

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FFTF-TFA-SRF-3&4
 SNF ID #: 334
 Fuel Units & Descr: 2 - HEX ARRAY 91 ROD
 Heavy Metal Mass: BOL= , EOL=85.81kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1992
 Estimates as of: 2030
 Template: FFTF (FAST, SST, 10 to 30%, Pu & U)
²Template Burnup(MWd): 5011.2
 Template BOL Heavy Metal Mass (MT): 0.0329181
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.40

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.1822E-12	3,631.587	3,953.599	0.00E+00	2.25E-08	2.44E-08	0.0150	1.363E+14
Am-241	1.1066E-01	3,631.587	3,953.599	1.72E+02	5.74E+02	6.10E+02	0.0250	2.584E+13
Am-242m	1.9247E-03	3,631.587	3,953.599	0.00E+00	6.99E+00	7.61E+00	0.0375	2.989E+13
Am-243	1.0740E-04	3,631.587	3,953.599	0.00E+00	3.90E-01	4.25E-01	0.0575	3.156E+13
C-14	2.6042E-05	3,631.587	3,953.599	0.00E+00	9.46E-02	1.03E-01	0.0850	1.431E+13
Cl-36	3.4243E-10	3,631.587	3,953.599	0.00E+00	1.24E-06	1.35E-06	0.1250	1.007E+13
Cm-243	4.0629E-04	3,631.587	3,953.599	0.00E+00	1.48E+00	1.61E+00	0.2250	1.155E+13
Cm-244	1.6024E-03	3,631.587	3,953.599	0.00E+00	5.82E+00	6.34E+00	0.3750	5.008E+12
Co-60	3.4283E-03	3,631.587	3,953.599	0.00E+00	1.25E+01	1.36E+01	0.5750	2.028E+14
Cs-134	1.5565E-03	3,631.587	3,953.599	0.00E+00	5.65E+00	6.15E+00	0.8500	2.119E+12
Cs-135	4.7693E-05	3,631.587	3,953.599	0.00E+00	1.73E-01	1.89E-01	1.2500	2.536E+12
Cs-137	1.4007E+00	3,631.587	3,953.599	0.00E+00	5.09E+03	5.54E+03	1.7500	5.738E+10
Eu-154	1.6184E-02	3,631.587	3,953.599	0.00E+00	5.88E+01	6.40E+01	2.2500	1.207E+07
Eu-155	1.3775E-02	3,631.587	3,953.599	0.00E+00	5.00E+01	5.45E+01	2.7500	6.584E+07
Fe-55	3.8035E-04	3,631.587	3,953.599	0.00E+00	1.38E+00	1.50E+00	3.5000	6.095E+06
H-3	3.8454E-03	3,631.587	3,953.599	0.00E+00	1.40E+01	1.52E+01	5.0000	2.325E+05
I-129	1.2891E-06	3,631.587	3,953.599	0.00E+00	4.68E-03	5.10E-03	7.0000	2.850E+04
Kr-85	2.7858E-02	3,631.587	3,953.599	0.00E+00	1.01E+02	1.10E+02	11.0000	3.030E+03
Np-237	3.7516E-06	3,631.587	3,953.599	0.00E+00	1.36E-02	1.48E-02		
Pa-231	1.2488E-11	3,631.587	3,953.599	0.00E+00	4.54E-08	4.94E-08		
Pb-210	2.4206E-12	3,631.587	3,953.599	0.00E+00	8.79E-09	9.57E-09		
Pm-147	1.5671E-02	3,631.587	3,953.599	0.00E+00	5.69E+01	6.20E+01		
Pu-238	1.4877E-02	3,631.587	3,953.599	0.00E+00	5.40E+01	5.88E+01		
Pu-239	-3.5520E-02	3,631.587	0.000	1.42E+03	1.29E+03	1.42E+03		
Pu-240	2.0690E-02	3,631.587	3,953.599	7.20E+02	7.95E+02	8.01E+02		
Pu-241	-1.4799E+00	3,631.587	0.000	3.23E+04	2.69E+04	3.23E+04		
Pu-242	1.1252E-05	3,631.587	3,953.599	1.92E-01	2.33E-01	2.36E-01		
Ra-226	7.8524E-12	3,631.587	3,953.599	0.00E+00	2.85E-08	3.10E-08		
Ra-228	2.4086E-16	3,631.587	3,953.599	0.00E+00	8.75E-13	9.52E-13		
Ru-106	1.5066E-05	3,631.587	3,953.599	0.00E+00	5.47E-02	5.96E-02		
Se-79	1.0127E-05	3,631.587	3,953.599	0.00E+00	3.68E-02	4.00E-02		
Sn-126	4.3902E-05	3,631.587	3,953.599	0.00E+00	1.59E-01	1.74E-01		
Sr-90	5.0088E-01	3,631.587	3,953.599	0.00E+00	1.82E+03	1.98E+03		
Tc-99	3.9412E-04	3,631.587	3,953.599	0.00E+00	1.43E+00	1.56E+00		
Th-229	2.7219E-12	3,631.587	3,953.599	0.00E+00	9.88E-09	1.08E-08		
Th-230	1.0441E-09	3,631.587	3,953.599	0.00E+00	3.79E-06	4.13E-06		
Th-232	3.1689E-16	3,631.587	3,953.599	0.00E+00	1.15E-12	1.25E-12		
Tl-208	4.6636E-07	3,631.587	3,953.599	0.00E+00	1.69E-03	1.84E-03		
U-232	1.2638E-06	3,631.587	3,953.599	0.00E+00	4.59E-03	5.00E-03		
U-233	5.7451E-10	3,631.587	3,953.599	0.00E+00	2.09E-06	2.27E-06		
U-234	4.3044E-06	3,631.587	3,953.599	0.00E+00	1.56E-02	1.70E-02		
U-235	-7.7765E-09	3,631.587	0.000	2.91E-04	2.62E-04	2.91E-04		
U-236	1.8050E-07	3,631.587	3,953.599	0.00E+00	6.55E-04	7.14E-04		
U-238	-1.7914E-07	3,631.587	0.000	2.12E-02	2.05E-02	2.12E-02		
Y-90	5.0088E-01	3,631.587	3,953.599	0.00E+00	1.82E+03	1.98E+03		
Other Radionuclides					5.15E+03	5.60E+03		
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							1.24E+02	1.33E+02
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	FAST	FAST	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	SST (316)	SST	
BOL HM Constituents:	PuO ₂ -UO ₂	Pu and U	
BOL Enrichment %:		10 to 30	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		3,631.587	Nominal burnup taken from SFD and converted to MWd using BOL=89.448kg Bounding burnup taken from SFD and converted to MWd using BOL=89.448kg
Bounding:		3,953.599	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.27		1.00
Bounding:	0.29		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FFTF-TFA-UO-1
 SNF ID #: 335
 Fuel Units & Descr: 1 - HEX ARRAY 217 ROD
 Heavy Metal Mass: BOL = : EOL=35.01kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1992
 Estimates as of: 2030
 Template: FFTF (FAST, SST, 10 to 30%, Pu & U)
²Template Burnup(MWd): 5011.2
 Template BOL Heavy Metal Mass (MT): 0.0329181
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.20

Radionuclide	II. Estimates		Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n				Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.1822E-12	835.266	1,229.597	0.00E+00	5.16E-09	7.60E-09	Avg. MeV
Am-241	1.1066E-01	835.266	1,229.597	6.91E+01	1.62E+02	2.05E+02	0.0150
Am-242m	1.9247E-03	835.266	1,229.597	0.00E+00	1.61E+00	2.37E+00	0.0250
Am-243	1.0740E-04	835.266	1,229.597	0.00E+00	8.97E-02	1.32E-01	0.0375
C-14	2.6042E-05	835.266	1,229.597	0.00E+00	2.18E-02	3.20E-02	0.0575
Cl-36	3.4243E-10	835.266	1,229.597	0.00E+00	2.86E-07	4.21E-07	0.0850
Cm-243	4.0629E-04	835.266	1,229.597	0.00E+00	3.39E-01	5.00E-01	0.1250
Cm-244	1.6024E-03	835.266	1,229.597	0.00E+00	1.34E+00	1.97E+00	0.2250
Co-60	3.4283E-03	835.266	1,229.597	0.00E+00	2.86E+00	4.22E+00	0.3750
Cs-134	1.5565E-03	835.266	1,229.597	0.00E+00	1.30E+00	1.91E+00	0.5750
Cs-135	4.7693E-05	835.266	1,229.597	0.00E+00	3.98E-02	5.86E-02	0.8500
Cs-137	1.4007E+00	835.266	1,229.597	0.00E+00	1.17E+03	1.72E+03	1.2500
Eu-154	1.6184E-02	835.266	1,229.597	0.00E+00	1.35E+01	1.99E+01	1.7500
Eu-155	1.3775E-02	835.266	1,229.597	0.00E+00	1.15E+01	1.69E+01	2.2500
Fe-55	3.8035E-04	835.266	1,229.597	0.00E+00	3.18E-01	4.68E-01	2.7500
H-3	3.8454E-03	835.266	1,229.597	0.00E+00	3.21E+00	4.73E+00	3.5000
I-129	1.2891E-06	835.266	1,229.597	0.00E+00	1.08E-03	1.59E-03	5.0000
Kr-85	2.7858E-02	835.266	1,229.597	0.00E+00	2.33E+01	3.43E+01	7.0000
Np-237	3.7516E-06	835.266	1,229.597	0.00E+00	3.13E-03	4.61E-03	11.0000
Pa-231	1.2488E-11	835.266	1,229.597	0.00E+00	1.04E-08	1.54E-08	
Pb-210	2.4206E-12	835.266	1,229.597	0.00E+00	2.02E-09	2.98E-09	
Pm-147	1.5671E-02	835.266	1,229.597	0.00E+00	1.31E+01	1.93E+01	
Pu-238	1.4877E-02	835.266	1,229.597	0.00E+00	1.24E+01	1.83E+01	
Pu-239	-3.5520E-02	835.266	0.000	5.67E+02	5.38E+02	5.67E+02	
Pu-240	2.0690E-02	835.266	1,229.597	2.88E+02	3.06E+02	3.14E+02	
Pu-241	-1.4799E+00	835.266	0.000	1.29E+04	1.17E+04	1.29E+04	
Pu-242	1.1252E-05	835.266	1,229.597	7.69E-02	8.63E-02	9.07E-02	
Ra-226	7.8524E-12	835.266	1,229.597	0.00E+00	6.56E-09	9.66E-09	
Ra-228	2.4086E-16	835.266	1,229.597	0.00E+00	2.01E-13	2.96E-13	
Ru-106	1.5066E-05	835.266	1,229.597	0.00E+00	1.26E-02	1.85E-02	
Se-79	1.0127E-05	835.266	1,229.597	0.00E+00	8.46E-03	1.25E-02	
Sn-126	4.3902E-05	835.266	1,229.597	0.00E+00	3.67E-02	5.40E-02	
Sr-90	5.0088E-01	835.266	1,229.597	0.00E+00	4.18E+02	6.16E+02	
Tc-99	3.9412E-04	835.266	1,229.597	0.00E+00	3.29E-01	4.85E-01	
Th-229	2.7219E-12	835.266	1,229.597	0.00E+00	2.27E-09	3.35E-09	
Th-230	1.0441E-09	835.266	1,229.597	0.00E+00	8.72E-07	1.28E-06	
Th-232	3.1689E-16	835.266	1,229.597	0.00E+00	2.65E-13	3.90E-13	
Tl-208	4.6636E-07	835.266	1,229.597	0.00E+00	3.90E-04	5.73E-04	
U-232	1.2638E-06	835.266	1,229.597	0.00E+00	1.06E-03	1.55E-03	
U-233	5.7451E-10	835.266	1,229.597	0.00E+00	4.80E-07	7.06E-07	
U-234	4.3044E-06	835.266	1,229.597	0.00E+00	3.60E-03	5.29E-03	
U-235	-7.7765E-09	835.266	0.000	1.16E-04	1.10E-04	1.16E-04	
U-236	1.8050E-07	835.266	1,229.597	0.00E+00	1.51E-04	2.22E-04	
U-238	-1.7914E-07	835.266	0.000	8.48E-03	8.33E-03	8.48E-03	
Y-90	5.0088E-01	835.266	1,229.597	0.00E+00	4.18E+02	6.16E+02	
Other Radionuclides					1.16E+03	1.74E+03	

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.10E+01	4.80E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	FAST	FAST	
BOL HM Constituents:	SST (D9)	SST	
BOL Enrichment %:	PuO2-UO2	Pu and U	
		10 to 30	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup taken from SFD and converted to MWd using BOL=35.848kg Bounding burnup taken from SFD and converted to MWd using BOL=35.848kg
	From SFD	Estimated	
Nominal:		835.266	
Bounding:		1,229.597	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.15		1.00
Bounding:	0.23		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FFTF-TFA-WBO18 & WBO42
 SNF ID #: 336
 Fuel Units & Descs: 2 - HEX ARRAY 61 ROD
 Heavy Metal Mass: BOL= : EOL=94.98kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1992
 Estimates as of: 2030
 Template: FERMI (Fast, Zirc, 10 to 40%, U)
²Template Burnup(MWd): 58.6725048
 Template BOL Heavy Metal Mass (MT): 0.018774
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.40

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	9.6110E-08	1,204.373	1,348.897	0.00E+00	1.16E-04	1.30E-04	Avg. MeV	
Am-241	6.5601E-07	1,204.373	1,348.897	0.00E+00	7.90E-04	8.85E-04	0.0150	8.925E+13
Am-242m	0.0000E+00	1,204.373	1,348.897	0.00E+00	0.00E+00	0.00E+00	0.0250	1.854E+13
Am-243	8.3770E-15	1,204.373	1,348.897	0.00E+00	1.01E-11	1.13E-11	0.0375	1.631E+13
C-14	2.1714E-05	1,204.373	1,348.897	0.00E+00	2.62E-02	2.93E-02	0.0575	1.728E+13
Cl-36	5.5188E-08	1,204.373	1,348.897	0.00E+00	6.65E-05	7.44E-05	0.0850	1.045E+13
Cm-243	1.5496E-14	1,204.373	1,348.897	0.00E+00	1.87E-11	2.09E-11	0.1250	6.768E+12
Cm-244	5.2375E-16	1,204.373	1,348.897	0.00E+00	6.31E-13	7.06E-13	0.2250	8.970E+12
Co-60	2.0947E-03	1,204.373	1,348.897	0.00E+00	2.52E+00	2.83E+00	0.3750	3.908E+12
Cs-134	6.2448E-07	1,204.373	1,348.897	0.00E+00	7.52E-04	8.42E-04	0.5750	6.904E+13
Cs-135	4.4996E-05	1,204.373	1,348.897	0.00E+00	5.42E-02	6.07E-02	0.8500	6.376E+11
Cs-137	1.3775E+00	1,204.373	1,348.897	0.00E+00	1.66E+03	1.86E+03	1.2500	4.229E+11
Eu-154	1.8510E-04	1,204.373	1,348.897	0.00E+00	2.23E-01	2.50E-01	1.7500	1.648E+10
Eu-155	1.4163E-03	1,204.373	1,348.897	0.00E+00	1.71E+00	1.91E+00	2.2500	2.902E+06
Fe-55	1.4179E-05	1,204.373	1,348.897	0.00E+00	1.71E-02	1.91E-02	2.7500	2.798E+05
H-3	3.5383E-03	1,204.373	1,348.897	0.00E+00	4.26E+00	4.77E+00	3.5000	3.574E+02
I-129	1.1426E-06	1,204.373	1,348.897	0.00E+00	1.38E-03	1.54E-03	5.0000	1.306E+02
Kr-85	3.8604E-02	1,204.373	1,348.897	0.00E+00	4.65E+01	5.21E+01	7.0000	1.244E+01
Np-237	3.3099E-06	1,204.373	1,348.897	0.00E+00	3.99E-03	4.46E-03	11.0000	1.257E+00
Pa-231	1.8953E-07	1,204.373	1,348.897	0.00E+00	2.28E-04	2.56E-04		
Pb-210	8.9531E-12	1,204.373	1,348.897	0.00E+00	1.08E-08	1.21E-08		
Pm-147	1.1588E-03	1,204.373	1,348.897	0.00E+00	1.40E+00	1.56E+00		
Pu-238	1.7146E-04	1,204.373	1,348.897	0.00E+00	2.07E-01	2.31E-01		
Pu-239	1.9464E-02	1,204.373	1,348.897	0.00E+00	2.34E+01	2.63E+01		
Pu-240	6.7919E-05	1,204.373	1,348.897	0.00E+00	8.18E-02	9.16E-02		
Pu-241	4.1774E-06	1,204.373	1,348.897	0.00E+00	5.03E-03	5.63E-03		
Pu-242	4.3751E-13	1,204.373	1,348.897	0.00E+00	5.27E-10	5.90E-10		
Ra-226	2.4219E-11	1,204.373	1,348.897	0.00E+00	2.92E-08	3.27E-08		
Ra-228	2.3572E-11	1,204.373	1,348.897	0.00E+00	2.84E-08	3.18E-08		
Ru-106	3.0951E-10	1,204.373	1,348.897	0.00E+00	3.73E-07	4.18E-07		
Se-79	1.6488E-05	1,204.373	1,348.897	0.00E+00	1.99E-02	2.22E-02		
Sn-126	3.7564E-05	1,204.373	1,348.897	0.00E+00	4.52E-02	5.07E-02		
Sr-90	1.2052E+00	1,204.373	1,348.897	0.00E+00	1.45E+03	1.63E+03		
Tc-99	4.4825E-04	1,204.373	1,348.897	0.00E+00	5.40E-01	6.05E-01		
Th-229	4.6478E-11	1,204.373	1,348.897	0.00E+00	5.60E-08	6.27E-08		
Th-230	2.2259E-09	1,204.373	1,348.897	0.00E+00	2.68E-06	3.00E-06		
Th-232	2.3691E-11	1,204.373	1,348.897	0.00E+00	2.85E-08	3.20E-08		
Th-208	5.8256E-09	1,204.373	1,348.897	0.00E+00	7.02E-06	7.86E-06		
U-232	1.5759E-08	1,204.373	1,348.897	0.00E+00	1.90E-05	2.13E-05		
U-233	1.0110E-08	1,204.373	1,348.897	0.00E+00	1.22E-05	1.36E-05		
U-234	4.9001E-06	1,204.373	1,348.897	0.00E+00	5.90E-03	6.61E-03		
U-235	-2.3191E-06	1,204.373	0.000	5.33E-02	5.05E-02	5.33E-02		
U-236	1.2633E-05	1,204.373	1,348.897	0.00E+00	1.52E-02	1.70E-02		
U-238	-9.5407E-08	1,204.373	0.000	2.41E-02	2.40E-02	2.41E-02		
Y-90	1.2053E+00	1,204.373	1,348.897	0.00E+00	1.45E+03	1.63E+03		
Other Radionuclides					1.65E+03	1.85E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.85E+01	2.08E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	FAST	FAST	This Template was used for the following reasons: This template is a good approximation since it is a FAST, Uranium fuel
Fuel Cladding:	SST (316)	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		10 to 40	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,204.373	Nominal burnup taken from SFD and converted to MWd using BOL=96.350kg
Bounding:		1,348.897	Bounding burnup taken from SFD and converted to MWd using BOL=96.350kg

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	4.00		1.00
Bounding:	4.48		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FMRB (GERMANY)
 SNF ID #: 577
 Fuel Units & Descr: 92 - MTR TYPE
 Heavy Metal Mass: BOL=13.14kg ; EOL=11.67kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 3.83

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.0068E-09	1,394.013	2,788.025	0.00E+00	2.80E-06	5.60E-06	0.0150	2.053E+14
Am-241	2.5251E-03	1,394.013	2,788.025	0.00E+00	3.52E+00	7.04E+00	0.0250	4.264E+13
Am-242m	3.9624E-07	1,394.013	2,788.025	0.00E+00	5.52E-04	1.10E-03	0.0375	3.706E+13
Am-243	1.4880E-06	1,394.013	2,788.025	0.00E+00	2.07E-03	4.15E-03	0.0575	3.989E+13
C-14	5.7053E-09	1,394.013	2,788.025	0.00E+00	7.95E-06	1.59E-05	0.0850	2.404E+13
Cl-36	1.3124E-32	1,394.013	2,788.025	0.00E+00	1.83E-29	3.66E-29	0.1250	1.588E+13
Cm-243	1.1419E-07	1,394.013	2,788.025	0.00E+00	1.59E-04	3.18E-04	0.2250	2.075E+13
Cm-244	1.6522E-05	1,394.013	2,788.025	0.00E+00	2.30E-02	4.61E-02	0.3750	9.072E+12
Co-60	7.4047E-07	1,394.013	2,788.025	0.00E+00	1.03E-03	2.06E-03	0.5750	1.492E+14
Cs-134	2.0455E-05	1,394.013	2,788.025	0.00E+00	2.85E-02	5.70E-02	0.8500	1.822E+12
Cs-135	3.4477E-06	1,394.013	2,788.025	0.00E+00	4.81E-03	9.61E-03	1.2500	8.815E+11
Cs-137	1.4365E+00	1,394.013	2,788.025	0.00E+00	2.00E+03	4.01E+03	1.7500	4.962E+10
Eu-154	7.3230E-03	1,394.013	2,788.025	0.00E+00	1.02E+01	2.04E+01	2.2500	4.149E+06
Eu-155	5.9259E-04	1,394.013	2,788.025	0.00E+00	8.26E-01	1.65E+00	2.7500	3.959E+06
Fe-55	2.2791E-06	1,394.013	2,788.025	0.00E+00	3.18E-03	6.35E-03	3.5000	2.296E+03
H-3	1.9698E-03	1,394.013	2,788.025	0.00E+00	2.75E+00	5.49E+00	5.0000	9.380E+02
I-129	7.5300E-07	1,394.013	2,788.025	0.00E+00	1.05E-03	2.10E-03	7.0000	1.027E+02
Kr-85	4.1176E-02	1,394.013	2,788.025	0.00E+00	5.74E+01	1.15E+02	11.0000	1.145E+01
Np-237	9.5752E-06	1,394.013	2,788.025	0.00E+00	1.33E-02	2.67E-02		
Pa-231	3.9379E-09	1,394.013	2,788.025	0.00E+00	5.49E-06	1.10E-05		
Pb-210	3.3115E-10	1,394.013	2,788.025	0.00E+00	4.62E-07	9.23E-07		
Pm-147	9.2402E-04	1,394.013	2,788.025	0.00E+00	1.29E+00	2.58E+00		
Pu-238	1.6217E-02	1,394.013	2,788.025	0.00E+00	2.26E+01	4.52E+01		
Pu-239	4.2810E-04	1,394.013	2,788.025	0.00E+00	5.97E-01	1.19E+00		
Pu-240	2.4333E-04	1,394.013	2,788.025	0.00E+00	3.39E-01	6.78E-01		
Pu-241	1.6242E-02	1,394.013	2,788.025	0.00E+00	2.26E+01	4.53E+01		
Pu-242	3.6329E-07	1,394.013	2,788.025	0.00E+00	5.06E-04	1.01E-03		
Ra-226	9.0114E-10	1,394.013	2,788.025	0.00E+00	1.26E-06	2.51E-06		
Ra-228	3.1019E-14	1,394.013	2,788.025	0.00E+00	4.32E-11	8.65E-11		
Ru-106	2.1225E-10	1,394.013	2,788.025	0.00E+00	2.96E-07	5.92E-07		
Se-79	1.2930E-05	1,394.013	2,788.025	0.00E+00	1.80E-02	3.60E-02		
Sn-126	1.1571E-05	1,394.013	2,788.025	0.00E+00	1.61E-02	3.23E-02		
Sr-90	1.3472E+00	1,394.013	2,788.025	0.00E+00	1.88E+03	3.76E+03		
Tc-99	4.2239E-04	1,394.013	2,788.025	0.00E+00	5.89E-01	1.18E+00		
Th-229	1.2407E-11	1,394.013	2,788.025	0.00E+00	1.73E-08	3.46E-08		
Th-230	8.3497E-08	1,394.013	2,788.025	0.00E+00	1.16E-04	2.33E-04		
Th-232	3.8371E-14	1,394.013	2,788.025	0.00E+00	5.35E-11	1.07E-10		
Tl-208	4.0414E-08	1,394.013	2,788.025	0.00E+00	5.63E-05	1.13E-04		
U-232	1.0948E-07	1,394.013	2,788.025	0.00E+00	1.53E-04	3.05E-04		
U-233	3.6275E-09	1,394.013	2,788.025	0.00E+00	5.06E-06	1.01E-05		
U-234	1.8562E-04	1,394.013	2,788.025	0.00E+00	2.59E-01	5.18E-01		
U-235	-2.7235E-06	1,394.013	0.000	2.59E-02	2.21E-02	2.59E-02		
U-236	1.5493E-05	1,394.013	2,788.025	0.00E+00	2.16E-02	4.32E-02		
U-238	-4.2851E-09	1,394.013	0.000	3.86E-04	3.80E-04	3.86E-04		
Y-90	1.3475E+00	1,394.013	2,788.025	0.00E+00	1.88E+03	3.76E+03		
Other Radionuclides					1.91E+03	3.82E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.33E+01	4.67E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	91.25787542	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,394.013	
Bounding:		2,788.025	

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

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.34	
Bounding:	0.67	

Estimated EOL HM/ Given EOL HM: 1.01

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRG-1 (GERMANY)
 SNF ID #: 581
 Fuel Units & Descr: 7 - MTR TYPE
 Heavy Metal Mass: BOL=9.57kg ; EOL=8.64kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.29

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	881.012	1,762.024	0.00E+00	1.77E-06	3.54E-06		
Am-241	2.5251E-03	881.012	1,762.024	0.00E+00	2.22E+00	4.45E+00	0.0150	1.298E+14
Am-242m	3.9624E-07	881.012	1,762.024	0.00E+00	3.49E-04	6.98E-04	0.0250	2.695E+13
Am-243	1.4880E-06	881.012	1,762.024	0.00E+00	1.31E-03	2.62E-03	0.0375	2.342E+13
C-14	5.7053E-09	881.012	1,762.024	0.00E+00	5.03E-06	1.01E-05	0.0575	2.521E+13
Cl-36	1.3124E-32	881.012	1,762.024	0.00E+00	1.16E-29	2.31E-29	0.0850	1.519E+13
Co-243	1.1419E-07	881.012	1,762.024	0.00E+00	1.01E-04	2.01E-04	0.1250	1.003E+13
Co-244	1.6522E-05	881.012	1,762.024	0.00E+00	1.46E-02	2.91E-02	0.2250	1.311E+13
Co-60	7.4047E-07	881.012	1,762.024	0.00E+00	6.52E-04	1.30E-03	0.3750	5.705E+12
Cs-134	2.0455E-05	881.012	1,762.024	0.00E+00	1.80E-02	3.60E-02	0.5750	9.429E+13
Cs-135	3.4477E-06	881.012	1,762.024	0.00E+00	3.04E-03	6.07E-03	0.8500	1.152E+12
Cs-137	1.4365E+00	881.012	1,762.024	0.00E+00	1.27E+03	2.53E+03	1.2500	5.571E+11
Eu-154	7.3230E-03	881.012	1,762.024	0.00E+00	6.45E+00	1.29E+01	1.7500	3.196E+10
Eu-155	5.9259E-04	881.012	1,762.024	0.00E+00	5.22E-01	1.04E+00	2.2500	2.622E+06
Fe-55	2.2791E-06	881.012	1,762.024	0.00E+00	2.01E-03	4.02E-03	2.7500	2.502E+06
H-3	1.9698E-03	881.012	1,762.024	0.00E+00	1.74E+00	3.47E+00	3.5000	1.463E+03
I-129	7.5300E-07	881.012	1,762.024	0.00E+00	6.63E-04	1.33E-03	5.0000	5.980E+02
Kr-85	4.1176E-02	881.012	1,762.024	0.00E+00	3.63E+01	7.26E+01	7.0000	6.549E+01
Np-237	9.5752E-06	881.012	1,762.024	0.00E+00	8.44E-03	1.69E-02	11.0000	7.303E+00
Pa-231	3.9379E-09	881.012	1,762.024	0.00E+00	3.47E-06	6.94E-06		
Pb-210	3.3115E-10	881.012	1,762.024	0.00E+00	2.92E-07	5.84E-07		
Pm-147	9.2402E-04	881.012	1,762.024	0.00E+00	8.14E-01	1.63E+00		
Pu-238	1.6217E-02	881.012	1,762.024	0.00E+00	1.43E+01	2.86E+01		
Pu-239	4.2810E-04	881.012	1,762.024	0.00E+00	3.77E-01	7.54E-01		
Pu-240	2.4333E-04	881.012	1,762.024	0.00E+00	2.14E-01	4.29E-01		
Pu-241	1.6242E-02	881.012	1,762.024	0.00E+00	1.43E+01	2.86E+01		
Pu-242	3.6329E-07	881.012	1,762.024	0.00E+00	3.20E-04	6.40E-04		
Ra-226	9.0114E-10	881.012	1,762.024	0.00E+00	7.94E-07	1.59E-06		
Ra-228	3.1019E-14	881.012	1,762.024	0.00E+00	2.73E-11	5.47E-11		
Ru-106	2.1225E-10	881.012	1,762.024	0.00E+00	1.87E-07	3.74E-07		
Se-79	1.2930E-05	881.012	1,762.024	0.00E+00	1.14E-02	2.28E-02		
Sn-126	1.1571E-05	881.012	1,762.024	0.00E+00	1.02E-02	2.04E-02		
Sr-90	1.3472E+00	881.012	1,762.024	0.00E+00	1.19E+03	2.37E+03		
Tc-99	4.2239E-04	881.012	1,762.024	0.00E+00	3.72E-01	7.44E-01		
Th-229	1.2407E-11	881.012	1,762.024	0.00E+00	1.09E-08	2.19E-08		
Th-230	8.3497E-08	881.012	1,762.024	0.00E+00	7.36E-05	1.47E-04		
Th-232	3.8371E-14	881.012	1,762.024	0.00E+00	3.38E-11	6.76E-11		
Ti-208	4.0414E-08	881.012	1,762.024	0.00E+00	3.56E-05	7.12E-05		
U-232	1.0948E-07	881.012	1,762.024	0.00E+00	9.65E-05	1.93E-04		
U-233	3.6275E-09	881.012	1,762.024	0.00E+00	3.20E-06	6.39E-06		
U-234	1.8562E-04	881.012	1,762.024	0.00E+00	1.64E-01	3.27E-01		
U-235	-2.7235E-06	881.012	0.000	4.08E-03	1.68E-03	4.08E-03		
U-236	1.5493E-05	881.012	1,762.024	0.00E+00	1.36E-02	2.73E-02		
U-238	-4.2851E-09	881.012	0.000	2.58E-03	2.58E-03	2.58E-03		
Y-90	1.3475E+00	881.012	1,762.024	0.00E+00	1.19E+03	2.37E+03		
Other Radionuclides					1.21E+03	2.41E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.47E+01	2.95E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	19.73077542	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nomina.:		881.012	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		1,762.024	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nomina.:	0.29		
Bounding:	0.59		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRG-1 (GERMANY) ¹Fuel decay start date: 1995
 SNF ID #: 742 Estimates as of: 2030
 Fuel Units & Descr: 141 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=23.42kg ; EOL=16.54kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 5.88

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.0068E-09	6,516.251	13,032.502	0.00E+00	1.31E-05	2.62E-05	Avg. MeV	
Am-241	2.5251E-03	6,516.251	13,032.502	0.00E+00	1.65E+01	3.29E+01	0.0150	9.599E+14
Am-242m	3.9624E-07	6,516.251	13,032.502	0.00E+00	2.58E-03	5.16E-03	0.0250	1.993E+14
Am-243	1.4880E-06	6,516.251	13,032.502	0.00E+00	9.70E-03	1.94E-02	0.0375	1.732E+14
C-14	5.7053E-09	6,516.251	13,032.502	0.00E+00	3.72E-05	7.44E-05	0.0575	1.865E+14
Cf-252	1.3124E-32	6,516.251	13,032.502	0.00E+00	8.55E-29	1.71E-28	0.0850	1.124E+14
Cm-243	1.1419E-07	6,516.251	13,032.502	0.00E+00	7.44E-04	1.49E-03	0.1250	7.421E+13
Cm-244	1.6522E-05	6,516.251	13,032.502	0.00E+00	1.08E-01	2.15E-01	0.2250	9.700E+13
Co-60	7.4047E-07	6,516.251	13,032.502	0.00E+00	4.83E-03	9.65E-03	0.3750	4.220E+13
Cs-134	2.0455E-05	6,516.251	13,032.502	0.00E+00	1.33E-01	2.67E-01	0.5750	6.974E+13
Cs-135	3.4477E-06	6,516.251	13,032.502	0.00E+00	2.25E-02	4.49E-02	0.8500	8.519E+12
Cs-137	1.4365E+00	6,516.251	13,032.502	0.00E+00	9.36E+03	1.87E+04	1.2500	4.121E+12
Eu-154	7.3230E-03	6,516.251	13,032.502	0.00E+00	4.77E+01	9.54E+01	1.7500	2.319E+11
Eu-155	5.9259E-04	6,516.251	13,032.502	0.00E+00	3.86E+00	7.72E+00	2.2500	1.940E+07
Fe-55	2.2791E-06	6,516.251	13,032.502	0.00E+00	1.49E-02	2.97E-02	2.7500	1.850E+07
H-3	1.9698E-03	6,516.251	13,032.502	0.00E+00	1.28E+01	2.57E+01	3.5000	1.072E+04
I-129	7.5300E-07	6,516.251	13,032.502	0.00E+00	4.91E-03	9.81E-03	5.0000	4.381E+03
Kr-85	4.1176E-02	6,516.251	13,032.502	0.00E+00	2.68E+02	5.37E+02	7.0000	4.795E+02
Np-237	9.5752E-06	6,516.251	13,032.502	0.00E+00	6.24E-02	1.25E-01	11.0000	5.346E+01
Pa-231	3.9379E-09	6,516.251	13,032.502	0.00E+00	2.57E-05	5.13E-05		
Pb-210	3.3115E-10	6,516.251	13,032.502	0.00E+00	2.16E-06	4.32E-06		
Pm-147	9.2402E-04	6,516.251	13,032.502	0.00E+00	6.02E+00	1.20E+01		
Pu-238	1.6217E-02	6,516.251	13,032.502	0.00E+00	1.06E+02	2.11E+02		
Pu-239	4.2810E-04	6,516.251	13,032.502	0.00E+00	2.79E+00	5.58E+00		
Pu-240	2.4333E-04	6,516.251	13,032.502	0.00E+00	1.59E+00	3.17E+00		
Pu-241	1.6242E-02	6,516.251	13,032.502	0.00E+00	1.06E+02	2.12E+02		
Pu-242	3.6329E-07	6,516.251	13,032.502	0.00E+00	2.37E-03	4.73E-03		
Ra-226	9.0114E-10	6,516.251	13,032.502	0.00E+00	5.87E-06	1.17E-05		
Ra-228	3.1019E-14	6,516.251	13,032.502	0.00E+00	2.02E-10	4.04E-10		
Ru-106	2.1225E-10	6,516.251	13,032.502	0.00E+00	1.38E-06	2.77E-06		
Se-79	1.2930E-05	6,516.251	13,032.502	0.00E+00	8.43E-02	1.69E-01		
Sn-126	1.1571E-05	6,516.251	13,032.502	0.00E+00	7.54E-02	1.51E-01		
Sr-90	1.3472E+00	6,516.251	13,032.502	0.00E+00	8.78E+03	1.76E+04		
Tc-99	4.2239E-04	6,516.251	13,032.502	0.00E+00	2.75E+00	5.50E+00		
Th-229	1.2407E-11	6,516.251	13,032.502	0.00E+00	8.08E-08	1.62E-07		
Th-230	8.3497E-08	6,516.251	13,032.502	0.00E+00	5.44E-04	1.09E-03		
Th-232	3.8371E-14	6,516.251	13,032.502	0.00E+00	2.50E-10	5.00E-10		
Tl-208	4.0414E-08	6,516.251	13,032.502	0.00E+00	2.63E-04	5.27E-04		
U-232	1.0948E-07	6,516.251	13,032.502	0.00E+00	7.13E-04	1.43E-03		
U-233	3.6275E-09	6,516.251	13,032.502	0.00E+00	2.36E-05	4.73E-05		
U-234	1.8562E-04	6,516.251	13,032.502	0.00E+00	1.21E+00	2.42E+00		
U-235	-2.7235E-06	6,516.251	0.000	4.70E-02	2.92E-02	4.70E-02		
U-236	1.5493E-05	6,516.251	13,032.502	0.00E+00	1.01E-01	2.02E-01		
U-238	-4.2851E-09	6,516.251	0.000	5.63E-04	5.35E-04	5.63E-04		
Y-90	1.3475E+00	6,516.251	13,032.502	0.00E+00	8.78E+03	1.76E+04	Total	Total
Other Radionuclides					8.92E+03	1.78E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.84381755	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		6,516.251	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		13,032.502	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.88		1.02
Bounding:	1.77		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template information

Fuel Name: FRG-1 (GERMANY) 1 Fuel decay start date: 1994
 SNF ID #: 741 Estimates as of: 2030
 Fuel Units & Descr: 109 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=161.56kg ; EOL=150.93kg 2 Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 4.54

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	10,064.449	20,128.897	0.00E+00	2.02E-05	4.04E-05		
Am-241	2.5251E-03	10,064.449	20,128.897	0.00E+00	2.54E+01	5.08E+01	0.0150	1.483E+15
Am-242m	3.9624E-07	10,064.449	20,128.897	0.00E+00	3.99E-03	7.98E-03	0.0250	3.078E+14
Am-243	1.4880E-06	10,064.449	20,128.897	0.00E+00	1.50E-02	3.00E-02	0.0375	2.676E+14
C-14	5.7053E-09	10,064.449	20,128.897	0.00E+00	5.74E-05	1.15E-04	0.0575	2.880E+14
Cl-36	1.3124E-32	10,064.449	20,128.897	0.00E+00	1.32E-28	2.64E-28	0.0850	1.735E+14
Cm-243	1.1419E-07	10,064.449	20,128.897	0.00E+00	1.15E-03	2.30E-03	0.1250	1.146E+14
Cm-244	1.6522E-05	10,064.449	20,128.897	0.00E+00	1.66E-01	3.33E-01	0.2250	1.498E+14
Co-60	7.4047E-07	10,064.449	20,128.897	0.00E+00	7.45E-03	1.49E-02	0.3750	6.517E+13
Cs-134	2.0455E-05	10,064.449	20,128.897	0.00E+00	2.06E-01	4.12E-01	0.5750	1.077E+15
Cs-135	3.4477E-06	10,064.449	20,128.897	0.00E+00	3.47E-02	6.94E-02	0.8500	1.316E+13
Cs-137	1.4365E+00	10,064.449	20,128.897	0.00E+00	1.45E+04	2.89E+04	1.2500	6.364E+12
Eu-154	7.3230E-03	10,064.449	20,128.897	0.00E+00	7.37E+01	1.47E+02	1.7500	3.582E+11
Eu-155	5.9259E-04	10,064.449	20,128.897	0.00E+00	5.96E+00	1.19E+01	2.2500	2.996E+07
Fe-55	2.2791E-06	10,064.449	20,128.897	0.00E+00	2.29E-02	4.59E-02	2.7500	2.858E+07
H-3	1.9698E-03	10,064.449	20,128.897	0.00E+00	1.98E+01	3.96E+01	3.5000	1.679E+04
I-129	7.5300E-07	10,064.449	20,128.897	0.00E+00	7.58E-03	1.52E-02	5.0000	6.864E+03
Kr-85	4.1176E-02	10,064.449	20,128.897	0.00E+00	4.14E+02	8.29E+02	7.0000	7.518E+02
Np-237	9.5752E-06	10,064.449	20,128.897	0.00E+00	9.64E-02	1.93E-01	11.0000	8.386E+01
Pa-231	3.9379E-09	10,064.449	20,128.897	0.00E+00	3.96E-05	7.93E-05		
Pb-210	3.3115E-10	10,064.449	20,128.897	0.00E+00	3.33E-06	6.67E-06		
Pm-147	9.2402E-04	10,064.449	20,128.897	0.00E+00	9.30E+00	1.86E+01		
Pu-238	1.6217E-02	10,064.449	20,128.897	0.00E+00	1.63E+02	3.26E+02		
Pu-239	4.2810E-04	10,064.449	20,128.897	0.00E+00	4.31E+00	8.62E+00		
Pu-240	2.4333E-04	10,064.449	20,128.897	0.00E+00	2.45E+00	4.90E+00		
Pu-241	1.6242E-02	10,064.449	20,128.897	0.00E+00	1.63E+02	3.27E+02		
Pu-242	3.6329E-07	10,064.449	20,128.897	0.00E+00	3.66E-03	7.31E-03		
Ra-226	9.0114E-10	10,064.449	20,128.897	0.00E+00	9.07E-06	1.81E-05		
Ra-228	3.1019E-14	10,064.449	20,128.897	0.00E+00	3.12E-10	6.24E-10		
Ru-106	2.1225E-10	10,064.449	20,128.897	0.00E+00	2.14E-06	4.27E-06		
Se-79	1.2930E-05	10,064.449	20,128.897	0.00E+00	1.30E-01	2.60E-01		
Sn-126	1.1571E-05	10,064.449	20,128.897	0.00E+00	1.16E-01	2.33E-01		
Sr-90	1.3472E+00	10,064.449	20,128.897	0.00E+00	1.36E+04	2.71E+04		
Tc-99	4.2239E-04	10,064.449	20,128.897	0.00E+00	4.25E+00	8.50E+00		
Th-229	1.2407E-11	10,064.449	20,128.897	0.00E+00	1.25E-07	2.50E-07		
Th-230	8.3497E-08	10,064.449	20,128.897	0.00E+00	8.40E-04	1.68E-03		
Th-232	3.8371E-14	10,064.449	20,128.897	0.00E+00	3.86E-10	7.72E-10		
Tl-208	4.0414E-08	10,064.449	20,128.897	0.00E+00	4.07E-04	8.13E-04		
U-232	1.0948E-07	10,064.449	20,128.897	0.00E+00	1.10E-03	2.20E-03		
U-233	3.6275E-09	10,064.449	20,128.897	0.00E+00	3.65E-05	7.30E-05		
U-234	1.8562E-04	10,064.449	20,128.897	0.00E+00	1.87E+00	3.74E+00		
U-235	-2.7235E-06	10,064.449	0.000	6.92E-02	4.18E-02	6.92E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.5493E-05	10,064.449	20,128.897	0.00E+00	1.56E-01	3.12E-01	1.88E+02	3.37E+02
U-238	-4.2851E-09	10,064.449	0.000	4.35E-02	4.35E-02	4.35E-02	Total	Total
Y-90	1.3475E+00	10,064.449	20,128.897	0.00E+00	1.36E+04	2.71E+04		
Other Radionuclides					1.38E+04	2.75E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.81106509	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		10,064.449	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		20,128.897	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.20		1.00
Bounding:	0.40		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRJ (GERMANY) ¹Fuel decay start date: 1995
 SNF ID #: 933 Estimate as of: 2030
 Fuel Units & Descr: 195 CONCENTRIC TUBES Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
 Heavy Metal Mass: BOL=39.31kg ; EOL=26.87kg ²Template Burnup(MWd): 164.6
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 5.42

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	9.5869E-10	11,459.442	22,918.885	0.00E+00	1.10E-05	2.20E-05		
Am-241	1.0109E-02	11,459.442	22,918.885	0.00E+00	1.16E+02	2.32E+02	0.0150	1.693E+15
Am-242m	1.2789E-06	11,459.442	22,918.885	0.00E+00	1.47E-02	2.93E-02	0.0250	3.478E+14
Am-243	3.7047E-05	11,459.442	22,918.885	0.00E+00	4.25E-01	8.49E-01	0.0375	3.049E+14
C-14	2.6416E-08	11,459.442	22,918.885	0.00E+00	3.03E-04	6.05E-04	0.0575	3.290E+14
Cl-36	4.4441E-31	11,459.442	22,918.885	0.00E+00	5.09E-27	1.02E-26	0.0850	1.963E+14
Cm-243	3.9605E-06	11,459.442	22,918.885	0.00E+00	4.54E-02	9.08E-02	0.1250	1.324E+14
Cm-244	2.6227E-03	11,459.442	22,918.885	0.00E+00	3.01E+01	6.01E+01	0.2250	1.696E+14
Co-60	6.7740E-06	11,459.442	22,918.885	0.00E+00	7.76E-02	1.55E-01	0.3750	7.361E+13
Cs-134	6.8894E-05	11,459.442	22,918.885	0.00E+00	7.89E-01	1.58E+00	0.5750	1.230E+15
Cs-135	4.2564E-06	11,459.442	22,918.885	0.00E+00	4.88E-02	9.76E-02	0.8500	1.821E+13
Cs-137	1.4399E+00	11,459.442	22,918.885	0.00E+00	1.65E+04	3.30E+04	1.2500	1.088E+13
Eu-154	1.5522E-02	11,459.442	22,918.885	0.00E+00	1.78E+02	3.56E+02	1.7500	5.148E+11
Eu-155	1.7588E-03	11,459.442	22,918.885	0.00E+00	2.02E+01	4.03E+01	2.2500	3.565E+07
Fe-55	2.4933E-05	11,459.442	22,918.885	0.00E+00	2.86E-01	5.71E-01	2.7500	3.582E+07
H-3	1.9945E-03	11,459.442	22,918.885	0.00E+00	2.29E+01	4.57E+01	3.5000	9.524E+05
I-129	6.6403E-07	11,459.442	22,918.885	0.00E+00	7.61E-03	1.52E-02	5.0000	4.047E+05
Kr-85	4.1002E-02	11,459.442	22,918.885	0.00E+00	4.70E+02	9.40E+02	7.0000	4.633E+04
Np-237	3.1610E-05	11,459.442	22,918.885	0.00E+00	3.62E-01	7.24E-01	11.0000	5.302E+03
Pa-231	1.8876E-09	11,459.442	22,918.885	0.00E+00	2.16E-05	4.33E-05		
Pb-210	8.3840E-11	11,459.442	22,918.885	0.00E+00	9.61E-07	1.92E-06		
Pm-147	4.6501E-04	11,459.442	22,918.885	0.00E+00	5.33E+00	1.07E+01		
Pu-238	1.3645E-01	11,459.442	22,918.885	0.00E+00	1.56E+03	3.13E+03		
Pu-239	6.9502E-04	11,459.442	22,918.885	0.00E+00	7.96E+00	1.59E+01		
Pu-240	3.8183E-04	11,459.442	22,918.885	0.00E+00	4.38E+00	8.75E+00		
Pu-241	6.5310E-02	11,459.442	22,918.885	0.00E+00	7.48E+02	1.50E+03		
Pu-242	3.0911E-06	11,459.442	22,918.885	0.00E+00	3.54E-02	7.08E-02		
Ra-226	2.3512E-10	11,459.442	22,918.885	0.00E+00	2.69E-06	5.39E-06		
Ra-228	3.3366E-14	11,459.442	22,918.885	0.00E+00	3.82E-10	7.65E-10		
Ru-106	2.4490E-10	11,459.442	22,918.885	0.00E+00	2.81E-06	5.61E-06		
Se-79	1.2333E-05	11,459.442	22,918.885	0.00E+00	1.41E-01	2.83E-01		
Sn-126	1.0194E-05	11,459.442	22,918.885	0.00E+00	1.17E-01	2.34E-01		
Sr-90	1.3348E+00	11,459.442	22,918.885	0.00E+00	1.53E+04	3.06E+04		
Tc-99	3.8058E-04	11,459.442	22,918.885	0.00E+00	4.36E+00	8.72E+00		
Th-229	1.7868E-11	11,459.442	22,918.885	0.00E+00	2.05E-07	4.10E-07		
Th-230	2.3348E-08	11,459.442	22,918.885	0.00E+00	2.68E-04	5.35E-04		
Th-232	4.1288E-14	11,459.442	22,918.885	0.00E+00	4.73E-10	9.46E-10		
Tl-208	4.3190E-08	11,459.442	22,918.885	0.00E+00	4.95E-04	9.90E-04		
U-232	1.1707E-07	11,459.442	22,918.885	0.00E+00	1.34E-03	2.68E-03		
U-233	7.2175E-09	11,459.442	22,918.885	0.00E+00	8.27E-05	1.65E-04		
U-234	6.1543E-05	11,459.442	22,918.885	0.00E+00	7.05E-01	1.41E+00		
U-235	-2.8661E-06	11,459.442	0.000	6.79E-02	3.50E-02	6.79E-02		
U-236	1.6701E-05	11,459.442	22,918.885	0.00E+00	1.91E-01	3.83E-01		
U-238	-9.4194E-09	11,459.442	0.000	2.66E-03	2.55E-03	2.66E-03		
Y-90	1.3348E+00	11,459.442	22,918.885	0.00E+00	1.53E+04	3.06E+04		
Other Radionuclides					1.58E+04	3.16E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.42E+02	4.83E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	79.8992512	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		11,459.442	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		22,918.885	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.67	
Bounding:	1.34	
		Estimated EOL HM/ Given EOL HM
		1.01

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRJ (GERMANY) ¹Fuel decay start date: 1993
 SNF ID #: 1000 Estimates as of: 2030
 Fuel Units & Descr: 10 - CONCENTRIC TUBES Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
 Heavy Metal Mass: BOL=3.78kg ; EOL=3.34kg ²Template Burnup(MWd): 164.6
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.28

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	9.5869E-10	408.049	816.097	0.00E+00	3.91E-07	7.82E-07	Avg. MeV	
Am-241	1.0109E-02	408.049	816.097	0.00E+00	4.13E+00	8.25E+00	0.0150	6.028E+13
Am-242m	1.2789E-06	408.049	816.097	0.00E+00	5.22E-04	1.04E-03	0.0250	1.239E+13
Am-243	3.7047E-05	408.049	816.097	0.00E+00	1.51E-02	3.02E-02	0.0375	1.086E+13
C-14	2.6416E-08	408.049	816.097	0.00E+00	1.08E-05	2.16E-05	0.0575	1.168E+13
Cl-36	4.4441E-31	408.049	816.097	0.00E+00	1.81E-28	3.63E-28	0.0850	6.989E+12
Cm-243	3.9605E-06	408.049	816.097	0.00E+00	1.62E-03	3.23E-03	0.1250	4.713E+12
Cm-244	2.6227E-03	408.049	816.097	0.00E+00	1.07E+00	2.14E+00	0.2250	6.039E+12
Co-60	6.7740E-06	408.049	816.097	0.00E+00	2.76E-03	5.53E-03	0.3750	2.621E+12
Cs-134	6.8894E-05	408.049	816.097	0.00E+00	2.81E-02	5.62E-02	0.5750	4.378E+13
Cs-135	4.2564E-06	408.049	816.097	0.00E+00	1.74E-03	3.47E-03	0.8500	6.484E+11
Cs-137	1.4399E+00	408.049	816.097	0.00E+00	5.88E+02	1.18E+03	1.2500	3.874E+11
Eu-154	1.5522E-02	408.049	816.097	0.00E+00	6.33E+00	1.27E+01	1.7500	1.833E+10
Eu-155	1.7588E-03	408.049	816.097	0.00E+00	7.18E-01	1.44E+00	2.2500	1.269E+06
Fe-55	2.4933E-05	408.049	816.097	0.00E+00	1.02E-02	2.03E-02	2.7500	1.275E+06
H-3	1.9945E-03	408.049	816.097	0.00E+00	8.14E-01	1.63E+00	3.5000	3.392E+04
I-129	6.6403E-07	408.049	816.097	0.00E+00	2.71E-04	5.42E-04	5.0000	1.441E+04
Kr-85	4.1002E-02	408.049	816.097	0.00E+00	1.67E+01	3.35E+01	7.0000	1.650E+03
Np-237	3.1610E-05	408.049	816.097	0.00E+00	1.29E-02	2.58E-02	11.0000	1.888E+02
Pa-231	1.8876E-09	408.049	816.097	0.00E+00	7.70E-07	1.54E-06		
Pb-210	8.3840E-11	408.049	816.097	0.00E+00	3.42E-08	6.84E-08		
Pm-147	4.6501E-04	408.049	816.097	0.00E+00	1.90E-01	3.79E-01		
Pu-238	1.3645E-01	408.049	816.097	0.00E+00	5.57E+01	1.11E+02		
Pu-239	6.9502E-04	408.049	816.097	0.00E+00	2.84E-01	5.67E-01		
Pu-240	3.8183E-04	408.049	816.097	0.00E+00	1.56E-01	3.12E-01		
Pu-241	6.5310E-02	408.049	816.097	0.00E+00	2.66E+01	5.33E+01		
Pu-242	3.0911E-06	408.049	816.097	0.00E+00	1.26E-03	2.52E-03		
Ra-226	2.3512E-10	408.049	816.097	0.00E+00	9.59E-08	1.92E-07		
Ra-228	3.3366E-14	408.049	816.097	0.00E+00	1.36E-11	2.72E-11		
Ru-106	2.4490E-10	408.049	816.097	0.00E+00	9.99E-08	2.00E-07		
Se-79	1.2333E-05	408.049	816.097	0.00E+00	5.03E-03	1.01E-02		
Sn-126	1.0194E-05	408.049	816.097	0.00E+00	4.16E-03	8.32E-03		
Sr-90	1.3348E+00	408.049	816.097	0.00E+00	5.45E+02	1.09E+03		
Tc-99	3.8056E-04	408.049	816.097	0.00E+00	1.55E-01	3.11E-01		
Th-229	1.7868E-11	408.049	816.097	0.00E+00	7.29E-09	1.46E-08		
Th-230	2.3348E-08	408.049	816.097	0.00E+00	9.53E-06	1.91E-05		
Th-232	4.1288E-14	408.049	816.097	0.00E+00	1.68E-11	3.37E-11		
Tl-208	4.3190E-08	408.049	816.097	0.00E+00	1.76E-05	3.52E-05		
U-232	1.1707E-07	408.049	816.097	0.00E+00	4.78E-05	9.55E-05		
U-233	7.2175E-09	408.049	816.097	0.00E+00	2.95E-06	5.89E-06		
U-234	6.1543E-05	408.049	816.097	0.00E+00	2.51E-02	5.02E-02		
U-235	2.8661E-06	408.049	0.000	3.67E-03	2.50E-03	3.67E-03		
U-236	1.6701E-05	408.049	816.097	0.00E+00	6.81E-03	1.36E-02		
U-238	9.4194E-09	408.049	0.000	7.00E-04	6.97E-04	7.00E-04		
Y-90	1.3348E+00	408.049	816.097	0.00E+00	5.45E+02	1.09E+03		
Other Radionuclides					5.63E+02	1.13E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.60E+00	1.72E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	44.88296013	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		408.049	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		816.097	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.25		
Bounding:	0.49		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRJ TUBES (GERMANY)
 SNF ID #: 999
 Fuel Units & Descr: 3 - CONCENTRIC TUBES
 Heavy Metal Mass: BOL=3.04kg ; EOL=3.01kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1998
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 10 to 20%, U)
²Template Burnup(MWd): 15
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.13

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.4973E-09	28.229	56.458	0.00E+00	4.23E-08	8.45E-08	Avg. MeV	
Am-241	2.6120E-02	28.229	56.458	0.00E+00	7.37E-01	1.47E+00	0.0150	5.075E+12
Am-242m	8.7133E-06	28.229	56.458	0.00E+00	2.46E-04	4.92E-04	0.0250	1.053E+12
Am-243	6.3980E-06	28.229	56.458	0.00E+00	1.81E-04	3.61E-04	0.0375	9.237E+11
C-14	2.9600E-08	28.229	56.458	0.00E+00	8.36E-07	1.67E-06	0.0575	1.001E+12
Ci-36	5.9507E-35	28.229	56.458	0.00E+00	1.68E-33	3.36E-33	0.0850	5.928E+11
Cm-243	1.9560E-06	28.229	56.458	0.00E+00	5.52E-05	1.10E-04	0.1250	3.955E+11
Cm-244	9.0867E-05	28.229	56.458	0.00E+00	2.57E-03	5.13E-03	0.2250	5.112E+11
Co-60	8.4667E-06	28.229	56.458	0.00E+00	2.39E-04	4.78E-04	0.3750	2.222E+11
Cs-134	3.9760E-04	28.229	56.458	0.00E+00	1.12E-02	2.24E-02	0.5750	3.788E+12
Cs-135	4.8607E-06	28.229	56.458	0.00E+00	1.37E-04	2.74E-04	0.8500	5.049E+10
Cs-137	1.8020E+00	28.229	56.458	0.00E+00	5.09E+01	1.02E+02	1.2500	2.731E+10
Eu-154	1.3960E-02	28.229	56.458	0.00E+00	3.94E-01	7.88E-01	1.7500	1.386E+09
Eu-155	2.0313E-03	28.229	56.458	0.00E+00	5.73E-02	1.15E-01	2.2500	1.036E+05
Fe-55	3.7360E-04	28.229	56.458	0.00E+00	1.05E-02	2.11E-02	2.7500	1.491E+04
H-3	3.5233E-03	28.229	56.458	0.00E+00	9.95E-02	1.99E-01	3.5000	2.861E+02
I-129	7.1600E-07	28.229	56.458	0.00E+00	2.02E-05	4.04E-05	5.0000	1.136E+02
Kr-85	7.4133E-02	28.229	56.458	0.00E+00	2.09E+00	4.19E+00	7.0000	1.283E+01
Np-237	3.8020E-06	28.229	56.458	0.00E+00	1.07E-04	2.15E-04	11.0000	1.458E+00
Pa-231	3.7020E-09	28.229	56.458	0.00E+00	1.05E-07	2.09E-07		
Pb-210	1.4067E-13	28.229	56.458	0.00E+00	3.97E-12	7.94E-12		
Pm-147	1.2360E-02	28.229	56.458	0.00E+00	3.49E-01	6.98E-01		
Pu-238	5.3133E-03	28.229	56.458	0.00E+00	1.50E-01	3.00E-01		
Pu-239	1.0313E-02	28.229	56.458	0.00E+00	2.91E-01	5.82E-01		
Pu-240	5.4153E-03	28.229	56.458	0.00E+00	1.53E-01	3.06E-01		
Pu-241	2.9540E-01	28.229	56.458	0.00E+00	8.34E+00	1.67E+01		
Pu-242	3.0713E-06	28.229	56.458	0.00E+00	8.67E-05	1.73E-04		
Ra-226	5.9440E-13	28.229	56.458	0.00E+00	1.68E-11	3.36E-11		
Ra-228	1.6733E-14	28.229	56.458	0.00E+00	4.72E-13	9.45E-13		
Ru-106	2.7233E-07	28.229	56.458	0.00E+00	7.69E-06	1.54E-05		
Se-79	1.2533E-05	28.229	56.458	0.00E+00	3.54E-04	7.08E-04		
Sn-126	1.1393E-05	28.229	56.458	0.00E+00	3.22E-04	6.43E-04		
Sr-90	1.6333E+00	28.229	56.458	0.00E+00	4.61E+01	9.22E+01		
Tc-99	4.3533E-04	28.229	56.458	0.00E+00	1.23E-02	2.46E-02		
Th-229	1.0827E-12	28.229	56.458	0.00E+00	3.06E-11	6.11E-11		
Th-230	1.0793E-10	28.229	56.458	0.00E+00	3.05E-09	6.09E-09		
Th-232	2.2773E-14	28.229	56.458	0.00E+00	6.43E-13	1.29E-12		
Tl-208	7.3067E-09	28.229	56.458	0.00E+00	2.06E-07	4.13E-07		
U-232	1.9833E-08	28.229	56.458	0.00E+00	5.60E-07	1.12E-06		
U-233	6.0453E-10	28.229	56.458	0.00E+00	1.71E-08	3.41E-08		
U-234	6.1000E-07	28.229	56.458	0.00E+00	1.72E-05	3.44E-05		
U-235	-2.5335E-06	28.229	0.000	1.30E-03	1.22E-03	1.30E-03		
U-236	1.3000E-05	28.229	56.458	0.00E+00	3.67E-04	7.34E-04		
U-238	-1.4207E-08	28.229	0.000	8.20E-04	8.19E-04	8.20E-04		
Y-90	1.6340E+00	28.229	56.458	0.00E+00	4.61E+01	9.23E+01		
Other Radionuclides					4.83E+01	9.66E+01		
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							6.95E-01	1.21E+00
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.72968438	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	0.249	28.229	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		56.458	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.21	113.31	
Bounding:	0.42		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRM (GERMANY)
 SNF ID #: 806
 Fuel Units & Descr: 31 - MTR TYPE
 Heavy Metal Mass: BOL=6.40kg ; EOL=3.17kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1995
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 1.29

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	3,053.191	6,056.473	0.00E+00	6.13E-06	1.22E-05	0.0150	4.461E+14
Am-241	2.5251E-03	3,053.191	6,056.473	0.00E+00	7.71E+00	1.53E+01	0.0250	9.263E+13
Am-242m	3.9624E-07	3,053.191	6,056.473	0.00E+00	1.21E-03	2.40E-03	0.0375	8.051E+13
Am-243	1.4880E-06	3,053.191	6,056.473	0.00E+00	4.54E-03	9.01E-03	0.0575	8.666E+13
C-14	5.7053E-09	3,053.191	6,056.473	0.00E+00	1.74E-05	3.46E-05	0.0850	5.221E+13
Cl-36	1.3124E-32	3,053.191	6,056.473	0.00E+00	4.01E-29	7.95E-29	0.1250	3.449E+13
Cm-243	1.1419E-07	3,053.191	6,056.473	0.00E+00	3.49E-04	6.92E-04	0.2250	4.508E+13
Cm-244	1.6522E-05	3,053.191	6,056.473	0.00E+00	5.04E-02	1.00E-01	0.3750	1.961E+13
Co-60	7.4047E-07	3,053.191	6,056.473	0.00E+00	2.26E-03	4.48E-03	0.5750	3.241E+14
Cs-134	2.0455E-05	3,053.191	6,056.473	0.00E+00	6.25E-02	1.24E-01	0.8500	3.959E+12
Cs-135	3.4477E-06	3,053.191	6,056.473	0.00E+00	1.05E-02	2.09E-02	1.2500	1.915E+12
Cs-137	1.4365E+00	3,053.191	6,056.473	0.00E+00	4.39E+03	8.70E+03	1.7500	1.078E+11
Eu-154	7.3230E-03	3,053.191	6,056.473	0.00E+00	2.24E+01	4.44E+01	2.2500	9.014E+06
Eu-155	5.9259E-04	3,053.191	6,056.473	0.00E+00	1.81E+00	3.59E+00	2.7500	8.599E+06
Fe-55	2.2791E-06	3,053.191	6,056.473	0.00E+00	6.96E-03	1.38E-02	3.5000	4.982E+03
H-3	1.9698E-03	3,053.191	6,056.473	0.00E+00	6.01E+00	1.19E+01	5.0000	2.036E+03
I-129	7.5300E-07	3,053.191	6,056.473	0.00E+00	2.30E-03	4.56E-03	7.0000	2.228E+02
Kr-85	4.1176E-02	3,053.191	6,056.473	0.00E+00	1.26E+02	2.49E+02	11.0000	2.484E+01
Np-237	9.5752E-06	3,053.191	6,056.473	0.00E+00	2.92E-02	5.80E-02		
Pa-231	3.9379E-09	3,053.191	6,056.473	0.00E+00	1.20E-05	2.38E-05		
Pb-210	3.3115E-10	3,053.191	6,056.473	0.00E+00	1.01E-06	2.01E-06		
Pm-147	9.2402E-04	3,053.191	6,056.473	0.00E+00	2.82E+00	5.60E+00		
Pu-238	1.6217E-02	3,053.191	6,056.473	0.00E+00	4.95E+01	9.82E+01		
Pu-239	4.2810E-04	3,053.191	6,056.473	0.00E+00	1.31E+00	2.59E+00		
Pu-240	2.4333E-04	3,053.191	6,056.473	0.00E+00	7.43E-01	1.47E+00		
Pu-241	1.6242E-02	3,053.191	6,056.473	0.00E+00	4.96E+01	9.84E+01		
Pu-242	3.6329E-07	3,053.191	6,056.473	0.00E+00	1.11E-03	2.20E-03		
Ra-226	9.0114E-10	3,053.191	6,056.473	0.00E+00	2.75E-06	5.46E-06		
Ra-228	3.1019E-14	3,053.191	6,056.473	0.00E+00	9.47E-11	1.88E-10		
Ru-106	2.1225E-10	3,053.191	6,056.473	0.00E+00	6.48E-07	1.29E-06		
Se-79	1.2930E-05	3,053.191	6,056.473	0.00E+00	3.95E-02	7.83E-02		
Sn-126	1.1571E-05	3,053.191	6,056.473	0.00E+00	3.53E-02	7.01E-02		
Sr-90	1.3472E+00	3,053.191	6,056.473	0.00E+00	4.11E+03	8.16E+03		
Tc-99	4.2239E-04	3,053.191	6,056.473	0.00E+00	1.29E+00	2.56E+00		
Th-229	1.2407E-11	3,053.191	6,056.473	0.00E+00	3.79E-08	7.51E-08		
Th-230	8.3497E-08	3,053.191	6,056.473	0.00E+00	2.55E-04	5.06E-04		
Th-232	3.8371E-14	3,053.191	6,056.473	0.00E+00	1.17E-10	2.32E-10		
Tl-208	4.0414E-08	3,053.191	6,056.473	0.00E+00	1.23E-04	2.45E-04		
U-232	1.0948E-07	3,053.191	6,056.473	0.00E+00	3.34E-04	6.63E-04		
U-233	3.6275E-09	3,053.191	6,056.473	0.00E+00	1.11E-05	2.20E-05		
U-234	1.8562E-04	3,053.191	6,056.473	0.00E+00	5.67E-01	1.12E+00		
U-235	-2.7235E-06	3,053.191	0.000	1.26E-02	4.28E-03	1.26E-02		
U-236	1.5493E-05	3,053.191	6,056.473	0.00E+00	4.73E-02	9.38E-02		
U-238	-4.2851E-09	3,053.191	0.000	1.91E-04	1.78E-04	1.91E-04		
Y-90	1.3475E+00	3,053.191	6,056.473	0.00E+00	4.11E+03	8.16E+03		
Other Radionuclides					4.18E+03	8.29E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.11E+01	1.01E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	91.10863583	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		3,053.191	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup calculated assuming all BOL heavy metal burned.
Bounding:		6,056.473	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.52		1.06
Bounding:	3.01		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRM (GERMANY) 1Fuel decay start date: 1995
 SNF ID #: 805 Estimates as of: 2030
 Fuel Units & Descr: 50 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=28.18kg ; EOL=23.47kg 2Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 2.08

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Avg. MeV	
Ac-227	2.0068E-09	4,460.461	8,920.923	0.00E+00	8.95E-06	1.79E-05	0.0150	6.570E+14
Am-241	2.5251E-03	4,460.461	8,920.923	0.00E+00	1.13E+01	2.25E+01	0.0250	1.364E+14
Am-242m	3.9624E-07	4,460.461	8,920.923	0.00E+00	1.77E-03	3.53E-03	0.0375	1.186E+14
Am-243	1.4880E-06	4,460.461	8,920.923	0.00E+00	6.64E-03	1.33E-02	0.0575	1.276E+14
C-14	5.7053E-09	4,460.461	8,920.923	0.00E+00	2.54E-05	5.09E-05	0.0850	7.691E+13
Cl-36	1.3124E-32	4,460.461	8,920.923	0.00E+00	5.85E-29	1.17E-28	0.1250	5.080E+13
Cm-243	1.1419E-07	4,460.461	8,920.923	0.00E+00	5.09E-04	1.02E-03	0.2250	6.640E+13
Cm-244	1.6522E-05	4,460.461	8,920.923	0.00E+00	7.37E-02	1.47E-01	0.3750	2.888E+13
Co-60	7.4047E-07	4,460.461	8,920.923	0.00E+00	3.30E-03	6.61E-03	0.5750	4.774E+14
Cs-134	2.0455E-05	4,460.461	8,920.923	0.00E+00	9.12E-02	1.82E-01	0.8500	5.831E+12
Cs-135	3.4477E-06	4,460.461	8,920.923	0.00E+00	1.54E-02	3.08E-02	1.2500	2.821E+12
Cs-137	1.4365E+00	4,460.461	8,920.923	0.00E+00	6.41E+03	1.28E+04	1.7500	1.588E+11
Eu-154	7.3230E-03	4,460.461	8,920.923	0.00E+00	3.27E+01	6.53E+01	2.2500	1.328E+07
Eu-155	5.9259E-04	4,460.461	8,920.923	0.00E+00	2.64E+00	5.29E+00	2.7500	1.267E+07
Fe-55	2.2791E-06	4,460.461	8,920.923	0.00E+00	1.02E-02	2.03E-02	3.5000	7.365E+03
H-3	1.9698E-03	4,460.461	8,920.923	0.00E+00	8.79E+00	1.76E+01	5.0000	3.010E+03
I-129	7.5300E-07	4,460.461	8,920.923	0.00E+00	3.36E-03	6.72E-03	7.0000	3.295E+02
Kr-85	4.1176E-02	4,460.461	8,920.923	0.00E+00	1.84E+02	3.67E+02	11.0000	3.674E+01
Np-237	9.5752E-06	4,460.461	8,920.923	0.00E+00	4.27E-02	8.54E-02		
Pa-231	3.9379E-09	4,460.461	8,920.923	0.00E+00	1.76E-05	3.51E-05		
Pb-210	3.3115E-10	4,460.461	8,920.923	0.00E+00	1.48E-06	2.95E-06		
Pm-147	9.2402E-04	4,460.461	8,920.923	0.00E+00	4.12E+00	8.24E+00		
Pu-238	1.6217E-02	4,460.461	8,920.923	0.00E+00	7.23E+01	1.45E+02		
Pu-239	4.2810E-04	4,460.461	8,920.923	0.00E+00	1.91E+00	3.82E+00		
Pu-240	2.4333E-04	4,460.461	8,920.923	0.00E+00	1.09E+00	2.17E+00		
Pu-241	1.6242E-02	4,460.461	8,920.923	0.00E+00	7.24E+01	1.45E+02		
Pu-242	3.6329E-07	4,460.461	8,920.923	0.00E+00	1.62E-03	3.24E-03		
Ra-226	9.0114E-10	4,460.461	8,920.923	0.00E+00	4.02E-06	8.04E-06		
Ra-228	3.1019E-14	4,460.461	8,920.923	0.00E+00	1.38E-10	2.77E-10		
Ru-106	2.1225E-10	4,460.461	8,920.923	0.00E+00	9.47E-07	1.89E-06		
Se-79	1.2930E-05	4,460.461	8,920.923	0.00E+00	5.77E-02	1.15E-01		
Sn-126	1.1571E-05	4,460.461	8,920.923	0.00E+00	5.16E-02	1.03E-01		
Sr-90	1.3472E+00	4,460.461	8,920.923	0.00E+00	6.01E+03	1.20E+04		
Tc-99	4.2239E-04	4,460.461	8,920.923	0.00E+00	1.88E+00	3.77E+00		
Th-229	1.2407E-11	4,460.461	8,920.923	0.00E+00	5.53E-08	1.11E-07		
Th-230	8.3497E-08	4,460.461	8,920.923	0.00E+00	3.72E-04	7.45E-04		
Th-232	3.8371E-14	4,460.461	8,920.923	0.00E+00	1.71E-10	3.42E-10		
Tl-208	4.0414E-08	4,460.461	8,920.923	0.00E+00	1.80E-04	3.61E-04		
U-232	1.0948E-07	4,460.461	8,920.923	0.00E+00	4.88E-04	9.77E-04		
U-233	3.6275E-09	4,460.461	8,920.923	0.00E+00	1.62E-05	3.24E-05		
U-234	1.8562E-04	4,460.461	8,920.923	0.00E+00	8.28E-01	1.66E+00		
U-235	-2.7235E-06	4,460.461	0.000	2.74E-02	1.52E-02	2.74E-02		
U-236	1.5493E-05	4,460.461	8,920.923	0.00E+00	6.91E-02	1.38E-01		
U-238	-4.2851E-09	4,460.461	0.000	5.21E-03	5.19E-03	5.21E-03		
Y-90	1.3475E+00	4,460.461	8,920.923	0.00E+00	6.01E+03	1.20E+04		
Other Radionuclides					6.10E+03	1.22E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	44.97952648	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	686.606	4,460.461	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		8,920.923	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.50	6.50	
Bounding:	1.01		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR ASTRA (AUSTRIA)
 SNF ID #: 654
 Fuel Units & Descr: 2 - MTR TYPE
 Heavy Metal Mass: BOL= 14kg ; EOL= 12kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.08

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	18.940	37.881	0.00E+00	1.26E-08	2.51E-08		
Am-241	2.0060E-03	18.940	37.881	0.00E+00	3.80E-02	7.60E-02	0.0150	3.999E+12
Am-242m	4.2429E-07	18.940	37.881	0.00E+00	8.04E-06	1.61E-05	0.0250	8.315E+11
Am-243	1.4899E-06	18.940	37.881	0.00E+00	2.82E-05	5.64E-05	0.0375	7.253E+11
C-14	5.7135E-09	18.940	37.881	0.00E+00	1.08E-07	2.16E-07	0.0575	7.768E+11
Cl-36	1.3124E-32	18.940	37.881	0.00E+00	2.49E-31	4.97E-31	0.0850	4.694E+11
Cm-243	1.6443E-07	18.940	37.881	0.00E+00	3.11E-06	6.23E-06	0.1250	3.176E+11
Cm-244	2.9330E-05	18.940	37.881	0.00E+00	5.56E-04	1.11E-03	0.2250	4.050E+11
Co-60	5.3186E-06	18.940	37.881	0.00E+00	1.01E-04	2.01E-04	0.3750	1.763E+11
Cs-134	3.1563E-03	18.940	37.881	0.00E+00	5.98E-02	1.20E-01	0.5750	2.876E+12
Cs-135	3.4477E-06	18.940	37.881	0.00E+00	6.53E-05	1.31E-04	0.8500	4.862E+10
Cs-137	2.0313E+00	18.940	37.881	0.00E+00	3.85E+01	7.69E+01	1.2500	2.777E+10
Eu-154	2.4513E-02	18.940	37.881	0.00E+00	4.64E-01	9.29E-01	1.7500	1.275E+09
Eu-155	4.8175E-03	18.940	37.881	0.00E+00	9.12E-02	1.82E-01	2.2500	1.118E+05
Fe-55	1.2397E-04	18.940	37.881	0.00E+00	2.35E-03	4.70E-03	2.7500	6.319E+04
H-3	4.5697E-03	18.940	37.881	0.00E+00	8.66E-02	1.73E-01	3.5000	2.904E+02
I-129	7.5300E-07	18.940	37.881	0.00E+00	1.43E-05	2.85E-05	5.0000	1.642E+01
Kr-85	1.0850E-01	18.940	37.881	0.00E+00	2.05E+00	4.11E+00	7.0000	1.813E+00
Np-237	9.5561E-06	18.940	37.881	0.00E+00	1.81E-04	3.62E-04	11.0000	2.032E-01
Pa-231	2.0359E-09	18.940	37.881	0.00E+00	3.86E-08	7.71E-08		
Pb-210	4.9728E-11	18.940	37.881	0.00E+00	9.42E-10	1.88E-09		
Pm-147	4.8502E-02	18.940	37.881	0.00E+00	9.19E-01	1.84E+00		
Pu-238	1.8254E-02	18.940	37.881	0.00E+00	3.46E-01	6.91E-01		
Pu-239	4.2810E-04	18.940	37.881	0.00E+00	8.11E-03	1.62E-02		
Pu-240	2.4368E-04	18.940	37.881	0.00E+00	4.62E-03	9.23E-03		
Pu-241	3.3415E-02	18.940	37.881	0.00E+00	6.33E-01	1.27E+00		
Pu-242	3.6329E-07	18.940	37.881	0.00E+00	6.88E-06	1.38E-05		
Ra-226	2.2854E-10	18.940	37.881	0.00E+00	4.33E-09	8.66E-09		
Ra-228	1.2426E-14	18.940	37.881	0.00E+00	2.35E-13	4.71E-13		
Ru-106	6.3589E-06	18.940	37.881	0.00E+00	1.20E-04	2.41E-04		
Se-79	1.2933E-05	18.940	37.881	0.00E+00	2.45E-04	4.90E-04		
Sn-126	1.1574E-05	18.940	37.881	0.00E+00	2.19E-04	4.38E-04		
Sr-90	1.9248E+00	18.940	37.881	0.00E+00	3.65E+01	7.29E+01		
Tc-99	4.2239E-04	18.940	37.881	0.00E+00	8.00E-03	1.60E-02		
Th-229	5.0953E-12	18.940	37.881	0.00E+00	9.65E-11	1.93E-10		
Th-230	4.1885E-08	18.940	37.881	0.00E+00	7.93E-07	1.59E-06		
Th-232	1.9270E-14	18.940	37.881	0.00E+00	3.65E-13	7.30E-13		
Tl-208	4.6024E-08	18.940	37.881	0.00E+00	8.72E-07	1.74E-06		
U-232	1.2582E-07	18.940	37.881	0.00E+00	2.38E-06	4.77E-06		
U-233	2.5825E-09	18.940	37.881	0.00E+00	4.89E-08	9.78E-08		
U-234	1.8450E-04	18.940	37.881	0.00E+00	3.49E-03	6.99E-03		
U-235	-2.7235E-06	18.940	0.000	2.82E-04	2.30E-04	2.82E-04		
U-236	1.5493E-05	18.940	37.881	0.00E+00	2.93E-04	5.87E-04		
U-238	-4.2851E-09	18.940	0.000	3.22E-06	3.14E-06	3.22E-06		
Y-90	1.9254E+00	18.940	37.881	0.00E+00	3.65E+01	7.29E+01		
Other Radionuclides					3.66E+01	7.33E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.52E-01	9.03E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.15	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		18.940	
Bounding:		37.881	

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

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.43	
Bounding:	0.86	

Estimated EOL HM/Given EOL HM: 1.01

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR ASTRA (AUSTRIA)
 SNF ID #: 556
 Fuel Units & Descr: 4 - MTR TYPE
 Heavy Metal Mass: BOL= ; EOL=6.96kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.11

II. Estimates							Gamma Sources	
	m	x _a	x _b	b	y _a	y _b	Photon Energy Group	Total Photons/sec (bounding)
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	6,591.255	6,591.255	0.00E+00	4.37E-06	4.37E-06	Avg. MeV	
Am-241	2.0060E-03	6,591.255	6,591.255	0.00E+00	1.32E+01	1.32E+01	0.0150	6.958E+14
Am-242m	4.2429E-07	6,591.255	6,591.255	0.00E+00	2.80E-03	2.80E-03	0.0250	1.447E+14
Am-243	1.4899E-06	6,591.255	6,591.255	0.00E+00	9.82E-03	9.82E-03	0.0375	1.262E+14
C-14	5.7135E-09	6,591.255	6,591.255	0.00E+00	3.77E-05	3.77E-05	0.0575	1.352E+14
Cl-36	1.3124E-32	6,591.255	6,591.255	0.00E+00	8.65E-29	8.65E-29	0.0850	8.168E+13
Cm-243	1.6443E-07	6,591.255	6,591.255	0.00E+00	1.08E-03	1.08E-03	0.1250	5.527E+13
Cm-244	2.9330E-05	6,591.255	6,591.255	0.00E+00	1.93E-01	1.93E-01	0.2250	7.048E+13
Co-60	5.3186E-06	6,591.255	6,591.255	0.00E+00	3.51E-02	3.51E-02	0.3750	3.068E+13
Cs-134	3.1563E-03	6,591.255	6,591.255	0.00E+00	2.08E+01	2.08E+01	0.5750	5.004E+14
Cs-135	3.4477E-06	6,591.255	6,591.255	0.00E+00	2.27E-02	2.27E-02	0.8500	8.460E+12
Cs-137	2.0313E+00	6,591.255	6,591.255	0.00E+00	1.34E+04	1.34E+04	1.2500	4.831E+12
Eu-154	2.4513E-02	6,591.255	6,591.255	0.00E+00	1.62E+02	1.62E+02	1.7500	2.218E+11
Eu-155	4.8175E-03	6,591.255	6,591.255	0.00E+00	3.18E+01	3.18E+01	2.2500	1.946E+07
Fe-55	1.2397E-04	6,591.255	6,591.255	0.00E+00	8.17E-01	8.17E-01	2.7500	1.100E+07
H-3	4.5697E-03	6,591.255	6,591.255	0.00E+00	3.01E+01	3.01E+01	3.5000	5.053E+04
I-129	7.5300E-07	6,591.255	6,591.255	0.00E+00	4.96E-03	4.96E-03	5.0000	2.856E+03
Kr-85	1.0850E-01	6,591.255	6,591.255	0.00E+00	7.15E+02	7.15E+02	7.0000	3.153E+02
Np-237	9.5561E-06	6,591.255	6,591.255	0.00E+00	6.30E-02	6.30E-02	11.0000	3.534E+01
Pa-231	2.0359E-09	6,591.255	6,591.255	0.00E+00	1.34E-05	1.34E-05		
Pb-210	4.9728E-11	6,591.255	6,591.255	0.00E+00	3.28E-07	3.28E-07		
Pm-147	4.8502E-02	6,591.255	6,591.255	0.00E+00	3.20E+02	3.20E+02		
Pu-238	1.8254E-02	6,591.255	6,591.255	0.00E+00	1.20E+02	1.20E+02		
Pu-239	4.2810E-04	6,591.255	6,591.255	0.00E+00	2.82E+00	2.82E+00		
Pu-240	2.4368E-04	6,591.255	6,591.255	0.00E+00	1.61E+00	1.61E+00		
Pu-241	3.3415E-02	6,591.255	6,591.255	0.00E+00	2.20E+02	2.20E+02		
Pu-242	3.6329E-07	6,591.255	6,591.255	0.00E+00	2.39E-03	2.39E-03		
Ra-226	2.2854E-10	6,591.255	6,591.255	0.00E+00	1.51E-06	1.51E-06		
Ra-228	1.2426E-14	6,591.255	6,591.255	0.00E+00	8.19E-11	8.19E-11		
Ru-106	6.3589E-06	6,591.255	6,591.255	0.00E+00	4.19E-02	4.19E-02		
Se-79	1.2933E-05	6,591.255	6,591.255	0.00E+00	8.52E-02	8.52E-02		
Sn-126	1.1574E-05	6,591.255	6,591.255	0.00E+00	7.63E-02	7.63E-02		
Sr-90	1.9248E+00	6,591.255	6,591.255	0.00E+00	1.27E+04	1.27E+04		
Tc-99	4.2239E-04	6,591.255	6,591.255	0.00E+00	2.78E+00	2.78E+00		
Th-229	5.0953E-12	6,591.255	6,591.255	0.00E+00	3.36E-08	3.36E-08		
Th-230	4.1885E-08	6,591.255	6,591.255	0.00E+00	2.76E-04	2.76E-04		
Th-232	1.9270E-14	6,591.255	6,591.255	0.00E+00	1.27E-10	1.27E-10		
Tl-208	4.6024E-08	6,591.255	6,591.255	0.00E+00	3.03E-04	3.03E-04		
U-232	1.2582E-07	6,591.255	6,591.255	0.00E+00	8.29E-04	8.29E-04		
U-233	2.5825E-09	6,591.255	6,591.255	0.00E+00	1.70E-05	1.70E-05		
U-234	1.8450E-04	6,591.255	6,591.255	0.00E+00	1.22E+00	1.22E+00		
U-235	-2.7235E-06	6,591.255	0.000	2.77E-02	9.76E-03	2.77E-02		
U-236	1.5493E-05	6,591.255	6,591.255	0.00E+00	1.02E-01	1.02E-01		
U-238	-4.2851E-09	6,591.255	0.000	2.80E-04	2.52E-04	2.80E-04		
Y-90	1.9254E+00	6,591.255	6,591.255	0.00E+00	1.27E+04	1.27E+04		
Other Radionuclides					1.27E+04	1.27E+04		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:		60 to 100	

Burnup Summary (MWd) ²			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.
	From SFD	Estimated	
Nominal:		6,591.255	
Bounding:		6,591.255	

Checks			Estimated EOL HM/Given EOL HM 1.02
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	1.50		
Bounding:	1.50		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR ASTRA (AUSTRIA)
 SNF ID #: 515
 Fuel Units & Descr: 49 - MTR TYPE
 Heavy Metal Mass: BOL=78.40kg ; EOL=74.60kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWD): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 2.04

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	3,596.306	7,192.612	0.00E+00	2.38E-06	4.77E-06	0.0150	7.592E+14
Am-241	2.0060E-03	3,596.306	7,192.612	0.00E+00	7.21E+00	1.44E+01	0.0250	1.579E+14
Am-242m	4.2429E-07	3,596.306	7,192.612	0.00E+00	1.53E-03	3.05E-03	0.0375	1.377E+14
Am-243	1.4899E-06	3,596.306	7,192.612	0.00E+00	5.36E-03	1.07E-02	0.0575	1.475E+14
C-14	5.7135E-09	3,596.306	7,192.612	0.00E+00	2.05E-05	4.11E-05	0.0850	8.913E+13
Cl-36	1.3124E-32	3,596.306	7,192.612	0.00E+00	4.72E-29	9.44E-29	0.1250	6.031E+13
Co-243	1.6443E-07	3,596.306	7,192.612	0.00E+00	5.91E-04	1.18E-03	0.2250	7.691E+13
Co-244	2.9330E-05	3,596.306	7,192.612	0.00E+00	1.05E-01	2.11E-01	0.3750	3.347E+13
Co-60	5.3186E-06	3,596.306	7,192.612	0.00E+00	1.91E-02	3.83E-02	0.5750	5.461E+12
Cs-134	3.1563E-03	3,596.306	7,192.612	0.00E+00	1.14E+01	2.27E+01	0.8500	9.232E+14
Cs-135	3.4477E-06	3,596.306	7,192.612	0.00E+00	1.24E-02	2.48E-02	1.2500	5.272E+12
Cs-137	2.0313E+00	3,596.306	7,192.612	0.00E+00	7.31E+03	1.46E+04	1.7500	2.420E+11
Eu-154	2.4513E-02	3,596.306	7,192.612	0.00E+00	8.82E+01	1.76E+02	2.2500	2.123E+07
Eu-155	4.8175E-03	3,596.306	7,192.612	0.00E+00	1.73E+01	3.47E+01	2.7500	1.200E+07
Fe-55	1.2397E-04	3,596.306	7,192.612	0.00E+00	4.46E-01	8.92E-01	3.5000	5.526E+04
H-3	4.5697E-03	3,596.306	7,192.612	0.00E+00	1.64E+01	3.29E+01	5.0000	3.171E+03
I-129	7.5300E-07	3,596.306	7,192.612	0.00E+00	2.71E-03	5.42E-03	7.0000	3.503E+02
Kr-85	1.0850E-01	3,596.306	7,192.612	0.00E+00	3.90E+02	7.80E+02	11.0000	3.928E+01
Np-237	9.5561E-06	3,596.306	7,192.612	0.00E+00	3.44E-02	6.87E-02		
Pa-231	2.0359E-09	3,596.306	7,192.612	0.00E+00	7.32E-06	1.46E-05		
Pb-210	4.9728E-11	3,596.306	7,192.612	0.00E+00	1.79E-07	3.58E-07		
Pm-147	4.8502E-02	3,596.306	7,192.612	0.00E+00	1.74E+02	3.49E+02		
Pu-238	1.8254E-02	3,596.306	7,192.612	0.00E+00	6.56E+01	1.31E+02		
Pu-239	4.2810E-04	3,596.306	7,192.612	0.00E+00	1.54E+00	3.08E+00		
Pu-240	2.4368E-04	3,596.306	7,192.612	0.00E+00	8.76E-01	1.75E+00		
Pu-241	3.3415E-02	3,596.306	7,192.612	0.00E+00	1.20E+02	2.40E+02		
Pu-242	3.6329E-07	3,596.306	7,192.612	0.00E+00	1.31E-03	2.61E-03		
Ra-226	2.2854E-10	3,596.306	7,192.612	0.00E+00	8.22E-07	1.64E-06		
Ra-228	1.2426E-14	3,596.306	7,192.612	0.00E+00	4.47E-11	8.94E-11		
Ru-106	6.3589E-06	3,596.306	7,192.612	0.00E+00	2.29E-02	4.57E-02		
Se-79	1.2933E-05	3,596.306	7,192.612	0.00E+00	4.65E-02	9.30E-02		
Sn-126	1.1574E-05	3,596.306	7,192.612	0.00E+00	4.16E-02	8.32E-02		
Sr-90	1.9248E+00	3,596.306	7,192.612	0.00E+00	6.92E+03	1.38E+04		
Tc-99	4.2239E-04	3,596.306	7,192.612	0.00E+00	1.52E+00	3.04E+00		
Th-229	5.0953E-12	3,596.306	7,192.612	0.00E+00	1.83E-08	3.66E-08		
Th-230	4.1885E-08	3,596.306	7,192.612	0.00E+00	1.51E-04	3.01E-04		
Th-232	1.9270E-14	3,596.306	7,192.612	0.00E+00	6.93E-11	1.39E-10		
Ti-208	4.6024E-08	3,596.306	7,192.612	0.00E+00	1.66E-04	3.31E-04		
U-232	1.2582E-07	3,596.306	7,192.612	0.00E+00	4.52E-04	9.05E-04		
U-233	2.5825E-09	3,596.306	7,192.612	0.00E+00	9.29E-06	1.86E-05		
U-234	1.8450E-04	3,596.306	7,192.612	0.00E+00	6.64E-01	1.33E+00		
U-235	-2.7235E-06	3,596.306	0.000	1.43E-02	4.50E-03	1.43E-02		
U-236	1.5493E-05	3,596.306	7,192.612	0.00E+00	5.57E-02	1.11E-01		
U-238	-4.2851E-09	3,596.306	0.000	2.41E-02	2.41E-02	2.41E-02		
Y-90	1.9254E+00	3,596.306	7,192.612	0.00E+00	6.92E+03	1.38E+04		
Other Radionuclides							6.96E+03	1.39E+04

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.57E+01	1.71E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	8.4375	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated: 3,596.306	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		7,192.612	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier: 0.15	Estimated Burnup/ Given Burnup	1.00
Bounding:	0.29		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR FMRB (GERMANY)
 SNF ID #: 1066
 Fuel Units & Descr: 18 - MTR TYPE
 Heavy Metal Mass: BOL=2.57kg : EOL=2.28kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.75

Radionuclide	II. Estimates		Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n				Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.0068E-09	272.742	545.483	5.47E-07	1.09E-06	Avg. MeV	
Am-241	2.5251E-03	272.742	545.483	6.89E-01	1.38E+00	0.0150	4.018E+13
Am-242m	3.9624E-07	272.742	545.483	1.08E-04	2.16E-04	0.0250	8.343E+12
Am-243	1.4880E-06	272.742	545.483	4.06E-04	8.12E-04	0.0375	7.251E+12
C-14	5.7053E-09	272.742	545.483	1.56E-06	3.11E-06	0.0575	7.805E+12
Cl-36	1.3124E-32	272.742	545.483	3.58E-30	7.16E-30	0.0850	4.703E+12
Cm-243	1.1419E-07	272.742	545.483	3.11E-05	6.23E-05	0.1250	3.106E+12
Cm-244	1.6522E-05	272.742	545.483	4.51E-03	9.01E-03	0.2250	4.060E+12
Co-60	7.4047E-07	272.742	545.483	2.02E-04	4.04E-04	0.3750	1.766E+12
Cs-134	2.0455E-05	272.742	545.483	5.58E-03	1.12E-02	0.5750	2.919E+13
Cs-135	3.4477E-06	272.742	545.483	9.40E-04	1.88E-03	0.8500	3.566E+11
Cs-137	1.4365E+00	272.742	545.483	3.92E+02	7.84E+02	1.2500	1.725E+11
Eu-154	7.3230E-03	272.742	545.483	2.00E+00	3.99E+00	1.7500	9.708E+09
Eu-155	5.9259E-04	272.742	545.483	1.62E-01	3.23E-01	2.2500	8.118E+05
Fe-55	2.2791E-06	272.742	545.483	6.22E-04	1.24E-03	2.7500	7.745E+05
H-3	1.9698E-03	272.742	545.483	5.37E-01	1.07E+00	3.5000	4.492E+02
I-129	7.5300E-07	272.742	545.483	2.05E-04	4.11E-04	5.0000	1.835E+02
Kr-85	4.1176E-02	272.742	545.483	1.12E+01	2.25E+01	7.0000	2.009E+01
Np-237	9.5752E-06	272.742	545.483	2.61E-03	5.22E-03	11.0000	2.240E+00
Pa-231	3.9379E-09	272.742	545.483	1.07E-06	2.15E-06		
Pb-210	3.3115E-10	272.742	545.483	9.03E-08	1.81E-07		
Pm-147	9.2402E-04	272.742	545.483	2.52E-01	5.04E-01		
Pu-238	1.6217E-02	272.742	545.483	4.42E+00	8.85E+00		
Pu-239	4.2810E-04	272.742	545.483	1.17E-01	2.34E-01		
Pu-240	2.4333E-04	272.742	545.483	6.64E-02	1.33E-01		
Pu-241	1.6242E-02	272.742	545.483	4.43E+00	8.86E+00		
Pu-242	3.6329E-07	272.742	545.483	9.91E-05	1.98E-04		
Ra-226	9.0114E-10	272.742	545.483	2.46E-07	4.92E-07		
Ra-228	3.1019E-14	272.742	545.483	8.46E-12	1.69E-11		
Ru-106	2.1225E-10	272.742	545.483	5.79E-08	1.16E-07		
Se-79	1.2930E-05	272.742	545.483	3.53E-03	7.05E-03		
Sn-126	1.1571E-05	272.742	545.483	3.16E-03	6.31E-03		
Sr-90	1.3472E+00	272.742	545.483	3.67E+02	7.35E+02		
Tc-99	4.2239E-04	272.742	545.483	1.15E-01	2.30E-01		
Th-229	1.2407E-11	272.742	545.483	3.38E-09	6.77E-09		
Th-230	8.3497E-08	272.742	545.483	2.28E-05	4.55E-05		
Th-232	3.8371E-14	272.742	545.483	1.05E-11	2.09E-11		
Th-208	4.0414E-08	272.742	545.483	1.10E-05	2.20E-05		
U-232	1.0948E-07	272.742	545.483	2.99E-05	5.97E-05		
U-233	3.6275E-09	272.742	545.483	9.89E-07	1.98E-06		
U-234	1.8562E-04	272.742	545.483	5.06E-02	1.01E-01		
U-235	-2.7235E-06	272.742	0.000	4.33E-03	5.07E-03		
U-236	1.5493E-05	272.742	545.483	4.23E-03	8.45E-03		
U-238	-4.2851E-09	272.742	0.000	7.44E-05	7.55E-05		
Y-90	1.3475E+00	272.742	545.483	3.68E+02	7.35E+02		
Other Radionuclides				3.73E+02	7.46E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.56E+00	9.13E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	91.25787542	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		272.742	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		545.483	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.34		1.01
Bounding:	0.67		

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

²Total burnup for all fuel associated with this worksheet must be 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 (ARGENTINA) ¹Fuel decay start date: 2010
 SNF ID #: 547 Estimates as of: 2030
 Fuel Units & Descr: 30 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=18.75kg ; EOL=18.71kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.25

