00E+00	1.38E-01	2.77E-01
Th-229	3 9270E-12	327.67	655 34	0 00E+00	1.29E-09	2.57E-09
Th-230	3 3578E-08	327.67	655 34	0 00E+00	1.10E-05	2.20E-05
Th-232	1 5452E-14	327.67	655 34	0 00E+00	5 06E-12	1 01E-11
Tl-208	4 6705E-08	327 67	655 34	0 00E+00	1.53E-05	3 06E-05
U-232	1 3045E-07	327 67	655 34	0 00E+00	4.27E-05	8 55E-05
U-233	2 3739E-09	327.67	655 34	0 00E+00	7 78E-07	1 56E-06
U-234	1 8423E-04	327 67	655.34	0 00E+00	6 04E-02	1 21E-01
U-235	-2.7235E-06	327 67	0.00	1 04E-02	9 50E-03	1 04E-02
U-236	1 5493E-05	327 67	655 34	0 00E+00	5 08E-03	1 02E-02
U-238	-4.2851E-09	327 67	0 00	6 55E-03	6 55E-03	6 55E-03
Y-90	2 1686E+00	327 67	655 34	0 00E+00	7 11E+02	1 42E+03
Other Radionuclides					7 13E+02	1 43E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	7.818E+13
0 0250	1.630E+13
0 0375	1.424E+13
0 0575	1.518E+13
0.0850	9 195E+12
0 1250	6.304E+12
0.2250	7.922E+12
0.3750	3.470E+12
0.5750	5 633E+13
0.8500	1.338E+12
1.2500	6 759E+11
1 7500	2 832E+10
2.2500	3 543E+07
2 7500	2 129E+06
3 5000	1 354E+05
5 0000	3.281E+02
7 0000	3 640E+01
11 0000	4 092E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8 87E+00	1.77E+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 77478682	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		327.67
Bounding		655.34

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 04	
Bounding	0 09	

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: UNIV OF VIRGINIA (ULAX HEU)
SNF ID #: 279
Fuel Units & Descr: 44 - 22 FLAT PLATES
Heavy Metal Mass: BOL=7 924kg, EOL=6 855kg
ROD Storage Site. SRS

[1]Fuel decay start date: 1966
Estimates as of: 2010
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' 1.83

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	1,012 55	2,025 11	0 00E+00	2 03E-06	4 06E-06
Am-241	2 5251E-03	1,012 55	2,025 11	0 00E+00	2 56E+00	5 11E+00
Am-242m	3 9624E-07	1,012 55	2,025 11	0 00E+00	4 01E-04	8 02E-04
Am-243	1 4880E-06	1,012 55	2,025 11	0 00E+00	1 51E-03	3 01E-03
C-14	5 7053E-09	1,012 55	2,025 11	0 00E+00	5 78E-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 1419E-07	1,012 55	2,025 11	0 00E+00	1.16E-04	2 31E-04
Cm-244	1 6522E-05	1,012 55	2,025 11	0 00E+00	1 67E-02	3 35E-02
Co-60	7 4047E-07	1,012 55	2,025 11	0 00E+00	7.50E-04	1 50E-03
Cs-134	2 0455E-05	1,012 55	2,025 11	0 00E+00	2.07E-02	4 14E-02
Cs-135	3 4477E-06	1,012.55	2,025 11	0 00E+00	3 49E-03	6 98E-03
Cs-137	1 4365E+00	1,012.55	2,025 11	0 00E+00	1 45E+03	2 91E+03
Eu-154	7 3230E-03	1,012 55	2,025 11	0 00E+00	7 41E+00	1 48E+01
Eu-155	5 9259E-04	1,012 55	2,025 11	0 00E+00	6 00E-01	1 20E+00
Fe-55	2.2791E-06	1,012.55	2,025 11	0 00E+00	2 31E-03	4 62E-03
H-3	1 9698E-03	1,012 55	2,025 11	0 00E+00	1 99E+00	3 99E+00
I-129	7 5300E-07	1,012.55	2,025 11	0 00E+00	7 62E-04	1 52E-03
Kr-85	4 1176E-02	1,012.55	2,025 11	0 00E+00	4 17E+01	8 34E+01
Np-237	9 5752E-06	1,012.55	2,025 11	0 00E+00	9 70E-03	1 94E-02
Pa-231	3 9379E-09	1,012.55	2,025 11	0.00E+00	3 99E-06	7 97E-06
Pb-210	3.3115E-10	1,012.55	2,025 11	0 00E+00	3 35E-07	6 71E-07
Pm-147	9.2402E-04	1,012.55	2,025 11	0 00E+00	9 36E-01	1.87E+00
Pu-238	1 6217E-02	1,012.55	2,025 11	0 00E+00	1 64E+01	3.28E+01
Pu-239	4.2810E-04	1,012 55	2,025 11	0 00E+00	4 33E-01	8 67E-01
Pu-240	2 4333E-04	1,012 55	2,025 11	0 00E+00	2 46E-01	4 93E-01
Pu-241	1 6242E-02	1,012 55	2,025 11	0 00E+00	1 64E+01	3.29E+01
Pu-242	3 6329E-07	1,012 55	2,025 11	0 00E+00	3 68E-04	7.36E-04
Ra-226	9 0114E-10	1,012 55	2,025 11	0 00E+00	9 12E-07	1.82E-06
Ra-228	3 1019E-14	1,012 55	2,025.11	0 00E+00	3 14E-11	6.28E-11
Ru-106	2 1225E-10	1,012 55	2,025.11	0 00E+00	2 15E-07	4.30E-07
Se-79	1 2930E-05	1,012 55	2,025.11	0 00E+00	1 31E-02	2.62E-02
Sn-126	1 1571E-05	1,012 55	2,025.11	0 00E+00	1 17E-02	2.34E-02
Sr-90	1 3472E+00	1,012 55	2,025.11	0 00E+00	1 36E+03	2 73E+03
Tc-99	4 2239E-04	1,012 55	2,025.11	0 00E+00	4 28E-01	8.55E-01
Th-229	1 2407E-11	1,012 55	2,025.11	0 00E+00	1.26E-08	2.51E-08
Th-230	8 3497E-08	1,012 55	2,025 11	0 00E+00	8 45E-05	1 69E-04
Th-232	3 8371E-14	1,012 55	2,025 11	0 00E+00	3 89E-11	7 77E-11
Tl-208	4 0414E-08	1,012 55	2,025 11	0 00E+00	4 09E-05	8.18E-05
U-232	1 0948E-07	1,012 55	2,025 11	0 00E+00	1 11E-04	2.22E-04
U-233	3 6275E-09	1,012 55	2,025 11	0 00E+00	3 67E-06	7 35E-06
U-234	1 8562E-04	1,012 55	2,025 11	0 00E+00	1 88E-01	3 76E-01
U-235	-2.7235E-06	1,012 55	0 00	1 59E-02	1.32E-02	1 59E-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 88E-04	1 84E-04	1 88E-04
Y-90	1 3475E+00	1,012 55	2,025 11	0 00E+00	1.36E+03	2 73E+03
Other Radionuclides					1 39E+03	2 77E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 492E+14
0 0250	3 097E+13
0 0375	2 692E+13
0 0575	2.898E+13
0 0850	1 746E+13
0 1250	1 153E+13
0.2250	1 507E+13
0.3750	6 557E+12
0 5750	1 084E+14
0 8500	1 324E+12
1.2500	6 402E+11
1 7500	3 603E+10
2.2500	3 013E+06
2.7500	2 876E+06
3.5000	1 667E+03
5 0000	6 812E+02
7 0000	7 454E+01
11 0000	8.311E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1 69E+01	3.39E+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 %	92 93756073	60 to 100	

Burnup Summary (MWd)[2]

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal	230.24	1,012.55	Nominal burnup calculated from the heavy metal mass destroyed
Bounding*	280 84	2,025 11	Bounding burnup assumed to be twice nominal burnup

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal	0 41	4 40	1 01
Bounding	0 81	7.21	

[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 VBWR (UO2)
SNF ID # 855
Fuel Units & Descr. 7 - ROD
Heavy Metal Mass BOL=6 578kg EOL=4.04kg
ROD Storage Site INEEL

[1]Fuel decay start date 1962
Estimates as of 2010
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 19