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	34.093	68.186	0.00E+00	2.26E-08	4.52E-08		
Am-241	2.0060E-03	34.093	68.186	0.00E+00	6.84E-02	1.37E-01	0.0150	7.198E+12
Am-242m	4.2429E-07	34.093	68.186	0.00E+00	1.45E-05	2.89E-05	0.0250	1.497E+12
Am-243	1.4899E-06	34.093	68.186	0.00E+00	5.08E-05	1.02E-04	0.0375	1.306E+12
C-14	5.7135E-09	34.093	68.186	0.00E+00	1.95E-07	3.90E-07	0.0575	1.398E+12
Cl-36	1.3124E-32	34.093	68.186	0.00E+00	4.47E-31	8.95E-31	0.0850	8.450E+11
Cm-243	1.6443E-07	34.093	68.186	0.00E+00	5.61E-06	1.12E-05	0.1250	5.718E+11
Cm-244	2.9330E-05	34.093	68.186	0.00E+00	1.00E-03	2.00E-03	0.2250	7.292E+11
Co-60	5.3186E-06	34.093	68.186	0.00E+00	1.81E-04	3.63E-04	0.3750	3.173E+11
Cs-134	3.1563E-03	34.093	68.186	0.00E+00	1.08E-01	2.15E-01	0.5750	5.177E+12
Cs-135	3.4477E-06	34.093	68.186	0.00E+00	1.18E-04	2.35E-04	0.8500	8.752E+10
Cs-137	2.0313E+00	34.093	68.186	0.00E+00	6.93E+01	1.39E+02	1.2500	4.998E+10
Eu-154	2.4513E-02	34.093	68.186	0.00E+00	8.36E-01	1.67E+00	1.7500	2.294E+09
Eu-155	4.8175E-03	34.093	68.186	0.00E+00	1.64E-01	3.28E-01	2.2500	2.013E+05
Fe-55	1.2397E-04	34.093	68.186	0.00E+00	4.23E-03	8.45E-03	2.7500	1.138E+05
H-3	4.5697E-03	34.093	68.186	0.00E+00	1.56E-01	3.12E-01	3.5000	5.498E+02
I-129	7.5300E-07	34.093	68.186	0.00E+00	2.57E-05	5.13E-05	5.0000	4.119E+01
Kr-85	1.0850E-01	34.093	68.186	0.00E+00	3.70E+00	7.40E+00	7.0000	4.603E+00
Np-237	9.5561E-06	34.093	68.186	0.00E+00	3.26E-04	6.52E-04	11.0000	5.197E-01
Pa-231	2.0359E-09	34.093	68.186	0.00E+00	6.94E-08	1.39E-07		
Pb-210	4.9728E-11	34.093	68.186	0.00E+00	1.70E-09	3.39E-09		
Pm-147	4.8502E-02	34.093	68.186	0.00E+00	1.65E+00	3.31E+00		
Pu-238	1.8254E-02	34.093	68.186	0.00E+00	6.22E-01	1.24E+00		
Pu-239	4.2810E-04	34.093	68.186	0.00E+00	1.46E-02	2.92E-02		
Pu-240	2.4368E-04	34.093	68.186	0.00E+00	8.31E-03	1.66E-02		
Pu-241	3.3415E-02	34.093	68.186	0.00E+00	1.14E+00	2.28E+00		
Pu-242	3.6329E-07	34.093	68.186	0.00E+00	1.24E-05	2.48E-05		
Ra-226	2.2854E-10	34.093	68.186	0.00E+00	7.79E-09	1.56E-08		
Ra-228	1.2426E-14	34.093	68.186	0.00E+00	4.24E-13	8.47E-13		
Ru-106	6.3589E-06	34.093	68.186	0.00E+00	2.17E-04	4.34E-04		
Se-79	1.2933E-05	34.093	68.186	0.00E+00	4.41E-04	8.82E-04		
Sn-126	1.1574E-05	34.093	68.186	0.00E+00	3.95E-04	7.89E-04		
Sr-90	1.9248E+00	34.093	68.186	0.00E+00	6.56E+01	1.31E+02		
Tc-99	4.2239E-04	34.093	68.186	0.00E+00	1.44E-02	2.88E-02		
Th-229	5.0953E-12	34.093	68.186	0.00E+00	1.74E-10	3.47E-10		
Th-230	4.1885E-08	34.093	68.186	0.00E+00	1.43E-06	2.86E-06		
Th-232	1.9270E-14	34.093	68.186	0.00E+00	6.57E-13	1.31E-12		
Ti-208	4.6024E-08	34.093	68.186	0.00E+00	1.57E-06	3.14E-06		
U-232	1.2582E-07	34.093	68.186	0.00E+00	4.29E-06	8.58E-06		
U-233	2.5825E-09	34.093	68.186	0.00E+00	8.80E-08	1.76E-07		
U-234	1.8450E-04	34.093	68.186	0.00E+00	6.29E-03	1.26E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-235	-2.7235E-06	34.093	0.000	8.10E-03	8.01E-03	8.10E-03	8.13E-01	1.63E+00
U-236	1.5493E-05	34.093	68.186	0.00E+00	5.28E-04	1.06E-03	Total	Total
U-238	-4.2851E-09	34.093	0.000	5.04E-03	5.04E-03	5.04E-03		
Y-90	1.9254E+00	34.093	68.186	0.00E+00	6.56E+01	1.31E+02		
Other Radionuclides					6.59E+01	1.32E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
	LIGHT WATER	LIGHT WATER	This template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	20	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		34.093	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		68.186	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.01		1.00
Bounding:	0.01		

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

²Total burnup for all fuel associated with this worksheet must be 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 (AUSTRALIA)
 SNF ID #: 649
 Fuel Units & Desc: 12 - ASSEMBLY
 Heavy Metal Mass: BOL=3.32kg ; EOL=3.32kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.50

Radionuclide	II. Estimates		b			Gamma Sources	
	m	x _n	x _b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV
Ac-227	6.6313E-10	3.409	6.819	0.00E+00	2.26E-09	4.52E-09	0.0150
Am-241	2.0060E-03	3.409	6.819	0.00E+00	6.84E-03	1.37E-02	0.0250
Am-242m	4.2429E-07	3.409	6.819	0.00E+00	1.45E-06	2.89E-06	0.0375
Am-243	1.4899E-06	3.409	6.819	0.00E+00	5.08E-06	1.02E-05	0.0575
C-14	5.7135E-09	3.409	6.819	0.00E+00	1.95E-08	3.90E-08	0.0850
Cl-36	1.3124E-32	3.409	6.819	0.00E+00	4.47E-32	8.95E-32	0.1250
Cm-243	1.6443E-07	3.409	6.819	0.00E+00	5.61E-07	1.12E-06	0.2250
Cm-244	2.9330E-05	3.409	6.819	0.00E+00	1.00E-04	2.00E-04	0.3750
Co-60	5.3186E-06	3.409	6.819	0.00E+00	1.81E-05	3.63E-05	0.5750
Cs-134	3.1563E-03	3.409	6.819	0.00E+00	1.08E-02	2.15E-02	0.8500
Cs-135	3.4477E-06	3.409	6.819	0.00E+00	1.18E-05	2.35E-05	1.2500
Cs-137	2.0313E+00	3.409	6.819	0.00E+00	6.93E+00	1.39E+01	1.7500
Eu-154	2.4513E-02	3.409	6.819	0.00E+00	8.36E-02	1.67E-01	2.2500
Eu-155	4.8175E-03	3.409	6.819	0.00E+00	1.64E-02	3.28E-02	2.7500
Fe-55	1.2397E-04	3.409	6.819	0.00E+00	4.23E-04	8.45E-04	3.5000
H-3	4.5697E-03	3.409	6.819	0.00E+00	1.56E-02	3.12E-02	5.0000
I-129	7.5300E-07	3.409	6.819	0.00E+00	2.57E-06	5.13E-06	7.0000
Kr-85	1.0850E-01	3.409	6.819	0.00E+00	3.70E-01	7.40E-01	11.0000
Np-237	9.5561E-06	3.409	6.819	0.00E+00	3.26E-05	6.52E-05	
Pa-231	2.0359E-09	3.409	6.819	0.00E+00	6.94E-09	1.39E-08	
Pb-210	4.9728E-11	3.409	6.819	0.00E+00	1.70E-10	3.39E-10	
Pm-147	4.8502E-02	3.409	6.819	0.00E+00	1.65E-01	3.31E-01	
Pu-238	1.8254E-02	3.409	6.819	0.00E+00	6.22E-02	1.24E-01	
Pu-239	4.2810E-04	3.409	6.819	0.00E+00	1.46E-03	2.92E-03	
Pu-240	2.4368E-04	3.409	6.819	0.00E+00	8.31E-04	1.66E-03	
Pu-241	3.3415E-02	3.409	6.819	0.00E+00	1.14E-01	2.28E-01	
Pu-242	3.6329E-07	3.409	6.819	0.00E+00	1.24E-06	2.48E-06	
Ra-226	2.2854E-10	3.409	6.819	0.00E+00	7.79E-10	1.56E-09	
Ra-228	1.2426E-14	3.409	6.819	0.00E+00	4.24E-14	8.47E-14	
Ru-106	6.3589E-06	3.409	6.819	0.00E+00	2.17E-05	4.34E-05	
Se-79	1.2933E-05	3.409	6.819	0.00E+00	4.41E-05	8.82E-05	
Sn-126	1.1574E-05	3.409	6.819	0.00E+00	3.95E-05	7.89E-05	
Sr-90	1.9248E+00	3.409	6.819	0.00E+00	6.56E+00	1.31E+01	
Tc-99	4.2239E-04	3.409	6.819	0.00E+00	1.44E-03	2.88E-03	
Th-229	5.0953E-12	3.409	6.819	0.00E+00	1.74E-11	3.47E-11	
Th-230	4.1885E-08	3.409	6.819	0.00E+00	1.43E-07	2.86E-07	
Th-232	1.9270E-14	3.409	6.819	0.00E+00	6.57E-14	1.31E-13	
Tl-208	4.6024E-08	3.409	6.819	0.00E+00	1.57E-07	3.14E-07	
U-232	1.2582E-07	3.409	6.819	0.00E+00	4.29E-07	8.58E-07	
U-233	2.5825E-09	3.409	6.819	0.00E+00	8.80E-09	1.76E-08	
U-234	1.8450E-04	3.409	6.819	0.00E+00	6.29E-04	1.26E-03	
U-235	-2.7235E-06	3.409	0.000	6.46E-03	6.45E-03	6.46E-03	
U-236	1.5493E-05	3.409	6.819	0.00E+00	5.28E-05	1.06E-04	
U-238	-4.2851E-09	3.409	0.000	1.12E-04	1.12E-04	1.12E-04	
Y-90	1.9254E+00	3.409	6.819	0.00E+00	6.56E+00	1.31E+01	
Other Radionuclides					6.59E+00	1.32E+01	

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.14E-02	1.63E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	89.99998815	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		3.409	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		6.819	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.00		1.00
Bounding:	0.01		

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

² Total burnup for all fuel associated with this worksheet must be 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 (CANADA)
 SNF ID #: 294
 Fuel Units & Descr: 14 - MULTI-PIN CLUSTER
 Heavy Metal Mass: BOL=2.20kg ; EOL=2.19kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.58

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	10.607	21.213	0.00E+00	7.03E-09	1.41E-08	Avg. MeV	
Am-241	2.0060E-03	10.607	21.213	0.00E+00	2.13E-02	4.26E-02	0.0150	2.239E+12
Am-242m	4.2429E-07	10.607	21.213	0.00E+00	4.50E-06	9.00E-06	0.0250	4.656E+11
Am-243	1.4899E-06	10.607	21.213	0.00E+00	1.58E-05	3.16E-05	0.0375	4.062E+11
C-14	5.7135E-09	10.607	21.213	0.00E+00	6.06E-08	1.21E-07	0.0575	4.350E+11
Cl-36	1.3124E-32	10.607	21.213	0.00E+00	1.39E-31	2.78E-31	0.0850	2.629E+11
Cm-243	1.6443E-07	10.607	21.213	0.00E+00	1.74E-06	3.49E-06	0.1250	1.779E+11
Cm-244	2.9330E-05	10.607	21.213	0.00E+00	3.11E-04	6.22E-04	0.2250	2.269E+11
Co-60	5.3186E-06	10.607	21.213	0.00E+00	5.64E-05	1.13E-04	0.3750	9.873E+10
Cs-134	3.1563E-03	10.607	21.213	0.00E+00	3.35E-02	6.70E-02	0.5750	1.611E+12
Cs-135	3.4477E-06	10.607	21.213	0.00E+00	3.66E-05	7.31E-05	0.8500	2.723E+10
Cs-137	2.0313E+00	10.607	21.213	0.00E+00	2.15E+01	4.31E+01	1.2500	1.555E+10
Eu-154	2.4513E-02	10.607	21.213	0.00E+00	2.60E-01	5.20E-01	1.7500	7.137E+08
Eu-155	4.8175E-03	10.607	21.213	0.00E+00	5.11E-02	1.02E-01	2.2500	6.262E+04
Fe-55	1.2397E-04	10.607	21.213	0.00E+00	1.31E-03	2.63E-03	2.7500	3.539E+04
H-3	4.5697E-03	10.607	21.213	0.00E+00	4.85E-02	9.69E-02	3.5000	1.630E+02
I-129	7.5300E-07	10.607	21.213	0.00E+00	7.99E-06	1.60E-05	5.0000	9.365E+00
Kr-85	1.0850E-01	10.607	21.213	0.00E+00	1.15E+00	2.30E+00	7.0000	1.034E+00
Np-237	9.5561E-06	10.607	21.213	0.00E+00	1.01E-04	2.03E-04	11.0000	1.160E-01
Pa-231	2.0359E-09	10.607	21.213	0.00E+00	2.16E-08	4.32E-08		
Pb-210	4.9728E-11	10.607	21.213	0.00E+00	5.27E-10	1.05E-09		
Pm-147	4.8502E-02	10.607	21.213	0.00E+00	5.14E-01	1.03E+00		
Pu-238	1.8254E-02	10.607	21.213	0.00E+00	1.94E-01	3.87E-01		
Pu-239	4.2810E-04	10.607	21.213	0.00E+00	4.54E-03	9.08E-03		
Pu-240	2.4368E-04	10.607	21.213	0.00E+00	2.58E-03	5.17E-03		
Pu-241	3.3415E-02	10.607	21.213	0.00E+00	3.54E-01	7.09E-01		
Pu-242	3.6329E-07	10.607	21.213	0.00E+00	3.85E-06	7.71E-06		
Ra-226	2.2854E-10	10.607	21.213	0.00E+00	2.42E-09	4.85E-09		
Ra-228	1.2426E-14	10.607	21.213	0.00E+00	1.32E-13	2.64E-13		
Ru-106	6.3589E-06	10.607	21.213	0.00E+00	6.74E-05	1.35E-04		
Se-79	1.2933E-05	10.607	21.213	0.00E+00	1.37E-04	2.74E-04		
Sn-126	1.1574E-05	10.607	21.213	0.00E+00	1.23E-04	2.46E-04		
Sr-90	1.9248E+00	10.607	21.213	0.00E+00	2.04E+01	4.08E+01		
Tc-99	4.2239E-04	10.607	21.213	0.00E+00	4.48E-03	8.96E-03		
Th-229	5.0953E-12	10.607	21.213	0.00E+00	5.40E-11	1.08E-10		
Th-230	4.1885E-08	10.607	21.213	0.00E+00	4.44E-07	8.89E-07		
Th-232	1.9270E-14	10.607	21.213	0.00E+00	2.04E-13	4.09E-13		
Tl-208	4.6024E-08	10.607	21.213	0.00E+00	4.88E-07	9.76E-07		
U-232	1.2582E-07	10.607	21.213	0.00E+00	1.33E-06	2.67E-06		
U-233	2.5825E-09	10.607	21.213	0.00E+00	2.74E-08	5.48E-08		
U-234	1.8450E-04	10.607	21.213	0.00E+00	1.96E-03	3.91E-03		
U-235	-2.7235E-06	10.607	0.000	4.43E-03	4.40E-03	4.43E-03		
U-236	1.5493E-05	10.607	21.213	0.00E+00	1.64E-04	3.29E-04		
U-238	-4.2851E-09	10.607	0.000	5.11E-05	5.11E-05	5.11E-05		
Y-90	1.9254E+00	10.607	21.213	0.00E+00	2.04E+01	4.08E+01		
Other Radionuclides								
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							2.53E-01	5.06E-01
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences:
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.09999644	60 to 100	

Burnup Summary (MWd)²

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal:		10.607	
Bounding:		21.213	

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

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.02		
Bounding:	0.03		

1.00

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN)
 SNF ID #: 551
 Fuel Units & Descr: 27 - ASSEMBLY
 Heavy Metal Mass: BOL=17.48kg ; EOL=17.47kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.13

Radionuclide	II. Estimates		Gamma Sources					
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	6.6313E-10	12.785	25.570	0.00E+00	8.48E-09	1.70E-08	0.0150	2.699E+12
Am-241	2.0060E-03	12.785	25.570	0.00E+00	2.56E-02	5.13E-02	0.0250	5.613E+11
Am-242m	4.2429E-07	12.785	25.570	0.00E+00	5.42E-06	1.08E-05	0.0375	4.896E+11
Am-243	1.4899E-06	12.785	25.570	0.00E+00	1.90E-05	3.81E-05	0.0575	5.243E+11
Ci-14	5.7135E-09	12.785	25.570	0.00E+00	7.30E-08	1.46E-07	0.0850	3.169E+11
Ci-36	1.3124E-32	12.785	25.570	0.00E+00	1.68E-31	3.36E-31	0.1250	2.144E+11
Cm-243	1.6443E-07	12.785	25.570	0.00E+00	2.10E-06	4.20E-06	0.2250	2.735E+11
Cm-244	2.9330E-05	12.785	25.570	0.00E+00	3.75E-04	7.50E-04	0.3750	1.190E+11
Co-60	5.3186E-06	12.785	25.570	0.00E+00	6.80E-05	1.36E-04	0.5750	1.941E+12
Cs-134	3.1563E-03	12.785	25.570	0.00E+00	4.04E-02	8.07E-02	0.8500	3.282E+10
Cs-135	3.4477E-06	12.785	25.570	0.00E+00	4.41E-05	8.82E-05	1.2500	1.874E+10
Cs-137	2.0313E+00	12.785	25.570	0.00E+00	2.60E+01	5.19E+01	1.7500	8.603E+08
Eu-154	2.4513E-02	12.785	25.570	0.00E+00	3.13E-01	6.27E-01	2.2500	7.552E+04
Eu-155	4.8175E-03	12.785	25.570	0.00E+00	6.16E-02	1.23E-01	2.7500	4.268E+04
Fe-55	1.2397E-04	12.785	25.570	0.00E+00	1.58E-03	3.17E-03	3.5000	2.219E+02
H-3	4.5697E-03	12.785	25.570	0.00E+00	5.84E-02	1.17E-01	5.0000	2.194E+01
I-129	7.5300E-07	12.785	25.570	0.00E+00	9.63E-06	1.93E-05	7.0000	2.474E+00
Kr-85	1.0850E-01	12.785	25.570	0.00E+00	1.39E+00	2.77E+00	11.0000	2.809E-01
Np-237	9.5561E-06	12.785	25.570	0.00E+00	1.22E-04	2.44E-04		
Pa-231	2.0359E-09	12.785	25.570	0.00E+00	2.60E-08	5.21E-08		
Pb-210	4.9728E-11	12.785	25.570	0.00E+00	6.36E-10	1.27E-09		
Pm-147	4.8502E-02	12.785	25.570	0.00E+00	6.20E-01	1.24E+00		
Pu-238	1.8254E-02	12.785	25.570	0.00E+00	2.33E-01	4.67E-01		
Pu-239	4.2810E-04	12.785	25.570	0.00E+00	5.47E-03	1.09E-02		
Pu-240	2.4368E-04	12.785	25.570	0.00E+00	3.12E-03	6.23E-03		
Pu-241	3.3415E-02	12.785	25.570	0.00E+00	4.27E-01	8.54E-01		
Pu-242	3.6329E-07	12.785	25.570	0.00E+00	4.64E-06	9.29E-06		
Ra-226	2.2854E-10	12.785	25.570	0.00E+00	2.92E-09	5.84E-09		
Ra-228	1.2426E-14	12.785	25.570	0.00E+00	1.59E-13	3.18E-13		
Ru-106	6.3589E-06	12.785	25.570	0.00E+00	8.13E-05	1.63E-04		
Se-79	1.2933E-05	12.785	25.570	0.00E+00	1.65E-04	3.31E-04		
Sn-126	1.1574E-05	12.785	25.570	0.00E+00	1.48E-04	2.96E-04		
Sr-90	1.9248E+00	12.785	25.570	0.00E+00	2.46E+01	4.92E+01		
Tc-99	4.2239E-04	12.785	25.570	0.00E+00	5.40E-03	1.08E-02		
Th-229	5.0953E-12	12.785	25.570	0.00E+00	6.51E-11	1.30E-10		
Th-230	4.1885E-08	12.785	25.570	0.00E+00	5.35E-07	1.07E-06		
Th-232	1.9270E-14	12.785	25.570	0.00E+00	2.46E-13	4.93E-13		
Tl-208	4.6024E-08	12.785	25.570	0.00E+00	5.88E-07	1.18E-06		
U-232	1.2582E-07	12.785	25.570	0.00E+00	1.61E-06	3.22E-06		
U-233	2.5825E-09	12.785	25.570	0.00E+00	3.30E-08	6.60E-08		
U-234	1.8450E-04	12.785	25.570	0.00E+00	2.36E-03	4.72E-03		
U-235	-2.7235E-06	12.785	0.000	7.56E-03	7.52E-03	7.56E-03		
U-236	1.5493E-05	12.785	25.570	0.00E+00	1.98E-04	3.96E-04		
U-238	-4.2851E-09	12.785	0.000	4.70E-03	4.70E-03	4.70E-03		
Y-90	1.9254E+00	12.785	25.570	0.00E+00	2.46E+01	4.92E+01		
Other Radionuclides					2.47E+01	4.95E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.05E-01	6.10E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	20.00000092	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		12.785	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		25.570	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.00		1.00
Bounding:	0.00		

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN)
 SNF ID #: 605
 Fuel Units & Descr: 81 - MTR TYPE
 Heavy Metal Mass: BOL=24.82kg ; EOL=24.79kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 3.38

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	6.6313E-10	30.684	61.367	0.00E+00	2.03E-08	4.07E-08	0.0150	6.479E+12
Am-241	2.0060E-03	30.684	61.367	0.00E+00	6.16E-02	1.23E-01	0.0250	1.347E+12
Am-242m	4.2429E-07	30.684	61.367	0.00E+00	1.30E-05	2.60E-05	0.0375	1.175E+12
Am-243	1.4899E-06	30.684	61.367	0.00E+00	4.57E-05	9.14E-05	0.0575	1.258E+12
C-14	5.7135E-09	30.684	61.367	0.00E+00	1.75E-07	3.51E-07	0.0850	7.606E+11
Cl-36	1.3124E-32	30.684	61.367	0.00E+00	4.03E-31	8.05E-31	0.1250	5.149E+11
Cm-243	1.6443E-07	30.684	61.367	0.00E+00	5.05E-06	1.01E-05	0.2250	6.572E+11
Cm-244	2.9330E-05	30.684	61.367	0.00E+00	9.00E-04	1.80E-03	0.3750	2.856E+11
Co-60	5.3186E-06	30.684	61.367	0.00E+00	1.63E-04	3.26E-04	0.5750	4.659E+12
Cs-134	3.1563E-03	30.684	61.367	0.00E+00	9.68E-02	1.94E-01	0.8500	7.877E+10
Cs-135	3.4477E-06	30.684	61.367	0.00E+00	1.06E-04	2.12E-04	1.2500	4.498E+10
Cs-137	2.0313E+00	30.684	61.367	0.00E+00	6.23E+01	1.25E+02	1.7500	2.065E+09
Eu-154	2.4513E-02	30.684	61.367	0.00E+00	7.52E-01	1.50E+00	2.2500	1.811E+05
Eu-155	4.8175E-03	30.684	61.367	0.00E+00	1.48E-01	2.96E-01	2.7500	1.024E+05
Fe-55	1.2397E-04	30.684	61.367	0.00E+00	3.80E-03	7.61E-03	3.5000	4.752E+02
H-3	4.5697E-03	30.684	61.367	0.00E+00	1.40E-01	2.80E-01	5.0000	2.859E+01
I-129	7.5300E-07	30.684	61.367	0.00E+00	2.31E-05	4.62E-05	7.0000	3.162E+00
Kr-85	1.0850E-01	30.684	61.367	0.00E+00	3.33E+00	6.66E+00	11.0000	3.547E-01
Np-237	9.5561E-06	30.684	61.367	0.00E+00	2.93E-04	5.86E-04		
Pa-231	2.0359E-09	30.684	61.367	0.00E+00	6.25E-08	1.25E-07		
Pb-210	4.9728E-11	30.684	61.367	0.00E+00	1.53E-09	3.05E-09		
Pm-147	4.8502E-02	30.684	61.367	0.00E+00	1.49E+00	2.98E+00		
Pu-238	1.8254E-02	30.684	61.367	0.00E+00	5.60E-01	1.12E+00		
Pu-239	4.2810E-04	30.684	61.367	0.00E+00	1.31E-02	2.63E-02		
Pu-240	2.4368E-04	30.684	61.367	0.00E+00	7.48E-03	1.50E-02		
Pu-241	3.3415E-02	30.684	61.367	0.00E+00	1.03E+00	2.05E+00		
Pu-242	3.6329E-07	30.684	61.367	0.00E+00	1.11E-05	2.23E-05		
Ra-226	2.2854E-10	30.684	61.367	0.00E+00	7.01E-09	1.40E-08		
Ra-228	1.2426E-14	30.684	61.367	0.00E+00	3.81E-13	7.63E-13		
Ru-106	6.3589E-06	30.684	61.367	0.00E+00	1.95E-04	3.90E-04		
Se-79	1.2933E-05	30.684	61.367	0.00E+00	3.97E-04	7.94E-04		
Sn-126	1.1574E-05	30.684	61.367	0.00E+00	3.55E-04	7.10E-04		
Sr-90	1.9248E+00	30.684	61.367	0.00E+00	5.91E+01	1.18E+02		
Tc-99	4.2239E-04	30.684	61.367	0.00E+00	1.30E-02	2.59E-02		
Th-229	5.0953E-12	30.684	61.367	0.00E+00	1.56E-10	3.13E-10		
Th-230	4.1885E-08	30.684	61.367	0.00E+00	1.29E-06	2.57E-06		
Th-232	1.9270E-14	30.684	61.367	0.00E+00	5.91E-13	1.18E-12		
Ti-208	4.6024E-08	30.684	61.367	0.00E+00	1.41E-06	2.82E-06		
U-232	1.2582E-07	30.684	61.367	0.00E+00	3.86E-06	7.72E-06		
U-233	2.5825E-09	30.684	61.367	0.00E+00	7.92E-08	1.58E-07		
U-234	1.8450E-04	30.684	61.367	0.00E+00	5.66E-03	1.13E-02		
U-235	-2.7235E-06	30.684	0.000	4.99E-02	4.98E-02	4.99E-02		
U-236	1.5493E-05	30.684	61.367	0.00E+00	4.75E-04	9.51E-04		
U-238	-4.2851E-09	30.684	0.000	5.84E-04	5.84E-04	5.84E-04		
Y-90	1.9254E+00	30.684	61.367	0.00E+00	5.91E+01	1.18E+02		
Other Radionuclides					5.93E+01	1.19E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.33E-01	1.46E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.00000613	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		30.684	
Bounding:		61.367	

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

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN)
 SNF ID #: 565
 Fuel Units & Descr: 30 - MTR TYPE
 Heavy Metal Mass: BOL=21.54kg ; EOL=21.52kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.25

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	C1/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Avg. MeV	
Ac-227	6.6313E-10	17.046	34.093	0.00E+00	1.13E-08	2.26E-08	0.0150	3.599E+12
Am-241	2.0060E-03	17.046	34.093	0.00E+00	3.42E-02	6.84E-02	0.0250	7.484E+11
Am-242m	4.2429E-07	17.046	34.093	0.00E+00	7.23E-06	1.45E-05	0.0375	6.528E+11
Am-243	1.4899E-06	17.046	34.093	0.00E+00	2.54E-05	5.08E-05	0.0575	6.991E+11
C-14	5.7135E-09	17.046	34.093	0.00E+00	9.74E-08	1.95E-07	0.0850	4.225E+11
Cl-36	1.3124E-32	17.046	34.093	0.00E+00	2.24E-31	4.47E-31	0.1250	2.860E+11
Cm-243	1.6443E-07	17.046	34.093	0.00E+00	2.80E-06	5.61E-06	0.2250	3.650E+11
Cm-244	2.9330E-05	17.046	34.093	0.00E+00	5.00E-04	1.00E-03	0.3750	1.587E+11
Co-60	5.3186E-06	17.046	34.093	0.00E+00	9.07E-05	1.81E-04	0.8500	4.376E+10
Cs-134	3.1563E-03	17.046	34.093	0.00E+00	5.38E-02	1.08E-01	1.2500	2.499E+10
Cs-135	3.4477E-06	17.046	34.093	0.00E+00	5.88E-05	1.18E-04	1.7500	1.147E+09
Cs-137	2.0313E+00	17.046	34.093	0.00E+00	3.46E+01	6.93E+01	2.2500	1.007E+05
Eu-154	2.4513E-02	17.046	34.093	0.00E+00	4.18E-01	8.36E-01	2.7500	5.690E+04
Eu-155	4.8175E-03	17.046	34.093	0.00E+00	8.21E-02	1.64E-01	5.0000	2.417E+01
Fe-55	1.2397E-04	17.046	34.093	0.00E+00	2.11E-03	4.23E-03	7.0000	2.712E+00
H-3	4.5697E-03	17.046	34.093	0.00E+00	7.79E-02	1.56E-01	11.0000	3.070E-01
I-129	7.5300E-07	17.046	34.093	0.00E+00	1.28E-05	2.57E-05		
Kr-85	1.0850E-01	17.046	34.093	0.00E+00	1.85E+00	3.70E+00		
Np-237	9.5561E-06	17.046	34.093	0.00E+00	1.63E-04	3.26E-04		
Pa-231	2.0359E-09	17.046	34.093	0.00E+00	3.47E-08	6.94E-08		
Pb-210	4.9728E-11	17.046	34.093	0.00E+00	8.48E-10	1.70E-09		
Pm-147	4.8502E-02	17.046	34.093	0.00E+00	8.27E-01	1.65E+00		
Pu-238	1.8254E-02	17.046	34.093	0.00E+00	3.11E-01	6.22E-01		
Pu-239	4.2810E-04	17.046	34.093	0.00E+00	7.30E-03	1.46E-02		
Pu-240	2.4368E-04	17.046	34.093	0.00E+00	4.15E-03	8.31E-03		
Pu-241	3.3415E-02	17.046	34.093	0.00E+00	5.70E-01	1.14E+00		
Pu-242	3.6329E-07	17.046	34.093	0.00E+00	6.19E-06	1.24E-05		
Ra-226	2.2854E-10	17.046	34.093	0.00E+00	3.90E-09	7.79E-09		
Ra-228	1.2426E-14	17.046	34.093	0.00E+00	2.12E-13	4.24E-13		
Ru-106	6.3589E-06	17.046	34.093	0.00E+00	1.08E-04	2.17E-04		
Se-79	1.2933E-05	17.046	34.093	0.00E+00	2.20E-04	4.41E-04		
Sn-126	1.1574E-05	17.046	34.093	0.00E+00	1.97E-04	3.95E-04		
Sr-90	1.9248E+00	17.046	34.093	0.00E+00	3.28E+01	6.56E+01		
Tc-99	4.2239E-04	17.046	34.093	0.00E+00	7.20E-03	1.44E-02		
Th-229	5.0953E-12	17.046	34.093	0.00E+00	8.69E-11	1.74E-10		
Th-230	4.1885E-08	17.046	34.093	0.00E+00	7.14E-07	1.43E-06		
Th-232	1.9270E-14	17.046	34.093	0.00E+00	3.28E-13	6.57E-13		
Th-208	4.6024E-08	17.046	34.093	0.00E+00	7.85E-07	1.57E-06		
U-232	1.2582E-07	17.046	34.093	0.00E+00	2.14E-06	4.29E-06		
U-233	2.5825E-09	17.046	34.093	0.00E+00	4.40E-08	8.80E-08		
U-234	1.8450E-04	17.046	34.093	0.00E+00	3.15E-03	6.29E-03		
U-235	-2.7235E-06	17.046	0.000	2.09E-02	2.09E-02	2.09E-02		
U-236	1.5493E-05	17.046	34.093	0.00E+00	2.64E-04	5.28E-04		
U-238	-4.2851E-09	17.046	0.000	3.98E-03	3.98E-03	3.98E-03		
Y-90	1.9254E+00	17.046	34.093	0.00E+00	3.28E+01	6.56E+01		
Other Radionuclides					3.30E+01	6.59E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.07E-01	8.13E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			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.
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U-ALX	U	
	44.97911463	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		17.046	
Bounding:		34.093	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.00		1.00
Bounding:	0.01		

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN) 1Fuel decay start date: 2010
 SNF ID #: 603 Estimates as of: 2030
 Fuel Units & Descr: 12 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=3.55kg ; EOL=3.55kg 2Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.40

II. Estimates							Gamma Sources	
	m	x _n	x _p	b	y _n	y _p	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	67.299	134.598	0.00E+00	4.46E-08	8.93E-08		
Am-241	2.0060E-03	67.299	134.598	0.00E+00	1.35E-01	2.70E-01	0.0150	1.421E+13
Am-242m	4.2429E-07	67.299	134.598	0.00E+00	2.86E-05	5.71E-05	0.0250	2.955E+12
Am-243	1.4899E-06	67.299	134.598	0.00E+00	1.00E-04	2.01E-04	0.0375	2.577E+12
C-14	5.7135E-09	67.299	134.598	0.00E+00	3.85E-07	7.69E-07	0.0575	2.760E+12
Cf-36	1.3124E-32	67.299	134.598	0.00E+00	8.83E-31	1.77E-30	0.0850	1.668E+12
Cm-243	1.6443E-07	67.299	134.598	0.00E+00	1.11E-05	2.21E-05	0.1250	1.129E+12
Cm-244	2.9330E-05	67.299	134.598	0.00E+00	1.97E-03	3.95E-03	0.2250	1.439E+12
Co-60	5.3186E-06	67.299	134.598	0.00E+00	3.58E-04	7.16E-04	0.3750	6.264E+11
Cs-134	3.1563E-03	67.299	134.598	0.00E+00	2.12E-01	4.25E-01	0.5750	1.022E+13
Cs-135	3.4477E-06	67.299	134.598	0.00E+00	2.32E-04	4.64E-04	0.8500	1.728E+11
Cs-137	2.0313E+00	67.299	134.598	0.00E+00	1.37E+02	2.73E+02	1.2500	9.866E+10
Eu-154	2.4513E-02	67.299	134.598	0.00E+00	1.65E+00	3.30E+00	1.7500	4.529E+09
Eu-155	4.8175E-03	67.299	134.598	0.00E+00	3.24E-01	6.48E-01	2.2500	3.973E+05
Fe-55	1.2397E-04	67.299	134.598	0.00E+00	8.34E-03	1.67E-02	2.7500	2.245E+05
H-3	4.5697E-03	67.299	134.598	0.00E+00	3.08E-01	6.15E-01	3.5000	1.033E+03
I-129	7.5300E-07	67.299	134.598	0.00E+00	5.07E-05	1.01E-04	5.0000	5.867E+01
Kr-85	1.0850E-01	67.299	134.598	0.00E+00	7.30E+00	1.46E+01	7.0000	6.479E+00
Np-237	9.5561E-06	67.299	134.598	0.00E+00	6.43E-04	1.29E-03	11.0000	7.262E-01
Pa-231	2.0359E-09	67.299	134.598	0.00E+00	1.37E-07	2.74E-07		
Pb-210	4.9728E-11	67.299	134.598	0.00E+00	3.35E-09	6.69E-09		
Pm-147	4.8502E-02	67.299	134.598	0.00E+00	3.26E+00	6.53E+00		
Pu-238	1.8254E-02	67.299	134.598	0.00E+00	1.23E+00	2.46E+00		
Pu-239	4.2810E-04	67.299	134.598	0.00E+00	2.88E-02	5.76E-02		
Pu-240	2.4368E-04	67.299	134.598	0.00E+00	1.64E-02	3.28E-02		
Pu-241	3.3415E-02	67.299	134.598	0.00E+00	2.25E+00	4.50E+00		
Pu-242	3.6329E-07	67.299	134.598	0.00E+00	2.44E-05	4.89E-05		
Ra-226	2.2854E-10	67.299	134.598	0.00E+00	1.54E-08	3.08E-08		
Ra-228	1.2426E-14	67.299	134.598	0.00E+00	8.36E-13	1.67E-12		
Ru-106	6.3589E-06	67.299	134.598	0.00E+00	4.28E-04	8.56E-04		
Se-79	1.2933E-05	67.299	134.598	0.00E+00	8.70E-04	1.74E-03		
Sn-126	1.1574E-05	67.299	134.598	0.00E+00	7.79E-04	1.56E-03		
Sr-90	1.9248E+00	67.299	134.598	0.00E+00	1.30E+02	2.59E+02		
Tc-99	4.2239E-04	67.299	134.598	0.00E+00	2.84E-02	5.69E-02		
Th-229	5.0953E-12	67.299	134.598	0.00E+00	3.43E-10	6.86E-10		
Th-230	4.1885E-08	67.299	134.598	0.00E+00	2.82E-06	5.64E-06		
Th-232	1.9270E-14	67.299	134.598	0.00E+00	1.30E-12	2.59E-12		
Tl-208	4.6024E-08	67.299	134.598	0.00E+00	3.10E-06	6.19E-06		
U-232	1.2582E-07	67.299	134.598	0.00E+00	8.47E-06	1.69E-05		
U-233	2.5825E-09	67.299	134.598	0.00E+00	1.74E-07	3.48E-07		
U-234	1.8450E-04	67.299	134.598	0.00E+00	1.24E-02	2.48E-02		
U-235	-2.7235E-06	67.299	0.000	6.90E-03	6.71E-03	6.90E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.5493E-05	67.299	134.598	0.00E+00	1.04E-03	2.09E-03	1.60E+00	3.21E+00
U-238	-4.2851E-09	67.299	0.000	1.22E-04	1.21E-04	1.22E-04	Total	Total
Y-90	1.9254E+00	67.299	134.598	0.00E+00	1.30E+02	2.59E+02		
Other Radionuclides					1.30E+02	2.60E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	89.81998522	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		67.299	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
Bounding:		134.598	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.06	
Bounding:	0.12	
		Estimated EOL HM/Given EOL HM
		0.98

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

²Total burnup for all fuel associated with this worksheet must be 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 (NETHERLANDS) ¹Fuel decay start date: 2010
 SNF ID #: 609 Estimates as of: 2030
 Fuel Units & Desc: 14 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=3.19kg ; EOL=3.19kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.58

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	3.978	7.955	0.00E+00	2.64E-09	5.28E-09	Avg. MeV	
Am-241	2.0060E-03	3.978	7.955	0.00E+00	7.98E-03	1.60E-02	0.0150	8.399E+11
Am-242m	4.2429E-07	3.978	7.955	0.00E+00	1.69E-06	3.38E-06	0.0250	1.746E+11
Am-243	1.4899E-06	3.978	7.955	0.00E+00	5.93E-06	1.19E-05	0.0375	1.523E+11
C-14	5.7135E-09	3.978	7.955	0.00E+00	2.27E-08	4.55E-08	0.0575	1.631E+11
Cl-36	1.3124E-32	3.978	7.955	0.00E+00	5.22E-32	1.04E-31	0.0850	9.859E+10
Cm-243	1.6443E-07	3.978	7.955	0.00E+00	6.54E-07	1.31E-06	0.1250	6.674E+10
Cm-244	2.9330E-05	3.978	7.955	0.00E+00	1.17E-04	2.33E-04	0.2250	8.519E+10
Co-60	5.3186E-06	3.978	7.955	0.00E+00	2.12E-05	4.23E-05	0.3750	3.702E+10
Cs-134	3.1563E-03	3.978	7.955	0.00E+00	1.26E-02	2.51E-02	0.5750	6.040E+10
Cs-135	3.4477E-06	3.978	7.955	0.00E+00	1.37E-05	2.74E-05	0.8500	1.021E+10
Cs-137	2.0313E+00	3.978	7.955	0.00E+00	8.08E+00	1.62E+01	1.2500	5.831E+09
Eu-154	2.4513E-02	3.978	7.955	0.00E+00	9.75E-02	1.95E-01	1.7500	2.677E+08
Eu-155	4.8175E-03	3.978	7.955	0.00E+00	1.92E-02	3.83E-02	2.2500	2.348E+04
Fe-55	1.2397E-04	3.978	7.955	0.00E+00	4.93E-04	9.86E-04	2.7500	1.327E+04
H-3	4.5697E-03	3.978	7.955	0.00E+00	1.82E-02	3.64E-02	3.5000	6.159E+01
I-129	7.5300E-07	3.978	7.955	0.00E+00	3.00E-06	5.99E-06	5.0000	3.705E+00
Kr-85	1.0850E-01	3.978	7.955	0.00E+00	4.32E-01	8.63E-01	7.0000	4.097E-01
Np-237	9.5561E-06	3.978	7.955	0.00E+00	3.80E-05	7.60E-05	11.0000	4.595E-02
Pa-231	2.0359E-09	3.978	7.955	0.00E+00	8.10E-09	1.62E-08		
Pb-210	4.9728E-11	3.978	7.955	0.00E+00	1.98E-10	3.96E-10		
Pm-147	4.8502E-02	3.978	7.955	0.00E+00	1.93E-01	3.86E-01		
Pu-238	1.8254E-02	3.978	7.955	0.00E+00	7.26E-02	1.45E-01		
Pu-239	4.2810E-04	3.978	7.955	0.00E+00	1.70E-03	3.41E-03		
Pu-240	2.4368E-04	3.978	7.955	0.00E+00	9.69E-04	1.94E-03		
Pu-241	3.3415E-02	3.978	7.955	0.00E+00	1.33E-01	2.66E-01		
Pu-242	3.6329E-07	3.978	7.955	0.00E+00	1.44E-06	2.89E-06		
Ra-226	2.2854E-10	3.978	7.955	0.00E+00	9.09E-10	1.82E-09		
Ra-228	1.2426E-14	3.978	7.955	0.00E+00	4.94E-14	9.89E-14		
Ru-106	6.3589E-06	3.978	7.955	0.00E+00	2.53E-05	5.06E-05		
Se-79	1.2933E-05	3.978	7.955	0.00E+00	5.14E-05	1.03E-04		
Sn-126	1.1574E-05	3.978	7.955	0.00E+00	4.60E-05	9.21E-05		
Sr-90	1.9248E+00	3.978	7.955	0.00E+00	7.66E+00	1.53E+01		
Tc-99	4.2239E-04	3.978	7.955	0.00E+00	1.68E-03	3.36E-03		
Th-229	5.0953E-12	3.978	7.955	0.00E+00	2.03E-11	4.05E-11		
Th-230	4.1885E-08	3.978	7.955	0.00E+00	1.67E-07	3.33E-07		
Th-232	1.9270E-14	3.978	7.955	0.00E+00	7.66E-14	1.53E-13		
Tl-208	4.6024E-08	3.978	7.955	0.00E+00	1.83E-07	3.66E-07		
U-232	1.2582E-07	3.978	7.955	0.00E+00	5.00E-07	1.00E-06		
U-233	2.5825E-09	3.978	7.955	0.00E+00	1.03E-08	2.05E-08		
U-234	1.8450E-04	3.978	7.955	0.00E+00	7.34E-04	1.47E-03		
U-235	-2.7235E-06	3.978	0.000	6.42E-03	6.40E-03	6.42E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.5493E-05	3.978	7.955	0.00E+00	6.16E-05	1.23E-04	9.50E-02	1.90E-01
U-238	-4.2851E-09	3.978	0.000	7.51E-05	7.51E-05	7.51E-05	Total	Total
Y-90	1.9254E+00	3.978	7.955	0.00E+00	7.66E+00	1.53E+01		
Other Radionuclides					7.69E+00	1.54E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.50E-02	1.90E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD LIGHT WATER	Used LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.9999964	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		3.978	
Bounding:		7.955	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.00		
Bounding:	0.01		1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (TAIWAN)
 SNF ID #: 628
 Fuel Units & Descr: 35 - MTR TYPE
 Heavy Metal Mass: BOL=4.76kg ; EOL=4.76kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
18"x10"
 1.46

Radionuclide	m		x _n		x _b		b		y _n		y _b		Gamma Sources	
	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)						
Ac-227	6.6313E-10	3.315	6.629	0.00E+00	2.20E-09	4.40E-09	Avg. MeV							
Am-241	2.0060E-03	3.315	6.629	0.00E+00	6.65E-03	1.33E-02	0.0150	7.00E+11						
Am-242m	4.2429E-07	3.315	6.629	0.00E+00	1.41E-06	2.81E-06	0.0250	1.455E+11						
Am-243	1.4899E-06	3.315	6.629	0.00E+00	4.94E-06	9.88E-06	0.0375	1.269E+11						
C-14	5.7135E-09	3.315	6.629	0.00E+00	1.89E-08	3.79E-08	0.0575	1.359E+11						
Cl-36	1.3124E-32	3.315	6.629	0.00E+00	4.35E-32	8.70E-32	0.0850	8.217E+10						
Cm-243	1.6443E-07	3.315	6.629	0.00E+00	5.45E-07	1.09E-06	0.1250	5.564E+10						
Cm-244	2.9330E-05	3.315	6.629	0.00E+00	9.72E-05	1.94E-04	0.2250	7.107E+10						
Co-60	5.3186E-06	3.315	6.629	0.00E+00	1.76E-05	3.53E-05	0.3750	3.085E+10						
Cs-134	3.1563E-03	3.315	6.629	0.00E+00	1.05E-02	2.09E-02	0.5750	5.033E+10						
Cs-135	3.4477E-06	3.315	6.629	0.00E+00	1.14E-05	2.29E-05	0.8500	8.509E+09						
Cs-137	2.0313E+00	3.315	6.629	0.00E+00	6.73E+00	1.35E+01	1.2500	4.859E+09						
Eu-154	2.4513E-02	3.315	6.629	0.00E+00	8.12E-02	1.62E-01	1.7500	2.230E+08						
Eu-155	4.8175E-03	3.315	6.629	0.00E+00	1.60E-02	3.19E-02	2.2500	1.957E+04						
Fe-55	1.2397E-04	3.315	6.629	0.00E+00	4.11E-04	8.22E-04	2.7500	1.106E+04						
H-3	4.5697E-03	3.315	6.629	0.00E+00	1.51E-02	3.03E-02	3.5000	5.172E+01						
I-129	7.5300E-07	3.315	6.629	0.00E+00	2.50E-06	4.99E-06	5.0000	3.251E+00						
Kr-85	1.0850E-01	3.315	6.629	0.00E+00	3.60E-01	7.19E-01	7.0000	3.599E-01						
Np-237	9.5561E-06	3.315	6.629	0.00E+00	3.17E-05	6.33E-05	11.0000	4.039E-02						
Pa-231	2.0359E-09	3.315	6.629	0.00E+00	6.75E-09	1.35E-08								
Pb-210	4.9728E-11	3.315	6.629	0.00E+00	1.65E-10	3.30E-10								
Pm-147	4.8502E-02	3.315	6.629	0.00E+00	1.61E-01	3.22E-01								
Pu-238	1.8254E-02	3.315	6.629	0.00E+00	6.05E-02	1.21E-01								
Pu-239	4.2810E-04	3.315	6.629	0.00E+00	1.42E-03	2.84E-03								
Pu-240	2.4368E-04	3.315	6.629	0.00E+00	8.08E-04	1.62E-03								
Pu-241	3.3415E-02	3.315	6.629	0.00E+00	1.11E-01	2.22E-01								
Pu-242	3.6329E-07	3.315	6.629	0.00E+00	1.20E-06	2.41E-06								
Ra-226	2.2854E-10	3.315	6.629	0.00E+00	7.58E-10	1.52E-09								
Ra-228	1.2426E-14	3.315	6.629	0.00E+00	4.12E-14	8.24E-14								
Ru-106	6.3589E-06	3.315	6.629	0.00E+00	2.11E-05	4.22E-05								
Se-79	1.2933E-05	3.315	6.629	0.00E+00	4.29E-05	8.57E-05								
Sn-126	1.1574E-05	3.315	6.629	0.00E+00	3.84E-05	7.67E-05								
Sr-90	1.9248E+00	3.315	6.629	0.00E+00	6.38E+00	1.28E+01								
Tc-99	4.2239E-04	3.315	6.629	0.00E+00	1.40E-03	2.80E-03								
Th-229	5.0953E-12	3.315	6.629	0.00E+00	1.69E-11	3.38E-11								
Th-230	4.1885E-08	3.315	6.629	0.00E+00	1.39E-07	2.78E-07								
Th-232	1.9270E-14	3.315	6.629	0.00E+00	6.39E-14	1.28E-13								
Tl-208	4.6024E-08	3.315	6.629	0.00E+00	1.53E-07	3.05E-07								
U-232	1.2582E-07	3.315	6.629	0.00E+00	4.17E-07	8.34E-07								
U-233	2.5825E-09	3.315	6.629	0.00E+00	8.56E-09	1.71E-08								
U-234	1.8450E-04	3.315	6.629	0.00E+00	6.12E-04	1.22E-03								
U-235	-2.7235E-06	3.315	0.000	9.59E-03	9.58E-03	9.59E-03								
U-236	1.5493E-05	3.315	6.629	0.00E+00	5.14E-05	1.03E-04								
U-238	-4.2851E-09	3.315	0.000	1.09E-04	1.09E-04	1.09E-04								
Y-90	1.9254E+00	3.315	6.629	0.00E+00	6.38E+00	1.28E+01								
Other Radionuclides					6.41E+00	1.28E+01								

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.93E-02	1.58E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding:	ALUM	ALUM
BOL HM Constituents:	U-ALX	U
BOL Enrichment %:	93.19000561	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:		3.315
Bounding:		6.629

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

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.00	
Bounding:	0.00	

Estimated EOL HM/ Given EOL HM
 1.00

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

²Total burnup for all fuel associated with this worksheet must be 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 (TAIWAN)
 SNF ID #: 555
 Fuel Units & Descr: 23 - ASSEMBLY
 Heavy Metal Mass: BOL=34.80kg ; EOL=34.80kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
³Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.96

Radionuclide	H. Estimates		Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n						Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	659.063	1,318.126	0.00E+00	4.37E-07	8.74E-07	Avg. MeV		
Am-241	2.0060E-03	659.063	1,318.126	0.00E+00	1.32E+00	2.64E+00	0.0150	1.391E+14	
Am-242m	4.2429E-07	659.063	1,318.126	0.00E+00	2.80E-04	5.59E-04	0.0250	2.893E+13	
Am-243	1.4899E-06	659.063	1,318.126	0.00E+00	9.82E-04	1.96E-03	0.0375	2.524E+13	
C-14	5.7135E-09	659.063	1,318.126	0.00E+00	3.77E-06	7.53E-06	0.0575	2.703E+13	
Cl-36	1.3124E-32	659.063	1,318.126	0.00E+00	8.65E-30	1.73E-29	0.0850	1.633E+13	
Cm-243	1.6443E-07	659.063	1,318.126	0.00E+00	1.08E-04	2.17E-04	0.1250	1.105E+13	
Cm-244	2.9330E-05	659.063	1,318.126	0.00E+00	1.93E-02	3.87E-02	0.2250	1.409E+13	
Co-60	5.3186E-06	659.063	1,318.126	0.00E+00	3.51E-03	7.01E-03	0.3750	6.135E+12	
Cs-134	3.1563E-03	659.063	1,318.126	0.00E+00	2.08E+00	4.16E+00	0.5750	1.001E+14	
Cs-135	3.4477E-06	659.063	1,318.126	0.00E+00	2.27E-03	4.54E-03	0.8500	1.692E+12	
Cs-137	2.0313E+00	659.063	1,318.126	0.00E+00	1.34E+03	2.68E+03	1.2500	9.661E+11	
Eu-154	2.4513E-02	659.063	1,318.126	0.00E+00	1.62E+01	3.23E+01	1.7500	4.435E+10	
Eu-155	4.8175E-03	659.063	1,318.126	0.00E+00	3.18E+00	6.35E+00	2.2500	3.891E+06	
Fe-55	1.2397E-04	659.063	1,318.126	0.00E+00	8.17E-02	1.63E-01	2.7500	2.199E+06	
H-3	4.5697E-03	659.063	1,318.126	0.00E+00	3.01E+00	6.02E+00	3.5000	1.015E+04	
I-129	7.5300E-07	659.063	1,318.126	0.00E+00	4.96E-04	9.93E-04	5.0000	5.926E+02	
Kr-85	1.0850E-01	659.063	1,318.126	0.00E+00	7.15E+01	1.43E+02	7.0000	6.553E+01	
Np-237	9.5561E-06	659.063	1,318.126	0.00E+00	6.30E-03	1.26E-02	11.0000	7.351E+00	
Pa-231	2.0359E-09	659.063	1,318.126	0.00E+00	1.34E-06	2.68E-06			
Pb-210	4.9728E-11	659.063	1,318.126	0.00E+00	3.28E-08	6.55E-08			
Pm-147	4.8502E-02	659.063	1,318.126	0.00E+00	3.20E+01	6.39E+01			
Pu-238	1.8254E-02	659.063	1,318.126	0.00E+00	1.20E+01	2.41E+01			
Pu-239	4.2810E-04	659.063	1,318.126	0.00E+00	2.82E-01	5.64E-01			
Pu-240	2.4368E-04	659.063	1,318.126	0.00E+00	1.61E-01	3.21E-01			
Pu-241	3.3415E-02	659.063	1,318.126	0.00E+00	2.20E+01	4.40E+01			
Pu-242	3.6329E-07	659.063	1,318.126	0.00E+00	2.39E-04	4.79E-04			
Ra-226	2.2854E-10	659.063	1,318.126	0.00E+00	1.51E-07	3.01E-07			
Ra-228	1.2426E-14	659.063	1,318.126	0.00E+00	8.19E-12	1.64E-11			
Ru-106	6.3589E-06	659.063	1,318.126	0.00E+00	4.19E-03	8.38E-03			
Se-79	1.2933E-05	659.063	1,318.126	0.00E+00	8.52E-03	1.70E-02			
Sn-126	1.1574E-05	659.063	1,318.126	0.00E+00	7.63E-03	1.53E-02			
Sr-90	1.9248E+00	659.063	1,318.126	0.00E+00	1.27E+03	2.54E+03			
Tc-99	4.2239E-04	659.063	1,318.126	0.00E+00	2.78E-01	5.57E-01			
Th-229	5.0953E-12	659.063	1,318.126	0.00E+00	3.36E-09	6.72E-09			
Th-230	4.1885E-08	659.063	1,318.126	0.00E+00	2.76E-05	5.52E-05			
Th-232	1.9270E-14	659.063	1,318.126	0.00E+00	1.27E-11	2.54E-11			
Tl-208	4.6024E-08	659.063	1,318.126	0.00E+00	3.03E-05	6.07E-05			
U-232	1.2582E-07	659.063	1,318.126	0.00E+00	8.29E-05	1.66E-04			
U-233	2.5825E-09	659.063	1,318.126	0.00E+00	1.70E-06	3.40E-06			
U-234	1.8450E-04	659.063	1,318.126	0.00E+00	1.22E-01	2.43E-01			
U-235	-2.7235E-06	659.063	0.000	1.49E-02	1.31E-02	1.49E-02			
U-236	1.5493E-05	659.063	1,318.126	0.00E+00	1.02E-02	2.04E-02			
U-238	-4.2851E-09	659.063	0.000	9.38E-03	9.37E-03	9.38E-03			
Y-90	1.9254E+00	659.063	1,318.126	0.00E+00	1.27E+03	2.54E+03			
Other Radionuclides					1.27E+03	2.55E+03			

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.57E+01	3.14E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding:	ALUM	ALUM
BOL HM Constituents:	U-ALX	U
BOL Enrichment %:	19.8300026	60 to 100

Basis for Parameter Differences:
 This Template was used for the following reasons:
 This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:		659.063
Bounding:		1,318.126

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

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

²Total burnup for all fuel associated with this worksheet must be 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 (VENEZUELA) ¹Fuel decay start date: 2010
 SNF ID #: 559 Estimates as of: 2030
 Fuel Units & Descr: 64 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=43.20kg ; EOL=39.05kg ²Template 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"
 2.67

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	6.6313E-10	3,933.540	7,867.080	0.00E+00	2.61E-06	5.22E-06	Avg. MeV	
Am-241	2.0060E-03	3,933.540	7,867.080	0.00E+00	7.89E+00	1.58E+01	0.0150	8.304E+14
Am-242m	4.2429E-07	3,933.540	7,867.080	0.00E+00	1.67E-03	3.34E-03	0.0250	1.727E+14
Am-243	1.4899E-06	3,933.540	7,867.080	0.00E+00	5.86E-03	1.17E-02	0.0375	1.506E+14
C-14	5.7135E-09	3,933.540	7,867.080	0.00E+00	2.25E-05	4.49E-05	0.0575	1.613E+14
Cf-252	1.3124E-32	3,933.540	7,867.080	0.00E+00	5.16E-29	1.03E-28	0.0850	9.749E+13
Cm-243	1.6443E-07	3,933.540	7,867.080	0.00E+00	6.47E-04	1.29E-03	0.1250	6.597E+13
Cm-244	2.9330E-05	3,933.540	7,867.080	0.00E+00	1.15E-01	2.31E-01	0.2250	8.412E+13
Co-60	5.3186E-06	3,933.540	7,867.080	0.00E+00	2.09E-02	4.18E-02	0.3750	3.661E+13
Cs-134	3.1563E-03	3,933.540	7,867.080	0.00E+00	1.24E+01	2.48E+01	0.5750	5.973E+14
Cs-135	3.4477E-06	3,933.540	7,867.080	0.00E+00	1.36E-02	2.71E-02	0.8500	1.010E+14
Cs-137	2.0313E+00	3,933.540	7,867.080	0.00E+00	7.99E+03	1.60E+04	1.2500	5.766E+12
Eu-154	2.4513E-02	3,933.540	7,867.080	0.00E+00	9.64E+01	1.93E+02	1.7500	2.647E+14
Eu-155	4.8175E-03	3,933.540	7,867.080	0.00E+00	1.89E+01	3.79E+01	2.2500	2.322E+07
Fe-55	1.2397E-04	3,933.540	7,867.080	0.00E+00	4.88E-01	9.75E-01	2.7500	1.312E+07
H-3	4.5697E-03	3,933.540	7,867.080	0.00E+00	1.80E+01	3.60E+01	3.5000	6.037E+04
I-129	7.5300E-07	3,933.540	7,867.080	0.00E+00	2.96E-03	5.92E-03	5.0000	3.434E+03
Kr-85	1.0850E-01	3,933.540	7,867.080	0.00E+00	4.27E+02	8.54E+02	7.0000	3.793E+02
Np-237	9.5561E-06	3,933.540	7,867.080	0.00E+00	3.76E-02	7.52E-02	11.0000	4.252E+01
Pa-231	2.0359E-09	3,933.540	7,867.080	0.00E+00	8.01E-06	1.60E-05		
Pb-210	4.9728E-11	3,933.540	7,867.080	0.00E+00	1.96E-07	3.91E-07		
Pm-147	4.8502E-02	3,933.540	7,867.080	0.00E+00	1.91E+02	3.82E+02		
Pu-238	1.8254E-02	3,933.540	7,867.080	0.00E+00	7.18E+01	1.44E+02		
Pu-239	4.2810E-04	3,933.540	7,867.080	0.00E+00	1.68E+00	3.37E+00		
Pu-240	2.4368E-04	3,933.540	7,867.080	0.00E+00	9.59E-01	1.92E+00		
Pu-241	3.3415E-02	3,933.540	7,867.080	0.00E+00	1.31E+02	2.63E+02		
Pu-242	3.6329E-07	3,933.540	7,867.080	0.00E+00	1.43E-03	2.86E-03		
Ra-226	2.2854E-10	3,933.540	7,867.080	0.00E+00	8.99E-07	1.80E-06		
Ra-228	1.2426E-14	3,933.540	7,867.080	0.00E+00	4.89E-11	9.78E-11		
Ru-106	6.3589E-06	3,933.540	7,867.080	0.00E+00	2.50E-02	5.00E-02		
Se-79	1.2933E-05	3,933.540	7,867.080	0.00E+00	5.09E-02	1.02E-01		
Sn-126	1.1574E-05	3,933.540	7,867.080	0.00E+00	4.55E-02	9.11E-02		
Sr-90	1.9248E+00	3,933.540	7,867.080	0.00E+00	7.57E+03	1.51E+04		
Tc-99	4.2239E-04	3,933.540	7,867.080	0.00E+00	1.66E+00	3.32E+00		
Th-229	5.0953E-12	3,933.540	7,867.080	0.00E+00	2.00E-08	4.01E-08		
Th-230	4.1885E-08	3,933.540	7,867.080	0.00E+00	1.65E-04	3.30E-04		
Th-232	1.9270E-14	3,933.540	7,867.080	0.00E+00	7.58E-11	1.52E-10		
Th-238	4.6024E-08	3,933.540	7,867.080	0.00E+00	1.81E-04	3.62E-04		
U-232	1.2582E-07	3,933.540	7,867.080	0.00E+00	4.95E-04	9.90E-04		
U-233	2.5825E-09	3,933.540	7,867.080	0.00E+00	1.02E-05	2.03E-05		
U-234	1.8450E-04	3,933.540	7,867.080	0.00E+00	7.26E-01	1.45E+00		
U-235	-2.7235E-06	3,933.540	0.000	1.87E-02	7.96E-03	1.87E-02		
U-236	1.5493E-05	3,933.540	7,867.080	0.00E+00	6.09E-02	1.22E-01		
U-238	-4.2851E-09	3,933.540	0.000	1.16E-02	1.16E-02	1.16E-02		
Y-90	1.9254E+00	3,933.540	7,867.080	0.00E+00	7.57E+03	1.51E+04		
Other Radionuclides					7.61E+03	1.52E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	20	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD:	Estimated: 3,933.540	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		7,867.080	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM 1.01
Nominal:	0.29		
Bounding:	0.58		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (ARGENTINA) ¹Fuel decay start date: 2010
 SNF ID #: 635 Estimates as of: 2030
 Fuel Units & Desc.: 14 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=2.40kg ; EOL=1.75kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.58

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	612.532	1,225.064	0.00E+00	4.06E-07	8.12E-07		
Am-241	2.0060E-03	612.532	1,225.064	0.00E+00	1.23E+00	2.46E+00	0.0150	1.293E+14
Am-242m	4.2429E-07	612.532	1,225.064	0.00E+00	2.60E-04	5.20E-04	0.0250	2.689E+13
Am-243	1.4899E-06	612.532	1,225.064	0.00E+00	9.13E-04	1.83E-03	0.0375	2.346E+13
C-14	5.7135E-09	612.532	1,225.064	0.00E+00	3.50E-06	7.00E-06	0.0575	2.512E+13
Cl-36	1.3124E-32	612.532	1,225.064	0.00E+00	8.04E-30	1.61E-29	0.0850	1.518E+13
Cm-243	1.6443E-07	612.532	1,225.064	0.00E+00	1.01E-04	2.01E-04	0.1250	1.027E+13
Cm-244	2.9330E-05	612.532	1,225.064	0.00E+00	1.80E-02	3.59E-02	0.2250	1.310E+13
Co-60	5.3186E-06	612.532	1,225.064	0.00E+00	3.26E-03	6.52E-03	0.3750	5.702E+12
Cs-134	3.1563E-03	612.532	1,225.064	0.00E+00	1.93E+00	3.87E+00	0.5750	9.301E+13
Cs-135	3.4477E-06	612.532	1,225.064	0.00E+00	2.11E-03	4.22E-03	0.8500	1.572E+12
Cs-137	2.0313E-00	612.532	1,225.064	0.00E+00	1.24E+03	2.49E+03	1.2500	8.979E+11
Eu-154	2.4513E-02	612.532	1,225.064	0.00E+00	1.50E+01	3.00E+01	1.7500	4.122E+10
Eu-155	4.8175E-03	612.532	1,225.064	0.00E+00	2.95E+00	5.90E+00	2.2500	3.616E+06
Fe-55	1.2397E-04	612.532	1,225.064	0.00E+00	7.59E-02	1.52E-01	2.7500	2.044E+06
H-3	4.5697E-03	612.532	1,225.064	0.00E+00	2.80E+00	5.60E+00	3.5000	9.391E+03
I-129	7.5300E-07	612.532	1,225.064	0.00E+00	4.61E-04	9.22E-04	5.0000	5.308E+02
Kr-85	1.0850E-01	612.532	1,225.064	0.00E+00	6.65E+01	1.33E+02	7.0000	5.861E+01
Np-237	9.5561E-06	612.532	1,225.064	0.00E+00	5.85E-03	1.17E-02	11.0000	6.569E+00
Pa-231	2.0359E-09	612.532	1,225.064	0.00E+00	1.25E-06	2.49E-06		
Pb-210	4.9728E-11	612.532	1,225.064	0.00E+00	3.05E-08	6.09E-08		
Pm-147	4.8502E-02	612.532	1,225.064	0.00E+00	2.97E+01	5.94E+01		
Pu-238	1.8254E-02	612.532	1,225.064	0.00E+00	1.12E+01	2.24E+01		
Pu-239	4.2810E-04	612.532	1,225.064	0.00E+00	2.62E-01	5.24E-01		
Pu-240	2.4368E-04	612.532	1,225.064	0.00E+00	1.49E-01	2.99E-01		
Pu-241	3.3415E-02	612.532	1,225.064	0.00E+00	2.05E+01	4.09E+01		
Pu-242	3.6329E-07	612.532	1,225.064	0.00E+00	2.23E-04	4.45E-04		
Ra-226	2.2854E-10	612.532	1,225.064	0.00E+00	1.40E-07	2.80E-07		
Ra-228	1.2426E-14	612.532	1,225.064	0.00E+00	7.61E-12	1.52E-11		
Ru-106	6.3589E-06	612.532	1,225.064	0.00E+00	3.90E-03	7.79E-03		
Se-79	1.2933E-05	612.532	1,225.064	0.00E+00	7.92E-03	1.58E-02		
Sn-126	1.1574E-05	612.532	1,225.064	0.00E+00	7.09E-03	1.42E-02		
Sr-90	1.9248E+00	612.532	1,225.064	0.00E+00	1.18E+03	2.36E+03		
Tc-99	4.2239E-04	612.532	1,225.064	0.00E+00	2.59E-01	5.17E-01		
Th-229	5.0953E-12	612.532	1,225.064	0.00E+00	3.12E-09	6.24E-09		
Th-230	4.1885E-08	612.532	1,225.064	0.00E+00	2.57E-05	5.13E-05		
Th-232	1.9270E-14	612.532	1,225.064	0.00E+00	1.18E-11	2.36E-11		
Tl-208	4.6024E-08	612.532	1,225.064	0.00E+00	2.82E-05	5.64E-05		
U-232	1.2582E-07	612.532	1,225.064	0.00E+00	7.71E-05	1.54E-04		
U-233	2.5825E-09	612.532	1,225.064	0.00E+00	1.58E-06	3.16E-06		
U-234	1.8450E-04	612.532	1,225.064	0.00E+00	1.13E-01	2.26E-01		
U-235	-2.7235E-06	612.532	0.000	4.66E-03	2.99E-03	4.66E-03		
U-236	1.5493E-05	612.532	1,225.064	0.00E+00	9.49E-03	1.90E-02		
U-238	-4.2851E-09	612.532	0.000	8.05E-05	7.79E-05	8.05E-05		
Y-90	1.9254E+00	612.532	1,225.064	0.00E+00	1.18E+03	2.36E+03		
Other Radionuclides					1.18E+03	2.37E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	90.00000174	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nomina:		612.532	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		1,225.064	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nomina:	0.81		1.02
Bounding:	1.63		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (CANADA) 1Fuel decay start date: 2010
 SNF ID #: 512 Estimates as of: 2030
 Fuel Units & Descr: 8 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=6.52kg ; EOL=5.87kg 2Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.33

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	617.456	1,234.913	0.00E+00	4.09E-07	8.19E-07	0.0150	1.304E+14
Am-241	2.0060E-03	617.456	1,234.913	0.00E+00	1.24E+00	2.48E+00	0.0250	2.711E+13
Am-242m	4.2429E-07	617.456	1,234.913	0.00E+00	2.62E-04	5.24E-04	0.0375	2.364E+13
Am-243	1.4899E-06	617.456	1,234.913	0.00E+00	9.20E-04	1.84E-03	0.0575	2.532E+13
C-14	5.7135E-09	617.456	1,234.913	0.00E+00	3.53E-06	7.06E-06	0.0850	1.530E+13
Cl-36	1.3124E-32	617.456	1,234.913	0.00E+00	8.10E-30	1.62E-29	0.1250	1.035E+13
Cm-243	1.6443E-07	617.456	1,234.913	0.00E+00	1.02E-04	2.03E-04	0.2250	1.320E+13
Cm-244	2.9330E-05	617.456	1,234.913	0.00E+00	1.81E-02	3.62E-02	0.3750	5.747E+12
Co-60	5.3186E-06	617.456	1,234.913	0.00E+00	3.28E-03	6.57E-03	0.5750	9.376E+13
Cs-134	3.1563E-03	617.456	1,234.913	0.00E+00	1.95E+00	3.90E+00	0.8500	1.585E+12
Cs-135	3.4477E-06	617.456	1,234.913	0.00E+00	2.13E-03	4.26E-03	1.2500	9.051E+11
Cs-137	2.0313E+00	617.456	1,234.913	0.00E+00	1.25E+03	2.51E+03	1.7500	4.155E+10
Eu-154	2.4513E-02	617.456	1,234.913	0.00E+00	1.51E+01	3.03E+01	2.2500	3.645E+06
Eu-155	4.8175E-03	617.456	1,234.913	0.00E+00	2.97E+00	5.95E+00	2.7500	2.060E+06
Fe-55	1.2397E-04	617.456	1,234.913	0.00E+00	7.65E-02	1.53E-01	3.5000	9.475E+03
H-3	4.5697E-03	617.456	1,234.913	0.00E+00	2.82E+00	5.64E+00	5.0000	5.389E+02
I-129	7.5300E-07	617.456	1,234.913	0.00E+00	4.65E-04	9.30E-04	7.0000	5.952E+01
Kr-85	1.0850E-01	617.456	1,234.913	0.00E+00	6.70E+01	1.34E+02	11.0000	6.672E+00
Np-237	9.5561E-06	617.456	1,234.913	0.00E+00	5.90E-03	1.18E-02		
Pa-231	2.0359E-09	617.456	1,234.913	0.00E+00	1.26E-06	2.51E-06		
Pb-210	4.9728E-11	617.456	1,234.913	0.00E+00	3.07E-08	6.14E-08		
Pm-147	4.8502E-02	617.456	1,234.913	0.00E+00	2.99E+01	5.99E+01		
Pu-238	1.8254E-02	617.456	1,234.913	0.00E+00	1.13E+01	2.25E+01		
Pu-239	4.2810E-04	617.456	1,234.913	0.00E+00	2.64E-01	5.29E-01		
Pu-240	2.4368E-04	617.456	1,234.913	0.00E+00	1.50E-01	3.01E-01		
Pu-241	3.3415E-02	617.456	1,234.913	0.00E+00	2.06E+01	4.13E+01		
Pu-242	3.6329E-07	617.456	1,234.913	0.00E+00	2.24E-04	4.49E-04		
Ra-226	2.2854E-10	617.456	1,234.913	0.00E+00	1.41E-07	2.82E-07		
Ra-228	1.2426E-14	617.456	1,234.913	0.00E+00	7.67E-12	1.53E-11		
Ru-106	6.3589E-06	617.456	1,234.913	0.00E+00	3.93E-03	7.85E-03		
Se-79	1.2933E-05	617.456	1,234.913	0.00E+00	7.99E-03	1.60E-02		
Sn-126	1.1574E-05	617.456	1,234.913	0.00E+00	7.15E-03	1.43E-02		
Sr-90	1.9248E+00	617.456	1,234.913	0.00E+00	1.19E+03	2.38E+03		
Tc-99	4.2239E-04	617.456	1,234.913	0.00E+00	2.61E-01	5.22E-01		
Th-229	5.0953E-12	617.456	1,234.913	0.00E+00	3.15E-09	6.29E-09		
Th-230	4.1885E-08	617.456	1,234.913	0.00E+00	2.59E-05	5.17E-05		
Th-232	1.9270E-14	617.456	1,234.913	0.00E+00	1.19E-11	2.38E-11		
Th-238	4.6024E-08	617.456	1,234.913	0.00E+00	2.84E-05	5.68E-05		
U-232	1.2582E-07	617.456	1,234.913	0.00E+00	7.77E-05	1.55E-04		
U-233	2.5825E-09	617.456	1,234.913	0.00E+00	1.59E-06	3.19E-06		
U-234	1.8450E-04	617.456	1,234.913	0.00E+00	1.14E-01	2.28E-01		
U-235	-2.7235E-06	617.456	0.000	2.82E-03	1.14E-03	2.82E-03		
U-236	1.5493E-05	617.456	1,234.913	0.00E+00	9.57E-03	1.91E-02		
U-238	-4.2851E-09	617.456	0.000	1.75E-03	1.75E-03	1.75E-03		
Y-90	1.9254E+00	617.456	1,234.913	0.00E+00	1.19E+03	2.38E+03		
Other Radionuclides					1.19E+03	2.39E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.47E+01	2.94E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20.00000037	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 617.456	Estimated: 617.456	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,234.913	

Checks		
Nominal:	Burnup Multiplier: 0.30	Estimated Burnup/ Given Burnup: 1.01
Bounding:	0.60	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (CANADA) ¹Fuel decay start date: 2010
 SNF ID #: 612 Estimates as of: 2030
 Fuel Units & Descr: 23 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=2.72kg ; EOL=1.76kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.96

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	910.464	1,820.929	0.00E+00	6.04E-07	1.21E-06	0.0150	1.922E+14
Am-241	2.0060E-03	910.464	1,820.929	0.00E+00	1.83E+00	3.65E+00	0.0250	3.997E+13
Am-242m	4.2429E-07	910.464	1,820.929	0.00E+00	3.86E-04	7.73E-04	0.0375	3.486E+13
Am-243	1.4899E-06	910.464	1,820.929	0.00E+00	1.36E-03	2.71E-03	0.0575	3.734E+13
C-14	5.7135E-09	910.464	1,820.929	0.00E+00	5.20E-06	1.04E-05	0.0850	2.256E+13
Cl-36	1.3124E-32	910.464	1,820.929	0.00E+00	1.19E-29	2.39E-29	0.1250	1.527E+13
Cm-243	1.6443E-07	910.464	1,820.929	0.00E+00	1.50E-04	2.99E-04	0.2250	1.947E+13
Cm-244	2.9330E-05	910.464	1,820.929	0.00E+00	2.67E-02	5.34E-02	0.3750	8.475E+12
Co-60	5.3186E-06	910.464	1,820.929	0.00E+00	4.84E-03	9.68E-03	0.5750	1.382E+14
Cs-134	3.1563E-03	910.464	1,820.929	0.00E+00	2.87E+00	5.75E+00	0.8500	2.337E+12
Cs-135	3.4477E-06	910.464	1,820.929	0.00E+00	3.14E-03	6.28E-03	1.2500	1.335E+12
Cs-137	2.0313E+00	910.464	1,820.929	0.00E+00	1.85E+03	3.70E+03	1.7500	6.127E+10
Eu-154	2.4513E-02	910.464	1,820.929	0.00E+00	2.23E+01	4.46E+01	2.2500	5.375E+06
Eu-155	4.8175E-03	910.464	1,820.929	0.00E+00	4.39E+00	8.77E+00	2.7500	3.038E+06
Fe-55	1.2397E-04	910.464	1,820.929	0.00E+00	1.13E-01	2.26E-01	3.5000	1.396E+04
H-3	4.5697E-03	910.464	1,820.929	0.00E+00	4.16E+00	8.32E+00	5.0000	7.889E+02
I-129	7.5300E-07	910.464	1,820.929	0.00E+00	6.86E-04	1.37E-03	7.0000	8.710E+01
Kr-85	1.0850E-01	910.464	1,820.929	0.00E+00	9.88E+01	1.98E+02	11.0000	9.762E+00
Np-237	9.5561E-06	910.464	1,820.929	0.00E+00	8.70E-03	1.74E-02		
Pa-231	2.0359E-09	910.464	1,820.929	0.00E+00	1.85E-06	3.71E-06		
Pb-210	4.9728E-11	910.464	1,820.929	0.00E+00	4.53E-08	9.06E-08		
Pm-147	4.8502E-02	910.464	1,820.929	0.00E+00	4.42E+01	8.83E+01		
Pu-238	1.8254E-02	910.464	1,820.929	0.00E+00	1.66E+01	3.32E+01		
Pu-239	4.2810E-04	910.464	1,820.929	0.00E+00	3.90E-01	7.80E-01		
Pu-240	2.4368E-04	910.464	1,820.929	0.00E+00	2.22E-01	4.44E-01		
Pu-241	3.3415E-02	910.464	1,820.929	0.00E+00	3.04E+01	6.08E+01		
Pu-242	3.6329E-07	910.464	1,820.929	0.00E+00	3.31E-04	6.62E-04		
Ra-226	2.2854E-10	910.464	1,820.929	0.00E+00	2.08E-07	4.16E-07		
Ra-228	1.2426E-14	910.464	1,820.929	0.00E+00	1.13E-11	2.26E-11		
Ru-106	6.3589E-06	910.464	1,820.929	0.00E+00	5.79E-03	1.16E-02		
Se-79	1.2933E-05	910.464	1,820.929	0.00E+00	1.18E-02	2.36E-02		
Sn-126	1.1574E-05	910.464	1,820.929	0.00E+00	1.05E-02	2.11E-02		
Sr-90	1.9248E+00	910.464	1,820.929	0.00E+00	1.75E+03	3.50E+03		
Tc-99	4.2239E-04	910.464	1,820.929	0.00E+00	3.85E-01	7.69E-01		
Th-229	5.0953E-12	910.464	1,820.929	0.00E+00	4.64E-09	9.28E-09		
Th-230	4.1885E-08	910.464	1,820.929	0.00E+00	3.81E-05	7.63E-05		
Th-232	1.9270E-14	910.464	1,820.929	0.00E+00	1.75E-11	3.51E-11		
Tl-208	4.6024E-08	910.464	1,820.929	0.00E+00	4.19E-05	8.38E-05		
U-232	1.2582E-07	910.464	1,820.929	0.00E+00	1.15E-04	2.29E-04		
U-233	2.5825E-09	910.464	1,820.929	0.00E+00	2.35E-06	4.70E-06		
U-234	1.8450E-04	910.464	1,820.929	0.00E+00	1.68E-01	3.36E-01		
U-235	-2.7235E-06	910.464	0.000	5.47E-03	2.99E-03	5.47E-03		
U-236	1.5493E-05	910.464	1,820.929	0.00E+00	1.41E-02	2.82E-02		
U-238	-4.2851E-09	910.464	0.000	6.40E-05	6.01E-05	6.40E-05		
Y-90	1.9254E+00	910.464	1,820.929	0.00E+00	1.75E+03	3.51E+03		
Other Radionuclides					1.76E+03	3.52E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.17E+01	4.34E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.99997633	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		910.464	
Bounding:		1,820.929	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	1.06		
Bounding:	2.13		

Estimated EOL HM/Given EOL HM: 1.03

¹ Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (GERMANY) ¹Fuel decay start date: 2010
 SNF ID #: 579 Estimates as of: 2030
 Fuel Units & Descr: 33 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=3.34kg ; EOL=2.06kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.38

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	6.6313E-10	1,206.313	2,412.627	0.00E+00	8.00E-07	1.60E-06	Avg. MeV	
Am-241	2.0060E-03	1,206.313	2,412.627	0.00E+00	2.42E+00	4.84E+00	0.0150	2.547E+14
Am-242m	4.2429E-07	1,206.313	2,412.627	0.00E+00	5.12E-04	1.02E-03	0.0250	5.296E+13
Am-243	1.4899E-06	1,206.313	2,412.627	0.00E+00	1.80E-03	3.59E-03	0.0375	4.619E+13
C-14	5.7135E-09	1,206.313	2,412.627	0.00E+00	6.89E-06	1.38E-05	0.0575	4.947E+13
Cl-36	1.3124E-32	1,206.313	2,412.627	0.00E+00	1.58E-29	3.17E-29	0.0850	2.990E+13
Cm-243	1.6443E-07	1,206.313	2,412.627	0.00E+00	1.98E-04	3.97E-04	0.1250	2.023E+13
Cm-244	2.9330E-05	1,206.313	2,412.627	0.00E+00	3.54E-02	7.08E-02	0.2250	2.580E+13
Co-60	5.3186E-06	1,206.313	2,412.627	0.00E+00	6.42E-03	1.28E-02	0.3750	1.123E+13
Cs-134	3.1563E-03	1,206.313	2,412.627	0.00E+00	3.81E+00	7.62E+00	0.5750	1.832E+14
Cs-135	3.4477E-06	1,206.313	2,412.627	0.00E+00	4.16E-03	8.32E-03	0.8500	3.097E+12
Cs-137	2.0313E-06	1,206.313	2,412.627	0.00E+00	2.45E+03	4.90E+03	1.2500	1.768E+12
Eu-154	2.4513E-02	1,206.313	2,412.627	0.00E+00	2.96E+01	5.91E+01	1.7500	8.117E+10
Eu-155	4.8175E-03	1,206.313	2,412.627	0.00E+00	5.81E+00	1.16E+01	2.2500	7.121E+06
Fe-55	1.2397E-04	1,206.313	2,412.627	0.00E+00	1.50E-01	2.99E-01	2.7500	4.025E+06
H-3	4.5697E-03	1,206.313	2,412.627	0.00E+00	5.51E+00	1.10E+01	3.5000	1.849E+04
I-129	7.5300E-07	1,206.313	2,412.627	0.00E+00	9.08E-04	1.82E-03	5.0000	1.045E+03
Kr-85	1.0850E-01	1,206.313	2,412.627	0.00E+00	1.31E+02	2.62E+02	7.0000	1.154E+02
Np-237	9.5561E-06	1,206.313	2,412.627	0.00E+00	1.15E-02	2.31E-02	11.0000	1.293E+01
Pa-231	2.0359E-09	1,206.313	2,412.627	0.00E+00	2.46E-06	4.91E-06		
Pb-210	4.9728E-11	1,206.313	2,412.627	0.00E+00	6.00E-08	1.20E-07		
Pm-147	4.8502E-02	1,206.313	2,412.627	0.00E+00	5.85E+01	1.17E+02		
Pu-238	1.8254E-02	1,206.313	2,412.627	0.00E+00	2.20E+01	4.40E+01		
Pu-239	4.2810E-04	1,206.313	2,412.627	0.00E+00	5.16E-01	1.03E+00		
Pu-240	2.4368E-04	1,206.313	2,412.627	0.00E+00	2.94E-01	5.88E-01		
Pu-241	3.3415E-02	1,206.313	2,412.627	0.00E+00	4.03E+01	8.06E+01		
Pu-242	3.6329E-07	1,206.313	2,412.627	0.00E+00	4.38E-04	8.76E-04		
Ra-226	2.2854E-10	1,206.313	2,412.627	0.00E+00	2.76E-07	5.51E-07		
Ra-228	1.2426E-14	1,206.313	2,412.627	0.00E+00	1.50E-11	3.00E-11		
Ru-106	6.3589E-06	1,206.313	2,412.627	0.00E+00	7.67E-03	1.53E-02		
Se-79	1.2933E-05	1,206.313	2,412.627	0.00E+00	1.56E-02	3.12E-02		
Sn-126	1.1574E-05	1,206.313	2,412.627	0.00E+00	1.40E-02	2.79E-02		
Sr-90	1.9248E+00	1,206.313	2,412.627	0.00E+00	2.32E+03	4.64E+03		
Tc-99	4.2239E-04	1,206.313	2,412.627	0.00E+00	5.10E-01	1.02E+00		
Th-229	5.0953E-12	1,206.313	2,412.627	0.00E+00	6.15E-09	1.23E-08		
Th-230	4.1885E-08	1,206.313	2,412.627	0.00E+00	5.05E-05	1.01E-04		
Th-232	1.9270E-14	1,206.313	2,412.627	0.00E+00	2.32E-11	4.65E-11		
Tl-208	4.6024E-08	1,206.313	2,412.627	0.00E+00	5.55E-05	1.11E-04		
U-232	1.2582E-07	1,206.313	2,412.627	0.00E+00	1.52E-04	3.04E-04		
U-233	2.5825E-09	1,206.313	2,412.627	0.00E+00	3.12E-06	6.23E-06		
U-234	1.8450E-04	1,206.313	2,412.627	0.00E+00	2.23E-01	4.45E-01		
U-235	-2.7235E-06	1,206.313	0.000	6.71E-03	3.42E-03	6.71E-03		
U-236	1.5493E-05	1,206.313	2,412.627	0.00E+00	1.87E-02	3.74E-02		
U-238	-4.2851E-09	1,206.313	0.000	7.85E-05	7.33E-05	7.85E-05		
Y-90	1.9254E+00	1,206.313	2,412.627	0.00E+00	2.32E+03	4.65E+03		
Other Radionuclides					2.33E+03	4.67E+03		

Thermal Power
 Nominal Heat Output (Watts) 2.88E+01
 Bounding Heat Output (Watts) 5.75E+01
 Total Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.99997131	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,206.313	
Bounding:		2,412.627	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	1.15		
Bounding:	2.30		

Estimated EOL HM/Given EOL HM: 1.04

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (GERMANY) ¹Fuel decay start date: 2010
 SNF ID #: 517 Estimates as of: 2030
 Fuel Units & Descr: 26 - ASSEMBLY Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=30.94kg ; EOL=26.11kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: SPS Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.08

Radionuclide	II. Estimates		x _b	b	y _n	y _b	Gamma Sources	
	m	x _n					Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.4556E-09	4,606.125	9,212.251	0.00E+00	1.13E-05	2.26E-05	0.0150	9.454E+14
Am-241	3.8752E-03	4,606.125	9,212.251	0.00E+00	1.78E+01	3.57E+01	0.0250	1.952E+14
Am-242m	1.8617E-06	4,606.125	9,212.251	0.00E+00	8.58E-03	1.72E-02	0.0375	2.043E+14
Am-243	2.3293E-07	4,606.125	9,212.251	0.00E+00	1.07E-03	2.15E-03	0.0575	1.889E+14
C-14	4.3233E-05	4,606.125	9,212.251	0.00E+00	1.99E-01	3.98E-01	0.0850	1.150E+14
Cl-36	4.3023E-08	4,606.125	9,212.251	0.00E+00	1.98E-04	3.96E-04	0.1250	1.291E+14
Cm-243	1.9053E-07	4,606.125	9,212.251	0.00E+00	8.78E-04	1.76E-03	0.2250	1.042E+14
Cm-244	1.7744E-06	4,606.125	9,212.251	0.00E+00	8.17E-03	1.63E-02	0.3750	4.281E+13
Co-60	4.3188E-03	4,606.125	9,212.251	0.00E+00	1.99E+01	3.98E+01	0.5750	6.821E+14
Cs-134	6.7188E-04	4,606.125	9,212.251	0.00E+00	3.09E+00	6.19E+00	0.8500	7.257E+13
Cs-135	3.1549E-05	4,606.125	9,212.251	0.00E+00	1.45E-01	2.91E-01	1.2500	7.819E+13
Cs-137	1.9489E+00	4,606.125	9,212.251	0.00E+00	8.98E+03	1.80E+04	1.7500	2.342E+12
Eu-154	4.0301E-01	4,606.125	9,212.251	0.00E+00	1.86E+03	3.71E+03	2.2500	3.719E+07
Eu-155	5.4000E-02	4,606.125	9,212.251	0.00E+00	2.49E+02	4.97E+02	2.7500	6.178E+06
Fe-55	1.5955E-04	4,606.125	9,212.251	0.00E+00	7.35E-01	1.47E+00	3.5000	4.232E+04
H-3	4.6571E-03	4,606.125	9,212.251	0.00E+00	2.15E+01	4.29E+01	5.0000	5.196E+03
I-129	7.3805E-07	4,606.125	9,212.251	0.00E+00	3.40E-03	6.80E-03	7.0000	5.865E+02
Kr-85	9.5684E-02	4,606.125	9,212.251	0.00E+00	4.41E+02	8.81E+02	11.0000	6.671E+01
Np-237	1.4618E-06	4,606.125	9,212.251	0.00E+00	6.73E-03	1.35E-02		
Pa-231	6.4782E-09	4,606.125	9,212.251	0.00E+00	2.98E-05	5.97E-05		
Pb-210	6.3158E-14	4,606.125	9,212.251	0.00E+00	2.91E-10	5.82E-10		
Pm-147	3.9564E-02	4,606.125	9,212.251	0.00E+00	1.82E+02	3.64E+02		
Pu-238	1.2008E-03	4,606.125	9,212.251	0.00E+00	5.53E+00	1.11E+01		
Pu-239	5.6917E-03	4,606.125	9,212.251	0.00E+00	2.62E+01	5.24E+01		
Pu-240	2.2617E-03	4,606.125	9,212.251	0.00E+00	1.04E+01	2.08E+01		
Pu-241	6.1113E-02	4,606.125	9,212.251	0.00E+00	2.81E+02	5.63E+02		
Pu-242	3.0602E-07	4,606.125	9,212.251	0.00E+00	1.41E-03	2.82E-03		
Ra-226	2.6707E-13	4,606.125	9,212.251	0.00E+00	1.23E-09	2.46E-09		
Ra-228	2.2556E-10	4,606.125	9,212.251	0.00E+00	1.04E-06	2.08E-06		
Ru-106	3.1293E-06	4,606.125	9,212.251	0.00E+00	1.44E-02	2.88E-02		
Se-79	1.2935E-05	4,606.125	9,212.251	0.00E+00	5.96E-02	1.19E-01		
Sn-126	1.2238E-05	4,606.125	9,212.251	0.00E+00	5.64E-02	1.13E-01		
Sr-90	1.8195E+00	4,606.125	9,212.251	0.00E+00	8.38E+03	1.68E+04		
Tc-99	4.4120E-04	4,606.125	9,212.251	0.00E+00	2.03E+00	4.06E+00		
Th-229	3.3308E-10	4,606.125	9,212.251	0.00E+00	1.53E-06	3.07E-06		
Th-230	4.6526E-11	4,606.125	9,212.251	0.00E+00	2.14E-07	4.29E-07		
Th-232	2.3744E-10	4,606.125	9,212.251	0.00E+00	1.09E-06	2.19E-06		
Th-208	1.8195E-08	4,606.125	9,212.251	0.00E+00	8.38E-05	1.68E-04		
U-232	4.9098E-08	4,606.125	9,212.251	0.00E+00	2.26E-04	4.52E-04		
U-233	1.3140E-07	4,606.125	9,212.251	0.00E+00	6.05E-04	1.21E-03		
U-234	2.2571E-07	4,606.125	9,212.251	0.00E+00	1.04E-03	2.08E-03		
U-235	2.6159E-06	4,606.125	0.000	1.34E-02	1.32E-03	1.34E-02		
U-236	1.2719E-05	4,606.125	9,212.251	0.00E+00	5.86E-02	1.17E-01		
U-238	3.8857E-08	4,606.125	0.000	8.32E-03	8.14E-03	8.32E-03		
Y-90	1.8211E+00	4,606.125	9,212.251	0.00E+00	8.39E+03	1.68E+04		
Other Radionuclides					9.65E+03	1.93E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.20E+02	2.39E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.999995	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		4,606.125	
Bounding:		9,212.251	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	4.03		
Bounding:	8.06		

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (GREECE)
 SNF ID #: 531
 Fuel Units & Descr: 18 - ASSEMBLY
 Heavy Metal Mass: BOL=11.07kg ; EOL=10.29kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.75

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	734.698	1,469.397	0.00E+00	4.87E-07	9.74E-07	0.0150	1.551E+14
Am-241	2.0060E-03	734.698	1,469.397	0.00E+00	1.47E+00	2.95E+00	0.0250	3.225E+13
Am-242m	4.2429E-07	734.698	1,469.397	0.00E+00	3.12E-04	6.23E-04	0.0375	2.813E+13
Am-243	1.4899E-06	734.698	1,469.397	0.00E+00	1.09E-03	2.19E-03	0.0575	3.013E+13
C-14	5.7135E-09	734.698	1,469.397	0.00E+00	4.20E-06	8.40E-06	0.0850	1.821E+13
Cl-36	1.3124E-32	734.698	1,469.397	0.00E+00	9.64E-30	1.93E-29	0.1250	1.232E+13
Cm-243	1.6443E-07	734.698	1,469.397	0.00E+00	1.21E-04	2.42E-04	0.2250	1.571E+13
Cm-244	2.9330E-05	734.698	1,469.397	0.00E+00	2.15E-02	4.31E-02	0.3750	6.839E+12
Co-60	5.3186E-06	734.698	1,469.397	0.00E+00	3.91E-03	7.82E-03	0.5750	1.116E+14
Cs-134	3.1563E-03	734.698	1,469.397	0.00E+00	2.32E+00	4.64E+00	0.8500	1.886E+12
Cs-135	3.4477E-06	734.698	1,469.397	0.00E+00	2.53E-03	5.07E-03	1.2500	1.077E+12
Cs-137	2.0313E+00	734.698	1,469.397	0.00E+00	1.49E+03	2.98E+03	1.7500	4.944E+10
Eu-154	2.4513E-02	734.698	1,469.397	0.00E+00	1.80E+01	3.60E+01	2.2500	4.337E+06
Eu-155	4.8175E-03	734.698	1,469.397	0.00E+00	3.54E+00	7.08E+00	2.7500	2.451E+06
Fe-55	1.2397E-04	734.698	1,469.397	0.00E+00	9.11E-02	1.82E-01	3.5000	1.128E+04
H-3	4.5697E-03	734.698	1,469.397	0.00E+00	3.36E+00	6.71E+00	5.0000	6.433E+02
I-129	7.5300E-07	734.698	1,469.397	0.00E+00	5.53E-04	1.11E-03	7.0000	7.106E+01
Kr-85	1.0850E-01	734.698	1,469.397	0.00E+00	7.97E+01	1.59E+02	11.0000	7.966E+00
Np-237	9.5561E-06	734.698	1,469.397	0.00E+00	7.02E-03	1.40E-02		
Pa-231	2.0359E-09	734.698	1,469.397	0.00E+00	1.50E-06	2.99E-06		
Pb-210	4.9728E-11	734.698	1,469.397	0.00E+00	3.65E-08	7.31E-08		
Pm-147	4.8502E-02	734.698	1,469.397	0.00E+00	3.56E+01	7.13E+01		
Pu-238	1.8254E-02	734.698	1,469.397	0.00E+00	1.34E+01	2.68E+01		
Pu-239	4.2810E-04	734.698	1,469.397	0.00E+00	3.15E-01	6.29E-01		
Pu-240	2.4368E-04	734.698	1,469.397	0.00E+00	1.79E-01	3.58E-01		
Pu-241	3.3415E-02	734.698	1,469.397	0.00E+00	2.45E+01	4.91E+01		
Pu-242	3.6329E-07	734.698	1,469.397	0.00E+00	2.67E-04	5.34E-04		
Ra-226	2.2854E-10	734.698	1,469.397	0.00E+00	1.68E-07	3.36E-07		
Ra-228	1.2426E-14	734.698	1,469.397	0.00E+00	9.13E-12	1.83E-11		
Ru-106	6.3589E-06	734.698	1,469.397	0.00E+00	4.67E-03	9.34E-03		
Se-79	1.2933E-05	734.698	1,469.397	0.00E+00	9.50E-03	1.90E-02		
Sn-126	1.1574E-05	734.698	1,469.397	0.00E+00	8.50E-03	1.70E-02		
Sr-90	1.9248E+00	734.698	1,469.397	0.00E+00	1.41E+03	2.83E+03		
Tc-99	4.2239E-04	734.698	1,469.397	0.00E+00	3.10E-01	6.21E-01		
Th-229	5.0953E-12	734.698	1,469.397	0.00E+00	3.74E-09	7.49E-09		
Th-230	4.1885E-08	734.698	1,469.397	0.00E+00	3.08E-05	6.15E-05		
Th-232	1.9270E-14	734.698	1,469.397	0.00E+00	1.42E-11	2.83E-11		
Th-208	4.6024E-08	734.698	1,469.397	0.00E+00	3.38E-05	6.76E-05		
U-232	1.2582E-07	734.698	1,469.397	0.00E+00	9.24E-05	1.85E-04		
U-233	2.5825E-09	734.698	1,469.397	0.00E+00	1.90E-06	3.79E-06		
U-234	1.8450E-04	734.698	1,469.397	0.00E+00	1.36E-01	2.71E-01		
U-235	-2.7235E-06	734.698	0.000	4.78E-03	2.78E-03	4.78E-03		
U-236	1.5493E-05	734.698	1,469.397	0.00E+00	1.14E-02	2.28E-02		
U-238	-4.2851E-09	734.698	0.000	2.98E-03	2.97E-03	2.98E-03		
Y-90	1.9254E+00	734.698	1,469.397	0.00E+00	1.41E+03	2.83E+03		
Other Radionuclides					1.42E+03	2.84E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.75E+01	3.50E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U3Si2	U	
	20.00000024	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:		734.698	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
		1,469.397	

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup
Bounding:	0.21	
	0.42	
		Estimated EOL HM/ Given EOL HM
		1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (JAPAN) ¹Fuel decay start date: 2010
 SNF ID #: 552 Estimates as of: 2030
 Fuel Units & Descr: 99 - ASSEMBLY Template: HFBR (Heavy Water, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=94.05kg ; EOL=84.64kg ²Template Burnup(MWd): 15
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 4.13

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5333E-10	8,939.124	17,878.248	0.00E+00	7.63E-06	1.53E-05		
Am-241	2.2753E-02	8,939.124	17,878.248	0.00E+00	2.03E+02	4.07E+02	0.0150	1.811E+15
Am-242m	8.9133E-06	8,939.124	17,878.248	0.00E+00	7.97E-02	1.59E-01	0.0250	3.769E+14
Am-243	6.4007E-06	8,939.124	17,878.248	0.00E+00	5.72E-02	1.14E-01	0.0375	3.306E+14
C-14	2.9620E-08	8,939.124	17,878.248	0.00E+00	2.65E-04	5.30E-04	0.0575	3.561E+14
Cl-36	5.9513E-35	8,939.124	17,878.248	0.00E+00	5.32E-31	1.06E-30	0.0850	2.120E+14
Cm-243	2.2087E-06	8,939.124	17,878.248	0.00E+00	1.97E-02	3.95E-02	0.1250	1.427E+14
Cm-244	1.1007E-04	8,939.124	17,878.248	0.00E+00	9.84E-01	1.97E+00	0.2250	1.827E+14
Co-60	1.6340E-05	8,939.124	17,878.248	0.00E+00	1.46E-01	2.92E-01	0.3750	7.951E+13
Cs-134	2.1353E-03	8,939.124	17,878.248	0.00E+00	1.91E+01	3.82E+01	0.5750	1.349E+15
Cs-135	4.8607E-06	8,939.124	17,878.248	0.00E+00	4.35E-02	8.69E-02	0.8500	2.081E+13
Cs-137	2.0227E+00	8,939.124	17,878.248	0.00E+00	1.81E+04	3.62E+04	1.2500	1.162E+13
Eu-154	2.0887E-02	8,939.124	17,878.248	0.00E+00	1.87E+02	3.73E+02	1.7500	5.483E+11
Eu-155	4.0867E-03	8,939.124	17,878.248	0.00E+00	3.65E+01	7.31E+01	2.2500	5.149E+07
Fe-55	1.4167E-03	8,939.124	17,878.248	0.00E+00	1.27E+01	2.53E+01	2.7500	6.083E+06
H-3	4.6653E-03	8,939.124	17,878.248	0.00E+00	4.17E+01	8.34E+01	3.5000	2.465E+05
I-129	7.1600E-07	8,939.124	17,878.248	0.00E+00	6.40E-03	1.28E-02	5.0000	3.744E+02
Kr-85	1.0240E-01	8,939.124	17,878.248	0.00E+00	9.15E+02	1.83E+03	7.0000	4.236E+03
Np-237	3.7227E-06	8,939.124	17,878.248	0.00E+00	3.33E-02	6.66E-02	11.0000	4.821E+02
Pa-231	2.6727E-09	8,939.124	17,878.248	0.00E+00	2.39E-05	4.78E-05		
Pb-210	4.3313E-14	8,939.124	17,878.248	0.00E+00	3.87E-10	7.74E-10		
Pm-147	4.6307E-02	8,939.124	17,878.248	0.00E+00	4.14E+02	8.28E+02		
Pu-238	5.5273E-03	8,939.124	17,878.248	0.00E+00	4.94E+01	9.88E+01		
Pu-239	1.0313E-02	8,939.124	17,878.248	0.00E+00	9.22E+01	1.84E+02		
Pu-240	5.4180E-03	8,939.124	17,878.248	0.00E+00	4.84E+01	9.69E+01		
Pu-241	3.7573E-01	8,939.124	17,878.248	0.00E+00	3.36E+03	6.72E+03		
Pu-242	3.0713E-06	8,939.124	17,878.248	0.00E+00	2.75E-02	5.49E-02		
Ra-226	2.3807E-13	8,939.124	17,878.248	0.00E+00	2.13E-09	4.26E-09		
Ra-228	1.0607E-14	8,939.124	17,878.248	0.00E+00	9.48E-11	1.90E-10		
Ru-106	8.4800E-06	8,939.124	17,878.248	0.00E+00	7.58E-02	1.52E-01		
Se-79	1.2533E-05	8,939.124	17,878.248	0.00E+00	1.12E-01	2.24E-01		
Sn-126	1.1393E-05	8,939.124	17,878.248	0.00E+00	1.02E-01	2.04E-01		
Sr-90	1.8400E+00	8,939.124	17,878.248	0.00E+00	1.64E+04	3.29E+04		
Tc-99	4.3533E-04	8,939.124	17,878.248	0.00E+00	3.89E+00	7.78E+00		
Th-229	5.8947E-13	8,939.124	17,878.248	0.00E+00	5.27E-09	1.05E-08		
Th-230	5.9500E-11	8,939.124	17,878.248	0.00E+00	5.32E-07	1.06E-06		
Th-232	1.6360E-14	8,939.124	17,878.248	0.00E+00	1.46E-10	2.92E-10		
Ti-208	7.6000E-09	8,939.124	17,878.248	0.00E+00	6.79E-05	1.36E-04		
U-232	2.0747E-08	8,939.124	17,878.248	0.00E+00	1.85E-04	3.71E-04		
U-233	4.4013E-10	8,939.124	17,878.248	0.00E+00	3.93E-06	7.87E-06		
U-234	4.6500E-07	8,939.124	17,878.248	0.00E+00	4.16E-03	8.31E-03		
U-235	-2.5335E-06	8,939.124	0.000	4.06E-02	1.80E-02	4.06E-02		
U-236	1.3000E-05	8,939.124	17,878.248	0.00E+00	1.16E-01	2.32E-01		
U-238	-1.4207E-08	8,939.124	0.000	2.53E-02	2.52E-02	2.53E-02		
Y-90	1.8400E+00	8,939.124	17,878.248	0.00E+00	1.64E+04	3.29E+04		
Other Radionuclides					1.72E+04	3.44E+04		

Thermal Power		
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)	
2.14E+02	4.28E+02	
Total	Total	

III. Template Selection Summary, Burnup Summary, and Checks

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

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		8,939.124	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		17,878.248	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	2.17		1.02
Bounding:	4.34		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (JAPAN)
 SNF ID #: 600
 Fuel Units & Descr: 54 - MTR TYPE
 Heavy Metal Mass: BOL=5.23kg ; EOL=4.16kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 2.25

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	1,012.553	2,025.107	0.00E+00	6.71E-07	1.34E-06	Avg. MeV	
Am-241	2.0060E-03	1,012.553	2,025.107	0.00E+00	2.03E+00	4.06E+00	0.0150	2.138E+14
Am-242m	4.2429E-07	1,012.553	2,025.107	0.00E+00	4.30E-04	8.59E-04	0.0250	4.445E+13
Am-243	1.4899E-06	1,012.553	2,025.107	0.00E+00	1.51E-03	3.02E-03	0.0375	3.877E+13
C-14	5.7135E-09	1,012.553	2,025.107	0.00E+00	5.79E-06	1.16E-05	0.0575	4.153E+13
Ci-36	1.3124E-32	1,012.553	2,025.107	0.00E+00	1.33E-29	2.66E-29	0.0850	2.509E+13
Cm-243	1.6443E-07	1,012.553	2,025.107	0.00E+00	1.66E-04	3.33E-04	0.1250	1.698E+13
Cm-244	2.9330E-05	1,012.553	2,025.107	0.00E+00	2.97E-02	5.94E-02	0.2250	2.165E+13
Co-60	5.3186E-06	1,012.553	2,025.107	0.00E+00	5.39E-03	1.08E-02	0.3750	9.425E+12
Cs-134	3.1563E-03	1,012.553	2,025.107	0.00E+00	3.20E+00	6.39E+00	0.5750	1.538E+14
Cs-135	3.4477E-06	1,012.553	2,025.107	0.00E+00	3.49E-03	6.98E-03	0.8500	2.599E+12
Cs-137	2.0313E+00	1,012.553	2,025.107	0.00E+00	2.06E+03	4.11E+03	1.2500	1.484E+12
Eu-154	2.4513E-02	1,012.553	2,025.107	0.00E+00	2.48E+01	4.96E+01	1.7500	6.814E+10
Eu-155	4.8175E-03	1,012.553	2,025.107	0.00E+00	4.88E+00	9.76E+00	2.2500	5.978E+06
Fe-55	1.2397E-04	1,012.553	2,025.107	0.00E+00	1.26E-01	2.51E-01	2.7500	3.378E+06
H-3	4.5697E-03	1,012.553	2,025.107	0.00E+00	4.63E+00	9.25E+00	3.5000	1.552E+04
I-129	7.5300E-07	1,012.553	2,025.107	0.00E+00	7.62E-04	1.52E-03	5.0000	8.775E+02
Kr-85	1.0850E-01	1,012.553	2,025.107	0.00E+00	1.10E+02	2.20E+02	7.0000	9.689E+01
Np-237	9.5561E-06	1,012.553	2,025.107	0.00E+00	9.68E-03	1.94E-02	11.0000	1.086E+01
Pa-231	2.0359E-09	1,012.553	2,025.107	0.00E+00	2.06E-06	4.12E-06		
Pb-210	4.9728E-11	1,012.553	2,025.107	0.00E+00	5.04E-08	1.01E-07		
Pm-147	4.8502E-02	1,012.553	2,025.107	0.00E+00	4.91E+01	9.82E+01		
Pu-238	1.8254E-02	1,012.553	2,025.107	0.00E+00	1.85E+01	3.70E+01		
Pu-239	4.2810E-04	1,012.553	2,025.107	0.00E+00	4.33E-01	8.67E-01		
Pu-240	2.4368E-04	1,012.553	2,025.107	0.00E+00	2.47E-01	4.93E-01		
Pu-241	3.3415E-02	1,012.553	2,025.107	0.00E+00	3.38E+01	6.77E+01		
Pu-242	3.6329E-07	1,012.553	2,025.107	0.00E+00	3.68E-04	7.36E-04		
Ra-226	2.2854E-10	1,012.553	2,025.107	0.00E+00	2.31E-07	4.63E-07		
Ra-228	1.2426E-14	1,012.553	2,025.107	0.00E+00	1.26E-11	2.52E-11		
Ru-106	6.3589E-06	1,012.553	2,025.107	0.00E+00	6.44E-03	1.29E-02		
Se-79	1.2933E-05	1,012.553	2,025.107	0.00E+00	1.31E-02	2.62E-02		
Sn-126	1.1574E-05	1,012.553	2,025.107	0.00E+00	1.17E-02	2.34E-02		
Sr-90	1.9248E+00	1,012.553	2,025.107	0.00E+00	1.95E+03	3.90E+03		
Tc-99	4.2239E-04	1,012.553	2,025.107	0.00E+00	4.28E-01	8.55E-01		
Th-229	5.0953E-12	1,012.553	2,025.107	0.00E+00	5.16E-09	1.03E-08		
Th-230	4.1885E-08	1,012.553	2,025.107	0.00E+00	4.24E-05	8.48E-05		
Th-232	1.9270E-14	1,012.553	2,025.107	0.00E+00	1.95E-11	3.90E-11		
Ti-208	4.6024E-08	1,012.553	2,025.107	0.00E+00	4.66E-05	9.32E-05		
U-232	1.2582E-07	1,012.553	2,025.107	0.00E+00	1.27E-04	2.55E-04		
U-233	2.5825E-09	1,012.553	2,025.107	0.00E+00	2.61E-06	5.23E-06		
U-234	1.8450E-04	1,012.553	2,025.107	0.00E+00	1.87E-01	3.74E-01		
U-235	-2.7235E-06	1,012.553	0.000	1.05E-02	7.75E-03	1.05E-02		
U-236	1.5493E-05	1,012.553	2,025.107	0.00E+00	1.57E-02	3.14E-02		
U-238	-4.2851E-09	1,012.553	0.000	1.23E-04	1.19E-04	1.23E-04		
Y-90	1.9254E+00	1,012.553	2,025.107	0.00E+00	1.95E+03	3.90E+03		
Other Radionuclides					1.96E+03	3.92E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.41E+01	4.83E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.99999931	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,012.553	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		2,025.107	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.62		
Bounding:	1.23		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (JAPAN)
 SNF ID #: 289
 Fuel Units & Desc: 17 - ASSEMBLY
 Heavy Metal Mass: BOL=8.92kg ; EOL=8.60kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.71

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	307.497	614.993	0.00E+00	2.04E-07	4.08E-07	Avg. MeV	
Am-241	2.0060E-03	307.497	614.993	0.00E+00	6.17E-01	1.23E+00	0.0150	6.492E+13
Am-242m	4.2429E-07	307.497	614.993	0.00E+00	1.30E-04	2.61E-04	0.0250	1.350E+13
Am-243	1.4899E-06	307.497	614.993	0.00E+00	4.58E-04	9.16E-04	0.0375	1.177E+13
C-14	5.7135E-09	307.497	614.993	0.00E+00	1.76E-06	3.51E-06	0.0575	1.261E+13
Cl-36	1.3124E-32	307.497	614.993	0.00E+00	4.04E-30	8.07E-30	0.0850	7.621E+12
Cm-243	1.6443E-07	307.497	614.993	0.00E+00	5.06E-05	1.01E-04	0.1250	5.157E+12
Cm-244	2.9330E-05	307.497	614.993	0.00E+00	9.02E-03	1.80E-02	0.2250	6.576E+12
Co-60	5.3186E-06	307.497	614.993	0.00E+00	1.64E-03	3.27E-03	0.3750	2.862E+12
Cs-134	3.1563E-03	307.497	614.993	0.00E+00	9.71E-01	1.94E+00	0.5750	4.669E+13
Cs-135	3.4477E-06	307.497	614.993	0.00E+00	1.06E-03	2.12E-03	0.8500	7.893E+11
Cs-137	2.0313E-03	307.497	614.993	0.00E+00	6.25E+02	1.25E+03	1.2500	4.508E+11
Eu-154	2.4513E-02	307.497	614.993	0.00E+00	7.54E+00	1.51E+01	1.7500	2.069E+10
Eu-155	4.8175E-03	307.497	614.993	0.00E+00	1.48E+00	2.96E+00	2.2500	1.815E+06
Fe-55	1.2397E-04	307.497	614.993	0.00E+00	3.81E-02	7.62E-02	2.7500	1.026E+06
H-3	4.5697E-03	307.497	614.993	0.00E+00	1.41E+00	2.81E+00	3.5000	4.727E+03
I-129	7.5300E-07	307.497	614.993	0.00E+00	2.32E-04	4.63E-04	5.0000	2.719E+02
Kr-85	1.0850E-01	307.497	614.993	0.00E+00	3.34E+01	6.67E+01	7.0000	3.005E+01
Np-237	9.5561E-06	307.497	614.993	0.00E+00	2.94E-03	5.88E-03	11.0000	3.369E+00
Pa-231	2.0359E-09	307.497	614.993	0.00E+00	6.26E-07	1.25E-06		
Pb-210	4.9728E-11	307.497	614.993	0.00E+00	1.53E-08	3.06E-08		
Pm-147	4.8502E-02	307.497	614.993	0.00E+00	1.49E+01	2.98E+01		
Pu-238	1.8254E-02	307.497	614.993	0.00E+00	5.61E+00	1.12E+01		
Pu-239	4.2810E-04	307.497	614.993	0.00E+00	1.32E-01	2.63E-01		
Pu-240	2.4368E-04	307.497	614.993	0.00E+00	7.49E-02	1.50E-01		
Pu-241	3.3415E-02	307.497	614.993	0.00E+00	1.03E+01	2.06E+01		
Pu-242	3.6329E-07	307.497	614.993	0.00E+00	1.12E-04	2.23E-04		
Ra-226	2.2854E-10	307.497	614.993	0.00E+00	7.03E-08	1.41E-07		
Ra-228	1.2426E-14	307.497	614.993	0.00E+00	3.82E-12	7.64E-12		
Ru-106	6.3589E-06	307.497	614.993	0.00E+00	1.96E-03	3.91E-03		
Se-79	1.2933E-05	307.497	614.993	0.00E+00	3.98E-03	7.95E-03		
Sn-126	1.1574E-05	307.497	614.993	0.00E+00	3.56E-03	7.12E-03		
Sr-90	1.9248E+00	307.497	614.993	0.00E+00	5.92E+02	1.18E+03		
Tc-99	4.2239E-04	307.497	614.993	0.00E+00	1.30E-01	2.60E-01		
Th-229	5.0953E-12	307.497	614.993	0.00E+00	1.57E-09	3.13E-09		
Th-230	4.1885E-08	307.497	614.993	0.00E+00	1.29E-05	2.58E-05		
Th-232	1.9270E-14	307.497	614.993	0.00E+00	5.93E-12	1.19E-11		
Tl-208	4.6024E-08	307.497	614.993	0.00E+00	1.42E-05	2.83E-05		
U-232	1.2582E-07	307.497	614.993	0.00E+00	3.87E-05	7.74E-05		
U-233	2.5825E-09	307.497	614.993	0.00E+00	7.94E-07	1.59E-06		
U-234	1.8450E-04	307.497	614.993	0.00E+00	5.67E-02	1.13E-01		
U-235	-2.7235E-06	307.497	0.000	3.86E-03	3.02E-03	3.86E-03		
U-236	1.5493E-05	307.497	614.993	0.00E+00	4.76E-03	9.53E-03		
U-238	-4.2851E-09	307.497	0.000	2.40E-03	2.40E-03	2.40E-03		
Y-90	1.9254E+00	307.497	614.993	0.00E+00	5.92E+02	1.18E+03		
Other Radionuclides					5.95E+02	1.19E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.33E+00	1.47E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons:
Fuel Cladding:	ALUM	ALUM	This fuel matches on all parameters except enrichment.
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20.00000028	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
		307.497	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		614.993	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
	0.11		1.00
Bounding:	0.22		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (NETHERLANDS)
 SNF ID #: 509
 Fuel Units & Descr: 7 - ASSEMBLY
 Heavy Metal Mass: BOL=5.53kg ; EOL=4.87kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.29

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	628.442	1,256.884	0.00E+00	4.17E-07	8.33E-07		
Am-241	2.0060E-03	628.442	1,256.884	0.00E+00	1.26E+00	2.52E+00	0.0150	1.327E+14
Am-242m	4.2429E-07	628.442	1,256.884	0.00E+00	2.67E-04	5.33E-04	0.0250	2.759E+13
Am-243	1.4899E-06	628.442	1,256.884	0.00E+00	9.36E-04	1.87E-03	0.0375	2.406E+13
C-14	5.7135E-09	628.442	1,256.884	0.00E+00	3.59E-06	7.18E-06	0.0575	2.577E+13
Cl-36	1.3124E-32	628.442	1,256.884	0.00E+00	8.25E-30	1.65E-29	0.0850	1.557E+13
Cm-243	1.6443E-07	628.442	1,256.884	0.00E+00	1.03E-04	2.07E-04	0.1250	1.054E+13
Cm-244	2.930E-05	628.442	1,256.884	0.00E+00	1.84E-02	3.69E-02	0.2250	1.344E+13
Co-60	5.3186E-06	628.442	1,256.884	0.00E+00	3.34E-03	6.68E-03	0.3750	5.850E+12
Cs-134	3.1563E-03	628.442	1,256.884	0.00E+00	1.98E+00	3.97E+00	0.5750	9.543E+12
Cs-135	3.4477E-06	628.442	1,256.884	0.00E+00	2.17E-03	4.33E-03	0.8500	1.613E+12
Cs-137	2.0313E+00	628.442	1,256.884	0.00E+00	1.28E+03	2.55E+03	1.2500	9.212E+11
Eu-154	2.4513E-02	628.442	1,256.884	0.00E+00	1.54E+01	3.08E+01	1.7500	4.229E+10
Eu-155	4.8175E-03	628.442	1,256.884	0.00E+00	3.03E+00	6.06E+00	2.2500	3.710E+06
Fe-55	1.2397E-04	628.442	1,256.884	0.00E+00	7.79E-02	1.56E-01	2.7500	2.097E+06
H-3	4.5697E-03	628.442	1,256.884	0.00E+00	2.87E+00	5.74E+00	3.5000	9.642E+03
I-129	7.5300E-07	628.442	1,256.884	0.00E+00	4.73E-04	9.46E-04	5.0000	5.478E+02
Kr-85	1.0850E-01	628.442	1,256.884	0.00E+00	6.82E+01	1.36E+02	7.0000	6.050E+01
Np-237	9.5561E-06	628.442	1,256.884	0.00E+00	6.01E-03	1.20E-02	11.0000	6.782E+00
Pa-231	2.0359E-09	628.442	1,256.884	0.00E+00	1.28E-06	2.56E-06		
Pb-210	4.9728E-11	628.442	1,256.884	0.00E+00	3.13E-08	6.25E-08		
Pm-147	4.8502E-02	628.442	1,256.884	0.00E+00	3.05E+01	6.10E+01		
Pu-238	1.8254E-02	628.442	1,256.884	0.00E+00	1.15E+01	2.29E+01		
Pu-239	4.2810E-04	628.442	1,256.884	0.00E+00	2.69E-01	5.38E-01		
Pu-240	2.4368E-04	628.442	1,256.884	0.00E+00	1.53E-01	3.06E-01		
Pu-241	3.3415E-02	628.442	1,256.884	0.00E+00	2.10E+01	4.20E+01		
Pu-242	3.6329E-07	628.442	1,256.884	0.00E+00	2.28E-04	4.57E-04		
Ra-226	2.2854E-10	628.442	1,256.884	0.00E+00	1.44E-07	2.87E-07		
Ra-228	1.2426E-14	628.442	1,256.884	0.00E+00	7.81E-12	1.56E-11		
Ru-106	6.3589E-06	628.442	1,256.884	0.00E+00	4.00E-03	7.99E-03		
Se-79	1.2933E-05	628.442	1,256.884	0.00E+00	8.13E-03	1.63E-02		
Sn-126	1.1574E-05	628.442	1,256.884	0.00E+00	7.27E-03	1.45E-02		
Sr-90	1.9248E+00	628.442	1,256.884	0.00E+00	1.21E+03	2.42E+03		
Tc-99	4.2239E-04	628.442	1,256.884	0.00E+00	2.65E-01	5.31E-01		
Th-229	5.0953E-12	628.442	1,256.884	0.00E+00	3.20E-09	6.40E-09		
Th-230	4.1885E-08	628.442	1,256.884	0.00E+00	2.63E-05	5.26E-05		
Th-232	1.9270E-14	628.442	1,256.884	0.00E+00	1.21E-11	2.42E-11		
Th-208	4.6024E-08	628.442	1,256.884	0.00E+00	2.89E-05	5.78E-05		
U-232	1.2582E-07	628.442	1,256.884	0.00E+00	7.91E-05	1.58E-04		
U-233	2.5825E-09	628.442	1,256.884	0.00E+00	1.62E-06	3.25E-06		
U-234	1.8450E-04	628.442	1,256.884	0.00E+00	1.16E-01	2.32E-01		
U-235	-2.7235E-06	628.442	0.000	2.39E-03	6.78E-04	2.39E-03		
U-236	1.5493E-05	628.442	1,256.884	0.00E+00	9.74E-03	1.95E-02		
U-238	-4.2851E-09	628.442	0.000	1.49E-03	1.48E-03	1.49E-03		
Y-90	1.9254E+00	628.442	1,256.884	0.00E+00	1.21E+03	2.42E+03		
Other Radionuclides					1.22E+03	2.43E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.50E+01	3.00E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20.0000038	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 628.442	Estimated: 628.442	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,256.884	

Checks		
Nominal:	Burnup Multiplier: 0.36	Estimated Burnup/ Given Burnup: 1.01
Bounding:	0.72	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (PERU)
 SNF ID #: 503
 Fuel Units & Descr: 6 - ASSEMBLY
 Heavy Metal Mass: BOL=6.00kg ; EOL=5.67kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimate as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.25

Radionuclide	II. Estimates		b				Gamma Sources	
	m	x _n	x _b	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	312.516	625.033	0.00E+00	2.07E-07	4.14E-07	Avg. MeV	
Am-241	2.0060E-03	312.516	625.033	0.00E+00	6.27E-01	1.25E+00	0.0150	6.598E+13
Am-242m	4.2429E-07	312.516	625.033	0.00E+00	1.33E-04	2.65E-04	0.0250	1.372E+13
Am-243	1.4899E-06	312.516	625.033	0.00E+00	4.66E-04	9.31E-04	0.0375	1.197E+13
C-14	5.7135E-09	312.516	625.033	0.00E+00	1.79E-06	3.57E-06	0.0575	1.282E+13
Cl-36	1.3124E-32	312.516	625.033	0.00E+00	4.10E-30	8.20E-30	0.0850	7.745E+12
Cm-243	1.6443E-07	312.516	625.033	0.00E+00	5.14E-05	1.03E-04	0.1250	5.241E+12
Cm-244	2.9330E-05	312.516	625.033	0.00E+00	9.17E-03	1.83E-02	0.2250	6.683E+12
Co-60	5.3186E-06	312.516	625.033	0.00E+00	1.66E-03	3.32E-03	0.3750	2.909E+12
Cs-134	3.1563E-03	312.516	625.033	0.00E+00	9.86E-01	1.97E+00	0.5750	4.745E+13
Cs-135	3.4477E-06	312.516	625.033	0.00E+00	1.08E-03	2.15E-03	0.8500	8.022E+11
Cs-137	2.0313E+00	312.516	625.033	0.00E+00	6.35E+02	1.27E+03	1.2500	4.581E+11
Eu-154	2.4513E-02	312.516	625.033	0.00E+00	7.66E+00	1.53E+01	1.7500	2.103E+10
Eu-155	4.8175E-03	312.516	625.033	0.00E+00	1.51E+00	3.01E+00	2.2500	1.845E+06
Fe-55	1.2397E-04	312.516	625.033	0.00E+00	3.87E-02	7.75E-02	2.7500	1.043E+06
H-3	4.5697E-03	312.516	625.033	0.00E+00	1.43E+00	2.86E+00	3.5000	4.800E+03
I-129	7.5300E-07	312.516	625.033	0.00E+00	2.35E-04	4.71E-04	5.0000	2.744E+02
Kr-85	1.0850E-01	312.516	625.033	0.00E+00	3.39E+01	6.78E+01	7.0000	3.032E+01
Np-237	9.5561E-06	312.516	625.033	0.00E+00	2.99E-03	5.97E-03	11.0000	3.399E+00
Pa-231	2.0359E-09	312.516	625.033	0.00E+00	6.36E-07	1.27E-06		
Pb-210	4.9728E-11	312.516	625.033	0.00E+00	1.55E-08	3.11E-08		
Pm-147	4.8502E-02	312.516	625.033	0.00E+00	1.52E+01	3.03E+01		
Pu-238	1.8254E-02	312.516	625.033	0.00E+00	5.70E+00	1.14E+01		
Pu-239	4.2810E-04	312.516	625.033	0.00E+00	1.34E-01	2.68E-01		
Pu-240	2.4368E-04	312.516	625.033	0.00E+00	7.62E-02	1.52E-01		
Pu-241	3.3415E-02	312.516	625.033	0.00E+00	1.04E+01	2.09E+01		
Pu-242	3.6329E-07	312.516	625.033	0.00E+00	1.14E-04	2.27E-04		
Ra-226	2.2854E-10	312.516	625.033	0.00E+00	7.14E-08	1.43E-07		
Ra-228	1.2426E-14	312.516	625.033	0.00E+00	3.88E-12	7.77E-12		
Ru-106	6.3589E-06	312.516	625.033	0.00E+00	1.99E-03	3.97E-03		
Se-79	1.2933E-05	312.516	625.033	0.00E+00	4.04E-03	8.08E-03		
Sn-126	1.1574E-05	312.516	625.033	0.00E+00	3.62E-03	7.23E-03		
Sr-90	1.9248E+00	312.516	625.033	0.00E+00	6.02E+02	1.20E+03		
Tc-99	4.2239E-04	312.516	625.033	0.00E+00	1.32E-01	2.64E-01		
Th-229	5.0953E-12	312.516	625.033	0.00E+00	1.59E-09	3.18E-09		
Th-230	4.1885E-08	312.516	625.033	0.00E+00	1.31E-05	2.62E-05		
Th-232	1.9270E-14	312.516	625.033	0.00E+00	6.02E-12	1.20E-11		
Tl-208	4.6024E-08	312.516	625.033	0.00E+00	1.44E-05	2.88E-05		
U-232	1.2582E-07	312.516	625.033	0.00E+00	3.93E-05	7.86E-05		
U-233	2.5825E-09	312.516	625.033	0.00E+00	8.07E-07	1.61E-06		
U-234	1.8450E-04	312.516	625.033	0.00E+00	5.77E-02	1.15E-01		
U-235	-2.7235E-06	312.516	0.000	2.59E-03	1.74E-03	2.59E-03		
U-236	1.5493E-05	312.516	625.033	0.00E+00	4.84E-03	9.68E-03		
U-238	-4.2851E-09	312.516	0.000	1.61E-03	1.61E-03	1.61E-03		
Y-90	1.9254E+00	312.516	625.033	0.00E+00	6.02E+02	1.20E+03		
Other Radionuclides					6.04E+02	1.21E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.45E+00	1.49E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			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.
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	
BOL HM Constituent:	ALUM	ALUM	
BOL Enrichment %:	U3O8	U	
	20	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Nomina:	From SFD	Estimated	
Bounding:		312.516	
		625.033	

Checks			Estimated EOL HM/Given EOL HM
Nomina:	Burnup Multiplier	Estimated Burnup/Given Burnup	
Bounding:	0.17		
	0.33		
		1.00	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (PORTUGAL)
 SNF ID #: 540
 Fuel Units & Descr: 9 - ASSEMBLY
 Heavy Metal Mass: BOL=4.05kg ; EOL=3.91kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.38

II. Estimates							Gamma Sources	
	m	x _a	x _b	b	y _a	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	6.6313E-10	130.405	260.809	0.00E+00	8.65E-08	1.73E-07	Avg. MeV	
Am-241	2.0060E-03	130.405	260.809	0.00E+00	2.62E-01	5.23E-01	0.0150	2.753E+13
Am-242m	4.2429E-07	130.405	260.809	0.00E+00	5.53E-05	1.11E-04	0.0250	5.725E+12
Am-243	1.4899E-06	130.405	260.809	0.00E+00	1.94E-04	3.89E-04	0.0375	4.994E+12
C-14	5.7135E-09	130.405	260.809	0.00E+00	7.45E-07	1.49E-06	0.0575	5.348E+12
Cl-36	1.3124E-32	130.405	260.809	0.00E+00	1.71E-30	3.42E-30	0.0850	3.232E+12
Cm-243	1.6443E-07	130.405	260.809	0.00E+00	2.14E-05	4.29E-05	0.1250	2.187E+12
Cm-244	2.9330E-05	130.405	260.809	0.00E+00	3.82E-03	7.65E-03	0.2250	2.789E+12
Co-60	5.3186E-06	130.405	260.809	0.00E+00	6.94E-04	1.39E-03	0.3750	1.214E+12
Cs-134	3.1563E-03	130.405	260.809	0.00E+00	4.12E-01	8.23E-01	0.5750	1.980E+13
Cs-135	3.4477E-06	130.405	260.809	0.00E+00	4.50E-04	8.99E-04	0.8500	3.348E+11
Cs-137	2.0313E+00	130.405	260.809	0.00E+00	2.65E+02	5.30E+02	1.2500	1.912E+11
Eu-154	2.4513E-02	130.405	260.809	0.00E+00	3.20E+00	6.39E+00	1.7500	8.775E+09
Eu-155	4.8175E-03	130.405	260.809	0.00E+00	6.28E-01	1.26E+00	2.2500	7.698E+05
Fe-55	1.2397E-04	130.405	260.809	0.00E+00	1.62E-02	3.23E-02	2.7500	4.351E+05
H-3	4.5697E-03	130.405	260.809	0.00E+00	5.96E-01	1.19E+00	3.5000	2.005E+03
I-129	7.5300E-07	130.405	260.809	0.00E+00	9.82E-05	1.96E-04	5.0000	1.155E+02
Kr-85	1.0850E-01	130.405	260.809	0.00E+00	1.41E+01	2.83E+01	7.0000	1.276E+01
Np-237	9.5561E-06	130.405	260.809	0.00E+00	1.25E-03	2.49E-03	11.0000	1.431E+00
Pa-231	2.0359E-09	130.405	260.809	0.00E+00	2.65E-07	5.31E-07		
Pb-210	4.9728E-11	130.405	260.809	0.00E+00	6.48E-09	1.30E-08		
Pm-147	4.8502E-02	130.405	260.809	0.00E+00	6.32E+00	1.26E+01		
Pu-238	1.8254E-02	130.405	260.809	0.00E+00	2.38E+00	4.76E+00		
Pu-239	4.2810E-04	130.405	260.809	0.00E+00	5.58E-02	1.12E-01		
Pu-240	2.4368E-04	130.405	260.809	0.00E+00	3.18E-02	6.36E-02		
Pu-241	3.3415E-02	130.405	260.809	0.00E+00	4.36E+00	8.71E+00		
Pu-242	3.6329E-07	130.405	260.809	0.00E+00	4.74E-05	9.47E-05		
Ra-226	2.2854E-10	130.405	260.809	0.00E+00	2.98E-08	5.96E-08		
Ra-228	1.2426E-14	130.405	260.809	0.00E+00	1.62E-12	3.24E-12		
Ru-106	6.3589E-06	130.405	260.809	0.00E+00	8.29E-04	1.66E-03		
Se-79	1.2933E-05	130.405	260.809	0.00E+00	1.69E-03	3.37E-03		
Sn-126	1.1574E-05	130.405	260.809	0.00E+00	1.51E-03	3.02E-03		
Sr-90	1.9248E+00	130.405	260.809	0.00E+00	2.51E+02	5.02E+02		
Tc-99	4.2239E-04	130.405	260.809	0.00E+00	5.51E-02	1.10E-01		
Th-229	5.0953E-12	130.405	260.809	0.00E+00	6.64E-10	1.33E-09		
Th-230	4.1885E-08	130.405	260.809	0.00E+00	5.46E-06	1.09E-05		
Th-232	1.9270E-14	130.405	260.809	0.00E+00	2.51E-12	5.03E-12		
Tl-208	4.6024E-08	130.405	260.809	0.00E+00	6.00E-06	1.20E-05		
U-232	1.2582E-07	130.405	260.809	0.00E+00	1.64E-05	3.28E-05		
U-233	2.5825E-09	130.405	260.809	0.00E+00	3.37E-07	6.74E-07		
U-234	1.8450E-04	130.405	260.809	0.00E+00	2.41E-02	4.81E-02		
U-235	-2.7235E-06	130.405	0.000	1.75E-03	1.40E-03	1.75E-03		
U-236	1.5493E-05	130.405	260.809	0.00E+00	2.02E-03	4.04E-03		
U-238	-4.2851E-09	130.405	0.000	1.09E-03	1.09E-03	1.09E-03		
Y-90	1.9254E+00	130.405	260.809	0.00E+00	2.51E+02	5.02E+02		
Other Radionuclides					2.52E+02	5.04E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.11E+00	6.22E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding:	ALUM	ALUM
BOL HM Constituents:	U-ALX	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:		130.405
Bounding:		260.809

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:	0.10	
Bounding:	0.20	

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (PORTUGAL)
 SNF ID #: 631
 Fuel Units & Descr: 9 - MTR TYPE
 Heavy Metal Mass: BOL=1.42kg ; EOL=.89kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18" x 10"
 0.38

II. Estimates							Gamma Sources	
	m	x _a	x _b	b	y _a	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	501.163	1,002.325	0.00E+00	3.32E-07	6.65E-07		
Am-241	2.0060E-03	501.163	1,002.325	0.00E+00	1.01E+00	2.01E+00	0.0150	1.058E+14
Am-242m	4.2429E-07	501.163	1,002.325	0.00E+00	2.13E-04	4.25E-04	0.0250	2.200E+13
Am-243	1.4899E-06	501.163	1,002.325	0.00E+00	7.47E-04	1.49E-03	0.0375	1.919E+13
C-14	5.7135E-09	501.163	1,002.325	0.00E+00	2.86E-06	5.73E-06	0.0575	2.955E+13
Cl-36	1.3124E-32	501.163	1,002.325	0.00E+00	6.58E-30	1.32E-29	0.0850	1.242E+13
Cm-243	1.6443E-07	501.163	1,002.325	0.00E+00	8.24E-05	1.65E-04	0.1250	8.405E+12
Cm-244	2.9330E-05	501.163	1,002.325	0.00E+00	1.47E-02	2.94E-02	0.2250	1.072E+13
Co-60	5.3186E-06	501.163	1,002.325	0.00E+00	2.67E-03	5.33E-03	0.3750	4.665E+12
Cs-134	3.1563E-03	501.163	1,002.325	0.00E+00	1.58E+00	3.16E+00	0.5750	7.610E+13
Cs-135	3.4477E-06	501.163	1,002.325	0.00E+00	1.73E-03	3.46E-03	0.8500	1.286E+12
Cs-137	2.0313E+00	501.163	1,002.325	0.00E+00	1.02E+03	2.04E+03	1.2500	7.347E+11
Eu-154	2.4513E-02	501.163	1,002.325	0.00E+00	1.23E+01	2.46E+01	1.7500	3.372E+10
Eu-155	4.8175E-03	501.163	1,002.325	0.00E+00	2.41E+00	4.83E+00	2.2500	2.959E+06
Fe-55	1.2397E-04	501.163	1,002.325	0.00E+00	6.21E-02	1.24E-01	2.7500	1.672E+06
H-3	4.5697E-03	501.163	1,002.325	0.00E+00	2.29E+00	4.58E+00	3.5000	7.693E+03
I-129	7.5300E-07	501.163	1,002.325	0.00E+00	3.77E-04	7.55E-04	5.0000	4.342E+02
Kr-85	1.0850E-01	501.163	1,002.325	0.00E+00	5.44E+01	1.09E+02	7.0000	4.795E+01
Np-237	9.5561E-06	501.163	1,002.325	0.00E+00	4.79E-03	9.58E-03	11.0000	5.373E+00
Pa-231	2.0359E-09	501.163	1,002.325	0.00E+00	1.02E-06	2.04E-06		
Pb-210	4.9728E-11	501.163	1,002.325	0.00E+00	2.49E-08	4.98E-08		
Pm-147	4.8502E-02	501.163	1,002.325	0.00E+00	2.43E+01	4.86E+01		
Pu-238	1.8254E-02	501.163	1,002.325	0.00E+00	9.15E+00	1.83E+01		
Pu-239	4.2810E-04	501.163	1,002.325	0.00E+00	2.15E-01	4.29E-01		
Pu-240	2.4368E-04	501.163	1,002.325	0.00E+00	1.22E-01	2.44E-01		
Pu-241	3.3415E-02	501.163	1,002.325	0.00E+00	1.67E+01	3.35E+01		
Pu-242	3.6329E-07	501.163	1,002.325	0.00E+00	1.82E-04	3.64E-04		
Ra-226	2.2854E-10	501.163	1,002.325	0.00E+00	1.15E-07	2.29E-07		
Ra-228	1.2426E-14	501.163	1,002.325	0.00E+00	6.23E-12	1.25E-11		
Ru-106	6.3589E-06	501.163	1,002.325	0.00E+00	3.19E-03	6.37E-03		
Se-79	1.2933E-05	501.163	1,002.325	0.00E+00	6.48E-03	1.30E-02		
Sn-126	1.1574E-05	501.163	1,002.325	0.00E+00	5.80E-03	1.16E-02		
Sr-90	1.9248E+00	501.163	1,002.325	0.00E+00	9.65E+02	1.93E+03		
Tc-99	4.2239E-04	501.163	1,002.325	0.00E+00	2.12E-01	4.23E-01		
Th-229	5.0953E-12	501.163	1,002.325	0.00E+00	2.55E-09	5.11E-09		
Th-230	4.1885E-08	501.163	1,002.325	0.00E+00	2.10E-05	4.20E-05		
Th-232	1.9270E-14	501.163	1,002.325	0.00E+00	9.66E-12	1.93E-11		
Tl-208	4.6024E-08	501.163	1,002.325	0.00E+00	2.31E-05	4.61E-05		
U-232	1.2582E-07	501.163	1,002.325	0.00E+00	6.31E-05	1.26E-04		
U-233	2.5825E-09	501.163	1,002.325	0.00E+00	1.29E-06	2.59E-06		
U-234	1.8450E-04	501.163	1,002.325	0.00E+00	9.25E-02	1.85E-01		
U-235	-2.7235E-06	501.163	0.000	2.86E-03	1.49E-03	2.86E-03		
U-236	1.5493E-05	501.163	1,002.325	0.00E+00	7.76E-03	1.55E-02		
U-238	-4.2851E-09	501.163	0.000	3.35E-05	3.13E-05	3.35E-05		
Y-90	1.9254E+00	501.163	1,002.325	0.00E+00	9.65E+02	1.93E+03		
Other Radionuclides					9.69E+02	1.94E+03		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.00000971	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		501.163	
Bounding:		1,002.325	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	1.12		
Bounding:	2.24		

Estimated EOL HM/Given EOL HM: 1.03

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C (SWEDEN) 1 Fuel decay start date: 2010
 SNF ID #: 523 Estimates as of: 2030
 Fuel Units & Descr: 480 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=960.00kg ; EOL=789.89kg 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"
 20.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	161,099.364	322,198.728	0.00E+00	1.07E-04	2.14E-04	Avg. MeV	
Am-241	2.0060E-03	161,099.364	322,198.728	0.00E+00	3.23E+02	6.46E+02	0.0150	3.401E+16
Am-242m	4.2429E-07	161,099.364	322,198.728	0.00E+00	6.84E-02	1.37E-01	0.0250	7.072E+15
Am-243	1.4899E-06	161,099.364	322,198.728	0.00E+00	2.40E-01	4.80E-01	0.0375	6.169E+15
C-14	5.7135E-09	161,099.364	322,198.728	0.00E+00	9.20E-04	1.84E-03	0.0575	6.607E+15
Cl-36	1.3124E-32	161,099.364	322,198.728	0.00E+00	2.11E-27	4.23E-27	0.0850	3.993E+15
Cm-243	1.6443E-07	161,099.364	322,198.728	0.00E+00	2.65E-02	5.30E-02	0.1250	2.702E+15
Cm-244	2.9330E-05	161,099.364	322,198.728	0.00E+00	4.73E+00	9.45E+00	0.2250	3.445E+15
Co-60	5.3186E-06	161,099.364	322,198.728	0.00E+00	8.57E-01	1.71E+00	0.3750	1.500E+15
Cs-134	3.1563E-03	161,099.364	322,198.728	0.00E+00	5.08E+02	1.02E+03	0.5750	2.446E+16
Cs-135	3.4477E-06	161,099.364	322,198.728	0.00E+00	5.55E-01	1.11E+00	0.8500	4.135E+14
Cs-137	2.0313E+00	161,099.364	322,198.728	0.00E+00	3.27E+05	6.54E+05	1.2500	2.362E+14
Eu-154	2.4513E-02	161,099.364	322,198.728	0.00E+00	3.95E+03	7.90E+03	1.7500	1.084E+13
Eu-155	4.8175E-03	161,099.364	322,198.728	0.00E+00	7.76E+02	1.55E+03	2.2500	9.510E+08
Fe-55	1.2397E-04	161,099.364	322,198.728	0.00E+00	2.00E+01	3.99E+01	2.7500	5.375E+08
H-3	4.5697E-03	161,099.364	322,198.728	0.00E+00	7.36E+02	1.47E+03	3.5000	2.471E+06
I-129	7.5300E-07	161,099.364	322,198.728	0.00E+00	1.21E-01	2.43E-01	5.0000	1.401E+05
Kr-85	1.0850E-01	161,099.364	322,198.728	0.00E+00	1.75E+04	3.50E+04	7.0000	1.548E+04
Np-237	9.5561E-06	161,099.364	322,198.728	0.00E+00	1.54E+00	3.08E+00	11.0000	1.735E+03
Pa-231	2.0359E-09	161,099.364	322,198.728	0.00E+00	3.28E-04	6.56E-04		
Pb-210	4.9728E-11	161,099.364	322,198.728	0.00E+00	8.01E-06	1.60E-05		
Pm-147	4.8502E-02	161,099.364	322,198.728	0.00E+00	7.81E+03	1.56E+04		
Pu-238	1.8254E-02	161,099.364	322,198.728	0.00E+00	2.94E+03	5.88E+03		
Pu-239	4.2810E-04	161,099.364	322,198.728	0.00E+00	6.90E+01	1.38E+02		
Pu-240	2.4368E-04	161,099.364	322,198.728	0.00E+00	3.93E+01	7.85E+01		
Pu-241	3.3415E-02	161,099.364	322,198.728	0.00E+00	5.38E+03	1.08E+04		
Pu-242	3.6329E-07	161,099.364	322,198.728	0.00E+00	5.85E-02	1.17E-01		
Ra-226	2.2854E-10	161,099.364	322,198.728	0.00E+00	3.68E-05	7.36E-05		
Ra-228	1.2426E-14	161,099.364	322,198.728	0.00E+00	2.00E-09	4.00E-09		
Ru-106	6.3589E-06	161,099.364	322,198.728	0.00E+00	1.02E+00	2.05E+00		
Se-79	1.2933E-05	161,099.364	322,198.728	0.00E+00	2.08E+00	4.17E+00		
Sn-126	1.1574E-05	161,099.364	322,198.728	0.00E+00	1.86E+00	3.73E+00		
Sr-90	1.9248E+00	161,099.364	322,198.728	0.00E+00	3.10E+05	6.20E+05		
Tc-99	4.2239E-04	161,099.364	322,198.728	0.00E+00	6.80E+01	1.36E+02		
Th-229	5.0953E-12	161,099.364	322,198.728	0.00E+00	8.21E-07	1.64E-06		
Th-230	4.1885E-08	161,099.364	322,198.728	0.00E+00	6.75E-03	1.35E-02		
Th-232	1.9270E-14	161,099.364	322,198.728	0.00E+00	3.10E-09	6.21E-09		
Tl-208	4.6024E-08	161,099.364	322,198.728	0.00E+00	7.41E-03	1.48E-02		
U-232	1.2582E-07	161,099.364	322,198.728	0.00E+00	2.03E-02	4.05E-02		
U-233	2.5825E-09	161,099.364	322,198.728	0.00E+00	4.16E-04	8.32E-04		
U-234	1.8450E-04	161,099.364	322,198.728	0.00E+00	2.97E+01	5.94E+01		
U-235	-2.7235E-06	161,099.364	0.000	4.15E-01	0.00E+00	4.15E-01	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.5493E-05	161,099.364	322,198.728	0.00E+00	2.50E+00	4.99E+00	3.84E+03	7.68E+03
U-238	-4.2851E-09	161,099.364	0.000	2.58E-01	2.57E-01	2.58E-01	Total	Total
Y-90	1.9254E+00	161,099.364	322,198.728	0.00E+00	3.10E+05	6.20E+05		
Other Radionuclides					3.12E+05	6.23E+05		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	20	60 to 100	

Burnup Summary (MWD) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		161,099.364	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		322,198.728	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.53		
Bounding:	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 MTR-C (TURKEY) 1 Fuel decay start date: 2010
 SNF ID #: 643 Estimates as of: 2030
 Fuel Units & Descr: 8 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=1.78kg ; EOL=.95kg 2 Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.33

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	784.132	1,568.264	0.00E+00	5.20E-07	1.04E-06	Avg. MeV	
Am-241	2.0060E-03	784.132	1,568.264	0.00E+00	1.57E+00	3.15E+00	0.0150	1.655E+14
Am-242m	4.2429E-07	784.132	1,568.264	0.00E+00	3.33E-04	6.65E-04	0.0250	3.442E+13
Am-243	1.4899E-06	784.132	1,568.264	0.00E+00	1.17E-03	2.34E-03	0.0375	3.003E+13
C-14	5.7135E-09	784.132	1,568.264	0.00E+00	4.48E-06	8.96E-06	0.0575	3.216E+13
Cf-252	1.3124E-32	784.132	1,568.264	0.00E+00	1.03E-29	2.06E-29	0.0850	1.943E+13
Cm-243	1.6443E-07	784.132	1,568.264	0.00E+00	1.29E-04	2.58E-04	0.1250	1.315E+13
Cm-244	2.9330E-05	784.132	1,568.264	0.00E+00	2.30E-02	4.60E-02	0.2250	1.677E+13
Co-60	5.3186E-06	784.132	1,568.264	0.00E+00	4.17E-03	8.34E-03	0.3750	7.299E+12
Cs-134	3.1563E-03	784.132	1,568.264	0.00E+00	2.47E+00	4.95E+00	0.5750	1.191E+14
Cs-135	3.4477E-06	784.132	1,568.264	0.00E+00	2.70E-03	5.41E-03	0.8500	2.013E+12
Cs-137	2.0313E+00	784.132	1,568.264	0.00E+00	1.59E+03	3.19E+03	1.2500	1.149E+12
Eu-154	2.4513E-02	784.132	1,568.264	0.00E+00	1.92E+01	3.84E+01	1.7500	5.277E+10
Eu-155	4.8175E-03	784.132	1,568.264	0.00E+00	3.78E+00	7.56E+00	2.2500	4.629E+06
Fe-55	1.2397E-04	784.132	1,568.264	0.00E+00	9.72E-02	1.94E-01	2.7500	2.616E+06
H-3	4.5697E-03	784.132	1,568.264	0.00E+00	3.58E+00	7.17E+00	3.5000	1.202E+04
I-129	7.5300E-07	784.132	1,568.264	0.00E+00	5.90E-04	1.18E-03	5.0000	6.794E+02
Kr-85	1.0850E-01	784.132	1,568.264	0.00E+00	8.51E+01	1.70E+02	7.0000	7.501E+01
Np-237	9.5561E-06	784.132	1,568.264	0.00E+00	7.49E-03	1.50E-02	11.0000	8.407E+00
Pa-231	2.0359E-09	784.132	1,568.264	0.00E+00	1.60E-06	3.19E-06		
Pb-210	4.9728E-11	784.132	1,568.264	0.00E+00	3.90E-08	7.80E-08		
Pm-147	4.8502E-02	784.132	1,568.264	0.00E+00	3.80E+01	7.61E+01		
Pu-238	1.8254E-02	784.132	1,568.264	0.00E+00	1.43E+01	2.86E+01		
Pu-239	4.2810E-04	784.132	1,568.264	0.00E+00	3.36E-01	6.71E-01		
Pu-240	2.4368E-04	784.132	1,568.264	0.00E+00	1.91E-01	3.82E-01		
Pu-241	3.3415E-02	784.132	1,568.264	0.00E+00	2.62E+01	5.24E+01		
Pu-242	3.6329E-07	784.132	1,568.264	0.00E+00	2.85E-04	5.70E-04		
Ra-226	2.2854E-10	784.132	1,568.264	0.00E+00	1.79E-07	3.58E-07		
Ra-228	1.2426E-14	784.132	1,568.264	0.00E+00	9.74E-12	1.95E-11		
Ru-106	6.3589E-06	784.132	1,568.264	0.00E+00	4.99E-03	9.97E-03		
Se-79	1.2933E-05	784.132	1,568.264	0.00E+00	1.01E-02	2.03E-02		
Sn-126	1.1574E-05	784.132	1,568.264	0.00E+00	9.08E-03	1.82E-02		
Sr-90	1.9248E+00	784.132	1,568.264	0.00E+00	1.51E+03	3.02E+03		
Tc-99	4.2239E-04	784.132	1,568.264	0.00E+00	3.31E-01	6.62E-01		
Th-229	5.0953E-12	784.132	1,568.264	0.00E+00	4.00E-09	7.99E-09		
Th-230	4.1885E-08	784.132	1,568.264	0.00E+00	3.28E-05	6.57E-05		
Th-232	1.9270E-14	784.132	1,568.264	0.00E+00	1.51E-11	3.02E-11		
Th-208	4.6024E-08	784.132	1,568.264	0.00E+00	3.61E-05	7.22E-05		
U-232	1.2582E-07	784.132	1,568.264	0.00E+00	9.87E-05	1.97E-04		
U-233	2.5825E-09	784.132	1,568.264	0.00E+00	2.03E-06	4.05E-06		
U-234	1.8450E-04	784.132	1,568.264	0.00E+00	1.45E-01	2.89E-01		
U-235	-2.7235E-06	784.132	0.000	3.58E-03	1.44E-03	3.58E-03		
U-236	1.5493E-05	784.132	1,568.264	0.00E+00	1.21E-02	2.43E-02		
U-238	-4.2851E-09	784.132	0.000	4.19E-05	3.85E-05	4.19E-05		
Y-90	1.9254E+00	784.132	1,568.264	0.00E+00	1.51E+03	3.02E+03		
Other Radionuclides					1.52E+03	3.03E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.87E+01	3.74E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.00002122	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	784.132	784.132	
Bounding:		1,568.264	

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:	1.40	
Bounding:	2.80	

Estimated EOL HM/ Given EOL HM: 1.05

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C1 (SWITZERLAND) ¹Fuel decay start date: 2010
 SNF ID #: 656 Estimates as of: 2030
 Fuel Units & Descr: 7 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=1.28kg ; EOL=.52kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.29

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	721.250	1,211.806	0.00E+00	4.78E-07	8.04E-07	Avg. MeV	
Am-241	2.0060E-03	721.250	1,211.806	0.00E+00	1.45E+00	2.43E+00	0.0150	1.279E+14
Am-242m	4.2429E-07	721.250	1,211.806	0.00E+00	3.06E-04	5.14E-04	0.0250	2.660E+13
Am-243	1.4899E-06	721.250	1,211.806	0.00E+00	1.07E-03	1.81E-03	0.0375	2.320E+13
C-14	5.7135E-09	721.250	1,211.806	0.00E+00	4.12E-06	6.92E-06	0.0575	2.485E+13
Cl-36	1.3124E-32	721.250	1,211.806	0.00E+00	9.47E-30	1.59E-29	0.0850	1.502E+13
Cm-243	1.6443E-07	721.250	1,211.806	0.00E+00	1.19E-04	1.99E-04	0.1250	1.016E+13
Cm-244	2.9330E-05	721.250	1,211.806	0.00E+00	2.12E-02	3.55E-02	0.2250	1.296E+13
Co-60	5.3186E-06	721.250	1,211.806	0.00E+00	3.84E-03	6.45E-03	0.3750	5.640E+12
Cs-134	3.1563E-03	721.250	1,211.806	0.00E+00	2.28E+00	3.82E+00	0.5750	9.200E+12
Cs-135	3.4477E-06	721.250	1,211.806	0.00E+00	2.49E-03	4.18E-03	0.8500	1.555E+12
Cs-137	2.0313E+00	721.250	1,211.806	0.00E+00	1.47E+03	2.46E+03	1.2500	8.882E+11
Eu-154	2.4513E-02	721.250	1,211.806	0.00E+00	1.77E+01	2.97E+01	1.7500	4.077E+10
Eu-155	4.8175E-03	721.250	1,211.806	0.00E+00	3.47E+00	5.84E+00	2.2500	3.577E+06
Fe-55	1.2397E-04	721.250	1,211.806	0.00E+00	8.94E-02	1.50E-01	2.7500	2.021E+06
H-3	4.5697E-03	721.250	1,211.806	0.00E+00	3.30E+00	5.54E+00	3.5000	9.289E+03
I-129	7.5300E-07	721.250	1,211.806	0.00E+00	5.43E-04	9.12E-04	5.0000	5.249E+02
Kr-85	1.0850E-01	721.250	1,211.806	0.00E+00	7.83E+01	1.31E+02	7.0000	5.796E+01
Np-237	9.5561E-06	721.250	1,211.806	0.00E+00	6.89E-03	1.16E-02	11.0000	6.496E+00
Pa-231	2.0359E-09	721.250	1,211.806	0.00E+00	1.47E-06	2.47E-06		
Pb-210	4.9728E-11	721.250	1,211.806	0.00E+00	3.59E-08	6.03E-08		
Pm-147	4.8502E-02	721.250	1,211.806	0.00E+00	3.50E+01	5.88E+01		
Pu-238	1.8254E-02	721.250	1,211.806	0.00E+00	1.32E+01	2.21E+01		
Pu-239	4.2810E-04	721.250	1,211.806	0.00E+00	3.09E-01	5.19E-01		
Pu-240	2.4368E-04	721.250	1,211.806	0.00E+00	1.76E-01	2.95E-01		
Pu-241	3.3415E-02	721.250	1,211.806	0.00E+00	2.41E+01	4.05E+01		
Pu-242	3.6329E-07	721.250	1,211.806	0.00E+00	2.62E-04	4.40E-04		
Ra-226	2.2854E-10	721.250	1,211.806	0.00E+00	1.65E-07	2.77E-07		
Ra-228	1.2426E-14	721.250	1,211.806	0.00E+00	8.96E-12	1.51E-11		
Ru-106	6.3589E-06	721.250	1,211.806	0.00E+00	4.59E-03	7.71E-03		
Se-79	1.2933E-05	721.250	1,211.806	0.00E+00	9.33E-03	1.57E-02		
Sn-126	1.1574E-05	721.250	1,211.806	0.00E+00	8.35E-03	1.40E-02		
Sr-90	1.9248E+00	721.250	1,211.806	0.00E+00	1.39E+03	2.33E+03		
Tc-99	4.2239E-04	721.250	1,211.806	0.00E+00	3.05E-01	5.12E-01		
Th-229	5.0953E-12	721.250	1,211.806	0.00E+00	3.67E-09	6.17E-09		
Th-230	4.1885E-08	721.250	1,211.806	0.00E+00	3.02E-05	5.08E-05		
Th-232	1.9270E-14	721.250	1,211.806	0.00E+00	1.39E-11	2.34E-11		
Tl-208	4.6024E-08	721.250	1,211.806	0.00E+00	3.32E-05	5.58E-05		
U-232	1.2582E-07	721.250	1,211.806	0.00E+00	9.07E-05	1.52E-04		
U-233	2.5825E-09	721.250	1,211.806	0.00E+00	1.86E-06	3.13E-06		
U-234	1.8450E-04	721.250	1,211.806	0.00E+00	1.33E-01	2.24E-01		
U-235	-2.7235E-06	721.250	0.000	2.57E-03	6.07E-04	2.57E-03		
U-236	1.5493E-05	721.250	1,211.806	0.00E+00	1.12E-02	1.88E-02		
U-238	-4.2851E-09	721.250	0.000	3.01E-05	2.70E-05	3.01E-05		
Y-90	1.9254E+00	721.250	1,211.806	0.00E+00	1.39E+03	2.33E+03		
Other Radionuclides					1.39E+03	2.34E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.72E+01	2.89E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding:	ALUM	ALUM
BOL HM Constituents:	U-ALX	U
BOL Enrichment %:	92.9999987	60 to 100

Basis for Parameter Differences:

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:		721.250
Bounding:		1,211.806

Nominal burnup calculated from the heavy metal mass destroyed.
 Bounding burnup calculated assuming all BOL heavy metal burned.

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	1.79	
Bounding:	3.01	

Estimated EOL HM/Given EOL HM: 1.09

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C2 (SWITZERLAND) ¹Fuel decay start date: 2010
 SNF ID #: 657 Estimates as of: 2030
 Fuel Units & Descr: 11 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=2.46kg ; EOL=1.00kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.46

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	1,387.573	2,330.331	0.00E+00	9.20E-07	1.55E-06	Avg. MeV	
Am-241	2.0060E-03	1,387.573	2,330.331	0.00E+00	2.78E+00	4.67E+00	0.0150	2.460E+14
Am-242m	4.2429E-07	1,387.573	2,330.331	0.00E+00	5.89E-04	9.89E-04	0.0250	5.115E+13
Am-243	1.4899E-06	1,387.573	2,330.331	0.00E+00	2.07E-03	3.47E-03	0.0375	4.462E+13
C-14	5.7135E-09	1,387.573	2,330.331	0.00E+00	7.93E-06	1.33E-05	0.0575	4.779E+13
Cl-36	1.3124E-32	1,387.573	2,330.331	0.00E+00	1.82E-29	3.06E-29	0.0850	2.888E+13
Cm-243	1.6443E-07	1,387.573	2,330.331	0.00E+00	2.28E-04	3.83E-04	0.1250	1.954E+13
Cm-244	2.9330E-05	1,387.573	2,330.331	0.00E+00	4.07E-02	6.83E-02	0.2250	2.492E+13
Co-60	5.3186E-06	1,387.573	2,330.331	0.00E+00	7.38E-03	1.24E-02	0.3750	1.085E+13
Cs-134	3.1563E-03	1,387.573	2,330.331	0.00E+00	4.38E+00	7.36E+00	0.5750	1.769E+14
Cs-135	3.4477E-06	1,387.573	2,330.331	0.00E+00	4.78E-03	8.03E-03	0.8500	2.991E+12
Cs-137	2.0313E+00	1,387.573	2,330.331	0.00E+00	2.82E+03	4.73E+03	1.2500	1.708E+12
Eu-154	2.4513E-02	1,387.573	2,330.331	0.00E+00	3.40E+01	5.71E+01	1.7500	7.841E+10
Eu-155	4.8175E-03	1,387.573	2,330.331	0.00E+00	6.68E+00	1.12E+01	2.2500	6.878E+06
Fe-55	1.2397E-04	1,387.573	2,330.331	0.00E+00	1.72E-01	2.89E-01	2.7500	3.887E+06
H-3	4.5697E-03	1,387.573	2,330.331	0.00E+00	6.34E+00	1.06E+01	3.5000	1.786E+04
I-129	7.5300E-07	1,387.573	2,330.331	0.00E+00	1.04E-03	1.75E-03	5.0000	1.009E+03
Kr-85	1.0850E-01	1,387.573	2,330.331	0.00E+00	1.51E+02	2.53E+02	7.0000	1.115E+02
Np-237	9.5561E-06	1,387.573	2,330.331	0.00E+00	1.33E-02	2.23E-02	11.0000	1.249E+01
Pa-231	2.0359E-09	1,387.573	2,330.331	0.00E+00	2.83E-06	4.74E-06		
Pb-210	4.9728E-11	1,387.573	2,330.331	0.00E+00	6.90E-08	1.16E-07		
Pm-147	4.8502E-02	1,387.573	2,330.331	0.00E+00	6.73E+01	1.13E+02		
Pu-238	1.8254E-02	1,387.573	2,330.331	0.00E+00	2.53E+01	4.25E+01		
Pu-239	4.2810E-04	1,387.573	2,330.331	0.00E+00	5.94E-01	9.98E-01		
Pu-240	2.4368E-04	1,387.573	2,330.331	0.00E+00	3.38E-01	5.68E-01		
Pu-241	3.3415E-02	1,387.573	2,330.331	0.00E+00	4.64E+01	7.79E+01		
Pu-242	3.6329E-07	1,387.573	2,330.331	0.00E+00	5.04E-04	8.47E-04		
Ra-226	2.2854E-10	1,387.573	2,330.331	0.00E+00	3.17E-07	5.33E-07		
Ra-228	1.2426E-14	1,387.573	2,330.331	0.00E+00	1.72E-11	2.90E-11		
Ru-106	6.3589E-06	1,387.573	2,330.331	0.00E+00	8.82E-03	1.48E-02		
Se-79	1.2933E-05	1,387.573	2,330.331	0.00E+00	1.79E-02	3.01E-02		
Sn-126	1.1574E-05	1,387.573	2,330.331	0.00E+00	1.61E-02	2.70E-02		
Sr-90	1.9248E+00	1,387.573	2,330.331	0.00E+00	2.67E+03	4.49E+03		
Tc-99	4.2239E-04	1,387.573	2,330.331	0.00E+00	5.86E-01	9.84E-01		
Th-229	5.0953E-12	1,387.573	2,330.331	0.00E+00	7.07E-09	1.19E-08		
Th-230	4.1885E-08	1,387.573	2,330.331	0.00E+00	5.81E-05	9.76E-05		
Th-232	1.9270E-14	1,387.573	2,330.331	0.00E+00	2.67E-11	4.49E-11		
Tl-208	4.6024E-08	1,387.573	2,330.331	0.00E+00	6.39E-05	1.07E-04		
U-232	1.2582E-07	1,387.573	2,330.331	0.00E+00	1.75E-04	2.93E-04		
U-233	2.5825E-09	1,387.573	2,330.331	0.00E+00	3.58E-06	6.02E-06		
U-234	1.8450E-04	1,387.573	2,330.331	0.00E+00	2.56E-01	4.30E-01		
U-235	-2.7235E-06	1,387.573	0.000	4.95E-03	1.17E-03	4.95E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.5493E-05	1,387.573	2,330.331	0.00E+00	2.15E-02	3.61E-02	3.31E+01	5.56E+01
U-238	-4.2851E-09	1,387.573	0.000	5.79E-05	5.19E-05	5.79E-05	Total	Total
Y-90	1.9254E+00	1,387.573	2,330.331	0.00E+00	2.67E+03	4.49E+03		
Other Radionuclides					2.68E+03	4.51E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.00001006	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,387.573	Nominal burnup calculated from the heavy metal mass destroyed. Bunding burnup calculated assuming all BOL heavy metal burned.
Bounding:		2,330.331	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.79		1.09
Bounding:	3.01		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-C2 (TURKEY) 1 Fuel decay start date: 2010
 SNF ID #: 527 Estimates as of: 2030
 Fuel Units & Descr: 9 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=13.95kg ; EOL=12.28kg 2 Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
Canister usage:
18"x10"
0.38

II. Estimates

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	1,585.311	3,170.621	0.00E+00	1.05E-06	2.10E-06	Avg. MeV	
Am-241	2.0060E-03	1,585.311	3,170.621	0.00E+00	3.18E+00	6.36E+00	0.0150	3.347E+14
Am-242m	4.2429E-07	1,585.311	3,170.621	0.00E+00	6.73E-04	1.35E-03	0.0250	6.960E+13
Am-243	1.4899E-06	1,585.311	3,170.621	0.00E+00	2.36E-03	4.72E-03	0.0375	6.071E+13
C-14	5.7135E-09	1,585.311	3,170.621	0.00E+00	9.06E-06	1.81E-05	0.0575	6.502E+13
Cl-36	1.3124E-32	1,585.311	3,170.621	0.00E+00	2.08E-29	4.16E-29	0.0850	3.929E+13
Cm-243	1.6443E-07	1,585.311	3,170.621	0.00E+00	2.61E-04	5.21E-04	0.1250	2.659E+13
Cm-244	2.9330E-05	1,585.311	3,170.621	0.00E+00	4.65E-02	9.30E-02	0.2250	3.390E+13
Co-60	5.3186E-06	1,585.311	3,170.621	0.00E+00	8.43E-03	1.69E-02	0.3750	1.476E+13
Cs-134	3.1563E-03	1,585.311	3,170.621	0.00E+00	5.00E+00	1.00E+01	0.5750	2.407E+14
Cs-135	3.4477E-06	1,585.311	3,170.621	0.00E+00	5.47E-03	1.09E-02	0.8500	4.070E+12
Cs-137	2.0313E+00	1,585.311	3,170.621	0.00E+00	3.22E+03	6.44E+03	1.2500	2.324E+12
Eu-154	2.4513E-02	1,585.311	3,170.621	0.00E+00	3.89E+01	7.77E+01	1.7500	1.067E+11
Eu-155	4.8175E-03	1,585.311	3,170.621	0.00E+00	7.64E+00	1.53E+01	2.2500	9.359E+06
Fe-55	1.2397E-04	1,585.311	3,170.621	0.00E+00	1.97E-01	3.93E-01	2.7500	5.289E+06
H-3	4.5697E-03	1,585.311	3,170.621	0.00E+00	7.24E+00	1.45E+01	3.5000	2.432E+04
I-129	7.5300E-07	1,585.311	3,170.621	0.00E+00	1.19E-03	2.39E-03	5.0000	1.382E+03
Kr-85	1.0850E-01	1,585.311	3,170.621	0.00E+00	1.72E+02	3.44E+02	7.0000	1.526E+02
Np-237	9.5561E-06	1,585.311	3,170.621	0.00E+00	1.51E-02	3.03E-02	11.0000	1.711E+01
Pa-231	2.0359E-09	1,585.311	3,170.621	0.00E+00	3.23E-06	6.46E-06		
Pb-210	4.9728E-11	1,585.311	3,170.621	0.00E+00	7.88E-08	1.58E-07		
Pm-147	4.8502E-02	1,585.311	3,170.621	0.00E+00	7.69E+01	1.54E+02		
Pu-238	1.8254E-02	1,585.311	3,170.621	0.00E+00	2.89E+01	5.79E+01		
Pu-239	4.2810E-04	1,585.311	3,170.621	0.00E+00	6.79E-01	1.36E+00		
Pu-240	2.4368E-04	1,585.311	3,170.621	0.00E+00	3.86E-01	7.73E-01		
Pu-241	3.3415E-02	1,585.311	3,170.621	0.00E+00	5.30E+01	1.06E+02		
Pu-242	3.6329E-07	1,585.311	3,170.621	0.00E+00	5.76E-04	1.15E-03		
Ra-226	2.2854E-10	1,585.311	3,170.621	0.00E+00	3.62E-07	7.25E-07		
Ra-228	1.2426E-14	1,585.311	3,170.621	0.00E+00	1.97E-11	3.94E-11		
Ru-106	6.3589E-06	1,585.311	3,170.621	0.00E+00	1.01E-02	2.02E-02		
Se-79	1.2933E-05	1,585.311	3,170.621	0.00E+00	2.05E-02	4.10E-02		
Sn-126	1.1574E-05	1,585.311	3,170.621	0.00E+00	1.83E-02	3.67E-02		
Sr-90	1.9248E+00	1,585.311	3,170.621	0.00E+00	3.05E+03	6.10E+03		
Tc-99	4.2239E-04	1,585.311	3,170.621	0.00E+00	6.70E-01	1.34E+00		
Th-229	5.0953E-12	1,585.311	3,170.621	0.00E+00	8.08E-09	1.62E-08		
Th-230	4.1885E-08	1,585.311	3,170.621	0.00E+00	6.64E-05	1.33E-04		
Th-232	1.9270E-14	1,585.311	3,170.621	0.00E+00	3.05E-11	6.11E-11		
Tl-208	4.6024E-08	1,585.311	3,170.621	0.00E+00	7.30E-05	1.46E-04		
U-232	1.2582E-07	1,585.311	3,170.621	0.00E+00	1.99E-04	3.99E-04		
U-233	2.5825E-09	1,585.311	3,170.621	0.00E+00	4.09E-06	8.19E-06		
U-234	1.8450E-04	1,585.311	3,170.621	0.00E+00	2.92E-01	5.85E-01		
U-235	-2.7235E-06	1,585.311	0.000	6.03E-03	1.71E-03	6.03E-03		
U-236	1.5493E-05	1,585.311	3,170.621	0.00E+00	2.46E-02	4.91E-02		
U-238	-4.2851E-09	1,585.311	0.000	3.75E-03	3.74E-03	3.75E-03		
Y-90	1.9254E+00	1,585.311	3,170.621	0.00E+00	3.05E+03	6.10E+03		
Other Radionuclides					3.07E+03	6.13E+03		

Thermal Power
 Nominal Heat Output (Watts) **3.78E+01**
 Bounding Heat Output (Watts) **7.56E+01**
 Total Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20.0000077	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		1,585.311	
Bounding:		3,170.621	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.36		1.01
Bounding:	0.72		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FRR MTR-O (PORTUGAL) Fuel decay start date: 2010
 SNF ID #: 541 Estimates as of: 2030
 Fuel Units & Descr: 3 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=1.35kg ; EOL=1.35kg Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.13

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
Radionuclide	CI/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	25.570	127.848	0.00E+00	1.70E-08	8.48E-08	Avg. MeV	
Am-241	2.0060E-03	25.570	127.848	0.00E+00	5.13E-02	2.56E-01	0.0150	1.350E+13
Am-242m	4.2429E-07	25.570	127.848	0.00E+00	1.08E-05	5.42E-05	0.0250	2.806E+12
Am-243	1.4899E-06	25.570	127.848	0.00E+00	3.81E-05	1.90E-04	0.0375	2.448E+12
C-14	5.7135E-09	25.570	127.848	0.00E+00	1.46E-07	7.30E-07	0.0575	2.622E+12
Cl-36	1.3124E-32	25.570	127.848	0.00E+00	3.36E-31	1.68E-30	0.0850	1.584E+12
Cr-243	1.6443E-07	25.570	127.848	0.00E+00	4.20E-06	2.10E-05	0.1250	1.072E+12
Cr-244	2.9330E-05	25.570	127.848	0.00E+00	7.50E-04	3.75E-03	0.2250	1.367E+12
Co-60	5.3186E-06	25.570	127.848	0.00E+00	1.36E-04	6.80E-04	0.3750	5.950E+11
Cs-134	3.1563E-03	25.570	127.848	0.00E+00	8.07E-02	4.04E-01	0.5750	9.707E+11
Cs-135	3.4477E-06	25.570	127.848	0.00E+00	8.82E-05	4.41E-04	0.8500	1.641E+11
Cs-137	2.0313E+00	25.570	127.848	0.00E+00	5.19E+01	2.60E+02	1.2500	9.371E+10
Eu-154	2.4513E-02	25.570	127.848	0.00E+00	6.27E-01	3.13E+00	1.7500	4.302E+09
Eu-155	4.8175E-03	25.570	127.848	0.00E+00	1.23E-01	6.16E-01	2.2500	3.774E+05
Fe-55	1.2397E-04	25.570	127.848	0.00E+00	3.17E-03	1.58E-02	2.7500	2.133E+05
H-3	4.5697E-03	25.570	127.848	0.00E+00	1.17E-01	5.84E-01	3.5000	9.819E+02
I-129	7.5300E-07	25.570	127.848	0.00E+00	1.93E-05	9.63E-05	5.0000	5.621E+01
Kr-85	1.0850E-01	25.570	127.848	0.00E+00	2.77E+00	1.39E+01	7.0000	6.211E+00
Np-237	9.5561E-06	25.570	127.848	0.00E+00	2.44E-04	1.22E-03	11.0000	6.963E-01
Pa-231	2.0359E-09	25.570	127.848	0.00E+00	5.21E-08	2.60E-07		
Pb-210	4.9728E-11	25.570	127.848	0.00E+00	1.27E-09	6.36E-09		
Pm-147	4.8502E-02	25.570	127.848	0.00E+00	1.24E+00	6.20E+00		
Pu-238	1.8254E-02	25.570	127.848	0.00E+00	4.67E-01	2.33E+00		
Pu-239	4.2810E-04	25.570	127.848	0.00E+00	1.09E-02	5.47E-02		
Pu-240	2.4368E-04	25.570	127.848	0.00E+00	6.23E-03	3.12E-02		
Pu-241	3.3415E-02	25.570	127.848	0.00E+00	8.54E-01	4.27E+00		
Pu-242	3.6329E-07	25.570	127.848	0.00E+00	9.29E-06	4.64E-05		
Ra-226	2.2854E-10	25.570	127.848	0.00E+00	5.84E-09	2.92E-08		
Ra-228	1.2426E-14	25.570	127.848	0.00E+00	3.18E-13	1.59E-12		
Ru-106	6.3589E-06	25.570	127.848	0.00E+00	1.63E-04	8.13E-04		
Se-79	1.2933E-05	25.570	127.848	0.00E+00	3.31E-04	1.65E-03		
Sn-126	1.1574E-05	25.570	127.848	0.00E+00	2.96E-04	1.48E-03		
Sr-90	1.9248E+00	25.570	127.848	0.00E+00	4.92E+01	2.46E+02		
Tc-99	4.2239E-04	25.570	127.848	0.00E+00	1.08E-02	5.40E-02		
Th-229	5.0953E-12	25.570	127.848	0.00E+00	1.30E-10	6.51E-10		
Th-230	4.1885E-08	25.570	127.848	0.00E+00	1.07E-06	5.35E-06		
Th-232	1.9270E-14	25.570	127.848	0.00E+00	4.93E-13	2.46E-12		
Th-208	4.6024E-08	25.570	127.848	0.00E+00	1.18E-06	5.88E-06		
U-232	1.2582E-07	25.570	127.848	0.00E+00	3.22E-06	1.61E-05		
U-233	2.5825E-09	25.570	127.848	0.00E+00	6.60E-08	3.30E-07		
U-234	1.8450E-04	25.570	127.848	0.00E+00	4.72E-03	2.36E-02		
U-235	-2.7235E-06	25.570	0.000	5.83E-04	5.14E-04	5.83E-04		
U-236	1.5493E-05	25.570	127.848	0.00E+00	3.96E-04	1.98E-03		
U-238	-4.2851E-09	25.570	0.000	3.63E-04	3.63E-04	3.63E-04		
Y-90	1.9254E+00	25.570	127.848	0.00E+00	4.92E+01	2.46E+02	6.10E-01	3.05E+00
Other Radionuclides					4.95E+01	2.47E+02	Total	Total

III. Template Selection Summary, Burnup Summary, and Checks
Template Selection Summary

	From SFD	Used	Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	20.00000132	60 to 100	

Burnup Summary (MWd)²

	From SFD	Estimated	Basis for burnup used in estimate: Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup taken directly from SFD (converted to MWd).
Nominal:	127.848	25.570	
Bounding:	127.848	51.139	

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.06		0.98
Bounding:	0.30	0.40	

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: FRR MTR-O (TURKEY) 1 Fuel decay start date: 2010
 SNF ID #: 642 Estimates as of: 2030
 Fuel Units & Descr: 2 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=.37kg ; EOL=.20kg 2 Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.08

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	160.993	321.987	0.00E+00	1.07E-07	2.14E-07		
Am-241	2.0060E-03	160.993	321.987	0.00E+00	3.23E-01	6.46E-01	0.0150	3.399E+13
Am-242m	4.2429E-07	160.993	321.987	0.00E+00	6.83E-05	1.37E-04	0.0250	7.068E+12
Am-243	1.4899E-06	160.993	321.987	0.00E+00	2.40E-04	4.80E-04	0.0375	6.165E+12
C-14	5.7135E-09	160.993	321.987	0.00E+00	9.20E-07	1.84E-06	0.0575	6.603E+12
Cl-36	1.3124E-32	160.993	321.987	0.00E+00	2.11E-30	4.23E-30	0.0850	3.990E+12
Cm-243	1.6443E-07	160.993	321.987	0.00E+00	2.65E-05	5.29E-05	0.1250	2.700E+12
Cm-244	2.9330E-05	160.993	321.987	0.00E+00	4.72E-03	9.44E-03	0.2250	3.443E+12
Co-60	5.3186E-06	160.993	321.987	0.00E+00	8.56E-04	1.71E-03	0.3750	1.499E+12
Cs-134	3.1563E-03	160.993	321.987	0.00E+00	5.08E-01	1.02E+00	0.5750	2.445E+13
Cs-135	3.4477E-06	160.993	321.987	0.00E+00	5.55E-04	1.11E-03	0.8500	4.133E+11
Cs-137	2.0313E+00	160.993	321.987	0.00E+00	3.27E+02	6.54E+02	1.2500	2.360E+11
Eu-154	2.4513E-02	160.993	321.987	0.00E+00	3.95E+00	7.89E+00	1.7500	1.083E+10
Eu-155	4.8175E-03	160.993	321.987	0.00E+00	7.76E-01	1.55E+00	2.2500	9.504E+05
Fe-55	1.2397E-04	160.993	321.987	0.00E+00	2.00E-02	3.99E-02	2.7500	5.371E+05
H-3	4.5697E-03	160.993	321.987	0.00E+00	7.36E-01	1.47E+00	3.5000	2.468E+03
I-129	7.5300E-07	160.993	321.987	0.00E+00	1.21E-04	2.42E-04	5.0000	1.395E+02
Kr-85	1.0850E-01	160.993	321.987	0.00E+00	1.75E+01	3.49E+01	7.0000	1.540E+01
Np-237	9.5611E-06	160.993	321.987	0.00E+00	1.54E-03	3.08E-03	11.0000	1.726E+00
Pa-231	2.0359E-09	160.993	321.987	0.00E+00	3.28E-07	6.56E-07		
Pb-210	4.9728E-11	160.993	321.987	0.00E+00	8.01E-09	1.60E-08		
Pm-147	4.8502E-02	160.993	321.987	0.00E+00	7.81E+00	1.56E+01		
Pu-238	1.8254E-02	160.993	321.987	0.00E+00	2.94E+00	5.88E+00		
Pu-239	4.2810E-04	160.993	321.987	0.00E+00	6.89E-02	1.38E-01		
Pu-240	2.4368E-04	160.993	321.987	0.00E+00	3.92E-02	7.85E-02		
Pu-241	3.3415E-02	160.993	321.987	0.00E+00	5.38E+00	1.08E+01		
Pu-242	3.6329E-07	160.993	321.987	0.00E+00	5.85E-05	1.17E-04		
Ra-226	2.2854E-10	160.993	321.987	0.00E+00	3.68E-08	7.36E-08		
Ra-228	1.2428E-14	160.993	321.987	0.00E+00	2.00E-12	4.00E-12		
Ru-106	6.3589E-06	160.993	321.987	0.00E+00	1.02E-03	2.05E-03		
Se-79	1.2933E-05	160.993	321.987	0.00E+00	2.08E-03	4.16E-03		
Sn-126	1.1574E-05	160.993	321.987	0.00E+00	1.86E-03	3.73E-03		
Sr-90	1.9248E+00	160.993	321.987	0.00E+00	3.10E+02	6.20E+02		
Tc-99	4.2239E-04	160.993	321.987	0.00E+00	6.80E-02	1.36E-01		
Th-229	5.0953E-12	160.993	321.987	0.00E+00	8.20E-10	1.64E-09		
Th-230	4.1885E-08	160.993	321.987	0.00E+00	6.74E-06	1.35E-05		
Th-232	1.9270E-14	160.993	321.987	0.00E+00	3.10E-12	6.20E-12		
Tl-208	4.6024E-08	160.993	321.987	0.00E+00	7.41E-06	1.48E-05		
U-232	1.2582E-07	160.993	321.987	0.00E+00	2.03E-05	4.05E-05		
U-233	2.5825E-09	160.993	321.987	0.00E+00	4.16E-07	8.32E-07		
U-234	1.8450E-04	160.993	321.987	0.00E+00	2.97E-02	5.94E-02		
U-235	-2.7235E-06	160.993	0.000	7.35E-04	2.96E-04	7.35E-04		
U-236	1.5493E-05	160.993	321.987	0.00E+00	2.49E-03	4.99E-03		
U-238	-4.2851E-09	160.993	0.000	8.60E-06	7.91E-06	8.60E-06		
Y-90	1.9254E+00	160.993	321.987	0.00E+00	3.10E+02	6.20E+02		
Other Radionuclides					3.11E+02	6.23E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.84E+00	7.68E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.999987	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		160.993	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		321.987	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	1.40		1.05
Bounding:	2.80		

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

²Total burnup for all fuel associated with this worksheet must be 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 (CANADA) 1 Fuel decay start date: 2010
 SNF ID #: 513 Estimates as of: 2030
 Fuel Units & Descr: 35 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=50.75kg ; EOL=45.68kg 2 Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.46

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	4,806.123	9,612.247	0.00E+00	3.19E-06	6.37E-06		
Am-241	2.0060E-03	4,806.123	9,612.247	0.00E+00	9.64E+00	1.93E+01	0.0150	1.015E+15
Am-242m	4.2429E-07	4,806.123	9,612.247	0.00E+00	2.04E-03	4.08E-03	0.0250	2.110E+14
Am-243	1.4899E-06	4,806.123	9,612.247	0.00E+00	7.16E-03	1.43E-02	0.0375	1.840E+14
C-14	5.7135E-09	4,806.123	9,612.247	0.00E+00	2.75E-05	5.49E-05	0.0575	1.971E+14
Cl-36	1.3124E-32	4,806.123	9,612.247	0.00E+00	6.31E-29	1.26E-28	0.0850	1.191E+14
Cm-243	1.6443E-07	4,806.123	9,612.247	0.00E+00	7.90E-04	1.58E-03	0.1250	8.060E+13
Cm-244	2.9330E-05	4,806.123	9,612.247	0.00E+00	1.41E-01	2.82E-01	0.2250	1.028E+14
Co-60	5.3186E-06	4,806.123	9,612.247	0.00E+00	2.56E-02	5.11E-02	0.3750	4.474E+13
Cs-134	3.1563E-03	4,806.123	9,612.247	0.00E+00	1.52E+01	3.03E+01	0.5750	7.298E+14
Cs-135	3.4477E-06	4,806.123	9,612.247	0.00E+00	1.66E-02	3.31E-02	0.8500	1.234E+13
Cs-137	2.0313E+00	4,806.123	9,612.247	0.00E+00	9.76E+03	1.95E+04	1.2500	7.045E+12
Eu-154	2.4513E-02	4,806.123	9,612.247	0.00E+00	1.18E+02	2.36E+02	1.7500	3.234E+11
Eu-155	4.8175E-03	4,806.123	9,612.247	0.00E+00	2.32E+01	4.63E+01	2.2500	2.837E+07
Fe-55	1.2397E-04	4,806.123	9,612.247	0.00E+00	5.96E-01	1.19E+00	2.7500	1.603E+07
H-3	4.5697E-03	4,806.123	9,612.247	0.00E+00	2.20E+01	4.39E+01	3.5000	7.375E+04
I-129	7.5300E-07	4,806.123	9,612.247	0.00E+00	3.62E-03	7.24E-03	5.0000	4.195E+03
Kr-85	1.0850E-01	4,806.123	9,612.247	0.00E+00	5.21E+02	1.04E+03	7.0000	4.633E+02
Np-237	9.5561E-06	4,806.123	9,612.247	0.00E+00	4.59E-02	9.19E-02	11.0000	5.193E+01
Pa-231	2.0359E-09	4,806.123	9,612.247	0.00E+00	9.79E-06	1.96E-05		
Pb-210	4.9728E-11	4,806.123	9,612.247	0.00E+00	2.39E-07	4.78E-07		
Pm-147	4.8502E-02	4,806.123	9,612.247	0.00E+00	2.33E+02	4.66E+02		
Pu-238	1.8254E-02	4,806.123	9,612.247	0.00E+00	8.77E+01	1.75E+02		
Pu-239	4.2810E-04	4,806.123	9,612.247	0.00E+00	2.06E+00	4.12E+00		
Pu-240	2.4368E-04	4,806.123	9,612.247	0.00E+00	1.17E+00	2.34E+00		
Pu-241	3.3415E-02	4,806.123	9,612.247	0.00E+00	1.61E+02	3.21E+02		
Pu-242	3.6329E-07	4,806.123	9,612.247	0.00E+00	1.75E-03	3.49E-03		
Ra-226	2.2854E-10	4,806.123	9,612.247	0.00E+00	1.10E-06	2.20E-06		
Ra-228	1.2426E-14	4,806.123	9,612.247	0.00E+00	5.97E-11	1.19E-10		
Ru-106	6.3589E-06	4,806.123	9,612.247	0.00E+00	3.06E-02	6.11E-02		
Se-79	1.2933E-05	4,806.123	9,612.247	0.00E+00	6.22E-02	1.24E-01		
Sn-126	1.1574E-05	4,806.123	9,612.247	0.00E+00	5.56E-02	1.11E-01		
Sr-90	1.9248E+00	4,806.123	9,612.247	0.00E+00	9.25E+03	1.85E+04		
Tc-99	4.2239E-04	4,806.123	9,612.247	0.00E+00	2.03E+00	4.06E+00		
Th-229	5.0953E-12	4,806.123	9,612.247	0.00E+00	2.45E-08	4.90E-08		
Th-230	4.1885E-08	4,806.123	9,612.247	0.00E+00	2.01E-04	4.03E-04		
Th-232	1.9270E-14	4,806.123	9,612.247	0.00E+00	9.26E-11	1.85E-10		
Tl-208	4.6024E-08	4,806.123	9,612.247	0.00E+00	2.21E-04	4.42E-04		
U-232	1.2582E-07	4,806.123	9,612.247	0.00E+00	6.05E-04	1.21E-03		
U-233	2.5825E-09	4,806.123	9,612.247	0.00E+00	1.24E-05	2.48E-05		
U-234	1.8450E-04	4,806.123	9,612.247	0.00E+00	8.87E-01	1.77E+00		
U-235	-2.7235E-06	4,806.123	0.000	2.19E-02	8.84E-03	2.19E-02		
U-236	1.5493E-05	4,806.123	9,612.247	0.00E+00	7.45E-02	1.49E-01		
U-238	-4.2851E-09	4,806.123	0.000	1.36E-02	1.36E-02	1.36E-02		
Y-90	1.9254E+00	4,806.123	9,612.247	0.00E+00	9.25E+03	1.85E+04		
Other Radionuclides					9.30E+03	1.86E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.15E+02	2.29E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		4,806.123	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		9,612.247	

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 (CANADA)
 SNF ID #: 720
 Fuel Units & Descr: 21 - MTR TYPE
 Heavy Metal Mass: BOL=4.43kg ; EOL=2.86kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.88

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	1,481.612	2,963.224	0.00E+00	9.82E-07	1.96E-06	Avg. MeV	
Am-241	2.0060E-03	1,481.612	2,963.224	0.00E+00	2.97E+00	5.94E+00	0.0150	3.128E+14
Am-242m	4.2429E-07	1,481.612	2,963.224	0.00E+00	6.29E-04	1.26E-03	0.0250	6.504E+13
Am-243	1.4899E-06	1,481.612	2,963.224	0.00E+00	2.21E-03	4.41E-03	0.0375	5.674E+13
C-14	5.7135E-09	1,481.612	2,963.224	0.00E+00	8.47E-06	1.69E-05	0.0575	6.076E+13
Cl-36	1.3124E-32	1,481.612	2,963.224	0.00E+00	1.94E-29	3.89E-29	0.0850	3.672E+13
Cm-243	1.6443E-07	1,481.612	2,963.224	0.00E+00	2.44E-04	4.87E-04	0.1250	2.485E+13
Cm-244	2.9330E-05	1,481.612	2,963.224	0.00E+00	4.35E-02	8.69E-02	0.2250	3.168E+13
Co-60	5.3186E-06	1,481.612	2,963.224	0.00E+00	7.88E-03	1.58E-02	0.3750	1.379E+13
Cs-134	3.1563E-03	1,481.612	2,963.224	0.00E+00	4.68E+00	9.35E+00	0.5750	2.250E+14
Cs-135	3.4477E-06	1,481.612	2,963.224	0.00E+00	5.11E-03	1.02E-02	0.8500	3.803E+12
Cs-137	2.0313E+00	1,481.612	2,963.224	0.00E+00	3.01E+03	6.02E+03	1.2500	2.172E+12
Eu-154	2.4513E-02	1,481.612	2,963.224	0.00E+00	3.63E+01	7.26E+01	1.7500	9.970E+10
Eu-155	4.8175E-03	1,481.612	2,963.224	0.00E+00	7.14E+00	1.43E+01	2.2500	8.747E+06
Fe-55	1.2397E-04	1,481.612	2,963.224	0.00E+00	1.84E-01	3.67E-01	2.7500	4.943E+06
H-3	4.5697E-03	1,481.612	2,963.224	0.00E+00	6.77E+00	1.35E+01	3.5000	2.271E+04
I-129	7.5300E-07	1,481.612	2,963.224	0.00E+00	1.12E-03	2.23E-03	5.0000	1.284E+03
Kr-85	1.0850E-01	1,481.612	2,963.224	0.00E+00	1.61E+02	3.22E+02	7.0000	1.417E+02
Np-237	9.5561E-06	1,481.612	2,963.224	0.00E+00	1.42E-02	2.83E-02	11.0000	1.589E+01
Pa-231	2.0359E-09	1,481.612	2,963.224	0.00E+00	3.02E-06	6.03E-06		
Pb-210	4.9728E-11	1,481.612	2,963.224	0.00E+00	7.37E-08	1.47E-07		
Pm-147	4.8502E-02	1,481.612	2,963.224	0.00E+00	7.19E+01	1.44E+02		
Pu-238	1.8254E-02	1,481.612	2,963.224	0.00E+00	2.70E+01	5.41E+01		
Pu-239	4.2810E-04	1,481.612	2,963.224	0.00E+00	6.34E-01	1.27E+00		
Pu-240	2.4368E-04	1,481.612	2,963.224	0.00E+00	3.61E-01	7.22E-01		
Pu-241	3.3415E-02	1,481.612	2,963.224	0.00E+00	4.95E+01	9.90E+01		
Pu-242	3.6329E-07	1,481.612	2,963.224	0.00E+00	5.38E-04	1.08E-03		
Ra-226	2.2854E-10	1,481.612	2,963.224	0.00E+00	3.39E-07	6.77E-07		
Ra-228	1.2426E-14	1,481.612	2,963.224	0.00E+00	1.84E-11	3.68E-11		
Ru-106	6.3589E-06	1,481.612	2,963.224	0.00E+00	9.42E-03	1.88E-02		
Se-79	1.2933E-05	1,481.612	2,963.224	0.00E+00	1.92E-02	3.83E-02		
Sn-126	1.1574E-05	1,481.612	2,963.224	0.00E+00	1.71E-02	3.43E-02		
Sr-90	1.9248E+00	1,481.612	2,963.224	0.00E+00	2.85E+03	5.70E+03		
Tc-99	4.2239E-04	1,481.612	2,963.224	0.00E+00	6.26E-01	1.25E+00		
Th-229	5.0953E-12	1,481.612	2,963.224	0.00E+00	7.55E-09	1.51E-08		
Th-230	4.1885E-08	1,481.612	2,963.224	0.00E+00	6.21E-05	1.24E-04		
Th-232	1.9270E-14	1,481.612	2,963.224	0.00E+00	2.86E-11	5.71E-11		
Tl-208	4.6024E-08	1,481.612	2,963.224	0.00E+00	6.82E-05	1.36E-04		
U-232	1.2582E-07	1,481.612	2,963.224	0.00E+00	1.86E-04	3.73E-04		
U-233	2.5825E-09	1,481.612	2,963.224	0.00E+00	3.83E-06	7.65E-06		
U-234	1.8450E-04	1,481.612	2,963.224	0.00E+00	2.73E-01	5.47E-01		
U-235	2.7235E-06	1,481.612	0.000	8.90E-03	4.86E-03	8.90E-03		
U-236	1.5493E-05	1,481.612	2,963.224	0.00E+00	2.30E-02	4.59E-02		
U-238	4.2851E-09	1,481.612	0.000	1.04E-04	9.78E-05	1.04E-04		
Y-90	1.9254E+00	1,481.612	2,963.224	0.00E+00	2.85E+03	5.71E+03		
Other Radionuclides					2.87E+03	5.73E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.53E+01	7.06E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U-ALX	U	
	92.99999478	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:		1,481.612	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
		2,963.224	

Checks			
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Bounding:	1.06		
	2.13		

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

² Total burnup for all fuel associated with this worksheet must be 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 (GERMANY)
 SNF ID #: 1068
 Fuel Units & Descr: 28 - MTR TYPE
 Heavy Metal Mass: BOL=12.88kg ; EOL=9.17kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.17

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	3,513.442	7,026.884	0.00E+00	2.33E-06	4.66E-06	Avg. MeV	
Am-241	2.0060E-03	3,513.442	7,026.884	0.00E+00	7.05E+00	1.41E+01	0.0150	7.417E+14
Am-242m	4.2429E-07	3,513.442	7,026.884	0.00E+00	1.49E-03	2.98E-03	0.0250	1.542E+14
Am-243	1.4899E-06	3,513.442	7,026.884	0.00E+00	5.23E-03	1.05E-02	0.0375	1.345E+14
C-14	5.7135E-09	3,513.442	7,026.884	0.00E+00	2.01E-05	4.01E-05	0.0575	1.441E+14
Cl-36	1.3124E-32	3,513.442	7,026.884	0.00E+00	4.61E-29	9.22E-29	0.0850	8.707E+13
Cm-243	1.6443E-07	3,513.442	7,026.884	0.00E+00	5.78E-04	1.16E-03	0.1250	5.892E+13
Cm-244	2.9330E-05	3,513.442	7,026.884	0.00E+00	1.03E-01	2.06E-01	0.2250	7.519E+13
Co-60	5.3186E-06	3,513.442	7,026.884	0.00E+00	1.87E-02	3.74E-02	0.3750	3.270E+13
Cs-134	3.1563E-03	3,513.442	7,026.884	0.00E+00	1.11E+01	2.22E+01	0.5750	5.335E+14
Cs-135	3.4477E-06	3,513.442	7,026.884	0.00E+00	1.21E-02	2.42E-02	0.8500	9.019E+12
Cs-137	2.0313E-00	3,513.442	7,026.884	0.00E+00	7.14E+03	1.43E+04	1.2500	5.150E+12
Eu-154	2.4513E-02	3,513.442	7,026.884	0.00E+00	8.61E+01	1.72E+02	1.7500	2.364E+11
Eu-155	4.8175E-03	3,513.442	7,026.884	0.00E+00	1.69E+01	3.39E+01	2.2500	2.074E+07
Fe-55	1.2397E-04	3,513.442	7,026.884	0.00E+00	4.36E-01	8.71E-01	2.7500	1.172E+07
H-3	4.5697E-03	3,513.442	7,026.884	0.00E+00	1.61E+01	3.21E+01	3.5000	5.388E+04
I-129	7.5300E-07	3,513.442	7,026.884	0.00E+00	2.65E-03	5.29E-03	5.0000	3.049E+03
Kr-85	1.0850E-01	3,513.442	7,026.884	0.00E+00	3.81E+02	7.62E+02	7.0000	3.367E+02
Np-237	9.5561E-06	3,513.442	7,026.884	0.00E+00	3.36E-02	6.71E-02	11.0000	3.773E+01
Pa-231	2.0359E-09	3,513.442	7,026.884	0.00E+00	7.15E-06	1.43E-05		
Pb-210	4.9728E-11	3,513.442	7,026.884	0.00E+00	1.75E-07	3.49E-07		
Pm-147	4.8502E-02	3,513.442	7,026.884	0.00E+00	1.70E+02	3.41E+02		
Pu-238	1.8254E-02	3,513.442	7,026.884	0.00E+00	6.41E+01	1.28E+02		
Pu-239	4.2810E-04	3,513.442	7,026.884	0.00E+00	1.50E+00	3.01E+00		
Pu-240	2.4368E-04	3,513.442	7,026.884	0.00E+00	8.56E-01	1.71E+00		
Pu-241	3.3415E-02	3,513.442	7,026.884	0.00E+00	1.17E+02	2.35E+02		
Pu-242	3.6329E-07	3,513.442	7,026.884	0.00E+00	1.28E-03	2.55E-03		
Ra-226	2.2854E-10	3,513.442	7,026.884	0.00E+00	8.03E-07	1.61E-06		
Ra-228	1.2426E-14	3,513.442	7,026.884	0.00E+00	4.37E-11	8.73E-11		
Ru-106	6.3589E-06	3,513.442	7,026.884	0.00E+00	2.23E-02	4.47E-02		
Se-79	1.2933E-05	3,513.442	7,026.884	0.00E+00	4.54E-02	9.09E-02		
Sn-126	1.1574E-05	3,513.442	7,026.884	0.00E+00	4.07E-02	8.13E-02		
Sr-90	1.9248E+00	3,513.442	7,026.884	0.00E+00	6.76E+03	1.35E+04		
Tc-99	4.2239E-04	3,513.442	7,026.884	0.00E+00	1.48E+00	2.97E+00		
Th-229	5.0953E-12	3,513.442	7,026.884	0.00E+00	1.79E-08	3.58E-08		
Th-230	4.1885E-08	3,513.442	7,026.884	0.00E+00	1.47E-04	2.94E-04		
Th-232	1.9270E-14	3,513.442	7,026.884	0.00E+00	6.77E-11	1.35E-10		
Th-208	4.6024E-08	3,513.442	7,026.884	0.00E+00	1.62E-04	3.23E-04		
U-232	1.2582E-07	3,513.442	7,026.884	0.00E+00	4.42E-04	8.84E-04		
U-233	2.5825E-09	3,513.442	7,026.884	0.00E+00	9.07E-06	1.81E-05		
U-234	1.8450E-04	3,513.442	7,026.884	0.00E+00	6.48E-01	1.30E+00		
U-235	-2.7235E-06	3,513.442	0.000	1.25E-02	2.98E-03	1.25E-02		
U-236	1.5493E-05	3,513.442	7,026.884	0.00E+00	5.44E-02	1.09E-01		
U-238	-4.2851E-09	3,513.442	0.000	2.38E-03	2.36E-03	2.38E-03		
Y-90	1.9254E+00	3,513.442	7,026.884	0.00E+00	6.76E+03	1.35E+04		
Other Radionuclides					6.80E+03	1.36E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.38E+01	1.68E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	45.06986957	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nomina:		3,513.442	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		7,026.884	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nomina:	0.87		1.02
Bounding:	1.73		