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	2,413 71	4,827 42	0 00E+00	2 12E-06	4 24E-06
Am-241	1 4352E-01	2,413 71	4,827 42	0 00E+00	3 46E+02	6 93E+02
Am-242m	2 8698E-04	2,413 71	4,827 42	0 00E+00	6 93E-01	1.39E+00
Am-243	6.2565E-04	2,413.71	4,827 42	0 00E+00	1 51E+00	3 02E+00
C-14	4 7901E-05	2,413 71	4,827 42	0 00E+00	1 16E-01	2 31E-01
Cl-36	8 0297E-07	2,413 71	4,827 42	0 00E+00	1 94E-03	3 88E-03
Cm-243	2.5081E-04	2,413 71	4,827 42	0 00E+00	6 05E-01	1 21E+00
Cm-244	4.9015E-02	2,413 71	4,827 42	0 00E+00	1 18E+02	2 37E+02
Co-60	2.5581E-03	2,413 71	4,827 42	0 00E+00	6 17E+00	1 23E+01
Cs-134	4 0536E-05	2,413 71	4,827 42	0 00E+00	9 78E-02	1 96E-01
Cs-135	1.4433E-05	2,413 71	4,827 42	0 00E+00	3 48E-02	6 97E-02
Cs-137	1.3979E+00	2,413 71	4,827 42	0 00E+00	3 37E+03	6 75E+03
Eu-154	2 0203E-02	2,413 71	4,827.42	0 00E+00	4 88E+01	9 75E+01
Eu-155	1 7684E-03	2,413 71	4,827.42	0 00E+00	4 27E+00	8 54E+00
Fe-55	4 3136E-05	2,413 71	4,827.42	0 00E+00	1 04E-01	2 08E-01
H-3	2 0769E-02	2,413 71	4,827.42	0 00E+00	5 01E+01	1 00E+02
I-129	9 8288E-07	2,413 71	4,827.42	0 00E+00	2.37E-03	4 74E-03
Kr-85	2 8214E-02	2,413 71	4,827.42	0 00E+00	6 81E+01	1.36E+02
Np-237	1 1218E-05	2,413 71	4,827 42	0 00E+00	2.71E-02	5 42E-02
Pa-231	1 3036E-09	2,413 71	4,827 42	0 00E+00	3.15E-06	6.29E-06
Pb-210	8 5078E-11	2,413 71	4,827 42	0 00E+00	2.05E-07	4 11E-07
Pm-147	3 6531E-04	2,413 71	4,827.42	0 00E+00	8 82E-01	1 76E+00
Pu-238	7.4564E-02	2,413 71	4,827 42	0 00E+00	1 80E+02	3 60E+02
Pu-239	1 1623E-02	2,413 71	4,827 42	0 00E+00	2 81E+01	5 61E+01
Pu-240	1 5132E-02	2,413 71	4,827 42	0 00E+00	3 65E+01	7.31E+01
Pu-241	9 0036E-01	2,413 71	4,827 42	0 00E+00	2.17E+03	4.35E+03
Pu-242	6 4260E-05	2,413 71	4,827.42	0 00E+00	1.55E-01	3 10E-01
Ra-226	2 2804E-10	2,413 71	4,827 42	0 00E+00	5.50E-07	1 10E-06
Ra-228	5 2713E-12	2,413 71	4,827 42	0 00E+00	1.27E-08	2 54E-08
Ru-106	6 1160E-10	2,413 71	4,827 42	0 00E+00	1.48E-06	2 95E-06
Se-79	1 2377E-05	2,413 71	4,827 42	0 00E+00	2 99E-02	5 98E-02
Sn-126	2 5210E-05	2,413 71	4,827 42	0 00E+00	6 08E-02	1 22E-01
Sr-90	9 1667E-01	2,413.71	4,827 42	0 00E+00	2.21E+03	4 43E+03
Tc-99	3 9357E-04	2,413.71	4,827 42	0 00E+00	9 50E-01	1 90E+00
Th-229	1.2057E-10	2,413 71	4,827 42	0 00E+00	2 91E-07	5 82E-07
Th-230	2 1043E-08	2,413 71	4,827 42	0 00E+00	5 08E-05	1 02E-04
Th-232	5.2972E-12	2,413 71	4,827 42	0 00E+00	1 28E-08	2 56E-08
Tl-208	1.7474E-07	2,413 71	4,827 42	0 00E+00	4 22E-04	8 44E-04
U-232	4.7368E-07	2,413 71	4,827 42	0 00E+00	1 14E-03	2.29E-03
U-233	2.5097E-08	2,413 71	4,827.42	0 00E+00	6 06E-05	1.21E-04
U-234	5 0000E-05	2,413 71	4,827.42	0 00E+00	1 21E-01	2 41E-01
U-235	-1 4489E-06	2,413 71	0.00	3.29E-03	0 00E+00	3.29E-03
U-236	7.5824E-06	2,413 71	4,827 42	0 00E+00	1 83E-02	3 66E-02
U-238	-2 6129E-07	2,413 71	0.00	1 70E-03	1 07E-03	1 70E-03
Y-90	9 1699E-01	2,413 71	4,827 42	0 00E+00	2.21E+03	4 43E+03
Other Radionuclides					3 24E+03	6 48E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.597E+14
0 0250	5.238E+13
0 0375	4.996E+13
0 0575	5 772E+13
0 0850	2.906E+13
0 1250	2 017E+13
0 2250	2 492E+13
0 3750	1.072E+13
0 5750	2 493E+14
0 8500	3 448E+12
1.2500	3.387E+12
1 7500	1 014E+11
2.2500	1 633E+07
2 7500	3 346E+07
3.5000	3.445E+06
5.0000	1 473E+06
7.0000	1 698E+05
11 0000	1 950E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.55E+01	1.11E+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 %	23 16820093	0 to 5

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		2,413 71
Bounding		4 827 42

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	10 48	
Bounding	20 97	

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: WORCESTER POLY INSTITUTE	[1]Fuel decay start date:	2035	
SNF ID #: 287	Estimates as of:	2010	
Fuel Units & Descr: 26 - 18 FLAT PLATES	Template	ATR (Light Water, Alum , 60 to 100%, U)	
Heavy Metal Mass: BOL=22 776kg; EOL=22.753kg	[2]Template Burnup(MWd):	367.2	
ROD Storage Site SRS	Template BOL Heavy Metal Mass (MT).	0 00116689	
	Template Decay Time	5 years	