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

²Total burnup for all fuel associated with this worksheet must be 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 (GERMANY)
 SNF ID #: 519
 Fuel Units & Descr: 97 - ASSEMBLY
 Heavy Metal Mass: BOL=155.20kg : EOL=131.80kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: TRIGA-AJ (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 4.04

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.4556E-09	22,332.297	44,664.593	0.00E+00	5.48E-05	1.10E-04	0.0150	4.584E+15
Am-241	3.8752E-03	22,332.297	44,664.593	0.00E+00	8.65E+01	1.73E+02	0.0250	9.465E+14
Am-242m	1.8617E-06	22,332.297	44,664.593	0.00E+00	4.16E-02	8.32E-02	0.0375	9.907E+14
Am-243	2.3293E-07	22,332.297	44,664.593	0.00E+00	5.20E-03	1.04E-02	0.0575	9.157E+14
C-14	4.3233E-05	22,332.297	44,664.593	0.00E+00	9.65E-01	1.93E+00	0.0850	5.575E+14
Cl-36	4.3023E-08	22,332.297	44,664.593	0.00E+00	9.61E-04	1.92E-03	0.1250	6.258E+14
Cm-243	1.9053E-07	22,332.297	44,664.593	0.00E+00	4.25E-03	8.51E-03	0.2250	5.052E+14
Cm-244	1.7744E-06	22,332.297	44,664.593	0.00E+00	3.96E-02	7.93E-02	0.3750	2.076E+14
Co-60	4.3188E-03	22,332.297	44,664.593	0.00E+00	9.64E+01	1.93E+02	0.5750	3.307E+15
Cs-134	6.7188E-04	22,332.297	44,664.593	0.00E+00	1.50E+01	3.00E+01	0.8500	3.518E+14
Cs-135	3.1549E-05	22,332.297	44,664.593	0.00E+00	7.05E-01	1.41E+00	1.2500	3.791E+14
Cs-137	1.9489E+00	22,332.297	44,664.593	0.00E+00	4.35E+04	8.70E+04	1.7500	1.136E+13
Eu-154	4.0301E-01	22,332.297	44,664.593	0.00E+00	9.00E+03	1.80E+04	2.2500	1.800E+08
Eu-155	5.4000E-02	22,332.297	44,664.593	0.00E+00	1.21E+03	2.41E+03	2.7500	2.995E+07
Fe-55	1.5955E-04	22,332.297	44,664.593	0.00E+00	3.56E+00	7.13E+00	3.5000	2.052E+05
H-3	4.6571E-03	22,332.297	44,664.593	0.00E+00	1.04E+02	2.08E+02	5.0000	2.520E+04
I-129	7.3805E-07	22,332.297	44,664.593	0.00E+00	1.65E-02	3.30E-02	7.0000	2.844E+03
Kr-85	9.5684E-02	22,332.297	44,664.593	0.00E+00	2.14E+03	4.27E+03	11.0000	3.235E+02
Np-237	1.4618E-06	22,332.297	44,664.593	0.00E+00	3.26E-02	6.53E-02		
Pa-231	6.4782E-09	22,332.297	44,664.593	0.00E+00	1.45E-04	2.89E-04		
Pb-210	6.3158E-14	22,332.297	44,664.593	0.00E+00	1.41E-09	2.82E-09		
Pm-147	3.9564E-02	22,332.297	44,664.593	0.00E+00	8.84E+02	1.77E+03		
Pu-238	1.2008E-03	22,332.297	44,664.593	0.00E+00	2.68E+01	5.36E+01		
Pu-239	5.6917E-03	22,332.297	44,664.593	0.00E+00	1.27E+02	2.54E+02		
Pu-240	2.2617E-03	22,332.297	44,664.593	0.00E+00	5.05E+01	1.01E+02		
Pu-241	6.1113E-02	22,332.297	44,664.593	0.00E+00	1.36E+03	2.73E+03		
Pu-242	3.0602E-07	22,332.297	44,664.593	0.00E+00	6.83E-03	1.37E-02		
Ra-226	2.6707E-13	22,332.297	44,664.593	0.00E+00	5.96E-09	1.19E-08		
Ra-228	2.2556E-10	22,332.297	44,664.593	0.00E+00	5.04E-06	1.01E-05		
Ru-106	3.1293E-06	22,332.297	44,664.593	0.00E+00	6.99E-02	1.40E-01		
Se-79	1.2935E-05	22,332.297	44,664.593	0.00E+00	2.89E-01	5.78E-01		
Sn-126	1.2238E-05	22,332.297	44,664.593	0.00E+00	2.73E-01	5.47E-01		
Sr-90	1.8195E+00	22,332.297	44,664.593	0.00E+00	4.06E+04	8.13E+04		
Tc-99	4.4120E-04	22,332.297	44,664.593	0.00E+00	9.85E+00	1.97E+01		
Th-229	3.3308E-10	22,332.297	44,664.593	0.00E+00	7.44E-06	1.49E-05		
Th-230	4.6526E-11	22,332.297	44,664.593	0.00E+00	1.04E-06	2.08E-06		
Th-232	2.3744E-10	22,332.297	44,664.593	0.00E+00	5.30E-06	1.06E-05		
Tl-208	1.8195E-08	22,332.297	44,664.593	0.00E+00	4.06E-04	8.13E-04		
U-232	4.9098E-08	22,332.297	44,664.593	0.00E+00	1.10E-03	2.19E-03		
U-233	1.3140E-07	22,332.297	44,664.593	0.00E+00	2.93E-03	5.87E-03		
U-234	2.2571E-07	22,332.297	44,664.593	0.00E+00	5.04E-03	1.01E-02		
U-235	-2.6159E-06	22,332.297	0.000	6.71E-02	8.66E-03	6.71E-02		
U-236	1.2719E-05	22,332.297	44,664.593	0.00E+00	2.84E-01	5.68E-01		
U-238	-3.8857E-08	22,332.297	0.000	4.17E-02	4.09E-02	4.17E-02		
Y-90	1.8211E+00	22,332.297	44,664.593	0.00E+00	4.07E+04	8.13E+04		
Other Radionuclides					4.68E+04	9.35E+04		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.9999963	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		22,332.297	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		44,664.593	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	3.89		1.00
Bounding:	7.79		

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

²Total burnup for all fuel associated with this worksheet must be 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 (GERMANY)
 SNF ID #: 583
 Fuel Units & Descr: 2 - MTR TYPE
 Heavy Metal Mass: BOL=40kg ; EOL=.27kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.08

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	124.060	248.119	0.00E+00	8.23E-08	1.65E-07		
Am-241	2.0060E-03	124.060	248.119	0.00E+00	2.49E-01	4.98E-01	0.0150	2.619E+13
Am-242m	4.2429E-07	124.060	248.119	0.00E+00	5.26E-05	1.05E-04	0.0250	5.446E+12
Am-243	1.4899E-06	124.060	248.119	0.00E+00	1.85E-04	3.70E-04	0.0375	4.751E+12
C-14	5.7135E-09	124.060	248.119	0.00E+00	7.09E-07	1.42E-06	0.0575	5.088E+12
Cl-36	1.3124E-32	124.060	248.119	0.00E+00	1.63E-30	3.26E-30	0.0850	3.075E+12
Co-243	1.6443E-07	124.060	248.119	0.00E+00	2.04E-05	4.08E-05	0.1250	2.080E+12
Co-244	2.9330E-05	124.060	248.119	0.00E+00	3.64E-03	7.28E-03	0.2250	2.653E+12
Co-60	5.3186E-06	124.060	248.119	0.00E+00	6.60E-04	1.32E-03	0.3750	1.155E+12
Cs-134	3.1563E-03	124.060	248.119	0.00E+00	3.92E-01	7.83E-01	0.5750	1.884E+13
Cs-135	3.4477E-06	124.060	248.119	0.00E+00	4.28E-04	8.55E-04	0.8500	3.185E+11
Cs-137	2.0313E+00	124.060	248.119	0.00E+00	2.52E+02	5.04E+02	1.2500	1.819E+11
Eu-154	2.4513E-02	124.060	248.119	0.00E+00	3.04E+00	6.08E+00	1.7500	8.348E+09
Eu-155	4.8175E-03	124.060	248.119	0.00E+00	5.98E-01	1.20E+00	2.2500	7.324E+05
Fe-55	1.2397E-04	124.060	248.119	0.00E+00	1.54E-02	3.08E-02	2.7500	4.139E+05
H-3	4.5697E-03	124.060	248.119	0.00E+00	5.67E-01	1.13E+00	3.5000	1.902E+03
I-129	7.5300E-07	124.060	248.119	0.00E+00	9.34E-05	1.87E-04	5.0000	1.075E+02
Kr-85	1.0850E-01	124.060	248.119	0.00E+00	1.35E+01	2.69E+01	7.0000	1.187E+01
Np-237	9.5561E-06	124.060	248.119	0.00E+00	1.19E-03	2.37E-03	11.0000	1.330E+00
Pa-231	2.0359E-09	124.060	248.119	0.00E+00	2.53E-07	5.05E-07		
Pb-210	4.9728E-11	124.060	248.119	0.00E+00	6.17E-09	1.23E-08		
Pm-147	4.8502E-02	124.060	248.119	0.00E+00	6.02E+00	1.20E+01		
Pu-238	1.8254E-02	124.060	248.119	0.00E+00	2.26E+00	4.53E+00		
Pu-239	4.2810E-04	124.060	248.119	0.00E+00	5.31E-02	1.06E-01		
Pu-240	2.4368E-04	124.060	248.119	0.00E+00	3.02E-02	6.05E-02		
Pu-241	3.3415E-02	124.060	248.119	0.00E+00	4.15E+00	8.29E+00		
Pu-242	3.6329E-07	124.060	248.119	0.00E+00	4.51E-05	9.01E-05		
Ra-226	2.2854E-10	124.060	248.119	0.00E+00	2.84E-08	5.67E-08		
Ra-228	1.2426E-14	124.060	248.119	0.00E+00	1.54E-12	3.08E-12		
Ru-106	6.3589E-06	124.060	248.119	0.00E+00	7.89E-04	1.58E-03		
Se-79	1.2933E-05	124.060	248.119	0.00E+00	1.60E-03	3.21E-03		
Sn-126	1.1574E-05	124.060	248.119	0.00E+00	1.44E-03	2.87E-03		
Sr-90	1.9248E+00	124.060	248.119	0.00E+00	2.39E+02	4.78E+02		
Tc-99	4.2239E-04	124.060	248.119	0.00E+00	5.24E-02	1.05E-01		
Th-229	5.0953E-12	124.060	248.119	0.00E+00	6.32E-10	1.26E-09		
Th-230	4.1885E-08	124.060	248.119	0.00E+00	5.20E-06	1.04E-05		
Th-232	1.9270E-14	124.060	248.119	0.00E+00	2.39E-12	4.78E-12		
Ti-208	4.6024E-08	124.060	248.119	0.00E+00	5.71E-06	1.14E-05		
U-232	1.2582E-07	124.060	248.119	0.00E+00	1.56E-05	3.12E-05		
U-233	2.5825E-09	124.060	248.119	0.00E+00	3.20E-07	6.41E-07		
U-234	1.8450E-04	124.060	248.119	0.00E+00	2.29E-02	4.58E-02		
U-235	-2.7235E-06	124.060	0.000	7.87E-04	4.49E-04	7.87E-04		
U-236	1.5493E-05	124.060	248.119	0.00E+00	1.92E-03	3.84E-03		
U-238	-4.2851E-09	124.060	0.000	1.36E-05	1.31E-05	1.36E-05		
Y-90	1.9254E+00	124.060	248.119	0.00E+00	2.39E+02	4.78E+02		
Other Radionuclides					2.40E+02	4.80E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.96E+00	5.91E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	90.00000989	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nomina.:		124.060	
Bounding:		248.119	

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

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nomina.:	0.97	
Bounding:	1.95	

Estimated EOL HM/Given EOL HM: 1.03

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

²Total burnup for all fuel associated with this worksheet must be 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 (GERMANY)
 SNF ID #: 1067
 Fuel Units & Descr: 7 - ASSEMBLY
 Heavy Metal Mass: BOL=14.70kg : EOL=12.94kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.29

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	6.6313E-10	1,670.542	3,341.084	0.00E+00	1.11E-06	2.22E-06	Avg. MeV	
Am-241	2.0060E-03	1,670.542	3,341.084	0.00E+00	3.35E+00	6.70E+00	0.0150	3.527E+14
Am-242m	4.2429E-07	1,670.542	3,341.084	0.00E+00	7.09E-04	1.42E-03	0.0250	7.334E+13
Am-243	1.4899E-06	1,670.542	3,341.084	0.00E+00	2.49E-03	4.98E-03	0.0375	6.397E+13
C-14	5.7135E-09	1,670.542	3,341.084	0.00E+00	9.54E-06	1.91E-05	0.0575	6.851E+13
Cl-36	1.3124E-32	1,670.542	3,341.084	0.00E+00	2.19E-29	4.38E-29	0.0850	4.140E+13
Cm-243	1.6443E-07	1,670.542	3,341.084	0.00E+00	2.75E-04	5.49E-04	0.1250	2.802E+13
Cm-244	2.9330E-05	1,670.542	3,341.084	0.00E+00	4.90E-02	9.80E-02	0.2250	3.572E+13
Co-60	5.3186E-06	1,670.542	3,341.084	0.00E+00	8.88E-03	1.78E-02	0.3750	1.555E+13
Cs-134	3.1563E-03	1,670.542	3,341.084	0.00E+00	5.27E+00	1.05E+01	0.5750	2.537E+14
Cs-135	3.4477E-06	1,670.542	3,341.084	0.00E+00	5.76E-03	1.15E-02	0.8500	4.288E+12
Cs-137	2.0313E+00	1,670.542	3,341.084	0.00E+00	3.39E+03	6.79E+03	1.2500	2.449E+12
Eu-154	2.4513E-02	1,670.542	3,341.084	0.00E+00	4.09E+01	8.19E+01	1.7500	1.124E+11
Eu-155	4.8175E-03	1,670.542	3,341.084	0.00E+00	8.05E+00	1.61E+01	2.2500	9.862E+06
Fe-55	1.2397E-04	1,670.542	3,341.084	0.00E+00	2.07E-01	4.14E-01	2.7500	5.573E-06
H-3	4.5897E-03	1,670.542	3,341.084	0.00E+00	7.63E+00	1.53E+01	3.5000	2.563E+04
I-129	7.5300E-07	1,670.542	3,341.084	0.00E+00	1.26E-03	2.52E-03	5.0000	1.456E+03
Kr-85	1.0850E-01	1,670.542	3,341.084	0.00E+00	1.81E+02	3.62E+02	7.0000	1.608E+02
Np-237	9.5561E-06	1,670.542	3,341.084	0.00E+00	1.60E-02	3.19E-02	11.0000	1.803E+01
Pa-231	2.0359E-09	1,670.542	3,341.084	0.00E+00	3.40E-06	6.80E-06		
Pb-210	4.9728E-11	1,670.542	3,341.084	0.00E+00	8.31E-08	1.66E-07		
Pm-147	4.8502E-02	1,670.542	3,341.084	0.00E+00	8.10E+01	1.62E+02		
Pu-238	1.8254E-02	1,670.542	3,341.084	0.00E+00	3.05E+01	6.10E+01		
Pu-239	4.2810E-04	1,670.542	3,341.084	0.00E+00	7.15E-01	1.43E+00		
Pu-240	2.4368E-04	1,670.542	3,341.084	0.00E+00	4.07E-01	8.14E-01		
Pu-241	3.3415E-02	1,670.542	3,341.084	0.00E+00	5.58E+01	1.12E+02		
Pu-242	3.6329E-07	1,670.542	3,341.084	0.00E+00	6.07E-04	1.21E-03		
Ra-226	2.2854E-10	1,670.542	3,341.084	0.00E+00	3.82E-07	7.64E-07		
Ra-228	1.2426E-14	1,670.542	3,341.084	0.00E+00	2.08E-11	4.15E-11		
Ru-106	6.3589E-06	1,670.542	3,341.084	0.00E+00	1.06E-02	2.12E-02		
Se-79	1.2933E-05	1,670.542	3,341.084	0.00E+00	2.16E-02	4.32E-02		
Sn-126	1.1574E-05	1,670.542	3,341.084	0.00E+00	1.93E-02	3.87E-02		
Sr-90	1.9248E+00	1,670.542	3,341.084	0.00E+00	3.22E+03	6.43E+03		
Tc-99	4.2239E-04	1,670.542	3,341.084	0.00E+00	7.06E-01	1.41E+00		
Th-229	5.0953E-12	1,670.542	3,341.084	0.00E+00	8.51E-09	1.70E-08		
Th-230	4.1885E-08	1,670.542	3,341.084	0.00E+00	7.00E-05	1.40E-04		
Th-232	1.9270E-14	1,670.542	3,341.084	0.00E+00	3.22E-11	6.44E-11		
Th-208	4.6024E-08	1,670.542	3,341.084	0.00E+00	7.69E-05	1.54E-04		
U-232	1.2582E-07	1,670.542	3,341.084	0.00E+00	2.10E-04	4.20E-04		
U-233	2.5825E-09	1,670.542	3,341.084	0.00E+00	4.31E-06	8.63E-06		
U-234	1.8450E-04	1,670.542	3,341.084	0.00E+00	3.08E-01	6.16E-01		
U-235	-2.7235E-06	1,670.542	0.000	6.35E-03	1.80E-03	6.35E-03		
U-236	1.5493E-05	1,670.542	3,341.084	0.00E+00	2.59E-02	5.18E-02		
U-238	-4.2851E-09	1,670.542	0.000	3.95E-03	3.95E-03	3.95E-03		
Y-90	1.9254E+00	1,670.542	3,341.084	0.00E+00	3.22E+03	6.43E+03		
Other Radionuclides					3.23E+03	6.46E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.98E+01	7.96E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding:	ALUM	ALUM
BOL HM Constituents:	U3Si2	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:		1,670.542
Bounding:		3,341.084

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 (GERMANY)
 SNF ID #: 582
 Fuel Units & Descr: 1 - MTR TYPE
 Heavy Metal Mass: BOL=.18kg ; EOL=.13kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.04

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	48.109	96.217	0.00E+00	3.19E-08	6.38E-08	0.0150	1.016E+13
Am-241	2.0060E-03	48.109	96.217	0.00E+00	9.65E-02	1.93E-01	0.0250	2.112E+12
Am-242m	4.2429E-07	48.109	96.217	0.00E+00	2.04E-05	4.08E-05	0.0375	1.842E+12
Am-243	1.4899E-06	48.109	96.217	0.00E+00	7.17E-05	1.43E-04	0.0575	1.973E+12
C-14	5.7135E-09	48.109	96.217	0.00E+00	2.75E-07	5.50E-07	0.0850	1.192E+12
Cl-36	1.3124E-32	48.109	96.217	0.00E+00	6.31E-31	1.26E-30	0.1250	8.068E+11
Cm-243	1.6443E-07	48.109	96.217	0.00E+00	7.91E-06	1.58E-05	0.2250	1.029E+12
Cm-244	2.9330E-05	48.109	96.217	0.00E+00	1.41E-03	2.82E-03	0.3750	4.478E+11
Co-60	5.3186E-06	48.109	96.217	0.00E+00	2.56E-04	5.12E-04	0.5750	7.305E+12
Cs-134	3.1563E-03	48.109	96.217	0.00E+00	1.52E-01	3.04E-01	0.8500	1.235E+11
Cs-135	3.4477E-06	48.109	96.217	0.00E+00	1.66E-04	3.32E-04	1.2500	7.052E+10
Cs-137	2.0313E+00	48.109	96.217	0.00E+00	9.77E+01	1.95E+02	1.7500	3.237E+09
Eu-154	2.4513E-02	48.109	96.217	0.00E+00	1.18E+00	2.36E+00	2.2500	2.840E+05
Eu-155	4.8175E-03	48.109	96.217	0.00E+00	2.32E-01	4.64E-01	2.7500	1.605E+05
Fe-55	1.2397E-04	48.109	96.217	0.00E+00	5.96E-03	1.19E-02	3.5000	7.376E+02
H-3	4.5697E-03	48.109	96.217	0.00E+00	2.20E-01	4.40E-01	5.0000	4.169E+01
I-129	7.5300E-07	48.109	96.217	0.00E+00	3.62E-05	7.25E-05	7.0000	4.603E+01
Kr-85	1.0850E-01	48.109	96.217	0.00E+00	5.22E+00	1.04E+01	11.0000	5.158E-01
Np-237	9.5561E-06	48.109	96.217	0.00E+00	4.60E-04	9.19E-04		
Pa-231	2.0359E-09	48.109	96.217	0.00E+00	9.79E-08	1.96E-07		
Pb-210	4.9728E-11	48.109	96.217	0.00E+00	2.39E-09	4.78E-09		
Pm-147	4.8502E-02	48.109	96.217	0.00E+00	2.33E+00	4.67E+00		
Pu-238	1.8254E-02	48.109	96.217	0.00E+00	8.78E-01	1.76E+00		
Pu-239	4.2810E-04	48.109	96.217	0.00E+00	2.06E-02	4.12E-02		
Pu-240	2.4368E-04	48.109	96.217	0.00E+00	1.17E-02	2.34E-02		
Pu-241	3.3415E-02	48.109	96.217	0.00E+00	1.61E+00	3.22E+00		
Pu-242	3.6329E-07	48.109	96.217	0.00E+00	1.75E-05	3.50E-05		
Ra-226	2.2854E-10	48.109	96.217	0.00E+00	1.10E-08	2.20E-08		
Ra-228	1.2426E-14	48.109	96.217	0.00E+00	5.98E-13	1.20E-12		
Ru-106	6.3589E-06	48.109	96.217	0.00E+00	3.06E-04	6.12E-04		
Se-79	1.2933E-05	48.109	96.217	0.00E+00	6.22E-04	1.24E-03		
Sn-126	1.1574E-05	48.109	96.217	0.00E+00	5.57E-04	1.11E-03		
Sr-90	1.9248E+00	48.109	96.217	0.00E+00	9.26E+01	1.85E+02		
Tc-99	4.2239E-04	48.109	96.217	0.00E+00	2.03E-02	4.06E-02		
Th-229	5.0953E-12	48.109	96.217	0.00E+00	2.45E-10	4.90E-10		
Th-230	4.1885E-08	48.109	96.217	0.00E+00	2.02E-06	4.03E-06		
Th-232	1.9270E-14	48.109	96.217	0.00E+00	9.27E-13	1.85E-12		
Th-208	4.6024E-08	48.109	96.217	0.00E+00	2.21E-06	4.43E-06		
U-232	1.2582E-07	48.109	96.217	0.00E+00	6.05E-06	1.21E-05		
U-233	2.5825E-09	48.109	96.217	0.00E+00	1.24E-07	2.48E-07		
U-234	1.8450E-04	48.109	96.217	0.00E+00	8.88E-03	1.78E-02		
U-235	-2.7235E-06	48.109	0.000	3.54E-04	2.23E-04	3.54E-04		
U-236	1.5493E-05	48.109	96.217	0.00E+00	7.45E-04	1.49E-03		
U-238	-4.2851E-09	48.109	0.000	4.15E-06	3.94E-06	4.15E-06		
Y-90	1.9254E+00	48.109	96.217	0.00E+00	9.26E+01	1.85E+02		
Other Radionuclides					9.30E+01	1.86E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.15E+00	2.29E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.99999263	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		48.109	
Bounding:		96.217	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.87		
Bounding:	1.73		

Estimated EOL HM/Given EOL HM: 1.02

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

²Total burnup for all fuel associated with this worksheet must be 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 (GERMANY)
 SNF ID #: 585
 Fuel Units & Descr: 50 - MTR TYPE
 Heavy Metal Mass: BOL=9.68kg : EOL=4.64kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWD): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 2.08

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.4556E-09	4,810.774	9,234.967	0.00E+00	1.18E-05	2.27E-05	0.0150	9.477E+14
Am-241	3.8752E-03	4,810.774	9,234.967	0.00E+00	1.86E+01	3.58E+01	0.0250	1.957E+14
Am-242m	1.8617E-06	4,810.774	9,234.967	0.00E+00	8.96E-03	1.72E-02	0.0375	2.048E+14
Am-243	2.3293E-07	4,810.774	9,234.967	0.00E+00	1.12E-03	2.15E-03	0.0575	1.893E+14
C-14	4.3233E-05	4,810.774	9,234.967	0.00E+00	2.08E-01	3.99E-01	0.0850	1.153E+14
Cl-36	4.3023E-08	4,810.774	9,234.967	0.00E+00	2.07E-04	3.97E-04	0.0575	1.893E+14
Cm-243	1.9053E-07	4,810.774	9,234.967	0.00E+00	9.17E-04	1.76E-03	0.1250	1.294E+14
Cm-244	1.7744E-06	4,810.774	9,234.967	0.00E+00	8.54E-03	1.64E-02	0.2250	1.045E+14
Co-60	4.3188E-03	4,810.774	9,234.967	0.00E+00	2.08E+01	3.99E+01	0.3750	4.292E+13
Cs-134	6.7188E-04	4,810.774	9,234.967	0.00E+00	3.23E+00	6.20E+00	0.5750	6.838E+14
Cs-135	3.1549E-05	4,810.774	9,234.967	0.00E+00	1.52E-01	2.91E-01	0.8500	7.275E+13
Cs-137	1.9489E+00	4,810.774	9,234.967	0.00E+00	9.38E+03	1.80E+04	1.2500	7.838E+13
Eu-154	4.0301E-01	4,810.774	9,234.967	0.00E+00	1.94E+03	3.72E+03	1.7500	2.348E+12
Eu-155	5.4000E-02	4,810.774	9,234.967	0.00E+00	2.60E+02	4.99E+02	2.2500	3.722E+07
Fe-55	1.5955E-04	4,810.774	9,234.967	0.00E+00	7.68E-01	1.47E+00	2.7500	6.193E+06
H-3	4.6571E-03	4,810.774	9,234.967	0.00E+00	2.24E+01	4.30E+01	3.5000	4.238E+04
I-129	7.3805E-07	4,810.774	9,234.967	0.00E+00	3.55E-03	6.82E-03	5.0000	5.190E+03
Kr-85	9.5684E-02	4,810.774	9,234.967	0.00E+00	4.60E+02	8.84E+02	7.0000	5.859E+02
Np-237	1.4618E-06	4,810.774	9,234.967	0.00E+00	7.03E-03	1.35E-02	11.0000	6.663E+01
Pa-231	6.4782E-09	4,810.774	9,234.967	0.00E+00	3.12E-05	5.98E-05		
Pb-210	6.3158E-14	4,810.774	9,234.967	0.00E+00	3.04E-10	5.83E-10		
Pm-147	3.9564E-02	4,810.774	9,234.967	0.00E+00	1.90E+02	3.65E+02		
Pu-238	1.2008E-03	4,810.774	9,234.967	0.00E+00	5.78E+00	1.11E+01		
Pu-239	5.6917E-03	4,810.774	9,234.967	0.00E+00	2.74E+01	5.26E+01		
Pu-240	2.2617E-03	4,810.774	9,234.967	0.00E+00	1.09E+01	2.09E+01		
Pu-241	6.1113E-02	4,810.774	9,234.967	0.00E+00	2.94E+02	5.64E+02		
Pu-242	3.0602E-07	4,810.774	9,234.967	0.00E+00	1.47E-03	2.83E-03		
Ra-226	2.6707E-13	4,810.774	9,234.967	0.00E+00	1.28E-09	2.47E-09		
Ra-228	2.2556E-10	4,810.774	9,234.967	0.00E+00	1.09E-06	2.08E-06		
Ru-106	3.1293E-06	4,810.774	9,234.967	0.00E+00	1.51E-02	2.89E-02		
Se-79	1.2935E-05	4,810.774	9,234.967	0.00E+00	6.22E-02	1.19E-01		
Sn-126	1.2238E-05	4,810.774	9,234.967	0.00E+00	5.89E-02	1.13E-01		
Sr-90	1.8195E+00	4,810.774	9,234.967	0.00E+00	8.75E+03	1.68E+04		
Tc-99	4.4120E-04	4,810.774	9,234.967	0.00E+00	2.12E+00	4.07E+00		
Th-229	3.3308E-10	4,810.774	9,234.967	0.00E+00	1.60E-06	3.08E-06		
Th-230	4.6526E-11	4,810.774	9,234.967	0.00E+00	2.24E-07	4.30E-07		
Th-232	2.3744E-10	4,810.774	9,234.967	0.00E+00	1.14E-06	2.19E-06		
Tl-208	1.8195E-08	4,810.774	9,234.967	0.00E+00	8.75E-05	1.68E-04		
U-232	4.9098E-08	4,810.774	9,234.967	0.00E+00	2.36E-04	4.53E-04		
U-233	1.3140E-07	4,810.774	9,234.967	0.00E+00	6.32E-04	1.21E-03		
U-234	2.2571E-07	4,810.774	9,234.967	0.00E+00	1.09E-03	2.08E-03		
U-235	-2.6159E-06	4,810.774	0.000	1.94E-02	6.86E-03	1.94E-02		
U-236	1.2719E-05	4,810.774	9,234.967	0.00E+00	6.12E-02	1.17E-01		
U-238	-3.8857E-08	4,810.774	0.000	2.28E-04	4.07E-05	2.28E-04		
Y-90	1.8211E+00	4,810.774	9,234.967	0.00E+00	8.76E+03	1.68E+04		
Other Radionuclides					1.01E+04	1.93E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.25E+02	2.40E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons:
Fuel Cladding:	ALUM	ALUM	This fuel matches on all parameters except enrichment.
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.9999938	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		4,810.774	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		9,234.967	Bounding burnup calculated assuming all BOL heavy metal burned.

Checks		
	Burnup Multiplier	Estimated EOL HM/Given EOL HM
Nominal:	13.46	1.02
Bounding:	25.84	

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

²Total burnup for all fuel associated with this worksheet must be 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 (GERMANY)
 SNF ID #: 584
 Fuel Units & Descr: 44 - MTR TYPE
 Heavy Metal Mass: BOL=8.14kg ; EOL=5.94kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.83

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	2,075.109	4,150.218	0.00E+00	1.38E-06	2.75E-06	Avg. MeV	
Am-241	2.0060E-03	2,075.109	4,150.218	0.00E+00	4.16E+00	8.33E+00	0.0150	4.381E+14
Am-242m	4.2429E-07	2,075.109	4,150.218	0.00E+00	8.80E-04	1.76E-03	0.0250	9.110E+13
Am-243	1.4899E-06	2,075.109	4,150.218	0.00E+00	3.09E-03	6.18E-03	0.0375	7.946E+13
C-14	5.7135E-09	2,075.109	4,150.218	0.00E+00	1.19E-05	2.37E-05	0.0575	8.511E+13
Cl-36	1.3124E-32	2,075.109	4,150.218	0.00E+00	2.72E-29	5.45E-29	0.0850	5.143E+13
Cm-243	1.6443E-07	2,075.109	4,150.218	0.00E+00	3.41E-04	6.82E-04	0.1250	3.480E+13
Cm-244	2.9330E-05	2,075.109	4,150.218	0.00E+00	6.09E-02	1.22E-01	0.2250	4.438E+13
Co-60	5.3186E-06	2,075.109	4,150.218	0.00E+00	1.10E-02	2.21E-02	0.3750	1.932E+13
Cs-134	3.1563E-03	2,075.109	4,150.218	0.00E+00	6.55E+00	1.31E+01	0.5750	3.151E+14
Cs-135	3.4477E-06	2,075.109	4,150.218	0.00E+00	7.15E-03	1.43E-02	0.8500	5.327E+12
Cs-137	2.0313E+00	2,075.109	4,150.218	0.00E+00	4.22E+03	8.43E+03	1.2500	3.042E+12
Eu-154	2.4513E-02	2,075.109	4,150.218	0.00E+00	5.09E+01	1.02E+02	1.7500	1.396E+11
Eu-155	4.8175E-03	2,075.109	4,150.218	0.00E+00	1.00E+01	2.00E+01	2.2500	1.225E+07
Fe-55	1.2397E-04	2,075.109	4,150.218	0.00E+00	2.57E-01	5.14E-01	2.7500	6.923E+06
H-3	4.5697E-03	2,075.109	4,150.218	0.00E+00	9.48E+00	1.90E+01	3.5000	3.181E+04
I-129	7.5300E-07	2,075.109	4,150.218	0.00E+00	1.56E-03	3.13E-03	5.0000	1.798E+03
Kr-85	1.0850E-01	2,075.109	4,150.218	0.00E+00	2.25E+02	4.50E+02	7.0000	1.985E+02
Np-237	9.5561E-06	2,075.109	4,150.218	0.00E+00	1.98E-02	3.97E-02	11.0000	2.225E+01
Pa-231	2.0359E-09	2,075.109	4,150.218	0.00E+00	4.22E-06	8.45E-06		
Pb-210	4.9728E-11	2,075.109	4,150.218	0.00E+00	1.03E-07	2.06E-07		
Pm-147	4.8502E-02	2,075.109	4,150.218	0.00E+00	1.01E+02	2.01E+02		
Pu-238	1.8254E-02	2,075.109	4,150.218	0.00E+00	3.79E+01	7.58E+01		
Pu-239	4.2810E-04	2,075.109	4,150.218	0.00E+00	8.88E-01	1.78E+00		
Pu-240	2.4368E-04	2,075.109	4,150.218	0.00E+00	5.06E-01	1.01E+00		
Pu-241	3.3415E-02	2,075.109	4,150.218	0.00E+00	6.93E+01	1.39E+02		
Pu-242	3.6329E-07	2,075.109	4,150.218	0.00E+00	7.54E-04	1.51E-03		
Ra-226	2.2854E-10	2,075.109	4,150.218	0.00E+00	4.74E-07	9.48E-07		
Ra-228	1.2426E-14	2,075.109	4,150.218	0.00E+00	2.58E-11	5.16E-11		
Ru-106	6.3589E-06	2,075.109	4,150.218	0.00E+00	1.32E-02	2.64E-02		
Se-79	1.2933E-05	2,075.109	4,150.218	0.00E+00	2.68E-02	5.37E-02		
Sn-126	1.1574E-05	2,075.109	4,150.218	0.00E+00	2.40E-02	4.80E-02		
Sr-90	1.9248E+00	2,075.109	4,150.218	0.00E+00	3.99E+03	7.99E+03		
Tc-99	4.2239E-04	2,075.109	4,150.218	0.00E+00	8.76E-01	1.75E+00		
Th-229	5.0953E-12	2,075.109	4,150.218	0.00E+00	1.06E-08	2.11E-08		
Th-230	4.1885E-08	2,075.109	4,150.218	0.00E+00	8.69E-05	1.74E-04		
Th-232	1.9270E-14	2,075.109	4,150.218	0.00E+00	4.00E-11	8.00E-11		
Tl-208	4.6024E-08	2,075.109	4,150.218	0.00E+00	9.55E-05	1.91E-04		
U-232	1.2582E-07	2,075.109	4,150.218	0.00E+00	2.61E-04	5.22E-04		
U-233	2.5825E-09	2,075.109	4,150.218	0.00E+00	5.36E-06	1.07E-05		
U-234	1.8450E-04	2,075.109	4,150.218	0.00E+00	3.83E-01	7.66E-01		
U-235	-2.7235E-06	2,075.109	0.000	1.64E-02	1.07E-02	1.64E-02		
U-236	1.5493E-05	2,075.109	4,150.218	0.00E+00	3.21E-02	6.43E-02		
U-238	-4.2851E-09	2,075.109	0.000	1.91E-04	1.83E-04	1.91E-04		
Y-90	1.9254E+00	2,075.109	4,150.218	0.00E+00	4.00E+03	7.99E+03		
Other Radionuclides					4.01E+03	8.03E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.95E+01	9.89E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.00001838	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,075.109	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		4,150.218	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.81		1.02
Bounding:	1.62		

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

² Total burnup for all fuel associated with this worksheet must be 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 (GREECE)
 SNF ID #: 532
 Fuel Units & Descr: 67 - ASSEMBLY
 Heavy Metal Mass: BOL=74.37kg ; EOL=67.68kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 2.79

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	6,332.340	12,664.680	0.00E+00	4.20E-06	8.40E-06	0.0150	1.337E+15
Am-241	2.0060E-03	6,332.340	12,664.680	0.00E+00	1.27E+01	2.54E+01	0.0250	2.780E+14
Am-242m	4.2429E-07	6,332.340	12,664.680	0.00E+00	2.69E-03	5.37E-03	0.0375	2.425E+14
Am-243	1.4899E-06	6,332.340	12,664.680	0.00E+00	9.43E-03	1.89E-02	0.0575	2.597E+14
C-14	5.7135E-09	6,332.340	12,664.680	0.00E+00	3.62E-05	7.24E-05	0.0850	1.569E+14
Cl-36	1.3124E-32	6,332.340	12,664.680	0.00E+00	8.31E-29	1.66E-28	0.1250	1.062E+14
Cm-243	1.6443E-07	6,332.340	12,664.680	0.00E+00	1.04E-03	2.08E-03	0.2250	1.354E+14
Cm-244	2.9330E-05	6,332.340	12,664.680	0.00E+00	1.86E-01	3.71E-01	0.3750	5.894E+13
Co-60	5.3186E-06	6,332.340	12,664.680	0.00E+00	3.37E-02	6.74E-02	0.5750	9.615E+14
Cs-134	3.1563E-03	6,332.340	12,664.680	0.00E+00	2.00E+01	4.00E+01	0.8500	1.626E+13
Cs-135	3.4477E-06	6,332.340	12,664.680	0.00E+00	2.18E-02	4.37E-02	1.2500	9.283E+12
Cs-137	2.0313E+00	6,332.340	12,664.680	0.00E+00	1.29E+04	2.57E+04	1.7500	4.261E+11
Eu-154	2.4513E-02	6,332.340	12,664.680	0.00E+00	1.55E+02	3.10E+02	2.2500	3.738E+07
Eu-155	4.8175E-03	6,332.340	12,664.680	0.00E+00	3.05E+01	6.10E+01	2.7500	2.113E+07
Fe-55	1.2397E-04	6,332.340	12,664.680	0.00E+00	7.85E-01	1.57E+00	3.5000	9.719E+04
H-3	4.5697E-03	6,332.340	12,664.680	0.00E+00	2.89E+01	5.79E+01	5.0000	5.531E+03
I-129	7.5300E-07	6,332.340	12,664.680	0.00E+00	4.77E-03	9.54E-03	7.0000	6.110E+02
Kr-85	1.0850E-01	6,332.340	12,664.680	0.00E+00	6.87E+02	1.37E+03	11.0000	6.849E+01
Np-237	9.5561E-06	6,332.340	12,664.680	0.00E+00	6.05E-02	1.21E-01		
Pa-231	2.0359E-09	6,332.340	12,664.680	0.00E+00	1.29E-05	2.58E-05		
Pb-210	4.9728E-11	6,332.340	12,664.680	0.00E+00	3.15E-07	6.30E-07		
Pm-147	4.8502E-02	6,332.340	12,664.680	0.00E+00	3.07E+02	6.14E+02		
Pu-238	1.8254E-02	6,332.340	12,664.680	0.00E+00	1.16E+02	2.31E+02		
Pu-239	4.2810E-04	6,332.340	12,664.680	0.00E+00	2.71E+00	5.42E+00		
Pu-240	2.4368E-04	6,332.340	12,664.680	0.00E+00	1.54E+00	3.09E+00		
Pu-241	3.3415E-02	6,332.340	12,664.680	0.00E+00	2.12E+02	4.23E+02		
Pu-242	3.6329E-07	6,332.340	12,664.680	0.00E+00	2.30E-03	4.60E-03		
Ra-226	2.2854E-10	6,332.340	12,664.680	0.00E+00	1.45E-06	2.89E-06		
Ra-228	1.2426E-14	6,332.340	12,664.680	0.00E+00	7.87E-11	1.57E-10		
Ru-106	6.3589E-06	6,332.340	12,664.680	0.00E+00	4.03E-02	8.05E-02		
Se-79	1.2933E-05	6,332.340	12,664.680	0.00E+00	8.19E-02	1.64E-01		
Sn-126	1.1574E-05	6,332.340	12,664.680	0.00E+00	7.33E-02	1.47E-01		
Sr-90	1.9248E+00	6,332.340	12,664.680	0.00E+00	1.22E+04	2.44E+04		
Tc-99	4.2239E-04	6,332.340	12,664.680	0.00E+00	2.67E+00	5.35E+00		
Th-229	5.0953E-12	6,332.340	12,664.680	0.00E+00	3.23E-08	6.45E-08		
Th-230	4.1885E-08	6,332.340	12,664.680	0.00E+00	2.65E-04	5.30E-04		
Th-232	1.9270E-14	6,332.340	12,664.680	0.00E+00	1.22E-10	2.44E-10		
Tl-208	4.6024E-08	6,332.340	12,664.680	0.00E+00	2.91E-04	5.83E-04		
U-232	1.2582E-07	6,332.340	12,664.680	0.00E+00	7.97E-04	1.59E-03		
U-233	2.5825E-09	6,332.340	12,664.680	0.00E+00	1.64E-05	3.27E-05		
U-234	1.8450E-04	6,332.340	12,664.680	0.00E+00	1.17E+00	2.34E+00		
U-235	-2.7235E-06	6,332.340	0.000	3.21E-02	1.49E-02	3.21E-02		
U-236	1.5493E-05	6,332.340	12,664.680	0.00E+00	9.81E-02	1.96E-01		
U-238	-4.2851E-09	6,332.340	0.000	2.00E-02	2.00E-02	2.00E-02		
Y-90	1.9254E+00	6,332.340	12,664.680	0.00E+00	1.22E+04	2.44E+04		
Other Radionuclides					1.22E+04	2.45E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.51E+02	3.02E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U3Si2	U	
	20	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:	6,332.340	12,664.680	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup
Bounding:	0.27	1.01
	0.54	

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

²Total burnup for all fuel associated with this worksheet must be 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 (INDONESIA) ¹Fuel decay start date: 2010
 SNF ID #: 502 Estimates as of: 2030
 Fuel Units & Descr: 142 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=177.50kg ; EOL=159.75kg ²Template 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"
 5.92

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	16,809.594	33,619.189	0.00E+00	1.11E-05	2.23E-05	0.0150	3.549E+15
Am-241	2.0060E-03	16,809.594	33,619.189	0.00E+00	3.37E+01	6.74E+01	0.0250	7.380E+14
Am-242m	4.2429E-07	16,809.594	33,619.189	0.00E+00	7.13E-03	1.43E-02	0.0375	6.437E+14
Am-243	1.4899E-06	16,809.594	33,619.189	0.00E+00	2.50E-02	5.01E-02	0.0575	6.894E+14
C-14	5.7135E-09	16,809.594	33,619.189	0.00E+00	9.60E-05	1.92E-04	0.0375	6.894E+14
Cl-36	1.3124E-32	16,809.594	33,619.189	0.00E+00	2.21E-28	4.41E-28	0.0850	4.166E+14
Cm-243	1.6443E-07	16,809.594	33,619.189	0.00E+00	2.76E-03	5.53E-03	0.1250	2.819E+14
Cm-244	2.9330E-05	16,809.594	33,619.189	0.00E+00	4.93E-01	9.86E-01	0.2250	3.595E+14
Co-60	5.3186E-06	16,809.594	33,619.189	0.00E+00	8.94E-02	1.79E-01	0.3750	1.565E+14
Cs-134	3.1963E-03	16,809.594	33,619.189	0.00E+00	5.31E+01	1.06E+02	0.5750	2.552E+15
Cs-135	3.4477E-06	16,809.594	33,619.189	0.00E+00	5.80E-02	1.16E-01	0.8500	4.315E+13
Cs-137	2.0313E+00	16,809.594	33,619.189	0.00E+00	3.41E+04	6.83E+04	1.2500	2.464E+13
Eu-154	2.4513E-02	16,809.594	33,619.189	0.00E+00	4.12E+02	8.24E+02	1.7500	1.131E+12
Eu-155	4.8175E-03	16,809.594	33,619.189	0.00E+00	8.10E+01	1.62E+02	2.2500	9.923E+07
Fe-55	1.2397E-04	16,809.594	33,619.189	0.00E+00	2.08E+00	4.17E+00	2.7500	5.608E+07
H-3	4.5697E-03	16,809.594	33,619.189	0.00E+00	7.68E+01	1.54E+02	3.5000	2.580E+05
I-129	7.5300E-07	16,809.594	33,619.189	0.00E+00	1.27E-02	2.53E-02	5.0000	1.467E+04
Kr-85	1.0850E-01	16,809.594	33,619.189	0.00E+00	1.82E+03	3.65E+03	7.0000	1.620E+03
Np-237	9.5561E-06	16,809.594	33,619.189	0.00E+00	1.61E-01	3.21E-01	11.0000	1.816E+02
Pa-231	2.0359E-09	16,809.594	33,619.189	0.00E+00	3.42E-05	6.84E-05		
Pb-210	4.9728E-11	16,809.594	33,619.189	0.00E+00	8.36E-07	1.67E-06		
Pm-147	4.8502E-02	16,809.594	33,619.189	0.00E+00	8.15E+02	1.63E+03		
Pu-238	1.8254E-02	16,809.594	33,619.189	0.00E+00	3.07E+02	6.14E+02		
Pu-239	4.2810E-04	16,809.594	33,619.189	0.00E+00	7.20E+00	1.44E+01		
Pu-240	2.4368E-04	16,809.594	33,619.189	0.00E+00	4.10E+00	8.19E+00		
Pu-241	3.3415E-02	16,809.594	33,619.189	0.00E+00	5.62E+02	1.12E+03		
Pu-242	3.6329E-07	16,809.594	33,619.189	0.00E+00	6.11E-03	1.22E-02		
Ra-226	2.2854E-10	16,809.594	33,619.189	0.00E+00	3.84E-06	7.68E-06		
Ra-228	1.2426E-14	16,809.594	33,619.189	0.00E+00	2.09E-10	4.18E-10		
Ru-106	6.3589E-06	16,809.594	33,619.189	0.00E+00	1.07E-01	2.14E-01		
Se-79	1.2933E-05	16,809.594	33,619.189	0.00E+00	2.17E-01	4.35E-01		
Sn-126	1.1574E-05	16,809.594	33,619.189	0.00E+00	1.95E-01	3.89E-01		
Sr-90	1.9248E+00	16,809.594	33,619.189	0.00E+00	3.24E+04	6.47E+04		
Tc-99	4.2239E-04	16,809.594	33,619.189	0.00E+00	7.10E+00	1.42E+01		
Th-229	5.0953E-12	16,809.594	33,619.189	0.00E+00	8.57E-08	1.71E-07		
Th-230	4.1885E-08	16,809.594	33,619.189	0.00E+00	7.04E-04	1.41E-03		
Th-232	1.9270E-14	16,809.594	33,619.189	0.00E+00	3.24E-10	6.48E-10		
Tl-208	4.6024E-08	16,809.594	33,619.189	0.00E+00	7.74E-04	1.55E-03		
U-232	1.2582E-07	16,809.594	33,619.189	0.00E+00	2.11E-03	4.23E-03		
U-233	2.5825E-09	16,809.594	33,619.189	0.00E+00	4.34E-05	8.68E-05		
U-234	1.8450E-04	16,809.594	33,619.189	0.00E+00	3.10E+00	6.20E+00		
U-235	2.7235E-06	16,809.594	0.000	7.67E-02	3.09E-02	7.67E-02		
U-236	1.5493E-05	16,809.594	33,619.189	0.00E+00	2.60E-01	5.21E-01		
U-238	4.2851E-09	16,809.594	0.000	4.77E-02	4.77E-02	4.77E-02		
Y-90	1.9254E+00	16,809.594	33,619.189	0.00E+00	3.24E+04	6.47E+04		
Other Radionuclides					3.25E+04	6.50E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.01E+02	8.01E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U3O8	U	
	20	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:	16,809.594	33,619.189	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup
Bounding:	0.30	1.01
	0.60	

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN)
 SNF ID #: 508
 Fuel Units & Descr: 149 - ASSEMBLY
 Heavy Metal Mass: BOL=205.62kg ; EOL=193.28kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 6.21

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	11,683.575	23,367.149	0.00E+00	7.75E-06	1.55E-05	0.0150	2.467E+15
Am-241	2.0060E-03	11,683.575	23,367.149	0.00E+00	2.34E+01	4.69E+01	0.0250	5.129E+14
Am-242m	4.2429E-07	11,683.575	23,367.149	0.00E+00	4.96E-03	9.91E-03	0.0375	4.474E+14
Am-243	1.4899E-06	11,683.575	23,367.149	0.00E+00	1.74E-02	3.48E-02	0.0575	4.792E+14
C-14	5.7135E-09	11,683.575	23,367.149	0.00E+00	6.68E-05	1.34E-04	0.0850	2.896E+14
Cl-36	1.3124E-32	11,683.575	23,367.149	0.00E+00	1.53E-28	3.07E-28	0.1250	1.959E+14
Cm-243	1.6443E-07	11,683.575	23,367.149	0.00E+00	1.92E-03	3.84E-03	0.2250	2.498E+14
Cm-244	2.9330E-05	11,683.575	23,367.149	0.00E+00	3.43E-01	6.85E-01	0.3750	1.088E+14
Co-60	5.3186E-06	11,683.575	23,367.149	0.00E+00	6.21E-02	1.24E-01	0.5750	1.774E+15
Cs-134	3.1563E-03	11,683.575	23,367.149	0.00E+00	3.69E+01	7.38E+01	0.8500	2.999E+13
Cs-135	3.4477E-06	11,683.575	23,367.149	0.00E+00	4.03E-02	8.06E-02	1.2500	1.713E+13
Cs-137	2.0313E+00	11,683.575	23,367.149	0.00E+00	2.37E+04	4.75E+04	1.7500	7.862E+11
Eu-154	2.4513E-02	11,683.575	23,367.149	0.00E+00	2.86E+02	5.73E+02	2.2500	6.897E+07
Eu-155	4.8175E-03	11,683.575	23,367.149	0.00E+00	5.63E+01	1.13E+02	2.7500	3.898E+07
Fe-55	1.2397E-04	11,683.575	23,367.149	0.00E+00	1.45E+00	2.90E+00	3.5000	1.794E+05
H-3	4.5697E-03	11,683.575	23,367.149	0.00E+00	5.34E+01	1.07E+02	5.0000	1.025E+04
I-129	7.5300E-07	11,683.575	23,367.149	0.00E+00	8.80E-03	1.76E-02	7.0000	1.132E+03
Kr-85	1.0850E-01	11,683.575	23,367.149	0.00E+00	1.27E+03	2.54E+03	11.0000	1.269E+02
Np-237	9.5561E-06	11,683.575	23,367.149	0.00E+00	1.12E-01	2.23E-01		
Pa-231	2.0359E-09	11,683.575	23,367.149	0.00E+00	2.38E-05	4.76E-05		
Pb-210	4.9728E-11	11,683.575	23,367.149	0.00E+00	5.81E-07	1.16E-06		
Pm-147	4.8502E-02	11,683.575	23,367.149	0.00E+00	5.67E+02	1.13E+03		
Pu-238	1.8254E-02	11,683.575	23,367.149	0.00E+00	2.13E+02	4.27E+02		
Pu-239	4.2810E-04	11,683.575	23,367.149	0.00E+00	5.00E+00	1.00E+01		
Pu-240	2.4368E-04	11,683.575	23,367.149	0.00E+00	2.85E+00	5.69E+00		
Pu-241	3.3415E-02	11,683.575	23,367.149	0.00E+00	3.90E+02	7.81E+02		
Pu-242	3.6329E-07	11,683.575	23,367.149	0.00E+00	4.24E-03	8.49E-03		
Ra-226	2.2854E-10	11,683.575	23,367.149	0.00E+00	2.67E-06	5.34E-06		
Ra-228	1.2426E-14	11,683.575	23,367.149	0.00E+00	1.45E-10	2.90E-10		
Ru-106	6.3589E-06	11,683.575	23,367.149	0.00E+00	7.43E-02	1.49E-01		
Se-79	1.2933E-05	11,683.575	23,367.149	0.00E+00	1.51E-01	3.02E-01		
Sn-126	1.1574E-05	11,683.575	23,367.149	0.00E+00	1.35E-01	2.70E-01		
Sr-90	1.9248E+00	11,683.575	23,367.149	0.00E+00	2.25E+04	4.50E+04		
Tc-99	4.2239E-04	11,683.575	23,367.149	0.00E+00	4.93E+00	9.87E+00		
Th-229	5.0953E-12	11,683.575	23,367.149	0.00E+00	5.95E-08	1.19E-07		
Th-230	4.1885E-08	11,683.575	23,367.149	0.00E+00	4.89E-04	9.79E-04		
Th-232	1.9270E-14	11,683.575	23,367.149	0.00E+00	2.25E-10	4.50E-10		
Tl-208	4.6024E-08	11,683.575	23,367.149	0.00E+00	5.38E-04	1.08E-03		
U-232	1.2582E-07	11,683.575	23,367.149	0.00E+00	1.47E-03	2.94E-03		
U-233	2.5825E-09	11,683.575	23,367.149	0.00E+00	3.02E-05	6.03E-05		
U-234	1.8450E-04	11,683.575	23,367.149	0.00E+00	2.16E+00	4.31E+00		
U-235	-2.7235E-06	11,683.575	0.000	8.89E-02	5.70E-02	8.89E-02		
U-236	1.5493E-05	11,683.575	23,367.149	0.00E+00	1.81E-01	3.62E-01		
U-238	-4.2851E-09	11,683.575	0.000	5.53E-02	5.52E-02	5.53E-02		
Y-90	1.9254E+00	11,683.575	23,367.149	0.00E+00	2.25E+04	4.50E+04		
Other Radionuclides					2.26E+04	4.52E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.79E+02	5.57E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3SI2	U	
BOL Enrichment %:	19.9999957	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		11,683.575	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		23,367.149	

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 (JAPAN)
 SNF ID #: 553
 Fuel Units & Descr: 476 - ASSEMBLY
 Heavy Metal Mass: BOL=714.00kg ; EOL=632.46kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 10 to 20%, U)
²Template Burnup(MWd): 15
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 19.83

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5333E-10	77,499.759	154,999.518	0.00E+00	6.61E-05	1.32E-04	0.0150	1.571E+16
Am-241	2.2753E-02	77,499.759	154,999.518	0.00E+00	1.76E+03	3.53E+03	0.0250	3.263E+15
Am-242m	8.9133E-06	77,499.759	154,999.518	0.00E+00	6.91E-01	1.38E+00	0.0375	2.866E+15
Am-243	6.4007E-06	77,499.759	154,999.518	0.00E+00	4.96E-01	9.92E-01	0.0575	3.087E+15
C-14	2.9620E-08	77,499.759	154,999.518	0.00E+00	2.30E-03	4.59E-03	0.0850	1.838E+15
Cl-36	5.9513E-35	77,499.759	154,999.518	0.00E+00	4.61E-30	9.22E-30	0.1250	1.237E+15
Cm-243	2.2087E-06	77,499.759	154,999.518	0.00E+00	1.71E-01	3.42E-01	0.2250	1.584E+15
Cm-244	1.1007E-04	77,499.759	154,999.518	0.00E+00	8.53E+00	1.71E+01	0.3750	6.894E+14
Co-60	1.6340E-05	77,499.759	154,999.518	0.00E+00	1.27E+00	2.53E+00	0.5750	1.169E+16
Cs-134	2.1353E-03	77,499.759	154,999.518	0.00E+00	1.65E+02	3.31E+02	0.8500	1.787E+14
Cs-135	4.8607E-06	77,499.759	154,999.518	0.00E+00	3.77E-01	7.53E-01	1.2500	1.007E+14
Cs-137	2.0227E+00	77,499.759	154,999.518	0.00E+00	1.57E+05	3.14E+05	1.7500	4.754E+12
Eu-154	2.0887E-02	77,499.759	154,999.518	0.00E+00	1.62E+03	3.24E+03	2.2500	4.459E+08
Eu-155	4.0867E-03	77,499.759	154,999.518	0.00E+00	3.17E+02	6.33E+02	2.7500	5.274E+07
Fe-55	1.4167E-03	77,499.759	154,999.518	0.00E+00	1.10E+02	2.20E+02	3.5000	2.137E+06
H-3	4.6653E-03	77,499.759	154,999.518	0.00E+00	3.62E+02	7.23E+02	5.0000	3.245E+05
I-129	7.1600E-07	77,499.759	154,999.518	0.00E+00	5.55E-02	1.11E-01	7.0000	3.672E+04
Kr-85	1.0240E-01	77,499.759	154,999.518	0.00E+00	7.94E+03	1.59E+04	11.0000	4.179E+03
Np-237	3.7227E-06	77,499.759	154,999.518	0.00E+00	2.89E-01	5.77E-01		
Pa-231	2.6727E-09	77,499.759	154,999.518	0.00E+00	2.07E-04	4.14E-04		
Pb-210	4.3313E-14	77,499.759	154,999.518	0.00E+00	3.36E-09	6.71E-09		
Pm-147	4.6307E-02	77,499.759	154,999.518	0.00E+00	3.59E+03	7.18E+03		
Pu-238	5.5273E-03	77,499.759	154,999.518	0.00E+00	4.28E+02	8.57E+02		
Pu-239	1.0313E-02	77,499.759	154,999.518	0.00E+00	7.99E+02	1.60E+03		
Pu-240	5.4180E-03	77,499.759	154,999.518	0.00E+00	4.20E+02	8.40E+02		
Pu-241	3.7573E-01	77,499.759	154,999.518	0.00E+00	2.91E+04	5.82E+04		
Pu-242	3.0713E-06	77,499.759	154,999.518	0.00E+00	2.38E-01	4.76E-01		
Ra-226	2.3807E-13	77,499.759	154,999.518	0.00E+00	1.85E-08	3.69E-08		
Ra-228	1.0607E-14	77,499.759	154,999.518	0.00E+00	8.22E-10	1.64E-09		
Ru-106	8.4800E-06	77,499.759	154,999.518	0.00E+00	6.57E-01	1.31E+00		
Se-79	1.2533E-05	77,499.759	154,999.518	0.00E+00	9.71E-01	1.94E+00		
Sn-126	1.1393E-05	77,499.759	154,999.518	0.00E+00	8.83E-01	1.77E+00		
Sr-90	1.8400E+00	77,499.759	154,999.518	0.00E+00	1.43E+05	2.85E+05		
Tc-99	4.3533E-04	77,499.759	154,999.518	0.00E+00	3.37E+01	6.75E+01		
Th-229	5.8947E-13	77,499.759	154,999.518	0.00E+00	4.57E-08	9.14E-08		
Th-230	5.9500E-11	77,499.759	154,999.518	0.00E+00	4.61E-06	9.22E-06		
Th-232	1.6360E-14	77,499.759	154,999.518	0.00E+00	1.27E-09	2.54E-09		
Tl-208	7.6000E-09	77,499.759	154,999.518	0.00E+00	5.89E-04	1.18E-03		
U-232	2.0747E-08	77,499.759	154,999.518	0.00E+00	1.61E-03	3.22E-03		
U-233	4.4013E-10	77,499.759	154,999.518	0.00E+00	3.41E-05	6.82E-05		
U-234	4.6500E-07	77,499.759	154,999.518	0.00E+00	3.60E-02	7.21E-02		
U-235	-2.5335E-06	77,499.759	0.000	3.09E-01	1.12E-01	3.09E-01		
U-236	1.3000E-05	77,499.759	154,999.518	0.00E+00	1.01E+00	2.01E+00		
U-238	-1.4207E-08	77,499.759	0.000	1.92E-01	1.91E-01	1.92E-01		
Y-90	1.8400E+00	77,499.759	154,999.518	0.00E+00	1.43E+05	2.85E+05		
Other Radionuclides					1.49E+05	2.98E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.85E+03	3.71E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

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

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		77,499.759	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		154,999.518	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	2.48		1.03
Bounding:	4.96		

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN)
 SNF ID #: 506
 Fuel Units & Descr: 70 - ASSEMBLY
 Heavy Metal Mass: BOL=73.50kg ; EOL=70.41kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 2.92

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	2,923.448	5,846.896	0.00E+00	1.94E-06	3.88E-06	Avg. MeV	
Am-241	2.0060E-03	2,923.448	5,846.896	0.00E+00	5.86E+00	1.17E+01	0.0150	6.172E+14
Am-242m	4.2429E-07	2,923.448	5,846.896	0.00E+00	1.24E-03	2.48E-03	0.0250	1.283E+14
Am-243	1.4899E-06	2,923.448	5,846.896	0.00E+00	4.36E-03	8.71E-03	0.0375	1.119E+14
C-14	5.7135E-09	2,923.448	5,846.896	0.00E+00	1.67E-05	3.34E-05	0.0575	1.199E+14
Cl-36	1.3124E-32	2,923.448	5,846.896	0.00E+00	3.84E-29	7.67E-29	0.0850	7.245E+13
Cm-243	1.6443E-07	2,923.448	5,846.896	0.00E+00	4.81E-04	9.61E-04	0.1250	4.903E+13
Cm-244	2.9330E-05	2,923.448	5,846.896	0.00E+00	8.57E-02	1.71E-01	0.2250	6.252E+13
Co-60	5.3186E-06	2,923.448	5,846.896	0.00E+00	1.55E-02	3.11E-02	0.3750	7.221E+13
Cs-134	3.1563E-03	2,923.448	5,846.896	0.00E+00	9.23E+00	1.85E+01	0.5750	4.439E+14
Cs-135	3.4477E-06	2,923.448	5,846.896	0.00E+00	1.01E-02	2.02E-02	0.8500	7.505E+12
Cs-137	2.0313E+00	2,923.448	5,846.896	0.00E+00	5.94E+03	1.19E+04	1.2500	4.286E+12
Eu-154	2.4513E-02	2,923.448	5,846.896	0.00E+00	7.17E+01	1.43E+02	1.7500	1.967E+11
Eu-155	4.8175E-03	2,923.448	5,846.896	0.00E+00	1.41E+01	2.82E+01	2.2500	1.726E+07
Fe-55	1.2397E-04	2,923.448	5,846.896	0.00E+00	3.62E-01	7.25E-01	2.7500	9.753E+06
H-3	4.5697E-03	2,923.448	5,846.896	0.00E+00	1.34E+01	2.67E+01	3.5000	4.492E+04
I-129	7.5300E-07	2,923.448	5,846.896	0.00E+00	2.20E-03	4.40E-03	5.0000	2.578E+03
Kr-85	1.0850E-01	2,923.448	5,846.896	0.00E+00	3.17E+02	6.34E+02	7.0000	2.849E+02
Np-237	9.5561E-06	2,923.448	5,846.896	0.00E+00	2.79E-02	5.59E-02	11.0000	3.194E+01
Pa-231	2.0359E-09	2,923.448	5,846.896	0.00E+00	5.95E-06	1.19E-05		
Pb-210	4.9728E-11	2,923.448	5,846.896	0.00E+00	1.45E-07	2.91E-07		
Pm-147	4.8502E-02	2,923.448	5,846.896	0.00E+00	1.42E+02	2.84E+02		
Pu-238	1.8254E-02	2,923.448	5,846.896	0.00E+00	5.34E+01	1.07E+02		
Pu-239	4.2810E-04	2,923.448	5,846.896	0.00E+00	1.25E+00	2.50E+00		
Pu-240	2.4368E-04	2,923.448	5,846.896	0.00E+00	7.12E-01	1.42E+00		
Pu-241	3.3415E-02	2,923.448	5,846.896	0.00E+00	9.77E+01	1.95E+02		
Pu-242	3.6329E-07	2,923.448	5,846.896	0.00E+00	1.06E-03	2.12E-03		
Ra-226	2.2854E-10	2,923.448	5,846.896	0.00E+00	6.68E-07	1.34E-06		
Ra-228	1.2426E-14	2,923.448	5,846.896	0.00E+00	3.63E-11	7.27E-11		
Ru-106	6.3589E-06	2,923.448	5,846.896	0.00E+00	1.86E-02	3.72E-02		
Se-79	1.2933E-05	2,923.448	5,846.896	0.00E+00	3.78E-02	7.56E-02		
Sn-126	1.1574E-05	2,923.448	5,846.896	0.00E+00	3.38E-02	6.77E-02		
Sr-90	1.9248E+00	2,923.448	5,846.896	0.00E+00	5.63E+03	1.13E+04		
Tc-99	4.2239E-04	2,923.448	5,846.896	0.00E+00	1.23E+00	2.47E+00		
Th-229	5.0953E-12	2,923.448	5,846.896	0.00E+00	1.49E-08	2.98E-08		
Th-230	4.1885E-08	2,923.448	5,846.896	0.00E+00	1.22E-04	2.45E-04		
Th-232	1.9270E-14	2,923.448	5,846.896	0.00E+00	5.63E-11	1.13E-10		
Th-208	4.6024E-08	2,923.448	5,846.896	0.00E+00	1.35E-04	2.69E-04		
U-232	1.2582E-07	2,923.448	5,846.896	0.00E+00	3.68E-04	7.36E-04		
U-233	2.5825E-09	2,923.448	5,846.896	0.00E+00	7.55E-06	1.51E-05		
U-234	1.8450E-04	2,923.448	5,846.896	0.00E+00	5.39E-01	1.08E+00		
U-235	-2.7235E-06	2,923.448	0.000	3.18E-02	2.38E-02	3.18E-02		
U-236	1.5493E-05	2,923.448	5,846.896	0.00E+00	4.53E-02	9.06E-02		
U-238	-4.2851E-09	2,923.448	0.000	1.98E-02	1.98E-02	1.98E-02		
Y-90	1.9254E+00	2,923.448	5,846.896	0.00E+00	5.63E+03	1.13E+04		
Other Radionuclides					5.65E+03	1.13E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.97E+01	1.39E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		Basis for Parameter Differences:
From SFD	Used	
Reactor Moderator:	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ALUM	
BOL HM Constituents:	U3Si2	
BOL Enrichment %:	20.00000028	

Burnup Summary (MWd) ²		Basis for burnup used in estimate:
From SFD	Estimated	
Nominal:	2,923.448	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:	5,846.896	

Checks		Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	
	0.13	1.00
Bounding:	0.25	

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN) 1Fuel decay start date: 2010
 SNF ID #: 602 Estimates as of: 2030
 Fuel Units & Desc: 40 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=7.74kg ; EOL=6.01kg 2Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.67

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	1,636.450	3,272.900	0.00E+00	1.09E-06	2.17E-06	0.0150	3.455E+14
Am-241	2.0060E-03	1,636.450	3,272.900	0.00E+00	3.28E+00	6.57E+00	0.0250	7.184E+13
Am-242m	4.2429E-07	1,636.450	3,272.900	0.00E+00	6.94E-04	1.39E-03	0.0375	6.266E+13
Am-243	1.4899E-06	1,636.450	3,272.900	0.00E+00	2.44E-03	4.88E-03	0.0575	6.711E+13
C-14	5.7135E-09	1,636.450	3,272.900	0.00E+00	9.35E-06	1.87E-05	0.0850	4.056E+13
Cl-36	1.3124E-32	1,636.450	3,272.900	0.00E+00	2.15E-29	4.30E-29	0.1250	2.744E+13
Cm-243	1.6443E-07	1,636.450	3,272.900	0.00E+00	2.69E-04	5.38E-04	0.2250	3.499E+13
Cm-244	2.9330E-05	1,636.450	3,272.900	0.00E+00	4.80E-02	9.60E-02	0.3750	1.523E+13
Co-60	5.3186E-06	1,636.450	3,272.900	0.00E+00	8.70E-03	1.74E-02	0.5750	2.485E+14
Cs-134	3.1563E-03	1,636.450	3,272.900	0.00E+00	5.17E+00	1.03E+01	0.8500	4.201E+12
Cs-135	3.4477E-06	1,636.450	3,272.900	0.00E+00	5.64E-03	1.13E-02	1.2500	2.399E+12
Cs-137	2.0313E+00	1,636.450	3,272.900	0.00E+00	3.32E+03	6.65E+03	1.7500	1.101E+11
Eu-154	2.4513E-02	1,636.450	3,272.900	0.00E+00	4.01E+01	8.02E+01	2.2500	9.661E+06
Eu-155	4.8175E-03	1,636.450	3,272.900	0.00E+00	7.88E+00	1.58E+01	2.7500	5.460E+06
Fe-55	1.2397E-04	1,636.450	3,272.900	0.00E+00	2.03E-01	4.06E-01	3.5000	2.509E+04
H-3	4.5697E-03	1,636.450	3,272.900	0.00E+00	7.48E+00	1.50E+01	5.0000	1.418E+03
I-129	7.5300E-07	1,636.450	3,272.900	0.00E+00	1.23E-03	2.46E-03	7.0000	1.566E+02
Kr-85	1.0850E-01	1,636.450	3,272.900	0.00E+00	1.78E+02	3.55E+02	11.0000	1.755E+01
Np-237	9.5561E-06	1,636.450	3,272.900	0.00E+00	1.56E-02	3.13E-02		
Pa-231	2.0359E-09	1,636.450	3,272.900	0.00E+00	3.33E-06	6.66E-06		
Pb-210	4.9728E-11	1,636.450	3,272.900	0.00E+00	8.14E-08	1.63E-07		
Pm-147	4.8502E-02	1,636.450	3,272.900	0.00E+00	7.94E+01	1.59E+02		
Pu-238	1.8254E-02	1,636.450	3,272.900	0.00E+00	2.99E+01	5.97E+01		
Pu-239	4.2810E-04	1,636.450	3,272.900	0.00E+00	7.01E-01	1.40E+00		
Pu-240	2.4368E-04	1,636.450	3,272.900	0.00E+00	3.99E-01	7.98E-01		
Pu-241	3.3415E-02	1,636.450	3,272.900	0.00E+00	5.47E+01	1.09E+02		
Pu-242	3.6329E-07	1,636.450	3,272.900	0.00E+00	5.95E-04	1.19E-03		
Ra-226	2.2854E-10	1,636.450	3,272.900	0.00E+00	3.74E-07	7.48E-07		
Ra-228	1.2426E-14	1,636.450	3,272.900	0.00E+00	2.03E-11	4.07E-11		
Ru-106	6.3589E-06	1,636.450	3,272.900	0.00E+00	1.04E-02	2.08E-02		
Se-79	1.2933E-05	1,636.450	3,272.900	0.00E+00	2.12E-02	4.23E-02		
Sn-126	1.1574E-05	1,636.450	3,272.900	0.00E+00	1.89E-02	3.79E-02		
Sr-90	1.9248E+00	1,636.450	3,272.900	0.00E+00	3.15E+03	6.30E+03		
Tc-99	4.2239E-04	1,636.450	3,272.900	0.00E+00	6.91E-01	1.38E+00		
Th-229	5.0953E-12	1,636.450	3,272.900	0.00E+00	8.34E-09	1.67E-08		
Th-230	4.1885E-08	1,636.450	3,272.900	0.00E+00	6.85E-05	1.37E-04		
Th-232	1.9270E-14	1,636.450	3,272.900	0.00E+00	3.15E-11	6.31E-11		
Tl-208	4.6024E-08	1,636.450	3,272.900	0.00E+00	7.53E-05	1.51E-04		
U-232	1.2582E-07	1,636.450	3,272.900	0.00E+00	2.06E-04	4.12E-04		
U-233	2.5825E-09	1,636.450	3,272.900	0.00E+00	4.23E-06	8.45E-06		
U-234	1.8450E-04	1,636.450	3,272.900	0.00E+00	3.02E-01	6.04E-01		
U-235	-2.7235E-06	1,636.450	0.000	1.56E-02	1.11E-02	1.56E-02		
U-236	1.5493E-05	1,636.450	3,272.900	0.00E+00	2.54E-02	5.07E-02		
U-238	-4.2851E-09	1,636.450	0.000	1.82E-04	1.75E-04	1.82E-04		
Y-90	1.9254E+00	1,636.450	3,272.900	0.00E+00	3.15E+03	6.30E+03		
Other Radionuclides					3.16E+03	6.33E+03		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.9999931	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,636.450	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		3,272.900	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.67		1.02
Bounding:	1.34		

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

²Total burnup for all fuel associated with this worksheet must be 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 (NETHERLANDS)
 SNF ID #: 510
 Fuel Units & Descr: 43 - ASSEMBLY
 Heavy Metal Mass: BOL=64.50kg ; EOL=56.76kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100% U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.79

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	6.6313E-10	7,329.929	14,659.858	0.00E+00	4.86E-06	9.72E-06	0.0150	1.547E+15
Am-241	2.0060E-03	7,329.929	14,659.858	0.00E+00	1.47E+01	2.94E+01	0.0250	3.218E+14
Am-242m	4.2429E-07	7,329.929	14,659.858	0.00E+00	3.11E-03	6.22E-03	0.0375	2.807E+14
Am-243	1.4899E-06	7,329.929	14,659.858	0.00E+00	1.09E-02	2.18E-02	0.0575	3.006E+14
C-14	5.7135E-09	7,329.929	14,659.858	0.00E+00	4.19E-05	8.38E-05	0.0850	1.817E+14
Cl-36	1.3124E-32	7,329.929	14,659.858	0.00E+00	9.62E-29	1.92E-28	0.1250	1.229E+14
Cm-243	1.6443E-07	7,329.929	14,659.858	0.00E+00	1.21E-03	2.41E-03	0.2250	1.567E+14
Cm-244	2.9330E-05	7,329.929	14,659.858	0.00E+00	2.15E-01	4.30E-01	0.3750	6.823E+13
Co-60	5.3186E-06	7,329.929	14,659.858	0.00E+00	3.90E-02	7.80E-02	0.5750	1.113E+15
Cs-134	3.1563E-03	7,329.929	14,659.858	0.00E+00	2.31E+01	4.63E+01	0.8500	1.882E+13
Cs-135	3.4477E-06	7,329.929	14,659.858	0.00E+00	2.53E-02	5.05E-02	1.2500	1.075E+13
Cs-137	2.0313E+00	7,329.929	14,659.858	0.00E+00	1.49E+04	2.98E+04	1.7500	4.932E+11
Eu-154	2.4513E-02	7,329.929	14,659.858	0.00E+00	1.80E+02	3.59E+02	2.2500	4.327E+07
Eu-155	4.8175E-03	7,329.929	14,659.858	0.00E+00	3.53E+01	7.06E+01	2.7500	2.445E+07
Fe-55	1.2397E-04	7,329.929	14,659.858	0.00E+00	9.09E-01	1.82E+00	3.5000	1.125E+05
H-3	4.5697E-03	7,329.929	14,659.858	0.00E+00	3.35E+01	6.70E+01	5.0000	6.389E+03
I-129	7.5300E-07	7,329.929	14,659.858	0.00E+00	5.52E-03	1.10E-02	7.0000	7.057E+02
Kr-85	1.0850E-01	7,329.929	14,659.858	0.00E+00	7.95E+02	1.59E+03	11.0000	7.910E+01
Np-237	9.5561E-06	7,329.929	14,659.858	0.00E+00	7.00E-02	1.40E-01		
Pa-231	2.0359E-09	7,329.929	14,659.858	0.00E+00	1.49E-05	2.98E-05		
Pb-210	4.9728E-11	7,329.929	14,659.858	0.00E+00	3.65E-07	7.29E-07		
Pm-147	4.8502E-02	7,329.929	14,659.858	0.00E+00	3.56E+02	7.11E+02		
Pu-238	1.8254E-02	7,329.929	14,659.858	0.00E+00	1.34E+02	2.68E+02		
Pu-239	4.2810E-04	7,329.929	14,659.858	0.00E+00	3.14E+00	6.28E+00		
Pu-240	2.4368E-04	7,329.929	14,659.858	0.00E+00	1.79E+00	3.57E+00		
Pu-241	3.3415E-02	7,329.929	14,659.858	0.00E+00	2.45E+02	4.90E+02		
Pu-242	3.6329E-07	7,329.929	14,659.858	0.00E+00	2.66E-03	5.33E-03		
Ra-226	2.2854E-10	7,329.929	14,659.858	0.00E+00	1.68E-06	3.35E-06		
Ra-228	1.2426E-14	7,329.929	14,659.858	0.00E+00	9.11E-11	1.82E-10		
Ru-106	6.3589E-06	7,329.929	14,659.858	0.00E+00	4.66E-02	9.32E-02		
Se-79	1.2933E-05	7,329.929	14,659.858	0.00E+00	9.48E-02	1.90E-01		
Sn-126	1.1574E-05	7,329.929	14,659.858	0.00E+00	8.48E-02	1.70E-01		
Sr-90	1.9248E+00	7,329.929	14,659.858	0.00E+00	1.41E+04	2.82E+04		
Tc-99	4.2239E-04	7,329.929	14,659.858	0.00E+00	3.10E+00	6.19E+00		
Th-229	5.0953E-12	7,329.929	14,659.858	0.00E+00	3.73E-08	7.47E-08		
Th-230	4.1885E-08	7,329.929	14,659.858	0.00E+00	3.07E-04	6.14E-04		
Th-232	1.9270E-14	7,329.929	14,659.858	0.00E+00	1.41E-10	2.82E-10		
Tl-208	4.6024E-08	7,329.929	14,659.858	0.00E+00	3.37E-04	6.75E-04		
U-232	1.2582E-07	7,329.929	14,659.858	0.00E+00	9.22E-04	1.84E-03		
U-233	2.5825E-09	7,329.929	14,659.858	0.00E+00	1.89E-05	3.79E-05		
U-234	1.8450E-04	7,329.929	14,659.858	0.00E+00	1.35E+00	2.70E+00		
U-235	-2.7235E-06	7,329.929	0.000	2.79E-02	7.91E-03	2.79E-02		
U-236	1.5493E-05	7,329.929	14,659.858	0.00E+00	1.14E-01	2.27E-01		
U-238	-4.2851E-09	7,329.929	0.000	1.73E-02	1.73E-02	1.73E-02		
Y-90	1.9254E+00	7,329.929	14,659.858	0.00E+00	1.41E+04	2.82E+04		
Other Radionuclides					1.42E+04	2.84E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.75E+02	3.49E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20.00000079	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 7,329.929	Estimated: 7,329.929	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		14,659.858	

Checks		
Nominal:	Burnup Multiplier: 0.36	Estimated Burnup/ Given Burnup: 1.01
Bounding:	0.72	

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

²Total burnup for all fuel associated with this worksheet must be 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 (NETHERLANDS)
 SNF ID #: 607
 Fuel Units & Descr: 19 - MTR TYPE
 Heavy Metal Mass: BOL=2.04kg ; EOL=1.09kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.79

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	899.668	1,799.337	0.00E+00	5.97E-07	1.19E-06		
Am-241	2.0060E-03	899.668	1,799.337	0.00E+00	1.80E+00	3.61E+00	0.0150	1.899E+14
Am-242m	4.2429E-07	899.668	1,799.337	0.00E+00	3.82E-04	7.63E-04	0.0250	3.950E+13
Am-243	1.4899E-06	899.668	1,799.337	0.00E+00	1.34E-03	2.68E-03	0.0375	3.445E+13
C-14	5.7135E-09	899.668	1,799.337	0.00E+00	5.14E-06	1.03E-05	0.0575	3.690E+13
Cl-36	1.3124E-32	899.668	1,799.337	0.00E+00	1.18E-29	2.36E-29	0.0850	2.230E+13
Cm-243	1.6443E-07	899.668	1,799.337	0.00E+00	1.48E-04	2.96E-04	0.1250	1.509E+13
Cm-244	2.9330E-05	899.668	1,799.337	0.00E+00	2.64E-02	5.28E-02	0.2250	1.924E+13
Co-60	5.3186E-06	899.668	1,799.337	0.00E+00	4.79E-03	9.57E-03	0.3750	8.374E+12
Cs-134	3.1563E-03	899.668	1,799.337	0.00E+00	2.84E+00	5.68E+00	0.5750	1.366E+14
Cs-135	3.4477E-06	899.668	1,799.337	0.00E+00	3.10E-03	6.20E-03	0.8500	2.309E+12
Cs-137	2.0313E+00	899.668	1,799.337	0.00E+00	1.83E+03	3.66E+03	1.2500	1.319E+12
Eu-154	2.4513E-02	899.668	1,799.337	0.00E+00	2.21E+01	4.41E+01	1.7500	6.054E+10
Eu-155	4.8175E-03	899.668	1,799.337	0.00E+00	4.33E+00	8.67E+00	2.2500	5.311E+06
Fe-55	1.2397E-04	899.668	1,799.337	0.00E+00	1.12E-01	2.23E-01	2.7500	3.002E+06
H-3	4.5697E-03	899.668	1,799.337	0.00E+00	4.11E+00	8.22E+00	3.5000	1.379E+04
I-129	7.5300E-07	899.668	1,799.337	0.00E+00	6.77E-04	1.35E-03	5.0000	7.795E+02
Kr-85	1.0850E-01	899.668	1,799.337	0.00E+00	9.76E+01	1.95E+02	7.0000	8.607E+01
Np-237	9.5561E-06	899.668	1,799.337	0.00E+00	8.60E-03	1.72E-02	11.0000	9.645E+00
Pa-231	2.0359E-09	899.668	1,799.337	0.00E+00	1.83E-06	3.66E-06		
Pb-210	4.9728E-11	899.668	1,799.337	0.00E+00	4.47E-08	8.95E-08		
Pm-147	4.8502E-02	899.668	1,799.337	0.00E+00	4.36E+01	8.73E+01		
Pu-238	1.8254E-02	899.668	1,799.337	0.00E+00	1.64E+01	3.28E+01		
Pu-239	4.2810E-04	899.668	1,799.337	0.00E+00	3.85E-01	7.70E-01		
Pu-240	2.4368E-04	899.668	1,799.337	0.00E+00	2.19E-01	4.38E-01		
Pu-241	3.3415E-02	899.668	1,799.337	0.00E+00	3.01E+01	6.01E+01		
Pu-242	3.6329E-07	899.668	1,799.337	0.00E+00	3.27E-04	6.54E-04		
Ra-226	2.2854E-10	899.668	1,799.337	0.00E+00	2.06E-07	4.11E-07		
Ra-228	1.2426E-14	899.668	1,799.337	0.00E+00	1.12E-11	2.24E-11		
Ru-106	6.3589E-06	899.668	1,799.337	0.00E+00	5.72E-03	1.14E-02		
Se-79	1.2933E-05	899.668	1,799.337	0.00E+00	1.16E-02	2.33E-02		
Sn-126	1.1574E-05	899.668	1,799.337	0.00E+00	1.04E-02	2.08E-02		
Sr-90	1.9248E+00	899.668	1,799.337	0.00E+00	1.73E+03	3.46E+03		
Tc-99	4.2239E-04	899.668	1,799.337	0.00E+00	3.80E-01	7.60E-01		
Th-229	5.0953E-12	899.668	1,799.337	0.00E+00	4.58E-09	9.17E-09		
Th-230	4.1885E-08	899.668	1,799.337	0.00E+00	3.77E-05	7.54E-05		
Th-232	1.9270E-14	899.668	1,799.337	0.00E+00	1.73E-11	3.47E-11		
Tl-208	4.6024E-08	899.668	1,799.337	0.00E+00	4.14E-05	8.28E-05		
U-232	1.2582E-07	899.668	1,799.337	0.00E+00	1.13E-04	2.26E-04		
U-233	2.5825E-09	899.668	1,799.337	0.00E+00	2.32E-06	4.65E-06		
U-234	1.8450E-04	899.668	1,799.337	0.00E+00	1.66E-01	3.32E-01		
U-235	-2.7235E-06	899.668	0.000	4.10E-03	1.65E-03	4.10E-03		
U-236	1.5493E-05	899.668	1,799.337	0.00E+00	1.39E-02	2.79E-02		
U-238	-4.2851E-09	899.668	0.000	4.81E-05	4.42E-05	4.81E-05	2.14E+01	4.29E+01
Y-90	1.9254E+00	899.668	1,799.337	0.00E+00	1.73E+03	3.46E+03	Total	Total
Other Radionuclides					1.74E+03	3.48E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.99998697	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		899.668	
Bounding:		1,799.337	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.40		
Bounding:	2.80		

Estimated EOL HM/Given EOL HM: 1.05

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

²Total burnup for all fuel associated with this worksheet must be 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 (NETHERLANDS)
SNF ID #: 608
Fuel Units & Descr: 61 - MTR TYPE
Heavy Metal Mass: BOL=12.46kg ; EOL=6.67kg
ROD Storage Site: SRS

¹Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated Canister usage:
18"x10"
2.54

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	5,487.977	10,975.954	0.00E+00	3.64E-06	7.28E-06	0.0150	1.159E+15
Am-241	2.0060E-03	5,487.977	10,975.954	0.00E+00	1.10E+01	2.20E+01	0.0250	2.409E+14
Am-242m	4.2429E-07	5,487.977	10,975.954	0.00E+00	2.33E-03	4.66E-03	0.0375	2.102E+14
Am-243	1.4899E-06	5,487.977	10,975.954	0.00E+00	8.18E-03	1.64E-02	0.0575	2.251E+14
C-14	5.7135E-09	5,487.977	10,975.954	0.00E+00	3.14E-05	6.27E-05	0.0850	1.360E+14
Cl-36	1.3124E-32	5,487.977	10,975.954	0.00E+00	7.20E-29	1.44E-28	0.1250	9.203E+13
Cm-243	1.6443E-07	5,487.977	10,975.954	0.00E+00	9.02E-04	1.80E-03	0.2250	1.174E+14
Cm-244	2.9330E-05	5,487.977	10,975.954	0.00E+00	1.61E-01	3.22E-01	0.3750	5.108E+13
Co-60	5.3186E-06	5,487.977	10,975.954	0.00E+00	2.92E-02	5.84E-02	0.5750	8.333E+14
Cs-134	3.1563E-03	5,487.977	10,975.954	0.00E+00	1.73E+01	3.46E+01	0.8500	1.409E+13
Cs-135	3.4477E-06	5,487.977	10,975.954	0.00E+00	1.89E-02	3.78E-02	1.2500	8.045E+12
Cs-137	2.0313E+00	5,487.977	10,975.954	0.00E+00	1.11E+04	2.23E+04	1.7500	3.693E+11
Eu-154	2.4513E-02	5,487.977	10,975.954	0.00E+00	1.35E+02	2.69E+02	2.2500	3.240E-07
Eu-155	4.8175E-03	5,487.977	10,975.954	0.00E+00	2.64E+01	5.29E+01	2.7500	1.831E+07
Fe-55	1.2397E-04	5,487.977	10,975.954	0.00E+00	6.80E-01	1.36E+00	3.5000	8.414E+04
H-3	4.5697E-03	5,487.977	10,975.954	0.00E+00	2.51E+01	5.02E+01	5.0000	4.755E+03
I-129	7.5300E-07	5,487.977	10,975.954	0.00E+00	4.13E-03	8.26E-03	7.0000	5.250E+02
Kr-85	1.0850E-01	5,487.977	10,975.954	0.00E+00	5.95E+02	1.19E+03	11.0000	5.884E+01
Np-237	9.5561E-06	5,487.977	10,975.954	0.00E+00	5.24E-02	1.05E-01		
Pa-231	2.0359E-09	5,487.977	10,975.954	0.00E+00	1.12E-05	2.23E-05		
Pb-210	4.9728E-11	5,487.977	10,975.954	0.00E+00	2.73E-07	5.46E-07		
Pm-147	4.8502E-02	5,487.977	10,975.954	0.00E+00	2.66E-02	5.32E-02		
Pu-238	1.8254E-02	5,487.977	10,975.954	0.00E+00	1.00E+02	2.00E+02		
Pu-239	4.2810E-04	5,487.977	10,975.954	0.00E+00	2.35E+00	4.70E+00		
Pu-240	2.4368E-04	5,487.977	10,975.954	0.00E+00	1.34E+00	2.67E+00		
Pu-241	3.3415E-02	5,487.977	10,975.954	0.00E+00	1.83E+02	3.67E+02		
Pu-242	3.6329E-07	5,487.977	10,975.954	0.00E+00	1.99E-03	3.99E-03		
Ra-226	2.2854E-10	5,487.977	10,975.954	0.00E+00	1.25E-06	2.51E-06		
Ra-228	1.2426E-14	5,487.977	10,975.954	0.00E+00	6.82E-11	1.36E-10		
Ru-106	6.3589E-06	5,487.977	10,975.954	0.00E+00	3.49E-02	6.98E-02		
Se-79	1.2933E-05	5,487.977	10,975.954	0.00E+00	7.10E-02	1.42E-01		
Sn-126	1.1574E-05	5,487.977	10,975.954	0.00E+00	6.35E-02	1.27E-01		
Sr-90	1.9248E+00	5,487.977	10,975.954	0.00E+00	1.06E+04	2.11E+04		
Tc-99	4.2239E-04	5,487.977	10,975.954	0.00E+00	2.32E+00	4.64E+00		
Th-229	5.0953E-12	5,487.977	10,975.954	0.00E+00	2.80E-08	5.59E-08		
Th-230	4.1885E-08	5,487.977	10,975.954	0.00E+00	2.30E-04	4.60E-04		
Th-232	1.9270E-14	5,487.977	10,975.954	0.00E+00	1.06E-10	2.12E-10		
Ti-208	4.6024E-08	5,487.977	10,975.954	0.00E+00	2.53E-04	5.05E-04		
U-232	1.2582E-07	5,487.977	10,975.954	0.00E+00	6.90E-04	1.38E-03		
U-233	2.5825E-09	5,487.977	10,975.954	0.00E+00	1.42E-05	2.83E-05		
U-234	1.8450E-04	5,487.977	10,975.954	0.00E+00	1.01E+00	2.03E+00		
U-235	-2.7235E-06	5,487.977	0.000	2.50E-02	1.01E-02	2.50E-02		
U-236	1.5493E-05	5,487.977	10,975.954	0.00E+00	8.50E-02	1.70E-01		
U-238	-4.2851E-09	5,487.977	0.000	2.93E-04	2.70E-04	2.93E-04		
Y-90	1.9254E+00	5,487.977	10,975.954	0.00E+00	1.06E+04	2.11E+04		
Other Radionuclides					1.06E+04	2.12E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.31E+02	2.62E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.99998578	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		5,487.977	
Bounding:		10,975.954	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.40		
Bounding:	2.80		

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

²Total burnup for all fuel associated with this worksheet must be 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 (PERU)
 SNF ID #: 504
 Fuel Units & Descr: 23 - ASSEMBLY
 Heavy Metal Mass: BOL=32.20kg : EOL=28.98kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.96

II. Estimates

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	6.6313E-10	3,049.400	6,098.801	0.00E+00	2.02E-06	4.04E-06	0.0150	6.438E+14
Am-241	2.0060E-03	3,049.400	6,098.801	0.00E+00	6.12E+00	1.22E+01	0.0250	1.339E+14
Am-242m	4.2429E-07	3,049.400	6,098.801	0.00E+00	1.29E-03	2.59E-03	0.0375	1.168E+14
Am-243	1.4899E-06	3,049.400	6,098.801	0.00E+00	4.54E-03	9.09E-03	0.0575	1.251E+14
C-14	5.7135E-09	3,049.400	6,098.801	0.00E+00	1.74E-05	3.48E-05	0.0850	7.557E+13
Cl-36	1.3124E-32	3,049.400	6,098.801	0.00E+00	4.00E-29	8.00E-29	0.1250	5.114E+13
Cm-243	1.6443E-07	3,049.400	6,098.801	0.00E+00	5.01E-04	1.00E-03	0.2250	6.521E+13
Cm-244	2.9330E-05	3,049.400	6,098.801	0.00E+00	8.94E-02	1.79E-01	0.3750	2.838E+13
Co-60	5.3186E-06	3,049.400	6,098.801	0.00E+00	1.62E-02	3.24E-02	0.5750	4.630E+14
Cs-134	3.1563E-03	3,049.400	6,098.801	0.00E+00	9.62E+00	1.92E+01	0.8500	7.828E+12
Cs-135	3.4477E-06	3,049.400	6,098.801	0.00E+00	1.05E-02	2.10E-02	1.2500	4.470E+12
Cs-137	2.0313E+00	3,049.400	6,098.801	0.00E+00	6.19E+03	1.24E+04	1.7500	2.052E+11
Eu-154	2.4513E-02	3,049.400	6,098.801	0.00E+00	7.47E+01	1.49E+02	2.2500	1.800E+07
Eu-155	4.8175E-03	3,049.400	6,098.801	0.00E+00	1.47E+01	2.94E+01	2.7500	1.017E+07
Fe-55	1.2397E-04	3,049.400	6,098.801	0.00E+00	3.78E-01	7.56E-01	3.5000	4.680E+04
H-3	4.5697E-03	3,049.400	6,098.801	0.00E+00	1.39E+01	2.79E+01	5.0000	2.662E+03
I-129	7.5300E-07	3,049.400	6,098.801	0.00E+00	2.30E-03	4.59E-03	7.0000	2.941E+02
Kr-85	1.0850E-01	3,049.400	6,098.801	0.00E+00	3.31E+02	6.62E+02	11.0000	3.296E+01
Np-237	9.5561E-06	3,049.400	6,098.801	0.00E+00	2.91E-02	5.83E-02		
Pa-231	2.0359E-09	3,049.400	6,098.801	0.00E+00	6.21E-06	1.24E-05		
Pb-210	4.9728E-11	3,049.400	6,098.801	0.00E+00	1.52E-07	3.03E-07		
Pm-147	4.8502E-02	3,049.400	6,098.801	0.00E+00	1.48E+02	2.96E+02		
Pu-238	1.8254E-02	3,049.400	6,098.801	0.00E+00	5.57E+01	1.11E+02		
Pu-239	4.2810E-04	3,049.400	6,098.801	0.00E+00	1.31E+00	2.61E+00		
Pu-240	2.4368E-04	3,049.400	6,098.801	0.00E+00	7.43E-01	1.49E+00		
Pu-241	3.3415E-02	3,049.400	6,098.801	0.00E+00	1.02E+02	2.04E+02		
Pu-242	3.6329E-07	3,049.400	6,098.801	0.00E+00	1.11E-03	2.22E-03		
Ra-226	2.2854E-10	3,049.400	6,098.801	0.00E+00	6.97E-07	1.39E-06		
Ra-228	1.2426E-14	3,049.400	6,098.801	0.00E+00	3.79E-11	7.58E-11		
Ru-106	6.3589E-06	3,049.400	6,098.801	0.00E+00	1.94E-02	3.88E-02		
Se-79	1.2933E-05	3,049.400	6,098.801	0.00E+00	3.94E-02	7.89E-02		
Sn-126	1.1574E-05	3,049.400	6,098.801	0.00E+00	3.53E-02	7.06E-02		
Sr-90	1.9248E+00	3,049.400	6,098.801	0.00E+00	5.87E+03	1.17E+04		
Tc-99	4.2239E-04	3,049.400	6,098.801	0.00E+00	1.29E+00	2.58E+00		
Th-229	5.0953E-12	3,049.400	6,098.801	0.00E+00	1.55E-08	3.11E-08		
Th-230	4.1885E-08	3,049.400	6,098.801	0.00E+00	1.28E-04	2.55E-04		
Th-232	1.9270E-14	3,049.400	6,098.801	0.00E+00	5.88E-11	1.18E-10		
Ti-208	4.6024E-08	3,049.400	6,098.801	0.00E+00	1.40E-04	2.81E-04		
U-232	1.2582E-07	3,049.400	6,098.801	0.00E+00	3.84E-04	7.67E-04		
U-233	2.5825E-09	3,049.400	6,098.801	0.00E+00	7.88E-06	1.58E-05		
U-234	1.8450E-04	3,049.400	6,098.801	0.00E+00	5.63E-01	1.13E+00		
U-235	-2.7235E-06	3,049.400	0.000	1.14E-02	3.13E-03	1.14E-02		
U-236	1.5493E-05	3,049.400	6,098.801	0.00E+00	4.72E-02	9.45E-02		
U-238	-4.2851E-09	3,049.400	0.000	9.04E-03	9.03E-03	9.04E-03		
Y-90	1.9254E+00	3,049.400	6,098.801	0.00E+00	5.87E+03	1.17E+04		
Other Radionuclides					5.90E+03	1.18E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.27E+01	1.45E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U3O8	U	
	16.42857201	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		3,049.400	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		6,098.801	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.30		1.01
Bounding:	0.60		

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

²Total burnup for all fuel associated with this worksheet must be 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 (PORTUGAL) 1Fuel decay start date: 2010
 SNF ID #: 632 Estimates as of: 2030
 Fuel Units & Descr: 22 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=6.25kg ; EOL=3.92kg 2Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.92

Radionuclide	m	x _a	x _b	b	y _a	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	2,200.116	4,400.231	0.00E+00	1.46E-06	2.92E-06	Avg. MeV	
Am-241	2.0060E-03	2,200.116	4,400.231	0.00E+00	4.41E+00	8.83E+00	0.0150	4.645E+14
Am-242m	4.2429E-07	2,200.116	4,400.231	0.00E+00	9.33E-04	1.87E-03	0.0250	9.659E+13
Am-243	1.4899E-06	2,200.116	4,400.231	0.00E+00	3.28E-03	6.56E-03	0.0375	8.425E+13
C-14	5.7135E-09	2,200.116	4,400.231	0.00E+00	1.26E-05	2.51E-05	0.0575	9.023E+13
Cl-36	1.3124E-32	2,200.116	4,400.231	0.00E+00	2.89E-29	5.77E-29	0.0850	5.453E+13
Cm-243	1.6443E-07	2,200.116	4,400.231	0.00E+00	3.62E-04	7.24E-04	0.1250	3.690E+13
Cm-244	2.9330E-05	2,200.116	4,400.231	0.00E+00	6.45E-02	1.29E-01	0.2250	4.705E+13
Co-60	5.3186E-06	2,200.116	4,400.231	0.00E+00	1.17E-02	2.34E-02	0.3750	2.048E+13
Cs-134	3.1563E-03	2,200.116	4,400.231	0.00E+00	6.94E+00	1.39E+01	0.5750	3.341E+14
Cs-135	3.4477E-06	2,200.116	4,400.231	0.00E+00	7.59E-03	1.52E-02	0.8500	5.648E+12
Cs-137	2.0313E+00	2,200.116	4,400.231	0.00E+00	4.47E+03	8.94E+03	1.2500	3.225E+12
Eu-154	2.4513E-02	2,200.116	4,400.231	0.00E+00	5.39E+01	1.08E+02	1.7500	1.480E+11
Eu-155	4.8175E-03	2,200.116	4,400.231	0.00E+00	1.06E+01	2.12E+01	2.2500	1.299E+07
Fe-55	1.2397E-04	2,200.116	4,400.231	0.00E+00	2.73E-01	5.45E-01	2.7500	7.340E+06
H-3	4.5697E-03	2,200.116	4,400.231	0.00E+00	1.01E+01	2.01E+01	3.5000	3.373E+04
I-129	7.5300E-07	2,200.116	4,400.231	0.00E+00	1.66E-03	3.31E-03	5.0000	1.906E+03
Kr-85	1.0850E-01	2,200.116	4,400.231	0.00E+00	2.39E+02	4.77E+02	7.0000	2.105E+02
Np-237	9.5561E-06	2,200.116	4,400.231	0.00E+00	2.10E-02	4.20E-02	11.0000	2.359E+01
Pa-231	2.0359E-09	2,200.116	4,400.231	0.00E+00	4.48E-06	8.96E-06		
Pb-210	4.9728E-11	2,200.116	4,400.231	0.00E+00	1.09E-07	2.19E-07		
Pm-147	4.8502E-02	2,200.116	4,400.231	0.00E+00	1.07E+02	2.13E+02		
Pu-238	1.8254E-02	2,200.116	4,400.231	0.00E+00	4.02E+01	8.03E+01		
Pu-239	4.2810E-04	2,200.116	4,400.231	0.00E+00	9.42E-01	1.88E+00		
Pu-240	2.4368E-04	2,200.116	4,400.231	0.00E+00	5.36E-01	1.07E+00		
Pu-241	3.3415E-02	2,200.116	4,400.231	0.00E+00	7.35E+01	1.47E+02		
Pu-242	3.6329E-07	2,200.116	4,400.231	0.00E+00	7.99E-04	1.60E-03		
Ra-226	2.2854E-10	2,200.116	4,400.231	0.00E+00	5.03E-07	1.01E-06		
Ra-228	1.2426E-14	2,200.116	4,400.231	0.00E+00	2.73E-11	5.47E-11		
Ru-106	6.3589E-06	2,200.116	4,400.231	0.00E+00	1.40E-02	2.80E-02		
Se-79	1.2933E-05	2,200.116	4,400.231	0.00E+00	2.85E-02	5.69E-02		
Sn-126	1.1574E-05	2,200.116	4,400.231	0.00E+00	2.55E-02	5.09E-02		
Sr-90	1.9248E+00	2,200.116	4,400.231	0.00E+00	4.23E+03	8.47E+03		
Tc-99	4.2239E-04	2,200.116	4,400.231	0.00E+00	9.29E-01	1.86E+00		
Th-229	5.0953E-12	2,200.116	4,400.231	0.00E+00	1.12E-08	2.24E-08		
Th-230	4.1885E-08	2,200.116	4,400.231	0.00E+00	9.22E-05	1.84E-04		
Th-232	1.9270E-14	2,200.116	4,400.231	0.00E+00	4.24E-11	8.48E-11		
Tl-208	4.6024E-08	2,200.116	4,400.231	0.00E+00	1.01E-04	2.03E-04		
U-232	1.2582E-07	2,200.116	4,400.231	0.00E+00	2.77E-04	5.54E-04		
U-233	2.5825E-09	2,200.116	4,400.231	0.00E+00	5.68E-06	1.14E-05		
U-234	1.8450E-04	2,200.116	4,400.231	0.00E+00	4.06E-01	8.12E-01		
U-235	-2.7235E-06	2,200.116	0.000	1.26E-02	6.56E-03	1.26E-02		
U-236	1.5493E-05	2,200.116	4,400.231	0.00E+00	3.41E-02	6.82E-02		
U-238	-4.2851E-09	2,200.116	0.000	1.47E-04	1.38E-04	1.47E-04		
Y-90	1.9254E+00	2,200.116	4,400.231	0.00E+00	4.24E+03	8.47E+03		
Other Radionuclides					4.26E+03	8.51E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.24E+01	1.05E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.99999055	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,200.116	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		4,400.231	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	1.12		
Bounding:	2.24		

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

²Total burnup for all fuel associated with this worksheet must be 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 (PORTUGAL)
 SNF ID #: 542
 Fuel Units & Descr: 6 - ASSEMBLY
 Heavy Metal Mass: BOL=5.40kg ; EOL=5.15kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.25

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	235.239	470.479	0.00E+00	1.56E-07	3.12E-07	0.0150	4.966E+13
Am-241	2.0060E-03	235.239	470.479	0.00E+00	4.72E-01	9.44E-01	0.0250	1.033E+13
Am-242m	4.2429E-07	235.239	470.479	0.00E+00	9.98E-05	2.00E-04	0.0375	9.008E+12
Am-243	1.4899E-06	235.239	470.479	0.00E+00	3.50E-04	7.01E-04	0.0575	9.648E+12
C-14	5.7135E-09	235.239	470.479	0.00E+00	1.34E-06	2.69E-06	0.0850	5.830E+12
Cf-254	1.3124E-32	235.239	470.479	0.00E+00	3.09E-30	6.17E-30	0.1250	3.945E+12
Cm-243	1.6443E-07	235.239	470.479	0.00E+00	3.87E-05	7.74E-05	0.2250	5.031E+12
Cm-244	2.9330E-05	235.239	470.479	0.00E+00	6.90E-03	1.38E-02	0.3750	2.190E+12
Co-60	5.3186E-06	235.239	470.479	0.00E+00	1.25E-03	2.50E-03	0.5750	3.572E+13
Cs-134	3.1563E-03	235.239	470.479	0.00E+00	7.42E-01	1.48E+00	0.8500	6.039E+11
Cs-135	3.4477E-06	235.239	470.479	0.00E+00	8.11E-04	1.62E-03	1.2500	3.448E+11
Cs-137	2.0313E+00	235.239	470.479	0.00E+00	4.78E+02	9.56E+02	1.7500	1.583E+10
Eu-154	2.4519E-02	235.239	470.479	0.00E+00	5.77E+00	1.15E+01	2.2500	1.389E+06
Eu-155	4.8175E-03	235.239	470.479	0.00E+00	1.13E+00	2.27E+00	2.7500	7.848E+05
Fe-55	1.2397E-04	235.239	470.479	0.00E+00	2.92E-02	5.83E-02	3.5000	3.614E+03
H-3	4.5697E-03	235.239	470.479	0.00E+00	1.07E+00	2.15E+00	5.0000	2.071E+02
I-129	7.5300E-07	235.239	470.479	0.00E+00	1.77E-04	3.54E-04	7.0000	2.289E+01
Kr-85	1.0850E-01	235.239	470.479	0.00E+00	2.55E+01	5.10E+01	11.0000	2.566E+00
Np-237	9.5561E-06	235.239	470.479	0.00E+00	2.25E-03	4.50E-03		
Pa-231	2.0359E-09	235.239	470.479	0.00E+00	4.79E-07	9.58E-07		
Pb-210	4.9728E-11	235.239	470.479	0.00E+00	1.17E-08	2.34E-08		
Pm-147	4.8502E-02	235.239	470.479	0.00E+00	1.14E+01	2.28E+01		
Pu-238	1.8254E-02	235.239	470.479	0.00E+00	4.29E+00	8.59E+00		
Pu-239	4.2810E-04	235.239	470.479	0.00E+00	1.01E-01	2.01E-01		
Pu-240	2.4368E-04	235.239	470.479	0.00E+00	5.73E-02	1.15E-01		
Pu-241	3.3415E-02	235.239	470.479	0.00E+00	7.86E+00	1.57E+01		
Pu-242	3.6329E-07	235.239	470.479	0.00E+00	8.55E-05	1.71E-04		
Ra-226	2.2854E-10	235.239	470.479	0.00E+00	5.38E-08	1.08E-07		
Ra-228	1.2426E-14	235.239	470.479	0.00E+00	2.92E-12	5.85E-12		
Ru-106	6.3589E-06	235.239	470.479	0.00E+00	1.50E-03	2.99E-03		
Se-79	1.2933E-05	235.239	470.479	0.00E+00	3.04E-03	6.08E-03		
Sn-126	1.1574E-05	235.239	470.479	0.00E+00	2.72E-03	5.45E-03		
Sr-90	1.9248E+00	235.239	470.479	0.00E+00	4.53E+02	9.06E+02		
Tc-99	4.2239E-04	235.239	470.479	0.00E+00	9.94E-02	1.99E-01		
Th-229	5.0953E-12	235.239	470.479	0.00E+00	1.20E-09	2.40E-09		
Th-230	4.1885E-08	235.239	470.479	0.00E+00	9.85E-06	1.97E-05		
Th-232	1.9270E-14	235.239	470.479	0.00E+00	4.53E-12	9.07E-12		
Ti-208	4.6024E-08	235.239	470.479	0.00E+00	1.08E-05	2.17E-05		
U-232	1.2582E-07	235.239	470.479	0.00E+00	2.96E-05	5.92E-05		
U-233	2.5825E-09	235.239	470.479	0.00E+00	6.08E-07	1.22E-06		
U-234	1.8450E-04	235.239	470.479	0.00E+00	4.34E-02	8.68E-02		
U-235	-2.7235E-06	235.239	0.000	2.33E-03	1.69E-03	2.33E-03		
U-236	1.5493E-05	235.239	470.479	0.00E+00	3.64E-03	7.29E-03		
U-238	-4.2851E-09	235.239	0.000	1.45E-03	1.45E-03	1.45E-03		
Y-90	1.9254E+00	235.239	470.479	0.00E+00	4.53E+02	9.06E+02		
Other Radionuclides					4.55E+02	9.10E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.61E+00	1.12E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	20.0000132	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		235.239	
Bounding:		470.479	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.14		
Bounding:	0.28		
			1.00

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

²Total burnup for all fuel associated with this worksheet must be 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 (SWITZERLAND)
 SNF ID #: 658
 Fuel Units & Descr: 55 - MTR TYPE
 Heavy Metal Mass: BOL=16.68kg ; EOL=5.97kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 2.29

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	6.6313E-10	10,135,949	15,792,496	0.00E+00	6.72E-06	1.05E-05	0.0150	1.667E+15
Am-241	2.0060E-03	10,135,949	15,792,496	0.00E+00	2.03E+01	3.17E+01	0.0250	3.467E+14
Am-242m	4.2429E-07	10,135,949	15,792,496	0.00E+00	4.30E-03	6.70E-03	0.0375	3.024E+14
Am-243	1.4899E-06	10,135,949	15,792,496	0.00E+00	1.51E-02	2.35E-02	0.0575	3.238E+14
C-14	5.7135E-09	10,135,949	15,792,496	0.00E+00	5.79E-05	9.02E-05	0.0850	1.957E+14
Cl-36	1.3124E-32	10,135,949	15,792,496	0.00E+00	1.33E-28	2.07E-28	0.1250	1.324E+14
Cm-243	1.6443E-07	10,135,949	15,792,496	0.00E+00	1.67E-03	2.60E-03	0.2250	1.689E+14
Cm-244	2.9330E-05	10,135,949	15,792,496	0.00E+00	2.97E-01	4.63E-01	0.3750	7.350E+13
Co-60	5.3186E-06	10,135,949	15,792,496	0.00E+00	5.39E-02	8.40E-02	0.5750	1.199E+15
Cs-134	3.1563E-03	10,135,949	15,792,496	0.00E+00	3.20E+01	4.98E+01	0.8500	2.027E+13
Cs-135	3.4477E-06	10,135,949	15,792,496	0.00E+00	3.49E-02	5.44E-02	1.2500	1.158E+13
Cs-137	2.0313E+00	10,135,949	15,792,496	0.00E+00	2.06E+04	3.21E+04	1.7500	5.313E+11
Eu-154	2.4513E-02	10,135,949	15,792,496	0.00E+00	2.48E+02	3.87E+02	2.2500	4.661E+07
Eu-155	4.8175E-03	10,135,949	15,792,496	0.00E+00	4.88E+01	7.61E+01	2.7500	2.634E+07
Fe-55	1.2397E-04	10,135,949	15,792,496	0.00E+00	1.26E+00	1.96E+00	3.5000	1.211E+05
H-3	4.5697E-03	10,135,949	15,792,496	0.00E+00	4.63E+01	7.22E+01	5.0000	6.841E+03
I-129	7.5300E-07	10,135,949	15,792,496	0.00E+00	7.63E-03	1.19E-02	7.0000	7.554E+02
Kr-85	1.0850E-01	10,135,949	15,792,496	0.00E+00	1.10E+03	1.71E+03	11.0000	8.465E+01
Np-237	9.5561E-06	10,135,949	15,792,496	0.00E+00	9.69E-02	1.51E-01		
Pa-231	2.0359E-09	10,135,949	15,792,496	0.00E+00	2.06E-05	3.22E-05		
Pb-210	4.9728E-11	10,135,949	15,792,496	0.00E+00	5.04E-07	7.85E-07		
Pm-147	4.8502E-02	10,135,949	15,792,496	0.00E+00	4.92E+02	7.66E+02		
Pu-238	1.8254E-02	10,135,949	15,792,496	0.00E+00	1.85E+02	2.88E+02		
Pu-239	4.2810E-04	10,135,949	15,792,496	0.00E+00	4.34E+00	6.76E+00		
Pu-240	2.4368E-04	10,135,949	15,792,496	0.00E+00	2.47E+00	3.85E+00		
Pu-241	3.3415E-02	10,135,949	15,792,496	0.00E+00	3.39E+02	5.28E+02		
Pu-242	3.6329E-07	10,135,949	15,792,496	0.00E+00	3.68E-03	5.74E-03		
Ra-226	2.2854E-10	10,135,949	15,792,496	0.00E+00	2.32E-06	3.61E-06		
Ra-228	1.2426E-14	10,135,949	15,792,496	0.00E+00	1.26E-10	1.96E-10		
Ru-106	6.3589E-06	10,135,949	15,792,496	0.00E+00	6.45E-02	1.00E-01		
Se-79	1.2933E-05	10,135,949	15,792,496	0.00E+00	1.31E-01	2.04E-01		
Sn-126	1.1574E-05	10,135,949	15,792,496	0.00E+00	1.17E-01	1.83E-01		
Sr-90	1.9248E+00	10,135,949	15,792,496	0.00E+00	1.95E+04	3.04E+04		
Tc-99	4.2239E-04	10,135,949	15,792,496	0.00E+00	4.28E+00	6.67E+00		
Th-229	5.0953E-12	10,135,949	15,792,496	0.00E+00	5.16E-08	8.05E-08		
Th-230	4.1885E-08	10,135,949	15,792,496	0.00E+00	4.25E-04	6.61E-04		
Th-232	1.9270E-14	10,135,949	15,792,496	0.00E+00	1.95E-10	3.04E-10		
Ti-208	4.6024E-08	10,135,949	15,792,496	0.00E+00	4.66E-04	7.27E-04		
U-232	1.2582E-07	10,135,949	15,792,496	0.00E+00	1.28E-03	1.99E-03		
U-233	2.5825E-09	10,135,949	15,792,496	0.00E+00	2.62E-05	4.08E-05		
U-234	1.8450E-04	10,135,949	15,792,496	0.00E+00	1.87E+00	2.91E+00		
U-235	-2.7235E-06	10,135,949	0.000	3.35E-02	5.91E-03	3.35E-02		
U-236	1.5493E-05	10,135,949	15,792,496	0.00E+00	1.57E-01	2.45E-01		
U-238	-4.2851E-09	10,135,949	0.000	3.92E-04	3.49E-04	3.92E-04		
Y-90	1.9254E+00	10,135,949	15,792,496	0.00E+00	1.95E+04	3.04E+04		
Other Radionuclides					1.96E+04	3.05E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.42E+02	3.76E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.00000816	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		10,135,949	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup calculated assuming all BOL heavy metal burned.
Bounding:		15,792,496	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.93		1.10
Bounding:	3.01		

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 (TURKEY)
SNF ID #: 644

Fuel Units & Descr: 18 - MTR TYPE
Heavy Metal Mass: BOL=5.42kg ; EOL=2.90kg
ROD Storage Site: SRS

¹Fuel decay start date: 2010
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
Canister usage:
18"x10"
0.75

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	2,386.489	4,772.977	0.00E+00	1.58E-06	3.17E-06	Avg. MeV	
Am-241	2.0060E-03	2,386.489	4,772.977	0.00E+00	4.79E+00	9.57E+00	0.0150	5.038E+14
Am-242m	4.2429E-07	2,386.489	4,772.977	0.00E+00	1.01E-03	2.03E-03	0.0250	1.048E+14
Am-243	1.4899E-06	2,386.489	4,772.977	0.00E+00	3.56E-03	7.11E-03	0.0375	9.139E+13
C-14	5.7135E-09	2,386.489	4,772.977	0.00E+00	1.36E-05	2.73E-05	0.0575	9.788E+13
Cl-36	1.3124E-32	2,386.489	4,772.977	0.00E+00	3.13E-29	6.26E-29	0.0850	5.915E+13
Cm-243	1.6443E-07	2,386.489	4,772.977	0.00E+00	3.92E-04	7.85E-04	0.1250	4.002E+13
Cm-244	2.9330E-05	2,386.489	4,772.977	0.00E+00	7.00E-02	1.40E-01	0.2250	5.103E+13
Co-60	5.3186E-06	2,386.489	4,772.977	0.00E+00	1.27E-02	2.54E-02	0.3750	2.221E+13
Cs-134	3.1563E-03	2,386.489	4,772.977	0.00E+00	7.53E+00	1.51E+01	0.5750	3.624E+14
Cs-135	3.4477E-06	2,386.489	4,772.977	0.00E+00	8.23E-03	1.65E-02	0.8500	6.126E+12
Cs-137	2.0313E+00	2,386.489	4,772.977	0.00E+00	4.85E+03	9.70E+03	1.2500	3.498E+12
Eu-154	2.4513E-02	2,386.489	4,772.977	0.00E+00	5.85E+01	1.17E+02	1.7500	1.606E+11
Eu-155	4.8175E-03	2,386.489	4,772.977	0.00E+00	1.15E+01	2.30E+01	2.2500	1.409E+07
Fe-55	1.2397E-04	2,386.489	4,772.977	0.00E+00	2.96E-01	5.92E-01	2.7500	7.962E+06
H-3	4.5697E-03	2,386.489	4,772.977	0.00E+00	1.09E+01	2.18E+01	3.5000	3.659E+04
I-129	7.5300E-07	2,386.489	4,772.977	0.00E+00	1.80E-03	3.59E-03	5.0000	2.068E+03
Kr-85	1.0850E-01	2,386.489	4,772.977	0.00E+00	2.59E+02	5.18E+02	7.0000	2.283E+02
Np-237	9.5561E-06	2,386.489	4,772.977	0.00E+00	2.28E-02	4.56E-02	11.0000	2.559E+01
Pa-231	2.0359E-09	2,386.489	4,772.977	0.00E+00	4.86E-06	9.72E-06		
Pb-210	4.9728E-11	2,386.489	4,772.977	0.00E+00	1.19E-07	2.37E-07		
Pm-147	4.8502E-02	2,386.489	4,772.977	0.00E+00	1.16E+02	2.31E+02		
Pu-238	1.8254E-02	2,386.489	4,772.977	0.00E+00	4.36E+01	8.71E+01		
Pu-239	4.2810E-04	2,386.489	4,772.977	0.00E+00	1.02E+00	2.04E+00		
Pu-240	2.4368E-04	2,386.489	4,772.977	0.00E+00	5.82E-01	1.16E+00		
Pu-241	3.3415E-02	2,386.489	4,772.977	0.00E+00	7.97E+01	1.59E+02		
Pu-242	3.6329E-07	2,386.489	4,772.977	0.00E+00	8.67E-04	1.73E-03		
Ra-226	2.2854E-10	2,386.489	4,772.977	0.00E+00	5.45E-07	1.09E-06		
Ra-228	1.2426E-14	2,386.489	4,772.977	0.00E+00	2.97E-11	5.93E-11		
Ru-106	6.3589E-06	2,386.489	4,772.977	0.00E+00	1.52E-02	3.04E-02		
Se-79	1.2933E-05	2,386.489	4,772.977	0.00E+00	3.09E-02	6.17E-02		
Sn-126	1.1574E-05	2,386.489	4,772.977	0.00E+00	2.76E-02	5.52E-02		
Sr-90	1.9248E+00	2,386.489	4,772.977	0.00E+00	4.59E+03	9.19E+03		
Tc-99	4.2239E-04	2,386.489	4,772.977	0.00E+00	1.01E+00	2.02E+00		
Th-229	5.0953E-12	2,386.489	4,772.977	0.00E+00	1.22E-08	2.43E-08		
Th-230	4.1885E-08	2,386.489	4,772.977	0.00E+00	1.00E-04	2.00E-04		
Th-232	1.9270E-14	2,386.489	4,772.977	0.00E+00	4.60E-11	9.20E-11		
Ti-208	4.6024E-08	2,386.489	4,772.977	0.00E+00	1.10E-04	2.20E-04		
U-232	1.2582E-07	2,386.489	4,772.977	0.00E+00	3.00E-04	6.01E-04		
U-233	2.5825E-09	2,386.489	4,772.977	0.00E+00	6.16E-06	1.23E-05		
U-234	1.8450E-04	2,386.489	4,772.977	0.00E+00	4.40E-01	8.81E-01		
U-235	-2.7235E-06	2,386.489	0.000	1.09E-02	4.39E-03	1.09E-02		
U-236	1.5493E-05	2,386.489	4,772.977	0.00E+00	3.70E-02	7.39E-02		
U-238	-4.2851E-09	2,386.489	0.000	1.28E-04	1.17E-04	1.28E-04		
Y-90	1.9254E+00	2,386.489	4,772.977	0.00E+00	4.59E+03	9.19E+03		
Other Radionuclides					4.62E+03	9.23E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.69E+01	1.14E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.99998782	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,386.489	
Bounding:		4,772.977	

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

Checks				
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM	
Nominal:	1.40			1.05
Bounding:	2.80			

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

²Total burnup for all fuel associated with this worksheet must be 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 (TURKEY)
 SNF ID #: 528
 Fuel Units & Descr: 32 - ASSEMBLY
 Heavy Metal Mass: BOL=67.20kg ; EOL=59.14kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.33

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	7,636.763	15,273.525	0.00E+00	5.06E-06	1.01E-05	Avg. MeV	
Am-241	2.0060E-03	7,636.763	15,273.525	0.00E+00	1.53E+01	3.06E+01	0.0150	1.612E+15
Am-242m	4.2429E-07	7,636.763	15,273.525	0.00E+00	3.24E-03	6.48E-03	0.0250	3.353E+14
Am-243	1.4899E-06	7,636.763	15,273.525	0.00E+00	1.14E-02	2.28E-02	0.0375	2.924E+14
C-14	5.7135E-09	7,636.763	15,273.525	0.00E+00	4.36E-05	8.73E-05	0.0575	3.132E+14
Cl-36	1.3124E-32	7,636.763	15,273.525	0.00E+00	1.00E-28	2.00E-28	0.0850	1.893E+14
Cm-243	1.6443E-07	7,636.763	15,273.525	0.00E+00	1.26E-03	2.51E-03	0.1250	1.281E+14
Cm-244	2.9330E-05	7,636.763	15,273.525	0.00E+00	2.24E-01	4.48E-01	0.2250	1.633E+14
Co-60	5.3186E-06	7,636.763	15,273.525	0.00E+00	4.06E-02	8.12E-02	0.3750	7.108E+13
Cs-134	3.1563E-03	7,636.763	15,273.525	0.00E+00	2.41E+01	4.82E+01	0.5750	1.160E+15
Cs-135	3.4477E-06	7,636.763	15,273.525	0.00E+00	2.63E-02	5.27E-02	0.8500	1.960E+13
Cs-137	2.0313E+00	7,636.763	15,273.525	0.00E+00	1.55E+04	3.10E+04	1.2500	1.119E+13
Eu-154	2.4513E-02	7,636.763	15,273.525	0.00E+00	1.87E+02	3.74E+02	1.7500	5.139E+11
Eu-155	4.8175E-03	7,636.763	15,273.525	0.00E+00	3.68E+01	7.36E+01	2.2500	4.508E+07
Fe-55	1.2397E-04	7,636.763	15,273.525	0.00E+00	9.47E-01	1.89E+00	2.7500	2.548E+07
H-3	4.5697E-03	7,636.763	15,273.525	0.00E+00	3.49E+01	6.98E+01	3.5000	1.172E+05
I-129	7.5300E-07	7,636.763	15,273.525	0.00E+00	5.75E-03	1.15E-02	5.0000	6.657E+03
Kr-85	1.0850E-01	7,636.763	15,273.525	0.00E+00	8.29E+02	1.66E+03	7.0000	7.352E+02
Np-237	9.5561E-06	7,636.763	15,273.525	0.00E+00	7.30E-02	1.46E-01	11.0000	8.241E+01
Pa-231	2.0359E-09	7,636.763	15,273.525	0.00E+00	1.55E-05	3.11E-05		
Pb-210	4.9728E-11	7,636.763	15,273.525	0.00E+00	3.80E-07	7.60E-07		
Pm-147	4.8502E-02	7,636.763	15,273.525	0.00E+00	3.70E+02	7.41E+02		
Pu-238	1.8254E-02	7,636.763	15,273.525	0.00E+00	1.39E+02	2.79E+02		
Pu-239	4.2810E-04	7,636.763	15,273.525	0.00E+00	3.27E+00	6.54E+00		
Pu-240	2.4368E-04	7,636.763	15,273.525	0.00E+00	1.86E+00	3.72E+00		
Pu-241	3.3415E-02	7,636.763	15,273.525	0.00E+00	2.55E+02	5.10E+02		
Pu-242	3.6329E-07	7,636.763	15,273.525	0.00E+00	2.77E-03	5.55E-03		
Ra-226	2.2854E-10	7,636.763	15,273.525	0.00E+00	1.75E-06	3.49E-06		
Ra-228	1.2426E-14	7,636.763	15,273.525	0.00E+00	9.49E-11	1.90E-10		
Ru-106	6.3589E-06	7,636.763	15,273.525	0.00E+00	4.86E-02	9.71E-02		
Se-79	1.2933E-05	7,636.763	15,273.525	0.00E+00	9.88E-02	1.98E-01		
Sn-126	1.1574E-05	7,636.763	15,273.525	0.00E+00	8.84E-02	1.77E-01		
Sr-90	1.9248E+00	7,636.763	15,273.525	0.00E+00	1.47E+04	2.94E+04		
Tc-99	4.2239E-04	7,636.763	15,273.525	0.00E+00	3.23E+00	6.45E+00		
Th-229	5.0953E-12	7,636.763	15,273.525	0.00E+00	3.89E-08	7.78E-08		
Th-230	4.1885E-08	7,636.763	15,273.525	0.00E+00	3.20E-04	6.40E-04		
Th-232	1.9270E-14	7,636.763	15,273.525	0.00E+00	1.47E-10	2.94E-10		
Th-208	4.6024E-08	7,636.763	15,273.525	0.00E+00	3.51E-04	7.03E-04		
U-232	1.2582E-07	7,636.763	15,273.525	0.00E+00	9.61E-04	1.92E-03		
U-233	2.5825E-09	7,636.763	15,273.525	0.00E+00	1.97E-05	3.94E-05		
U-234	1.8450E-04	7,636.763	15,273.525	0.00E+00	1.41E+00	2.82E+00		
U-235	-2.7235E-06	7,636.763	0.000	2.90E-02	8.24E-03	2.90E-02		
U-236	1.5493E-05	7,636.763	15,273.525	0.00E+00	1.18E-01	2.37E-01		
U-238	-4.2851E-09	7,636.763	0.000	1.81E-02	1.80E-02	1.81E-02		
Y-90	1.9254E+00	7,636.763	15,273.525	0.00E+00	1.47E+04	2.94E+04		
Other Radionuclides					1.48E+04	2.95E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.82E+02	3.64E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20.00000028	60 to 100	

Burnup Summary (MWd)²

	From SFD	Estimated	Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Nominal:		7,636.763	
Bounding:		15,273.525	

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.36		
Bounding:	0.72		

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

²Total burnup for all fuel associated with this worksheet must be 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 (CANADA)
 SNF ID #: 661
 Fuel Units & Descr: 225 - MULTI-PIN CLUSTER
 Heavy Metal Mass: BOL=118.60kg ; EOL=34.63kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x15"
 18.75

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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	79,521,220	112,314,133	0.00E+00	5.27E-05	7.45E-05	Avg. MeV	
Am-241	2.0060E-03	79,521,220	112,314,133	0.00E+00	1.60E+02	2.25E+02	0.0150	1.186E+16
Am-242m	4.2429E-07	79,521,220	112,314,133	0.00E+00	3.37E-02	4.77E-02	0.0250	2.465E+15
Am-243	1.4899E-06	79,521,220	112,314,133	0.00E+00	1.18E-01	1.67E-01	0.0375	2.150E+15
C-14	5.7135E-09	79,521,220	112,314,133	0.00E+00	4.54E-04	6.42E-04	0.0575	2.303E+15
Ci-36	1.3124E-32	79,521,220	112,314,133	0.00E+00	1.04E-27	1.47E-27	0.0850	1.392E+15
Cm-243	1.6443E-07	79,521,220	112,314,133	0.00E+00	1.31E-02	1.85E-02	0.1250	9.418E+14
Cm-244	2.9330E-05	79,521,220	112,314,133	0.00E+00	2.39E+00	3.29E+00	0.2250	1.201E+15
Co-60	5.3186E-06	79,521,220	112,314,133	0.00E+00	4.23E-01	5.97E-01	0.3750	5.227E+14
Cs-134	3.1563E-03	79,521,220	112,314,133	0.00E+00	2.51E+02	3.54E+02	0.5750	8.527E+15
Cs-135	3.4477E-06	79,521,220	112,314,133	0.00E+00	2.74E-01	3.87E-01	0.8500	1.442E+14
Cs-137	2.0313E+00	79,521,220	112,314,133	0.00E+00	1.62E+05	2.28E+05	1.2500	8.232E+13
Eu-154	2.4513E-02	79,521,220	112,314,133	0.00E+00	1.95E+03	2.75E+03	1.7500	3.779E+12
Eu-155	4.8175E-03	79,521,220	112,314,133	0.00E+00	3.83E+02	5.41E+02	2.2500	3.315E+08
Fe-55	1.2397E-04	79,521,220	112,314,133	0.00E+00	9.86E+00	1.39E+01	2.7500	1.874E+08
H-3	4.5697E-03	79,521,220	112,314,133	0.00E+00	3.63E+02	5.13E+02	3.5000	8.609E+05
I-129	7.5300E-07	79,521,220	112,314,133	0.00E+00	5.99E-02	8.46E-02	5.0000	4.865E+04
Kr-85	1.0850E-01	79,521,220	112,314,133	0.00E+00	8.63E+03	1.22E+04	7.0000	5.372E+03
Np-237	9.5561E-06	79,521,220	112,314,133	0.00E+00	7.60E-01	1.07E+00	11.0000	6.021E+02
Pa-231	2.0359E-09	79,521,220	112,314,133	0.00E+00	1.62E-04	2.29E-04		
Pb-210	4.9728E-11	79,521,220	112,314,133	0.00E+00	3.95E-06	5.59E-06		
Pm-147	4.8502E-02	79,521,220	112,314,133	0.00E+00	3.86E+03	5.45E+03		
Pu-238	1.8254E-02	79,521,220	112,314,133	0.00E+00	1.45E+03	2.05E+03		
Pu-239	4.2810E-04	79,521,220	112,314,133	0.00E+00	3.40E+01	4.81E+01		
Pu-240	2.4368E-04	79,521,220	112,314,133	0.00E+00	1.94E+01	2.74E+01		
Pu-241	3.3415E-02	79,521,220	112,314,133	0.00E+00	2.66E+03	3.75E+03		
Pu-242	3.6329E-07	79,521,220	112,314,133	0.00E+00	2.89E-02	4.08E-02		
Ra-226	2.2854E-10	79,521,220	112,314,133	0.00E+00	1.82E-05	2.57E-05		
Ra-228	1.2426E-14	79,521,220	112,314,133	0.00E+00	9.88E-10	1.40E-09		
Ru-106	6.3589E-06	79,521,220	112,314,133	0.00E+00	5.06E-01	7.14E-01		
Se-79	1.2933E-05	79,521,220	112,314,133	0.00E+00	1.03E+00	1.45E+00		
Sn-126	1.1574E-05	79,521,220	112,314,133	0.00E+00	9.20E-01	1.30E+00		
Sr-90	1.9248E+00	79,521,220	112,314,133	0.00E+00	1.53E+05	2.16E+05		
Tc-99	4.2239E-04	79,521,220	112,314,133	0.00E+00	3.36E+01	4.74E+01		
Th-229	5.0953E-12	79,521,220	112,314,133	0.00E+00	4.05E-07	5.72E-07		
Th-230	4.1885E-08	79,521,220	112,314,133	0.00E+00	3.33E-03	4.70E-03		
Th-232	1.9270E-14	79,521,220	112,314,133	0.00E+00	1.53E-09	2.16E-09		
Ti-208	4.6024E-08	79,521,220	112,314,133	0.00E+00	3.66E-03	5.17E-03		
U-232	1.2582E-07	79,521,220	112,314,133	0.00E+00	1.00E-02	1.41E-02		
U-233	2.5825E-09	79,521,220	112,314,133	0.00E+00	2.05E-04	2.90E-04		
U-234	1.8450E-04	79,521,220	112,314,133	0.00E+00	1.47E+01	2.07E+01		
U-235	-2.7235E-06	79,521,220	0.000	2.39E-01	2.22E-02	2.39E-01		
U-236	1.5493E-05	79,521,220	112,314,133	0.00E+00	1.23E+00	1.74E+00		
U-238	-4.2851E-09	79,521,220	0.000	2.73E-03	2.39E-03	2.73E-03	1.90E+03	2.68E+03
Y-90	1.9254E+00	79,521,220	112,314,133	0.00E+00	1.53E+05	2.16E+05	Total	Total
Other Radionuclides					1.54E+05	2.17E+05		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.14999856	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		79,521,220	
Bounding:		112,314,133	

Nominal burnup calculated from the heavy metal mass destroyed.
 Bounding burnup calculated assuming all BOL heavy metal burned.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	2.13		
Bounding:	3.01		

Estimated EOL HM/Given EOL HM: 1.14

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (CANADA) ¹Fuel decay start date: 2010
 SNF ID #: 660 Estimates as of: 2030
 Fuel Units & Descr: 1527 - MULTI-PIN CLUSTER Template: HFBR (Heavy Water, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=3796.27kg ; EOL=3226.40kg ²Template Burnup(MWd): 15
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00034251
Template Decay Time: 20 years

Estimated
Canister usage:
18'x15'
127.25

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5333E-10	541,647.528	1,083,295.056	0.00E+00	4.62E-04	9.24E-04	0.0150	1.098E+17
Am-241	2.2753E-02	541,647.528	1,083,295.056	0.00E+00	1.23E+04	2.46E+04	0.0250	2.280E+16
Am-242m	8.9133E-06	541,647.528	1,083,295.056	0.00E+00	4.83E+00	9.66E+00	0.0375	2.003E+16
Am-243	6.4007E-06	541,647.528	1,083,295.056	0.00E+00	3.47E+00	6.93E+00	0.0575	2.158E+16
C-14	2.9620E-08	541,647.528	1,083,295.056	0.00E+00	1.60E-02	3.21E-02	0.0850	1.284E+16
Cf-252	5.9513E-35	541,647.528	1,083,295.056	0.00E+00	3.22E-29	6.45E-29	0.1250	8.648E+15
Cm-243	2.2087E-06	541,647.528	1,083,295.056	0.00E+00	1.20E+00	2.39E+00	0.2250	1.107E+16
Cm-244	1.1007E-04	541,647.528	1,083,295.056	0.00E+00	5.96E+01	1.19E+02	0.3750	4.818E+15
Co-60	1.6340E-05	541,647.528	1,083,295.056	0.00E+00	8.85E+00	1.77E+01	0.5750	8.172E+16
Cs-134	2.1353E-03	541,647.528	1,083,295.056	0.00E+00	1.16E+03	2.31E+03	0.8500	1.249E+15
Cs-135	4.8607E-06	541,647.528	1,083,295.056	0.00E+00	2.63E+00	5.27E+00	1.2500	7.038E+14
Cs-137	2.0227E+00	541,647.528	1,083,295.056	0.00E+00	1.10E+06	2.19E+06	1.7500	3.322E+13
Eu-154	2.0887E-02	541,647.528	1,083,295.056	0.00E+00	1.13E+04	2.26E+04	2.2500	3.116E+09
Eu-155	4.0867E-03	541,647.528	1,083,295.056	0.00E+00	2.21E+03	4.43E+03	2.7500	3.686E+08
Fe-55	1.4167E-03	541,647.528	1,083,295.056	0.00E+00	7.67E+02	1.53E+03	3.5000	1.494E+07
H-3	4.6653E-03	541,647.528	1,083,295.056	0.00E+00	2.53E+03	5.05E+03	5.0000	2.267E+06
I-129	7.1600E-07	541,647.528	1,083,295.056	0.00E+00	3.88E-01	7.76E-01	7.0000	2.566E+05
Kr-85	1.0240E-01	541,647.528	1,083,295.056	0.00E+00	5.55E+04	1.11E+05	11.0000	2.920E+04
Np-237	3.7227E-06	541,647.528	1,083,295.056	0.00E+00	2.02E+00	4.03E+00		
Pa-231	2.6727E-09	541,647.528	1,083,295.056	0.00E+00	1.45E-03	2.90E-03		
Pb-210	4.3313E-14	541,647.528	1,083,295.056	0.00E+00	2.35E-08	4.69E-08		
Pm-147	4.6307E-02	541,647.528	1,083,295.056	0.00E+00	2.51E+04	5.02E+04		
Pu-238	5.5273E-03	541,647.528	1,083,295.056	0.00E+00	2.99E+03	5.99E+03		
Pu-239	1.0313E-02	541,647.528	1,083,295.056	0.00E+00	5.59E+03	1.12E+04		
Pu-240	5.4180E-03	541,647.528	1,083,295.056	0.00E+00	2.93E+03	5.87E+03		
Pu-241	3.7573E-01	541,647.528	1,083,295.056	0.00E+00	2.04E+05	4.07E+05		
Pu-242	3.0713E-06	541,647.528	1,083,295.056	0.00E+00	1.66E+00	3.33E+00		
Ra-226	2.3807E-13	541,647.528	1,083,295.056	0.00E+00	1.29E-07	2.58E-07		
Ra-228	1.0607E-14	541,647.528	1,083,295.056	0.00E+00	5.75E-09	1.15E-08		
Ru-106	8.4800E-06	541,647.528	1,083,295.056	0.00E+00	4.59E+00	9.19E+00		
Se-79	1.2533E-05	541,647.528	1,083,295.056	0.00E+00	6.79E+00	1.36E+01		
Sn-126	1.1393E-05	541,647.528	1,083,295.056	0.00E+00	6.17E+00	1.23E+01		
Sr-90	1.8400E+00	541,647.528	1,083,295.056	0.00E+00	9.97E+05	1.99E+06		
Tc-99	4.3533E-04	541,647.528	1,083,295.056	0.00E+00	2.36E+02	4.72E+02		
Th-229	5.8947E-13	541,647.528	1,083,295.056	0.00E+00	3.19E-07	6.39E-07		
Th-230	5.9500E-11	541,647.528	1,083,295.056	0.00E+00	3.22E-05	6.45E-05		
Th-232	1.6360E-14	541,647.528	1,083,295.056	0.00E+00	8.86E-09	1.77E-08		
Tl-208	7.6000E-09	541,647.528	1,083,295.056	0.00E+00	4.12E-03	8.23E-03		
U-232	2.0747E-08	541,647.528	1,083,295.056	0.00E+00	1.12E-02	2.25E-02		
U-233	4.4013E-10	541,647.528	1,083,295.056	0.00E+00	2.38E-04	4.77E-04		
U-234	4.6500E-07	541,647.528	1,083,295.056	0.00E+00	2.52E-01	5.04E-01		
U-235	-2.5335E-06	541,647.528	0.000	1.62E+00	2.48E-01	1.62E+00		
U-236	1.3000E-05	541,647.528	1,083,295.056	0.00E+00	7.04E+00	1.41E+01		
U-238	-1.4207E-08	541,647.528	0.000	1.02E+00	1.02E+00	1.02E+00		
Y-90	1.8400E+00	541,647.528	1,083,295.056	0.00E+00	9.97E+05	1.99E+06		
Other Radionuclides					1.04E+06	2.08E+06		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.30E+04	2.59E+04
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.75000043	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		541,647.528	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		1,083,295.056	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 (CANADA)
 SNF ID #: 662
 Fuel Units & Descr: 741 - MULTI-PIN CLUSTER
 Heavy Metal Mass: BOL=395.69kg ; EOL=97.59kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x15"
 61.75

II. Estimates							Gamma Sources	
	m	x _a	x _b	b	y _a	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	3.1355E-10	274,584.760	364,474.925	0.00E+00	8.61E-05	1.14E-04	0.0150	3.853E+16
Am-241	8.0194E-03	274,584.760	364,474.925	0.00E+00	2.20E+03	2.92E+03	0.0250	7.942E+15
Am-242m	1.3694E-06	274,584.760	364,474.925	0.00E+00	3.76E-01	4.99E-01	0.0375	7.057E+15
Am-243	3.7096E-05	274,584.760	364,474.925	0.00E+00	1.02E+01	1.35E+01	0.0575	7.471E+15
C-14	2.6464E-08	274,584.760	364,474.925	0.00E+00	7.27E-03	9.65E-03	0.0850	4.522E+15
Cl-36	4.4441E-31	274,584.760	364,474.925	0.00E+00	1.22E-25	1.62E-25	0.1250	3.203E+15
Cm-243	5.7029E-06	274,584.760	364,474.925	0.00E+00	1.57E+00	2.08E+00	0.2250	3.893E+15
Cm-244	4.6555E-03	274,584.760	364,474.925	0.00E+00	1.28E+03	1.70E+03	0.3750	1.685E+15
Co-60	4.8663E-05	274,584.760	364,474.925	0.00E+00	1.34E+01	1.77E+01	0.5750	2.789E+16
Cs-134	1.0638E-02	274,584.760	364,474.925	0.00E+00	2.92E+03	3.88E+03	0.8500	7.302E+14
Cs-135	4.2564E-06	274,584.760	364,474.925	0.00E+00	1.17E+00	1.55E+00	1.2500	4.682E+14
Cs-137	2.0358E+00	274,584.760	364,474.925	0.00E+00	5.59E+05	7.42E+05	1.7500	1.804E+13
Eu-154	5.1956E-02	274,584.760	364,474.925	0.00E+00	1.43E+04	1.89E+04	2.2500	1.154E+09
Eu-155	1.4295E-02	274,584.760	364,474.925	0.00E+00	3.93E+03	5.21E+03	2.7500	6.750E+08
Fe-55	1.3560E-03	274,584.760	364,474.925	0.00E+00	3.72E+02	4.94E+02	3.5000	2.853E+07
H-3	4.6258E-03	274,584.760	364,474.925	0.00E+00	1.27E+03	1.69E+03	5.0000	1.097E+07
I-129	6.6403E-07	274,584.760	364,474.925	0.00E+00	1.82E-01	2.42E-01	7.0000	1.259E+06
Kr-85	1.0808E-01	274,584.760	364,474.925	0.00E+00	2.97E+04	3.94E+04	11.0000	1.442E+05
Np-237	3.1537E-05	274,584.760	364,474.925	0.00E+00	8.66E+00	1.15E+01		
Pa-231	9.7023E-10	274,584.760	364,474.925	0.00E+00	2.66E-04	3.54E-04		
Pb-210	1.1731E-11	274,584.760	364,474.925	0.00E+00	3.22E-06	4.28E-06		
Pm-147	2.4405E-02	274,584.760	364,474.925	0.00E+00	6.70E+03	8.89E+03		
Pu-238	1.5358E-01	274,584.760	364,474.925	0.00E+00	4.22E+04	5.60E+04		
Pu-239	6.9502E-04	274,584.760	364,474.925	0.00E+00	1.91E+02	2.53E+02		
Pu-240	3.7631E-04	274,584.760	364,474.925	0.00E+00	1.03E+02	1.37E+02		
Pu-241	1.3433E-01	274,584.760	364,474.925	0.00E+00	3.69E+04	4.90E+04		
Pu-242	3.0911E-06	274,584.760	364,474.925	0.00E+00	8.49E-01	1.13E+00		
Ra-226	5.5079E-11	274,584.760	364,474.925	0.00E+00	1.51E-05	2.01E-05		
Ra-228	1.3335E-14	274,584.760	364,474.925	0.00E+00	3.66E-09	4.86E-09		
Ru-106	7.3390E-06	274,584.760	364,474.925	0.00E+00	2.02E+00	2.67E+00		
Se-79	1.2339E-05	274,584.760	364,474.925	0.00E+00	3.39E+00	4.50E+00		
Sn-126	1.0194E-05	274,584.760	364,474.925	0.00E+00	2.80E+00	3.72E+00		
Sr-90	1.9064E+00	274,584.760	364,474.925	0.00E+00	5.23E+05	6.95E+05		
Tc-99	3.8056E-04	274,584.760	364,474.925	0.00E+00	1.04E+02	1.39E+02		
Th-229	4.9198E-12	274,584.760	364,474.925	0.00E+00	1.35E-06	1.79E-06		
Th-230	1.0547E-08	274,584.760	364,474.925	0.00E+00	2.90E-03	3.84E-03		
Th-232	2.0705E-14	274,584.760	364,474.925	0.00E+00	5.69E-09	7.55E-09		
Ti-208	4.8827E-08	274,584.760	364,474.925	0.00E+00	1.34E-02	1.78E-02		
U-232	1.3414E-07	274,584.760	364,474.925	0.00E+00	3.68E-02	4.89E-02		
U-233	3.7679E-09	274,584.760	364,474.925	0.00E+00	1.03E-03	1.37E-03		
U-234	5.2047E-05	274,584.760	364,474.925	0.00E+00	1.43E+01	1.90E+01		
U-235	-2.8661E-06	274,584.760	0.000	7.95E-01	8.24E-03	7.95E-01		
U-236	1.6701E-05	274,584.760	364,474.925	0.00E+00	4.59E+00	6.09E+00		
U-238	-9.4194E-09	274,584.760	0.000	9.31E-03	6.72E-03	9.31E-03		
Y-90	1.9070E+00	274,584.760	364,474.925	0.00E+00	5.24E+05	6.95E+05		
Other Radionuclides					5.35E+05	7.10E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.94E+03	1.05E+04
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.99999565	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		274,584.760	
Bounding:		364,474.925	

Nominal burnup calculated from the heavy metal mass destroyed.
 Bounding burnup calculated assuming all BOL heavy metal burned.

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	1.59	
Bounding:	2.11	

Estimated EOL HM/ Given EOL HM: 1.06

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

²Total burnup for all fuel associated with this worksheet must be 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 (CANADA)
 SNF ID #: 663
 Fuel Units & Descr: 131 - MULTI-PIN CLUSTER
 Heavy Metal Mass: BOL=76.65kg ; EOL=32.38kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x15"
 10.92

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)		Avg. MeV
Ac-227	3.1355E-10	40,772.532	70,600.795	0.00E+00	1.28E-05	2.21E-05		0.0150
Am-241	8.0194E-03	40,772.532	70,600.795	0.00E+00	3.27E+02	5.66E+02		7.464E+15
Am-242m	1.3694E-06	40,772.532	70,600.795	0.00E+00	5.58E-02	9.67E-02		0.0250
Am-243	3.7096E-05	40,772.532	70,600.795	0.00E+00	1.51E+00	2.62E+00		0.0375
C-14	2.6464E-08	40,772.532	70,600.795	0.00E+00	1.08E-03	1.87E-03		0.0575
Cl-36	4.4441E-31	40,772.532	70,600.795	0.00E+00	1.81E-26	3.14E-26		0.0850
Cm-243	5.7029E-06	40,772.532	70,600.795	0.00E+00	2.33E-01	4.03E-01		0.1250
Cm-244	4.6555E-03	40,772.532	70,600.795	0.00E+00	1.90E+02	3.29E+02		0.2250
Co-60	4.8663E-05	40,772.532	70,600.795	0.00E+00	1.98E+00	3.44E+00		0.3750
Cs-134	1.0638E-02	40,772.532	70,600.795	0.00E+00	4.34E+02	7.51E+02		0.5750
Cs-135	4.2564E-06	40,772.532	70,600.795	0.00E+00	1.74E-01	3.01E-01		0.8500
Cs-137	2.0358E+00	40,772.532	70,600.795	0.00E+00	8.30E+04	1.44E+05		1.2500
Eu-154	5.1956E-02	40,772.532	70,600.795	0.00E+00	2.12E+03	3.67E+03		1.7500
Eu-155	1.4295E-02	40,772.532	70,600.795	0.00E+00	5.83E+02	1.01E+03		2.2500
Fe-55	1.3560E-03	40,772.532	70,600.795	0.00E+00	5.53E+01	9.57E+01		2.7500
H-3	4.6258E-03	40,772.532	70,600.795	0.00E+00	1.89E+02	3.27E+02		3.5000
I-129	6.6403E-07	40,772.532	70,600.795	0.00E+00	2.71E-02	4.69E-02		5.0000
Kr-85	1.0808E-01	40,772.532	70,600.795	0.00E+00	4.41E+03	7.63E+03		7.0000
Np-237	3.1537E-05	40,772.532	70,600.795	0.00E+00	1.29E+00	2.23E+00		11.0000
Pa-231	9.7023E-10	40,772.532	70,600.795	0.00E+00	3.96E-05	6.85E-05		
Pb-210	1.1731E-11	40,772.532	70,600.795	0.00E+00	4.78E-07	8.28E-07		
Pm-147	2.4405E-02	40,772.532	70,600.795	0.00E+00	9.95E+02	1.72E+03		
Pu-238	1.5358E-01	40,772.532	70,600.795	0.00E+00	6.26E+03	1.08E+04		
Pu-239	6.9502E-04	40,772.532	70,600.795	0.00E+00	2.83E+01	4.91E+01		
Pu-240	3.7631E-04	40,772.532	70,600.795	0.00E+00	1.53E+01	2.66E+01		
Pu-241	1.3433E-01	40,772.532	70,600.795	0.00E+00	5.48E+03	9.48E+03		
Pu-242	3.0911E-06	40,772.532	70,600.795	0.00E+00	1.26E-01	2.18E-01		
Ra-226	5.5079E-11	40,772.532	70,600.795	0.00E+00	2.25E-06	3.89E-06		
Ra-228	1.3335E-14	40,772.532	70,600.795	0.00E+00	5.44E-10	9.41E-10		
Ru-106	7.3390E-06	40,772.532	70,600.795	0.00E+00	2.99E-01	5.18E-01		
Se-79	1.2339E-05	40,772.532	70,600.795	0.00E+00	5.03E-01	8.71E-01		
Sn-126	1.0194E-05	40,772.532	70,600.795	0.00E+00	4.16E-01	7.20E-01		
Sr-90	1.9064E+00	40,772.532	70,600.795	0.00E+00	7.77E+04	1.35E+05		
Tc-99	3.8056E-04	40,772.532	70,600.795	0.00E+00	1.55E+01	2.69E+01		
Th-229	4.9198E-12	40,772.532	70,600.795	0.00E+00	2.01E-07	3.47E-07		
Th-230	1.0547E-08	40,772.532	70,600.795	0.00E+00	4.30E-04	7.45E-04		
Th-232	2.0705E-14	40,772.532	70,600.795	0.00E+00	8.44E-10	1.46E-09		
Tl-208	4.8827E-08	40,772.532	70,600.795	0.00E+00	1.99E-03	3.45E-03		
U-232	1.3414E-07	40,772.532	70,600.795	0.00E+00	5.47E-03	9.47E-03		
U-233	3.7679E-09	40,772.532	70,600.795	0.00E+00	1.54E-04	2.66E-04		
U-234	5.2047E-05	40,772.532	70,600.795	0.00E+00	2.12E+00	3.67E+00		
U-235	-2.8661E-06	40,772.532	0.000	1.54E-01	3.74E-02	1.54E-01		
U-236	1.6701E-05	40,772.532	70,600.795	0.00E+00	6.81E-01	1.18E+00		
U-238	-9.4194E-09	40,772.532	0.000	1.76E-03	1.38E-03	1.76E-03		
Y-90	1.9070E+00	40,772.532	70,600.795	0.00E+00	7.78E+04	1.35E+05		
Other Radionuclides					7.94E+04	1.37E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.18E+03	2.04E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.15000501	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		40,772.532	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		70,600.795	Bounding burnup calculated assuming all BOL heavy metal burned.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.22		1.03
Bounding:	2.11		

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

²Total burnup for all fuel associated with this worksheet must be 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 (SO. KOREA) ¹Fuel decay start date: 2010
 SNF ID #: 659 Estimates as of: 2030
 Fuel Units & Descr: 158 - MULTI-PIN CLUSTER Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=343.65kg ; EOL=298.29kg ²Template 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"x15"
 13.17

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	42,958.501	85,917.002	0.00E+00	2.85E-05	5.70E-05	Avg. MeV	
Am-241	2.0060E-03	42,958.501	85,917.002	0.00E+00	8.62E+01	1.72E+02	0.0150	9.069E+15
Am-242m	4.2429E-07	42,958.501	85,917.002	0.00E+00	1.82E-02	3.65E-02	0.0250	1.886E+15
Am-243	1.4899E-06	42,958.501	85,917.002	0.00E+00	6.40E-02	1.28E-01	0.0375	1.645E+15
C-14	5.7135E-09	42,958.501	85,917.002	0.00E+00	2.45E-04	4.91E-04	0.0575	1.762E+15
Cl-36	1.3124E-32	42,958.501	85,917.002	0.00E+00	5.64E-28	1.13E-27	0.0850	1.065E+15
Cm-243	1.6443E-07	42,958.501	85,917.002	0.00E+00	7.06E-03	1.41E-02	0.1250	7.204E+14
Cm-244	2.9330E-05	42,958.501	85,917.002	0.00E+00	1.26E+00	2.52E+00	0.2250	9.186E+14
Co-60	5.3186E-06	42,958.501	85,917.002	0.00E+00	2.28E-01	4.57E-01	0.3750	3.999E+14
Cs-134	3.1563E-03	42,958.501	85,917.002	0.00E+00	1.36E+02	2.71E+02	0.5750	6.523E+15
Cs-135	3.4477E-06	42,958.501	85,917.002	0.00E+00	1.48E-01	2.96E-01	0.8500	1.103E+14
Cs-137	2.0313E+00	42,958.501	85,917.002	0.00E+00	8.73E+04	1.75E+05	1.2500	6.297E+13
Eu-154	2.4513E-02	42,958.501	85,917.002	0.00E+00	1.05E+03	2.11E+03	1.7500	2.891E+12
Eu-155	4.8175E-03	42,958.501	85,917.002	0.00E+00	2.07E+02	4.14E+02	2.2500	2.536E+08
Fe-55	1.2397E-04	42,958.501	85,917.002	0.00E+00	5.33E+00	1.07E+01	2.7500	1.433E+08
H-3	4.5697E-03	42,958.501	85,917.002	0.00E+00	1.96E+02	3.93E+02	3.5000	6.591E+05
I-129	7.5300E-07	42,958.501	85,917.002	0.00E+00	3.23E-02	6.47E-02	5.0000	3.742E+04
Kr-85	1.0850E-01	42,958.501	85,917.002	0.00E+00	4.66E+03	9.32E+03	7.0000	4.133E+03
Np-237	9.5561E-06	42,958.501	85,917.002	0.00E+00	4.11E-01	8.21E-01	11.0000	4.633E+02
Pa-231	2.0359E-09	42,958.501	85,917.002	0.00E+00	8.75E-05	1.75E-04		
Pb-210	4.9728E-11	42,958.501	85,917.002	0.00E+00	2.14E-06	4.27E-06		
Pm-147	4.8502E-02	42,958.501	85,917.002	0.00E+00	2.08E+03	4.17E+03		
Pu-238	1.8254E-02	42,958.501	85,917.002	0.00E+00	7.84E+02	1.57E+03		
Pu-239	4.2810E-04	42,958.501	85,917.002	0.00E+00	1.84E+01	3.68E+01		
Pu-240	2.4368E-04	42,958.501	85,917.002	0.00E+00	1.05E+01	2.09E+01		
Pu-241	3.3415E-02	42,958.501	85,917.002	0.00E+00	1.44E+03	2.87E+03		
Pu-242	3.6329E-07	42,958.501	85,917.002	0.00E+00	1.56E-02	3.12E-02		
Ra-226	2.2854E-10	42,958.501	85,917.002	0.00E+00	9.82E-06	1.96E-05		
Ra-228	1.2426E-14	42,958.501	85,917.002	0.00E+00	5.34E-10	1.07E-09		
Ru-106	6.3589E-06	42,958.501	85,917.002	0.00E+00	2.73E-01	5.46E-01		
Se-79	1.2933E-05	42,958.501	85,917.002	0.00E+00	5.56E-01	1.11E+00		
Sn-126	1.1574E-05	42,958.501	85,917.002	0.00E+00	4.97E-01	9.94E-01		
Sr-90	1.9248E+00	42,958.501	85,917.002	0.00E+00	8.27E+04	1.65E+05		
Tc-99	4.2239E-04	42,958.501	85,917.002	0.00E+00	1.81E+01	3.63E+01		
Th-229	5.0953E-12	42,958.501	85,917.002	0.00E+00	2.19E-07	4.38E-07		
Th-230	4.1885E-08	42,958.501	85,917.002	0.00E+00	1.80E-03	3.60E-03		
Th-232	1.9270E-14	42,958.501	85,917.002	0.00E+00	8.28E-10	1.66E-09		
Tl-208	4.6024E-08	42,958.501	85,917.002	0.00E+00	1.98E-03	3.95E-03		
U-232	1.2582E-07	42,958.501	85,917.002	0.00E+00	5.40E-03	1.08E-02		
U-233	2.5825E-09	42,958.501	85,917.002	0.00E+00	1.11E-04	2.22E-04		
U-234	1.8450E-04	42,958.501	85,917.002	0.00E+00	7.93E+00	1.59E+01		
U-235	-2.7235E-06	42,958.501	0.000	1.49E-01	3.15E-02	1.49E-01		
U-236	1.5493E-05	42,958.501	85,917.002	0.00E+00	6.66E-01	1.33E+00		
U-238	-4.2851E-09	42,958.501	0.000	9.24E-02	9.22E-02	9.24E-02		
Y-90	1.9254E+00	42,958.501	85,917.002	0.00E+00	8.27E+04	1.65E+05		
Other Radionuclides					8.31E+04	1.66E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.02E+03	2.05E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U3Si2	U	
	20.00000055	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:		42,958.501	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
		85,917.002	

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup
Bounding:	0.40	
	0.79	
		Estimated EOL HM/ Given EOL HM
		1.01

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

²Total burnup for all fuel associated with this worksheet must be 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 (SO. KOREA)
 SNF ID #: 293
 Fuel Units & Descr: 48 - MULTI-PIN CLUSTER
 Heavy Metal Mass: BOL=59.52kg ; EOL=52.14kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x15"
 4.00

Radionuclide	m		x _n		x _b		b		y _n		y _b		Gamma Sources	
	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)	Avg. MeV					
Ac-227	6.6313E-10	6,991.276	13,982.553	0.00E+00	4.64E-06	9.27E-06								
Am-241	2.0060E-03	6,991.276	13,982.553	0.00E+00	1.40E+01	2.80E+01	0.0150	1.476E+15						
Am-242m	4.2429E-07	6,991.276	13,982.553	0.00E+00	2.97E-03	5.93E-03	0.0250	3.069E+14						
Am-243	1.4899E-06	6,991.276	13,982.553	0.00E+00	1.04E-02	2.08E-02	0.0375	2.677E+14						
C-14	5.7135E-09	6,991.276	13,982.553	0.00E+00	3.99E-05	7.99E-05	0.0575	2.867E+14						
Ci-36	1.3124E-32	6,991.276	13,982.553	0.00E+00	9.18E-09	1.84E-08	0.0850	1.733E+14						
Cm-243	1.6443E-07	6,991.276	13,982.553	0.00E+00	1.15E-03	2.30E-03	0.1250	1.172E+14						
Cm-244	2.9330E-05	6,991.276	13,982.553	0.00E+00	2.05E-01	4.10E-01	0.2250	1.495E+14						
Co-60	5.3186E-06	6,991.276	13,982.553	0.00E+00	3.72E-02	7.44E-02	0.3750	6.508E+13						
Cs-134	3.1563E-03	6,991.276	13,982.553	0.00E+00	2.21E+01	4.41E+01	0.5750	1.062E+15						
Cs-135	3.4477E-06	6,991.276	13,982.553	0.00E+00	2.41E-02	4.82E-02	0.8500	1.795E+13						
Cs-137	2.0313E+00	6,991.276	13,982.553	0.00E+00	1.42E+04	2.84E+04	1.2500	1.025E+13						
Eu-154	2.4513E-02	6,991.276	13,982.553	0.00E+00	1.71E+02	3.43E+02	1.7500	4.705E+11						
Eu-155	4.8175E-03	6,991.276	13,982.553	0.00E+00	3.37E+01	6.74E+01	2.2500	4.127E+07						
Fe-55	1.2397E-04	6,991.276	13,982.553	0.00E+00	8.67E-01	1.73E+00	2.7500	2.332E+07						
H-3	4.5697E-03	6,991.276	13,982.553	0.00E+00	3.19E+01	6.39E+01	3.5000	1.073E+05						
I-129	7.5300E-07	6,991.276	13,982.553	0.00E+00	5.26E-03	1.05E-02	5.0000	6.093E+03						
Kr-85	1.0850E-01	6,991.276	13,982.553	0.00E+00	7.59E+02	1.52E+03	7.0000	6.729E+02						
Np-237	9.5561E-06	6,991.276	13,982.553	0.00E+00	6.68E-02	1.34E-01	11.0000	7.543E+01						
Pa-231	2.0359E-09	6,991.276	13,982.553	0.00E+00	1.42E-05	2.85E-05								
Pb-210	4.9728E-11	6,991.276	13,982.553	0.00E+00	3.48E-07	6.95E-07								
Pm-147	4.8502E-02	6,991.276	13,982.553	0.00E+00	3.39E+02	6.78E+02								
Pu-238	1.8254E-02	6,991.276	13,982.553	0.00E+00	1.28E+02	2.55E+02								
Pu-239	4.2810E-04	6,991.276	13,982.553	0.00E+00	2.99E+00	5.99E+00								
Pu-240	2.4368E-04	6,991.276	13,982.553	0.00E+00	1.70E+00	3.41E+00								
Pu-241	3.3415E-02	6,991.276	13,982.553	0.00E+00	2.34E+02	4.67E+02								
Pu-242	3.6329E-07	6,991.276	13,982.553	0.00E+00	2.54E-03	5.08E-03								
Ra-226	2.2854E-10	6,991.276	13,982.553	0.00E+00	1.60E-06	3.20E-06								
Ra-228	1.2426E-14	6,991.276	13,982.553	0.00E+00	8.69E-11	1.74E-10								
Ru-106	6.3589E-06	6,991.276	13,982.553	0.00E+00	4.45E-02	8.89E-02								
Se-79	1.2933E-05	6,991.276	13,982.553	0.00E+00	9.04E-02	1.81E-01								
Sn-126	1.1574E-05	6,991.276	13,982.553	0.00E+00	8.09E-02	1.62E-01								
Sr-90	1.9248E+00	6,991.276	13,982.553	0.00E+00	1.35E+04	2.69E+04								
Tc-99	4.2239E-04	6,991.276	13,982.553	0.00E+00	2.95E+00	5.91E+00								
Th-229	5.0953E-12	6,991.276	13,982.553	0.00E+00	3.56E-08	7.12E-08								
Th-230	4.1885E-08	6,991.276	13,982.553	0.00E+00	2.93E-04	5.86E-04								
Th-232	1.9270E-14	6,991.276	13,982.553	0.00E+00	1.35E-10	2.69E-10								
Tl-208	4.6024E-08	6,991.276	13,982.553	0.00E+00	3.22E-04	6.44E-04								
U-232	1.2582E-07	6,991.276	13,982.553	0.00E+00	8.80E-04	1.76E-03								
U-233	2.5825E-09	6,991.276	13,982.553	0.00E+00	1.81E-05	3.61E-05								
U-234	1.8450E-04	6,991.276	13,982.553	0.00E+00	1.29E+00	2.58E+00								
U-235	-2.7235E-06	6,991.276	0.000	2.57E-02	6.68E-03	2.57E-02								
U-236	1.5493E-05	6,991.276	13,982.553	0.00E+00	1.08E-01	2.17E-01								
U-238	-4.2851E-09	6,991.276	0.000	1.60E-02	1.60E-02	1.60E-02								
Y-90	1.9254E+00	6,991.276	13,982.553	0.00E+00	1.35E+04	2.69E+04								
Other Radionuclides					1.35E+04	2.70E+04								

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3S2	U	
BOL Enrichment %:	19.9999952	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		6,991.276	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		13,982.553	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.37		1.01
Bounding:	0.75		

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

²Total burnup for all fuel associated with this worksheet must be 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 (CANADA)
 SNF ID #: 666
 Fuel Units & Descr: 2 - 297 ROD ARRAY
 Heavy Metal Mass: BOL=1.77kg ; EOL=1.74kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.50

Radionuclide	II. Estimates		x _b	b	y _n	y _b	Gamma Sources	
	m	x _n					Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	6.6313E-10	28.240	56.480	0.00E+00	1.87E-08	3.75E-08	0.0150	5.962E+12
Am-241	2.0060E-03	28.240	56.480	0.00E+00	5.66E-02	1.13E-01	0.0250	1.240E+12
Am-242m	4.2429E-07	28.240	56.480	0.00E+00	1.20E-05	2.40E-05	0.0375	1.081E+12
Am-243	1.4899E-06	28.240	56.480	0.00E+00	4.21E-05	8.42E-05	0.0575	1.158E+12
C-14	5.7135E-09	28.240	56.480	0.00E+00	1.61E-07	3.23E-07	0.0850	6.999E+11
Cl-36	1.3124E-32	28.240	56.480	0.00E+00	3.71E-31	7.41E-31	0.1250	4.736E+11
Cm-243	1.6443E-07	28.240	56.480	0.00E+00	4.64E-06	9.29E-06	0.2250	6.040E+11
Cm-244	2.9330E-05	28.240	56.480	0.00E+00	8.28E-04	1.66E-03	0.3750	2.629E+11
Co-60	5.3186E-06	28.240	56.480	0.00E+00	1.50E-04	3.00E-04	0.5750	4.288E+12
Cs-134	3.1563E-03	28.240	56.480	0.00E+00	8.91E-02	1.78E-01	0.8500	7.249E+10
Cs-135	3.4477E-06	28.240	56.480	0.00E+00	9.74E-05	1.95E-04	1.2500	4.140E+10
Cs-137	2.0313E+00	28.240	56.480	0.00E+00	5.74E+01	1.15E+02	1.7500	1.900E+09
Eu-154	2.4513E-02	28.240	56.480	0.00E+00	6.92E-01	1.38E+00	2.2500	1.667E+05
Eu-155	4.8175E-03	28.240	56.480	0.00E+00	1.36E-01	2.72E-01	2.7500	9.422E+04
Fe-55	1.2397E-04	28.240	56.480	0.00E+00	3.50E-03	7.00E-03	3.5000	4.333E+02
H-3	4.5697E-03	28.240	56.480	0.00E+00	1.29E-01	2.58E-01	5.0000	2.460E+01
I-129	7.5300E-07	28.240	56.480	0.00E+00	2.13E-05	4.25E-05	7.0000	2.717E+00
Kr-85	1.0850E-01	28.240	56.480	0.00E+00	3.06E+00	6.13E+00	11.0000	3.045E-01
Np-237	9.5561E-06	28.240	56.480	0.00E+00	2.70E-04	5.40E-04		
Pa-231	2.0359E-09	28.240	56.480	0.00E+00	5.75E-08	1.15E-07		
Pb-210	4.9728E-11	28.240	56.480	0.00E+00	1.40E-09	2.81E-09		
Pm-147	4.8502E-02	28.240	56.480	0.00E+00	1.37E+00	2.74E+00		
Pu-238	1.8254E-02	28.240	56.480	0.00E+00	5.16E-01	1.03E+00		
Pu-239	4.2810E-04	28.240	56.480	0.00E+00	1.21E-02	2.42E-02		
Pu-240	2.4368E-04	28.240	56.480	0.00E+00	6.88E-03	1.38E-02		
Pu-241	3.3415E-02	28.240	56.480	0.00E+00	9.44E-01	1.89E+00		
Pu-242	3.6329E-07	28.240	56.480	0.00E+00	1.03E-05	2.05E-05		
Ra-226	2.2854E-10	28.240	56.480	0.00E+00	6.45E-09	1.29E-08		
Ra-228	1.2426E-14	28.240	56.480	0.00E+00	3.51E-13	7.02E-13		
Ru-106	6.3589E-06	28.240	56.480	0.00E+00	1.80E-04	3.59E-04		
Se-79	1.2933E-05	28.240	56.480	0.00E+00	3.65E-04	7.30E-04		
Sn-126	1.1574E-05	28.240	56.480	0.00E+00	3.27E-04	6.54E-04		
Sr-90	1.9248E+00	28.240	56.480	0.00E+00	5.44E+01	1.09E+02		
Tc-99	4.2239E-04	28.240	56.480	0.00E+00	1.19E-02	2.39E-02		
Th-229	5.0953E-12	28.240	56.480	0.00E+00	1.44E-10	2.88E-10		
Th-230	4.1885E-08	28.240	56.480	0.00E+00	1.18E-06	2.37E-06		
Th-232	1.9270E-14	28.240	56.480	0.00E+00	5.44E-13	1.09E-12		
Tl-208	4.6024E-08	28.240	56.480	0.00E+00	1.30E-06	2.60E-06		
U-232	1.2582E-07	28.240	56.480	0.00E+00	3.55E-06	7.11E-06		
U-233	2.5825E-09	28.240	56.480	0.00E+00	7.29E-08	1.46E-07		
U-234	1.8450E-04	28.240	56.480	0.00E+00	5.21E-03	1.04E-02		
U-235	-2.7235E-06	28.240	0.000	3.57E-03	3.49E-03	3.57E-03		
U-236	1.5493E-05	28.240	56.480	0.00E+00	4.38E-04	8.75E-04		
U-238	-4.2851E-09	28.240	0.000	4.10E-05	4.09E-05	4.10E-05		
Y-90	1.9254E+00	28.240	56.480	0.00E+00	5.44E+01	1.09E+02		
Other Radionuclides								
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							6.73E-01	1.35E+00
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.11512415	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		28.240	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		56.480	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.05		1.00
Bounding:	0.10		

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

²Total burnup for all fuel associated with this worksheet must be 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 (CANADA)
 SNF ID #: 665
 Fuel Units & Descr: 2 - 297 ROD ARRAY
 Heavy Metal Mass: BOL=1.77kg ; EOL=1.74kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.50

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	28.240	56.480	0.00E+00	1.87E-08	3.75E-08	Avg. MeV	
Am-241	2.0060E-03	28.240	56.480	0.00E+00	5.66E-02	1.13E-01	0.0150	5.962E+12
Am-242m	4.2429E-07	28.240	56.480	0.00E+00	1.20E-05	2.40E-05	0.0250	1.240E+12
Am-243	1.4899E-06	28.240	56.480	0.00E+00	4.21E-05	8.42E-05	0.0375	1.081E+12
C-14	5.7135E-09	28.240	56.480	0.00E+00	1.61E-07	3.23E-07	0.0575	1.158E+12
Ci-36	1.3124E-32	28.240	56.480	0.00E+00	3.71E-31	7.41E-31	0.0850	6.999E+11
Cm-243	1.6443E-07	28.240	56.480	0.00E+00	4.64E-06	9.29E-06	0.1250	4.736E+11
Cm-244	2.9330E-05	28.240	56.480	0.00E+00	8.28E-04	1.66E-03	0.2250	6.040E+11
Co-60	5.3186E-06	28.240	56.480	0.00E+00	1.50E-04	3.00E-04	0.3750	2.629E+11
Cs-134	3.1563E-03	28.240	56.480	0.00E+00	8.91E-02	1.78E-01	0.5750	4.288E+12
Cs-135	3.4477E-06	28.240	56.480	0.00E+00	9.74E-05	1.95E-04	0.8500	7.249E+10
Cs-137	2.0313E+00	28.240	56.480	0.00E+00	5.74E+01	1.15E+02	1.2500	4.140E+10
Eu-154	2.4513E-02	28.240	56.480	0.00E+00	6.92E-01	1.38E+00	1.7500	1.900E+09
Eu-155	4.8175E-03	28.240	56.480	0.00E+00	1.36E-01	2.72E-01	2.2500	1.667E+05
Fe-55	1.2397E-04	28.240	56.480	0.00E+00	3.50E-03	7.00E-03	2.7500	9.422E+04
H-3	4.5697E-03	28.240	56.480	0.00E+00	1.29E-01	2.58E-01	3.5000	4.333E+02
I-129	7.5300E-07	28.240	56.480	0.00E+00	2.13E-05	4.25E-05	5.0000	2.460E+01
Kr-85	1.0850E-01	28.240	56.480	0.00E+00	3.06E+00	6.13E+00	7.0000	2.717E+00
Np-237	9.5561E-06	28.240	56.480	0.00E+00	2.70E-04	5.40E-04	11.0000	3.045E-01
Pa-231	2.0359E-09	28.240	56.480	0.00E+00	5.75E-08	1.15E-07		
Pb-210	4.9728E-11	28.240	56.480	0.00E+00	1.40E-09	2.81E-09		
Pm-147	4.8502E-02	28.240	56.480	0.00E+00	1.37E+00	2.74E+00		
Pu-238	1.8254E-02	28.240	56.480	0.00E+00	5.16E-01	1.03E+00		
Pu-239	4.2810E-04	28.240	56.480	0.00E+00	1.21E-02	2.42E-02		
Pu-240	2.4368E-04	28.240	56.480	0.00E+00	6.88E-03	1.38E-02		
Pu-241	3.3415E-02	28.240	56.480	0.00E+00	9.44E-01	1.89E+00		
Pu-242	3.6329E-07	28.240	56.480	0.00E+00	1.03E-05	2.05E-05		
Ra-226	2.2854E-10	28.240	56.480	0.00E+00	6.45E-09	1.29E-08		
Ra-228	1.2426E-14	28.240	56.480	0.00E+00	3.51E-13	7.02E-13		
Ru-106	6.3589E-06	28.240	56.480	0.00E+00	1.80E-04	3.59E-04		
Se-79	1.2933E-05	28.240	56.480	0.00E+00	3.65E-04	7.30E-04		
Sn-126	1.1574E-05	28.240	56.480	0.00E+00	3.27E-04	6.54E-04		
Sr-90	1.9248E+00	28.240	56.480	0.00E+00	5.44E+01	1.09E+02		
Tc-99	4.2239E-04	28.240	56.480	0.00E+00	1.19E-02	2.39E-02		
Th-229	5.0953E-12	28.240	56.480	0.00E+00	1.44E-10	2.88E-10		
Th-230	4.1885E-08	28.240	56.480	0.00E+00	1.18E-06	2.37E-06		
Th-232	1.9270E-14	28.240	56.480	0.00E+00	5.44E-13	1.09E-12		
Ti-208	4.6024E-08	28.240	56.480	0.00E+00	1.30E-06	2.60E-06		
U-232	1.2582E-07	28.240	56.480	0.00E+00	3.55E-06	7.11E-06		
U-233	2.5825E-09	28.240	56.480	0.00E+00	7.29E-08	1.46E-07		
U-234	1.8450E-04	28.240	56.480	0.00E+00	5.21E-03	1.04E-02		
U-235	-2.7235E-06	28.240	0.000	3.57E-03	3.49E-03	3.57E-03		
U-236	1.5493E-05	28.240	56.480	0.00E+00	4.38E-04	8.75E-04		
U-238	-4.2851E-09	28.240	0.000	4.10E-05	4.09E-05	4.10E-05		
Y-90	1.9254E+00	28.240	56.480	0.00E+00	5.44E+01	1.09E+02		
Other Radionuclides					5.46E+01	1.09E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.73E-01	1.35E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.11512415	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		28.240	
Bounding:		56.480	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.05		
Bounding:	0.10		

Estimated EOL HM/Given EOL HM: 1.00

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

²Total burnup for all fuel associated with this worksheet must be 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 (CANADA)
 SNF ID #: 669
 Fuel Units & Descr: 2 - 297 ROD ARRAY
 Heavy Metal Mass: BOL=1.77kg ; EOL=1.74kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.50

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	28.221	56.442	0.00E+00	1.87E-08	3.74E-08	0.0150	5.958E+12
Am-241	2.0060E-03	28.221	56.442	0.00E+00	5.66E-02	1.13E-01	0.0250	1.239E+12
Am-242m	4.2429E-07	28.221	56.442	0.00E+00	1.20E-05	2.39E-05	0.0375	1.091E+12
Am-243	1.4899E-06	28.221	56.442	0.00E+00	4.20E-05	8.41E-05	0.0575	1.091E+12
C-14	5.7135E-09	28.221	56.442	0.00E+00	1.61E-07	3.22E-07	0.0575	1.157E+12
Cl-36	1.3124E-32	28.221	56.442	0.00E+00	3.70E-31	7.41E-31	0.0850	6.994E+11
Cm-243	1.6443E-07	28.221	56.442	0.00E+00	4.64E-06	9.28E-06	0.1250	4.733E+11
Cm-244	2.9330E-05	28.221	56.442	0.00E+00	8.28E-04	1.66E-03	0.2250	6.036E+11
Co-60	5.3186E-06	28.221	56.442	0.00E+00	1.50E-04	3.00E-04	0.3750	2.627E+11
Cs-134	3.1563E-03	28.221	56.442	0.00E+00	8.91E-02	1.78E-01	0.5750	4.285E+12
Cs-135	3.4477E-06	28.221	56.442	0.00E+00	9.73E-05	1.95E-04	0.8500	7.244E+10
Cs-137	2.0313E+00	28.221	56.442	0.00E+00	5.73E+01	1.15E+02	1.2500	4.137E+10
Eu-154	2.4513E-02	28.221	56.442	0.00E+00	6.92E-01	1.38E+00	1.7500	1.899E+09
Eu-155	4.8175E-03	28.221	56.442	0.00E+00	1.36E-01	2.72E-01	2.2500	1.666E+05
Fe-55	1.2397E-04	28.221	56.442	0.00E+00	3.50E-03	7.00E-03	2.7500	9.415E+04
H-3	4.5697E-03	28.221	56.442	0.00E+00	1.29E-01	2.58E-01	3.5000	4.330E+02
I-129	7.5300E-07	28.221	56.442	0.00E+00	2.13E-05	4.25E-05	5.0000	2.459E+01
Kr-85	1.0850E-01	28.221	56.442	0.00E+00	3.06E+00	6.12E+00	7.0000	2.715E+00
Np-237	9.5561E-06	28.221	56.442	0.00E+00	2.70E-04	5.39E-04	11.0000	3.043E-01
Pa-231	2.0359E-09	28.221	56.442	0.00E+00	5.75E-08	1.15E-07		
Pb-210	4.9728E-11	28.221	56.442	0.00E+00	1.40E-09	2.81E-09		
Pm-147	4.8502E-02	28.221	56.442	0.00E+00	1.37E+00	2.74E+00		
Pu-238	1.8254E-02	28.221	56.442	0.00E+00	5.15E-01	1.03E+00		
Pu-239	4.2810E-04	28.221	56.442	0.00E+00	1.21E-02	2.42E-02		
Pu-240	2.4368E-04	28.221	56.442	0.00E+00	6.88E-03	1.38E-02		
Pu-241	3.3415E-02	28.221	56.442	0.00E+00	9.43E-01	1.89E+00		
Pu-242	3.6329E-07	28.221	56.442	0.00E+00	1.03E-05	2.05E-05		
Ra-226	2.2854E-10	28.221	56.442	0.00E+00	6.45E-09	1.29E-08		
Ra-228	1.2426E-14	28.221	56.442	0.00E+00	3.51E-13	7.01E-13		
Ru-106	6.3589E-06	28.221	56.442	0.00E+00	1.79E-04	3.59E-04		
Se-79	1.2933E-05	28.221	56.442	0.00E+00	3.65E-04	7.30E-04		
Sn-126	1.1574E-05	28.221	56.442	0.00E+00	3.27E-04	6.53E-04		
Sr-90	1.9248E+00	28.221	56.442	0.00E+00	5.43E+01	1.09E+02		
Tc-99	4.2239E-04	28.221	56.442	0.00E+00	1.19E-02	2.38E-02		
Th-229	5.0953E-12	28.221	56.442	0.00E+00	1.44E-10	2.88E-10		
Th-230	4.1885E-08	28.221	56.442	0.00E+00	1.18E-06	2.36E-06		
Th-232	1.9270E-14	28.221	56.442	0.00E+00	5.44E-13	1.09E-12		
Ti-208	4.6024E-08	28.221	56.442	0.00E+00	1.30E-06	2.60E-06		
U-232	1.2582E-07	28.221	56.442	0.00E+00	3.55E-06	7.10E-06		
U-233	2.5825E-09	28.221	56.442	0.00E+00	7.29E-08	1.46E-07		
U-234	1.8450E-04	28.221	56.442	0.00E+00	5.21E-03	1.04E-02		
U-235	-2.7235E-06	28.221	0.000	3.57E-03	3.49E-03	3.57E-03		
U-236	1.5493E-05	28.221	56.442	0.00E+00	4.37E-04	8.74E-04		
U-238	-4.2851E-09	28.221	0.000	4.10E-05	4.09E-05	4.10E-05		
Y-90	1.9254E+00	28.221	56.442	0.00E+00	5.43E+01	1.09E+02		
Other Radionuclides					5.46E+01	1.09E+02		

Thermal Power		
	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
Total	6.73E-01	1.35E+00

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.11512415	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		28.221	
Bounding:		56.442	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.05		
Bounding:	0.10		

Estimated EOL HM/Given EOL HM: 1.00

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

²Total burnup for all fuel associated with this worksheet must be 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 (CANADA)
 SNF ID #: 668
 Fuel Units & Descr: 2 - 297 ROD ARRAY
 Heavy Metal Mass: BOL=1.77kg ; EOL=1.74kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.50

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	28.240	56.480	0.00E+00	1.87E-08	3.75E-08	Avg. MeV	
Am-241	2.0060E-03	28.240	56.480	0.00E+00	5.66E-02	1.13E-01	0.0150	5.962E+12
Am-242m	4.2429E-07	28.240	56.480	0.00E+00	1.20E-05	2.40E-05	0.0250	1.240E+12
Am-243	1.4899E-06	28.240	56.480	0.00E+00	4.21E-05	8.42E-05	0.0375	1.081E+12
C-14	5.7135E-09	28.240	56.480	0.00E+00	1.61E-07	3.23E-07	0.0575	1.158E+12
Cl-36	1.3124E-32	28.240	56.480	0.00E+00	3.71E-31	7.41E-31	0.0850	6.999E+11
Cm-243	1.6443E-07	28.240	56.480	0.00E+00	4.64E-06	9.29E-06	0.1250	4.736E+11
Cm-244	2.9330E-05	28.240	56.480	0.00E+00	8.28E-04	1.66E-03	0.2250	6.040E+11
Co-60	5.3186E-06	28.240	56.480	0.00E+00	1.50E-04	3.00E-04	0.3750	2.629E+11
Cs-134	3.1563E-03	28.240	56.480	0.00E+00	8.91E-02	1.78E-01	0.5750	4.288E+12
Cs-135	3.4477E-06	28.240	56.480	0.00E+00	9.74E-05	1.95E-04	0.8500	7.249E+10
Cs-137	2.0313E+00	28.240	56.480	0.00E+00	5.74E+01	1.15E+02	1.2500	4.140E+10
Eu-154	2.4513E-02	28.240	56.480	0.00E+00	6.92E-01	1.38E+00	1.7500	1.900E+09
Eu-155	4.8175E-03	28.240	56.480	0.00E+00	1.36E-01	2.72E-01	2.2500	1.667E+05
Fe-55	1.2397E-04	28.240	56.480	0.00E+00	3.50E-03	7.00E-03	2.7500	9.422E+04
H-3	4.5697E-03	28.240	56.480	0.00E+00	1.29E-01	2.58E-01	3.5000	4.333E+02
I-129	7.5300E-07	28.240	56.480	0.00E+00	2.13E-05	4.25E-05	5.0000	2.460E+01
Kr-85	1.0850E-01	28.240	56.480	0.00E+00	3.06E+00	6.13E+00	7.0000	2.717E+00
Np-237	9.5561E-06	28.240	56.480	0.00E+00	2.70E-04	5.40E-04	11.0000	3.045E-01
Pa-231	2.0359E-09	28.240	56.480	0.00E+00	5.75E-08	1.15E-07		
Pb-210	4.9728E-11	28.240	56.480	0.00E+00	1.40E-09	2.81E-09		
Pm-147	4.8502E-02	28.240	56.480	0.00E+00	1.37E+00	2.74E+00		
Pu-238	1.8254E-02	28.240	56.480	0.00E+00	5.16E-01	1.03E+00		
Pu-239	4.2810E-04	28.240	56.480	0.00E+00	1.21E-02	2.42E-02		
Pu-240	2.4368E-04	28.240	56.480	0.00E+00	6.88E-03	1.38E-02		
Pu-241	3.3415E-02	28.240	56.480	0.00E+00	9.44E-01	1.89E+00		
Pu-242	3.6329E-07	28.240	56.480	0.00E+00	1.03E-05	2.05E-05		
Ra-226	2.2854E-10	28.240	56.480	0.00E+00	6.45E-09	1.29E-08		
Ra-228	1.2426E-14	28.240	56.480	0.00E+00	3.51E-13	7.02E-13		
Ru-106	6.3589E-06	28.240	56.480	0.00E+00	1.80E-04	3.59E-04		
Se-79	1.2933E-05	28.240	56.480	0.00E+00	3.65E-04	7.30E-04		
Sn-126	1.1574E-05	28.240	56.480	0.00E+00	3.27E-04	6.54E-04		
Sr-90	1.9248E+00	28.240	56.480	0.00E+00	5.44E+01	1.09E+02		
Tc-99	4.2239E-04	28.240	56.480	0.00E+00	1.19E-02	2.39E-02		
Th-229	5.0953E-12	28.240	56.480	0.00E+00	1.44E-10	2.88E-10		
Th-230	4.1885E-08	28.240	56.480	0.00E+00	1.18E-06	2.37E-06		
Th-232	1.9270E-14	28.240	56.480	0.00E+00	5.44E-13	1.09E-12		
Tl-208	4.6024E-08	28.240	56.480	0.00E+00	1.30E-06	2.60E-06		
U-232	1.2582E-07	28.240	56.480	0.00E+00	3.55E-06	7.11E-06		
U-233	2.5825E-09	28.240	56.480	0.00E+00	7.29E-08	1.46E-07		
U-234	1.8450E-04	28.240	56.480	0.00E+00	5.21E-03	1.04E-02		
U-235	-2.7235E-06	28.240	0.000	3.57E-03	3.49E-03	3.57E-03		
U-236	1.5493E-05	28.240	56.480	0.00E+00	4.38E-04	8.75E-04		
U-238	-4.2851E-09	28.240	0.000	4.10E-05	4.09E-05	4.10E-05		
Y-90	1.9254E+00	28.240	56.480	0.00E+00	5.44E+01	1.09E+02		
Other Radionuclides					5.46E+01	1.09E+02		
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							6.73E-01	1.35E+00
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.11512415	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		28.240	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		56.480	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.05		1.00
Bounding:	0.10		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FFR SLOWPOKE (MONTREAL)
 SNF ID #: 667
 Fuel Units & Desc: 2 - 297 ROD ARRAY
 Heavy Metal Mass: BOL=1.77kg ; EOL=1.74kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.50

Radionuclide	II. Estimates		x _b	b	y _n	y _b	Gamma Sources	
	m	x _n					Photon Energy Group	Total Photons/sec (bounding)
Ac-227	6.6313E-10	28.240	56.480	0.00E+00	1.87E-08	3.75E-08	Avg. MeV	
Am-241	2.0060E-03	28.240	56.480	0.00E+00	5.66E-02	1.13E-01	0.0150	5.962E+12
Am-242m	4.2429E-07	28.240	56.480	0.00E+00	1.20E-05	2.40E-05	0.0250	1.240E+12
Am-243	1.4899E-06	28.240	56.480	0.00E+00	4.21E-05	8.42E-05	0.0375	1.081E+12
Ci-14	5.7135E-09	28.240	56.480	0.00E+00	1.61E-07	3.23E-07	0.0575	1.158E+12
Ci-36	1.3124E-32	28.240	56.480	0.00E+00	3.71E-31	7.41E-31	0.0850	6.999E+11
Cm-243	1.6443E-07	28.240	56.480	0.00E+00	4.64E-06	9.29E-06	0.1250	4.736E+11
Cm-244	2.9330E-05	28.240	56.480	0.00E+00	8.28E-04	1.66E-03	0.2250	6.040E+11
Co-60	5.3186E-06	28.240	56.480	0.00E+00	1.50E-04	3.00E-04	0.3750	2.629E+11
Cs-134	3.1563E-03	28.240	56.480	0.00E+00	8.91E-02	1.78E-01	0.5750	4.288E+12
Cs-135	3.4477E-06	28.240	56.480	0.00E+00	9.74E-05	1.95E-04	0.8500	7.249E+10
Cs-137	2.0313E+00	28.240	56.480	0.00E+00	5.74E+01	1.15E+02	1.2500	4.140E+10
Eu-154	2.4513E-02	28.240	56.480	0.00E+00	6.92E-01	1.38E+00	1.7500	1.900E+09
Eu-155	4.8175E-03	28.240	56.480	0.00E+00	1.36E-01	2.72E-01	2.2500	1.667E+05
Fe-55	1.2397E-04	28.240	56.480	0.00E+00	3.50E-03	7.00E-03	2.7500	9.422E+04
H-3	4.5697E-03	28.240	56.480	0.00E+00	1.29E-01	2.58E-01	3.5000	4.333E+02
I-129	7.5300E-07	28.240	56.480	0.00E+00	2.13E-05	4.25E-05	5.0000	2.460E+01
Kr-85	1.0850E-01	28.240	56.480	0.00E+00	3.06E+00	6.13E+00	7.0000	2.717E+00
Np-237	9.5561E-06	28.240	56.480	0.00E+00	2.70E-04	5.40E-04	11.0000	3.045E-01
Pa-231	2.0359E-09	28.240	56.480	0.00E+00	5.75E-08	1.15E-07		
Pb-210	4.9728E-11	28.240	56.480	0.00E+00	1.40E-09	2.81E-09		
Pm-147	4.8502E-02	28.240	56.480	0.00E+00	1.37E+00	2.74E+00		
Pu-238	1.8254E-02	28.240	56.480	0.00E+00	5.16E-01	1.03E+00		
Pu-239	4.2810E-04	28.240	56.480	0.00E+00	1.21E-02	2.42E-02		
Pu-240	2.4368E-04	28.240	56.480	0.00E+00	6.88E-03	1.38E-02		
Pu-241	3.3415E-02	28.240	56.480	0.00E+00	9.44E-01	1.89E+00		
Pu-242	3.6329E-07	28.240	56.480	0.00E+00	1.03E-05	2.05E-05		
Ra-226	2.2854E-10	28.240	56.480	0.00E+00	6.45E-09	1.29E-08		
Ra-228	1.2426E-14	28.240	56.480	0.00E+00	3.51E-13	7.02E-13		
Ru-106	6.3589E-06	28.240	56.480	0.00E+00	1.80E-04	3.59E-04		
Se-79	1.2933E-05	28.240	56.480	0.00E+00	3.65E-04	7.30E-04		
Sn-126	1.1574E-05	28.240	56.480	0.00E+00	3.27E-04	6.54E-04		
Sr-90	1.9248E+00	28.240	56.480	0.00E+00	5.44E+01	1.09E+02		
Tc-99	4.2239E-04	28.240	56.480	0.00E+00	1.19E-02	2.39E-02		
Th-229	5.0953E-12	28.240	56.480	0.00E+00	1.44E-10	2.88E-10		
Th-230	4.1885E-08	28.240	56.480	0.00E+00	1.18E-06	2.37E-06		
Th-232	1.9270E-14	28.240	56.480	0.00E+00	5.44E-13	1.09E-12		
Ti-208	4.6024E-08	28.240	56.480	0.00E+00	1.30E-06	2.60E-06		
U-232	1.2582E-07	28.240	56.480	0.00E+00	3.55E-06	7.11E-06		
U-233	2.5825E-09	28.240	56.480	0.00E+00	7.29E-08	1.46E-07		
U-234	1.8450E-04	28.240	56.480	0.00E+00	5.21E-03	1.04E-02		
U-235	-2.7235E-06	28.240	0.000	3.57E-03	3.49E-03	3.57E-03		
U-236	1.5493E-05	28.240	56.480	0.00E+00	4.38E-04	8.75E-04		
U-238	-4.2851E-09	28.240	0.000	4.10E-05	4.09E-05	4.10E-05		
Y-90	1.9254E+00	28.240	56.480	0.00E+00	5.44E+01	1.09E+02		
Other Radionuclides								
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							6.73E-01	1.35E+00
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.11512415	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		28.240	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		56.480	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.05		1.00
Bounding:	0.10		

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 TARGET (ARGENTINA)
 SNF ID #: 297
 Fuel Units & Descr: 48 - PARTICULATE
 Heavy Metal Mass: BOL=3.97kg ; EOL=3.97kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012892
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.33

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.0233E-09	74.997	149.995	0.00E+00	6.02E-07	1.20E-06	Avg. MeV	
Am-241	8.8502E-05	74.997	149.995	0.00E+00	6.64E-03	1.33E-02	0.0150	1.615E+13
Am-242m	9.1098E-09	74.997	149.995	0.00E+00	6.83E-07	1.37E-06	0.0250	3.357E+12
Am-243	9.8652E-10	74.997	149.995	0.00E+00	7.40E-08	1.48E-07	0.0375	2.893E+12
C-14	2.3062E-04	74.997	149.995	0.00E+00	1.73E-02	3.46E-02	0.0575	3.120E+12
Cl-36	1.2261E-06	74.997	149.995	0.00E+00	9.20E-05	1.84E-04	0.0850	1.889E+12
Cm-243	3.5824E-10	74.997	149.995	0.00E+00	2.69E-08	5.37E-08	0.1250	1.227E+12
Cm-244	4.1131E-09	74.997	149.995	0.00E+00	3.08E-07	6.17E-07	0.2250	1.615E+12
Co-60	5.0882E-01	74.997	149.995	0.00E+00	3.82E+01	7.63E+01	0.3750	7.064E+11
Cs-134	4.6705E-04	74.997	149.995	0.00E+00	3.50E-02	7.01E-02	0.5750	1.147E+13
Cs-135	3.0316E-05	74.997	149.995	0.00E+00	2.27E-03	4.55E-03	0.8500	1.234E+11
Cs-137	2.0516E+00	74.997	149.995	0.00E+00	1.54E+02	3.08E+02	1.2500	5.694E+12
Eu-154	2.2413E-03	74.997	149.995	0.00E+00	1.68E-01	3.36E-01	1.7500	3.139E+09
Eu-155	5.6772E-03	74.997	149.995	0.00E+00	4.26E-01	8.52E-01	2.2500	3.036E+07
Fe-55	6.6988E-02	74.997	149.995	0.00E+00	5.02E+00	1.00E+01	2.7500	2.310E+05
H-3	5.8303E-03	74.997	149.995	0.00E+00	4.37E-01	8.75E-01	3.5000	8.735E+02
I-129	7.3195E-07	74.997	149.995	0.00E+00	5.49E-05	1.10E-04	5.0000	5.349E+00
Kr-85	1.0880E-01	74.997	149.995	0.00E+00	8.16E+00	1.63E+01	7.0000	5.981E-01
Np-237	1.1481E-06	74.997	149.995	0.00E+00	8.61E-05	1.72E-04	11.0000	6.761E-02
Pa-231	2.3844E-08	74.997	149.995	0.00E+00	1.79E-06	3.58E-06		
Pb-210	9.6339E-14	74.997	149.995	0.00E+00	7.23E-12	1.45E-11		
Pm-147	6.1148E-02	74.997	149.995	0.00E+00	4.59E+00	9.17E+00		
Pu-238	3.3228E-04	74.997	149.995	0.00E+00	2.49E-02	4.98E-02		
Pu-239	6.6805E-04	74.997	149.995	0.00E+00	5.01E-02	1.00E-01		
Pu-240	8.6972E-05	74.997	149.995	0.00E+00	6.52E-03	1.30E-02		
Pu-241	1.4714E-03	74.997	149.995	0.00E+00	1.10E-01	2.21E-01		
Pu-242	1.9717E-09	74.997	149.995	0.00E+00	1.48E-07	2.96E-07		
Ra-226	4.4093E-13	74.997	149.995	0.00E+00	3.31E-11	6.61E-11		
Ra-228	7.8419E-12	74.997	149.995	0.00E+00	5.88E-10	1.18E-09		
Ru-106	5.5175E-06	74.997	149.995	0.00E+00	4.14E-04	8.28E-04		
Se-79	1.3226E-05	74.997	149.995	0.00E+00	9.92E-04	1.98E-03		
Sn-126	1.1493E-05	74.997	149.995	0.00E+00	8.62E-04	1.72E-03		
Sr-90	1.9501E+00	74.997	149.995	0.00E+00	1.46E+02	2.93E+02		
Tc-99	4.6656E-04	74.997	149.995	0.00E+00	3.50E-02	7.00E-02		
Th-229	7.2080E-12	74.997	149.995	0.00E+00	5.41E-10	1.08E-09		
Th-230	8.1248E-11	74.997	149.995	0.00E+00	6.09E-09	1.22E-08		
Th-232	8.3161E-12	74.997	149.995	0.00E+00	6.24E-10	1.25E-09		
Tl-208	2.5008E-08	74.997	149.995	0.00E+00	1.88E-06	3.75E-06		
U-232	6.7754E-08	74.997	149.995	0.00E+00	5.08E-06	1.02E-05		
U-233	3.0582E-09	74.997	149.995	0.00E+00	2.29E-07	4.59E-07		
U-234	3.6722E-07	74.997	149.995	0.00E+00	2.75E-05	5.51E-05		
U-235	-2.7761E-06	74.997	0.000	4.15E-03	3.94E-03	4.15E-03		
U-236	1.6190E-05	74.997	149.995	0.00E+00	1.21E-03	2.43E-03		
U-238	-2.8547E-09	74.997	0.000	6.89E-04	6.89E-04	6.89E-04		
Y-90	1.9501E+00	74.997	149.995	0.00E+00	1.46E+02	2.93E+02		
Other Radionuclides					1.69E+02	3.38E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.35E+00	4.69E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
	LIGHT WATER	LIGHT WATER	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).
Fuel Cladding:	NONE	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	48.34531901	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
		74.997	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
Bounding:		149.995	