Estimated Canister usage 18"x10' 0 72

II. Estimates

Radionuclide	m: C/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 4545E-10	22.16	44 32	0 00E+00	3.22E-09	6 45E-09
Am-241	1.1190E-03	22.16	44 32	0 00E+00	2 48E-02	4 96E-02
Am-242m	4 5425E-07	22.16	44 32	0 00E+00	1 01E-05	2 01E-05
Am-243	1.4921E-06	22.16	44 32	0 00E+00	3 31E-05	6 61E-05
C-14	5 7244E-09	22.16	44 32	0 00E+00	1 27E-07	2 54E-07
Cl-36	1.3124E-32	22.16	44 32	0 00E+00	2.91E-31	5 82E-31
Cm-243	2.3676E-07	22.16	44.32	0 00E+00	5 25E-06	1 05E-05
Cm-244	5.2042E-05	22.16	44.32	0 00E+00	1 15E-03	2 31E-03
Co-60	3 8208E-05	22.16	44 32	0 00E+00	8 47E-04	1 69E-03
Cs-134	4 8693E-01	22.16	44.32	0 00E+00	1 08E+01	2.16E+01
Cs-135	3 4477E-06	22.16	44.32	0 00E+00	7 64E-05	1 53E-04
Cs-137	2 8731E+00	22.16	44.32	0 00E+00	6 37E+01	1.27E+02
Eu-154	8.2053E-02	22.16	44.32	0 00E+00	1 82E+00	3 64E+00
Eu-155	3.9134E-02	22.16	44.32	0 00E+00	8 67E-01	1 73E+00
Fe-55	6.7429E-03	22.16	44.32	0 00E+00	1 49E-01	2 99E-01
H-3	1.0599E-02	22.16	44.32	0 00E+00	2 35E-01	4 70E-01
I-129	7.5300E-07	22.16	44.32	0 00E+00	1 67E-05	3 34E-05
Kr-85	2 8595E-01	22.16	44.32	0 00E+00	6 34E+00	1.27E+01
Np-237	9 5479E-06	22.16	44.32	0 00E+00	2 12E-04	4.23E-04
Pa-231	8.9297E-10	22.16	44.32	0 00E+00	1 98E-08	3 96E-08
Pb-210	3.7609E-12	22.16	44.32	0 00E+00	8 33E-11	1 67E-10
Pm-147	2 5452E+00	22.16	44.32	0 00E+00	5 64E+01	1.13E+02
Pu-238	2 0550E-02	22 16	44.32	0 00E+00	4 55E-01	9 11E-01
Pu-239	4.2838E-04	22 16	44.32	0 00E+00	9 49E-03	1 90E-02
Pu-240	2 4401E-04	22 16	44.32	0 00E+00	5 41E-03	1 08E-02
Pu-241	6 8764E-02	22 16	44.32	0 00E+00	1 52E+00	3 05E+00
Pu-242	3 6329E-07	22 16	44.32	0 00E+00	8 05E-06	1.61E-05
Ra-226	3 8045E-11	22 16	44.32	0 00E+00	8 43E-10	1 69E-09
Ra-228	2 9902E-15	22 16	44 32	0 00E+00	6 63E-14	1.33E-13
Ru-106	1 9055E-01	22 16	44 32	0 00E+00	4.22E+00	8 45E+00
Se-79	1 2936E-05	22 16	44.32	0 00E+00	2 87E-04	5.73E-04
Sn-126	1 1574E-05	22 16	44 32	0 00E+00	2 56E-04	5.13E-04
Sr-90	2 7505E+00	22 16	44 32	0 00E+00	6.10E+01	1.22E+02
Tc-99	4.2239E-04	22 16	44 32	0 00E+00	9 36E-03	1 87E-02
Th-229	1 8848E-12	22 16	44 32	0 00E+00	4 18E-11	8.35E-11
Th-230	1 7042E-08	22 16	44 32	0 00E+00	3.78E-07	7 55E-07
Th-232	7 8132E-15	22 16	44 32	0.00E+00	1.73E-13	3.46E-13
Tl-208	4 4063E-08	22 16	44 32	0 00E+00	9 76E-07	1 95E-06
U-232	1 3151E-07	22 16	44 32	0 00E+00	2.91E-06	5 83E-06
U-233	1 9564E-09	22 16	44 32	0 00E+00	4.34E-08	8 67E-08
U-234	1 8371E-04	22 16	44 32	0 00E+00	4 07E-03	8.14E-03
U-235	-2.7235E-06	22 16	0 00	9.78E-03	9 72E-03	9 78E-03
U-236	1 5493E-05	22 16	44 32	0 00E+00	3 43E-04	6 87E-04
U-238	-4 2851E-09	22.16	0 00	6 13E-03	6.13E-03	6.13E-03
Y-90	2 7505E+00	22 16	44 32	0 00E+00	6 10E+01	1 22E+02
Other Radionuclides					1 14E+02	2 28E+02

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	8 551E+12
0 0250	1 842E+12
0 0375	1 700E+12
0 0575	1 671E+12
0 0850	1 066E+12
0 1250	9.228E+11
0 2250	9 033E+11
0 3750	4.372E+11
0 5750	6 005E+12
0 8500	8 409E+11
1 2500	1 565E+11
1 7500	6 561E+09
2 2500	1 376E+10
2.7500	7 917E+07
3 5000	8.781E+06
5 0000	4 043E+01
7 0000	4 559E+00
11 0000	5 175E-01

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.12E+00	2.25E+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 %	19 8630137	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		22.16
Bounding		44 32

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	ZPRL (UALX-LEU) TAIWAN	[1]Fuel decay start date	1997
SNF ID #	554	Estimates as of	2010
Fuel Units & Descr	35 - ASSEMBLY	Template	ATR (Light Water, Alum., 60 to 100%, U)
Heavy Metal Mass	BOL=23 748kg EOL=23.348kg	[2]Template Burnup(MWd)	367.2
ROD Storage Site	SRS	Template BOL Heavy Metal Mass (MT).	0 00116689
		Template Decay Time	10 years

Estimated Canister usage 18"x10' 0 97

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 8404E-10	377 86	755.72	0 00E+00	1 07E-07	2 15E-07
Am-241	1 4935E-03	377 86	755 72	0 00E+00	5 64E-01	1 13E+00
Am-242m	4 4390E-07	377 86	755 72	0 00E+00	1 68E-04	3 35E-04
Am-243	1 4913E-06	377 86	755 72	0 00E+00	5 63E-04	1 13E-03
C-14	5 7217E-09	377.86	755 72	0 00E+00	2 16E-06	4 32E-06
Cl-36	1 3124E-32	377.86	755 72	0 00E+00	4 96E-30	9 92E-30
Cm-243	2 0967E-07	377.86	755 72	0 00E+00	7 92E-05	1 58E-04
Cm-244	4 3001E-05	377.86	755 72	0 00E+00	1 62E-02	3 25E-02
Co-60	1 9798E-05	377.86	755 72	0 00E+00	7 48E-03	1 50E-02
Cs-134	9 0795E-02	377 86	755 72	0 00E+00	3 43E+01	6 86E+01
Cs-135	3 4477E-06	377 86	755 72	0 00E+00	1.30E-03	2 61E-03
Cs-137	2 5588E+00	377 86	755 72	0 00E+00	9 67E+02	1 93E+03
Eu-154	5 4847E-02	377 86	755 72	0 00E+00	2 07E+01	4 14E+01
Eu-155	1 9469E-02	377 86	755 72	0 00E+00	7.36E+00	1 47E+01
Fe-55	1 7797E-03	377 86	755 72	0 00E+00	6.72E-01	1.34E+00
H-3	8 0065E-03	377 86	755 72	0 00E+00	3 03E+00	6 05E+00
I-129	7.5300E-07	377 86	755 72	0 00E+00	2.85E-04	5 69E-04
Kr-85	2 0705E-01	377.86	755 72	0 00E+00	7.82E+01	1.56E+02
Np-237	9 5507E-06	377 86	755 72	0 00E+00	3 61E-03	7.22E-03
Pa-231	1.2740E-09	377 86	755 72	0 00E+00	4 81E-07	9 63E-07
Pb-210	1.1838E-11	377 86	755 72	0 00E+00	4 47E-09	8 95E-09
Pm-147	6.7974E-01	377 86	755 72	0 00E+00	2.57E+02	5.14E+02
Pu-238	1 9755E-02	377 86	755.72	0 00E+00	7.46E+00	1.49E+01
Pu-239	4.2838E-04	377 86	755 72	0.00E+00	1 62E-01	3 24E-01
Pu-240	2 4390E-04	377 86	755.72	0 00E+00	9 22E-02	1 84E-01
Pu-241	5 4058E-02	377.86	755.72	0.00E+00	2 04E+01	4 09E+01
Pu-242	3 6329E-07	377.86	755 72	0 00E+00	1 37E-04	2 75E-04
Ra-226	8 3742E-11	377.86	755 72	0 00E+00	3 16E-08	6 33E-08
Ra-228	5 7734E-15	377.86	755 72	0 00E+00	2 18E-12	4 36E-12
Ru-106	6 1356E-03	377.86	755 72	0 00E+00	2 32E+00	4 64E+00
Se-79	1 2936E-05	377.86	755 72	0 00E+00	4 89E-03	9 78E-03
Sn-126	1.1574E-05	377.86	755 72	0 00E+00	4 37E-03	8 75E-03
Sr-90	2 4417E+00	377 86	755 72	0 00E+00	9 23E+02	1 85E+03
Tc-99	4 2239E-04	377.86	755 72	0 00E+00	1 60E-01	3.19E-01
Th-229	2 8568E-12	377 86	755 72	0 00E+00	1 08E-09	2.16E-09
Th-230	2 5310E-08	377 86	755 72	0 00E+00	9.56E-06	1.91E-05
Th-232	1 1631E-14	377 86	755 72	0 00E+00	4.39E-12	8.79E-12
Tl-208	4 6705E-08	377 86	755 72	0 00E+00	1 76E-05	3 53E-05
U-232	1 3151E-07	377 86	755 72	0 00E+00	4 97E-05	9 94E-05
U-233	2 1650E-09	377 86	755 72	0 00E+00	8 18E-07	1 64E-06
U-234	1 8399E-04	377 86	755 72	0 00E+00	6 95E-02	1.39E-01
U-235	-2 7235E-06	377 86	0 00	1.01E-02	9 11E-03	1 01E-02
U-236	1.5493E-05	377 86	755 72	0 00E+00	5 85E-03	1.17E-02
U-238	-4 2851E-09	377 86	0 00	6 41E-03	6 40E-03	6 41E-03
Y-90	2 4423E+00	377 86	755 72	0 00E+00	9.23E+02	1 85E+03
Other Radionuclides					9 39E+02	1 88E+03