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup
	0.40	
Bounding:	0.81	
		Estimated EOL HM/ Given EOL HM
		0.98

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

²Total burnup for all fuel associated with this worksheet must be 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) 1Fuel decay start date: 2010
 SNF ID #: 671 Estimates as of: 2030
 Fuel Units & Descr: 5952 - PARTICULATE Template: Pathfinder (Light Water, SST, 60 to 100%, U)
 Heavy Metal Mass: BOL=492.23kg ; EOL=492.23kg 2Template Burnup(MWd): 6.01
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00012882
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 165.33

II. Estimates	m	x _a	x _b	b	y _a	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.0233E-09	9,299.685	18,599.370	0.00E+00	7.46E-05	1.49E-04	0.0150	2.003E+15
Am-241	8.8502E-05	9,299.685	18,599.370	0.00E+00	8.23E-01	1.65E+00	0.0250	4.162E+14
Am-242m	9.1098E-09	9,299.685	18,599.370	0.00E+00	8.47E-05	1.69E-04	0.0375	3.587E+14
Am-243	9.8652E-10	9,299.685	18,599.370	0.00E+00	9.17E-06	1.83E-05	0.0575	3.868E+14
C-14	2.3062E-04	9,299.685	18,599.370	0.00E+00	2.14E+00	4.29E+00	0.0850	2.342E+14
Cf-252	1.2261E-06	9,299.685	18,599.370	0.00E+00	1.14E-02	2.28E-02	0.1250	1.521E+14
Cm-243	3.5824E-10	9,299.685	18,599.370	0.00E+00	3.33E-06	6.66E-06	0.2250	2.002E+14
Cm-244	4.1131E-09	9,299.685	18,599.370	0.00E+00	3.83E-05	7.65E-05	0.3750	8.759E+13
Co-60	5.0882E-01	9,299.685	18,599.370	0.00E+00	4.73E+03	9.46E+03	0.5750	1.422E+15
Cs-134	4.6705E-04	9,299.685	18,599.370	0.00E+00	4.34E+00	8.69E+00	0.8500	1.530E+13
Cs-135	3.0316E-05	9,299.685	18,599.370	0.00E+00	2.82E-01	5.64E-01	1.2500	7.060E+14
Cs-137	2.0516E+00	9,299.685	18,599.370	0.00E+00	1.91E+04	3.82E+04	1.7500	3.893E+11
Eu-154	2.2413E-03	9,299.685	18,599.370	0.00E+00	2.08E+01	4.17E+01	2.2500	3.765E+09
Eu-155	5.6772E-03	9,299.685	18,599.370	0.00E+00	5.28E+01	1.06E+02	2.7500	2.865E+07
Fe-55	6.6988E-02	9,299.685	18,599.370	0.00E+00	6.23E+02	1.25E+03	3.5000	1.083E+05
H-3	5.8303E-03	9,299.685	18,599.370	0.00E+00	5.42E+01	1.08E+02	5.0000	6.633E+02
I-129	7.3195E-07	9,299.685	18,599.370	0.00E+00	6.81E-03	1.36E-02	7.0000	7.416E+01
Kr-85	1.0880E-01	9,299.685	18,599.370	0.00E+00	1.01E+03	2.02E+03	11.0000	8.383E+00
Np-237	1.1481E-06	9,299.685	18,599.370	0.00E+00	1.07E-02	2.14E-02		
Pa-231	2.3844E-08	9,299.685	18,599.370	0.00E+00	2.22E-04	4.43E-04		
Pb-210	9.6339E-14	9,299.685	18,599.370	0.00E+00	8.96E-10	1.79E-09		
Pm-147	6.1148E-02	9,299.685	18,599.370	0.00E+00	5.69E+02	1.14E+03		
Pu-238	3.3228E-04	9,299.685	18,599.370	0.00E+00	3.09E+00	6.18E+00		
Pu-239	6.6805E-04	9,299.685	18,599.370	0.00E+00	6.21E+00	1.24E+01		
Pu-240	8.6972E-05	9,299.685	18,599.370	0.00E+00	8.09E-01	1.62E+00		
Pu-241	1.4714E-03	9,299.685	18,599.370	0.00E+00	1.37E+01	2.74E+01		
Pu-242	1.9717E-09	9,299.685	18,599.370	0.00E+00	1.83E-05	3.67E-05		
Ra-226	4.4093E-13	9,299.685	18,599.370	0.00E+00	4.10E-09	8.20E-09		
Ra-228	7.8419E-12	9,299.685	18,599.370	0.00E+00	7.29E-08	1.46E-07		
Ru-106	5.5175E-06	9,299.685	18,599.370	0.00E+00	5.13E-02	1.03E-01		
Se-79	1.3226E-05	9,299.685	18,599.370	0.00E+00	1.23E-01	2.46E-01		
Sn-126	1.1493E-05	9,299.685	18,599.370	0.00E+00	1.07E-01	2.14E-01		
Sr-90	1.9501E+00	9,299.685	18,599.370	0.00E+00	1.81E+04	3.63E+04		
Tc-99	4.6656E-04	9,299.685	18,599.370	0.00E+00	4.34E+00	8.68E+00		
Th-229	7.2080E-12	9,299.685	18,599.370	0.00E+00	6.70E-08	1.34E-07		
Th-230	8.1248E-11	9,299.685	18,599.370	0.00E+00	7.56E-07	1.51E-06		
Th-232	8.3161E-12	9,299.685	18,599.370	0.00E+00	7.73E-08	1.55E-07		
Ti-208	2.5008E-08	9,299.685	18,599.370	0.00E+00	2.33E-04	4.65E-04		
U-232	6.7754E-08	9,299.685	18,599.370	0.00E+00	6.30E-04	1.26E-03		
U-233	3.0582E-09	9,299.685	18,599.370	0.00E+00	2.84E-05	5.69E-05		
U-234	3.6722E-07	9,299.685	18,599.370	0.00E+00	3.42E-03	6.83E-03		
U-235	-2.7761E-06	9,299.685	0.000	5.14E-01	4.88E-01	5.14E-01		
U-236	1.6190E-05	9,299.685	18,599.370	0.00E+00	1.51E-01	3.01E-01		
U-238	-2.8547E-09	9,299.685	0.000	8.55E-02	8.54E-02	8.55E-02		
Y-90	1.9501E+00	9,299.685	18,599.370	0.00E+00	1.81E+04	3.63E+04		
Other Radionuclides					2.10E+04	4.19E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.91E+02	5.82E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	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).
Fuel Cladding:	NONE	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	48.34531901	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
Nominal:		9,299.685	
Bounding:		18,599.370	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.40		
Bounding:	0.81		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

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.33

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.0233E-09	74.997	149.995	0.00E+00	6.02E-07	1.20E-06	0.0150	1.615E+13
Am-241	8.8502E-05	74.997	149.995	0.00E+00	6.64E-03	1.33E-02	0.0250	3.357E+12
Am-242m	9.1098E-09	74.997	149.995	0.00E+00	6.83E-07	1.37E-06	0.0375	2.893E+12
Am-243	9.8652E-10	74.997	149.995	0.00E+00	7.40E-08	1.48E-07	0.0575	3.120E+12
C-14	2.3062E-04	74.997	149.995	0.00E+00	1.73E-02	3.46E-02	0.0850	1.889E+12
Cl-36	1.2261E-06	74.997	149.995	0.00E+00	9.20E-05	1.84E-04	0.1250	1.227E+12
Cm-243	3.5824E-10	74.997	149.995	0.00E+00	2.69E-08	5.37E-08	0.2250	1.615E+12
Cm-244	4.1131E-09	74.997	149.995	0.00E+00	3.08E-07	6.17E-07	0.3750	7.064E+11
Co-60	5.0882E-01	74.997	149.995	0.00E+00	3.82E+01	7.63E+01	0.5750	1.147E+13
Cs-134	4.6705E-04	74.997	149.995	0.00E+00	3.50E-02	7.01E-02	0.8500	1.234E+12
Cs-135	3.0318E-05	74.997	149.995	0.00E+00	2.27E-03	4.55E-03	1.2500	5.694E+11
Cs-137	2.0516E+00	74.997	149.995	0.00E+00	1.54E+02	3.08E+02	1.7500	3.139E+09
Eu-154	2.2413E-03	74.997	149.995	0.00E+00	1.68E-01	3.36E-01	2.2500	3.036E+07
Eu-155	5.6772E-03	74.997	149.995	0.00E+00	4.26E-01	8.52E-01	2.7500	2.310E+05
Fe-55	6.6988E-02	74.997	149.995	0.00E+00	5.02E+00	1.00E+01	3.5000	8.735E+02
H-3	5.8303E-03	74.997	149.995	0.00E+00	4.37E-01	8.75E-01	5.0000	5.349E+00
I-129	7.3195E-07	74.997	149.995	0.00E+00	5.49E-05	1.10E-04	7.0000	5.981E-01
Kr-85	1.0880E-01	74.997	149.995	0.00E+00	8.16E+00	1.63E+01	11.0000	6.761E-02
Np-237	1.1481E-06	74.997	149.995	0.00E+00	8.61E-05	1.72E-04		
Pa-231	2.3844E-08	74.997	149.995	0.00E+00	1.79E-06	3.58E-06		
Pb-210	9.6339E-14	74.997	149.995	0.00E+00	7.23E-12	1.45E-11		
Pm-147	6.1148E-02	74.997	149.995	0.00E+00	4.59E+00	9.17E+00		
Pu-238	3.3228E-04	74.997	149.995	0.00E+00	2.49E-02	4.98E-02		
Pu-239	6.6805E-04	74.997	149.995	0.00E+00	5.01E-02	1.00E-01		
Pu-240	8.6972E-05	74.997	149.995	0.00E+00	6.52E-03	1.30E-02		
Pu-241	1.4714E-03	74.997	149.995	0.00E+00	1.10E-01	2.21E-01		
Pu-242	1.9717E-09	74.997	149.995	0.00E+00	1.48E-07	2.96E-07		
Ra-226	4.4093E-13	74.997	149.995	0.00E+00	3.31E-11	6.61E-11		
Ra-228	7.8419E-12	74.997	149.995	0.00E+00	5.88E-10	1.18E-09		
Ru-106	5.5175E-06	74.997	149.995	0.00E+00	4.14E-04	8.28E-04		
Se-79	1.3226E-05	74.997	149.995	0.00E+00	9.92E-04	1.98E-03		
Sn-126	1.1493E-05	74.997	149.995	0.00E+00	8.62E-04	1.72E-03		
Sr-90	1.9501E+00	74.997	149.995	0.00E+00	1.46E+02	2.93E+02		
Tc-99	4.6656E-04	74.997	149.995	0.00E+00	3.50E-02	7.00E-02		
Th-229	7.2080E-12	74.997	149.995	0.00E+00	5.41E-10	1.08E-09		
Th-230	8.1248E-11	74.997	149.995	0.00E+00	6.09E-09	1.22E-08		
Th-232	8.3161E-12	74.997	149.995	0.00E+00	6.24E-10	1.25E-09		
Tl-208	2.5008E-08	74.997	149.995	0.00E+00	1.88E-06	3.75E-06		
U-232	6.7754E-08	74.997	149.995	0.00E+00	5.08E-06	1.02E-05		
U-233	3.0582E-09	74.997	149.995	0.00E+00	2.29E-07	4.59E-07		
U-234	3.6722E-07	74.997	149.995	0.00E+00	2.75E-05	5.51E-05		
U-235	-2.7761E-06	74.997	0.000	4.15E-03	3.94E-03	4.15E-03		
U-236	1.6190E-05	74.997	149.995	0.00E+00	1.21E-03	2.43E-03		
U-238	-2.8547E-09	74.997	0.000	6.89E-04	6.89E-04	6.89E-04		
Y-90	1.9501E+00	74.997	149.995	0.00E+00	1.46E+02	2.93E+02		
Other Radionuclides					1.69E+02	3.38E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.35E+00	4.69E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	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).
Fuel Cladding:	NONE	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	48.34531901	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		74.997	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
Bounding:		149.995	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.40		
Bounding:	0.81		

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

² Total burnup for all fuel associated with this worksheet must be 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 (AUSTRALIA) ¹Fuel decay start date: 2010
 SNF ID #: 684 Estimates as of: 2030
 Fuel Units & Descr: 169 - ASSEMBLY Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
 Heavy Metal Mass: BOL=47.88kg ; EOL=32.65kg ²Template Burnup(MWd): 164.6
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 5.63

II. Estimates		m	x _n	x _b	b	y _n	y _b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)	
Ac-227	3.1355E-10	14,025.543	28,051.087	0.00E+00	4.40E-06	8.80E-06	Avg. MeV		
Am-241	8.0194E-03	14,025.543	28,051.087	0.00E+00	1.12E+02	2.25E+02	0.0150	2.966E+15	
Am-242m	1.3694E-06	14,025.543	28,051.087	0.00E+00	1.92E-02	3.84E-02	0.0250	6.113E+14	
Am-243	3.7096E-05	14,025.543	28,051.087	0.00E+00	5.20E-01	1.04E+00	0.0375	5.431E+14	
C-14	2.6464E-08	14,025.543	28,051.087	0.00E+00	3.71E-04	7.42E-04	0.0575	5.750E+14	
Cf-254	4.4441E-31	14,025.543	28,051.087	0.00E+00	6.23E-27	1.25E-26	0.0850	3.481E+14	
Cm-243	5.7029E-06	14,025.543	28,051.087	0.00E+00	8.00E-02	1.60E-01	0.1250	2.465E+14	
Cm-244	4.6555E-03	14,025.543	28,051.087	0.00E+00	6.53E+01	1.31E+02	0.2250	2.996E+14	
Co-60	4.8663E-05	14,025.543	28,051.087	0.00E+00	6.83E-01	1.37E+00	0.3750	1.296E+14	
Cs-134	1.0638E-02	14,025.543	28,051.087	0.00E+00	1.49E+02	2.98E+02	0.5750	2.146E+15	
Cs-135	4.2564E-06	14,025.543	28,051.087	0.00E+00	5.97E-02	1.19E-01	0.8500	5.620E+13	
Cs-137	2.0358E+00	14,025.543	28,051.087	0.00E+00	2.86E+04	5.71E+04	1.2500	3.603E+13	
Eu-154	5.1956E-02	14,025.543	28,051.087	0.00E+00	7.29E+02	1.46E+03	1.7500	1.389E+12	
Eu-155	1.4295E-02	14,025.543	28,051.087	0.00E+00	2.00E+02	4.01E+02	2.2500	8.881E+07	
Fe-55	1.3560E-03	14,025.543	28,051.087	0.00E+00	1.90E+01	3.80E+01	2.7500	5.195E+07	
H-3	4.6258E-03	14,025.543	28,051.087	0.00E+00	6.49E+01	1.30E+02	3.5000	2.196E+06	
I-129	6.6403E-07	14,025.543	28,051.087	0.00E+00	9.31E-03	1.86E-02	5.0000	8.440E+05	
Kr-85	1.0808E-01	14,025.543	28,051.087	0.00E+00	1.52E+03	3.03E+03	7.0000	9.688E+04	
Np-237	3.1537E-05	14,025.543	28,051.087	0.00E+00	4.42E-01	8.85E-01	11.0000	1.110E+04	
Pa-231	9.7023E-10	14,025.543	28,051.087	0.00E+00	1.36E-05	2.72E-05			
Pb-210	1.1731E-11	14,025.543	28,051.087	0.00E+00	1.65E-07	3.29E-07			
Pm-147	2.4405E-02	14,025.543	28,051.087	0.00E+00	3.42E+02	6.85E+02			
Pu-238	1.5358E-01	14,025.543	28,051.087	0.00E+00	2.15E+03	4.31E+03			
Pu-239	6.9502E-04	14,025.543	28,051.087	0.00E+00	9.75E+00	1.95E+01			
Pu-240	3.7631E-04	14,025.543	28,051.087	0.00E+00	5.28E+00	1.06E+01			
Pu-241	1.3433E-01	14,025.543	28,051.087	0.00E+00	1.88E+03	3.77E+03			
Pu-242	3.0911E-06	14,025.543	28,051.087	0.00E+00	4.34E-02	8.67E-02			
Ra-226	5.5079E-11	14,025.543	28,051.087	0.00E+00	7.73E-07	1.55E-06			
Ra-228	1.3335E-14	14,025.543	28,051.087	0.00E+00	1.87E-10	3.74E-10			
Ru-106	7.3390E-06	14,025.543	28,051.087	0.00E+00	1.03E-01	2.06E-01			
Se-79	1.2339E-05	14,025.543	28,051.087	0.00E+00	1.73E-01	3.46E-01			
Sn-126	1.0194E-05	14,025.543	28,051.087	0.00E+00	1.43E-01	2.86E-01			
Sr-90	1.9064E+00	14,025.543	28,051.087	0.00E+00	2.67E+04	5.35E+04			
Tc-99	3.8056E-04	14,025.543	28,051.087	0.00E+00	5.34E+00	1.07E+01			
Th-229	4.9198E-12	14,025.543	28,051.087	0.00E+00	6.90E-08	1.38E-07			
Th-230	1.0547E-08	14,025.543	28,051.087	0.00E+00	1.48E-04	2.96E-04			
Th-232	2.0705E-14	14,025.543	28,051.087	0.00E+00	2.90E-10	5.81E-10			
Tl-208	4.8827E-08	14,025.543	28,051.087	0.00E+00	6.85E-04	1.37E-03			
U-232	1.3414E-07	14,025.543	28,051.087	0.00E+00	1.88E-03	3.76E-03			
U-233	3.7679E-09	14,025.543	28,051.087	0.00E+00	5.28E-05	1.06E-04			
U-234	5.2047E-05	14,025.543	28,051.087	0.00E+00	7.30E-01	1.46E+00			
U-235	-2.8661E-06	14,025.543	0.000	6.21E-02	2.19E-02	6.21E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)	
U-236	1.6701E-05	14,025.543	28,051.087	0.00E+00	2.34E-01	4.68E-01	4.06E+02	8.11E+02	
U-238	-9.4194E-09	14,025.543	0.000	6.44E-03	6.30E-03	6.44E-03	Total	Total	
Y-90	1.9070E+00	14,025.543	28,051.087	0.00E+00	2.67E+04	5.35E+04			
Other Radionuclides					2.73E+04	5.46E+04			

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	60.00000706	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		14,025.543	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		28,051.087	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.67	
Bounding:	1.34	

Estimated EOL HM/Given EOL HM: 1.01

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

²Total burnup for all fuel associated with this worksheet must be 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 (AUSTRALIA)
 SNF ID #: 300
 Fuel Units & Descr: 266 - ASSEMBLY
 Heavy Metal Mass: BOL=38.25kg ; EOL=22.02kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 8.87

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.1355E-10	14,945.819	29,891.638	0.00E+00	4.69E-06	9.37E-06	Avg. MeV	
Am-241	8.0194E-03	14,945.819	29,891.638	0.00E+00	1.20E+02	2.40E+02	0.0150	3.160E+15
Am-242m	1.3694E-06	14,945.819	29,891.638	0.00E+00	2.05E-02	4.09E-02	0.0250	6.514E+14
Am-243	3.7096E-05	14,945.819	29,891.638	0.00E+00	5.54E-01	1.11E+00	0.0375	5.788E+14
C-14	2.6464E-08	14,945.819	29,891.638	0.00E+00	3.96E-04	7.91E-04	0.0575	6.128E+14
Cl-36	4.4441E-31	14,945.819	29,891.638	0.00E+00	6.64E-27	1.33E-26	0.0850	3.709E+14
Cm-243	5.7029E-02	14,945.819	29,891.638	0.00E+00	8.52E-02	1.70E-01	0.1250	2.627E+14
Cm-244	4.6555E-03	14,945.819	29,891.638	0.00E+00	6.96E+01	1.39E+02	0.2250	3.192E+14
Co-60	4.8663E-05	14,945.819	29,891.638	0.00E+00	7.27E-01	1.45E+00	0.3750	1.382E+14
Cs-134	1.0638E-02	14,945.819	29,891.638	0.00E+00	1.59E+02	3.18E+02	0.5750	2.287E+15
Cs-135	4.2564E-06	14,945.819	29,891.638	0.00E+00	6.36E-02	1.27E-01	0.8500	5.989E+13
Cs-137	2.0358E+00	14,945.819	29,891.638	0.00E+00	3.04E+04	6.09E+04	1.2500	3.840E+13
Eu-154	5.1956E-02	14,945.819	29,891.638	0.00E+00	7.77E+02	1.55E+03	1.7500	1.480E+12
Eu-155	1.4295E-02	14,945.819	29,891.638	0.00E+00	2.14E+02	4.27E+02	2.2500	9.464E+07
Fe-55	1.3560E-03	14,945.819	29,891.638	0.00E+00	2.03E+01	4.05E+01	2.7500	5.536E+07
H-3	4.6258E-03	14,945.819	29,891.638	0.00E+00	6.91E+01	1.38E+02	3.5000	2.340E+06
I-129	6.6403E-07	14,945.819	29,891.638	0.00E+00	9.92E-03	1.98E-02	5.0000	8.993E+05
Kr-85	1.0808E-01	14,945.819	29,891.638	0.00E+00	1.62E+03	3.23E+03	7.0000	1.032E+05
Np-237	3.1537E-05	14,945.819	29,891.638	0.00E+00	4.71E-01	9.43E-01	11.0000	1.183E+04
Pa-231	9.7023E-10	14,945.819	29,891.638	0.00E+00	1.45E-05	2.90E-05		
Pb-210	1.1731E-11	14,945.819	29,891.638	0.00E+00	1.75E-07	3.51E-07		
Pm-147	2.4405E-02	14,945.819	29,891.638	0.00E+00	3.65E+02	7.29E+02		
Pu-238	1.5358E-01	14,945.819	29,891.638	0.00E+00	2.30E+03	4.59E+03		
Pu-239	6.9502E-04	14,945.819	29,891.638	0.00E+00	1.04E+01	2.08E+01		
Pu-240	3.7631E-04	14,945.819	29,891.638	0.00E+00	5.62E+00	1.12E+01		
Pu-241	1.3433E-01	14,945.819	29,891.638	0.00E+00	2.01E+03	4.02E+03		
Pu-242	3.0911E-06	14,945.819	29,891.638	0.00E+00	4.62E-02	9.24E-02		
Ra-226	5.5079E-11	14,945.819	29,891.638	0.00E+00	8.23E-07	1.65E-06		
Ra-228	1.3335E-14	14,945.819	29,891.638	0.00E+00	1.99E-10	3.99E-10		
Ru-106	7.3390E-06	14,945.819	29,891.638	0.00E+00	1.10E-01	2.19E-01		
Se-79	1.2339E-05	14,945.819	29,891.638	0.00E+00	1.84E-01	3.69E-01		
Sn-126	1.0194E-05	14,945.819	29,891.638	0.00E+00	1.52E-01	3.05E-01		
Sr-90	1.9064E+00	14,945.819	29,891.638	0.00E+00	2.85E+04	5.70E+04		
Tc-99	3.8058E-04	14,945.819	29,891.638	0.00E+00	5.69E+00	1.14E+01		
Th-229	4.9198E-12	14,945.819	29,891.638	0.00E+00	7.35E-08	1.47E-07		
Th-230	1.0547E-08	14,945.819	29,891.638	0.00E+00	1.58E-04	3.15E-04		
Th-232	2.0705E-14	14,945.819	29,891.638	0.00E+00	3.09E-10	6.19E-10		
Th-208	4.8827E-08	14,945.819	29,891.638	0.00E+00	7.30E-04	1.46E-03		
U-232	1.3414E-07	14,945.819	29,891.638	0.00E+00	2.00E-03	4.01E-03		
U-233	3.7679E-09	14,945.819	29,891.638	0.00E+00	5.63E-05	1.13E-04		
U-234	5.2047E-05	14,945.819	29,891.638	0.00E+00	7.78E-01	1.56E+00		
U-235	-2.8661E-06	14,945.819	0.000	6.61E-02	2.33E-02	6.61E-02		
U-236	1.6701E-05	14,945.819	29,891.638	0.00E+00	2.50E-01	4.99E-01		
U-238	-9.4194E-09	14,945.819	0.000	2.57E-03	2.43E-03	2.57E-03		
Y-90	1.9070E+00	14,945.819	29,891.638	0.00E+00	2.85E+04	5.70E+04		
Other Radionuclides					2.91E+04	5.82E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.32E+02	8.65E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	80.00000311	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		14,945.819	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		29,891.638	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Bumup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.89		
Bounding:	1.79		

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

²Total burnup for all fuel associated with this worksheet must be 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 (AUSTRALIA) ¹Fuel decay start date: 2010
 SNF ID #: 299 Estimates as of: 2030
 Fuel Units & Descr: 289 - ASSEMBLY Template: HFBR (Heavy Water, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=289.00kg ; EOL=260.10kg ²Template Burnup(MWd): 15
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 9.63

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5333E-10	27,468.450	54,936.900	0.00E+00	2.34E-05	4.69E-05	0.0150	5.566E+15
Am-241	2.2753E-02	27,468.450	54,936.900	0.00E+00	6.25E+02	1.25E+03	0.0250	1.156E+15
Am-242m	8.9133E-06	27,468.450	54,936.900	0.00E+00	2.45E-01	4.90E-01	0.0375	1.016E+15
Am-243	6.4007E-06	27,468.450	54,936.900	0.00E+00	1.76E-01	3.52E-01	0.0575	1.094E+15
C-14	2.9620E-08	27,468.450	54,936.900	0.00E+00	8.14E-04	1.63E-03	0.0850	6.514E+14
Cl-36	5.9513E-35	27,468.450	54,936.900	0.00E+00	1.63E-30	3.27E-30	0.1250	4.386E+14
Cm-243	2.2087E-06	27,468.450	54,936.900	0.00E+00	6.07E-02	1.21E-01	0.2250	5.614E+14
Cm-244	1.1007E-04	27,468.450	54,936.900	0.00E+00	3.02E+00	6.05E+00	0.3750	2.443E+14
Co-60	1.6340E-05	27,468.450	54,936.900	0.00E+00	4.49E-01	8.98E-01	0.5750	4.144E+15
Cs-134	2.1353E-03	27,468.450	54,936.900	0.00E+00	5.87E+01	1.17E+02	0.8500	6.334E+13
Cs-135	4.8607E-06	27,468.450	54,936.900	0.00E+00	1.34E-01	2.67E-01	1.2500	3.569E+13
Cs-137	2.0227E+00	27,468.450	54,936.900	0.00E+00	5.56E+04	1.11E+05	1.7500	1.685E+12
Eu-154	2.0887E-02	27,468.450	54,936.900	0.00E+00	5.74E+02	1.15E+03	2.2500	1.580E+08
Eu-155	4.0867E-03	27,468.450	54,936.900	0.00E+00	1.12E+02	2.25E+02	2.7500	1.869E+07
Fe-55	1.4167E-03	27,468.450	54,936.900	0.00E+00	3.89E+01	7.78E+01	3.5000	7.575E+05
H-3	4.6653E-03	27,468.450	54,936.900	0.00E+00	1.28E+02	2.56E+02	5.0000	1.150E+05
I-129	7.1600E-07	27,468.450	54,936.900	0.00E+00	1.97E-02	3.93E-02	7.0000	1.302E+04
Kr-85	1.0240E-01	27,468.450	54,936.900	0.00E+00	2.81E+03	5.63E+03	11.0000	1.481E+03
Np-237	3.7227E-06	27,468.450	54,936.900	0.00E+00	1.02E-01	2.05E-01		
Pa-231	2.6727E-09	27,468.450	54,936.900	0.00E+00	7.34E-05	1.47E-04		
Pb-210	4.3313E-14	27,468.450	54,936.900	0.00E+00	1.19E-09	2.38E-09		
Pm-147	4.6307E-02	27,468.450	54,936.900	0.00E+00	1.27E+03	2.54E+03		
Pu-238	5.5273E-03	27,468.450	54,936.900	0.00E+00	1.52E+02	3.04E+02		
Pu-239	1.0313E-02	27,468.450	54,936.900	0.00E+00	2.83E+02	5.67E+02		
Pu-240	5.4180E-03	27,468.450	54,936.900	0.00E+00	1.49E+02	2.98E+02		
Pu-241	3.7573E-01	27,468.450	54,936.900	0.00E+00	1.03E+04	2.06E+04		
Pu-242	3.0713E-06	27,468.450	54,936.900	0.00E+00	8.44E-02	1.69E-01		
Ra-226	2.3807E-13	27,468.450	54,936.900	0.00E+00	6.54E-09	1.31E-08		
Ra-228	1.0607E-14	27,468.450	54,936.900	0.00E+00	2.91E-10	5.83E-10		
Ru-106	8.4800E-06	27,468.450	54,936.900	0.00E+00	2.33E-01	4.66E-01		
Se-79	1.2533E-05	27,468.450	54,936.900	0.00E+00	3.44E-01	6.89E-01		
Sn-126	1.1393E-05	27,468.450	54,936.900	0.00E+00	3.13E-01	6.26E-01		
Sr-90	1.8400E+00	27,468.450	54,936.900	0.00E+00	5.05E+04	1.01E+05		
Tc-99	4.3533E-04	27,468.450	54,936.900	0.00E+00	1.20E+01	2.39E+01		
Th-229	5.8947E-13	27,468.450	54,936.900	0.00E+00	1.62E-08	3.24E-08		
Th-230	5.9500E-11	27,468.450	54,936.900	0.00E+00	1.63E-06	3.27E-06		
Th-232	1.6360E-14	27,468.450	54,936.900	0.00E+00	4.49E-10	8.99E-10		
Tl-208	7.6000E-09	27,468.450	54,936.900	0.00E+00	2.09E-04	4.18E-04		
U-232	2.0747E-08	27,468.450	54,936.900	0.00E+00	5.70E-04	1.14E-03		
U-233	4.4013E-10	27,468.450	54,936.900	0.00E+00	1.21E-05	2.42E-05		
U-234	4.6500E-07	27,468.450	54,936.900	0.00E+00	1.28E-02	2.55E-02		
U-235	-2.5335E-06	27,468.450	0.000	1.25E-01	5.53E-02	1.25E-01		
U-236	1.3000E-05	27,468.450	54,936.900	0.00E+00	3.57E-01	7.14E-01		
U-238	-1.4207E-08	27,468.450	0.000	7.77E-02	7.73E-02	7.77E-02		
Y-90	1.8400E+00	27,468.450	54,936.900	0.00E+00	5.05E+04	1.01E+05		
Other Radionuclides					5.28E+04	1.06E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.57E+02	1.31E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters.
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	HEAVY WATER	HEAVY WATER	
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U-ALX	U	
	20.0000003	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		27,468.450	
Bounding:		54,936.900	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
Bounding:	2.17		
	4.34		
			1.02

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (DENMARK) ¹Fuel decay start date: 2010
 SNF ID #: 298 Estimates as of: 2030
 Fuel Units & Descr: 184 - ASSEMBLY Template: HFBR (Heavy Water, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=165.60kg ; EOL=142.62kg ²Template Burnup(MWd): 15
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00034251
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 6.13

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV		
Ac-227	8.5333E-10	21,843.202	43,686.404	0.00E+00	1.86E-05	3.73E-05		
Am-241	2.2753E-02	21,843.202	43,686.404	0.00E+00	4.97E+02	9.94E+02	0.0150	4.426E+15
Am-242m	8.9133E-06	21,843.202	43,686.404	0.00E+00	1.95E-01	3.89E-01	0.0250	9.196E+14
Am-243	6.4007E-06	21,843.202	43,686.404	0.00E+00	1.40E-01	2.80E-01	0.0375	8.078E+14
C-14	2.9620E-08	21,843.202	43,686.404	0.00E+00	6.47E-04	1.29E-03	0.0575	8.702E+14
Cl-36	5.9513E-35	21,843.202	43,686.404	0.00E+00	1.30E-30	2.60E-30	0.0850	5.180E+14
Cm-243	2.2087E-06	21,843.202	43,686.404	0.00E+00	4.82E-02	9.65E-02	0.1250	3.487E+14
Cm-244	1.1007E-04	21,843.202	43,686.404	0.00E+00	2.40E+00	4.81E+00	0.2250	4.464E+14
Co-60	1.6340E-05	21,843.202	43,686.404	0.00E+00	3.57E-01	7.14E-01	0.3750	1.943E+14
Cs-134	2.1353E-03	21,843.202	43,686.404	0.00E+00	4.66E+01	9.33E+01	0.5750	3.296E+15
Cs-135	4.8607E-06	21,843.202	43,686.404	0.00E+00	1.06E-01	2.12E-01	0.8500	5.037E+13
Cs-137	2.0227E+00	21,843.202	43,686.404	0.00E+00	4.42E+04	8.84E+04	1.2500	2.838E+13
Eu-154	2.0887E-02	21,843.202	43,686.404	0.00E+00	4.56E+02	9.12E+02	1.7500	1.340E+12
Eu-155	4.0867E-03	21,843.202	43,686.404	0.00E+00	8.93E+01	1.79E+02	2.2500	1.257E+08
Fe-55	1.4167E-03	21,843.202	43,686.404	0.00E+00	3.09E+01	6.19E+01	2.7500	1.486E+07
H-3	4.6653E-03	21,843.202	43,686.404	0.00E+00	1.02E+02	2.04E+02	3.5000	6.023E+05
I-129	7.1600E-07	21,843.202	43,686.404	0.00E+00	1.56E-02	3.13E-02	5.0000	9.145E+04
Kr-85	1.0240E-01	21,843.202	43,686.404	0.00E+00	2.24E+03	4.47E+03	7.0000	1.035E+04
Np-237	3.7227E-06	21,843.202	43,686.404	0.00E+00	8.13E-02	1.63E-01	11.0000	1.177E+03
Pa-231	2.6727E-09	21,843.202	43,686.404	0.00E+00	5.84E-05	1.17E-04		
Pb-210	4.3313E-14	21,843.202	43,686.404	0.00E+00	9.46E-10	1.89E-09		
Pm-147	4.6307E-02	21,843.202	43,686.404	0.00E+00	1.01E+03	2.02E+03		
Pu-238	5.5273E-03	21,843.202	43,686.404	0.00E+00	1.21E+02	2.41E+02		
Pu-239	1.0313E-02	21,843.202	43,686.404	0.00E+00	2.25E+02	4.51E+02		
Pu-240	5.4180E-03	21,843.202	43,686.404	0.00E+00	1.18E+02	2.37E+02		
Pu-241	3.7573E-01	21,843.202	43,686.404	0.00E+00	8.21E+03	1.64E+04		
Pu-242	3.0713E-06	21,843.202	43,686.404	0.00E+00	6.71E-02	1.34E-01		
Ra-226	2.3807E-13	21,843.202	43,686.404	0.00E+00	5.20E-09	1.04E-08		
Ra-228	1.0607E-14	21,843.202	43,686.404	0.00E+00	2.32E-10	4.63E-10		
Ru-106	8.4800E-06	21,843.202	43,686.404	0.00E+00	1.85E-01	3.70E-01		
Se-79	1.2533E-05	21,843.202	43,686.404	0.00E+00	2.74E-01	5.48E-01		
Sn-126	1.1393E-05	21,843.202	43,686.404	0.00E+00	2.49E-01	4.98E-01		
Sr-90	1.8400E+00	21,843.202	43,686.404	0.00E+00	4.02E+04	8.04E+04		
Tc-99	4.3533E-04	21,843.202	43,686.404	0.00E+00	9.51E+00	1.90E+01		
Th-229	5.8947E-13	21,843.202	43,686.404	0.00E+00	1.29E-08	2.58E-08		
Th-230	5.9500E-11	21,843.202	43,686.404	0.00E+00	1.30E-06	2.60E-06		
Th-232	1.6360E-14	21,843.202	43,686.404	0.00E+00	3.57E-10	7.15E-10		
Th-208	7.6000E-09	21,843.202	43,686.404	0.00E+00	1.66E-04	3.32E-04		
U-232	2.0747E-08	21,843.202	43,686.404	0.00E+00	4.53E-04	9.06E-04		
U-233	4.4013E-10	21,843.202	43,686.404	0.00E+00	9.61E-06	1.92E-05		
U-234	4.6500E-07	21,843.202	43,686.404	0.00E+00	1.02E-02	2.03E-02		
U-235	-2.5335E-06	21,843.202	0.000	7.16E-02	1.62E-02	7.16E-02		
U-236	1.3000E-05	21,843.202	43,686.404	0.00E+00	2.84E-01	5.68E-01	5.22E+02	1.04E+03
U-238	-1.4207E-08	21,843.202	0.000	4.45E-02	4.42E-02	4.45E-02	Total	Total
Y-90	1.8400E+00	21,843.202	43,686.404	0.00E+00	4.02E+04	8.04E+04		
Other Radionuclides					4.20E+04	8.39E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.22E+02	1.04E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd)²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		21,843.202	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		43,686.404	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HW/Given EOL HM
Nominal:	3.01		
Bounding:	6.02		

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

²Total burnup for all fuel associated with this worksheet must be 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 (DENMARK)
 SNF ID #: 676
 Fuel Units & Descr: 5 - ASSEMBLY
 Heavy Metal Mass: BOL=64kg : EOL=34kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.17

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	3.1355E-10	279.555	559.110	0.00E+00	8.77E-08	1.75E-07		
Am-241	8.0194E-03	279.555	559.110	0.00E+00	2.24E+00	4.48E+00	0.0150	5.911E+13
Am-242m	1.3694E-06	279.555	559.110	0.00E+00	3.83E-04	7.66E-04	0.0250	1.218E+13
Am-243	3.7096E-05	279.555	559.110	0.00E+00	1.04E-02	2.07E-02	0.0375	1.083E+13
C-14	2.6464E-08	279.555	559.110	0.00E+00	7.40E-06	1.48E-05	0.0575	1.146E+13
Cf-252	4.4441E-31	279.555	559.110	0.00E+00	1.24E-28	2.48E-28	0.0850	6.937E+12
Cm-243	5.7029E-06	279.555	559.110	0.00E+00	1.59E-03	3.19E-03	0.1250	4.913E+12
Cm-244	4.6555E-03	279.555	559.110	0.00E+00	1.30E+00	2.60E+00	0.2250	5.971E+12
Co-60	4.8663E-05	279.555	559.110	0.00E+00	1.36E-02	2.72E-02	0.3750	2.584E+12
Cs-134	1.0638E-02	279.555	559.110	0.00E+00	2.97E+00	5.95E+00	0.5750	4.278E+13
Cs-135	4.2564E-06	279.555	559.110	0.00E+00	1.19E-03	2.38E-03	0.8500	1.120E+12
Cs-137	2.0358E+00	279.555	559.110	0.00E+00	5.69E+02	1.14E+03	1.2500	7.182E+11
Eu-154	5.1956E-02	279.555	559.110	0.00E+00	1.45E+01	2.90E+01	1.7500	2.768E+10
Eu-155	1.4295E-02	279.555	559.110	0.00E+00	4.00E+00	7.99E+00	2.2500	1.770E+06
Fe-55	1.3560E-03	279.555	559.110	0.00E+00	3.79E-01	7.58E-01	2.7500	1.035E+06
H-3	4.6258E-03	279.555	559.110	0.00E+00	1.29E+00	2.59E+00	3.5000	4.377E+04
I-129	6.6403E-07	279.555	559.110	0.00E+00	1.86E-04	3.71E-04	5.0000	1.682E+04
Kr-85	1.0808E-01	279.555	559.110	0.00E+00	3.02E+01	6.04E+01	7.0000	1.931E+03
Np-237	3.1537E-05	279.555	559.110	0.00E+00	8.82E-03	1.76E-02	11.0000	2.213E+02
Pa-231	9.7023E-10	279.555	559.110	0.00E+00	2.71E-07	5.42E-07		
Pb-210	1.1731E-11	279.555	559.110	0.00E+00	3.28E-09	6.56E-09		
Pm-147	2.4405E-02	279.555	559.110	0.00E+00	6.82E+00	1.36E+01		
Pu-238	1.5358E-01	279.555	559.110	0.00E+00	4.29E+01	8.59E+01		
Pu-239	6.9502E-04	279.555	559.110	0.00E+00	1.94E-01	3.89E-01		
Pu-240	3.7631E-04	279.555	559.110	0.00E+00	1.05E-01	2.10E-01		
Pu-241	1.3433E-01	279.555	559.110	0.00E+00	3.76E+01	7.51E+01		
Pu-242	3.0911E-06	279.555	559.110	0.00E+00	8.64E-04	1.73E-03		
Ra-226	5.5079E-11	279.555	559.110	0.00E+00	1.54E-08	3.08E-08		
Ra-228	1.3335E-14	279.555	559.110	0.00E+00	3.73E-12	7.46E-12		
Ru-106	7.3390E-06	279.555	559.110	0.00E+00	2.05E-03	4.10E-03		
Se-79	1.2339E-05	279.555	559.110	0.00E+00	3.45E-03	6.90E-03		
Sn-126	1.0194E-05	279.555	559.110	0.00E+00	2.85E-03	5.70E-03		
Sr-90	1.9064E+00	279.555	559.110	0.00E+00	5.33E+02	1.07E+03		
Tc-99	3.8056E-04	279.555	559.110	0.00E+00	1.06E-01	2.13E-01		
Th-229	4.9198E-12	279.555	559.110	0.00E+00	1.38E-09	2.75E-09		
Th-230	1.0547E-08	279.555	559.110	0.00E+00	2.95E-06	5.90E-06		
Th-232	2.0705E-14	279.555	559.110	0.00E+00	5.79E-12	1.16E-11		
Tl-208	4.8827E-08	279.555	559.110	0.00E+00	1.36E-05	2.73E-05		
U-232	1.3414E-07	279.555	559.110	0.00E+00	3.75E-05	7.50E-05		
U-233	3.7679E-09	279.555	559.110	0.00E+00	1.05E-06	2.11E-06		
U-234	5.2047E-05	279.555	559.110	0.00E+00	1.46E-02	2.91E-02		
U-235	2.8661E-06	279.555	0.000	1.29E-03	4.85E-04	1.29E-03		
U-236	1.6701E-05	279.555	559.110	0.00E+00	4.67E-03	9.34E-03		
U-238	-9.4194E-09	279.555	0.000	1.51E-05	1.24E-05	1.51E-05		
Y-90	1.9070E+00	279.555	559.110	0.00E+00	5.33E+02	1.07E+03		
Other Radionuclides					5.44E+02	1.09E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.09E+00	1.62E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
HEAVY WATER	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.99999218	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
279.555		279.555	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
559.110		559.110	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup	
1.00			1.02
2.00			

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

²Total burnup for all fuel associated with this worksheet must be 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 (DENMARK)
 SNF ID #: 678
 Fuel Units & Descr: 5 - ASSEMBLY
 Heavy Metal Mass: BOL= .79kg ; EOL= .42kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.17

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.1355E-10	338.505	677.011	0.00E+00	1.06E-07	2.12E-07	Avg. MeV	
Am-241	8.0194E-03	338.505	677.011	0.00E+00	2.71E+00	5.43E+00	0.0150	7.158E+13
Am-242m	1.3694E-06	338.505	677.011	0.00E+00	4.64E-04	9.27E-04	0.0250	1.475E+13
Am-243	3.7096E-05	338.505	677.011	0.00E+00	1.26E-02	2.51E-02	0.0375	1.311E+13
C-14	2.6464E-08	338.505	677.011	0.00E+00	8.96E-06	1.79E-05	0.0575	1.388E+13
Cl-36	4.4441E-31	338.505	677.011	0.00E+00	1.50E-28	3.01E-28	0.0850	8.400E+12
Cm-243	5.7029E-06	338.505	677.011	0.00E+00	1.93E-03	3.86E-03	0.1250	5.949E+12
Cm-244	4.6555E-03	338.505	677.011	0.00E+00	1.58E+00	3.15E+00	0.2250	7.230E+12
Co-60	4.8663E-05	338.505	677.011	0.00E+00	1.65E-02	3.29E-02	0.3750	3.129E+12
Cs-134	1.0638E-02	338.505	677.011	0.00E+00	3.60E+00	7.20E+00	0.5750	5.180E+13
Cs-135	4.2564E-06	338.505	677.011	0.00E+00	1.44E-03	2.88E-03	0.8500	1.356E+12
Cs-137	2.0358E+00	338.505	677.011	0.00E+00	6.89E+02	1.38E+03	1.2500	8.697E+11
Eu-154	5.1956E-02	338.505	677.011	0.00E+00	1.76E+01	3.52E+01	1.7500	3.351E+10
Eu-155	1.4295E-02	338.505	677.011	0.00E+00	4.84E+00	9.68E+00	2.2500	2.143E+06
Fe-55	1.3560E-03	338.505	677.011	0.00E+00	4.59E-01	9.18E-01	2.7500	1.254E+06
H-3	4.6258E-03	338.505	677.011	0.00E+00	1.57E+00	3.13E+00	3.5000	5.299E+04
I-129	6.6403E-07	338.505	677.011	0.00E+00	2.25E-04	4.50E-04	5.0000	2.037E+04
Kr-85	1.0808E-01	338.505	677.011	0.00E+00	3.66E+01	7.32E+01	7.0000	2.338E+03
Np-237	3.1537E-05	338.505	677.011	0.00E+00	1.07E-02	2.14E-02	11.0000	2.679E+02
Pa-231	9.7023E-10	338.505	677.011	0.00E+00	3.28E-07	6.57E-07		
Pb-210	1.1731E-11	338.505	677.011	0.00E+00	3.97E-09	7.94E-09		
Pm-147	2.4405E-02	338.505	677.011	0.00E+00	8.26E+00	1.65E+01		
Pu-238	1.5358E-01	338.505	677.011	0.00E+00	5.20E+01	1.04E+02		
Pu-239	6.9502E-04	338.505	677.011	0.00E+00	2.35E-01	4.71E-01		
Pu-240	3.7831E-04	338.505	677.011	0.00E+00	1.27E-01	2.55E-01		
Pu-241	1.3433E-01	338.505	677.011	0.00E+00	4.55E+01	9.09E+01		
Pu-242	3.0911E-06	338.505	677.011	0.00E+00	1.05E-03	2.09E-03		
Ra-226	5.5079E-11	338.505	677.011	0.00E+00	1.86E-08	3.73E-08		
Ra-228	1.3335E-14	338.505	677.011	0.00E+00	4.51E-12	9.03E-12		
Ru-106	7.3390E-06	338.505	677.011	0.00E+00	2.48E-03	4.97E-03		
Se-79	1.2339E-05	338.505	677.011	0.00E+00	4.18E-03	8.35E-03		
Sn-126	1.0194E-05	338.505	677.011	0.00E+00	3.45E-03	6.90E-03		
Sr-90	1.9064E+00	338.505	677.011	0.00E+00	6.45E+02	1.29E+03		
Tc-99	3.8056E-04	338.505	677.011	0.00E+00	1.29E-01	2.58E-01		
Th-229	4.9198E-12	338.505	677.011	0.00E+00	1.67E-09	3.33E-09		
Th-230	1.0547E-08	338.505	677.011	0.00E+00	3.57E-06	7.14E-06		
Th-232	2.0705E-14	338.505	677.011	0.00E+00	7.01E-12	1.40E-11		
Tl-208	4.8827E-08	338.505	677.011	0.00E+00	1.65E-05	3.31E-05		
U-232	1.3414E-07	338.505	677.011	0.00E+00	4.54E-05	9.08E-05		
U-233	3.7679E-09	338.505	677.011	0.00E+00	1.28E-06	2.55E-06		
U-234	5.2047E-05	338.505	677.011	0.00E+00	1.76E-02	3.52E-02		
U-235	-2.8661E-06	338.505	0.000	1.59E-03	6.18E-04	1.59E-03		
U-236	1.6701E-05	338.505	677.011	0.00E+00	5.65E-03	1.13E-02		
U-238	-9.4194E-09	338.505	0.000	1.86E-05	1.54E-05	1.86E-05		
Y-90	1.9070E+00	338.505	677.011	0.00E+00	6.46E+02	1.29E+03		
Other Radionuclides					6.59E+02	1.32E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
0.79E+00	1.96E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.00000949	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		338.505	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		677.011	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.98		1.02
Bounding:	1.96		

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

² Total burnup for all fuel associated with this worksheet must be 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 (GERMANY) ¹Fuel decay start date: 2010
 SNF ID #: 675 Estimates as of: 2030
 Fuel Units & Descr: 135 - ASSEMBLY Template: HFBR (Heavy Water, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=151.88kg ; EOL=136.69kg ²Template Burnup(MWd): 15
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 4.50

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5333E-10	14,435.184	28,870.368	0.00E+00	1.23E-05	2.46E-05	Avg. MeV	
Am-241	2.2753E-02	14,435.184	28,870.368	0.00E+00	3.28E+02	6.57E+02	0.0150	2.925E+15
Am-242m	8.9133E-06	14,435.184	28,870.368	0.00E+00	1.29E-01	2.57E-01	0.0250	6.077E+14
Am-243	6.4007E-06	14,435.184	28,870.368	0.00E+00	9.24E-02	1.85E-01	0.0375	5.338E+14
C-14	2.9620E-08	14,435.184	28,870.368	0.00E+00	4.28E-04	8.55E-04	0.0575	5.751E+14
Cl-36	5.9513E-35	14,435.184	28,870.368	0.00E+00	8.59E-31	1.72E-30	0.0850	3.423E+14
Cm-243	2.2087E-06	14,435.184	28,870.368	0.00E+00	3.19E-02	6.38E-02	0.1250	2.305E+14
Cm-244	1.1007E-04	14,435.184	28,870.368	0.00E+00	1.59E+00	3.18E+00	0.2250	2.950E+14
Co-60	1.6340E-05	14,435.184	28,870.368	0.00E+00	2.36E-01	4.72E-01	0.3750	1.284E+14
Cs-134	2.1353E-03	14,435.184	28,870.368	0.00E+00	3.08E+01	6.16E+01	0.5750	2.178E+15
Cs-135	4.8607E-06	14,435.184	28,870.368	0.00E+00	7.02E-02	1.40E-01	0.8500	3.329E+13
Cs-137	2.0227E+00	14,435.184	28,870.368	0.00E+00	2.92E+04	5.84E+04	1.2500	1.876E+13
Eu-154	2.0887E-02	14,435.184	28,870.368	0.00E+00	3.02E+02	6.03E+02	1.7500	8.854E+11
Eu-155	4.0867E-03	14,435.184	28,870.368	0.00E+00	5.90E+01	1.18E+02	2.2500	8.305E+07
Fe-55	1.4167E-03	14,435.184	28,870.368	0.00E+00	2.04E+01	4.09E+01	2.7500	9.823E+06
H-3	4.6653E-03	14,435.184	28,870.368	0.00E+00	6.73E+01	1.35E+02	3.5000	3.981E+05
I-129	7.1600E-07	14,435.184	28,870.368	0.00E+00	1.03E-02	2.07E-02	5.0000	6.046E+04
Kr-85	1.0240E-01	14,435.184	28,870.368	0.00E+00	1.48E+03	2.96E+03	7.0000	6.841E+03
Np-237	3.7227E-06	14,435.184	28,870.368	0.00E+00	5.37E-02	1.07E-01	11.0000	7.785E+02
Pa-231	2.6727E-09	14,435.184	28,870.368	0.00E+00	3.86E-05	7.72E-05		
Pb-210	4.3313E-14	14,435.184	28,870.368	0.00E+00	6.25E-10	1.25E-09		
Pm-147	4.6307E-02	14,435.184	28,870.368	0.00E+00	6.68E+02	1.34E+03		
Pu-238	5.5273E-03	14,435.184	28,870.368	0.00E+00	7.98E+01	1.60E+02		
Pu-239	1.0313E-02	14,435.184	28,870.368	0.00E+00	1.49E+02	2.98E+02		
Pu-240	5.4180E-03	14,435.184	28,870.368	0.00E+00	7.82E+01	1.56E+02		
Pu-241	3.7573E-01	14,435.184	28,870.368	0.00E+00	5.42E+03	1.08E+04		
Pu-242	3.0713E-06	14,435.184	28,870.368	0.00E+00	4.43E-02	8.87E-02		
Ra-226	2.3807E-13	14,435.184	28,870.368	0.00E+00	3.44E-09	6.87E-09		
Ra-228	1.0607E-14	14,435.184	28,870.368	0.00E+00	1.53E-10	3.06E-10		
Ru-106	8.4800E-06	14,435.184	28,870.368	0.00E+00	1.22E-01	2.45E-01		
Se-79	1.2533E-05	14,435.184	28,870.368	0.00E+00	1.81E-01	3.62E-01		
Sn-126	1.1393E-05	14,435.184	28,870.368	0.00E+00	1.64E-01	3.29E-01		
Sr-90	1.8400E+00	14,435.184	28,870.368	0.00E+00	2.66E+04	5.31E+04		
Tc-99	4.3533E-04	14,435.184	28,870.368	0.00E+00	6.28E+00	1.26E+01		
Th-229	5.8947E-13	14,435.184	28,870.368	0.00E+00	8.51E-09	1.70E-08		
Th-230	5.9500E-11	14,435.184	28,870.368	0.00E+00	8.59E-07	1.72E-06		
Th-232	1.6360E-14	14,435.184	28,870.368	0.00E+00	2.36E-10	4.72E-10		
Tl-208	7.6000E-09	14,435.184	28,870.368	0.00E+00	1.10E-04	2.19E-04		
U-232	2.0747E-08	14,435.184	28,870.368	0.00E+00	2.99E-04	5.99E-04		
U-233	4.4013E-10	14,435.184	28,870.368	0.00E+00	6.35E-06	1.27E-05		
U-234	4.6500E-07	14,435.184	28,870.368	0.00E+00	6.71E-03	1.34E-02		
U-235	-2.5335E-06	14,435.184	0.000	6.56E-02	2.91E-02	6.56E-02		
U-236	1.3000E-05	14,435.184	28,870.368	0.00E+00	1.88E-01	3.75E-01		
U-238	-1.4207E-08	14,435.184	0.000	4.08E-02	4.06E-02	4.08E-02		
Y-90	1.8400E+00	14,435.184	28,870.368	0.00E+00	2.66E+04	5.31E+04		
Other Radionuclides					2.77E+04	5.55E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.45E+02	6.90E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		14,435.184	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		28,870.368	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	2.17		
Bounding:	4.34		

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

²Total burnup for all fuel associated with this worksheet must be 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 (GERMANY) 1 Fuel decay start date: 2010
 SNF ID #: 674 Estimates as of: 2030
 Fuel Units & Descr: 18 - ASSEMBLY Template: HFBR (Heavy Water, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=18.00kg ; EOL=16.20kg 2 Template Burnup(MWd): 15
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00034251
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.60

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	8.5333E-10	1,710.837	3,421.673	0.00E+00	1.46E-06	2.92E-06	Avg. MeV	
Am-241	2.2753E-02	1,710.837	3,421.673	0.00E+00	3.89E+01	7.79E+01	0.0150	3.467E+14
Am-242m	8.9133E-06	1,710.837	3,421.673	0.00E+00	1.52E-02	3.05E-02	0.0250	7.202E+13
Am-243	6.4007E-06	1,710.837	3,421.673	0.00E+00	1.10E-02	2.19E-02	0.0375	6.327E+13
C-14	2.9620E-08	1,710.837	3,421.673	0.00E+00	5.07E-05	1.01E-04	0.0575	6.816E+13
Ct-36	5.9513E-35	1,710.837	3,421.673	0.00E+00	1.02E-31	2.04E-31	0.0850	4.057E+13
Cm-243	2.2087E-06	1,710.837	3,421.673	0.00E+00	3.78E-03	7.56E-03	0.1250	2.732E+13
Cm-244	1.1007E-04	1,710.837	3,421.673	0.00E+00	1.88E-01	3.77E-01	0.2250	3.497E+13
Co-60	1.6340E-05	1,710.837	3,421.673	0.00E+00	2.80E-02	5.59E-02	0.3750	1.522E+13
Cs-134	2.1353E-03	1,710.837	3,421.673	0.00E+00	3.65E+00	7.31E+00	0.5750	2.581E+14
Cs-135	4.8607E-06	1,710.837	3,421.673	0.00E+00	8.32E-03	1.66E-02	0.8500	3.945E+12
Cs-137	2.0227E+00	1,710.837	3,421.673	0.00E+00	3.46E+03	6.92E+03	1.2500	2.223E+12
Eu-154	2.0887E-02	1,710.837	3,421.673	0.00E+00	3.57E+01	7.15E+01	1.7500	1.049E+11
Eu-155	4.0867E-03	1,710.837	3,421.673	0.00E+00	6.99E+00	1.40E+01	2.2500	9.843E+06
Fe-55	1.4167E-03	1,710.837	3,421.673	0.00E+00	2.42E+00	4.85E+00	2.7500	1.164E+06
H-3	4.6653E-03	1,710.837	3,421.673	0.00E+00	7.98E+00	1.60E+01	3.5000	4.718E+04
I-129	7.1600E-07	1,710.837	3,421.673	0.00E+00	1.22E-03	2.45E-03	5.0000	7.165E+03
Kr-85	1.0240E-01	1,710.837	3,421.673	0.00E+00	1.75E+02	3.50E+02	7.0000	8.108E+02
Np-237	3.7227E-06	1,710.837	3,421.673	0.00E+00	6.37E-03	1.27E-02	11.0000	9.227E+01
Pa-231	2.6727E-09	1,710.837	3,421.673	0.00E+00	4.57E-06	9.14E-06		
Pb-210	4.3313E-14	1,710.837	3,421.673	0.00E+00	7.41E-11	1.48E-10		
Pm-147	4.6307E-02	1,710.837	3,421.673	0.00E+00	7.92E+01	1.58E+02		
Pu-238	5.5273E-03	1,710.837	3,421.673	0.00E+00	9.46E+00	1.89E+01		
Pu-239	1.0313E-02	1,710.837	3,421.673	0.00E+00	1.76E+01	3.53E+01		
Pu-240	5.4180E-03	1,710.837	3,421.673	0.00E+00	9.27E+00	1.85E+01		
Pu-241	3.7573E-01	1,710.837	3,421.673	0.00E+00	6.43E+02	1.29E+03		
Pu-242	3.0713E-06	1,710.837	3,421.673	0.00E+00	5.25E-03	1.05E-02		
Ra-226	2.3807E-13	1,710.837	3,421.673	0.00E+00	4.07E-10	8.15E-10		
Ra-228	1.0607E-14	1,710.837	3,421.673	0.00E+00	1.81E-11	3.63E-11		
Ru-106	8.4800E-06	1,710.837	3,421.673	0.00E+00	1.45E-02	2.90E-02		
Se-79	1.2533E-05	1,710.837	3,421.673	0.00E+00	2.14E-02	4.29E-02		
Sn-126	1.1393E-05	1,710.837	3,421.673	0.00E+00	1.95E-02	3.90E-02		
Sr-90	1.8400E+00	1,710.837	3,421.673	0.00E+00	3.15E+03	6.30E+03		
Tc-99	4.3533E-04	1,710.837	3,421.673	0.00E+00	7.45E-01	1.49E+00		
Th-229	5.8947E-13	1,710.837	3,421.673	0.00E+00	1.01E-09	2.02E-09		
Th-230	5.9500E-11	1,710.837	3,421.673	0.00E+00	1.02E-07	2.04E-07		
Th-232	1.6360E-14	1,710.837	3,421.673	0.00E+00	2.80E-11	5.60E-11		
Th-208	7.6000E-09	1,710.837	3,421.673	0.00E+00	1.30E-05	2.60E-05		
U-232	2.0747E-08	1,710.837	3,421.673	0.00E+00	3.55E-05	7.10E-05		
U-233	4.4013E-10	1,710.837	3,421.673	0.00E+00	7.53E-07	1.51E-06		
U-234	4.6500E-07	1,710.837	3,421.673	0.00E+00	7.96E-04	1.59E-03		
U-235	-2.5335E-06	1,710.837	0.000	7.78E-03	3.45E-03	7.78E-03		
U-236	1.3000E-05	1,710.837	3,421.673	0.00E+00	2.22E-02	4.45E-02		
U-238	-1.4207E-08	1,710.837	0.000	4.84E-03	4.82E-03	4.84E-03		
Y-90	1.8400E+00	1,710.837	3,421.673	0.00E+00	3.15E+03	6.30E+03		
Other Radionuclides					3.29E+03	6.57E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.09E+01	8.18E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,710.837	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		3,421.673	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Bumup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	2.17		1.02
Bounding:	4.34		

¹ Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be 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 (GERMANY) ¹Fuel decay start date: 2010
 SNF ID #: 673 Estimates as of: 2030
 Fuel Units & Descr: 135 - ASSEMBLY Template: HFBR (Heavy Water, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=121.50kg ; EOL=109.35kg ²Template Burnup(MWd): 15
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 4.50

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	8.5333E-10	11,548.147	23,096.295	0.00E+00	9.85E-06	1.97E-05	0.0150	2.340E+15
Am-241	2.2753E-02	11,548.147	23,096.295	0.00E+00	2.63E+02	5.26E+02	0.0250	4.862E+14
Am-242m	8.9133E-06	11,548.147	23,096.295	0.00E+00	1.03E-01	2.06E-01	0.0375	4.271E+14
Am-243	6.4007E-06	11,548.147	23,096.295	0.00E+00	7.39E-02	1.48E-01	0.0575	4.601E+14
C-14	2.9620E-08	11,548.147	23,096.295	0.00E+00	3.42E-04	6.84E-04	0.0850	2.738E+14
Cl-36	5.9513E-35	11,548.147	23,096.295	0.00E+00	6.87E-31	1.37E-30	0.1250	1.844E+14
Cm-243	2.2087E-06	11,548.147	23,096.295	0.00E+00	2.55E-02	5.10E-02	0.2250	2.360E+14
Cm-244	1.1007E-04	11,548.147	23,096.295	0.00E+00	1.27E+00	2.54E+00	0.3750	1.027E+14
Co-60	1.6340E-05	11,548.147	23,096.295	0.00E+00	1.89E-01	3.77E-01	0.5750	1.742E+15
Cs-134	2.1353E-03	11,548.147	23,096.295	0.00E+00	2.47E+01	4.93E+01	0.8500	2.663E+13
Cs-135	4.8607E-06	11,548.147	23,096.295	0.00E+00	5.61E-02	1.12E-01	1.2500	1.501E+13
Cs-137	2.0227E+00	11,548.147	23,096.295	0.00E+00	2.34E+04	4.67E+04	1.7500	7.083E+11
Eu-154	2.0887E-02	11,548.147	23,096.295	0.00E+00	2.41E+02	4.82E+02	2.2500	6.644E+07
Eu-155	4.0867E-03	11,548.147	23,096.295	0.00E+00	4.72E+01	9.44E+01	2.7500	7.859E+06
Fe-55	1.4167E-03	11,548.147	23,096.295	0.00E+00	1.64E+01	3.27E+01	3.5000	3.185E+05
H-3	4.6653E-03	11,548.147	23,096.295	0.00E+00	5.39E+01	1.08E+02	5.0000	4.837E+04
I-129	7.1600E-07	11,548.147	23,096.295	0.00E+00	8.27E-03	1.65E-02	7.0000	5.473E+03
Kr-85	1.0240E-01	11,548.147	23,096.295	0.00E+00	1.18E+03	2.37E+03	11.0000	6.228E+02
Np-237	3.7227E-06	11,548.147	23,096.295	0.00E+00	4.30E-02	8.60E-02		
Pa-231	2.6727E-09	11,548.147	23,096.295	0.00E+00	3.09E-05	6.17E-05		
Pb-210	4.3313E-14	11,548.147	23,096.295	0.00E+00	5.00E-10	1.00E-09		
Pm-147	4.6307E-02	11,548.147	23,096.295	0.00E+00	5.35E+02	1.07E+03		
Pu-238	5.5273E-03	11,548.147	23,096.295	0.00E+00	6.38E+01	1.28E+02		
Pu-239	1.0313E-02	11,548.147	23,096.295	0.00E+00	1.19E+02	2.38E+02		
Pu-240	5.4180E-03	11,548.147	23,096.295	0.00E+00	6.26E+01	1.25E+02		
Pu-241	3.7573E-01	11,548.147	23,096.295	0.00E+00	4.34E+03	8.68E+03		
Pu-242	3.0713E-06	11,548.147	23,096.295	0.00E+00	3.55E-02	7.09E-02		
Ra-226	2.3807E-13	11,548.147	23,096.295	0.00E+00	2.75E-09	5.50E-09		
Ra-228	1.0607E-14	11,548.147	23,096.295	0.00E+00	1.22E-10	2.45E-10		
Ru-106	8.4800E-06	11,548.147	23,096.295	0.00E+00	9.79E-02	1.96E-01		
Se-79	1.2533E-05	11,548.147	23,096.295	0.00E+00	1.45E-01	2.89E-01		
Sn-126	1.1393E-05	11,548.147	23,096.295	0.00E+00	1.32E-01	2.63E-01		
Sr-90	1.8400E+00	11,548.147	23,096.295	0.00E+00	2.12E+04	4.25E+04		
Tc-99	4.3533E-04	11,548.147	23,096.295	0.00E+00	5.03E+00	1.01E+01		
Th-229	5.8947E-13	11,548.147	23,096.295	0.00E+00	6.81E-09	1.36E-08		
Th-230	5.9500E-11	11,548.147	23,096.295	0.00E+00	6.87E-07	1.37E-06		
Th-232	1.6360E-14	11,548.147	23,096.295	0.00E+00	1.89E-10	3.78E-10		
Ti-208	7.6000E-09	11,548.147	23,096.295	0.00E+00	8.78E-05	1.76E-04		
U-232	2.0747E-08	11,548.147	23,096.295	0.00E+00	2.40E-04	4.79E-04		
U-233	4.4013E-10	11,548.147	23,096.295	0.00E+00	5.08E-06	1.02E-05		
U-234	4.6500E-07	11,548.147	23,096.295	0.00E+00	5.37E-03	1.07E-02		
U-235	-2.5335E-06	11,548.147	0.000	5.25E-02	2.33E-02	5.25E-02		
U-236	1.3000E-05	11,548.147	23,096.295	0.00E+00	1.50E-01	3.00E-01		
U-238	-1.4207E-08	11,548.147	0.000	3.27E-02	3.25E-02	3.27E-02		
Y-90	1.8400E+00	11,548.147	23,096.295	0.00E+00	2.12E+04	4.25E+04		
Other Radionuclides					2.22E+04	4.44E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.76E+02	5.52E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		11,548.147	
Bounding:		23,096.295	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	2.17		
Bounding:	4.34		

Estimated EOL HM/Given EOL HM: 1.02

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (GERMANY) ¹Fuel decay start date: 2010
 SNF ID #: 683 Estimates as of: 2030
 Fuel Units & Descr: 105 - ASSEMBLY Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
 Heavy Metal Mass: BOL=19.69kg ; EOL=13.39kg ²Template Burnup(MWd): 164.6
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 3.50

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	3.1355E-10	5,802.949	11,605.898	0.00E+00	1.82E-06	3.64E-06	Avg. MeV	
Am-241	8.0194E-03	5,802.949	11,605.898	0.00E+00	4.65E+01	9.31E+01	0.0150	1.227E+15
Am-242m	1.3694E-06	5,802.949	11,605.898	0.00E+00	7.95E-03	1.59E-02	0.0250	2.529E+14
Am-243	3.7096E-05	5,802.949	11,605.898	0.00E+00	2.15E-01	4.31E-01	0.0375	2.247E+14
C-14	2.6464E-08	5,802.949	11,605.898	0.00E+00	1.54E-04	3.07E-04	0.0575	2.379E+14
Cl-36	4.4441E-31	5,802.949	11,605.898	0.00E+00	2.58E-27	5.16E-27	0.0850	1.440E+14
Cm-243	5.7029E-06	5,802.949	11,605.898	0.00E+00	3.31E-02	6.62E-02	0.1250	1.020E+14
Cm-244	4.6555E-03	5,802.949	11,605.898	0.00E+00	2.70E+01	5.40E+01	0.2250	1.240E+14
Co-60	4.8663E-05	5,802.949	11,605.898	0.00E+00	2.82E-01	5.65E-01	0.3750	5.364E+13
Cs-134	1.0638E-02	5,802.949	11,605.898	0.00E+00	6.17E+01	1.23E+02	0.5750	8.880E+14
Cs-135	4.2564E-06	5,802.949	11,605.898	0.00E+00	2.47E-02	4.94E-02	0.8500	2.325E+13
Cs-137	2.0358E+00	5,802.949	11,605.898	0.00E+00	1.18E+04	2.36E+04	1.2500	1.491E+13
Eu-154	5.1956E-02	5,802.949	11,605.898	0.00E+00	3.01E+02	6.03E+02	1.7500	5.745E+11
Eu-155	1.4295E-02	5,802.949	11,605.898	0.00E+00	8.30E+01	1.66E+02	2.2500	3.674E+07
Fe-55	1.3560E-03	5,802.949	11,605.898	0.00E+00	7.87E+00	1.57E+01	2.7500	2.149E+07
H-3	4.6258E-03	5,802.949	11,605.898	0.00E+00	2.68E+01	5.37E+01	3.5000	9.085E+05
I-129	6.6403E-07	5,802.949	11,605.898	0.00E+00	3.85E-03	7.71E-03	5.0000	3.492E+05
Kr-85	1.0808E-01	5,802.949	11,605.898	0.00E+00	6.27E+02	1.25E+03	7.0000	4.008E+04
Np-237	3.1537E-05	5,802.949	11,605.898	0.00E+00	1.83E-01	3.66E-01	11.0000	4.593E+03
Pa-231	9.7023E-10	5,802.949	11,605.898	0.00E+00	5.63E-06	1.13E-05		
Pb-210	1.1731E-11	5,802.949	11,605.898	0.00E+00	6.81E-08	1.36E-07		
Pm-147	2.4405E-02	5,802.949	11,605.898	0.00E+00	1.42E+02	2.83E+02		
Pu-238	1.5358E-01	5,802.949	11,605.898	0.00E+00	8.91E+02	1.78E+03		
Pu-239	6.9502E-04	5,802.949	11,605.898	0.00E+00	4.03E+00	8.07E+00		
Pu-240	3.7631E-04	5,802.949	11,605.898	0.00E+00	2.18E+00	4.37E+00		
Pu-241	1.3433E-01	5,802.949	11,605.898	0.00E+00	7.79E+02	1.56E+03		
Pu-242	3.0911E-06	5,802.949	11,605.898	0.00E+00	1.79E-02	3.59E-02		
Ra-226	5.5079E-11	5,802.949	11,605.898	0.00E+00	3.20E-07	6.39E-07		
Ra-228	1.3335E-14	5,802.949	11,605.898	0.00E+00	7.74E-11	1.55E-10		
Ru-106	7.3390E-06	5,802.949	11,605.898	0.00E+00	4.26E-02	8.52E-02		
Se-79	1.2339E-05	5,802.949	11,605.898	0.00E+00	7.16E-02	1.43E-01		
Sn-126	1.0194E-05	5,802.949	11,605.898	0.00E+00	5.92E-02	1.18E-01		
Sr-90	1.9064E+00	5,802.949	11,605.898	0.00E+00	1.11E+04	2.21E+04		
Tc-99	3.8056E-04	5,802.949	11,605.898	0.00E+00	2.21E+00	4.42E+00		
Th-229	4.9198E-12	5,802.949	11,605.898	0.00E+00	2.85E-08	5.71E-08		
Th-230	1.0547E-08	5,802.949	11,605.898	0.00E+00	6.12E-05	1.22E-04		
Th-232	2.0705E-14	5,802.949	11,605.898	0.00E+00	1.20E-10	2.40E-10		
Tl-208	4.8827E-08	5,802.949	11,605.898	0.00E+00	2.83E-04	5.67E-04		
U-232	1.3414E-07	5,802.949	11,605.898	0.00E+00	7.78E-04	1.56E-03		
U-233	3.7679E-09	5,802.949	11,605.898	0.00E+00	2.19E-05	4.37E-05		
U-234	5.2047E-05	5,802.949	11,605.898	0.00E+00	3.02E-01	6.04E-01		
U-235	-2.8661E-06	5,802.949	0.000	3.40E-02	1.74E-02	3.40E-02		
U-236	1.6701E-05	5,802.949	11,605.898	0.00E+00	9.69E-02	1.94E-01		
U-238	-9.4194E-09	5,802.949	0.000	1.32E-03	1.27E-03	1.32E-03		
Y-90	1.9070E+00	5,802.949	11,605.898	0.00E+00	1.11E+04	2.21E+04		
Other Radionuclides					1.13E+04	2.26E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.68E+02	3.36E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	80	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		5,802.949	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		11,605.898	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.68		
Bounding:	1.35		

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

²Total burnup for all fuel associated with this worksheet must be 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 (GERMANY) 1Fuel decay start date: 2010
 SNF ID #: 685 Estimates as of: 2030
 Fuel Units & Descr: 130 - ASSEMBLY Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
 Heavy Metal Mass: BOL=27.63kg : EOL=18.79kg 2Template Burnup(MWd): 164.6
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.000377
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 4.33

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	3.1355E-10	8,142.551	16,285.101	0.00E+00	2.55E-06	5.11E-06	Avg. MeV	
Am-241	8.0194E-03	8,142.551	16,285.101	0.00E+00	6.53E+01	1.31E+02	0.0150	1.722E+15
Am-242m	1.3694E-06	8,142.551	16,285.101	0.00E+00	1.12E-02	2.23E-02	0.0250	3.549E+14
Am-243	3.7096E-05	8,142.551	16,285.101	0.00E+00	3.02E-01	6.04E-01	0.0375	3.153E+14
C-14	2.6464E-08	8,142.551	16,285.101	0.00E+00	2.15E-04	4.31E-04	0.0575	3.338E+14
Cl-36	4.4441E-31	8,142.551	16,285.101	0.00E+00	3.62E-27	7.24E-27	0.0850	2.021E+14
Cm-243	5.7029E-06	8,142.551	16,285.101	0.00E+00	4.64E-02	9.29E-02	0.1250	1.431E+14
Cm-244	4.6555E-03	8,142.551	16,285.101	0.00E+00	3.79E+01	7.58E+01	0.2250	1.739E+14
Co-60	4.8663E-05	8,142.551	16,285.101	0.00E+00	3.96E-01	7.92E-01	0.3750	7.527E+13
Cs-134	1.0638E-02	8,142.551	16,285.101	0.00E+00	8.66E+01	1.73E+02	0.5750	1.246E+15
Cs-135	4.2564E-06	8,142.551	16,285.101	0.00E+00	3.47E-02	6.93E-02	0.8500	3.263E+13
Cs-137	2.0358E+00	8,142.551	16,285.101	0.00E+00	1.66E+04	3.32E+04	1.2500	2.092E+13
Eu-154	5.1956E-02	8,142.551	16,285.101	0.00E+00	4.23E+02	8.46E+02	1.7500	8.062E+11
Eu-155	1.4295E-02	8,142.551	16,285.101	0.00E+00	1.16E+02	2.33E+02	2.2500	5.156E+07
Fe-55	1.3560E-03	8,142.551	16,285.101	0.00E+00	1.10E+01	2.21E+01	2.7500	3.016E+07
H-3	4.6258E-03	8,142.551	16,285.101	0.00E+00	3.77E+01	7.53E+01	3.5000	1.275E+06
I-129	6.6403E-07	8,142.551	16,285.101	0.00E+00	5.41E-03	1.08E-02	5.0000	4.900E+05
Kr-85	1.0808E-01	8,142.551	16,285.101	0.00E+00	8.80E+02	1.76E+03	7.0000	5.625E+04
Np-237	3.1537E-05	8,142.551	16,285.101	0.00E+00	2.57E-01	5.14E-01	11.0000	6.445E+03
Pa-231	9.7023E-10	8,142.551	16,285.101	0.00E+00	7.90E-06	1.58E-05		
Pb-210	1.1731E-11	8,142.551	16,285.101	0.00E+00	9.55E-08	1.91E-07		
Pm-147	2.4405E-02	8,142.551	16,285.101	0.00E+00	1.99E+02	3.97E+02		
Pu-238	1.5358E-01	8,142.551	16,285.101	0.00E+00	1.25E+03	2.50E+03		
Pu-239	6.9502E-04	8,142.551	16,285.101	0.00E+00	5.66E+00	1.13E+01		
Pu-240	3.7631E-04	8,142.551	16,285.101	0.00E+00	3.06E+00	6.13E+00		
Pu-241	1.3433E-01	8,142.551	16,285.101	0.00E+00	1.09E+03	2.19E+03		
Pu-242	3.0911E-06	8,142.551	16,285.101	0.00E+00	2.52E-02	5.03E-02		
Ra-226	5.5079E-11	8,142.551	16,285.101	0.00E+00	4.48E-07	8.97E-07		
Ra-228	1.3335E-14	8,142.551	16,285.101	0.00E+00	1.09E-10	2.17E-10		
Ru-106	7.3390E-06	8,142.551	16,285.101	0.00E+00	5.98E-02	1.20E-01		
Se-79	1.2339E-05	8,142.551	16,285.101	0.00E+00	1.00E-01	2.01E-01		
Sn-126	1.0194E-05	8,142.551	16,285.101	0.00E+00	8.30E-02	1.66E-01		
Sr-90	1.9064E+00	8,142.551	16,285.101	0.00E+00	1.55E+04	3.10E+04		
Tc-99	3.8056E-04	8,142.551	16,285.101	0.00E+00	3.10E+00	6.20E+00		
Th-229	4.9198E-12	8,142.551	16,285.101	0.00E+00	4.01E-08	8.01E-08		
Th-230	1.0547E-08	8,142.551	16,285.101	0.00E+00	8.59E-05	1.72E-04		
Th-232	2.0705E-14	8,142.551	16,285.101	0.00E+00	1.69E-10	3.37E-10		
Tl-208	4.8827E-08	8,142.551	16,285.101	0.00E+00	3.98E-04	7.95E-04		
U-232	1.3414E-07	8,142.551	16,285.101	0.00E+00	1.09E-03	2.18E-03		
U-233	3.7679E-09	8,142.551	16,285.101	0.00E+00	3.07E-05	6.14E-05		
U-234	5.2047E-05	8,142.551	16,285.101	0.00E+00	4.24E-01	8.48E-01		
U-235	2.8661E-06	8,142.551	0.000	4.78E-02	2.44E-02	4.78E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.6701E-05	8,142.551	16,285.101	0.00E+00	1.36E-01	2.72E-01	2.35E+02	4.71E+02
U-238	-9.4194E-09	8,142.551	0.000	1.86E-03	1.78E-03	1.86E-03	Total	Total
Y-90	1.9070E+00	8,142.551	16,285.101	0.00E+00	1.55E+04	3.11E+04		
Other Radionuclides					1.59E+04	3.17E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	80	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		8,142.551	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		16,285.101	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.68		1.01
Bounding:	1.35		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FSVR
 SNF ID #: 86
 Fuel Units & Descr: 1464 - CARBON COATED PART
 Heavy Metal Mass: BOL=15366.58kg ; EOL=14725.94kg
 ROD Storage Site: FSV

¹Fuel decay start date: 1989
 Estimates as of: 2030
 Template: FSV (Graphite, Graphite, 60 to 100%, Th & U)
²Template Burnup(MWd): 1270.275
 Template BOL Heavy Metal Mass (MT): 0.012702752
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 292.80

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.8818E-06	605,875.765	1,211,751.530	0.00E+00	2.35E+00	4.70E+00	Avg. MeV	
Am-241	3.1387E-03	605,875.765	1,211,751.530	0.00E+00	1.90E+03	3.80E+03	0.0150	8.503E+16
Am-242m	2.3971E-06	605,875.765	1,211,751.530	0.00E+00	1.45E+00	2.90E+00	0.0250	1.742E+16
Am-243	4.6069E-05	605,875.765	1,211,751.530	0.00E+00	2.79E+01	5.58E+01	0.0375	1.518E+16
C-14	2.3121E-05	605,875.765	1,211,751.530	0.00E+00	1.40E+01	2.80E+01	0.0575	1.633E+16
Cl-36	1.0667E-06	605,875.765	1,211,751.530	0.00E+00	6.46E-01	1.29E+00	0.0850	9.859E+15
Cm-243	2.5357E-05	605,875.765	1,211,751.530	0.00E+00	1.54E+01	3.07E+01	0.1250	6.651E+15
Cm-244	6.4458E-03	605,875.765	1,211,751.530	0.00E+00	3.91E+03	7.81E+03	0.2250	8.553E+15
Co-60	4.5014E-04	605,875.765	1,211,751.530	0.00E+00	2.73E+02	5.45E+02	0.3750	3.698E+15
Cs-134	3.8086E-05	605,875.765	1,211,751.530	0.00E+00	2.31E+01	4.62E+01	0.5750	6.002E+16
Cs-135	2.4711E-05	605,875.765	1,211,751.530	0.00E+00	1.50E+01	2.99E+01	0.8500	9.483E+14
Cs-137	1.3273E+00	605,875.765	1,211,751.530	0.00E+00	8.04E+05	1.61E+06	1.2500	6.114E+14
Eu-154	1.5705E-02	605,875.765	1,211,751.530	0.00E+00	9.52E+03	1.90E+04	1.7500	2.904E+13
Eu-155	1.0415E-03	605,875.765	1,211,751.530	0.00E+00	6.31E+02	1.26E+03	2.2500	2.140E+09
Fe-56	4.4707E-08	605,875.765	1,211,751.530	0.00E+00	2.71E-02	5.42E-02	2.7500	2.533E+13
H-3	3.9094E-03	605,875.765	1,211,751.530	0.00E+00	2.37E+03	4.74E+03	3.5000	1.210E+08
I-129	1.0092E-06	605,875.765	1,211,751.530	0.00E+00	6.11E-01	1.22E+00	5.0000	5.159E+07
Kr-85	3.9519E-02	605,875.765	1,211,751.530	0.00E+00	2.39E+04	4.79E+04	7.0000	5.929E+06
Np-237	1.2541E-05	605,875.765	1,211,751.530	0.00E+00	7.60E+00	1.52E+01	11.0000	6.798E+05
Pa-231	4.7376E-06	605,875.765	1,211,751.530	0.00E+00	2.87E+00	5.74E+00		
Pb-210	1.4194E-09	605,875.765	1,211,751.530	0.00E+00	8.60E-04	1.72E-03		
Pm-147	1.5146E-04	605,875.765	1,211,751.530	0.00E+00	9.18E+01	1.84E+02		
Pu-238	1.6248E-01	605,875.765	1,211,751.530	0.00E+00	9.84E+04	1.97E+05		
Pu-239	1.3580E-04	605,875.765	1,211,751.530	0.00E+00	8.23E+01	1.65E+02		
Pu-240	2.7136E-04	605,875.765	1,211,751.530	0.00E+00	1.64E+02	3.29E+02		
Pu-241	1.9342E-02	605,875.765	1,211,751.530	0.00E+00	1.17E+04	2.34E+04		
Pu-242	3.8866E-06	605,875.765	1,211,751.530	0.00E+00	2.35E+00	4.71E+00		
Ra-226	2.7923E-09	605,875.765	1,211,751.530	0.00E+00	1.69E-03	3.38E-03		
Ra-228	9.1791E-07	605,875.765	1,211,751.530	0.00E+00	5.56E-01	1.11E+00		
Ru-106	3.5205E-11	605,875.765	1,211,751.530	0.00E+00	2.13E-05	4.27E-05		
Se-79	2.1082E-05	605,875.765	1,211,751.530	0.00E+00	1.28E+01	2.55E+01		
Sn-126	2.2192E-05	605,875.765	1,211,751.530	0.00E+00	1.34E+01	2.69E+01		
Sr-90	1.2667E+00	605,875.765	1,211,751.530	0.00E+00	7.67E+05	1.53E+06		
Tc-99	3.9331E-04	605,875.765	1,211,751.530	0.00E+00	2.02E+02	4.04E+02		
Th-229	1.0612E-05	605,875.765	1,211,751.530	0.00E+00	6.43E+00	1.29E+01		
Th-230	1.8878E-07	605,875.765	1,211,751.530	0.00E+00	1.14E-01	2.29E-01		
Th-232	-6.9673E-08	605,875.765	0.000	1.52E+00	1.48E+00	1.52E+00		
Tl-208	5.9530E-04	605,875.765	1,211,751.530	0.00E+00	3.61E+02	7.21E+02		
U-232	1.6115E-03	605,875.765	1,211,751.530	0.00E+00	9.76E+02	1.95E+03		
U-233	2.0602E-03	605,875.765	1,211,751.530	0.00E+00	1.25E+03	2.50E+03		
U-234	2.8939E-04	605,875.765	1,211,751.530	0.00E+00	1.75E+02	3.51E+02		
U-235	-1.7343E-06	605,875.765	0.000	3.04E+00	1.99E+00	3.04E+00		
U-236	8.6281E-06	605,875.765	1,211,751.530	0.00E+00	5.23E+00	1.05E+01		
U-238	-5.6065E-09	605,875.765	0.000	3.02E-02	2.68E-02	3.02E-02		
Y-90	1.2667E+00	605,875.765	1,211,751.530	0.00E+00	7.67E+05	1.53E+06	Total	Total
Other Radionuclides					7.72E+05	1.54E+06		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	GRAPHITE	
Fuel Cladding:	TRISO IN GRAPHI	GRAPHITE	
BOL HM Constituents:	ThC2-UC2	Th and U	
BOL Enrichment %:	93.15000362	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		605,875.765	
Bounding:	722,229.410	1,211,751.530	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.39	
Bounding:	0.79	1.68

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: FSVR 1 Fuel decay start date: 1980
 SNF ID #: 85 Estimates as of: 2030
 Fuel Units & Descr: 744 - CARBON COATED PART Template: FSV (Graphite, Graphite, 60 to 100%, Th & U)
 Heavy Metal Mass: BOL=8780.02kg ; EOL=8626.16kg 2 Template Burnup(MWd): 1270.275
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.012702752
Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 148.80

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	4.2062E-06	145,508.600	412,660.865	0.00E+00	6.12E-01	1.74E+00		
Am-241	3.2229E-03	145,508.600	412,660.865	0.00E+00	4.69E+02	1.33E+03	0.0150	2.031E+16
Am-242m	2.2381E-06	145,508.600	412,660.865	0.00E+00	3.26E-01	9.24E-01	0.0250	4.147E+15
Am-243	4.6006E-05	145,508.600	412,660.865	0.00E+00	6.69E+00	1.90E+01	0.0375	3.600E+15
C-14	2.3082E-05	145,508.600	412,660.865	0.00E+00	3.36E+00	9.52E+00	0.0575	3.888E+15
Cl-36	1.0667E-06	145,508.600	412,660.865	0.00E+00	1.55E-01	4.40E-01	0.0850	2.346E+15
Cm-243	1.7602E-05	145,508.600	412,660.865	0.00E+00	2.56E+00	7.26E+00	0.1250	1.544E+15
Cm-244	3.6307E-03	145,508.600	412,660.865	0.00E+00	5.28E+02	1.50E+03	0.2250	2.032E+15
Co-60	6.2585E-05	145,508.600	412,660.865	0.00E+00	9.11E+00	2.58E+01	0.3750	8.799E+14
Cs-134	2.4585E-07	145,508.600	412,660.865	0.00E+00	3.58E-02	1.01E-01	0.5750	1.444E+16
Cs-135	2.4711E-05	145,508.600	412,660.865	0.00E+00	3.60E+00	1.02E+01	0.8500	1.805E+14
Cs-137	9.3838E-01	145,508.600	412,660.865	0.00E+00	1.37E+05	3.87E+05	1.2500	8.716E+13
Eu-154	4.6887E-03	145,508.600	412,660.865	0.00E+00	6.82E+02	1.93E+03	1.7500	5.542E+12
Eu-155	1.2793E-04	145,508.600	412,660.865	0.00E+00	1.86E+01	5.28E+01	2.2500	4.611E+08
Fe-55	8.1951E-10	145,508.600	412,660.865	0.00E+00	1.19E-04	3.38E-04	2.7500	7.465E+12
H-3	1.6839E-03	145,508.600	412,660.865	0.00E+00	2.45E+02	6.95E+02	3.5000	2.463E+07
I-129	1.0092E-06	145,508.600	412,660.865	0.00E+00	1.47E-01	4.16E-01	5.0000	1.048E+07
Kr-85	1.4981E-02	145,508.600	412,660.865	0.00E+00	2.18E+03	6.18E+03	7.0000	1.203E+06
Np-237	1.2556E-05	145,508.600	412,660.865	0.00E+00	1.83E+00	5.18E+00	11.0000	1.378E+05
Pa-231	4.7360E-06	145,508.600	412,660.865	0.00E+00	6.89E-01	1.95E+00		
Pb-210	2.1901E-09	145,508.600	412,660.865	0.00E+00	3.19E-04	9.04E-04		
Pm-147	2.8781E-06	145,508.600	412,660.865	0.00E+00	4.19E-01	1.19E+00		
Pu-238	1.4430E-01	145,508.600	412,660.865	0.00E+00	2.10E+04	5.95E+04		
Pu-239	1.3572E-04	145,508.600	412,660.865	0.00E+00	1.97E+01	5.60E+01		
Pu-240	2.7537E-04	145,508.600	412,660.865	0.00E+00	4.01E+01	1.14E+02		
Pu-241	9.3995E-03	145,508.600	412,660.865	0.00E+00	1.37E+03	3.88E+03		
Pu-242	3.8866E-06	145,508.600	412,660.865	0.00E+00	5.66E-01	1.60E+00		
Ra-226	4.1243E-09	145,508.600	412,660.865	0.00E+00	6.00E-04	1.70E-03		
Ra-228	9.1949E-07	145,508.600	412,660.865	0.00E+00	1.34E-01	3.79E-01		
Ru-106	1.1667E-15	145,508.600	412,660.865	0.00E+00	1.70E-10	4.81E-10		
Se-79	2.1074E-05	145,508.600	412,660.865	0.00E+00	3.07E+00	8.70E+00		
Sn-126	2.2192E-05	145,508.600	412,660.865	0.00E+00	3.23E+00	9.16E+00		
Sr-90	8.8642E-01	145,508.600	412,660.865	0.00E+00	1.29E+05	3.66E+05		
Tc-99	3.3323E-04	145,508.600	412,660.865	0.00E+00	4.85E+01	1.38E+02		
Th-229	1.3517E-05	145,508.600	412,660.865	0.00E+00	1.97E+00	5.58E+00		
Th-230	2.2822E-07	145,508.600	412,660.865	0.00E+00	3.32E-02	9.42E-02		
Th-232	-6.9673E-08	145,508.600	0.000	8.68E-01	8.58E-01	8.68E-01		
Ti-208	5.1524E-04	145,508.600	412,660.865	0.00E+00	7.50E+01	2.13E+02		
U-232	1.3950E-03	145,508.600	412,660.865	0.00E+00	2.03E+02	5.76E+02		
U-233	2.0602E-03	145,508.600	412,660.865	0.00E+00	3.00E+02	8.50E+02		
U-234	2.9513E-04	145,508.600	412,660.865	0.00E+00	4.29E+01	1.22E+02		
U-235	-1.7343E-06	145,508.600	0.000	1.74E+00	1.48E+00	1.74E+00		
U-236	8.6281E-06	145,508.600	412,660.865	0.00E+00	1.26E+00	3.56E+00		
U-238	-5.6065E-09	145,508.600	0.000	1.73E-02	1.65E-02	1.73E-02		
Y-90	8.8642E-01	145,508.600	412,660.865	0.00E+00	1.29E+05	3.66E+05		
Other Radionuclides					1.31E+05	3.73E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.33E+03	6.59E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	GRAPHITE	
Fuel Cladding:	TRISO IN GRAPHI	GRAPHITE	
BOL HM Constituents:	Th&U	Th and U	
BOL Enrichment %:	93.13638737	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		145,508.600	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:	412,660.865	291,017.199	Bounding burnup taken directly from SFD (converted to MWd).