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1.028E+14
0 0250	2 163E+13
0 0375	1.886E+13
0 0575	1.992E+13
0 0850	1.212E+13
0 1250	8 479E+12
0.2250	1 041E+13
0.3750	4 665E+12
0 5750	7.573E+13
0 8500	3 694E+12
1.2500	1.202E+12
1 7500	4.390E+10
2.2500	2.903E+09
2 7500	4 050E+07
3.5000	4 822E+06
5.0000	4 153E+02
7 0000	4 620E+01
11 0000	5.202E+00

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.20E+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 %	19 74998117	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		377 86
Bounding		755 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	0.05	
Bounding	0 10	

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)

2010 Summary, Totals for all Spent Fuels

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 69E+02	3 17E+02
Am-241	2 61E+06	3 74E+06
Am-242m	6 62E+03	1 04E+04
Am-243	5 45E+03	8 48E+03
C-14	2.93E+04	3 86E+04
Cl-36	5 09E+02	6 83E+02
Cm-243	1 80E+03	3 18E+03
Cm-244	2 55E+05	4 40E+05
Co-60	2 02E+07	2 60E+07
Cs-134	1 82E+06	3 26E+06
Cs-135	4 00E+02	5 77E+02
Cs-137	4.16E+07	6 52E+07
Eu-154	1.12E+06	1 76E+06
Eu-155	3 27E+05	5 65E+05
Fe-55	3.13E+06	5 33E+06
H-3	2 87E+05	4 40E+05
I-129	2.23E+01	3 28E+01
Kr-85	2.05E+06	3 44E+06
Np-237	1.99E+02	3 10E+02
Pa-231	3 41E+02	4 08E+02
Pb-210	5 02E-02	5 92E-02
Pm-147	7.35E+06	1 42E+07
Pu-238	9.38E+05	1 53E+06
Pu-239	4 80E+05	5 87E+05
Pu-240	3 50E+05	4 55E+05
Pu-241	1 61E+07	2 99E+07
Pu-242	4 96E+02	7 26E+02
Ra-226	8 79E-02	1 02E-01
Ra-228	1 38E+01	1 67E+01
Ru-106	6.12E+05	1.17E+06
Se-79	3 68E+02	5 32E+02
Sn-126	3 88E+02	6 00E+02
Sr-90	3 54E+07	5 53E+07
Tc-99	9 53E+03	1 44E+04
Th-229	1 79E+02	2 08E+02
Th-230	6 24E+00	7 48E+00
Th-232	8 04E+00	8 40E+00
Tl-208	4 03E+04	4 89E+04
U-232	1 09E+05	1 32E+05
U-233	1 74E+04	2.16E+04
U-234	1 01E+04	1 25E+04
U-235	1 93E+02	2 66E+02
U-236	2 83E+02	4 19E+02
U-238	7 89E+02	8 00E+02
Y-90	3 54E+07	5 53E+07
Other Radionuclides	5 69E+07	8 87E+07

Gamma Sources	
Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	3 390E+18
0 0250	7 048E+17
0 0375	6 421E+17
0 0575	6 967E+17
0 0850	3 991E+17
0 1250	3 026E+17
0.2250	3 409E+17
0 3750	1 527E+17
0 5750	2 613E+18
0 8500	1 631E+17
1 2500	1 975E+18
1 7500	2 158E+15
2.2500	1 595E+15
2.7500	1 728E+15
3 5000	1 220E+12
5 0000	2 831E+09
7 0000	3 258E+08
11 0000	3 739E+07

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.00E+06	1.47E+06
Total	Total

Total Canister Usage Summary	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	1402 9	1446.1	165 3	27.0	162 4	403 0

Bare Fuel Transfers	
166	Assemblies

2010 Summary, Totals for 18" x 10' Canister

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2.99E+00	6 87E+00
Am-241	1.29E+06	1.78E+06
Am-242m	2 77E+03	3 82E+03
Am-243	2 61E+03	3 61E+03
C-14	2 26E+04	2 92E+04
Cl-36	4 18E+02	5 42E+02
Cm-243	2 33E+02	3 51E+02
Cm-244	4 70E+04	6 71E+04
Co-60	1 51E+07	1 70E+07
Cs-134	9 86E+05	1 95E+06
Cs-135	9 74E+01	1 47E+02
Cs-137	1 43E+07	2 49E+07
Eu-154	6 53E+05	9 96E+05
Eu-155	1 55E+05	2 73E+05
Fe-55	1 00E+06	1.15E+06
H-3	1 09E+05	1.56E+05
I-129	5 20E+00	8 83E+00
Kr-85	9 32E+05	1.71E+06
Np-237	7 46E+01	1.26E+02
Pa-231	3 76E+00	8.56E+00
Pb-210	5.19E-03	7.12E-03
Pm-147	4 87E+06	9 64E+06
Pu-238	2.90E+05	5 04E+05
Pu-239	1.15E+05	1 31E+05
Pu-240	6.09E+04	8 66E+04
Pu-241	4 40E+06	1 13E+07
Pu-242	1.51E+02	1 88E+02
Ra-226	1 44E-02	1.91E-02
Ra-228	2 17E-01	4 27E-01
Ru-106	3 57E+05	7 12E+05
Se-79	9 21E+01	1 54E+02
Sn-126	8 62E+01	1 47E+02
Sr-90	1.33E+07	2 32E+07
Tc-99	2 98E+03	5 00E+03
Th-229	1 98E+00	4.56E+00
Th-230	1 46E+00	1 92E+00
Th-232	5 98E-01	6 31E-01
Tl-208	3 98E+02	9.40E+02
U-232	1 08E+03	2.54E+03
U-233	1 85E+03	1.96E+03
U-234	3 89E+03	5 18E+03
U-235	1 09E+02	1 51E+02
U-236	1 11E+02	1 82E+02
U-238	2 69E+01	3 34E+01
Y-90	1.33E+07	2 32E+07
Other Radionuclides	2.58E+07	4 24E+07

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.483E+18
0 0250	3 101E+17
0 0375	2 806E+17
0 0575	3 072E+17
0 0850	1 751E+17
0 1250	1 417E+17
0.2250	1 491E+17
0 3750	6 826E+16
0 5750	1 040E+18
0 8500	9 240E+16
1.2500	1.289E+18
1 7500	1 080E+15
2 2500	1 092E+15
2 7500	3 961E+13
3 5000	7.412E+11
5 0000	4 408E+08
7 0000	5 059E+07
11 0000	5.796E+06

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.95E+05	7.03E+05
Total	Total

Total Canister Usage Summary

	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	1402 9	0 0	0 0	0 0	0 0	0 0

Bare Fuel Transfers

0	Assemblies

2010 Summary, Totals for 18" x 15' Canister

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 42E+02	2.53E+02
Am-241	4 51E+05	6 92E+05
Am-242m	2 49E+03	4.52E+03
Am-243	1 32E+03	2.21E+03
C-14	3 98E+03	4 45E+03
Cl-36	5 00E+01	5.77E+01
Cm-243	1 02E+03	1.91E+03
Cm-244	1 11E+05	1.98E+05
Co-60	4 60E+06	7 96E+06
Cs-134	8 22E+05	1.29E+06
Cs-135	1 96E+02	2.76E+02
Cs-137	1 54E+07	2.26E+07
Eu-154	3 31E+05	5 30E+05
Eu-155	1 48E+05	2.56E+05
Fe-55	2 12E+06	4.16E+06
H-3	1 13E+05	1.73E+05
I-129	9 51E+00	1.30E+01
Kr-85	7 52E+05	1.13E+06
Np-237	5 14E+01	7 84E+01
Pa-231	3 02E+02	3.18E+02
Pb-210	4 08E-02	4 27E-02
Pm-147	2 38E+06	4 36E+06
Pu-238	3 71E+05	5 97E+05
Pu-239	1 93E+05	2.44E+05
Pu-240	1 42E+05	1 80E+05
Pu-241	6 70E+06	9.79E+06
Pu-242	1 38E+02	2.34E+02
Ra-226	6 71E-02	6 98E-02
Ra-228	1 22E+01	1.32E+01
Ru-106	2 53E+05	4 53E+05
Se-79	1 71E+02	2 20E+02
Sn-126	2 25E+02	3 14E+02
Sr-90	1 31E+07	1 83E+07
Tc-99	3 34E+03	4.73E+03
Th-229	1 63E+02	1 72E+02
Th-230	4 22E+00	4 43E+00
Th-232	3 48E+00	3 77E+00
Tl-208	3 54E+04	3 75E+04
U-232	9 58E+04	1 02E+05
U-233	3 18E+03	6 22E+03
U-234	5 16E+03	5 49E+03
U-235	2 20E+01	3 15E+01
U-236	7 84E+01	1 06E+02
U-238	4 20E+01	4 30E+01
Y-90	1 31E+07	1 83E+07
Other Radionuclides	1 88E+07	2 76E+07