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.17		1.00
Bounding:	0.47	0.71	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: GA HTGR FUEL
 SNF ID #: 89
 Fuel Units & Descr: 2 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=2.16kg ; EOL=2.08kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1996
 Estimates as of: 2030
 Template: FSV (Graphite, Graphite, 60 to 100%, Th & U)
²Template Burnup(MWd): 1270.275
 Template BOL Heavy Metal Mass (MT): 0.012702752
 Template Decay Time: 25 years

Estimated
 Canister usage:
 HIC
 1.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.3583E-06	76.225	152.451	0.00E+00	2.58E-04	5.12E-04	Avg. MeV	
Am-241	2.8805E-03	76.225	152.451	0.00E+00	2.20E-01	4.39E-01	0.0150	1.357E+13
Am-242m	2.5089E-06	76.225	152.451	0.00E+00	1.91E-04	3.82E-04	0.0250	2.787E+12
Am-243	4.6116E-05	76.225	152.451	0.00E+00	3.52E-03	7.03E-03	0.0375	2.446E+12
C-14	2.3152E-05	76.225	152.451	0.00E+00	1.76E-03	3.53E-03	0.0575	2.613E+12
Cl-36	1.0667E-06	76.225	152.451	0.00E+00	8.13E-05	1.63E-04	0.0850	1.580E+12
Cm-243	3.2339E-05	76.225	152.451	0.00E+00	2.47E-03	4.93E-03	0.1250	1.100E+12
Cm-244	9.4546E-03	76.225	152.451	0.00E+00	7.21E-01	1.44E+00	0.2250	1.372E+12
Co-60	1.6776E-03	76.225	152.451	0.00E+00	1.28E-01	2.56E-01	0.3750	5.920E+11
Cs-134	1.0974E-03	76.225	152.451	0.00E+00	8.36E-02	1.67E-01	0.5750	9.534E+11
Cs-135	2.4711E-05	76.225	152.451	0.00E+00	1.88E-03	3.77E-03	0.8500	1.973E+11
Cs-137	1.6729E+00	76.225	152.451	0.00E+00	1.28E+02	2.55E+02	1.2500	1.558E+11
Eu-154	3.5166E-02	76.225	152.451	0.00E+00	2.68E+00	5.36E+00	1.7500	5.941E+09
Eu-155	4.2148E-03	76.225	152.451	0.00E+00	3.21E-01	6.43E-01	2.2500	4.127E+05
Fe-55	6.4301E-07	76.225	152.451	0.00E+00	4.90E-05	9.80E-05	2.7500	3.510E+09
H-3	6.8528E-03	76.225	152.451	0.00E+00	5.22E-01	1.04E+00	3.5000	2.175E+04
I-129	1.0092E-06	76.225	152.451	0.00E+00	7.69E-05	1.54E-04	5.0000	9.278E+03
Kr-85	7.5440E-02	76.225	152.451	0.00E+00	5.75E+00	1.15E+01	7.0000	1.067E+03
Np-237	1.2525E-05	76.225	152.451	0.00E+00	9.55E-04	1.91E-03	11.0000	1.224E+02
Pa-231	4.7383E-06	76.225	152.451	0.00E+00	3.61E-04	7.22E-04		
Pb-210	9.1476E-10	76.225	152.451	0.00E+00	6.97E-08	1.39E-07		
Pm-147	2.1271E-03	76.225	152.451	0.00E+00	1.62E-01	3.24E-01		
Pu-238	1.7587E-01	76.225	152.451	0.00E+00	1.34E+01	2.68E+01		
Pu-239	1.3580E-04	76.225	152.451	0.00E+00	1.04E-02	2.07E-02		
Pu-240	2.6404E-04	76.225	152.451	0.00E+00	2.01E-02	4.03E-02		
Pu-241	3.1300E-02	76.225	152.451	0.00E+00	2.39E+00	4.77E+00		
Pu-242	3.8866E-06	76.225	152.451	0.00E+00	2.96E-04	5.93E-04		
Ra-226	1.7059E-09	76.225	152.451	0.00E+00	1.30E-07	2.60E-07		
Ra-228	9.1083E-07	76.225	152.451	0.00E+00	6.94E-05	1.39E-04		
Ru-106	3.4126E-08	76.225	152.451	0.00E+00	2.60E-06	5.20E-06		
Se-79	2.1082E-05	76.225	152.451	0.00E+00	1.61E-03	3.21E-03		
Sn-126	2.2200E-05	76.225	152.451	0.00E+00	1.69E-03	3.38E-03		
Sr-90	1.6067E+00	76.225	152.451	0.00E+00	1.22E+02	2.45E+02		
Tc-99	3.3331E-04	76.225	152.451	0.00E+00	2.54E-02	5.08E-02		
Th-229	7.7062E-06	76.225	152.451	0.00E+00	5.87E-04	1.17E-03		
Th-230	1.5020E-07	76.225	152.451	0.00E+00	1.14E-05	2.29E-05		
Th-232	6.9673E-08	76.225	0.000	2.14E-04	2.09E-04	2.14E-04		
Tl-208	6.5584E-04	76.225	152.451	0.00E+00	5.00E-02	1.00E-01		
U-232	1.7744E-03	76.225	152.451	0.00E+00	1.35E-01	2.71E-01		
U-233	2.0602E-03	76.225	152.451	0.00E+00	1.57E-01	3.14E-01		
U-234	2.8285E-04	76.225	152.451	0.00E+00	2.16E-02	4.31E-02		
U-235	-1.7343E-06	76.225	0.000	4.28E-04	2.95E-04	4.28E-04		
U-236	8.6281E-06	76.225	152.451	0.00E+00	6.58E-04	1.32E-03		
U-238	-5.6065E-09	76.225	0.000	4.25E-06	3.83E-06	4.25E-06		
Y-90	1.6067E+00	76.225	152.451	0.00E+00	1.22E+02	2.45E+02		
Other Radionuclides					1.22E+02	2.44E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.99E+00	3.98E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	GRAPHITE	
Fuel Cladding:	PYROLYTIC CARBON IN	GRAPHITE	
BOL HM Constituents:	ThCo-UCO	Th and U	
BOL Enrichment %:	92.18943312	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		76.225	
Bounding:		152.451	

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

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.35		1.00
Bounding:	0.71		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: GA RERTR
 SNF ID #: 90
 Fuel Units & Descr: 1 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=3.85kg ; EOL=3.07kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 HIC
 0.50

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	744.212	1,488.424	0.00E+00	6.34E-07	1.27E-06	Avg. MeV	
Am-241	1.8331E-03	744.212	1,488.424	0.00E+00	1.36E+00	2.73E+00	0.0150	2.406E+14
Am-242m	1.4129E-06	744.212	1,488.424	0.00E+00	1.05E-03	2.10E-03	0.0250	5.293E+13
Am-243	1.4774E-07	744.212	1,488.424	0.00E+00	1.10E-04	2.20E-04	0.0375	4.508E+13
C-14	1.2871E-04	744.212	1,488.424	0.00E+00	9.58E-02	1.92E-01	0.0575	4.627E+13
Cl-36	2.8120E-06	744.212	1,488.424	0.00E+00	2.09E-03	4.19E-03	0.0850	2.866E+13
Cm-243	1.7940E-07	744.212	1,488.424	0.00E+00	1.34E-04	2.67E-04	0.1250	2.082E+13
Cm-244	1.6962E-06	744.212	1,488.424	0.00E+00	1.26E-03	2.52E-03	0.2250	2.432E+13
Co-60	1.2839E+00	744.212	1,488.424	0.00E+00	9.56E+02	1.91E+03	0.3750	1.234E+13
Cs-134	9.0541E-02	744.212	1,488.424	0.00E+00	6.74E+01	1.35E+02	0.5750	1.641E+14
Cs-135	3.2195E-05	744.212	1,488.424	0.00E+00	2.40E-02	4.79E-02	0.8500	7.040E+12
Cs-137	2.7564E+00	744.212	1,488.424	0.00E+00	2.05E+03	4.10E+03	1.2500	1.430E+14
Eu-154	1.5368E-02	744.212	1,488.424	0.00E+00	1.14E+01	2.29E+01	1.7500	9.533E+10
Eu-155	2.9293E-02	744.212	1,488.424	0.00E+00	2.18E+01	4.36E+01	2.2500	1.536E+11
Fe-55	7.7158E-01	744.212	1,488.424	0.00E+00	5.74E+02	1.15E+03	2.7500	1.219E+09
H-3	1.1111E-02	744.212	1,488.424	0.00E+00	8.27E+00	1.65E+01	3.5000	1.419E+08
I-129	7.3684E-07	744.212	1,488.424	0.00E+00	5.48E-04	1.10E-03	5.0000	7.823E+02
Kr-85	2.5263E-01	744.212	1,488.424	0.00E+00	1.88E+02	3.76E+02	7.0000	8.854E+01
Np-237	1.2427E-06	744.212	1,488.424	0.00E+00	9.25E-04	1.85E-03	11.0000	1.009E+01
Pa-231	3.8511E-09	744.212	1,488.424	0.00E+00	2.87E-06	5.73E-06		
Pb-210	7.3880E-15	744.212	1,488.424	0.00E+00	5.50E-12	1.10E-11		
Pm-147	2.1023E+00	744.212	1,488.424	0.00E+00	1.56E+03	3.13E+03		
Pu-238	1.0383E-03	744.212	1,488.424	0.00E+00	7.73E-01	1.55E+00		
Pu-239	5.5293E-03	744.212	1,488.424	0.00E+00	4.11E+00	8.23E+00		
Pu-240	2.1278E-03	744.212	1,488.424	0.00E+00	1.58E+00	3.17E+00		
Pu-241	1.0195E-01	744.212	1,488.424	0.00E+00	7.59E+01	1.52E+02		
Pu-242	2.3128E-07	744.212	1,488.424	0.00E+00	1.72E-04	3.44E-04		
Ra-226	5.2782E-14	744.212	1,488.424	0.00E+00	3.93E-11	7.86E-11		
Ra-228	1.9338E-10	744.212	1,488.424	0.00E+00	1.44E-07	2.88E-07		
Ru-106	9.1684E-02	744.212	1,488.424	0.00E+00	6.82E+01	1.36E+02		
Se-79	1.3018E-05	744.212	1,488.424	0.00E+00	9.69E-03	1.94E-02		
Sn-126	1.2167E-05	744.212	1,488.424	0.00E+00	9.05E-03	1.81E-02		
Sr-90	2.6045E+00	744.212	1,488.424	0.00E+00	1.94E+03	3.88E+03		
Tc-99	4.4241E-04	744.212	1,488.424	0.00E+00	3.29E-01	6.58E-01		
Th-229	1.3713E-10	744.212	1,488.424	0.00E+00	1.02E-07	2.04E-07		
Th-230	1.8090E-11	744.212	1,488.424	0.00E+00	1.35E-08	2.69E-08		
Th-232	2.5278E-10	744.212	1,488.424	0.00E+00	1.88E-07	3.76E-07		
Ti-208	1.6947E-08	744.212	1,488.424	0.00E+00	1.26E-05	2.52E-05		
U-232	4.8737E-08	744.212	1,488.424	0.00E+00	3.63E-05	7.25E-05		
U-233	1.2203E-07	744.212	1,488.424	0.00E+00	9.08E-05	1.82E-04		
U-234	1.5925E-07	744.212	1,488.424	0.00E+00	1.19E-04	2.37E-04		
U-235	-2.6194E-06	744.212	0.000	1.65E-03	0.00E+00	1.65E-03		
U-236	1.2693E-05	744.212	1,488.424	0.00E+00	9.45E-03	1.89E-02		
U-238	-3.6331E-08	744.212	0.000	1.04E-03	1.01E-03	1.04E-03		
Y-90	2.6060E+00	744.212	1,488.424	0.00E+00	1.94E+03	3.88E+03		
Other Radionuclides					2.68E+03	5.37E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.33E+01	8.66E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative).
Fuel Cladding:	INCOLOY (800H)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.78706778	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
		744.212	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,488.424	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
	5.67		1.05
Bounding:	11.33		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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)
 SNF ID #: 745
 Fuel Units & Descr: 69 - 19 ROD ASSEMBLY
 Heavy Metal Mass: BOL=60.54kg ; EOL=59.86kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1960
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 2.88

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec
	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)	Avg. MeV	Total
Ac-227	4.5940E-08	638.771	1,277.541	0.00E+00	2.93E-05	5.87E-05	0.0150	4.663E+13
Am-241	1.1471E-04	638.771	1,277.541	0.00E+00	7.33E-02	1.47E-01	0.0250	9.689E+12
Am-242m	7.4210E-09	638.771	1,277.541	0.00E+00	4.74E-06	9.48E-06	0.0375	8.420E+12
Am-243	9.8236E-10	638.771	1,277.541	0.00E+00	6.28E-07	1.26E-06	0.0575	9.035E+12
C-14	2.2928E-04	638.771	1,277.541	0.00E+00	1.46E-01	2.93E-01	0.0850	5.457E+12
Cf-252	1.2260E-06	638.771	1,277.541	0.00E+00	7.83E-04	1.57E-03	0.1250	3.539E+12
Cm-243	1.2000E-10	638.771	1,277.541	0.00E+00	7.67E-08	1.53E-07	0.2250	4.705E+12
Cm-244	7.3577E-10	638.771	1,277.541	0.00E+00	4.70E-07	9.40E-07	0.3750	2.051E+12
Co-60	1.3732E-03	638.771	1,277.541	0.00E+00	8.77E-01	1.75E+00	0.5750	3.451E+13
Cs-134	1.2709E-10	638.771	1,277.541	0.00E+00	8.12E-08	1.62E-07	0.8500	3.351E+11
Cs-135	3.0316E-05	638.771	1,277.541	0.00E+00	1.94E-02	3.87E-02	1.2500	2.426E+11
Cs-137	7.2579E-01	638.771	1,277.541	0.00E+00	4.64E+02	9.27E+02	1.7500	8.623E+09
Eu-154	5.9750E-05	638.771	1,277.541	0.00E+00	3.82E-02	7.63E-02	2.2500	1.631E+06
Eu-155	1.0577E-05	638.771	1,277.541	0.00E+00	6.76E-03	1.35E-02	2.7500	7.301E+05
Fe-55	4.1631E-07	638.771	1,277.541	0.00E+00	2.66E-04	5.32E-04	3.5000	8.581E+01
H-3	4.6722E-04	638.771	1,277.541	0.00E+00	2.98E-01	5.97E-01	5.0000	3.554E+01
I-129	7.3195E-07	638.771	1,277.541	0.00E+00	4.68E-04	9.35E-04	7.0000	3.940E+00
Kr-85	5.9418E-03	638.771	1,277.541	0.00E+00	3.80E+00	7.59E+00	11.0000	4.432E-01
Np-237	1.1499E-06	638.771	1,277.541	0.00E+00	7.35E-04	1.47E-03		
Pa-231	7.0899E-08	638.771	1,277.541	0.00E+00	4.53E-05	9.06E-05		
Pb-210	2.2363E-12	638.771	1,277.541	0.00E+00	1.43E-09	2.86E-09		
Pm-147	4.2296E-07	638.771	1,277.541	0.00E+00	2.70E-04	5.40E-04		
Pu-238	2.3295E-04	638.771	1,277.541	0.00E+00	1.49E-01	2.98E-01		
Pu-239	6.6722E-04	638.771	1,277.541	0.00E+00	4.26E-01	8.52E-01		
Pu-240	8.6556E-05	638.771	1,277.541	0.00E+00	5.53E-02	1.11E-01		
Pu-241	1.6889E-04	638.771	1,277.541	0.00E+00	1.08E-01	2.16E-01		
Pu-242	1.9717E-09	638.771	1,277.541	0.00E+00	1.26E-06	2.52E-06		
Ra-226	4.5740E-12	638.771	1,277.541	0.00E+00	2.92E-09	5.84E-09		
Ra-228	8.3511E-12	638.771	1,277.541	0.00E+00	5.33E-09	1.07E-08		
Ru-106	2.0516E-19	638.771	1,277.541	0.00E+00	1.31E-16	2.62E-16		
Se-79	1.3220E-05	638.771	1,277.541	0.00E+00	8.44E-03	1.69E-02		
Sn-126	1.1489E-05	638.771	1,277.541	0.00E+00	7.34E-03	1.47E-02		
Sr-90	6.6872E-01	638.771	1,277.541	0.00E+00	4.27E+02	8.54E+02		
Tc-99	4.6639E-04	638.771	1,277.541	0.00E+00	2.98E-01	5.96E-01		
Th-229	2.3727E-11	638.771	1,277.541	0.00E+00	1.52E-08	3.03E-08		
Th-230	2.7354E-10	638.771	1,277.541	0.00E+00	1.75E-07	3.49E-07		
Th-232	8.3594E-12	638.771	1,277.541	0.00E+00	5.34E-09	1.07E-08		
Tl-208	1.6228E-08	638.771	1,277.541	0.00E+00	1.04E-05	2.07E-05		
U-232	4.3960E-08	638.771	1,277.541	0.00E+00	2.81E-05	5.62E-05		
U-233	3.3344E-09	638.771	1,277.541	0.00E+00	2.13E-06	4.26E-06		
U-234	4.0749E-07	638.771	1,277.541	0.00E+00	2.60E-04	5.21E-04		
U-235	-2.7761E-06	638.771	0.000	1.21E-01	1.19E-01	1.21E-01		
U-236	1.6190E-05	638.771	1,277.541	0.00E+00	1.03E-02	2.07E-02		
U-238	-2.8547E-09	638.771	0.000	1.59E-03	1.58E-03	1.59E-03		
Y-90	6.6889E-01	638.771	1,277.541	0.00E+00	4.27E+02	8.55E+02		
Other Radionuclides					5.80E+02	1.16E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.20E+00	1.04E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		Basis for Parameter Differences:
From SFD	Used	
Reactor Moderator:	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative).
Fuel Cladding:	HASTELLOY-X	
BOL HM Constituents:	UO ₂ -BeO ₂	
BOL Enrichment %:	92.20234775	

Burnup Summary (MWd) ²		Basis for burnup used in estimate:
From SFD	Estimated	
Nominal:	638.771	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:	1,277.541	

Checks		Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	
	0.23	1.00
Bounding:	0.45	

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

²Total burnup for all fuel associated with this worksheet must be 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=1.07kg ; EOL=1.02kg
ROD Storage Site: INEEL

¹Fuel decay start date: 1960
Estimates as of: 2030
Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
Template BOL Heavy Metal Mass (MT): 0.00012882
Template Decay Time: 65 years

Estimated
Canister usage:
18"x10"
0.08

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4.5940E-08	46.193	92.387	0.00E+00	2.12E-06	4.24E-06	Avg. MeV	
Am-241	1.1471E-04	46.193	92.387	0.00E+00	5.30E-03	1.06E-02	0.0150	3.372E+12
Am-242m	7.4210E-09	46.193	92.387	0.00E+00	3.43E-07	6.86E-07	0.0250	7.006E+11
Am-243	9.8236E-10	46.193	92.387	0.00E+00	4.54E-08	9.08E-08	0.0375	6.089E+11
C-14	2.2928E-04	46.193	92.387	0.00E+00	1.06E-02	2.12E-02	0.0575	6.534E+11
Cl-36	1.2260E-06	46.193	92.387	0.00E+00	5.66E-05	1.13E-04	0.0850	3.946E+11
Cm-243	1.2000E-10	46.193	92.387	0.00E+00	5.54E-09	1.11E-08	0.1250	2.559E+11
Cm-244	7.3577E-10	46.193	92.387	0.00E+00	3.40E-08	6.80E-08	0.2250	3.401E+11
Co-60	1.3732E-03	46.193	92.387	0.00E+00	6.34E-02	1.27E-01	0.3750	1.483E+11
Cs-134	1.2709E-10	46.193	92.387	0.00E+00	5.87E-09	1.17E-08	0.5750	2.495E+12
Cs-135	3.0316E-05	46.193	92.387	0.00E+00	1.40E-03	2.80E-03	0.8500	2.424E+10
Cs-137	7.2579E-01	46.193	92.387	0.00E+00	3.35E+01	6.71E+01	1.2500	1.754E+10
Eu-154	5.9750E-05	46.193	92.387	0.00E+00	2.76E-03	5.52E-03	1.7500	6.236E+08
Eu-155	1.0577E-05	46.193	92.387	0.00E+00	4.89E-04	9.77E-04	2.2500	1.179E+05
Fe-55	4.1631E-07	46.193	92.387	0.00E+00	1.92E-05	3.85E-05	2.7500	5.280E+04
H-3	4.6722E-04	46.193	92.387	0.00E+00	2.16E-02	4.32E-02	3.5000	5.494E+00
I-129	7.3195E-07	46.193	92.387	0.00E+00	3.38E-05	6.76E-05	5.0000	2.270E+00
Kr-85	5.9418E-03	46.193	92.387	0.00E+00	2.74E-01	5.49E-01	7.0000	2.510E-01
Np-237	1.1499E-06	46.193	92.387	0.00E+00	5.31E-05	1.06E-04	11.0000	2.819E-02
Pa-231	7.0899E-08	46.193	92.387	0.00E+00	3.28E-06	6.55E-06		
Pb-210	2.2363E-12	46.193	92.387	0.00E+00	1.03E-10	2.07E-10		
Pm-147	4.2296E-07	46.193	92.387	0.00E+00	1.95E-05	3.91E-05		
Pu-238	2.3295E-04	46.193	92.387	0.00E+00	1.08E-02	2.15E-02		
Pu-239	6.6722E-04	46.193	92.387	0.00E+00	3.08E-02	6.16E-02		
Pu-240	8.6556E-05	46.193	92.387	0.00E+00	4.00E-03	8.00E-03		
Pu-241	1.6889E-04	46.193	92.387	0.00E+00	7.80E-03	1.56E-02		
Pu-242	1.9717E-09	46.193	92.387	0.00E+00	9.11E-08	1.82E-07		
Ra-226	4.5740E-12	46.193	92.387	0.00E+00	2.11E-10	4.23E-10		
Ra-228	8.3511E-12	46.193	92.387	0.00E+00	3.86E-10	7.72E-10		
Ru-106	2.0516E-19	46.193	92.387	0.00E+00	9.48E-18	1.90E-17		
Se-79	1.3220E-05	46.193	92.387	0.00E+00	6.11E-04	1.22E-03		
Sn-126	1.1489E-05	46.193	92.387	0.00E+00	5.31E-04	1.06E-03		
Sr-90	6.6872E-01	46.193	92.387	0.00E+00	3.09E+01	6.18E+01		
Tc-99	4.6639E-04	46.193	92.387	0.00E+00	2.15E-02	4.31E-02		
Th-229	2.3727E-11	46.193	92.387	0.00E+00	1.10E-09	2.19E-09		
Th-230	2.7354E-10	46.193	92.387	0.00E+00	1.26E-08	2.53E-08		
Th-232	8.3594E-12	46.193	92.387	0.00E+00	3.86E-10	7.72E-10		
Ti-208	1.6228E-08	46.193	92.387	0.00E+00	7.50E-07	1.50E-06		
U-232	4.3960E-08	46.193	92.387	0.00E+00	2.03E-06	4.06E-06		
U-233	3.3344E-09	46.193	92.387	0.00E+00	1.54E-07	3.08E-07		
U-234	4.0749E-07	46.193	92.387	0.00E+00	1.88E-05	3.76E-05		
U-235	-2.7761E-06	46.193	0.000	2.16E-03	2.03E-03	2.16E-03		
U-236	1.6190E-05	46.193	92.387	0.00E+00	7.48E-04	1.50E-03		
U-238	-2.8547E-09	46.193	0.000	2.27E-05	2.26E-05	2.27E-05		
Y-90	6.6889E-01	46.193	92.387	0.00E+00	3.09E+01	6.18E+01		
Other Radionuclides					4.20E+01	8.39E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.76E-01	7.52E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	SST (316L)	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	93.67088608	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		46.193	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		92.387	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.93		1.00
Bounding:	1.86		

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

²Total burnup for all fuel associated with this worksheet must be 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 CAN (1B-8T 1&2)
 SNF ID #: 94
 Fuel Units & Descr: 1 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=91kg ; EOL=91kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1961
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.08

II. Estimates		m	x _n	x _b	b	y _n	y _b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)	Avg. MeV
Ac-227	4.5940E-08	17.155	34.310	0.00E+00	7.88E-07	1.58E-06			
Am-241	1.1471E-04	17.155	34.310	0.00E+00	1.97E-03	3.94E-03		0.0150	1.252E+12
Am-242m	7.4210E-09	17.155	34.310	0.00E+00	1.27E-07	2.55E-07		0.0250	2.602E+11
Am-243	9.8236E-10	17.155	34.310	0.00E+00	1.69E-08	3.37E-08		0.0375	2.261E+11
C-14	2.2928E-04	17.155	34.310	0.00E+00	3.93E-03	7.87E-03		0.0575	2.426E+11
Cl-36	1.2260E-06	17.155	34.310	0.00E+00	2.10E-05	4.21E-05		0.0850	1.466E+11
Cm-243	1.2000E-10	17.155	34.310	0.00E+00	2.06E-09	4.12E-09		0.1250	9.503E+10
Cm-244	7.3577E-10	17.155	34.310	0.00E+00	1.26E-08	2.52E-08		0.2250	1.263E+11
Co-60	1.3732E-03	17.155	34.310	0.00E+00	2.36E-02	4.71E-02		0.3750	5.509E+10
Cs-134	1.2709E-10	17.155	34.310	0.00E+00	2.18E-09	4.36E-09		0.5750	9.267E+11
Cs-135	3.0316E-05	17.155	34.310	0.00E+00	5.20E-04	1.04E-03		0.8500	9.000E+09
Cs-137	7.2579E-01	17.155	34.310	0.00E+00	1.25E+01	2.49E+01		1.2500	6.514E+09
Eu-154	5.9750E-05	17.155	34.310	0.00E+00	1.03E-03	2.05E-03		1.7500	2.316E+08
Eu-155	1.0577E-05	17.155	34.310	0.00E+00	1.81E-04	3.63E-04		2.2500	4.380E+04
Fe-55	4.1631E-07	17.155	34.310	0.00E+00	7.14E-06	1.43E-05		2.7500	1.961E+04
H-3	4.6722E-04	17.155	34.310	0.00E+00	8.02E-03	1.60E-02		3.5000	2.139E+00
I-129	7.3195E-07	17.155	34.310	0.00E+00	1.26E-05	2.51E-05		5.0000	8.845E-01
Kr-85	5.9418E-03	17.155	34.310	0.00E+00	1.02E-01	2.04E-01		7.0000	9.791E-02
Np-237	1.1499E-06	17.155	34.310	0.00E+00	1.97E-05	3.95E-05		11.0000	1.100E-02
Pa-231	7.0899E-08	17.155	34.310	0.00E+00	1.22E-06	2.43E-06			
Pb-210	2.2363E-12	17.155	34.310	0.00E+00	3.84E-11	7.67E-11			
Pm-147	4.2296E-07	17.155	34.310	0.00E+00	7.26E-06	1.45E-05			
Pu-238	2.3295E-04	17.155	34.310	0.00E+00	4.00E-03	7.99E-03			
Pu-239	6.6722E-04	17.155	34.310	0.00E+00	1.14E-02	2.29E-02			
Pu-240	8.6556E-05	17.155	34.310	0.00E+00	1.48E-03	2.97E-03			
Pu-241	1.6889E-04	17.155	34.310	0.00E+00	2.90E-03	5.79E-03			
Pu-242	1.9717E-09	17.155	34.310	0.00E+00	3.38E-08	6.76E-08			
Ra-226	4.5740E-12	17.155	34.310	0.00E+00	7.85E-11	1.57E-10			
Ra-228	8.3511E-12	17.155	34.310	0.00E+00	1.43E-10	2.87E-10			
Ru-106	2.0516E-19	17.155	34.310	0.00E+00	3.52E-18	7.04E-18			
Se-79	1.3220E-05	17.155	34.310	0.00E+00	2.27E-04	4.54E-04			
Sn-126	1.1489E-05	17.155	34.310	0.00E+00	1.97E-04	3.94E-04			
Sr-90	6.6872E-01	17.155	34.310	0.00E+00	1.15E+01	2.29E+01			
Tc-99	4.6639E-04	17.155	34.310	0.00E+00	8.00E-03	1.60E-02			
Th-229	2.3727E-11	17.155	34.310	0.00E+00	4.07E-10	8.14E-10			
Th-230	2.7354E-10	17.155	34.310	0.00E+00	4.69E-09	9.39E-09			
Th-232	8.3594E-12	17.155	34.310	0.00E+00	1.43E-10	2.87E-10			
Tl-208	1.6228E-08	17.155	34.310	0.00E+00	2.78E-07	5.57E-07			
U-232	4.3960E-08	17.155	34.310	0.00E+00	7.54E-07	1.51E-06			
U-233	3.3344E-09	17.155	34.310	0.00E+00	5.72E-08	1.14E-07			
U-234	4.0749E-07	17.155	34.310	0.00E+00	6.99E-06	1.40E-05			
U-235	-2.7761E-06	17.155	0.000	1.83E-03	1.78E-03	1.83E-03			
U-236	1.6190E-05	17.155	34.310	0.00E+00	2.78E-04	5.55E-04			
U-238	-2.8547E-09	17.155	0.000	2.05E-05	2.05E-05	2.05E-05			
Y-90	6.6889E-01	17.155	34.310	0.00E+00	1.15E+01	2.29E+01			
Other Radionuclides					1.56E+01	3.12E+01			

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.40E-05	1.40E-05
1.40E-01	2.79E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative).
Fuel Cladding:	NONE	SST	
BOL HM Constituents:	UO2-BeO2	U	
BOL Enrichment %:	93.28193833	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 17.155	Estimated: 17.155	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
Bounding:		34.310	

Checks		
Nominal:	Burnup Multiplier: 0.40	Estimated Burnup/Given Burnup: 0.99
Bounding:	0.81	

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

² Total burnup for all fuel associated with this worksheet must be 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 PELLETS (1B-7T-1)
 SNF ID #: 95
 Fuel Units & Descr: 1 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=.07kg ; EOL=.07kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1961
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 65 years

Estimated
 Canister usage:
18"x10"
 0.08

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4.5940E-08	1.396	2.792	0.00E+00	6.41E-08	1.28E-07	Avg. MeV	
Am-241	1.1471E-04	1.396	2.792	0.00E+00	1.60E-04	3.20E-04	0.0150	1.019E+11
Am-242m	7.4210E-09	1.396	2.792	0.00E+00	1.04E-08	2.07E-08	0.0250	2.118E+10
Am-243	9.8236E-10	1.396	2.792	0.00E+00	1.37E-09	2.74E-09	0.0375	1.840E+10
C-14	2.2928E-04	1.396	2.792	0.00E+00	3.20E-04	6.40E-04	0.0575	1.975E+10
Cl-36	1.2260E-06	1.396	2.792	0.00E+00	1.71E-06	3.42E-06	0.0850	1.193E+10
Cm-243	1.2000E-10	1.396	2.792	0.00E+00	1.68E-10	3.35E-10	0.1250	7.734E+09
Cm-244	7.3577E-10	1.396	2.792	0.00E+00	1.03E-09	2.05E-09	0.2250	1.028E+10
Co-60	1.3732E-03	1.396	2.792	0.00E+00	1.92E-03	3.83E-03	0.3750	4.483E+09
Cs-134	1.2709E-10	1.396	2.792	0.00E+00	1.77E-10	3.55E-10	0.5750	7.543E+10
Cs-135	3.0316E-05	1.396	2.792	0.00E+00	4.23E-05	8.47E-05	0.8500	7.325E+08
Cs-137	7.2579E-01	1.396	2.792	0.00E+00	1.01E+00	2.03E+00	1.2500	5.302E+08
Eu-154	5.9750E-05	1.396	2.792	0.00E+00	8.34E-05	1.67E-04	1.7500	1.885E+07
Eu-155	1.0577E-05	1.396	2.792	0.00E+00	1.48E-05	2.95E-05	2.2500	3.564E+03
Fe-55	4.1631E-07	1.396	2.792	0.00E+00	5.81E-07	1.16E-06	2.7500	1.596E+03
H-3	4.6722E-04	1.396	2.792	0.00E+00	6.52E-04	1.30E-03	3.5000	1.743E-01
I-129	7.3195E-07	1.396	2.792	0.00E+00	1.02E-06	2.04E-06	5.0000	7.209E-02
Kr-85	5.9418E-03	1.396	2.792	0.00E+00	8.30E-03	1.66E-02	7.0000	7.980E-04
Np-237	1.1499E-06	1.396	2.792	0.00E+00	1.61E-06	3.21E-06	11.0000	8.968E-04
Pa-231	7.0899E-08	1.396	2.792	0.00E+00	9.90E-08	1.98E-07		
Pb-210	2.2363E-12	1.396	2.792	0.00E+00	3.12E-12	6.24E-12		
Pm-147	4.2296E-07	1.396	2.792	0.00E+00	5.91E-07	1.18E-06		
Pu-238	2.3295E-04	1.396	2.792	0.00E+00	3.25E-04	6.50E-04		
Pu-239	6.6722E-04	1.396	2.792	0.00E+00	9.32E-04	1.86E-03		
Pu-240	8.6556E-05	1.396	2.792	0.00E+00	1.21E-04	2.42E-04		
Pu-241	1.6889E-04	1.396	2.792	0.00E+00	2.36E-04	4.72E-04		
Pu-242	1.9717E-09	1.396	2.792	0.00E+00	2.75E-09	5.51E-09		
Ra-226	4.5740E-12	1.396	2.792	0.00E+00	6.39E-12	1.28E-11		
Ra-228	8.3511E-12	1.396	2.792	0.00E+00	1.17E-11	2.33E-11		
Ru-106	2.0516E-19	1.396	2.792	0.00E+00	2.86E-19	5.73E-19		
Se-79	1.3220E-05	1.396	2.792	0.00E+00	1.85E-05	3.69E-05		
Sn-126	1.1489E-05	1.396	2.792	0.00E+00	1.60E-05	3.21E-05		
Sr-90	6.6872E-01	1.396	2.792	0.00E+00	9.34E-01	1.87E+00		
Tc-99	4.6639E-04	1.396	2.792	0.00E+00	6.51E-04	1.30E-03		
Th-229	2.3727E-11	1.396	2.792	0.00E+00	3.31E-11	6.63E-11		
Th-230	2.7354E-10	1.396	2.792	0.00E+00	3.82E-10	7.64E-10		
Th-232	8.3594E-12	1.396	2.792	0.00E+00	1.17E-11	2.33E-11		
Tl-208	1.6228E-08	1.396	2.792	0.00E+00	2.27E-08	4.53E-08		
U-232	4.3960E-08	1.396	2.792	0.00E+00	6.14E-08	1.23E-07		
U-233	3.3344E-09	1.396	2.792	0.00E+00	4.66E-09	9.31E-09		
U-234	4.0749E-07	1.396	2.792	0.00E+00	5.69E-07	1.14E-06		
U-235	-2.7761E-06	1.396	0.000	1.49E-04	1.45E-04	1.49E-04		
U-236	1.6190E-05	1.396	2.792	0.00E+00	2.26E-05	4.52E-05		
U-238	-2.8547E-09	1.396	0.000	1.71E-06	1.71E-06	1.71E-06		
Y-90	6.6889E-01	1.396	2.792	0.00E+00	9.34E-01	1.87E+00		
Other Radionuclides					1.27E+00	2.54E+00		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.14E-02	2.27E-02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative).
Fuel Cladding:	NONE	SST	
BOL HM Constituents:	UO2-BeO2	U	
BOL Enrichment %:	93.09997294	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1.396	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
Bounding:		2.792	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.40		
Bounding:	0.81		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: GE TEST	¹ Fuel decay start date: 1972
SNF ID #: 96	Estimates as of: 2030
Fuel Units & Descr: 22 - CANISTER OF SCRAP	Template: FTF (FAST, SST, 10 to 30%, Pu & U)
Heavy Metal Mass: BOL= ; EOL=45.20kg	² Template Burnup(MWd): 5011.2
ROD Storage Site: HANFORD	Template BOL Heavy Metal Mass (MT): 0.0329181
	Template Decay Time: 50 years

Estimated
Canister usage:
HIC
2.00

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group Avg. MeV Total Photons/sec (bounding)
Ac-227	9.4369E-12	45,119.376	45,119.376	0.00E+00	4.26E-07	4.26E-07	0.0150
Am-241	1.1078E-01	45,119.376	45,119.376	1.74E+02	5.17E+03	5.17E+03	1.917E+14
Am-242m	1.7940E-03	45,119.376	45,119.376	0.00E+00	8.09E+01	8.09E+01	0.0250
Am-243	1.0724E-04	45,119.376	45,119.376	0.00E+00	4.84E+00	4.84E+00	0.0375
C-14	2.5942E-05	45,119.376	45,119.376	0.00E+00	1.17E+00	1.17E+00	0.0575
Cl-36	3.4243E-10	45,119.376	45,119.376	0.00E+00	1.55E-05	1.55E-05	0.0850
Cm-243	2.8217E-04	45,119.376	45,119.376	0.00E+00	1.27E+01	1.27E+01	0.1250
Cm-244	7.7027E-04	45,119.376	45,119.376	0.00E+00	3.48E+01	3.48E+01	0.2250
Co-60	1.3011E-04	45,119.376	45,119.376	0.00E+00	5.87E+00	5.87E+00	0.3750
Cs-134	1.2951E-07	45,119.376	45,119.376	0.00E+00	5.84E-03	5.84E-03	0.5750
Cs-135	4.7693E-05	45,119.376	45,119.376	0.00E+00	2.15E+00	2.15E+00	0.8500
Cs-137	9.3351E-01	45,119.376	45,119.376	0.00E+00	4.21E+04	4.21E+04	1.2500
Eu-154	2.6341E-03	45,119.376	45,119.376	0.00E+00	1.19E+02	1.19E+02	1.7500
Eu-155	4.0968E-04	45,119.376	45,119.376	0.00E+00	1.85E+01	1.85E+01	2.2500
Fe-55	2.5543E-07	45,119.376	45,119.376	0.00E+00	1.15E-02	1.15E-02	2.7500
H-3	1.2053E-03	45,119.376	45,119.376	0.00E+00	5.44E+01	5.44E+01	3.5000
I-129	1.2891E-06	45,119.376	45,119.376	0.00E+00	5.82E-02	5.82E-02	5.0000
Kr-85	7.0043E-03	45,119.376	45,119.376	0.00E+00	3.16E+02	3.16E+02	7.0000
Np-237	4.3622E-06	45,119.376	45,119.376	0.00E+00	1.97E-01	1.97E-01	11.0000
Pa-231	1.6733E-11	45,119.376	45,119.376	0.00E+00	7.55E-07	7.55E-07	
Pb-210	6.0684E-12	45,119.376	45,119.376	0.00E+00	2.74E-07	2.74E-07	
Pm-147	1.1315E-05	45,119.376	45,119.376	0.00E+00	5.11E-01	5.11E-01	
Pu-238	6.1482E-03	45,119.376	45,119.376	0.00E+00	2.77E+02	2.77E+02	
Pu-239	-3.5520E-02	45,119.376	0.000	1.43E+03	0.00E+00	1.43E+03	
Pu-240	2.0590E-02	45,119.376	45,119.376	7.27E+02	1.66E+03	1.66E+03	
Pu-241	-2.0307E+00	45,119.376	0.000	3.26E+04	0.00E+00	3.26E+04	
Pu-242	1.1252E-05	45,119.376	45,119.376	1.94E-01	7.02E-01	7.02E-01	
Ra-226	1.6601E-11	45,119.376	45,119.376	0.00E+00	7.49E-07	7.49E-07	
Ra-228	3.7077E-16	45,119.376	45,119.376	0.00E+00	1.67E-11	1.67E-11	
Ru-106	3.3126E-14	45,119.376	45,119.376	0.00E+00	1.49E-09	1.49E-09	
Se-79	1.0117E-05	45,119.376	45,119.376	0.00E+00	4.56E-01	4.56E-01	
Sn-126	4.3902E-05	45,119.376	45,119.376	0.00E+00	1.98E+00	1.98E+00	
Sr-90	3.2926E-01	45,119.376	45,119.376	0.00E+00	1.49E+04	1.49E+04	
Tc-99	3.9412E-04	45,119.376	45,119.376	0.00E+00	1.78E+01	1.78E+01	
Th-229	3.6957E-12	45,119.376	45,119.376	0.00E+00	1.67E-07	1.67E-07	
Th-230	1.6942E-09	45,119.376	45,119.376	0.00E+00	7.64E-05	7.64E-05	
Th-232	4.6236E-16	45,119.376	45,119.376	0.00E+00	2.09E-11	2.09E-11	
Tl-208	4.0390E-07	45,119.376	45,119.376	0.00E+00	1.82E-02	1.82E-02	
U-232	1.0941E-06	45,119.376	45,119.376	0.00E+00	4.94E-02	4.94E-02	
U-233	8.1218E-10	45,119.376	45,119.376	0.00E+00	3.66E-05	3.66E-05	
U-234	5.3101E-06	45,119.376	45,119.376	0.00E+00	2.40E-01	2.40E-01	
U-235	-6.7647E-09	45,119.376	0.000	2.94E-04	0.00E+00	2.94E-04	
U-236	2.1272E-07	45,119.376	45,119.376	0.00E+00	9.60E-03	9.60E-03	
U-238	-1.7914E-07	45,119.376	0.000	2.14E-02	1.33E-02	2.14E-02	
Y-90	3.2926E-01	45,119.376	45,119.376	0.00E+00	1.49E+04	1.49E+04	
Other Radionuclides					4.34E+04	4.34E+04	

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.39E+02	5.85E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
Reactor Moderator:	From SFD	Used
Fuel Cladding:	FAST	FAST
BOL HM Constituents:	ZIRC-2	SST
BOL Enrichment %:	PuO2-UO2	Pu and U
		10 to 30

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

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:		45,119.376
Bounding:		45,119.376

Basis for burnup used in estimate:
Nominal burnup set equal to bounding burnup.
Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	3.28	
Bounding:	3.28	

Estimated EOL HM/Given EOL HM: **1.05**

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

²Total burnup for all fuel associated with this worksheet must be 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=3.99kg ; EOL=3.98kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template 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							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.4545E-10	7.576	15.152	0.00E+00	1.10E-09	2.20E-09		
Am-241	1.1190E-03	7.576	15.152	0.00E+00	8.48E-03	1.70E-02	0.0150	2.924E+12
Am-242m	4.5425E-07	7.576	15.152	0.00E+00	3.44E-06	6.88E-06	0.0250	6.298E+11
Am-243	1.4921E-06	7.576	15.152	0.00E+00	1.13E-05	2.26E-05	0.0375	5.812E+11
C-14	5.7244E-09	7.576	15.152	0.00E+00	4.34E-08	8.67E-08	0.0575	5.714E+11
Cl-36	1.3124E-32	7.576	15.152	0.00E+00	9.94E-32	1.99E-31	0.0850	3.643E+11
Cm-243	2.3676E-07	7.576	15.152	0.00E+00	1.79E-06	3.59E-06	0.1250	3.155E+11
Cm-244	5.2042E-05	7.576	15.152	0.00E+00	3.94E-04	7.89E-04	0.2250	3.089E+11
Co-60	3.8208E-05	7.576	15.152	0.00E+00	2.89E-04	5.79E-04	0.3750	1.495E+11
Cs-134	4.8693E-01	7.576	15.152	0.00E+00	3.69E+00	7.38E+00	0.5750	2.053E+12
Cs-135	3.4477E-06	7.576	15.152	0.00E+00	2.61E-05	5.22E-05	0.8500	2.875E+11
Cs-137	2.8731E+00	7.576	15.152	0.00E+00	2.18E+01	4.35E+01	1.2500	5.349E+10
Eu-154	8.2053E-02	7.576	15.152	0.00E+00	6.22E-01	1.24E+00	1.7500	2.243E+09
Eu-155	3.9134E-02	7.576	15.152	0.00E+00	2.96E-01	5.93E-01	2.2500	4.705E+09
Fe-55	6.7429E-03	7.576	15.152	0.00E+00	5.11E-02	1.02E-01	2.7500	2.707E+07
H-3	1.0599E-02	7.576	15.152	0.00E+00	8.03E-02	1.61E-01	3.5000	3.003E+06
I-129	7.5300E-07	7.576	15.152	0.00E+00	5.70E-06	1.14E-05	5.0000	9.269E+10
Kr-85	2.8595E-01	7.576	15.152	0.00E+00	2.17E+00	4.33E+00	7.0000	1.034E+01
Np-237	9.5479E-06	7.576	15.152	0.00E+00	7.23E-05	1.45E-04	11.0000	1.165E-01
Pa-231	8.9297E-10	7.576	15.152	0.00E+00	6.77E-09	1.35E-08		
Pb-210	3.7609E-12	7.576	15.152	0.00E+00	2.85E-11	5.70E-11		
Pm-147	2.5452E+00	7.576	15.152	0.00E+00	1.93E+01	3.86E+01		
Pu-238	2.0550E-02	7.576	15.152	0.00E+00	1.56E-01	3.11E-01		
Pu-239	4.2838E-04	7.576	15.152	0.00E+00	3.25E-03	6.49E-03		
Pu-240	2.4401E-04	7.576	15.152	0.00E+00	1.85E-03	3.70E-03		
Pu-241	6.8764E-02	7.576	15.152	0.00E+00	5.21E-01	1.04E+00		
Pu-242	3.6329E-07	7.576	15.152	0.00E+00	2.75E-06	5.50E-06		
Ra-226	3.8045E-11	7.576	15.152	0.00E+00	2.88E-10	5.76E-10		
Ra-228	2.9902E-15	7.576	15.152	0.00E+00	2.27E-14	4.53E-14		
Ru-106	1.9055E-01	7.576	15.152	0.00E+00	1.44E+00	2.89E+00		
Se-79	1.2936E-05	7.576	15.152	0.00E+00	9.80E-05	1.96E-04		
Sn-126	1.1574E-05	7.576	15.152	0.00E+00	8.77E-05	1.75E-04		
Sr-90	2.7505E+00	7.576	15.152	0.00E+00	2.08E+01	4.17E+01		
Tc-99	4.2239E-04	7.576	15.152	0.00E+00	3.20E-03	6.40E-03		
Th-229	1.8848E-12	7.576	15.152	0.00E+00	1.43E-11	2.86E-11		
Th-230	1.7042E-08	7.576	15.152	0.00E+00	1.29E-07	2.58E-07		
Th-232	7.8132E-15	7.576	15.152	0.00E+00	5.92E-14	1.18E-13		
Th-234	4.4063E-08	7.576	15.152	0.00E+00	3.34E-07	6.68E-07		
U-232	1.3151E-07	7.576	15.152	0.00E+00	9.96E-07	1.99E-06		
U-233	1.9564E-09	7.576	15.152	0.00E+00	1.48E-08	2.96E-08		
U-234	1.8371E-04	7.576	15.152	0.00E+00	1.39E-03	2.78E-03		
U-235	-2.7235E-06	7.576	0.000	8.10E-03	8.08E-03	8.10E-03		
U-236	1.5493E-05	7.576	15.152	0.00E+00	1.17E-04	2.35E-04		
U-238	-4.2851E-09	7.576	0.000	8.13E-05	8.13E-05	8.13E-05		
Y-90	2.7505E+00	7.576	15.152	0.00E+00	2.08E+01	4.17E+01		
Other Radionuclides					3.90E+01	7.79E+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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.93787575	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		7.576	
Bounding:		15.152	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.01		
Bounding:	0.01		

Estimated EOL HM/Given EOL HM: 1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: GETR FILTERS
 SNF ID #: 98
 Fuel Units & Descr: 70 - FILTERS
 Heavy Metal Mass: BOL=4.54kg ; EOL=4.42kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1977
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 50 years

Estimated
 Canister usage:
 HIC
 1.56

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.4276E-08	119.026	238.051	0.00E+00	4.08E-06	8.16E-06	Avg. MeV	
Am-241	1.1458E-04	119.026	238.051	0.00E+00	1.36E-02	2.73E-02	0.0150	1.241E+13
Am-242m	7.9468E-09	119.026	238.051	0.00E+00	9.46E-07	1.89E-06	0.0250	2.580E+12
Am-243	9.8386E-10	119.026	238.051	0.00E+00	1.17E-07	2.34E-07	0.0375	2.237E+12
C-14	2.2978E-04	119.026	238.051	0.00E+00	2.74E-02	5.47E-02	0.0575	2.406E+12
Cl-36	1.2261E-06	119.026	238.051	0.00E+00	1.46E-04	2.92E-04	0.0850	1.453E+12
Cm-243	1.7271E-10	119.026	238.051	0.00E+00	2.06E-08	4.11E-08	0.1250	9.427E+11
Cm-244	1.3058E-09	119.026	238.051	0.00E+00	1.55E-07	3.11E-07	0.2250	1.252E+12
Co-60	9.8636E-03	119.026	238.051	0.00E+00	1.17E+00	2.35E+00	0.3750	5.462E+11
Cs-134	1.9617E-08	119.026	238.051	0.00E+00	2.33E-06	4.67E-06	0.5750	9.094E+12
Cs-135	3.0316E-05	119.026	238.051	0.00E+00	3.61E-03	7.22E-03	0.8500	8.979E+10
Cs-137	1.0263E+00	119.026	238.051	0.00E+00	1.22E+02	2.44E+02	1.2500	2.045E+11
Eu-154	2.0017E-04	119.026	238.051	0.00E+00	2.38E-02	4.76E-02	1.7500	2.313E+09
Eu-155	8.5957E-05	119.026	238.051	0.00E+00	1.02E-02	2.05E-02	2.2500	1.172E+06
Fe-55	2.2646E-05	119.026	238.051	0.00E+00	2.70E-03	5.39E-03	2.7500	1.596E+05
H-3	1.0835E-03	119.026	238.051	0.00E+00	1.29E-01	2.58E-01	3.5000	1.472E+01
I-129	7.3195E-07	119.026	238.051	0.00E+00	8.71E-05	1.74E-04	5.0000	6.083E+00
Kr-85	1.5661E-02	119.026	238.051	0.00E+00	1.86E+00	3.73E+00	7.0000	6.727E-01
Np-237	1.1494E-06	119.026	238.051	0.00E+00	1.37E-04	2.74E-04	11.0000	7.556E-02
Pa-231	5.8070E-08	119.026	238.051	0.00E+00	6.91E-06	1.38E-05		
Pb-210	1.2985E-12	119.026	238.051	0.00E+00	1.55E-10	3.09E-10		
Pm-147	2.2196E-05	119.026	238.051	0.00E+00	2.64E-03	5.28E-03		
Pu-238	2.6223E-04	119.026	238.051	0.00E+00	3.12E-02	6.24E-02		
Pu-239	6.6739E-04	119.026	238.051	0.00E+00	7.94E-02	1.59E-01		
Pu-240	8.6705E-05	119.026	238.051	0.00E+00	1.03E-02	2.06E-02		
Pu-241	3.4759E-04	119.026	238.051	0.00E+00	4.14E-02	8.27E-02		
Pu-242	1.9717E-09	119.026	238.051	0.00E+00	2.35E-07	4.69E-07		
Ra-226	3.0000E-12	119.026	238.051	0.00E+00	3.57E-10	7.14E-10		
Ra-228	8.3328E-12	119.026	238.051	0.00E+00	9.92E-10	1.98E-09		
Ru-106	6.1464E-15	119.026	238.051	0.00E+00	7.32E-13	1.46E-12		
Se-79	1.3221E-05	119.026	238.051	0.00E+00	1.57E-03	3.15E-03		
Sn-126	1.1491E-05	119.026	238.051	0.00E+00	1.37E-03	2.74E-03		
Sr-90	9.5541E-01	119.026	238.051	0.00E+00	1.14E+02	2.27E+02		
Tc-99	4.6656E-04	119.026	238.051	0.00E+00	5.55E-02	1.11E-01		
Th-229	1.9085E-11	119.026	238.051	0.00E+00	2.27E-09	4.54E-09		
Th-230	2.1913E-10	119.026	238.051	0.00E+00	2.61E-08	5.22E-08		
Th-232	8.3478E-12	119.026	238.051	0.00E+00	9.94E-10	1.99E-09		
Ti-208	1.8752E-08	119.026	238.051	0.00E+00	2.23E-06	4.46E-06		
U-232	5.0782E-08	119.026	238.051	0.00E+00	6.04E-06	1.21E-05		
U-233	3.2596E-09	119.026	238.051	0.00E+00	3.88E-07	7.76E-07		
U-234	3.9817E-07	119.026	238.051	0.00E+00	4.74E-05	9.48E-05		
U-235	-2.7761E-06	119.026	0.000	9.14E-03	8.81E-03	9.14E-03		
U-236	1.6190E-05	119.026	238.051	0.00E+00	1.93E-03	3.85E-03		
U-238	-2.8547E-09	119.026	0.000	1.05E-04	1.04E-04	1.05E-04		
Y-90	9.5557E-01	119.026	238.051	0.00E+00	1.14E+02	2.27E+02		
Other Radionuclides					1.45E+02	2.90E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.39E+00	2.78E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative).
Fuel Cladding:	NONE	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	93.14635987	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		119.026	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		238.051	

Checks			
	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.56		1.00
Bounding:	1.12		

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

²Total burnup for all fuel associated with this worksheet must be 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 (GREECE)
 SNF ID #: 1069
 Fuel Units & Descr: 46 - MTR TYPE
 Heavy Metal Mass: BOL=7.99kg ; EOL=6.27kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1993
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 1.28

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.0068E-09	1,629.252	3,258.504	0.00E+00	3.27E-06	6.54E-06	Avg. MeV	
Am-241	2.5251E-03	1,629.252	3,258.504	0.00E+00	4.11E+00	8.23E+00	0.0150	2.400E+14
Am-242m	3.9624E-07	1,629.252	3,258.504	0.00E+00	6.46E-04	1.29E-03	0.0250	4.983E+13
Am-243	1.4880E-06	1,629.252	3,258.504	0.00E+00	2.42E-03	4.85E-03	0.0375	4.332E+13
C-14	5.7053E-09	1,629.252	3,258.504	0.00E+00	9.30E-06	1.86E-05	0.0575	4.662E+13
Cl-36	1.3124E-32	1,629.252	3,258.504	0.00E+00	2.14E-29	4.28E-29	0.0850	2.809E+13
Cm-243	1.1419E-07	1,629.252	3,258.504	0.00E+00	1.86E-04	3.72E-04	0.1250	1.855E+13
Cm-244	1.6522E-05	1,629.252	3,258.504	0.00E+00	2.69E-02	5.38E-02	0.2250	2.425E+13
Co-60	7.4047E-07	1,629.252	3,258.504	0.00E+00	1.21E-03	2.41E-03	0.3750	1.055E+13
Cs-134	2.0455E-05	1,629.252	3,258.504	0.00E+00	3.33E-02	6.67E-02	0.5750	1.744E+14
Cs-135	3.4477E-06	1,629.252	3,258.504	0.00E+00	5.62E-03	1.12E-02	0.8500	2.130E+13
Cs-137	1.4365E+00	1,629.252	3,258.504	0.00E+00	2.34E+03	4.68E+03	1.2500	1.030E+12
Eu-154	7.3230E-03	1,629.252	3,258.504	0.00E+00	1.19E+01	2.39E+01	1.7500	5.799E+10
Eu-155	5.9259E-04	1,629.252	3,258.504	0.00E+00	9.65E-01	1.93E+00	2.2500	4.850E+06
Fe-55	2.2791E-06	1,629.252	3,258.504	0.00E+00	3.71E-03	7.43E-03	2.7500	4.627E+06
H-3	1.9698E-03	1,629.252	3,258.504	0.00E+00	3.21E+00	6.42E+00	3.5000	2.681E+03
I-129	7.5300E-07	1,629.252	3,258.504	0.00E+00	1.23E-03	2.45E-03	5.0000	1.096E+09
Kr-85	4.1176E-02	1,629.252	3,258.504	0.00E+00	6.71E+01	1.34E+02	7.0000	1.199E+02
Np-237	9.5752E-04	1,629.252	3,258.504	0.00E+00	1.56E-02	3.12E-02	11.0000	1.337E+01
Pa-231	3.9379E-09	1,629.252	3,258.504	0.00E+00	6.42E-06	1.28E-05		
Pb-210	3.3115E-10	1,629.252	3,258.504	0.00E+00	5.40E-07	1.08E-06		
Pm-147	9.2402E-04	1,629.252	3,258.504	0.00E+00	1.51E+00	3.01E+00		
Pu-238	1.6217E-02	1,629.252	3,258.504	0.00E+00	2.64E+01	5.28E+01		
Pu-239	4.2810E-04	1,629.252	3,258.504	0.00E+00	6.97E-01	1.39E+00		
Pu-240	2.4333E-04	1,629.252	3,258.504	0.00E+00	3.96E-01	7.93E-01		
Pu-241	1.6242E-02	1,629.252	3,258.504	0.00E+00	2.65E+01	5.29E+01		
Pu-242	3.6329E-07	1,629.252	3,258.504	0.00E+00	5.92E-04	1.18E-03		
Ra-226	9.0114E-10	1,629.252	3,258.504	0.00E+00	1.47E-06	2.94E-06		
Ra-228	3.1019E-14	1,629.252	3,258.504	0.00E+00	5.05E-11	1.01E-10		
Ru-106	2.1225E-10	1,629.252	3,258.504	0.00E+00	3.46E-07	6.92E-07		
Se-79	1.2930E-05	1,629.252	3,258.504	0.00E+00	2.11E-02	4.21E-02		
Sn-126	1.1571E-05	1,629.252	3,258.504	0.00E+00	1.89E-02	3.77E-02		
Sr-90	1.3472E+00	1,629.252	3,258.504	0.00E+00	2.19E+03	4.39E+03		
Tc-99	4.2239E-04	1,629.252	3,258.504	0.00E+00	6.88E-01	1.38E+00		
Th-229	1.2407E-11	1,629.252	3,258.504	0.00E+00	2.02E-08	4.04E-08		
Th-230	8.3497E-08	1,629.252	3,258.504	0.00E+00	1.36E-04	2.72E-04		
Th-232	3.8371E-14	1,629.252	3,258.504	0.00E+00	6.25E-11	1.25E-10		
Th-208	4.0414E-08	1,629.252	3,258.504	0.00E+00	6.58E-05	1.32E-04		
U-232	1.0948E-07	1,629.252	3,258.504	0.00E+00	1.78E-04	3.57E-04		
U-233	3.6275E-09	1,629.252	3,258.504	0.00E+00	5.91E-06	1.18E-05		
U-234	1.8562E-04	1,629.252	3,258.504	0.00E+00	3.02E-01	6.05E-01		
U-235	-2.7235E-06	1,629.252	0.000	1.59E-02	1.14E-02	1.59E-02		
U-236	1.5493E-05	1,629.252	3,258.504	0.00E+00	2.52E-02	5.05E-02		
U-238	-4.2851E-09	1,629.252	0.000	2.17E-04	2.10E-04	2.17E-04		
Y-90	1.3475E+00	1,629.252	3,258.504	0.00E+00	2.20E+03	4.39E+03		
Other Radionuclides					2.23E+03	4.46E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.73E+01	5.45E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	91.93720219	60 to 100	

Burnup Summary (MWd) ³			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	1,629.252	1,629.252	
Bounding:	3,258.504	3,258.504	

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

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

²Total burnup for all fuel associated with this worksheet must be 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 (GREECE)
 SNF ID #: 440
 Fuel Units & Descr: 108 - MTR TYPE
 Heavy Metal Mass: BOL=18.76kg ; EOL=14.72kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1993
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 3.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.0068E-09	3,825.201	7,650.402	0.00E+00	7.68E-06	1.54E-05	Avg. MeV	
Am-241	2.5251E-03	3,825.201	7,650.402	0.00E+00	9.66E+00	1.93E+01	0.0150	5.635E+14
Am-242m	3.9624E-07	3,825.201	7,650.402	0.00E+00	1.52E-03	3.03E-03	0.0250	1.170E+14
Am-243	1.4880E-06	3,825.201	7,650.402	0.00E+00	5.69E-03	1.14E-02	0.0375	1.017E+14
C-14	5.7053E-09	3,825.201	7,650.402	0.00E+00	2.18E-05	4.36E-05	0.0575	1.095E+14
Cl-36	1.3124E-32	3,825.201	7,650.402	0.00E+00	5.02E-29	1.00E-28	0.0850	6.596E+13
Cm-243	1.1419E-07	3,825.201	7,650.402	0.00E+00	4.37E-04	8.74E-04	0.1250	4.356E+13
Cm-244	1.6522E-05	3,825.201	7,650.402	0.00E+00	6.32E-02	1.26E-01	0.2250	5.694E+13
Co-60	7.4047E-07	3,825.201	7,650.402	0.00E+00	2.83E-03	5.66E-03	0.3750	2.477E+13
Cs-134	2.0455E-05	3,825.201	7,650.402	0.00E+00	7.82E-02	1.56E-01	0.5750	4.094E+14
Cs-135	3.4477E-06	3,825.201	7,650.402	0.00E+00	1.32E-02	2.64E-02	0.8500	5.001E+12
Cs-137	1.4365E+00	3,825.201	7,650.402	0.00E+00	5.50E+03	1.10E+04	1.2500	2.419E+12
Eu-154	7.3230E-03	3,825.201	7,650.402	0.00E+00	2.80E+01	5.60E+01	1.7500	1.362E+11
Eu-155	5.9259E-04	3,825.201	7,650.402	0.00E+00	2.27E+00	4.53E+00	2.2500	1.139E+07
Fe-55	2.2791E-06	3,825.201	7,650.402	0.00E+00	8.72E-03	1.74E-02	2.7500	1.086E+07
H-3	1.9698E-03	3,825.201	7,650.402	0.00E+00	7.53E+00	1.51E+01	3.5000	6.295E+03
I-129	7.5300E-07	3,825.201	7,650.402	0.00E+00	2.88E-03	5.76E-03	5.0000	2.572E+03
Kr-85	4.1176E-02	3,825.201	7,650.402	0.00E+00	1.58E+02	3.15E+02	7.0000	2.815E+02
Np-237	9.5752E-06	3,825.201	7,650.402	0.00E+00	3.66E-02	7.33E-02	11.0000	3.139E+01
Pa-231	3.9379E-09	3,825.201	7,650.402	0.00E+00	1.51E-05	3.01E-05		
Pb-210	3.3115E-10	3,825.201	7,650.402	0.00E+00	1.27E-06	2.53E-06		
Pm-147	9.2402E-04	3,825.201	7,650.402	0.00E+00	3.53E+00	7.07E+00		
Pu-238	1.6217E-02	3,825.201	7,650.402	0.00E+00	6.20E+01	1.24E+02		
Pu-239	4.2810E-04	3,825.201	7,650.402	0.00E+00	1.64E+00	3.28E+00		
Pu-240	2.4333E-04	3,825.201	7,650.402	0.00E+00	9.31E-01	1.86E+00		
Pu-241	1.6242E-02	3,825.201	7,650.402	0.00E+00	6.21E+01	1.24E+02		
Pu-242	3.6329E-07	3,825.201	7,650.402	0.00E+00	1.39E-03	2.78E-03		
Ra-226	9.0114E-10	3,825.201	7,650.402	0.00E+00	3.45E-06	6.89E-06		
Ra-228	3.1019E-14	3,825.201	7,650.402	0.00E+00	1.19E-10	2.37E-10		
Ru-106	2.1225E-10	3,825.201	7,650.402	0.00E+00	8.12E-07	1.62E-06		
Se-79	1.2930E-05	3,825.201	7,650.402	0.00E+00	4.95E-02	9.89E-02		
Sn-126	1.1571E-05	3,825.201	7,650.402	0.00E+00	4.43E-02	8.85E-02		
Sr-90	1.3472E+00	3,825.201	7,650.402	0.00E+00	5.15E+03	1.03E+04		
Tc-99	4.2239E-04	3,825.201	7,650.402	0.00E+00	1.62E+00	3.23E+00		
Th-229	1.2407E-11	3,825.201	7,650.402	0.00E+00	4.75E-08	9.49E-08		
Th-230	8.3497E-08	3,825.201	7,650.402	0.00E+00	3.19E-04	6.39E-04		
Th-232	3.8371E-14	3,825.201	7,650.402	0.00E+00	1.47E-10	2.94E-10		
Ti-208	4.0414E-08	3,825.201	7,650.402	0.00E+00	1.55E-04	3.09E-04		
U-232	1.0948E-07	3,825.201	7,650.402	0.00E+00	4.19E-04	8.38E-04		
U-233	3.6275E-09	3,825.201	7,650.402	0.00E+00	1.39E-05	2.78E-05		
U-234	1.8562E-04	3,825.201	7,650.402	0.00E+00	7.10E-01	1.42E+00		
U-235	-2.7235E-06	3,825.201	0.000	3.73E-02	2.69E-02	3.73E-02		
U-236	1.5493E-05	3,825.201	7,650.402	0.00E+00	5.93E-02	1.19E-01		
U-238	-4.2851E-09	3,825.201	0.000	5.08E-04	4.92E-04	5.08E-04		
Y-90	1.3475E+00	3,825.201	7,650.402	0.00E+00	5.15E+03	1.03E+04		
Other Radionuclides					5.23E+03	1.05E+04		
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							6.40E+01	1.28E+02
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	91.93720219	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		3,825.201	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		7,650.402	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.65		1.02
Bounding:	1.30		

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

²Total burnup for all fuel associated with this worksheet must be 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

¹Fuel decay start date: 1996
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.69

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	5.4520E-10	534.240	1,068.479	0.00E+00	2.91E-07	5.83E-07	0.0150	1.002E+14
Am-241	9.2284E-03	534.240	1,068.479	0.00E+00	4.93E+00	9.86E+00	0.0250	2.062E+13
Am-242m	1.3390E-06	534.240	1,068.479	0.00E+00	7.15E-04	1.43E-03	0.0375	1.820E+13
Am-243	3.7084E-05	534.240	1,068.479	0.00E+00	1.98E-02	3.96E-02	0.0575	1.942E+13
C-14	2.6452E-08	534.240	1,068.479	0.00E+00	1.41E-05	2.83E-05	0.0850	1.169E+13
Cl-36	4.4441E-31	534.240	1,068.479	0.00E+00	2.37E-28	4.75E-28	0.1250	8.109E+12
Cm-243	5.0498E-06	534.240	1,068.479	0.00E+00	2.70E-03	5.40E-03	0.2250	1.009E+13
Cm-244	3.8451E-03	534.240	1,068.479	0.00E+00	2.05E+00	4.11E+00	0.3750	4.367E+12
Co-60	2.5225E-05	534.240	1,068.479	0.00E+00	1.35E-02	2.70E-02	0.5750	7.241E+13
Cs-134	1.9830E-03	534.240	1,068.479	0.00E+00	1.06E+00	2.12E+00	0.8500	1.426E+12
Cs-135	4.2564E-06	534.240	1,068.479	0.00E+00	2.27E-03	4.55E-03	1.2500	9.626E+11
Cs-137	1.8141E+00	534.240	1,068.479	0.00E+00	9.69E+02	1.94E+03	7.0000	3.081E+10
Eu-154	3.4733E-02	534.240	1,068.479	0.00E+00	1.86E+01	3.71E+01	2.2500	2.148E+06
Eu-155	7.1081E-03	534.240	1,068.479	0.00E+00	3.80E+00	7.59E+00	2.7500	1.846E+06
Fe-55	3.5790E-04	534.240	1,068.479	0.00E+00	1.91E-01	3.82E-01	3.5000	6.338E+04
H-3	3.4945E-03	534.240	1,068.479	0.00E+00	1.87E+00	3.73E+00	5.0000	2.686E+04
I-129	6.6403E-07	534.240	1,068.479	0.00E+00	3.55E-04	7.10E-04	7.0000	3.081E+10
Kr-85	7.8250E-02	534.240	1,068.479	0.00E+00	4.18E+01	8.36E+01	11.0000	3.529E+02
Np-237	3.1567E-05	534.240	1,068.479	0.00E+00	1.69E-02	3.37E-02		
Pa-231	1.3372E-09	534.240	1,068.479	0.00E+00	7.14E-07	1.43E-06		
Pb-210	3.0644E-11	534.240	1,068.479	0.00E+00	1.64E-08	3.27E-08		
Pm-147	6.5188E-03	534.240	1,068.479	0.00E+00	3.48E+00	6.97E+00		
Pu-238	1.4769E-01	534.240	1,068.479	0.00E+00	7.89E+01	1.58E+02		
Pu-239	6.9502E-04	534.240	1,068.479	0.00E+00	3.71E-01	7.43E-01		
Pu-240	3.7928E-04	534.240	1,068.479	0.00E+00	2.03E-01	4.05E-01		
Pu-241	1.0565E-01	534.240	1,068.479	0.00E+00	5.64E+01	1.13E+02		
Pu-242	3.0911E-06	534.240	1,068.479	0.00E+00	1.65E-03	3.30E-03		
Ra-226	1.1081E-10	534.240	1,068.479	0.00E+00	5.92E-08	1.18E-07		
Ra-228	2.1185E-14	534.240	1,068.479	0.00E+00	1.13E-11	2.26E-11		
Ru-106	2.3621E-07	534.240	1,068.479	0.00E+00	1.26E-04	2.52E-04		
Se-79	1.2339E-05	534.240	1,068.479	0.00E+00	6.59E-03	1.32E-02		
Sn-126	1.0194E-05	534.240	1,068.479	0.00E+00	5.45E-03	1.09E-02		
Sr-90	1.6932E+00	534.240	1,068.479	0.00E+00	9.05E+02	1.81E+03		
Tc-99	3.8056E-04	534.240	1,068.479	0.00E+00	2.03E-01	4.07E-01		
Th-229	9.1252E-12	534.240	1,068.479	0.00E+00	4.88E-09	9.75E-09		
Th-230	1.5407E-08	534.240	1,068.479	0.00E+00	8.23E-06	1.65E-05		
Th-232	2.8937E-14	534.240	1,068.479	0.00E+00	1.55E-11	3.09E-11		
Tl-208	4.7272E-08	534.240	1,068.479	0.00E+00	2.53E-05	5.05E-05		
U-232	1.2855E-07	534.240	1,068.479	0.00E+00	6.87E-05	1.37E-04		
U-233	5.1470E-09	534.240	1,068.479	0.00E+00	2.75E-06	5.50E-06		
U-234	5.6069E-05	534.240	1,068.479	0.00E+00	3.00E-02	5.99E-02		
U-235	-2.8661E-06	534.240	0.000	1.02E-02	8.63E-03	1.02E-02		
U-236	1.6701E-05	534.240	1,068.479	0.00E+00	8.92E-03	1.78E-02		
U-238	-9.4194E-09	534.240	0.000	1.18E-04	1.13E-04	1.18E-04		
Y-90	1.6932E+00	534.240	1,068.479	0.00E+00	9.05E+02	1.81E+03		
Other Radionuclides					9.27E+02	1.85E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.06930693	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		534.240	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,068.479	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.24		1.00
Bounding:	0.48		

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

² Total burnup for all fuel associated with this worksheet must be 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=.55kg ; EOL=.52kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1966
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 50 years

Estimated
 Canister usage:
18"x15"
 0.04

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.5200E-06	25.850	51.699	0.00E+00	6.51E-05	1.30E-04		
Am-241	8.6432E+00	25.850	51.699	0.00E+00	2.23E+02	4.47E+02	0.0150	4.428E+13
Am-242m	1.5728E-02	25.850	51.699	0.00E+00	4.07E-01	8.13E-01	0.0250	8.654E+12
Am-243	1.6288E-02	25.850	51.699	0.00E+00	4.21E-01	8.42E-01	0.0375	7.318E+12
C-14	1.2068E-01	25.850	51.699	0.00E+00	3.12E+00	6.24E+00	0.0575	1.382E+13
Cf-36	2.2849E-03	25.850	51.699	0.00E+00	5.91E-02	1.18E-01	0.0850	4.633E+12
Cm-243	6.0144E-04	25.850	51.699	0.00E+00	1.55E-02	3.11E-02	0.1250	3.278E+12
Cm-244	9.4880E-02	25.850	51.699	0.00E+00	2.45E+00	4.91E+00	0.2250	4.009E+12
Co-60	3.9052E+00	25.850	51.699	0.00E+00	1.01E+02	2.02E+02	0.3750	1.735E+12
Cs-134	2.2139E-06	25.850	51.699	0.00E+00	5.72E-05	1.14E-04	0.5750	2.872E+13
Cs-135	4.3976E-04	25.850	51.699	0.00E+00	1.14E-02	2.27E-02	0.8500	6.290E+11
Cs-137	1.4887E+01	25.850	51.699	0.00E+00	3.85E+02	7.70E+02	1.2500	1.542E+13
Eu-154	3.7342E-01	25.850	51.699	0.00E+00	9.65E+00	1.93E+01	1.7500	1.853E+10
Eu-155	8.4893E-03	25.850	51.699	0.00E+00	2.19E-01	4.39E-01	2.2500	8.014E+07
Fe-55	5.3750E-03	25.850	51.699	0.00E+00	1.39E-01	2.78E-01	2.7500	1.379E+08
H-3	1.0472E-01	25.850	51.699	0.00E+00	2.71E+00	5.41E+00	3.5000	8.339E+04
I-129	1.0618E-05	25.850	51.699	0.00E+00	2.74E-04	5.49E-04	5.0000	3.523E+04
Kr-85	2.2717E-01	25.850	51.699	0.00E+00	5.87E+00	1.17E+01	7.0000	4.010E+03
Np-237	1.6400E-04	25.850	51.699	0.00E+00	4.24E-03	8.48E-03	11.0000	4.573E+02
Pa-231	2.8688E-06	25.850	51.699	0.00E+00	7.42E-05	1.48E-04		
Pb-210	4.7312E-08	25.850	51.699	0.00E+00	1.22E-06	2.45E-06		
Pm-147	3.2198E-04	25.850	51.699	0.00E+00	8.32E-03	1.66E-02		
Pu-238	-1.1924E+00	25.850	0.000	7.03E+01	3.95E+01	7.03E+01		
Pu-239	-4.8600E-02	25.850	0.000	8.51E+00	7.25E+00	8.51E+00		
Pu-240	-3.0127E-01	25.850	0.000	1.09E+01	3.08E+00	1.09E+01		
Pu-241	-1.2917E+02	25.850	0.000	2.80E+03	0.00E+00	2.80E+03		
Pu-242	-1.1381E-04	25.850	0.000	4.70E-02	4.41E-02	4.70E-02		
Ra-226	1.0760E-07	25.850	51.699	0.00E+00	2.78E-06	5.56E-06		
Ra-228	6.0160E-07	25.850	51.699	0.00E+00	1.56E-05	3.11E-05		
Ru-106	1.3388E-13	25.850	51.699	0.00E+00	3.46E-12	6.92E-12		
Se-79	1.9179E-04	25.850	51.699	0.00E+00	4.96E-03	9.92E-03		
Sn-126	1.6669E-04	25.850	51.699	0.00E+00	4.31E-03	8.62E-03		
Sr-90	1.3859E+01	25.850	51.699	0.00E+00	3.58E+02	7.17E+02		
Tc-99	6.7678E-03	25.850	51.699	0.00E+00	1.75E-01	3.50E-01		
Th-229	2.2592E-06	25.850	51.699	0.00E+00	5.84E-05	1.17E-04		
Th-230	7.5955E-06	25.850	51.699	0.00E+00	1.96E-04	3.93E-04		
Th-232	6.0208E-07	25.850	51.699	0.00E+00	1.56E-05	3.11E-05		
Th-238	7.5795E-05	25.850	51.699	0.00E+00	1.96E-03	3.92E-03		
U-232	2.0521E-04	25.850	51.699	0.00E+00	5.30E-03	1.06E-02		
U-233	3.6128E-04	25.850	51.699	0.00E+00	9.34E-03	1.87E-02		
U-234	1.2788E-02	25.850	51.699	0.00E+00	3.31E-01	6.61E-01		
U-235	5.7486E-04	25.850	51.699	2.35E-04	1.51E-02	3.00E-02		
U-236	2.3485E-04	25.850	51.699	0.00E+00	6.07E-03	1.21E-02		
U-238	1.1581E-04	25.850	51.699	2.93E-05	3.02E-03	6.02E-03		
Y-90	1.3861E+01	25.850	51.699	0.00E+00	3.58E+02	7.17E+02		
Other Radionuclides					1.33E+03	2.66E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.55E+01	3.08E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	ZIRC-4	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:	2.896564327	0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		25.850	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:	16.416	51.699	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	1.41	Estimated EOL HM/ Given EOL HM
Bounding:	2.82	

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (ASSEMBLY)
 SNF ID #: 383
 Fuel Units & Descr: 1 - ASSEMBLY
 Heavy Metal Mass: BOL=236.25kg ; EOL=229.17kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1974
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 1.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.0733E-09	6,732.935	13,465.871	0.00E+00	7.23E-06	1.45E-05	Avg. MeV	
Am-241	1.4751E-01	6,732.935	13,465.871	0.00E+00	9.93E+02	1.99E+03	0.0150	5.124E+14
Am-242m	2.6809E-04	6,732.935	13,465.871	0.00E+00	1.81E+00	3.61E+00	0.0250	1.027E+14
Am-243	6.2484E-04	6,732.935	13,465.871	0.00E+00	4.21E+00	8.41E+00	0.0375	9.676E+13
C-14	4.7820E-05	6,732.935	13,465.871	0.00E+00	3.22E-01	6.44E-01	0.0575	1.211E+14
Cl-36	8.0297E-07	6,732.935	13,465.871	0.00E+00	5.41E-03	1.08E-02	0.0850	5.657E+13
Cm-243	1.7426E-04	6,732.935	13,465.871	0.00E+00	1.17E+00	2.35E+00	0.1250	3.764E+13
Cm-244	2.7616E-02	6,732.935	13,465.871	0.00E+00	1.86E+02	3.72E+02	0.2250	4.830E+13
Co-60	3.5610E-04	6,732.935	13,465.871	0.00E+00	2.40E+00	4.80E+00	0.3750	2.086E+13
Cs-134	2.6260E-07	6,732.935	13,465.871	0.00E+00	1.77E-03	3.54E-03	0.5750	4.912E+14
Cs-135	1.4433E-05	6,732.935	13,465.871	0.00E+00	9.72E-02	1.94E-01	0.8500	4.796E+12
Cs-137	9.8870E-01	6,732.935	13,465.871	0.00E+00	6.66E+03	1.33E+04	1.2500	3.052E+12
Eu-154	6.0320E-03	6,732.935	13,465.871	0.00E+00	4.06E+01	8.12E+01	1.7500	1.342E+11
Eu-155	2.1770E-04	6,732.935	13,465.871	0.00E+00	1.47E+00	2.93E+00	2.2500	2.206E+07
Fe-55	7.9296E-07	6,732.935	13,465.871	0.00E+00	5.34E-03	1.07E-02	2.7500	7.773E+07
H-3	8.9486E-03	6,732.935	13,465.871	0.00E+00	6.03E+01	1.21E+02	3.5000	5.547E+06
I-129	9.8288E-07	6,732.935	13,465.871	0.00E+00	6.62E-03	1.32E-02	5.0000	2.370E+06
Kr-85	1.0707E-02	6,732.935	13,465.871	0.00E+00	7.21E+01	1.44E+02	7.0000	2.731E+05
Np-237	1.1927E-05	6,732.935	13,465.871	0.00E+00	8.03E-02	1.61E-01	11.0000	3.135E+04
Pa-231	1.4703E-09	6,732.935	13,465.871	0.00E+00	9.90E-06	1.98E-05		
Pb-210	1.6828E-10	6,732.935	13,465.871	0.00E+00	1.13E-06	2.27E-06		
Pm-147	6.9606E-06	6,732.935	13,465.871	0.00E+00	4.69E-02	9.37E-02		
Pu-238	6.6263E-02	6,732.935	13,465.871	0.00E+00	4.46E+02	8.92E+02		
Pu-239	1.1618E-02	6,732.935	13,465.871	0.00E+00	7.82E+01	1.56E+02		
Pu-240	1.5142E-02	6,732.935	13,465.871	0.00E+00	1.02E+02	2.04E+02		
Pu-241	4.3766E-01	6,732.935	13,465.871	0.00E+00	2.95E+03	5.89E+03		
Pu-242	6.4260E-05	6,732.935	13,465.871	0.00E+00	4.33E-01	8.65E-01		
Ra-226	3.8501E-10	6,732.935	13,465.871	0.00E+00	2.59E-06	5.18E-06		
Ra-228	5.2955E-12	6,732.935	13,465.871	0.00E+00	3.57E-08	7.13E-08		
Ru-106	2.0413E-14	6,732.935	13,465.871	0.00E+00	1.37E-10	2.75E-10		
Se-79	1.2376E-05	6,732.935	13,465.871	0.00E+00	8.33E-02	1.67E-01		
Sn-126	2.5210E-05	6,732.935	13,465.871	0.00E+00	1.70E-01	3.39E-01		
Sr-90	6.4163E-01	6,732.935	13,465.871	0.00E+00	4.32E+03	8.64E+03		
Tc-99	3.9357E-04	6,732.935	13,465.871	0.00E+00	2.65E+00	5.30E+00		
Th-229	1.5644E-10	6,732.935	13,465.871	0.00E+00	1.05E-06	2.11E-06		
Th-230	2.7972E-08	6,732.935	13,465.871	0.00E+00	1.88E-04	3.77E-04		
Th-232	5.3036E-12	6,732.935	13,465.871	0.00E+00	3.57E-08	7.14E-08		
Ti-208	1.5136E-07	6,732.935	13,465.871	0.00E+00	1.02E-03	2.04E-03		
U-232	4.1005E-07	6,732.935	13,465.871	0.00E+00	2.76E-03	5.52E-03		
U-233	2.5856E-08	6,732.935	13,465.871	0.00E+00	1.74E-04	3.48E-04		
U-234	5.2665E-05	6,732.935	13,465.871	0.00E+00	3.55E-01	7.09E-01		
U-235	-1.4487E-06	6,732.935	0.000	1.48E-02	5.05E-03	1.48E-02		
U-236	7.5888E-06	6,732.935	13,465.871	0.00E+00	5.11E-02	1.02E-01		
U-238	-2.6129E-07	6,732.935	0.000	7.71E-02	7.53E-02	7.71E-02		
Y-90	6.4180E-01	6,732.935	13,465.871	0.00E+00	4.32E+03	8.64E+03		
Other Radionuclides					6.42E+03	1.28E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.22E+02	2.44E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.900129144	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	6,617.309	6,732.935	
Bounding:		13,465.871	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.81	1.02	
Bounding:	1.63		

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

²Total burnup for all fuel associated with this worksheet must be 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 RODS
 SNF ID #: 864
 Fuel Units & Descr: 12 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=25.09kg ; EOL=20.86kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1974
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 HIC
 12.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	1.0733E-09	4,021.389	8,042.778	0.00E+00	4.32E-06	8.63E-06	0.0150	3.060E+14
Am-241	1.4751E-01	4,021.389	8,042.778	0.00E+00	5.93E+02	1.19E+03	0.0250	6.133E+13
Am-242m	2.6809E-04	4,021.389	8,042.778	0.00E+00	1.08E+00	2.16E+00	0.0375	5.779E+13
Am-243	6.2484E-04	4,021.389	8,042.778	0.00E+00	2.51E+00	5.03E+00	0.0575	7.231E+13
C-14	4.7820E-05	4,021.389	8,042.778	0.00E+00	1.92E-01	3.85E-01	0.0850	3.379E+13
Cl-36	8.0297E-07	4,021.389	8,042.778	0.00E+00	3.23E-03	6.46E-03	0.1250	2.248E+13
Cr-243	1.7426E-04	4,021.389	8,042.778	0.00E+00	7.01E-01	1.40E+00	0.2250	2.885E+13
Cr-244	2.7616E-02	4,021.389	8,042.778	0.00E+00	1.11E+02	2.22E+02	0.3750	1.246E+13
Co-60	3.5610E-04	4,021.389	8,042.778	0.00E+00	1.43E+00	2.86E+00	0.5750	2.934E+14
Cs-134	2.6260E-07	4,021.389	8,042.778	0.00E+00	1.06E-03	2.11E-03	0.8500	2.865E+12
Cs-135	1.4433E-05	4,021.389	8,042.778	0.00E+00	5.80E-02	1.16E-01	1.2500	1.823E+12
Cs-137	9.8870E-01	4,021.389	8,042.778	0.00E+00	3.98E+03	7.95E+03	1.7500	8.016E+10
Eu-154	6.0320E-03	4,021.389	8,042.778	0.00E+00	2.43E+01	4.85E+01	2.2500	1.317E+07
Eu-155	2.1770E-04	4,021.389	8,042.778	0.00E+00	8.75E-01	1.75E+00	2.7500	4.642E+07
Fe-55	7.9296E-07	4,021.389	8,042.778	0.00E+00	3.19E-03	6.38E-03	3.5000	3.313E+06
H-3	8.9486E-03	4,021.389	8,042.778	0.00E+00	3.60E+01	7.20E+01	5.0000	1.416E+06
I-129	9.8288E-07	4,021.389	8,042.778	0.00E+00	3.95E-03	7.91E-03	7.0000	1.631E+05
Kr-85	1.0707E-02	4,021.389	8,042.778	0.00E+00	4.31E+01	8.61E+01	11.0000	1.873E+04
Np-237	1.1927E-05	4,021.389	8,042.778	0.00E+00	4.80E-02	9.59E-02		
Pa-231	1.4703E-09	4,021.389	8,042.778	0.00E+00	5.91E-06	1.18E-05		
Pb-210	1.6828E-10	4,021.389	8,042.778	0.00E+00	6.77E-07	1.35E-06		
Pm-147	6.9606E-06	4,021.389	8,042.778	0.00E+00	2.80E-02	5.60E-02		
Pu-238	6.6263E-02	4,021.389	8,042.778	0.00E+00	2.66E+02	5.33E+02		
Pu-239	1.1618E-02	4,021.389	8,042.778	0.00E+00	4.67E+01	9.34E+01		
Pu-240	1.5142E-02	4,021.389	8,042.778	0.00E+00	6.09E+01	1.22E+02		
Pu-241	4.3766E-01	4,021.389	8,042.778	0.00E+00	1.76E+03	3.52E+03		
Pu-242	6.4260E-05	4,021.389	8,042.778	0.00E+00	2.58E-01	5.17E-01		
Ra-226	3.8501E-10	4,021.389	8,042.778	0.00E+00	1.55E-06	3.10E-06		
Ra-228	5.2955E-12	4,021.389	8,042.778	0.00E+00	2.13E-08	4.26E-08		
Ru-106	2.0413E-14	4,021.389	8,042.778	0.00E+00	8.21E-11	1.64E-10		
Se-79	1.2376E-05	4,021.389	8,042.778	0.00E+00	4.98E-02	9.95E-02		
Sn-126	2.5210E-05	4,021.389	8,042.778	0.00E+00	1.01E-01	2.03E-01		
Sr-90	6.4163E-01	4,021.389	8,042.778	0.00E+00	2.58E+03	5.16E+03		
Tc-99	3.9357E-04	4,021.389	8,042.778	0.00E+00	1.58E+00	3.17E+00		
Th-229	1.5644E-10	4,021.389	8,042.778	0.00E+00	6.29E-07	1.26E-06		
Th-230	2.7972E-08	4,021.389	8,042.778	0.00E+00	1.12E-04	2.25E-04		
Th-232	5.3036E-12	4,021.389	8,042.778	0.00E+00	2.13E-08	4.27E-08		
Tl-208	1.5136E-07	4,021.389	8,042.778	0.00E+00	6.09E-04	1.22E-03		
U-232	4.1005E-07	4,021.389	8,042.778	0.00E+00	1.65E-03	3.30E-03		
U-233	2.5856E-08	4,021.389	8,042.778	0.00E+00	1.04E-04	2.08E-04		
U-234	5.2665E-05	4,021.389	8,042.778	0.00E+00	2.12E-01	4.24E-01		
U-235	-1.4487E-06	4,021.389	0.000	1.57E-03	0.00E+00	1.57E-03		
U-236	7.5888E-06	4,021.389	8,042.778	0.00E+00	3.05E-02	6.10E-02		
U-238	-2.6129E-07	4,021.389	0.000	8.19E-03	7.14E-03	8.19E-03		
Y-90	6.4180E-01	4,021.389	8,042.778	0.00E+00	2.58E+03	5.16E+03		
Other Radionuclides					3.83E+03	7.66E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.27E+01	1.45E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.899985651	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	702.475	4,021.389	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		8,042.778	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	4.58	5.72	
Bounding:	9.16		

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

²Total burnup for all fuel associated with this worksheet must be 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 #: 102
 Fuel Units & Descr: 220 - 18 CURVED PLATES
 Heavy Metal Mass: BOL=82.72kg ; EOL=58.10kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1977
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 6.11

Radionuclide	m	x _a	x _b	b	y _a	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.4241E-09	22,675.714	45,351.427	0.00E+00	3.23E-05	6.46E-05	Avg. MeV	
Am-241	1.0407E-02	22,675.714	45,351.427	0.00E+00	2.36E+02	4.72E+02	0.0150	2.349E+15
Am-242m	1.1944E-06	22,675.714	45,351.427	0.00E+00	2.71E-02	5.42E-02	0.0250	4.813E+14
Am-243	3.6993E-05	22,675.714	45,351.427	0.00E+00	8.39E-01	1.68E+00	0.0375	4.202E+14
C-14	2.6367E-08	22,675.714	45,351.427	0.00E+00	5.98E-04	1.20E-03	0.0575	4.553E+14
Cl-36	4.4435E-31	22,675.714	45,351.427	0.00E+00	1.01E-26	2.02E-26	0.0850	2.711E+14
Cm-243	2.7503E-06	22,675.714	45,351.427	0.00E+00	6.24E-02	1.25E-01	0.1250	1.787E+14
Cm-244	1.4775E-03	22,675.714	45,351.427	0.00E+00	3.35E+01	6.70E+01	0.2250	2.340E+14
Co-60	9.4350E-07	22,675.714	45,351.427	0.00E+00	2.14E-02	4.28E-02	0.3750	1.018E+14
Cs-134	4.4666E-07	22,675.714	45,351.427	0.00E+00	1.01E-02	2.03E-02	0.5750	1.719E+15
Cs-135	4.2564E-06	22,675.714	45,351.427	0.00E+00	9.65E-02	1.93E-01	0.8500	2.018E+13
Cs-137	1.0182E+00	22,675.714	45,351.427	0.00E+00	2.31E+04	4.62E+04	1.2500	9.546E+12
Eu-154	4.6373E-03	22,675.714	45,351.427	0.00E+00	1.05E+02	2.10E+02	1.7500	5.480E+11
Eu-155	2.1646E-04	22,675.714	45,351.427	0.00E+00	4.91E+00	9.82E+00	2.2500	4.896E+07
Fe-55	4.5838E-07	22,675.714	45,351.427	0.00E+00	1.04E-02	2.08E-02	2.7500	6.083E+07
H-3	8.5966E-04	22,675.714	45,351.427	0.00E+00	1.95E+01	3.90E+01	3.5000	1.135E+06
I-129	6.6403E-07	22,675.714	45,351.427	0.00E+00	1.51E-02	3.01E-02	5.0000	4.805E+05
Kr-85	1.5553E-02	22,675.714	45,351.427	0.00E+00	3.53E+02	7.05E+02	7.0000	5.481E+04
Np-237	3.1665E-05	22,675.714	45,351.427	0.00E+00	7.18E-01	1.44E+00	11.0000	6.259E+03
Pa-231	2.4380E-09	22,675.714	45,351.427	0.00E+00	5.53E-05	1.11E-04		
Pb-210	1.7394E-10	22,675.714	45,351.427	0.00E+00	3.94E-06	7.89E-06		
Pm-147	8.8578E-06	22,675.714	45,351.427	0.00E+00	2.01E-01	4.02E-01		
Pu-238	1.2120E-01	22,675.714	45,351.427	0.00E+00	2.75E+03	5.50E+03		
Pu-239	6.9441E-04	22,675.714	45,351.427	0.00E+00	1.57E+01	3.15E+01		
Pu-240	3.8299E-04	22,675.714	45,351.427	0.00E+00	8.68E+00	1.74E+01		
Pu-241	3.1731E-02	22,675.714	45,351.427	0.00E+00	7.20E+02	1.44E+03		
Pu-242	3.0911E-06	22,675.714	45,351.427	0.00E+00	7.01E-02	1.40E-01		
Ra-226	4.1239E-10	22,675.714	45,351.427	0.00E+00	9.35E-06	1.87E-05		
Ra-228	4.5680E-14	22,675.714	45,351.427	0.00E+00	1.04E-09	2.07E-09		
Ru-106	8.1713E-15	22,675.714	45,351.427	0.00E+00	1.85E-10	3.71E-10		
Se-79	1.2333E-05	22,675.714	45,351.427	0.00E+00	2.80E-01	5.59E-01		
Sn-126	1.0194E-05	22,675.714	45,351.427	0.00E+00	2.31E-01	4.62E-01		
Sr-90	9.3378E-01	22,675.714	45,351.427	0.00E+00	2.12E+04	4.23E+04		
Tc-99	3.8050E-04	22,675.714	45,351.427	0.00E+00	8.63E+00	1.73E+01		
Th-229	2.9532E-11	22,675.714	45,351.427	0.00E+00	6.70E-07	1.34E-06		
Th-230	3.1981E-08	22,675.714	45,351.427	0.00E+00	7.25E-04	1.45E-03		
Th-232	5.3633E-14	22,675.714	45,351.427	0.00E+00	1.22E-09	2.43E-09		
Ti-208	3.7406E-08	22,675.714	45,351.427	0.00E+00	8.48E-04	1.70E-03		
U-232	1.0134E-07	22,675.714	45,351.427	0.00E+00	2.30E-03	4.60E-03		
U-233	9.2892E-09	22,675.714	45,351.427	0.00E+00	2.11E-04	4.21E-04		
U-234	6.6403E-05	22,675.714	45,351.427	0.00E+00	1.51E+00	3.01E+00		
U-235	-2.8661E-06	22,675.714	0.000	1.66E-01	1.01E-01	1.66E-01		
U-236	1.6701E-05	22,675.714	45,351.427	0.00E+00	3.79E-01	7.57E-01		
U-238	-9.4194E-09	22,675.714	0.000	1.92E-03	1.71E-03	1.92E-03		
Y-90	9.3439E-01	22,675.714	45,351.427	0.00E+00	2.12E+04	4.24E+04		
Other Radionuclides					2.22E+04	4.44E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.56E+02	7.12E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.08510638	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		22,675.714	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		45,351.427	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.63		1.01
Bounding:	1.26		

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

²Total burnup for all fuel associated with this worksheet must be 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=394.80kg : EOL=282.24kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1982
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 29.17

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	Y _n	Y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	9.5869E-10	103,679.354	207,358.707	0.00E+00	9.94E-05	1.99E-04	0.0150	1.532E+16
Am-241	1.0109E-02	103,679.354	207,358.707	0.00E+00	1.05E+03	2.10E+03	0.0250	3.147E+15
Am-242m	1.2789E-06	103,679.354	207,358.707	0.00E+00	1.33E-01	2.65E-01	0.0375	2.758E+15
Am-243	3.7047E-05	103,679.354	207,358.707	0.00E+00	3.84E+00	7.68E+00	0.0575	2.967E+15
C-14	2.6416E-08	103,679.354	207,358.707	0.00E+00	2.74E-03	5.48E-03	0.0850	1.776E+15
Cl-36	4.4441E-31	103,679.354	207,358.707	0.00E+00	4.61E-26	9.22E-26	0.1250	1.198E+15
Cm-243	3.9605E-06	103,679.354	207,358.707	0.00E+00	4.11E-01	8.21E-01	0.2250	1.534E+15
Cm-244	2.6227E-03	103,679.354	207,358.707	0.00E+00	2.72E+02	5.44E+02	0.3750	6.659E+14
Co-60	6.7740E-06	103,679.354	207,358.707	0.00E+00	7.02E-01	1.40E+00	0.5750	1.112E+16
Cs-134	6.8894E-05	103,679.354	207,358.707	0.00E+00	7.14E+00	1.43E+01	0.8500	1.647E+14
Cs-135	4.2564E-06	103,679.354	207,358.707	0.00E+00	4.41E-01	8.83E-01	1.2500	9.844E+13
Cs-137	1.4399E+00	103,679.354	207,358.707	0.00E+00	1.49E+05	2.99E+05	1.7500	4.658E+12
Eu-154	1.5522E-02	103,679.354	207,358.707	0.00E+00	1.61E+03	3.22E+03	2.2500	3.225E+08
Eu-155	1.7588E-03	103,679.354	207,358.707	0.00E+00	1.82E+02	3.65E+02	2.7500	3.241E+08
Fe-55	2.4933E-05	103,679.354	207,358.707	0.00E+00	2.59E+00	5.17E+00	3.5000	8.617E+06
H-3	1.9945E-03	103,679.354	207,358.707	0.00E+00	2.07E+02	4.14E+02	5.0000	3.661E+06
I-129	6.6403E-07	103,679.354	207,358.707	0.00E+00	6.88E-02	1.38E-01	7.0000	4.192E+05
Kr-85	4.1002E-02	103,679.354	207,358.707	0.00E+00	4.25E+03	8.50E+03	11.0000	4.797E+04
Np-237	3.1610E-05	103,679.354	207,358.707	0.00E+00	3.28E+00	6.55E+00		
Pa-231	1.8876E-09	103,679.354	207,358.707	0.00E+00	1.96E-04	3.91E-04		
Pb-210	8.3840E-11	103,679.354	207,358.707	0.00E+00	8.69E-06	1.74E-05		
Pm-147	4.6501E-04	103,679.354	207,358.707	0.00E+00	4.82E+01	9.64E+01		
Pu-238	1.3645E-01	103,679.354	207,358.707	0.00E+00	1.41E+04	2.83E+04		
Pu-239	6.9502E-04	103,679.354	207,358.707	0.00E+00	7.21E+01	1.44E+02		
Pu-240	3.8183E-04	103,679.354	207,358.707	0.00E+00	3.96E+01	7.92E+01		
Pu-241	6.5310E-02	103,679.354	207,358.707	0.00E+00	6.77E+03	1.35E+04		
Pu-242	3.0911E-06	103,679.354	207,358.707	0.00E+00	3.20E-01	6.41E-01		
Ra-226	2.3512E-10	103,679.354	207,358.707	0.00E+00	2.44E-05	4.88E-05		
Ra-228	3.3366E-14	103,679.354	207,358.707	0.00E+00	3.46E-09	6.92E-09		
Ru-106	2.4490E-10	103,679.354	207,358.707	0.00E+00	2.54E-05	5.08E-05		
Se-79	1.2333E-05	103,679.354	207,358.707	0.00E+00	1.28E+00	2.56E+00		
Sn-126	1.0194E-05	103,679.354	207,358.707	0.00E+00	1.06E+00	2.11E+00		
Sr-90	1.3348E+00	103,679.354	207,358.707	0.00E+00	1.38E+05	2.77E+05		
Tc-99	3.8056E-04	103,679.354	207,358.707	0.00E+00	3.95E+01	7.89E+01		
Th-229	1.7868E-11	103,679.354	207,358.707	0.00E+00	1.85E-06	3.70E-06		
Th-230	2.3348E-08	103,679.354	207,358.707	0.00E+00	2.42E-03	4.84E-03		
Th-232	4.1288E-14	103,679.354	207,358.707	0.00E+00	4.28E-09	8.56E-09		
Th-230	4.3190E-08	103,679.354	207,358.707	0.00E+00	4.48E-03	8.96E-03		
U-232	1.1707E-07	103,679.354	207,358.707	0.00E+00	1.21E-02	2.43E-02		
U-233	7.2175E-09	103,679.354	207,358.707	0.00E+00	7.48E-04	1.50E-03		
U-234	6.1543E-05	103,679.354	207,358.707	0.00E+00	6.38E+00	1.28E+01		
U-235	-2.8661E-06	103,679.354	0.000	7.94E-01	4.97E-01	7.94E-01		
U-236	1.6701E-05	103,679.354	207,358.707	0.00E+00	1.73E+00	3.46E+00		
U-238	-9.4194E-09	103,679.354	0.000	9.18E-03	8.20E-03	9.18E-03		
Y-90	1.3348E+00	103,679.354	207,358.707	0.00E+00	1.38E+05	2.77E+05		
Other Radionuclides					1.43E+05	2.86E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.19E+03	4.37E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.08510638	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		103,679.354	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		207,358.707	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.60		1.01
Bounding:	1.20		

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

²Total burnup for all fuel associated with this worksheet must be 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 #: 961
 Fuel Units & Descr: 20 - 18 CURVED PLATES
 Heavy Metal Mass: BOL=7.52kg ; EOL=5.28kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1977
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.56