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 119E+18
0 0250	2 333E+17
0 0375	2 145E+17
0 0575	2 230E+17
0 0850	1 335E+17
0 1250	9 930E+16
0 2250	1 138E+17
0 3750	5 080E+16
0 5750	9 122E+17
0 8500	6 058E+16
1 2500	6 055E+17
1 7500	7 656E+14
2 2500	5 023E+14
2 7500	1 322E+15
3 5000	4 742E+11
5 0000	1 263E+09
7 0000	1 454E+08
11 0000	1 670E+07

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.26E+05	4.89E+05
Total	Total

Total Canister Usage Summary

	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	0 0	1446 1	0 0	0 0	0 0	0 0

Bare Fuel Transfers	
0	Assemblies

2010 Summary, Totals for 24" x 10' Canister

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	6 43E-04	1 29E-03
Am-241	1 94E+03	3 89E+03
Am-242m	4 11E-01	8 23E-01
Am-243	1 44E+00	2 89E+00
C-14	5 54E-03	1 11E-02
Cl-36	1 27E-26	2 54E-26
Cm-243	1 59E-01	3 19E-01
Cm-244	2 84E+01	5 69E+01
Co-60	5 16E+00	1 03E+01
Cs-134	3 06E+03	6 12E+03
Cs-135	3 34E+00	6 68E+00
Cs-137	1 97E+06	3 94E+06
Eu-154	2 38E+04	4 75E+04
Eu-155	4 67E+03	9 34E+03
Fe-55	1.20E+02	2 40E+02
H-3	4 43E+03	8 86E+03
I-129	7.30E-01	1 46E+00
Kr-85	1.05E+05	2.10E+05
Np-237	9.26E+00	1.85E+01
Pa-231	1 97E-03	3 95E-03
Pb-210	4 82E-05	9 64E-05
Pm-147	4.70E+04	9 40E+04
Pu-238	1.77E+04	3.54E+04
Pu-239	4 15E+02	8.30E+02
Pu-240	2 36E+02	4 72E+02
Pu-241	3 24E+04	6 48E+04
Pu-242	3 52E-01	7 04E-01
Ra-226	2 22E-04	4 43E-04
Ra-228	1 20E-08	2 41E-08
Ru-106	6 16E+00	1 23E+01
Se-79	1.25E+01	2 51E+01
Sn-126	1 12E+01	2 24E+01
Sr-90	1 87E+06	3 73E+06
Tc-99	4 09E+02	8 19E+02
Th-229	4 94E-06	9 88E-06
Th-230	4 06E-02	8.12E-02
Th-232	1 87E-08	3.74E-08
Tl-208	4 46E-02	8 92E-02
U-232	1.22E-01	2.44E-01
U-233	2 50E-03	5 01E-03
U-234	1 79E+02	3 58E+02
U-235	4 64E+00	7.28E+00
U-236	1.50E+01	3.00E+01
U-238	8.14E-02	8 55E-02
Y-90	1.87E+06	3 73E+06
Other Radionuclides	1 87E+06	3 75E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	2.047E+17
0 0250	4.256E+16
0.0375	3.712E+16
0.0575	3.976E+16
0 0850	2 402E+16
0 1250	1 626E+16
0.2250	2 073E+16
0 3750	9 024E+15
0 5750	1 472E+17
0 8500	2 489E+15
1.2500	1 421E+15
1.7500	6 522E+13
2 2500	5 721E+09
2 7500	3 234E+09
3 5000	1 486E+07
5 0000	8 401E+05
7 0000	9 274E+04
11 0000	1 039E+04

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 31E+04	4 62E+04
Total	Total

Total Canister Usage Summary

	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	0 0	0 0	165 3	0 0	0 0	0 0

Bare Fuel Transfers	
0	Assemblies

2010 Summary, Totals for 24" x 15' Canister

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2.35E+01	4.15E+01
Am-241	6.30E+01	1 11E+02
Am-242m	4 37E-01	7.72E-01
Am-243	8 78E-02	1.55E-01
C-14	2 61E+01	4 60E+01
Cl-36	5 10E-01	9 01E-01
Cm-243	1.10E-01	1 94E-01
Cm-244	5 84E+00	1 03E+01
Co-60	9 17E+02	1 62E+03
Cs-134	2 08E+02	3 67E+02
Cs-135	8 06E+00	1 42E+01
Cs-137	5.24E+05	9 26E+05
Eu-154	5 42E+03	9 58E+03
Eu-155	7 52E+02	1 33E+03
Fe-55	9 32E+00	1 65E+01
H-3	1 05E+03	1 86E+03
I-129	4 46E-01	7 89E-01
Kr-85	3 37E+04	5 95E+04
Np-237	3 52E-02	6 23E-02
Pa-231	3 38E+01	5 98E+01
Pb-210	3 36E-03	5 94E-03
Pm-147	1 04E+03	1 83E+03
Pu-238	1 29E+02	2 29E+02
Pu-239	7 75E+00	1.37E+01
Pu-240	4 56E+00	8 05E+00
Pu-241	6 70E+02	1.18E+03
Pu-242	1 15E-02	2 03E-02
Ra-226	4 07E-03	7 20E-03
Ra-228	1.29E+00	2 27E+00
Ru-106	1 10E-02	1 94E-02
Se-79	9 97E+00	1 76E+01
Sn-126	1.12E+01	1 98E+01
Sr-90	5 33E+05	9 42E+05
Tc-99	9 16E+01	1 62E+02
Th-229	1.32E+01	2 33E+01
Th-230	2 91E-01	5.14E-01
Th-232	3 60E+00	3 62E+00
Tl-208	4.33E+03	7.65E+03
U-232	1.17E+04	2 07E+04
U-233	1.12E+04	1.22E+04
U-234	2.30E+02	4 07E+02
U-235	1 88E-02	3 13E-02
U-236	3.74E-02	6 60E-02
U-238	1.51E-03	1.59E-03
Y-90	5 33E+05	9.42E+05
Other Radionuclides	5 80E+05	1.02E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	5.208E+16
0 0250	1 075E+16
0 0375	9 202E+15
0 0575	1 004E+16
0 0850	6 368E+15
0 1250	4 078E+15
0.2250	5 685E+15
0 3750	2 307E+15
0 5750	3 494E+16
0 8500	6 914E+14
1 2500	4 374E+14
1 7500	4 170E+13
2.2500	1 679E+09
2.7500	2 688E+14
3 5000	1 091E+06
5 0000	3 394E+05
7 0000	2 540E+04
11 0000	2 006E+03

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9 44E+03	1 65E+04
Total	Total

Total Canister Usage Summary

	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	0 0	0 0	0 0	27 0	0 0	0 0

Bare Fuel Transfers

0	Assemblies

2010 Summary, Totals for High Integrity Canister (HIC)

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 00E+00	1.50E+01
Am-241	2 81E+04	3 20E+04
Am-242m	3 41E+02	3 50E+02
Am-243	8 99E+01	1 08E+02
C-14	2 40E+01	4 11E+01
Cl-36	3 43E-01	6 73E-01
Cm-243	1.20E+02	1.29E+02
Cm-244	7.27E+03	9.24E+03
Co-60	8.70E+03	1.05E+04
Cs-134	5.23E+03	5.46E+03
Cs-135	1 42E+01	1.95E+01
Cs-137	7.21E+05	1.09E+06
Eu-154	1 04E+04	1 49E+04
Eu-155	1 08E+04	1 14E+04
Fe-55	1 58E+03	2 18E+03
H-3	5 66E+03	7 28E+03
I-129	4 44E-01	7 40E-01
Kr-85	2 92E+04	5 10E+04
Np-237	1 91E+00	2 27E+00
Pa-231	1.45E+00	2.16E+01
Pb-210	1 49E-04	2 16E-03
Pm-147	4.93E+04	5.16E+04
Pu-238	1 19E+04	1.44E+04
Pu-239	3 16E+03	8 31E+03
Pu-240	7.17E+03	7 61E+03
Pu-241	1 64E+05	2 88E+05
Pu-242	8 80E+00	1 07E+01
Ra-226	1 92E-04	2 63E-03
Ra-228	5 48E-02	8 22E-01
Ru-106	1 64E+03	1.71E+03
Se-79	5 17E+00	1 15E+01
Sn-126	1.36E+01	2.10E+01
Sr-90	4 54E+05	8 08E+05
Tc-99	1.59E+02	2.26E+02
Th-229	5 61E-01	8 43E+00
Th-230	1 45E-02	1 88E-01
Th-232	3 55E-01	3 56E-01
Tl-208	1 84E+02	2 77E+03
U-232	4 99E+02	7 50E+03
U-233	1 16E+03	1 20E+03
U-234	1 64E+01	1 55E+02
U-235	1 77E-01	3 83E-01
U-236	2 39E+00	2 66E+00
U-238	4.32E-01	4 95E-01
Y-90	4 54E+05	8.08E+05
Other Radionuclides	7.26E+05	1.12E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 614E+16
0 0250	9 605E+15
0 0375	8 867E+15
0 0575	9 243E+15
0.0850	5 516E+15
0 1250	3 708E+15
0 2250	4 723E+15
0 3750	2 054E+15
0 5750	4 077E+16
0 8500	8.119E+14
1 2500	1.189E+15
1 7500	2.680E+13
2.2500	2.990E+11
2 7500	9 729E+13
3 5000	1 918E+09
5 0000	5 858E+07
7.0000	6 746E+06
11 0000	7 744E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.99E+03	1.54E+04
Total	Total

Total Canister Usage Summary

	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	0 0	0 0	0 0	0 0	162 4	0 0

Bare Fuel Transfers	
0	Assemblies

2010 Summary, Totals for MCO

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2.52E-03	3 18E-03
Am-241	5 51E+05	6 77E+05
Am-242m	4 21E+02	5 84E+02
Am-243	5 06E+02	8 08E+02
C-14	4 87E+02	5 69E+02
Cl-36	3 48E-01	6 96E-01
Cm-243	1 09E+02	2 18E+02
Cm-244	2 36E+04	4 51E+04
Co-60	1 43E+03	2 58E+03
Cs-134	8 87E+01	1 16E+02
Cs-135	5 73E+01	7 02E+01
Cs-137	6 66E+06	8 06E+06
Eu-154	4 24E+04	5 56E+04
Eu-155	2.24E+03	3 20E+03
Fe-55	3 33E+01	5 39E+01
H-3	1.97E+04	3 01E+04
I-129	4 78E+00	5 78E+00
Kr-85	1.48E+05	1.78E+05
Np-237	4 82E+01	5 88E+01
Pa-231	6 90E-03	8 29E-03
Pb-210	1.54E-04	2 06E-04
Pm-147	3 19E+03	3 75E+03
Pu-238	1 34E+05	1 79E+05
Pu-239	1 51E+05	1.75E+05
Pu-240	1.22E+05	1 44E+05
Pu-241	3 48E+06	4 28E+06
Pu-242	1 01E+02	1 39E+02
Ra-226	5 94E-04	7 58E-04
Ra-228	2 34E-06	4 64E-06
Ru-106	3 27E-03	3 92E-03
Se-79	6 06E+01	7 32E+01
Sn-126	1 09E+01	2.19E+01
Sr-90	4 70E+06	5 66E+06
Tc-99	2 02E+03	2 43E+03
Th-229	5 88E-05	1 12E-04
Th-230	9 17E-02	1 12E-01
Th-232	2 38E-06	4 69E-06
Tl-208	7 58E-02	1 52E-01
U-232	2 05E-01	4 11E-01
U-233	1.59E-02	2 75E-02
U-234	3.54E+02	4.19E+02
U-235	4.57E+01	5.25E+01
U-236	6 38E+01	7.51E+01
U-238	7 03E+02	7 05E+02
Y-90	4 70E+06	5 66E+06
Other Radionuclides	6 39E+06	7 73E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	3 251E+17
0 0250	6 632E+16
0 0375	6 163E+16
0 0575	7.046E+16
0 0850	3 682E+16
0.1250	2.461E+16
0.2250	3.159E+16
0.3750	1.366E+16
0.5750	2.979E+17
0 8500	3.191E+15
1.2500	2 011E+15
1.7500	8 934E+13
2.2500	8 684E+09
2 7500	6.150E+09
3 5000	7 413E+08
5 0000	3 163E+08
7 0000	3 636E+07
11.0000	4 171E+06

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9 64E+04	1.18E+05
Total	Total

Total Canister Usage Summary

	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	0 0	0 0	0 0	0 0	0 0	403 0

Bare Fuel Transfers	
0	Assemblies

2010 Summary, Totals for Bare Fuel Transfers

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	4 09E-02	8 16E-02
Am-241	2 88E+05	5 50E+05
Am-242m	5 95E+02	1 13E+03
Am-243	9 30E+02	1 74E+03
C-14	2 14E+03	4 26E+03
Cl-36	4 02E+01	8 03E+01
Cm-243	3 12E+02	5 71E+02
Cm-244	6 58E+04	1.21E+05
Co-60	4 91E+05	9 82E+05
Cs-134	6 44E+02	1.21E+03
Cs-135	2 29E+01	4 32E+01
Cs-137	2 02E+06	3 76E+06
Eu-154	5 57E+04	1 06E+05
Eu-155	5 88E+03	1 11E+04
Fe-55	5 42E+03	1 08E+04
H-3	3 40E+04	6 32E+04
I-129	1.21E+00	2 24E+00
Kr-85	5 37E+04	1 00E+05
Np-237	1.40E+01	2.59E+01
Pa-231	5 13E-02	1.02E-01
Pb-210	4 73E-04	9 34E-04
Pm-147	3 20E+03	6 04E+03
Pu-238	1.13E+05	1 94E+05
Pu-239	1 70E+04	2 77E+04
Pu-240	1 78E+04	3 58E+04
Pu-241	1 32E+06	4 14E+06
Pu-242	9 65E+01	1 53E+02
Ra-226	1.29E-03	2 54E-03
Ra-228	1.03E-02	2 07E-02
Ru-106	3.28E-01	6.18E-01
Se-79	1.63E+01	3 03E+01
Sn-126	2.92E+01	5.36E+01
Sr-90	1.44E+06	2.69E+06
Tc-99	5 31E+02	9 87E+02
Th-229	3 03E-02	6 05E-02
Th-230	1.20E-01	2 36E-01
Th-232	1.04E-02	2 08E-02
Tl-208	1 70E+00	3 37E+00
U-232	4 60E+00	9 11E+00
U-233	6.25E+00	1.25E+01
U-234	2 71E+02	5 32E+02
U-235	1.17E+01	2.31E+01
U-236	1.21E+01	2.28E+01
U-238	1.62E+01	1.85E+01
Y-90	1.44E+06	2 69E+06
Other Radionuclides	2 66E+06	5 05E+06

Gamma Sources	
Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1.601E+17
0 0250	3.218E+16
0 0375	3 017E+16
0 0575	3 705E+16
0 0850	1 777E+16
0.1250	1.301E+16
0.2250	1 528E+16
0 3750	6 558E+15
0 5750	1 395E+17
0 8500	2 970E+15
1 2500	7.509E+16
1 7500	8 912E+13
2 2500	3.915E+11
2 7500	1.213E+11
3 5000	1.758E+09
5 0000	7.513E+08
7.0000	8 657E+07
11 0000	9 941E+06

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.47E+04	8 42E+04
Total	Total

Total Canister Usage Summary	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	0 0	0 0	0 0	0 0	0.0	0 0

Bare Fuel Transfers		BWR	PWR
166	Assemblies	87	79

2010 Summary, DBE category: Stable Metals, Intact

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 98E-03	5 93E-03
Am-241	2 32E+04	4 51E+04
Am-242m	1 46E+01	2 88E+01
Am-243	4 31E+01	7.70E+01
C-14	3 46E+01	6 92E+01
Cl-36	6 27E-01	1 25E+00
Cm-243	8 86E+00	1.57E+01
Cm-244	5 57E+03	9.19E+03
Co-60	9 04E+03	1 80E+04
Cs-134	1 73E+06	3 09E+06
Cs-135	2 18E+01	4 23E+01
Cs-137	1 36E+07	2 64E+07
Eu-154	3 86E+05	7 26E+05
Eu-155	1 72E+05	3 17E+05
Fe-55	9 85E+04	1 81E+05
H-3	4 29E+04	8 26E+04
I-129	4 07E+00	7 94E+00
Kr-85	1.10E+06	2 11E+06
Np-237	6 47E+01	1 21E+02
Pa-231	8.89E-03	1 76E-02
Pb-210	1.79E-04	3 57E-04
Pm-147	6 75E+06	1 31E+07
Pu-238	2 07E+05	3 70E+05
Pu-239	1 02E+04	2 03E+04
Pu-240	5 45E+03	1 08E+04
Pu-241	9 45E+05	1 82E+06
Pu-242	6 75E+00	1 27E+01
Ra-226	7 57E-04	1 51E-03
Ra-228	1.70E-04	3 41E-04
Ru-106	5 81E+05	1.11E+06
Se-79	7 09E+01	1.38E+02
Sn-126	6 29E+01	1.23E+02
Sr-90	1 29E+07	2.49E+07
Tc-99	2 32E+03	4.52E+03
Th-229	5 02E-04	1.00E-03
Th-230	1 41E-01	2.80E-01
Th-232	1 59E-03	1 60E-03
Tl-208	2 45E-01	4 76E-01
U-232	6 96E-01	1 35E+00
U-233	1.15E-01	2 29E-01
U-234	7.77E+02	1 53E+03
U-235	2.22E+01	3 74E+01
U-236	8 47E+01	1 64E+02
U-238	3 54E+00	3 61E+00
Y-90	1.29E+07	2 49E+07
Other Radionuclides	1 94E+07	3.73E+07

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 587E+18
0 0250	3 374E+17
0 0375	3 067E+17
0 0575	3 099E+17
0 0850	1.940E+17
0 1250	1.562E+17
0.2250	1 652E+17
0 3750	7 699E+16
0 5750	1 158E+18
0 8500	1 263E+17
1 2500	2 825E+16
1 7500	1 062E+15
2 2500	1 545E+15
2 7500	1 016E+13
3 5000	1 152E+12
5 0000	6 245E+07
7.0000	7 158E+06
11 0000	8 195E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.14E+05	4 10E+05
Total	Total

Total Canister Usage Summary

	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	1017 1	235.9	165 3	0 0	1 0	0 0

Bare Fuel Transfers

0	Assemblies

2010 Summary, DBE category: Stable Metals, Not Intact

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	0.00E+00	0 00E+00
Am-241	0 00E+00	0 00E+00
Am-242m	0 00E+00	0 00E+00
Am-243	0 00E+00	0 00E+00
C-14	0 00E+00	0 00E+00
Cl-36	0 00E+00	0 00E+00
Cm-243	0 00E+00	0 00E+00
Cm-244	0 00E+00	0 00E+00
Co-60	0 00E+00	0 00E+00
Cs-134	0 00E+00	0 00E+00
Cs-135	0 00E+00	0 00E+00
Cs-137	0 00E+00	0 00E+00
Eu-154	0 00E+00	0 00E+00
Eu-155	0 00E+00	0.00E+00
Fe-55	0 00E+00	0.00E+00
H-3	0 00E+00	0.00E+00
I-129	0.00E+00	0 00E+00
Kr-85	0 00E+00	0 00E+00
Np-237	0 00E+00	0 00E+00
Pa-231	0.00E+00	0 00E+00
Pb-210	0 00E+00	0 00E+00
Pm-147	0 00E+00	0 00E+00
Pu-238	0 00E+00	0 00E+00
Pu-239	0 00E+00	0 00E+00
Pu-240	0 00E+00	0 00E+00
Pu-241	0 00E+00	0 00E+00
Pu-242	0 00E+00	0 00E+00
Ra-226	0 00E+00	0 00E+00
Ra-228	0 00E+00	0.00E+00
Ru-106	0 00E+00	0.00E+00
Se-79	0 00E+00	0.00E+00
Sn-126	0 00E+00	0.00E+00
Sr-90	0 00E+00	0 00E+00
Tc-99	0 00E+00	0 00E+00
Th-229	0.00E+00	0 00E+00
Th-230	0.00E+00	0 00E+00
Th-232	0.00E+00	0 00E+00
Tl-208	0 00E+00	0 00E+00
U-232	0 00E+00	0 00E+00
U-233	0 00E+00	0 00E+00
U-234	0 00E+00	0 00E+00
U-235	0 00E+00	0 00E+00
U-236	0 00E+00	0 00E+00
U-238	0 00E+00	0 00E+00
Y-90	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

Total Canister Usage Summary	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	0 0	0 0	0 0	0 0	0 0	0 0

Bare Fuel Transfers	
0	Assemblies

2010 Summary, DBE category: Non-Metals, Intact

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	2 68E+02	3 01E+02
Am-241	1 07E+06	2 02E+06
Am-242m	3 73E+03	7 21E+03
Am-243	2 94E+03	5 58E+03
C-14	1.12E+04	1 97E+04
Cl-36	2 01E+02	3 60E+02
Cm-243	1.42E+03	2 66E+03
Cm-244	1 87E+05	3 42E+05
Co-60	2.57E+06	4 61E+06
Cs-134	6 01E+04	1 14E+05
Cs-135	2 30E+02	3 62E+02
Cs-137	1 50E+07	2 36E+07
Eu-154	3 01E+05	5 35E+05
Eu-155	8 96E+04	1 67E+05
Fe-55	8 47E+04	1.63E+05
H-3	1 32E+05	2.26E+05
I-129	1 06E+01	1.58E+01
Kr-85	5 49E+05	8 45E+05
Np-237	5 90E+01	1 03E+02
Pa-231	3 39E+02	3 86E+02
Pb-210	4 36E-02	5.03E-02
Pm-147	3 43E+05	6 66E+05
Pu-238	5.17E+05	8 49E+05
Pu-239	2 15E+05	2 76E+05
Pu-240	1 63E+05	2 35E+05
Pu-241	7 24E+06	1 72E+07
Pu-242	3.21E+02	4 87E+02
Ra-226	6 92E-02	8 04E-02
Ra-228	1 37E+01	1 58E+01
Ru-106	1 89E+04	3 70E+04
Se-79	1 87E+02	2 63E+02
Sn-126	2 60E+02	3 92E+02
Sr-90	1.21E+07	1.84E+07
Tc-99	3 53E+03	5 62E+03
Th-229	1.78E+02	2 00E+02
Th-230	4.29E+00	5 19E+00
Th-232	7 64E+00	7 99E+00
Tl-208	4 01E+04	4 61E+04
U-232	1 09E+05	1 25E+05
U-233	1 61E+04	2 02E+04
U-234	4 81E+03	6 22E+03
U-235	4 94E+01	9 45E+01
U-236	6 72E+01	1.10E+02
U-238	4 18E+01	5 07E+01
Y-90	1 21E+07	1 84E+07
Other Radionuclides	1 88E+07	3 03E+07

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	1 068E+18
0 0250	2 186E+17
0 0375	2 003E+17
0 0575	2 284E+17
0 0850	1 239E+17
0.1250	8 677E+16
0.2250	1 068E+17
0.3750	4 590E+16
0 5750	8 870E+17
0 8500	2.135E+16
1 2500	3.545E+17
1 7500	6 662E+14
2 2500	1 773E+13
2 7500	1 620E+15
3 5000	4 350E+10
5 0000	2 164E+09
7 0000	2 492E+08
11 0000	2 861E+07

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2 98E+05	4 75E+05
Total	Total

Total Canister Usage Summary

	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	166 9	848 3	0 0	27.0	4 0	18 0

Bare Fuel Transfers	
166	Assemblies

2010 Summary, DBE category: Non-Metals, Not Intact

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1.06E+00	1.51E+01
Am-241	2.79E+05	3.55E+05
Am-242m	9 53E+02	1.15E+03
Am-243	7.34E+02	1 01E+03
C-14	3 68E+03	4 40E+03
Cl-36	6 82E+01	8 18E+01
Cm-243	2 45E+02	3 49E+02
Cm-244	3 53E+04	5 85E+04
Co-60	7 86E+06	1 16E+07
Cs-134	2 72E+04	4 69E+04
Cs-135	3 88E+01	5 15E+01
Cs-137	2.53E+06	3.62E+06
Eu-154	1.44E+05	2.02E+05
Eu-155	3 50E+04	4 94E+04
Fe-55	2 57E+06	4 60E+06
H-3	3 18E+04	4 77E+04
I-129	1.21E+00	1.85E+00
Kr-85	1 06E+05	1 59E+05
Np-237	9 60E+00	1 37E+01
Pa-231	1 54E+00	2 18E+01
Pb-210	5.20E-04	2.57E-03
Pm-147	2 01E+05	3 42E+05
Pu-238	9 71E+04	1.47E+05
Pu-239	1.25E+04	2.39E+04
Pu-240	1.98E+04	2.71E+04
Pu-241	3.00E+06	4 54E+06
Pu-242	7.11E+01	1 06E+02
Ra-226	1 29E-03	3 87E-03
Ra-228	7 16E-02	8 42E-01
Ru-106	1 16E+04	2 16E+04
Se-79	1 78E+01	2 90E+01
Sn-126	2 65E+01	4.22E+01
Sr-90	2 04E+06	2 94E+06
Tc-99	6 07E+02	8.32E+02
Th-229	5 98E-01	8 48E+00
Th-230	1.38E-01	3 33E-01
Th-232	3 97E-01	4 00E-01
Tl-208	1.88E+02	2 77E+03
U-232	5 08E+02	7.51E+03
U-233	1.25E+03	1 30E+03
U-234	4 05E+02	6 29E+02
U-235	2 29E+01	2 77E+01
U-236	1 64E+01	2 05E+01
U-238	3 07E+01	3 15E+01
Y-90	2 04E+06	2.94E+06
Other Radionuclides	3 98E+06	5.45E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	1 954E+17
0 0250	3 939E+16
0 0375	3 568E+16
0 0575	4 015E+16
0 0850	2 124E+16
0.1250	1 665E+16
0.2250	1 762E+16
0.3750	7 646E+15
0 5750	1.379E+17
0 8500	6.524E+15
1.2500	8 596E+17
1 7500	1 639E+14
2 2500	2 830E+13
2 7500	9 764E+13
3 5000	2 327E+10
5 0000	3 667E+08
7.0000	4 223E+07
11 0000	4 849E+06

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.69E+05	2.48E+05
Total	Total

Total Canister Usage Summary

	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	196 7	352 8	0 0	0 0	148 4	0 0

Bare Fuel Transfers

0	Assemblies

2010 Summary, DBE category: Other, Intact

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 22E-02	1 89E-02
Am-241	6 13E+04	7.15E+04
Am-242m	5 96E+01	1.13E+02
Am-243	4 89E+01	8 92E+01
C-14	3 15E+03	3.15E+03
Cl-36	3 72E+01	3.72E+01
Cm-243	2 71E+01	5 39E+01
Cm-244	3.30E+03	6.37E+03
Co-60	5 24E+05	5.25E+05
Cs-134	6.32E+02	1 43E+03
Cs-135	1.33E+01	1 82E+01
Cs-137	1 84E+06	2 06E+06
Eu-154	9 88E+03	1 20E+04
Eu-155	1 86E+03	3 24E+03
Fe-55	4 90E+03	5 01E+03
H-3	3 06E+04	3 22E+04
I-129	1 03E+00	1 19E+00
Kr-85	4 83E+04	5 40E+04
Np-237	8 57E+00	9 54E+00
Pa-231	2 24E-02	3 57E-02
Pb-210	4 95E-03	4 95E-03
Pm-147	4 37E+03	8 53E+03
Pu-238	1 52E+04	2 03E+04
Pu-239	9 32E+04	9 58E+04
Pu-240	4 60E+04	4 73E+04
Pu-241	1 84E+06	1 90E+06
Pu-242	1 69E+01	2 11E+01
Ra-226	1 33E-02	1 33E-02
Ra-228	1 26E-03	1 26E-03
Ru-106	1 95E+02	4 45E+02
Se-79	1 77E+01	1 98E+01
Sn-126	1 90E+01	2 39E+01
Sr-90	1 57E+06	1.72E+06
Tc-99	5 62E+02	6 25E+02
Th-229	4 73E-03	4 74E-03
Th-230	1.21E+00	1 22E+00
Th-232	1 27E-03	1 27E-03
Tl-208	8 07E-02	1 01E-01
U-232	2 18E-01	2 74E-01
U-233	9 97E-01	9 99E-01
U-234	2 65E+03	2 65E+03
U-235	2 23E+00	2.68E+00
U-236	3 15E+01	3.29E+01
U-238	4 52E+00	4.73E+00
Y-90	1 57E+06	1 72E+06
Other Radionuclides	2 40E+06	2 62E+06

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0 0150	9 739E+16
0 0250	2 000E+16
0 0375	1 777E+16
0 0575	1 949E+16
0 0850	1 117E+16
0 1250	7 390E+15
0 2250	9 562E+15
0 3750	4 166E+15
0 5750	7 658E+16
0 8500	9 342E+14
1 2500	3 928E+16
1.7500	2 436E+13
2.2500	2 472E+11
2.7500	7 867E+09
3 5000	5 816E+08
5 0000	5 065E+07
7 0000	5 816E+06
11 0000	6 669E+05

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.50E+04	3 79E+04
Total	Total

Total Canister Usage Summary

	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	21 7	9 0	0 0	0 0	1 0	0 0

Bare Fuel Transfers

0	Assemblies

2010 Summary, DBE category: Other, Not Intact

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)
Ac-227	1 80E-01	1 82E-01
Am-241	1 18E+06	1.24E+06
Am-242m	1 86E+03	1 90E+03
Am-243	1 69E+03	1 72E+03
C-14	1 12E+04	1 12E+04
Cl-36	2 02E+02	2 02E+02
Cm-243	9 78E+01	9 78E+01
Cm-244	2 42E+04	2 45E+04
Co-60	9 28E+06	9 28E+06
Cs-134	1 06E+03	1 07E+03
Cs-135	9 57E+01	1 03E+02
Cs-137	8 68E+06	9 50E+06
Eu-154	2 82E+05	2 86E+05
Eu-155	2 85E+04	2 87E+04
Fe-55	3.75E+05	3.75E+05
H-3	4.96E+04	5 11E+04
I-129	5 44E+00	6.03E+00
Kr-85	2 54E+05	2.72E+05
Np-237	5 76E+01	6 34E+01
Pa-231	2 71E-01	2 75E-01
Pb-210	9 38E-04	9 54E-04
Pm-147	4 89E+04	4 94E+04
Pu-238	1 02E+05	1 39E+05
Pu-239	1 48E+05	1 71E+05
Pu-240	1 16E+05	1 34E+05
Pu-241	3 09E+06	4 45E+06
Pu-242	7 95E+01	9 93E+01
Ra-226	3 34E-03	3 41E-03
Ra-228	5.23E-02	5.23E-02
Ru-106	2 98E+01	2.98E+01
Se-79	7 43E+01	8 19E+01
Sn-126	1.92E+01	1.99E+01
Sr-90	6 78E+06	7.36E+06
Tc-99	2.51E+03	2 76E+03
Th-229	1 10E-01	1.10E-01
Th-230	4 50E-01	4 60E-01
Th-232	3 41E-03	3 79E-03
Tl-208	8 54E+00	8 54E+00
U-232	2 31E+01	2 31E+01
U-233	3.20E+01	3 20E+01
U-234	1 46E+03	1 51E+03
U-235	9 67E+01	1 03E+02
U-236	8 30E+01	9 12E+01
U-238	7 08E+02	7.10E+02
Y-90	6 78E+06	7.36E+06
Other Radionuclides	1 23E+07	1 31E+07

Gamma Sources

Photon Energy Group	Total Photons/sec (bounding)
Avg MeV	
0 0150	4 417E+17
0 0250	8 945E+16
0 0375	8 161E+16
0 0575	9 876E+16
0 0850	4 884E+16
0 1250	3 559E+16
0.2250	4 176E+16
0.3750	1 795E+16
0 5750	3 528E+17
0 8500	8 009E+15
1.2500	6 930E+17
1.7500	2.414E+14
2.2500	3 652E+12
2 7500	3 119E+11
3 5000	4 714E+08
5 0000	1 871E+08
7 0000	2.141E+07
11.0000	2 450E+06

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.87E+05	3.00E+05
Total	Total

Total Canister Usage Summary

	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	0 5	0 0	0 0	0 0	8 0	385 0

Bare Fuel Transfers	
0	Assemblies