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.4241E-09	2,061.429	4,122.857	0.00E+00	2.94E-06	5.87E-06	0.0150	2.136E+14
Am-241	1.0407E-02	2,061.429	4,122.857	0.00E+00	2.15E+01	4.29E+01	0.0250	4.376E+13
Am-242m	1.1944E-06	2,061.429	4,122.857	0.00E+00	2.46E-03	4.92E-03	0.0375	3.820E+13
Am-243	3.6993E-05	2,061.429	4,122.857	0.00E+00	7.63E-02	1.53E-01	0.0575	4.139E+13
C-14	2.6367E-08	2,061.429	4,122.857	0.00E+00	5.44E-05	1.09E-04	0.0850	2.464E+13
Cl-36	4.4435E-31	2,061.429	4,122.857	0.00E+00	9.16E-28	1.83E-27	0.1250	1.625E+13
Co-243	2.7503E-06	2,061.429	4,122.857	0.00E+00	5.67E-03	1.13E-02	0.2250	2.127E+13
Co-244	1.4775E-03	2,061.429	4,122.857	0.00E+00	3.05E+00	6.09E+00	0.3750	9.255E+12
Co-60	9.4350E-07	2,061.429	4,122.857	0.00E+00	1.94E-03	3.89E-03	0.5750	1.563E+14
Cs-134	4.4666E-07	2,061.429	4,122.857	0.00E+00	9.21E-04	1.84E-03	0.8500	1.834E+12
Cs-135	4.2564E-06	2,061.429	4,122.857	0.00E+00	8.77E-03	1.75E-02	1.2500	8.678E+11
Cs-137	1.0182E+00	2,061.429	4,122.857	0.00E+00	2.10E+03	4.20E+03	1.7500	4.982E+10
Eu-154	4.6373E-03	2,061.429	4,122.857	0.00E+00	9.56E+00	1.91E+01	2.2500	4.451E+06
Eu-155	2.1646E-04	2,061.429	4,122.857	0.00E+00	4.46E-01	8.92E-01	2.7500	5.530E+06
Fe-55	4.5838E-07	2,061.429	4,122.857	0.00E+00	9.45E-04	1.89E-03	3.5000	1.031E+05
H-3	8.5966E-04	2,061.429	4,122.857	0.00E+00	1.77E+00	3.54E+00	5.0000	4.368E+04
I-129	6.6403E-07	2,061.429	4,122.857	0.00E+00	1.37E-03	2.74E-03	7.0000	4.983E+03
Kr-85	1.5553E-02	2,061.429	4,122.857	0.00E+00	3.21E+01	6.41E+01	11.0000	5.690E+02
Np-237	3.1665E-05	2,061.429	4,122.857	0.00E+00	6.53E-02	1.31E-01		
Pa-231	2.4380E-09	2,061.429	4,122.857	0.00E+00	5.03E-06	1.01E-05		
Pb-210	1.7394E-10	2,061.429	4,122.857	0.00E+00	3.59E-07	7.17E-07		
Pm-147	8.8578E-06	2,061.429	4,122.857	0.00E+00	1.83E-02	3.65E-02		
Pu-238	1.2120E-01	2,061.429	4,122.857	0.00E+00	2.50E+02	5.00E+02		
Pu-239	6.9441E-04	2,061.429	4,122.857	0.00E+00	1.43E+00	2.86E+00		
Pu-240	3.8299E-04	2,061.429	4,122.857	0.00E+00	7.90E-01	1.58E+00		
Pu-241	3.1731E-02	2,061.429	4,122.857	0.00E+00	6.54E+01	1.31E+02		
Pu-242	3.0911E-06	2,061.429	4,122.857	0.00E+00	6.37E-03	1.27E-02		
Ra-226	4.1239E-10	2,061.429	4,122.857	0.00E+00	8.50E-07	1.70E-06		
Ra-228	4.5680E-14	2,061.429	4,122.857	0.00E+00	9.42E-11	1.88E-10		
Ru-106	8.1713E-15	2,061.429	4,122.857	0.00E+00	1.68E-11	3.37E-11		
Se-79	1.2333E-05	2,061.429	4,122.857	0.00E+00	2.54E-02	5.08E-02		
Sn-126	1.0194E-05	2,061.429	4,122.857	0.00E+00	2.10E-02	4.20E-02		
Sr-90	9.3378E-01	2,061.429	4,122.857	0.00E+00	1.92E+03	3.85E+03		
Tc-99	3.8050E-04	2,061.429	4,122.857	0.00E+00	7.84E-01	1.57E+00		
Th-229	2.9532E-11	2,061.429	4,122.857	0.00E+00	6.09E-08	1.22E-07		
Th-230	3.1981E-08	2,061.429	4,122.857	0.00E+00	6.59E-05	1.32E-04		
Th-232	5.3633E-14	2,061.429	4,122.857	0.00E+00	1.11E-10	2.21E-10		
Tl-208	3.7406E-08	2,061.429	4,122.857	0.00E+00	7.71E-05	1.54E-04		
U-232	1.0134E-07	2,061.429	4,122.857	0.00E+00	2.09E-04	4.18E-04		
U-233	9.2892E-09	2,061.429	4,122.857	0.00E+00	1.91E-05	3.83E-05		
U-234	6.6403E-05	2,061.429	4,122.857	0.00E+00	1.37E-01	2.74E-01		
U-235	-2.8661E-06	2,061.429	0.000	1.51E-02	9.22E-03	1.51E-02		
U-236	1.6701E-05	2,061.429	4,122.857	0.00E+00	3.44E-02	6.89E-02		
U-238	-9.4194E-09	2,061.429	0.000	1.75E-04	1.55E-04	1.75E-04		
Y-90	9.3439E-01	2,061.429	4,122.857	0.00E+00	1.93E+03	3.85E+03		
Other Radionuclides					2.02E+03	4.04E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.24E+01	6.47E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.08510638	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,061.429	
Bounding:		4,122.857	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.63		
Bounding:	1.26		

Estimated EOL HM/Given EOL HM: 1.01

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: HFEF FISSION CHAMBERS
 SNF ID #: 894
 Fuel Units & Descr: 1 - UNKNOWN
 Heavy Metal Mass: BOL = : EOL=24.35kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 35 years

Estimated
 Canister usage:
18"x10"
 0.01

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.7038E-09	23,240.106	23,240.106	0.00E+00	1.56E-04	1.56E-04	0.0150	1.622E+15
Am-241	3.9068E-03	23,240.106	23,240.106	0.00E+00	9.08E+01	9.08E+01	0.0250	3.371E+14
Am-242m	1.2325E-06	23,240.106	23,240.106	0.00E+00	2.86E-02	2.86E-02	0.0375	2.928E+14
Am-243	1.4732E-07	23,240.106	23,240.106	0.00E+00	3.42E-03	3.42E-03	0.0575	3.155E+14
C-14	1.2824E-04	23,240.106	23,240.106	0.00E+00	2.98E+00	2.98E+00	0.0850	1.898E+14
Ci-36	2.8120E-06	23,240.106	23,240.106	0.00E+00	6.54E-02	6.54E-02	0.1250	1.235E+14
Cm-243	8.6556E-08	23,240.106	23,240.106	0.00E+00	2.01E-03	2.01E-03	0.2250	1.635E+14
Cm-244	5.3835E-07	23,240.106	23,240.106	0.00E+00	1.25E-02	1.25E-02	0.3750	7.131E+13
Co-60	2.4887E-02	23,240.106	23,240.106	0.00E+00	5.78E+02	5.78E+02	0.5750	1.193E+15
Cs-134	3.8030E-06	23,240.106	23,240.106	0.00E+00	8.84E-02	8.84E-02	0.8500	1.221E+13
Cs-135	3.2195E-05	23,240.106	23,240.106	0.00E+00	7.48E-01	7.48E-01	1.2500	4.737E+13
Cs-137	1.3788E+00	23,240.106	23,240.106	0.00E+00	3.20E+04	3.20E+04	1.7500	3.169E+11
Eu-154	1.3711E-03	23,240.106	23,240.106	0.00E+00	3.19E+01	3.19E+01	2.2500	2.596E+08
Eu-155	4.4361E-04	23,240.106	23,240.106	0.00E+00	1.03E+01	1.03E+01	2.7500	1.193E+07
Fe-55	2.6075E-04	23,240.106	23,240.106	0.00E+00	6.06E+00	6.06E+00	3.5000	2.858E+04
H-3	2.0647E-03	23,240.106	23,240.106	0.00E+00	4.80E+01	4.80E+01	5.0000	1.203E+04
I-129	7.3684E-07	23,240.106	23,240.106	0.00E+00	1.71E-02	1.71E-02	7.0000	1.357E+03
Kr-85	3.6346E-02	23,240.106	23,240.106	0.00E+00	8.45E+02	8.45E+02	11.0000	1.543E+02
Np-237	1.2844E-06	23,240.106	23,240.106	0.00E+00	2.98E-02	2.98E-02		
Pa-231	1.2352E-08	23,240.106	23,240.106	0.00E+00	2.87E-04	2.87E-04		
Pb-210	3.5338E-13	23,240.106	23,240.106	0.00E+00	8.21E-09	8.21E-09		
Pm-147	7.6346E-04	23,240.106	23,240.106	0.00E+00	1.77E+01	1.77E+01		
Pu-238	8.1970E-04	23,240.106	23,240.106	0.00E+00	1.90E+01	1.90E+01		
Pu-239	5.5248E-03	23,240.106	23,240.106	0.00E+00	1.28E+02	1.28E+02		
Pu-240	2.1203E-03	23,240.106	23,240.106	0.00E+00	4.93E+01	4.93E+01		
Pu-241	2.4075E-02	23,240.106	23,240.106	0.00E+00	5.60E+02	5.60E+02		
Pu-242	2.3128E-07	23,240.106	23,240.106	0.00E+00	5.37E-03	5.37E-03		
Ra-226	9.6481E-13	23,240.106	23,240.106	0.00E+00	2.24E-08	2.24E-08		
Ra-228	2.5188E-10	23,240.106	23,240.106	0.00E+00	5.85E-06	5.85E-06		
Ru-106	1.0214E-10	23,240.106	23,240.106	0.00E+00	2.37E-06	2.37E-06		
Se-79	1.3014E-05	23,240.106	23,240.106	0.00E+00	3.02E-01	3.02E-01		
Sn-126	1.2164E-05	23,240.106	23,240.106	0.00E+00	2.83E-01	2.83E-01		
Sr-90	1.2762E+00	23,240.106	23,240.106	0.00E+00	2.97E+04	2.97E+04		
Tc-99	4.4241E-04	23,240.106	23,240.106	0.00E+00	1.03E+01	1.03E+01		
Th-229	5.9684E-10	23,240.106	23,240.106	0.00E+00	1.39E-05	1.39E-05		
Th-230	9.3880E-11	23,240.106	23,240.106	0.00E+00	2.18E-06	2.18E-06		
Th-232	2.5278E-10	23,240.106	23,240.106	0.00E+00	5.87E-06	5.87E-06		
Tl-208	1.3723E-08	23,240.106	23,240.106	0.00E+00	3.19E-04	3.19E-04		
U-232	3.6932E-08	23,240.106	23,240.106	0.00E+00	8.58E-04	8.58E-04		
U-233	1.2224E-07	23,240.106	23,240.106	0.00E+00	2.84E-03	2.84E-03		
U-234	2.5714E-07	23,240.106	23,240.106	0.00E+00	5.98E-03	5.98E-03		
U-235	-2.6194E-06	23,240.106	0.000	2.10E-02	0.00E+00	2.10E-02		
U-236	1.2695E-05	23,240.106	23,240.106	0.00E+00	2.95E-01	2.95E-01		
U-238	-3.6331E-08	23,240.106	0.000	1.31E-02	1.22E-02	1.31E-02		
Y-90	1.2765E+00	23,240.106	23,240.106	0.00E+00	2.97E+04	2.97E+04		
Other Radionuclides					3.20E+04	3.20E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.74E+02	3.74E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative) and enrichment (unknown).
Fuel Cladding:	UNKNOWN	SST	
BOL HM Constituents:	U METAL	U	
BOL Enrichment %:		10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		23,240.106	Nominal burnup set equal to bounding burnup.
Bounding:		23,240.106	Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	14.00		1.78
Bounding:	14.00		

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

²Total burnup for all fuel associated with this worksheet must be 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: 59 - 171 CURVED PLATES
 Heavy Metal Mass: BOL=162.19kg ; EOL=125.22kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1986
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 19.67

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.0068E-09	37,303.930	74,607.860	0.00E+00	7.49E-05	1.50E-04	Avg. MeV	
Am-241	2.5251E-03	37,303.930	74,607.860	0.00E+00	9.42E+01	1.88E+02	0.0150	5.495E+15
Am-242m	3.9624E-07	37,303.930	74,607.860	0.00E+00	1.48E-02	2.96E-02	0.0250	1.141E+15
Am-243	1.4880E-06	37,303.930	74,607.860	0.00E+00	5.55E-02	1.11E-01	0.0375	9.918E+14
C-14	5.7053E-09	37,303.930	74,607.860	0.00E+00	2.13E-04	4.26E-04	0.0575	1.068E+15
Cl-36	1.3124E-32	37,303.930	74,607.860	0.00E+00	4.90E-28	9.79E-28	0.0850	6.432E+14
Cm-243	1.1419E-07	37,303.930	74,607.860	0.00E+00	4.26E-03	8.52E-03	0.1250	4.248E+14
Cm-244	1.6522E-05	37,303.930	74,607.860	0.00E+00	6.16E-01	1.23E+00	0.2250	5.553E+14
Co-60	7.4047E-07	37,303.930	74,607.860	0.00E+00	2.76E-02	5.52E-02	0.3750	2.416E+14
Cs-134	2.0455E-05	37,303.930	74,607.860	0.00E+00	7.63E-01	1.53E+00	0.5750	3.993E+15
Cs-135	3.4477E-06	37,303.930	74,607.860	0.00E+00	1.29E-01	2.57E-01	0.8500	4.877E+13
Cs-137	1.4365E+00	37,303.930	74,607.860	0.00E+00	5.36E+04	1.07E+05	1.2500	2.359E+13
Eu-154	7.3230E-03	37,303.930	74,607.860	0.00E+00	2.73E+02	5.46E+02	1.7500	1.328E+12
Eu-155	5.9259E-04	37,303.930	74,607.860	0.00E+00	2.21E+01	4.42E+01	2.2500	1.110E+08
Fe-55	2.2791E-06	37,303.930	74,607.860	0.00E+00	8.50E-02	1.70E-01	2.7500	1.059E+08
H-3	1.9698E-03	37,303.930	74,607.860	0.00E+00	7.35E+01	1.47E+02	3.5000	6.139E+04
I-129	7.5300E-07	37,303.930	74,607.860	0.00E+00	2.81E-02	5.62E-02	5.0000	2.508E+04
Kr-85	4.1176E-02	37,303.930	74,607.860	0.00E+00	1.54E+03	3.07E+03	7.0000	2.745E+03
Np-237	9.5752E-06	37,303.930	74,607.860	0.00E+00	3.57E-01	7.14E-01	11.0000	3.061E+02
Pa-231	3.9379E-09	37,303.930	74,607.860	0.00E+00	1.47E-04	2.94E-04		
Pb-210	3.3115E-10	37,303.930	74,607.860	0.00E+00	1.24E-05	2.47E-05		
Pm-147	9.2402E-04	37,303.930	74,607.860	0.00E+00	3.45E+01	6.89E+01		
Pu-238	1.6217E-02	37,303.930	74,607.860	0.00E+00	6.05E+02	1.21E+03		
Pu-239	4.2810E-04	37,303.930	74,607.860	0.00E+00	1.60E+01	3.19E+01		
Pu-240	2.4333E-04	37,303.930	74,607.860	0.00E+00	9.08E+00	1.82E+01		
Pu-241	1.6242E-02	37,303.930	74,607.860	0.00E+00	6.06E+02	1.21E+03		
Pu-242	3.6329E-07	37,303.930	74,607.860	0.00E+00	1.36E-02	2.71E-02		
Ra-226	9.0114E-10	37,303.930	74,607.860	0.00E+00	3.36E-05	6.72E-05		
Ra-228	3.1019E-14	37,303.930	74,607.860	0.00E+00	1.16E-09	2.31E-09		
Ru-106	2.1225E-10	37,303.930	74,607.860	0.00E+00	7.92E-06	1.58E-05		
Se-79	1.2930E-05	37,303.930	74,607.860	0.00E+00	4.82E-01	9.65E-01		
Sn-126	1.1571E-05	37,303.930	74,607.860	0.00E+00	4.32E-01	8.63E-01		
Sr-90	1.3472E+00	37,303.930	74,607.860	0.00E+00	5.03E+04	1.01E+05		
Tc-99	4.2239E-04	37,303.930	74,607.860	0.00E+00	1.58E+01	3.15E+01		
Th-229	1.2407E-11	37,303.930	74,607.860	0.00E+00	4.63E-07	9.26E-07		
Th-230	8.3497E-08	37,303.930	74,607.860	0.00E+00	3.11E-03	6.23E-03		
Th-232	3.8371E-14	37,303.930	74,607.860	0.00E+00	1.43E-09	2.86E-09		
Tl-208	4.0414E-08	37,303.930	74,607.860	0.00E+00	1.51E-03	3.02E-03		
U-232	1.0948E-07	37,303.930	74,607.860	0.00E+00	4.08E-03	8.17E-03		
U-233	3.6275E-09	37,303.930	74,607.860	0.00E+00	1.35E-04	2.71E-04		
U-234	1.8562E-04	37,303.930	74,607.860	0.00E+00	6.92E+00	1.38E+01		
U-235	-2.7235E-06	37,303.930	0.000	3.26E-01	2.25E-01	3.26E-01		
U-236	1.5493E-05	37,303.930	74,607.860	0.00E+00	5.78E-01	1.16E+00		
U-238	-4.2851E-09	37,303.930	0.000	3.74E-03	3.58E-03	3.74E-03		
Y-90	1.3475E+00	37,303.930	74,607.860	0.00E+00	5.03E+04	1.01E+05		
Other Radionuclides					5.10E+04	1.02E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.24E+02	1.25E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.1408311	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	37,303.930	35,010.739	
Bounding:		74,607.860	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.73	0.94	
Bounding:	1.46		

Estimated EOL HM/Given EOL HM: 1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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: 437 - 171 CURVED PLATES
 Heavy Metal Mass: BOL=1201.31kg ; EOL=929.37kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1986
 Estimates as of: 2030
 Template: ATR (Light Water; Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 95 years

Estimated
 Canister usage:
 18"x10"
 145.67

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	276,301.990	552,603.980	0.00E+00	5.54E-04	1.11E-03	0.0150	4.070E+16
Am-241	2.5251E-03	276,301.990	552,603.980	0.00E+00	6.98E+02	1.40E+03	0.0250	8.451E+15
Am-242m	3.9624E-07	276,301.990	552,603.980	0.00E+00	1.09E-01	2.19E-01	0.0375	7.346E+15
Am-243	1.4880E-06	276,301.990	552,603.980	0.00E+00	4.11E-01	8.22E-01	0.0575	7.907E+15
C-14	5.7053E-09	276,301.990	552,603.980	0.00E+00	1.58E-03	3.15E-03	0.0850	4.764E+15
Cl-36	1.3124E-32	276,301.990	552,603.980	0.00E+00	3.63E-27	7.25E-27	0.1250	3.147E+15
Cm-243	1.1419E-07	276,301.990	552,603.980	0.00E+00	3.16E-02	6.31E-02	0.2250	4.113E+15
Cm-244	1.6522E-05	276,301.990	552,603.980	0.00E+00	4.57E+00	9.13E+00	0.3750	1.789E+15
Co-60	7.4047E-07	276,301.990	552,603.980	0.00E+00	2.05E-01	4.09E-01	0.5750	2.957E+16
Cs-134	2.0455E-05	276,301.990	552,603.980	0.00E+00	5.65E+00	1.13E+01	0.8500	3.612E+14
Cs-135	3.4477E-06	276,301.990	552,603.980	0.00E+00	9.53E-01	1.91E+00	1.2500	1.747E+14
Cs-137	1.4365E+00	276,301.990	552,603.980	0.00E+00	3.97E+05	7.94E+05	1.7500	9.835E+12
Eu-154	7.3230E-03	276,301.990	552,603.980	0.00E+00	2.02E+03	4.05E+03	2.2500	8.224E+08
Eu-155	5.9259E-04	276,301.990	552,603.980	0.00E+00	1.64E+02	3.27E+02	2.7500	7.846E+08
Fe-55	2.2791E-06	276,301.990	552,603.980	0.00E+00	6.30E-01	1.26E+00	3.5000	4.547E+05
H-3	1.9698E-03	276,301.990	552,603.980	0.00E+00	5.44E+02	1.09E+03	5.0000	1.858E+05
I-129	7.5300E-07	276,301.990	552,603.980	0.00E+00	2.08E-01	4.16E-01	7.0000	2.033E+04
Kr-85	4.1176E-02	276,301.990	552,603.980	0.00E+00	1.14E+04	2.28E+04	11.0000	2.267E+03
Np-237	9.5752E-06	276,301.990	552,603.980	0.00E+00	2.65E+00	5.29E+00		
Pa-231	3.9379E-09	276,301.990	552,603.980	0.00E+00	1.09E-03	2.18E-03		
Pb-210	3.3115E-10	276,301.990	552,603.980	0.00E+00	9.15E-05	1.83E-04		
Pm-147	9.2402E-04	276,301.990	552,603.980	0.00E+00	2.55E+02	5.11E+02		
Pu-238	1.6217E-02	276,301.990	552,603.980	0.00E+00	4.48E+03	8.96E+03		
Pu-239	4.2810E-04	276,301.990	552,603.980	0.00E+00	1.18E+02	2.37E+02		
Pu-240	2.4333E-04	276,301.990	552,603.980	0.00E+00	6.72E+01	1.34E+02		
Pu-241	1.6242E-02	276,301.990	552,603.980	0.00E+00	4.49E+03	8.98E+03		
Pu-242	3.6329E-07	276,301.990	552,603.980	0.00E+00	1.00E-01	2.01E-01		
Ra-226	9.0114E-10	276,301.990	552,603.980	0.00E+00	2.49E-04	4.98E-04		
Ra-228	3.1019E-14	276,301.990	552,603.980	0.00E+00	8.57E-09	1.71E-08		
Ru-106	2.1225E-10	276,301.990	552,603.980	0.00E+00	5.86E-05	1.17E-04		
Se-79	1.2930E-05	276,301.990	552,603.980	0.00E+00	3.57E+00	7.15E+00		
Sn-126	1.1571E-05	276,301.990	552,603.980	0.00E+00	3.20E+00	6.39E+00		
Sr-90	1.3472E+00	276,301.990	552,603.980	0.00E+00	3.72E+05	7.44E+05		
Tc-99	4.2239E-04	276,301.990	552,603.980	0.00E+00	1.17E+02	2.33E+02		
Th-229	1.2407E-11	276,301.990	552,603.980	0.00E+00	3.43E-06	6.86E-06		
Th-230	8.3497E-08	276,301.990	552,603.980	0.00E+00	2.31E-02	4.61E-02		
Th-232	3.8371E-14	276,301.990	552,603.980	0.00E+00	1.06E-08	2.12E-08		
Tl-208	4.0414E-08	276,301.990	552,603.980	0.00E+00	1.12E-02	2.23E-02		
U-232	1.0948E-07	276,301.990	552,603.980	0.00E+00	3.02E-02	6.05E-02		
U-233	3.6275E-09	276,301.990	552,603.980	0.00E+00	1.00E-03	2.00E-03		
U-234	1.8562E-04	276,301.990	552,603.980	0.00E+00	5.13E+01	1.03E+02		
U-235	-2.7235E-06	276,301.990	0.000	2.42E+00	1.67E+00	2.42E+00		
U-236	1.5493E-05	276,301.990	552,603.980	0.00E+00	4.28E+00	8.56E+00		
U-238	-4.2851E-09	276,301.990	0.000	2.77E-02	2.65E-02	2.77E-02		
Y-90	1.3475E+00	276,301.990	552,603.980	0.00E+00	3.72E+05	7.45E+05		
Other Radionuclides					3.78E+05	7.56E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.82E+03	9.25E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.1408311	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	276,301.990	257,537.285	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		552,603.980	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.73	0.93	1.00
Bounding:	1.46		

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

²Total burnup for all fuel associated with this worksheet must be 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: 59 - 369 CURVED PLATES
 Heavy Metal Mass: BOL=424.68kg ; EOL=351.81kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1986
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 24"x10"
 19.67

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	97,675.503	195,351.006	0.00E+00	1.96E-04	3.92E-04	0.0150	1.439E+16
Am-241	2.5251E-03	97,675.503	195,351.006	0.00E+00	2.47E+02	4.93E+02	0.0250	2.988E+15
Am-242m	3.9624E-07	97,675.503	195,351.006	0.00E+00	3.87E-02	7.74E-02	0.0375	2.597E+15
Am-243	1.4880E-06	97,675.503	195,351.006	0.00E+00	1.45E-01	2.91E-01	0.0575	2.795E+15
C-14	5.7053E-09	97,675.503	195,351.006	0.00E+00	5.57E-04	1.11E-03	0.0850	1.684E+15
Ci-36	1.3124E-32	97,675.503	195,351.006	0.00E+00	1.28E-27	2.56E-27	0.1250	1.112E+15
Cm-243	1.1419E-07	97,675.503	195,351.006	0.00E+00	1.12E-02	2.23E-02	0.2250	1.454E+15
Cm-244	1.6522E-05	97,675.503	195,351.006	0.00E+00	1.61E+00	3.23E+00	0.3750	6.325E+14
Co-60	7.4047E-07	97,675.503	195,351.006	0.00E+00	7.23E-02	1.45E-01	0.8500	1.277E+14
Cs-134	2.0455E-05	97,675.503	195,351.006	0.00E+00	2.00E+00	4.00E+00	1.2500	6.176E+13
Cs-135	3.4477E-06	97,675.503	195,351.006	0.00E+00	3.37E-01	6.74E-01	1.7500	3.477E+12
Cs-137	1.4365E+00	97,675.503	195,351.006	0.00E+00	1.40E+05	2.81E+05	2.2500	2.907E+08
Eu-154	7.3230E-03	97,675.503	195,351.006	0.00E+00	7.15E+02	1.43E+03	2.7500	2.774E+08
Eu-155	5.9259E-04	97,675.503	195,351.006	0.00E+00	5.79E+01	1.16E+02	3.5000	1.607E+05
Fe-55	2.2791E-06	97,675.503	195,351.006	0.00E+00	2.23E-01	4.45E-01	5.0000	6.567E+04
H-3	1.9698E-03	97,675.503	195,351.006	0.00E+00	1.92E+02	3.85E+02	7.0000	7.188E+03
I-129	7.5300E-07	97,675.503	195,351.006	0.00E+00	7.35E-02	1.47E-01	11.0000	8.014E+02
Kr-85	4.1176E-02	97,675.503	195,351.006	0.00E+00	4.02E+03	8.04E+03		
Np-237	9.5752E-06	97,675.503	195,351.006	0.00E+00	9.35E-01	1.87E+00		
Pa-231	3.9379E-09	97,675.503	195,351.006	0.00E+00	3.85E-04	7.69E-04		
Pb-210	3.3115E-10	97,675.503	195,351.006	0.00E+00	3.23E-05	6.47E-05		
Pm-147	9.2402E-04	97,675.503	195,351.006	0.00E+00	9.03E+01	1.81E+02		
Pu-238	1.6217E-02	97,675.503	195,351.006	0.00E+00	1.58E+03	3.17E+03		
Pu-239	4.2810E-04	97,675.503	195,351.006	0.00E+00	4.18E+01	8.36E+01		
Pu-240	2.4333E-04	97,675.503	195,351.006	0.00E+00	2.38E+01	4.75E+01		
Pu-241	1.6242E-02	97,675.503	195,351.006	0.00E+00	1.59E+03	3.17E+03		
Pu-242	3.6329E-07	97,675.503	195,351.006	0.00E+00	3.55E-02	7.10E-02		
Ra-226	9.0114E-10	97,675.503	195,351.006	0.00E+00	8.80E-05	1.76E-04		
Ra-228	3.1019E-14	97,675.503	195,351.006	0.00E+00	3.03E-09	6.06E-09		
Ru-106	2.1225E-10	97,675.503	195,351.006	0.00E+00	2.07E-05	4.15E-05		
Se-79	1.2930E-05	97,675.503	195,351.006	0.00E+00	1.26E+00	2.53E+00		
Sn-126	1.1571E-05	97,675.503	195,351.006	0.00E+00	1.13E+00	2.26E+00		
Sr-90	1.3472E+00	97,675.503	195,351.006	0.00E+00	1.32E+05	2.63E+05		
Tc-99	4.2239E-04	97,675.503	195,351.006	0.00E+00	4.13E+01	8.25E+01		
Th-229	1.2407E-11	97,675.503	195,351.006	0.00E+00	1.21E-06	2.42E-06		
Th-230	8.3497E-08	97,675.503	195,351.006	0.00E+00	8.16E-03	1.63E-02		
Th-232	3.8371E-14	97,675.503	195,351.006	0.00E+00	3.75E-09	7.50E-09		
Ti-208	4.0414E-08	97,675.503	195,351.006	0.00E+00	3.95E-03	7.89E-03		
U-232	1.0948E-07	97,675.503	195,351.006	0.00E+00	1.07E-02	2.14E-02		
U-233	3.6275E-09	97,675.503	195,351.006	0.00E+00	3.54E-04	7.09E-04		
U-234	1.8562E-04	97,675.503	195,351.006	0.00E+00	1.81E+01	3.63E+01		
U-235	-2.7235E-06	97,675.503	0.000	8.55E-01	5.89E-01	8.55E-01		
U-236	1.5493E-05	97,675.503	195,351.006	0.00E+00	1.51E+00	3.03E+00		
U-238	-4.2851E-09	97,675.503	0.000	9.79E-03	9.37E-03	9.79E-03		
Y-90	1.3475E+00	97,675.503	195,351.006	0.00E+00	1.32E+05	2.63E+05		
Other Radionuclides					1.34E+05	2.67E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.63E+03	3.27E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.14083004	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	97,675.503	69,004.569	
Bounding:		195,351.006	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.73	0.71	
Bounding:	1.46		

Estimated EOL HM/Given EOL HM: 0.93

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

²Total burnup for all fuel associated with this worksheet must be 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) Fuel decay start date: 1986
 SNF ID #: 1084 Estimates as of: 2030
 Fuel Units & Descr: 437 - 369 CURVED PLATES Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=3145.48kg ; EOL=2610.33kg Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
 Canister usage:
 24"x10"
 145.67

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.0068E-09	723,460.929	1,446,921.858	0.00E+00	1.45E-03	2.90E-03	Avg. MeV	
Am-241	2.5251E-03	723,460.929	1,446,921.858	0.00E+00	1.83E+03	3.65E+03	0.0150	1.066E+17
Am-242m	3.9624E-07	723,460.929	1,446,921.858	0.00E+00	2.87E-01	5.73E-01	0.0250	2.213E+16
Am-243	1.4880E-06	723,460.929	1,446,921.858	0.00E+00	1.08E+00	2.15E+00	0.0375	1.923E+16
C-14	5.7053E-09	723,460.929	1,446,921.858	0.00E+00	4.13E-03	8.26E-03	0.0575	2.070E+16
Cl-36	1.3124E-32	723,460.929	1,446,921.858	0.00E+00	9.49E-27	1.90E-26	0.0850	1.247E+16
Cm-243	1.1419E-07	723,460.929	1,446,921.858	0.00E+00	8.26E-02	1.65E-01	0.1250	8.239E+15
Cm-244	1.6522E-05	723,460.929	1,446,921.858	0.00E+00	1.20E+01	2.39E+01	0.2250	1.077E+16
Co-60	7.4047E-07	723,460.929	1,446,921.858	0.00E+00	5.36E-01	1.07E+00	0.3750	4.685E+15
Cs-134	2.0455E-05	723,460.929	1,446,921.858	0.00E+00	1.48E+01	2.96E+01	0.5750	7.743E+16
Cs-135	3.4477E-06	723,460.929	1,446,921.858	0.00E+00	2.49E+00	4.99E+00	0.8500	9.458E+14
Cs-137	1.4365E+00	723,460.929	1,446,921.858	0.00E+00	1.04E+06	2.08E+06	1.2500	4.575E+14
Eu-154	7.3230E-03	723,460.929	1,446,921.858	0.00E+00	5.30E+03	1.06E+04	1.7500	2.575E+13
Eu-155	5.9259E-04	723,460.929	1,446,921.858	0.00E+00	4.29E+02	8.57E+02	2.2500	2.153E+09
Fe-55	2.2791E-06	723,460.929	1,446,921.858	0.00E+00	1.65E+00	3.30E+00	2.7500	2.054E+09
H-3	1.9698E-03	723,460.929	1,446,921.858	0.00E+00	1.43E+03	2.85E+03	3.5000	1.191E+06
I-129	7.5300E-07	723,460.929	1,446,921.858	0.00E+00	5.45E-01	1.09E+00	5.0000	4.864E+05
Kr-85	4.1176E-02	723,460.929	1,446,921.858	0.00E+00	2.98E+04	5.96E+04	7.0000	5.324E+04
Np-237	9.5752E-06	723,460.929	1,446,921.858	0.00E+00	6.93E+00	1.39E+01	11.0000	5.935E+03
Pa-231	3.9379E-09	723,460.929	1,446,921.858	0.00E+00	2.85E-03	5.70E-03		
Pb-210	3.3115E-10	723,460.929	1,446,921.858	0.00E+00	2.40E-04	4.79E-04		
Pm-147	9.2402E-04	723,460.929	1,446,921.858	0.00E+00	6.68E+02	1.34E+03		
Pu-238	1.6217E-02	723,460.929	1,446,921.858	0.00E+00	1.17E+04	2.35E+04		
Pu-239	4.2810E-04	723,460.929	1,446,921.858	0.00E+00	3.10E+02	6.19E+02		
Pu-240	2.4333E-04	723,460.929	1,446,921.858	0.00E+00	1.76E+02	3.52E+02		
Pu-241	1.6242E-02	723,460.929	1,446,921.858	0.00E+00	1.18E+04	2.35E+04		
Pu-242	3.6329E-07	723,460.929	1,446,921.858	0.00E+00	2.63E-01	5.26E-01		
Ra-226	9.0114E-10	723,460.929	1,446,921.858	0.00E+00	6.52E-04	1.30E-03		
Ra-228	3.1019E-14	723,460.929	1,446,921.858	0.00E+00	2.24E-08	4.49E-08		
Ru-106	2.1225E-10	723,460.929	1,446,921.858	0.00E+00	1.54E-04	3.07E-04		
Se-79	1.2930E-05	723,460.929	1,446,921.858	0.00E+00	9.35E+00	1.87E+01		
Sn-126	1.1571E-05	723,460.929	1,446,921.858	0.00E+00	8.37E+00	1.67E+01		
Sr-90	1.3472E+00	723,460.929	1,446,921.858	0.00E+00	9.75E+05	1.95E+06		
Tc-99	4.2239E-04	723,460.929	1,446,921.858	0.00E+00	3.06E+02	6.11E+02		
Th-229	1.2407E-11	723,460.929	1,446,921.858	0.00E+00	8.98E-06	1.80E-05		
Th-230	8.3497E-08	723,460.929	1,446,921.858	0.00E+00	6.04E-02	1.21E-01		
Th-232	3.8371E-14	723,460.929	1,446,921.858	0.00E+00	2.78E-08	5.55E-08		
Ti-208	4.0414E-08	723,460.929	1,446,921.858	0.00E+00	2.92E-02	5.85E-02		
U-232	1.0948E-07	723,460.929	1,446,921.858	0.00E+00	7.92E-02	1.58E-01		
U-233	3.6275E-09	723,460.929	1,446,921.858	0.00E+00	2.62E-03	5.25E-03		
U-234	1.8562E-04	723,460.929	1,446,921.858	0.00E+00	1.34E+02	2.69E+02		
U-235	-2.7235E-06	723,460.929	0.000	6.33E+00	4.36E+00	6.33E+00		
U-236	1.5493E-05	723,460.929	1,446,921.858	0.00E+00	1.12E+01	2.24E+01		
U-238	-4.2851E-09	723,460.929	0.000	7.25E-02	6.94E-02	7.25E-02		
Y-90	1.3475E+00	723,460.929	1,446,921.858	0.00E+00	9.75E+05	1.95E+06		
Other Radionuclides					9.90E+05	1.98E+06		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.21E+04	2.42E+04
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.14083004	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	723,460.929	506,797.621	
Bounding:		1,446,921.858	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.73	0.70	
Bounding:	1.46		

Estimated EOL HM/Given EOL HM: 0.93

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: HIFAR (AUSTRALIA)
 SNF ID #: 680
 Fuel Units & Descr: 240 - 12 CURVED PLATES
 Heavy Metal Mass: BOL=45.19kg ; EOL=33.62kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1998
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 6.67

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)		Avg. MeV
Ac-227	5.4520E-10	10,655.320	21,310.639	0.00E+00	5.81E-06	1.16E-05		
Am-241	9.2284E-03	10,655.320	21,310.639	0.00E+00	9.83E+01	1.97E+02	0.0150	1.998E+15
Am-242m	1.3390E-06	10,655.320	21,310.639	0.00E+00	1.43E-02	2.85E-02	0.0250	4.112E+14
Am-243	3.7084E-05	10,655.320	21,310.639	0.00E+00	3.95E-01	7.90E-01	0.0375	3.631E+14
C-14	2.6452E-08	10,655.320	21,310.639	0.00E+00	2.82E-04	5.64E-04	0.0575	3.872E+14
Cf-36	4.4441E-31	10,655.320	21,310.639	0.00E+00	4.74E-27	9.47E-27	0.0850	2.331E+14
Cm-243	5.0498E-06	10,655.320	21,310.639	0.00E+00	5.38E-02	1.08E-01	0.1250	1.617E+14
Cm-244	3.8451E-03	10,655.320	21,310.639	0.00E+00	4.10E+01	8.19E+01	0.2250	2.012E+14
Co-60	2.5225E-05	10,655.320	21,310.639	0.00E+00	2.69E-01	5.38E-01	0.3750	8.709E+13
Cs-134	1.9830E-03	10,655.320	21,310.639	0.00E+00	2.11E+01	4.23E+01	0.5750	1.444E+15
Cs-135	4.2564E-06	10,655.320	21,310.639	0.00E+00	4.54E-02	9.07E-02	0.8500	2.844E+13
Cs-137	1.8141E+00	10,655.320	21,310.639	0.00E+00	1.93E+04	3.87E+04	1.2500	1.920E+13
Eu-154	3.4733E-02	10,655.320	21,310.639	0.00E+00	3.70E+02	7.40E+02	1.7500	7.946E+11
Eu-155	7.1081E-03	10,655.320	21,310.639	0.00E+00	7.57E+01	1.51E+02	2.2500	4.284E+07
Fe-55	3.5790E-04	10,655.320	21,310.639	0.00E+00	3.81E+00	7.63E+00	2.7500	3.681E+07
H-3	3.4945E-03	10,655.320	21,310.639	0.00E+00	3.72E+01	7.45E+01	3.5000	1.264E+06
I-129	6.6403E-07	10,655.320	21,310.639	0.00E+00	7.08E-03	1.42E-02	5.0000	5.358E+05
Kr-85	7.8250E-02	10,655.320	21,310.639	0.00E+00	8.34E+02	1.67E+03	7.0000	6.146E+04
Np-237	3.1567E-05	10,655.320	21,310.639	0.00E+00	3.36E-01	6.73E-01	11.0000	7.040E+03
Pa-231	1.3372E-09	10,655.320	21,310.639	0.00E+00	1.42E-05	2.85E-05		
Pb-210	3.0644E-11	10,655.320	21,310.639	0.00E+00	3.27E-07	6.53E-07		
Pm-147	6.5188E-03	10,655.320	21,310.639	0.00E+00	6.95E+01	1.39E+02		
Pu-238	1.4769E-01	10,655.320	21,310.639	0.00E+00	1.57E+03	3.15E+03		
Pu-239	6.9502E-04	10,655.320	21,310.639	0.00E+00	7.41E+00	1.48E+01		
Pu-240	3.7928E-04	10,655.320	21,310.639	0.00E+00	4.04E+00	8.08E+00		
Pu-241	1.0565E-01	10,655.320	21,310.639	0.00E+00	1.13E+03	2.25E+03		
Pu-242	3.0911E-06	10,655.320	21,310.639	0.00E+00	3.29E-02	6.59E-02		
Ra-226	1.1081E-10	10,655.320	21,310.639	0.00E+00	1.18E-06	2.36E-06		
Ra-228	2.1185E-14	10,655.320	21,310.639	0.00E+00	2.26E-10	4.51E-10		
Ru-106	2.3621E-07	10,655.320	21,310.639	0.00E+00	2.52E-03	5.03E-03		
Se-79	1.2339E-05	10,655.320	21,310.639	0.00E+00	1.31E-01	2.63E-01		
Sn-126	1.0194E-05	10,655.320	21,310.639	0.00E+00	1.09E-01	2.17E-01		
Sr-90	1.6932E+00	10,655.320	21,310.639	0.00E+00	1.80E+04	3.61E+04		
Tc-99	3.8056E-04	10,655.320	21,310.639	0.00E+00	4.05E+00	8.11E+00		
Th-229	9.1252E-12	10,655.320	21,310.639	0.00E+00	9.72E-08	1.94E-07		
Th-230	1.5407E-08	10,655.320	21,310.639	0.00E+00	1.64E-04	3.28E-04		
Th-232	2.8937E-14	10,655.320	21,310.639	0.00E+00	3.08E-10	6.17E-10		
Tl-208	4.7272E-08	10,655.320	21,310.639	0.00E+00	5.04E-04	1.01E-03		
U-232	1.2855E-07	10,655.320	21,310.639	0.00E+00	1.37E-03	2.74E-03		
U-233	5.1470E-09	10,655.320	21,310.639	0.00E+00	5.48E-05	1.10E-04		
U-234	5.6069E-05	10,655.320	21,310.639	0.00E+00	5.97E-01	1.19E+00		
U-235	-2.8661E-06	10,655.320	0.000	7.80E-02	4.74E-02	7.80E-02		
U-236	1.6701E-05	10,655.320	21,310.639	0.00E+00	1.78E-01	3.56E-01		
U-238	-9.4194E-09	10,655.320	0.000	3.06E-03	2.96E-03	3.06E-03		
Y-90	1.6932E+00	10,655.320	21,310.639	0.00E+00	1.80E+04	3.61E+04		
Other Radionuclides					1.85E+04	3.70E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.76E+02	5.53E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	79.8255621	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		10,655.320	
Bounding:		21,310.639	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.54		
Bounding:	1.08		

1.01

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

²Total burnup for all fuel associated with this worksheet must be 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

¹Fuel decay start date: 1988
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
Canister usage:
18"x10"
1.38

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	2,406.376	4,812.753	0.00E+00	4.83E-06	9.66E-06	0.0150	3.545E+14
Am-241	2.5251E-03	2,406.376	4,812.753	0.00E+00	6.08E+00	1.22E+01	0.0250	7.361E+13
Am-242m	3.9624E-07	2,406.376	4,812.753	0.00E+00	9.54E-04	1.91E-03	0.0375	6.398E+13
Am-243	1.4880E-06	2,406.376	4,812.753	0.00E+00	3.58E-03	7.16E-03	0.0675	6.886E+13
C-14	5.7053E-09	2,406.376	4,812.753	0.00E+00	1.37E-05	2.75E-05	0.0850	4.149E+13
Ci-36	1.3124E-32	2,406.376	4,812.753	0.00E+00	3.16E-29	6.32E-29	0.1250	2.741E+13
Cm-243	1.1419E-07	2,406.376	4,812.753	0.00E+00	2.75E-04	5.50E-04	0.2250	3.582E+13
Cm-244	1.6522E-05	2,406.376	4,812.753	0.00E+00	3.98E-02	7.95E-02	0.3750	1.558E+13
Co-60	7.4047E-07	2,406.376	4,812.753	0.00E+00	1.78E-03	3.56E-03	0.5750	2.575E+14
Cs-134	2.0455E-05	2,406.376	4,812.753	0.00E+00	4.92E-02	9.84E-02	0.8500	3.146E+12
Cs-135	3.4477E-06	2,406.376	4,812.753	0.00E+00	8.30E-03	1.66E-02	1.2500	1.522E+12
Cs-137	1.4365E+00	2,406.376	4,812.753	0.00E+00	3.46E+03	6.91E+03	1.7500	8.566E+10
Eu-154	7.3230E-03	2,406.376	4,812.753	0.00E+00	1.76E+01	3.52E+01	2.2500	7.163E+06
Eu-155	5.9259E-04	2,406.376	4,812.753	0.00E+00	1.43E+00	2.85E+00	2.7500	6.834E+06
Fe-55	2.2791E-06	2,406.376	4,812.753	0.00E+00	5.48E-03	1.10E-02	3.5000	3.959E+03
H-3	1.9698E-03	2,406.376	4,812.753	0.00E+00	4.74E+00	9.48E+00	5.0000	1.618E+03
I-129	7.5300E-07	2,406.376	4,812.753	0.00E+00	1.81E-03	3.62E-03	7.0000	1.770E+02
Kr-85	4.1176E-02	2,406.376	4,812.753	0.00E+00	9.91E+01	1.98E+02	11.0000	1.974E+01
Np-237	9.5752E-06	2,406.376	4,812.753	0.00E+00	2.30E-02	4.61E-02		
Pa-231	3.9379E-09	2,406.376	4,812.753	0.00E+00	9.48E-06	1.90E-05		
Pb-210	3.3115E-10	2,406.376	4,812.753	0.00E+00	7.97E-07	1.59E-06		
Pm-147	9.2402E-04	2,406.376	4,812.753	0.00E+00	2.22E+00	4.45E+00		
Pu-238	1.6217E-02	2,406.376	4,812.753	0.00E+00	3.90E+01	7.80E+01		
Pu-239	4.2810E-04	2,406.376	4,812.753	0.00E+00	1.03E+00	2.06E+00		
Pu-240	2.4333E-04	2,406.376	4,812.753	0.00E+00	5.86E-01	1.17E+00		
Pu-241	1.6242E-02	2,406.376	4,812.753	0.00E+00	3.91E+01	7.82E+01		
Pu-242	3.6329E-07	2,406.376	4,812.753	0.00E+00	8.74E-04	1.75E-03		
Ra-226	9.0114E-10	2,406.376	4,812.753	0.00E+00	2.17E-06	4.34E-06		
Ra-228	3.1019E-14	2,406.376	4,812.753	0.00E+00	7.46E-11	1.49E-10		
Ru-106	1.2225E-10	2,406.376	4,812.753	0.00E+00	5.11E-07	1.02E-06		
Se-79	1.2930E-05	2,406.376	4,812.753	0.00E+00	3.11E-02	6.22E-02		
Sn-126	1.1571E-05	2,406.376	4,812.753	0.00E+00	2.78E-02	5.57E-02		
Sr-90	1.3472E+00	2,406.376	4,812.753	0.00E+00	3.24E+03	6.48E+03		
Tc-99	4.2239E-04	2,406.376	4,812.753	0.00E+00	1.02E+00	2.03E+00		
Th-229	1.2407E-11	2,406.376	4,812.753	0.00E+00	2.99E-08	5.97E-08		
Th-230	8.3497E-08	2,406.376	4,812.753	0.00E+00	2.01E-04	4.02E-04		
Th-232	3.8371E-14	2,406.376	4,812.753	0.00E+00	9.23E-11	1.85E-10		
Ti-208	4.0414E-08	2,406.376	4,812.753	0.00E+00	9.73E-05	1.95E-04		
U-232	1.0948E-07	2,406.376	4,812.753	0.00E+00	2.63E-04	5.27E-04		
U-233	3.6275E-09	2,406.376	4,812.753	0.00E+00	8.73E-06	1.75E-05		
U-234	1.8562E-04	2,406.376	4,812.753	0.00E+00	4.47E-01	8.93E-01		
U-235	-2.7235E-06	2,406.376	0.000	1.32E-02	6.63E-03	1.32E-02		
U-236	1.5493E-05	2,406.376	4,812.753	0.00E+00	3.73E-02	7.46E-02		
U-238	-4.2851E-09	2,406.376	0.000	1.51E-04	1.41E-04	1.51E-04		
Y-90	1.3475E+00	2,406.376	4,812.753	0.00E+00	3.24E+03	6.49E+03		
Other Radionuclides					3.29E+03	6.59E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.03E+01	8.05E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.13082871	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,406.376	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		4,812.753	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	1.17		1.04
Bounding:	2.33		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: HTGR (PEACH BOTTOM SCRAP)
 SNF ID #: 935
 Fuel Units & Descr: 21 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=18.72kg ; EOL=16.34kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1967
 Estimates as of: 2030
 Template: FSV (Graphite, Graphite, 60 to 100%, Th & U)
²Template Burnup(MWd): 1270.275
 Template BOL Heavy Metal Mass (MT): 0.012702752
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 1.62

II. Estimates	m	x _n	x ₀	b	y _n	y ₀	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4.2062E-06	2,252.151	4,504.302	0.00E+00	9.47E-03	1.89E-02	Avg. MeV	
Am-241	3.2229E-03	2,252.151	4,504.302	0.00E+00	7.26E+00	1.45E+01	0.0150	2.217E+14
Am-242m	2.2381E-06	2,252.151	4,504.302	0.00E+00	5.04E-03	1.01E-02	0.0250	4.526E+13
Am-243	4.6006E-05	2,252.151	4,504.302	0.00E+00	1.04E-01	2.07E-01	0.0375	3.929E+13
C-14	2.3082E-05	2,252.151	4,504.302	0.00E+00	5.20E-02	1.04E-01	0.0575	4.244E+13
Cl-36	1.0667E-06	2,252.151	4,504.302	0.00E+00	2.40E-03	4.80E-03	0.0850	2.561E+13
Cm-243	1.7602E-05	2,252.151	4,504.302	0.00E+00	3.96E-02	7.93E-02	0.1250	1.685E+13
Cm-244	3.6307E-03	2,252.151	4,504.302	0.00E+00	8.18E+00	1.64E+01	0.2250	2.218E+13
Co-60	6.2585E-05	2,252.151	4,504.302	0.00E+00	1.41E-01	2.82E-01	0.3750	9.604E+12
Cs-134	2.4585E-07	2,252.151	4,504.302	0.00E+00	5.54E-04	1.11E-03	0.5750	1.576E+14
Cs-135	2.4711E-05	2,252.151	4,504.302	0.00E+00	5.57E-02	1.11E-01	0.8500	1.971E+12
Cs-137	9.3838E-01	2,252.151	4,504.302	0.00E+00	2.11E+03	4.23E+03	1.2500	9.514E+11
Eu-154	4.6887E-03	2,252.151	4,504.302	0.00E+00	1.06E+01	2.11E+01	1.7500	6.050E+10
Eu-155	1.2793E-04	2,252.151	4,504.302	0.00E+00	2.88E-01	5.76E-01	2.2500	5.034E+06
Fe-55	8.1951E-10	2,252.151	4,504.302	0.00E+00	1.85E-06	3.69E-06	2.7500	8.148E+10
H-3	1.6839E-03	2,252.151	4,504.302	0.00E+00	3.79E+00	7.58E+00	3.5000	2.688E+05
I-129	1.0092E-06	2,252.151	4,504.302	0.00E+00	2.27E-03	4.55E-03	5.0000	1.144E+05
Kr-85	1.4981E-02	2,252.151	4,504.302	0.00E+00	3.37E+01	6.75E+01	7.0000	1.313E+04
Np-237	1.2556E-05	2,252.151	4,504.302	0.00E+00	2.83E-02	5.66E-02	11.0000	1.504E+03
Pa-231	4.7360E-06	2,252.151	4,504.302	0.00E+00	1.07E-02	2.13E-02		
Pb-210	2.1901E-09	2,252.151	4,504.302	0.00E+00	4.93E-06	9.86E-06		
Pm-147	2.8781E-06	2,252.151	4,504.302	0.00E+00	6.48E-03	1.30E-02		
Pu-238	1.4430E-01	2,252.151	4,504.302	0.00E+00	3.25E+02	6.50E+02		
Pu-239	1.3572E-04	2,252.151	4,504.302	0.00E+00	3.06E-01	6.11E-01		
Pu-240	2.7537E-04	2,252.151	4,504.302	0.00E+00	6.20E-01	1.24E+00		
Pu-241	9.3995E-03	2,252.151	4,504.302	0.00E+00	2.12E+01	4.23E+01		
Pu-242	3.8866E-06	2,252.151	4,504.302	0.00E+00	8.75E-03	1.75E-02		
Ra-226	4.1243E-09	2,252.151	4,504.302	0.00E+00	9.29E-06	1.86E-05		
Ra-228	9.1949E-07	2,252.151	4,504.302	0.00E+00	2.07E-03	4.14E-03		
Ru-106	1.1667E-15	2,252.151	4,504.302	0.00E+00	2.63E-12	5.26E-12		
Se-79	2.1074E-05	2,252.151	4,504.302	0.00E+00	4.75E-02	9.49E-02		
Sn-126	2.2192E-05	2,252.151	4,504.302	0.00E+00	5.00E-02	1.00E-01		
Sr-90	8.8642E-01	2,252.151	4,504.302	0.00E+00	2.00E+03	3.99E+03		
Tc-99	3.3323E-04	2,252.151	4,504.302	0.00E+00	7.50E-01	1.50E+00		
Th-229	1.3517E-05	2,252.151	4,504.302	0.00E+00	3.04E-02	6.09E-02		
Th-230	2.2822E-07	2,252.151	4,504.302	0.00E+00	5.14E-04	1.03E-03		
Th-232	-6.9673E-08	2,252.151	0.000	1.85E-03	1.69E-03	1.85E-03		
Th-208	5.1524E-04	2,252.151	4,504.302	0.00E+00	1.16E+00	2.32E+00		
U-232	1.3950E-03	2,252.151	4,504.302	0.00E+00	3.14E+00	6.28E+00		
U-233	2.0602E-03	2,252.151	4,504.302	0.00E+00	4.64E+00	9.28E+00		
U-234	2.9513E-04	2,252.151	4,504.302	0.00E+00	6.65E-01	1.33E+00		
U-235	-1.7343E-06	2,252.151	0.000	3.70E-03	0.00E+00	3.70E-03		
U-236	8.6281E-06	2,252.151	4,504.302	0.00E+00	1.94E-02	3.89E-02		
U-238	-5.6065E-09	2,252.151	0.000	3.68E-05	2.42E-05	3.68E-05		
Y-90	8.8642E-01	2,252.151	4,504.302	0.00E+00	2.00E+03	3.99E+03		
Other Radionuclides					2.04E+03	4.07E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.60E+01	7.20E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	GRAPHITE	
Fuel Cladding:	BISO IN GRAPHIT	GRAPHITE	
BOL HM Constituents:	ThC-UC	Th and U	
BOL Enrichment %:	80.23127938	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	1,239.494	2,252.151	
Bounding:	1,361.222	4,504.302	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.20	1.82	
Bounding:	2.41	3.31	

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

²Total burnup for all fuel associated with this worksheet must be 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) ¹Fuel decay start date: 1961
 SNF ID #: 105 Estimates as of: 2030
 Fuel Units & Descr: 13 - CANISTER OF SCRAP Template: Pathfinder (Light Water, SST, 60 to 100%, U)
 Heavy Metal Mass: BOL=4.55kg ; EOL=4.04kg ²Template Burnup(MWd): 6.01
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.36

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	4.5940E-08	482.620	965.241	0.00E+00	2.22E-05	4.43E-05	Avg. MeV	
Am-241	1.1471E-04	482.620	965.241	0.00E+00	5.54E-02	1.11E-01	0.0150	3.523E+13
Am-242m	7.4210E-09	482.620	965.241	0.00E+00	3.58E-06	7.16E-06	0.0250	7.320E+12
Am-243	9.8236E-10	482.620	965.241	0.00E+00	4.74E-07	9.48E-07	0.0375	6.361E+12
C-14	2.2928E-04	482.620	965.241	0.00E+00	1.11E-01	2.21E-01	0.0575	6.826E+12
Cl-36	1.2260E-06	482.620	965.241	0.00E+00	5.92E-04	1.18E-03	0.0850	4.123E+12
Cm-243	1.2000E-10	482.620	965.241	0.00E+00	5.79E-08	1.16E-07	0.1250	2.673E+12
Cm-244	7.3577E-10	482.620	965.241	0.00E+00	3.55E-07	7.10E-07	0.2250	3.553E+12
Co-60	1.3732E-03	482.620	965.241	0.00E+00	6.63E-01	1.33E+00	0.3750	1.550E+12
Cs-134	1.2709E-10	482.620	965.241	0.00E+00	6.13E-08	1.23E-07	0.5750	2.607E+11
Cs-135	3.0316E-05	482.620	965.241	0.00E+00	1.46E-02	2.93E-02	0.8500	2.532E+13
Cs-137	7.2579E-01	482.620	965.241	0.00E+00	3.50E+02	7.01E+02	1.2500	1.833E+11
Eu-154	5.9750E-05	482.620	965.241	0.00E+00	2.88E-02	5.77E-02	1.7500	6.515E+09
Eu-155	1.0577E-05	482.620	965.241	0.00E+00	5.10E-03	1.02E-02	2.2500	1.232E+06
Fe-55	4.1631E-07	482.620	965.241	0.00E+00	2.01E-04	4.02E-04	2.7500	5.516E+05
H-3	4.6722E-04	482.620	965.241	0.00E+00	2.25E-01	4.51E-01	3.5000	5.624E+11
I-129	7.3195E-07	482.620	965.241	0.00E+00	3.53E-04	7.07E-04	5.0000	2.323E+01
Kr-85	5.9418E-03	482.620	965.241	0.00E+00	2.87E+00	5.74E+00	7.0000	2.568E+00
Np-237	1.1499E-06	482.620	965.241	0.00E+00	5.55E-04	1.11E-03	11.0000	2.883E-01
Pa-231	7.0899E-08	482.620	965.241	0.00E+00	3.42E-05	6.84E-05		
Pb-210	2.2363E-12	482.620	965.241	0.00E+00	1.08E-09	2.16E-09		
Pm-147	4.2296E-07	482.620	965.241	0.00E+00	2.04E-04	4.08E-04		
Pu-238	2.3295E-04	482.620	965.241	0.00E+00	1.12E-01	2.25E-01		
Pu-239	6.6722E-04	482.620	965.241	0.00E+00	3.22E-01	6.44E-01		
Pu-240	8.6556E-05	482.620	965.241	0.00E+00	4.18E-02	8.35E-02		
Pu-241	1.6889E-04	482.620	965.241	0.00E+00	8.15E-02	1.63E-01		
Pu-242	1.9717E-09	482.620	965.241	0.00E+00	9.52E-07	1.90E-06		
Ra-226	4.5740E-12	482.620	965.241	0.00E+00	2.21E-09	4.42E-09		
Ra-228	8.3511E-12	482.620	965.241	0.00E+00	4.03E-09	8.06E-09		
Ru-106	2.0516E-19	482.620	965.241	0.00E+00	9.90E-17	1.98E-16		
Se-79	1.3220E-05	482.620	965.241	0.00E+00	6.38E-03	1.28E-02		
Sn-126	1.1489E-05	482.620	965.241	0.00E+00	5.54E-03	1.11E-02		
Sr-90	6.6872E-01	482.620	965.241	0.00E+00	3.23E+02	6.45E+02		
Tc-99	4.6639E-04	482.620	965.241	0.00E+00	2.25E-01	4.50E-01		
Th-229	2.3727E-11	482.620	965.241	0.00E+00	1.15E-08	2.29E-08		
Th-230	2.7354E-10	482.620	965.241	0.00E+00	1.32E-07	2.64E-07		
Th-232	8.3594E-12	482.620	965.241	0.00E+00	4.03E-09	8.07E-09		
Ti-208	1.6228E-08	482.620	965.241	0.00E+00	7.83E-06	1.57E-05		
U-232	4.3960E-08	482.620	965.241	0.00E+00	2.12E-05	4.24E-05		
U-233	3.3344E-09	482.620	965.241	0.00E+00	1.61E-06	3.22E-06		
U-234	4.0749E-07	482.620	965.241	0.00E+00	1.97E-04	3.93E-04		
U-235	-2.7761E-06	482.620	0.000	9.16E-03	7.82E-03	1.56E-03		
U-236	1.6190E-05	482.620	965.241	0.00E+00	7.81E-03	9.16E-02		
U-238	-2.8547E-09	482.620	0.000	1.05E-04	1.03E-04	1.05E-04		
Y-90	6.6889E-01	482.620	965.241	0.00E+00	3.23E+02	6.46E+02		
Other Radionuclides					4.38E+02	8.77E+02		

Thermal Power		
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)	
3.93E+00	7.86E+00	
Total	Total	

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative).
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	
BOL HM Constituents:	NICHROME	SST	
BOL Enrichment %:	UO2	U	
	93.15	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		482.620	
Bounding:		965.241	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM 1.00
Nominal:	2.27		
Bounding:	4.55		

¹ Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 113
 Fuel Units & Descr: 7 - TUBE
 Heavy Metal Mass: BOL= : EOL=8.11kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.16

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	7.7980E-09	7,772.046	7,772.046	0.00E+00	6.06E-05	6.06E-05		
Am-241	2.3560E-02	7,772.046	7,772.046	0.00E+00	1.83E+02	1.83E+02	0.0150	2.680E+14
Am-242m	3.0880E-06	7,772.046	7,772.046	0.00E+00	2.40E-02	2.40E-02	0.0250	5.494E+13
Am-243	2.0520E-06	7,772.046	7,772.046	0.00E+00	1.59E-02	1.59E-02	0.0375	4.837E+13
C-14	1.1222E-03	7,772.046	7,772.046	0.00E+00	8.72E+00	8.72E+00	0.0575	5.357E+13
Cl-36	8.3760E-11	7,772.046	7,772.046	0.00E+00	6.51E-07	6.51E-07	0.0850	3.082E+13
Cm-243	2.4260E-07	7,772.046	7,772.046	0.00E+00	1.89E-03	1.89E-03	0.1250	2.003E+13
Cm-244	3.3140E-06	7,772.046	7,772.046	0.00E+00	2.58E-02	2.58E-02	0.2250	2.653E+13
Co-60	1.2454E-03	7,772.046	7,772.046	0.00E+00	9.68E+00	9.68E+00	0.3750	1.155E+13
Cs-134	3.3040E-10	7,772.046	7,772.046	0.00E+00	2.57E-06	2.57E-06	0.5750	2.066E+14
Cs-135	7.9140E-06	7,772.046	7,772.046	0.00E+00	6.15E-02	6.15E-02	0.8500	1.974E+12
Cs-137	7.1580E-01	7,772.046	7,772.046	0.00E+00	5.56E+03	5.56E+03	1.2500	1.427E+12
Eu-154	6.0500E-04	7,772.046	7,772.046	0.00E+00	4.70E+00	4.70E+00	1.7500	5.101E+10
Eu-155	9.4860E-06	7,772.046	7,772.046	0.00E+00	7.37E-02	7.37E-02	2.2500	9.180E+06
Fe-55	1.9322E-08	7,772.046	7,772.046	0.00E+00	1.50E-04	1.50E-04	2.7500	9.536E+06
H-3	4.4180E-03	7,772.046	7,772.046	0.00E+00	3.43E+01	3.43E+01	3.5000	3.886E+04
I-129	7.5020E-07	7,772.046	7,772.046	0.00E+00	5.83E-03	5.83E-03	5.0000	1.631E+04
Kr-85	5.4940E-03	7,772.046	7,772.046	0.00E+00	4.27E+01	4.27E+01	7.0000	1.833E+03
Np-237	5.8040E-06	7,772.046	7,772.046	0.00E+00	4.51E-02	4.51E-02	11.0000	2.080E+02
Pa-231	1.1096E-08	7,772.046	7,772.046	0.00E+00	8.62E-05	8.62E-05		
Pb-210	1.4712E-08	7,772.046	7,772.046	0.00E+00	1.14E-04	1.14E-04		
Pm-147	3.5920E-07	7,772.046	7,772.046	0.00E+00	2.79E-03	2.79E-03		
Pu-238	5.0700E-03	7,772.046	7,772.046	0.00E+00	3.94E+01	3.94E+01		
Pu-239	1.8728E-02	7,772.046	7,772.046	0.00E+00	1.46E+02	1.46E+02		
Pu-240	8.3280E-03	7,772.046	7,772.046	0.00E+00	6.47E+01	6.47E+01		
Pu-241	3.4460E-02	7,772.046	7,772.046	0.00E+00	2.68E+02	2.68E+02		
Pu-242	2.0380E-06	7,772.046	7,772.046	0.00E+00	1.58E-02	1.58E-02		
Ra-226	2.9640E-08	7,772.046	7,772.046	0.00E+00	2.30E-04	2.30E-04		
Ra-228	1.1922E-09	7,772.046	7,772.046	0.00E+00	9.27E-06	9.27E-06		
Ru-106	3.5780E-19	7,772.046	7,772.046	0.00E+00	2.78E-15	2.78E-15		
Se-79	1.2520E-05	7,772.046	7,772.046	0.00E+00	9.73E-02	9.73E-02		
Sn-126	1.2050E-05	7,772.046	7,772.046	0.00E+00	9.37E-02	9.37E-02		
Sr-90	6.1880E-01	7,772.046	7,772.046	0.00E+00	4.81E+03	4.81E+03		
Tc-99	4.4120E-04	7,772.046	7,772.046	0.00E+00	3.43E+00	3.43E+00		
Th-229	6.9280E-09	7,772.046	7,772.046	0.00E+00	5.38E-05	5.38E-05		
Th-230	1.7084E-06	7,772.046	7,772.046	0.00E+00	1.33E-02	1.33E-02		
Th-232	1.1926E-09	7,772.046	7,772.046	0.00E+00	9.27E-06	9.27E-06		
Ti-208	3.4740E-08	7,772.046	7,772.046	0.00E+00	2.70E-04	2.70E-04		
U-232	9.2940E-08	7,772.046	7,772.046	0.00E+00	7.22E-04	7.22E-04		
U-233	9.1680E-07	7,772.046	7,772.046	0.00E+00	7.13E-03	7.13E-03		
U-234	2.3440E-03	7,772.046	7,772.046	0.00E+00	1.82E+01	1.82E+01		
U-235	-2.3296E-06	7,772.046	0.000	1.75E-03	0.00E+00	1.75E-03		
U-236	2.6620E-05	7,772.046	7,772.046	0.00E+00	2.07E-01	2.07E-01		
U-238	-1.3291E-07	7,772.046	0.000	5.13E-03	4.09E-03	5.13E-03		
Y-90	6.1900E-01	7,772.046	7,772.046	0.00E+00	4.81E+03	4.81E+03		
Other Radionuclides					5.32E+03	5.32E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC	ZIRC	
BOL HM Constituents:	U-Mo	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		7,772.046	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		7,772.046	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	32.83		2.59
Bounding:	32.83		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 117
 Fuel Units & Descr: 76 - TUBE
 Heavy Metal Mass: BOL = ; EOL=36.13kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x15"
 3.45

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	7.7980E-09	34,632.914	34,632.914	0.00E+00	2.70E-04	2.70E-04	0.0150	1.185E+15
Am-241	2.3560E-02	34,632.914	34,632.914	0.00E+00	8.16E+02	8.16E+02	0.0250	2.448E+14
Am-242m	3.0880E-06	34,632.914	34,632.914	0.00E+00	1.07E-01	1.07E-01	0.0375	2.155E+14
Am-243	2.0520E-06	34,632.914	34,632.914	0.00E+00	7.11E-02	7.11E-02	0.0575	2.387E+14
C-14	1.1222E-03	34,632.914	34,632.914	0.00E+00	3.89E+01	3.89E+01	0.0850	1.373E+14
Cf-254	8.3760E-11	34,632.914	34,632.914	0.00E+00	2.90E-06	2.90E-06	0.1250	8.925E+13
Cm-243	2.4260E-07	34,632.914	34,632.914	0.00E+00	8.40E-03	8.40E-03	0.2250	1.182E+14
Cm-244	3.3140E-06	34,632.914	34,632.914	0.00E+00	1.15E-01	1.15E-01	0.3750	5.148E+13
Co-60	1.2454E-03	34,632.914	34,632.914	0.00E+00	4.31E+01	4.31E+01	0.5750	9.208E+14
Cs-134	3.3040E-10	34,632.914	34,632.914	0.00E+00	1.14E-05	1.14E-05	0.8500	8.796E+12
Cs-135	7.9140E-06	34,632.914	34,632.914	0.00E+00	2.74E-01	2.74E-01	1.2500	6.357E+12
Cs-137	7.1580E-01	34,632.914	34,632.914	0.00E+00	2.48E+04	2.48E+04	1.7500	2.273E+11
Eu-154	6.0500E-04	34,632.914	34,632.914	0.00E+00	2.10E+01	2.10E+01	2.2500	4.091E+07
Eu-155	9.4860E-06	34,632.914	34,632.914	0.00E+00	3.29E-01	3.29E-01	2.7500	4.249E+07
Fe-55	1.9322E-08	34,632.914	34,632.914	0.00E+00	6.69E-04	6.69E-04	3.5000	1.732E+05
H-3	4.4180E-03	34,632.914	34,632.914	0.00E+00	1.53E+02	1.53E+02	5.0000	7.266E+04
I-129	7.5020E-07	34,632.914	34,632.914	0.00E+00	2.60E-02	2.60E-02	7.0000	8.170E+03
Kr-85	5.4940E-03	34,632.914	34,632.914	0.00E+00	1.90E+02	1.90E+02	11.0000	9.270E+02
Np-237	5.8040E-06	34,632.914	34,632.914	0.00E+00	2.01E-01	2.01E-01		
Pa-231	1.1096E-08	34,632.914	34,632.914	0.00E+00	3.84E-04	3.84E-04		
Pb-210	1.4712E-08	34,632.914	34,632.914	0.00E+00	5.10E-04	5.10E-04		
Pm-147	3.5920E-07	34,632.914	34,632.914	0.00E+00	1.24E-02	1.24E-02		
Pu-238	5.0700E-03	34,632.914	34,632.914	0.00E+00	1.76E+02	1.76E+02		
Pu-239	1.8728E-02	34,632.914	34,632.914	0.00E+00	6.49E+02	6.49E+02		
Pu-240	8.3280E-03	34,632.914	34,632.914	0.00E+00	2.88E+02	2.88E+02		
Pu-241	3.4460E-02	34,632.914	34,632.914	0.00E+00	1.19E+03	1.19E+03		
Pu-242	2.0380E-06	34,632.914	34,632.914	0.00E+00	7.06E-02	7.06E-02		
Ra-226	2.9640E-08	34,632.914	34,632.914	0.00E+00	1.03E-03	1.03E-03		
Ra-228	1.1922E-09	34,632.914	34,632.914	0.00E+00	4.13E-05	4.13E-05		
Ru-106	3.5780E-19	34,632.914	34,632.914	0.00E+00	1.24E-14	1.24E-14		
Se-79	1.2520E-05	34,632.914	34,632.914	0.00E+00	4.34E-01	4.34E-01		
Sn-126	1.2050E-05	34,632.914	34,632.914	0.00E+00	4.17E-01	4.17E-01		
Sr-90	6.1880E-01	34,632.914	34,632.914	0.00E+00	2.14E+04	2.14E+04		
Tc-99	4.4120E-04	34,632.914	34,632.914	0.00E+00	1.53E+01	1.53E+01		
Th-229	6.9280E-09	34,632.914	34,632.914	0.00E+00	2.40E-04	2.40E-04		
Th-230	1.7084E-06	34,632.914	34,632.914	0.00E+00	5.92E-02	5.92E-02		
Th-232	1.1926E-09	34,632.914	34,632.914	0.00E+00	4.13E-05	4.13E-05		
Tl-208	3.4740E-08	34,632.914	34,632.914	0.00E+00	1.20E-03	1.20E-03		
U-232	9.2940E-08	34,632.914	34,632.914	0.00E+00	3.22E-03	3.22E-03		
U-233	9.1680E-07	34,632.914	34,632.914	0.00E+00	3.18E-02	3.18E-02		
U-234	2.3440E-03	34,632.914	34,632.914	0.00E+00	8.12E+01	8.12E+01		
U-235	-2.3296E-06	34,632.914	0.000	7.81E-03	0.00E+00	7.81E-03		
U-236	2.6620E-05	34,632.914	34,632.914	0.00E+00	9.22E-01	9.22E-01		
U-238	-1.3291E-07	34,632.914	0.000	2.28E-02	1.82E-02	2.28E-02		
Y-90	6.1900E-01	34,632.914	34,632.914	0.00E+00	2.14E+04	2.14E+04		
Other Radionuclides					2.37E+04	2.37E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC	ZIRC	
BOL HM Constituents:	U-Zr	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		34,632.914	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		34,632.914	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	32.83		2.59
Bounding:	32.83		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 867
 Fuel Units & Descr: 6 - TUBE
 Heavy Metal Mass: BOL= ; EOL=45.46kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x15"
 0.27

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	7.7980E-09	43,571.999	43,571.999	0.00E+00	3.40E-04	3.40E-04	Avg. MeV	
Am-241	2.3560E-02	43,571.999	43,571.999	0.00E+00	1.03E+03	1.03E+03	0.0150	1.491E+15
Am-242m	3.0880E-06	43,571.999	43,571.999	0.00E+00	1.35E-01	1.35E-01	0.0250	3.080E+14
Am-243	2.0520E-06	43,571.999	43,571.999	0.00E+00	8.94E-02	8.94E-02	0.0375	2.712E+14
C-14	1.1222E-03	43,571.999	43,571.999	0.00E+00	4.89E+01	4.89E+01	0.0575	3.003E+14
Cl-36	8.3760E-11	43,571.999	43,571.999	0.00E+00	3.65E-06	3.65E-06	0.0850	1.728E+14
Cm-243	2.4260E-07	43,571.999	43,571.999	0.00E+00	1.06E-02	1.06E-02	0.1250	1.123E+14
Cm-244	3.3140E-06	43,571.999	43,571.999	0.00E+00	1.44E-01	1.44E-01	0.2250	1.487E+14
Co-60	1.2454E-03	43,571.999	43,571.999	0.00E+00	5.43E+01	5.43E+01	0.3750	6.477E+13
Cs-134	3.3040E-10	43,571.999	43,571.999	0.00E+00	1.44E-05	1.44E-05	0.5750	1.159E+15
Cs-135	7.9140E-06	43,571.999	43,571.999	0.00E+00	3.45E-01	3.45E-01	0.8500	1.107E+13
Cs-137	7.1580E-01	43,571.999	43,571.999	0.00E+00	3.12E+04	3.12E+04	1.2500	7.997E+12
Eu-154	6.0500E-04	43,571.999	43,571.999	0.00E+00	2.64E+01	2.64E+01	1.7500	2.860E+11
Eu-155	9.4860E-06	43,571.999	43,571.999	0.00E+00	4.13E-01	4.13E-01	2.2500	5.146E+07
Fe-55	1.9322E-08	43,571.999	43,571.999	0.00E+00	8.42E-04	8.42E-04	2.7500	5.346E+07
H-3	4.4180E-03	43,571.999	43,571.999	0.00E+00	1.93E+02	1.93E+02	3.5000	2.179E+05
I-129	7.5020E-07	43,571.999	43,571.999	0.00E+00	3.27E-02	3.27E-02	5.0000	9.141E+04
Kr-85	5.4940E-03	43,571.999	43,571.999	0.00E+00	2.39E+02	2.39E+02	7.0000	1.028E+04
Np-237	5.8040E-06	43,571.999	43,571.999	0.00E+00	2.53E-01	2.53E-01	11.0000	1.166E+03
Pa-231	1.1096E-08	43,571.999	43,571.999	0.00E+00	4.83E-04	4.83E-04		
Pb-210	1.4712E-08	43,571.999	43,571.999	0.00E+00	6.41E-04	6.41E-04		
Pm-147	3.5920E-07	43,571.999	43,571.999	0.00E+00	1.57E-02	1.57E-02		
Pu-238	5.0700E-03	43,571.999	43,571.999	0.00E+00	2.21E+02	2.21E+02		
Pu-239	1.8728E-02	43,571.999	43,571.999	0.00E+00	8.16E+02	8.16E+02		
Pu-240	8.3280E-03	43,571.999	43,571.999	0.00E+00	3.63E+02	3.63E+02		
Pu-241	3.4460E-02	43,571.999	43,571.999	0.00E+00	1.50E+03	1.50E+03		
Pu-242	2.0380E-06	43,571.999	43,571.999	0.00E+00	8.88E-02	8.88E-02		
Ra-226	2.9640E-08	43,571.999	43,571.999	0.00E+00	1.29E-03	1.29E-03		
Ra-228	1.1922E-09	43,571.999	43,571.999	0.00E+00	5.19E-05	5.19E-05		
Ru-106	3.5780E-19	43,571.999	43,571.999	0.00E+00	1.56E-14	1.56E-14		
Se-79	1.2520E-05	43,571.999	43,571.999	0.00E+00	5.46E-01	5.46E-01		
Sn-126	1.2050E-05	43,571.999	43,571.999	0.00E+00	5.25E-01	5.25E-01		
Sr-90	6.1880E-01	43,571.999	43,571.999	0.00E+00	2.70E+04	2.70E+04		
Tc-99	4.4120E-04	43,571.999	43,571.999	0.00E+00	1.92E+01	1.92E+01		
Th-229	6.9280E-09	43,571.999	43,571.999	0.00E+00	3.02E-04	3.02E-04		
Th-230	1.7084E-06	43,571.999	43,571.999	0.00E+00	7.44E-02	7.44E-02		
Th-232	1.1926E-09	43,571.999	43,571.999	0.00E+00	5.20E-05	5.20E-05		
Tl-208	3.4740E-08	43,571.999	43,571.999	0.00E+00	1.51E-03	1.51E-03		
U-232	9.2940E-08	43,571.999	43,571.999	0.00E+00	4.05E-03	4.05E-03		
U-233	9.1680E-07	43,571.999	43,571.999	0.00E+00	3.99E-02	3.99E-02		
U-234	2.3440E-03	43,571.999	43,571.999	0.00E+00	1.02E+02	1.02E+02		
U-235	-2.3296E-06	43,571.999	0.000	9.83E-03	0.00E+00	9.83E-03		
U-236	2.6620E-05	43,571.999	43,571.999	0.00E+00	1.16E+00	1.16E+00		
U-238	-1.3291E-07	43,571.999	0.000	2.87E-02	2.29E-02	2.87E-02		
Y-90	6.1900E-01	43,571.999	43,571.999	0.00E+00	2.70E+04	2.70E+04		
Other Radionuclides					2.98E+04	2.98E+04		
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							4.14E+02	4.14E+02
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC-2	ZIRC	
BOL HM Constituents:	U METAL	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		43,571.999	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		43,571.999	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	32.83		2.59
Bounding:	32.83		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 113
 Fuel Units & Descr: 82 - TUBE
 Heavy Metal Mass: BOL= ; EOL=92.77kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimate as of: 2030
 Template: HFBR (Heavy Water, SST, 0 to 5% U)
²Template Burnup(MWD): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 1.15

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	9.2380E-09	88,573.243	88,573.243	0.00E+00	8.18E-04	8.18E-04	0.0150	2.835E+15
Am-241	2.2020E-01	88,573.243	88,573.243	0.00E+00	1.95E+04	1.95E+04	0.0250	5.483E+14
Am-242m	8.9860E-05	88,573.243	88,573.243	0.00E+00	7.96E+00	7.96E+00	0.0375	4.892E+14
Am-243	5.2240E-05	88,573.243	88,573.243	0.00E+00	4.63E+00	4.63E+00	0.0575	7.545E+14
C-14	2.2080E-02	88,573.243	88,573.243	0.00E+00	1.96E+03	1.96E+03	0.0850	2.925E+14
Cl-36	4.1880E-04	88,573.243	88,573.243	0.00E+00	3.71E+01	3.71E+01	0.1250	1.899E+14
Cm-243	8.0820E-06	88,573.243	88,573.243	0.00E+00	7.16E-01	7.16E-01	0.2250	2.497E+14
Cm-244	2.3260E-04	88,573.243	88,573.243	0.00E+00	2.06E+01	2.06E+01	0.3750	1.084E+14
Co-60	9.9520E-02	88,573.243	88,573.243	0.00E+00	8.81E+03	8.81E+03	0.5750	2.360E+15
Cs-134	7.2160E-10	88,573.243	88,573.243	0.00E+00	6.39E-05	6.39E-05	0.8500	2.002E+13
Cs-135	3.7460E-06	88,573.243	88,573.243	0.00E+00	3.32E-01	3.32E-01	1.2500	6.595E+14
Cs-137	7.2140E-01	88,573.243	88,573.243	0.00E+00	6.39E+04	6.39E+04	1.7500	4.940E+11
Eu-154	8.2120E-04	88,573.243	88,573.243	0.00E+00	7.27E+01	7.27E+01	2.2500	3.511E+09
Eu-155	1.2284E-05	88,573.243	88,573.243	0.00E+00	1.09E+00	1.09E+00	2.7500	3.688E+08
Fe-55	1.8062E-05	88,573.243	88,573.243	0.00E+00	1.60E+00	1.60E+00	3.5000	1.862E+06
H-3	8.2700E-03	88,573.243	88,573.243	0.00E+00	7.33E+02	7.33E+02	5.0000	7.733E+05
I-129	9.1660E-07	88,573.243	88,573.243	0.00E+00	8.12E-02	8.12E-02	7.0000	8.611E+04
Kr-85	4.6540E-03	88,573.243	88,573.243	0.00E+00	4.12E+02	4.12E+02	11.0000	9.707E+03
Np-237	2.1800E-05	88,573.243	88,573.243	0.00E+00	1.93E+00	1.93E+00		
Pa-231	1.2982E-08	88,573.243	88,573.243	0.00E+00	1.15E-03	1.15E-03		
Pb-210	1.3604E-08	88,573.243	88,573.243	0.00E+00	1.20E-03	1.20E-03		
Pm-147	2.8480E-07	88,573.243	88,573.243	0.00E+00	2.52E-02	2.52E-02		
Pu-238	2.8680E-02	88,573.243	88,573.243	0.00E+00	2.54E+03	2.54E+03		
Pu-239	6.5040E-02	88,573.243	88,573.243	0.00E+00	5.76E+03	5.76E+03		
Pu-240	2.6620E-02	88,573.243	88,573.243	0.00E+00	2.36E+03	2.36E+03		
Pu-241	3.2120E-01	88,573.243	88,573.243	0.00E+00	2.84E+04	2.84E+04		
Pu-242	1.6742E-05	88,573.243	88,573.243	0.00E+00	1.48E+00	1.48E+00		
Ra-226	2.7420E-08	88,573.243	88,573.243	0.00E+00	2.43E-03	2.43E-03		
Ra-228	2.0880E-10	88,573.243	88,573.243	0.00E+00	1.85E-05	1.85E-05		
Ru-106	8.1300E-19	88,573.243	88,573.243	0.00E+00	7.20E-14	7.20E-14		
Se-79	2.8480E-05	88,573.243	88,573.243	0.00E+00	2.52E+00	2.52E+00		
Sn-126	1.7790E-05	88,573.243	88,573.243	0.00E+00	1.58E+00	1.58E+00		
Sr-90	5.0780E-01	88,573.243	88,573.243	0.00E+00	4.50E+04	4.50E+04		
Tc-99	4.3360E-04	88,573.243	88,573.243	0.00E+00	3.84E+01	3.84E+01		
Th-229	3.1120E-09	88,573.243	88,573.243	0.00E+00	2.76E-04	2.76E-04		
Th-230	1.5812E-06	88,573.243	88,573.243	0.00E+00	1.40E-01	1.40E-01		
Th-232	2.0900E-10	88,573.243	88,573.243	0.00E+00	1.85E-05	1.85E-05		
Tl-208	1.1448E-07	88,573.243	88,573.243	0.00E+00	1.01E-02	1.01E-02		
U-232	3.1000E-07	88,573.243	88,573.243	0.00E+00	2.75E-02	2.75E-02		
U-233	4.1460E-07	88,573.243	88,573.243	0.00E+00	3.67E-02	3.67E-02		
U-234	2.1720E-03	88,573.243	88,573.243	0.00E+00	1.92E+02	1.92E+02		
U-235	-1.7016E-06	88,573.243	0.000	2.01E-02	0.00E+00	2.01E-02		
U-236	2.6100E-05	88,573.243	88,573.243	0.00E+00	2.31E+00	2.31E+00		
U-238	-5.1291E-07	88,573.243	0.000	5.87E-02	1.32E-02	5.87E-02		
Y-90	5.0800E-01	88,573.243	88,573.243	0.00E+00	4.50E+04	4.50E+04		
Other Radionuclides					5.73E+05	5.73E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.97E+03	1.97E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
From SFD	Used		
Reactor Moderator:	HEAVY WATER	HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	SST	SST	
BOL HM Constituents:	U METAL	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
		88,573.243	Nominal burnup set equal to bounding burnup.
Bounding:		88,573.243	Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup
	32.70	
Bounding:	32.70	
		Estimated EOL HM/Given EOL HM
		2.26

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 976
 Fuel Units & Descr: 2 - TUBE
 Heavy Metal Mass: BOL= : EOL=5.41kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.02

Radionuclide	IL Estimates		Gamma Sources					
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	7.7980E-09	5,183.089	5,183.089	0.00E+00	4.04E-05	4.04E-05	0.0150	1.774E+14
Am-241	2.3560E-02	5,183.089	5,183.089	0.00E+00	1.22E+02	1.22E+02	0.0250	3.664E+13
Am-242m	3.0880E-06	5,183.089	5,183.089	0.00E+00	1.60E-02	1.60E-02	0.0375	3.226E+13
Am-243	2.0520E-06	5,183.089	5,183.089	0.00E+00	1.06E-02	1.06E-02	0.0575	3.572E+13
C-14	1.1222E-03	5,183.089	5,183.089	0.00E+00	5.82E+00	5.82E+00	0.0850	2.055E+13
Cl-36	8.3760E-11	5,183.089	5,183.089	0.00E+00	4.34E-07	4.34E-07	0.1250	1.336E+13
Cm-243	2.4260E-07	5,183.089	5,183.089	0.00E+00	1.26E-03	1.26E-03	0.2250	1.769E+13
Cm-244	3.3140E-06	5,183.089	5,183.089	0.00E+00	1.72E-02	1.72E-02	0.3750	7.704E+12
Co-60	1.2454E-03	5,183.089	5,183.089	0.00E+00	6.46E+00	6.46E+00	0.5750	1.378E+14
Cs-134	3.3040E-10	5,183.089	5,183.089	0.00E+00	1.71E-06	1.71E-06	0.8500	2.592E+12
Cs-135	7.9140E-06	5,183.089	5,183.089	0.00E+00	4.10E-02	4.10E-02	1.2500	9.513E+11
Cs-137	7.1580E-01	5,183.089	5,183.089	0.00E+00	3.71E+03	3.71E+03	1.7500	3.402E+10
Eu-154	6.0500E-04	5,183.089	5,183.089	0.00E+00	3.14E+00	3.14E+00	2.2500	6.122E+06
Eu-155	9.4860E-06	5,183.089	5,183.089	0.00E+00	4.92E-02	4.92E-02	2.7500	6.359E+06
Fe-55	1.9322E-08	5,183.089	5,183.089	0.00E+00	1.00E-04	1.00E-04	3.5000	2.592E+04
H-3	4.4180E-03	5,183.089	5,183.089	0.00E+00	2.29E+01	2.29E+01	5.0000	1.087E+04
I-129	7.5020E-07	5,183.089	5,183.089	0.00E+00	3.89E-03	3.89E-03	7.0000	1.223E+03
Kr-85	5.4940E-03	5,183.089	5,183.089	0.00E+00	2.85E+01	2.85E+01	11.0000	1.387E+02
Np-237	5.8040E-06	5,183.089	5,183.089	0.00E+00	3.01E-02	3.01E-02		
Pa-231	1.1096E-08	5,183.089	5,183.089	0.00E+00	5.75E-05	5.75E-05		
Pb-210	1.4712E-08	5,183.089	5,183.089	0.00E+00	7.63E-05	7.63E-05		
Pm-147	3.5920E-07	5,183.089	5,183.089	0.00E+00	1.86E-03	1.86E-03		
Pu-238	5.0700E-03	5,183.089	5,183.089	0.00E+00	2.63E+01	2.63E+01		
Pu-239	1.8728E-02	5,183.089	5,183.089	0.00E+00	9.71E+01	9.71E+01		
Pu-240	8.3280E-03	5,183.089	5,183.089	0.00E+00	4.32E+01	4.32E+01		
Pu-241	3.4460E-02	5,183.089	5,183.089	0.00E+00	1.79E+02	1.79E+02		
Pu-242	2.0380E-06	5,183.089	5,183.089	0.00E+00	1.06E-02	1.06E-02		
Ra-226	2.9640E-08	5,183.089	5,183.089	0.00E+00	1.54E-04	1.54E-04		
Ra-228	1.1922E-09	5,183.089	5,183.089	0.00E+00	6.18E-06	6.18E-06		
Ru-106	3.5780E-19	5,183.089	5,183.089	0.00E+00	1.85E-15	1.85E-15		
Se-79	1.2520E-05	5,183.089	5,183.089	0.00E+00	6.49E-02	6.49E-02		
Sn-126	1.2050E-05	5,183.089	5,183.089	0.00E+00	6.25E-02	6.25E-02		
Sr-90	6.1880E-01	5,183.089	5,183.089	0.00E+00	3.21E+03	3.21E+03		
Tc-99	4.4120E-04	5,183.089	5,183.089	0.00E+00	2.29E+00	2.29E+00		
Th-229	6.9280E-09	5,183.089	5,183.089	0.00E+00	3.59E-05	3.59E-05		
Th-230	1.7084E-06	5,183.089	5,183.089	0.00E+00	8.85E-03	8.85E-03		
Th-232	1.1926E-09	5,183.089	5,183.089	0.00E+00	6.18E-06	6.18E-06		
Tl-208	3.4740E-08	5,183.089	5,183.089	0.00E+00	1.80E-04	1.80E-04		
U-232	9.2940E-08	5,183.089	5,183.089	0.00E+00	4.82E-04	4.82E-04		
U-233	9.1680E-07	5,183.089	5,183.089	0.00E+00	4.75E-03	4.75E-03		
U-234	2.3440E-03	5,183.089	5,183.089	0.00E+00	1.21E+01	1.21E+01		
U-235	-2.3296E-06	5,183.089	0.000	1.17E-03	0.00E+00	1.17E-03		
U-236	2.6620E-05	5,183.089	5,183.089	0.00E+00	1.38E-01	1.38E-01		
U-238	-1.3291E-07	5,183.089	0.000	3.42E-03	2.73E-03	3.42E-03		
Y-90	6.1900E-01	5,183.089	5,183.089	0.00E+00	3.21E+03	3.21E+03		
Other Radionuclides					3.55E+03	3.55E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.92E+01	4.92E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		5,183.089	Nominal burnup set equal to bounding burnup.
Bounding:		5,183.089	Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	32.83		2.59
Bounding:	32.83		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 977
 Fuel Units & Descr: 3 - TUBE
 Heavy Metal Mass: BOL= ; EOL=15.78kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x15"
 0.14

II. Estimates

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
								Avg. MeV
Ac-227	7.7980E-09	15,122.233	15,122.233	0.00E+00	1.18E-04	1.18E-04		
Am-241	2.3560E-02	15,122.233	15,122.233	0.00E+00	3.56E+02	3.56E+02	0.0150	5.176E+14
Am-242m	3.0880E-06	15,122.233	15,122.233	0.00E+00	4.67E-02	4.67E-02	0.0250	1.069E+14
Am-243	2.0520E-06	15,122.233	15,122.233	0.00E+00	3.10E-02	3.10E-02	0.0375	9.411E+13
C-14	1.1222E-03	15,122.233	15,122.233	0.00E+00	1.70E+01	1.70E+01	0.0575	1.042E+14
Cl-36	8.3760E-11	15,122.233	15,122.233	0.00E+00	1.27E-06	1.27E-06	0.0850	5.996E+13
Cm-243	2.4260E-07	15,122.233	15,122.233	0.00E+00	3.67E-03	3.67E-03	0.1250	3.897E+13
Cm-244	3.3140E-06	15,122.233	15,122.233	0.00E+00	5.01E-02	5.01E-02	0.2250	5.162E+13
Co-60	1.2454E-03	15,122.233	15,122.233	0.00E+00	1.88E+01	1.88E+01	0.3750	2.248E+13
Cs-134	3.3040E-10	15,122.233	15,122.233	0.00E+00	5.00E-06	5.00E-06	0.5750	4.021E+14
Cs-135	7.9140E-06	15,122.233	15,122.233	0.00E+00	1.20E-01	1.20E-01	0.8500	3.841E+12
Cs-137	7.1580E-01	15,122.233	15,122.233	0.00E+00	1.08E+04	1.08E+04	1.2500	2.776E+12
Eu-154	6.0500E-04	15,122.233	15,122.233	0.00E+00	9.15E+00	9.15E+00	1.7500	9.926E+10
Eu-155	9.4860E-06	15,122.233	15,122.233	0.00E+00	1.43E-01	1.43E-01	2.2500	1.786E+07
Fe-55	1.9322E-08	15,122.233	15,122.233	0.00E+00	2.92E-04	2.92E-04	2.7500	1.855E+07
H-3	4.4180E-03	15,122.233	15,122.233	0.00E+00	6.68E+01	6.68E+01	3.5000	7.562E+04
I-129	7.5020E-07	15,122.233	15,122.233	0.00E+00	1.13E-02	1.13E-02	5.0000	3.173E+04
Kr-85	5.4940E-03	15,122.233	15,122.233	0.00E+00	8.31E+01	8.31E+01	7.0000	3.567E+03
Np-237	5.8040E-06	15,122.233	15,122.233	0.00E+00	8.78E-02	8.78E-02	11.0000	4.048E+02
Pa-231	1.1096E-08	15,122.233	15,122.233	0.00E+00	1.68E-04	1.68E-04		
Pb-210	1.4712E-08	15,122.233	15,122.233	0.00E+00	2.22E-04	2.22E-04		
Pm-147	3.5920E-07	15,122.233	15,122.233	0.00E+00	5.43E-03	5.43E-03		
Pu-238	5.0700E-03	15,122.233	15,122.233	0.00E+00	7.67E+01	7.67E+01		
Pu-239	1.8728E-02	15,122.233	15,122.233	0.00E+00	2.83E+02	2.83E+02		
Pu-240	8.3280E-03	15,122.233	15,122.233	0.00E+00	1.26E+02	1.26E+02		
Pu-241	3.4460E-02	15,122.233	15,122.233	0.00E+00	5.21E+02	5.21E+02		
Pu-242	2.0380E-06	15,122.233	15,122.233	0.00E+00	3.08E-02	3.08E-02		
Ra-226	2.9640E-08	15,122.233	15,122.233	0.00E+00	4.48E-04	4.48E-04		
Ra-228	1.1922E-09	15,122.233	15,122.233	0.00E+00	1.80E-05	1.80E-05		
Ru-106	3.5780E-19	15,122.233	15,122.233	0.00E+00	5.41E-15	5.41E-15		
Se-79	1.2520E-05	15,122.233	15,122.233	0.00E+00	1.89E-01	1.89E-01		
Sn-126	1.2050E-05	15,122.233	15,122.233	0.00E+00	1.82E-01	1.82E-01		
Sr-90	6.1880E-01	15,122.233	15,122.233	0.00E+00	9.36E+03	9.36E+03		
Tc-99	4.4120E-04	15,122.233	15,122.233	0.00E+00	6.67E+00	6.67E+00		
Th-229	6.9280E-09	15,122.233	15,122.233	0.00E+00	1.05E-04	1.05E-04		
Th-230	1.7084E-06	15,122.233	15,122.233	0.00E+00	2.58E-02	2.58E-02		
Th-232	1.1926E-09	15,122.233	15,122.233	0.00E+00	1.80E-05	1.80E-05		
Tl-208	3.4740E-08	15,122.233	15,122.233	0.00E+00	5.25E-04	5.25E-04		
U-232	9.2940E-08	15,122.233	15,122.233	0.00E+00	1.41E-03	1.41E-03		
U-233	9.1680E-07	15,122.233	15,122.233	0.00E+00	1.39E-02	1.39E-02		
U-234	2.3440E-03	15,122.233	15,122.233	0.00E+00	3.54E+01	3.54E+01		
U-235	-2.3296E-06	15,122.233	0.000	3.41E-03	0.00E+00	3.41E-03		
U-236	2.6620E-05	15,122.233	15,122.233	0.00E+00	4.03E-01	4.03E-01		
U-238	-1.3291E-07	15,122.233	0.000	9.97E-03	7.96E-03	9.97E-03		
Y-90	6.1900E-01	15,122.233	15,122.233	0.00E+00	9.36E+03	9.36E+03		
Other Radionuclides					1.04E+04	1.04E+04		
								Thermal Power
								Nominal Heat Output (Watts)
								Bounding Heat Output (Watts)
								1.44E+02 1.44E+02
								Total Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		Basis for Parameter Differences:
Reactor Moderator:	From SFD: HEAVY WATER Used: HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC ZIRC	
BOL HM Constituents:	U-Zr U	
BOL Enrichment %:	0 to 5	

Burnup Summary (MWd) ²		Basis for burnup used in estimate:
Nominal:	From SFD: 15,122.233 Estimated: 15,122.233	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:	15,122.233	

Checks		Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier: 32.83 Estimated Burnup/ Given Burnup	2.59
Bounding:	32.83	

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 283
 Fuel Units & Descr: 8 - TUBE
 Heavy Metal Mass: BOL= : EOL=139.53kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1963
 Estimates as of: 2030
 Template: PWR (Light Water, Zinc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x15"
 0.36

Radionuclide	m	x _a	x _b	b	y _a	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.2581E-09	209.629	209.629	0.00E+00	2.64E-07	2.64E-07	Avg. MeV	
Am-241	1.4761E-01	209.629	209.629	0.00E+00	3.09E+01	3.09E+01	0.0150	5.675E+12
Am-242m	2.5032E-04	209.629	209.629	0.00E+00	5.25E-02	5.25E-02	0.0250	1.127E+12
Am-243	6.2387E-04	209.629	209.629	0.00E+00	1.31E-01	1.31E-01	0.0375	1.054E+12
C-14	4.7739E-05	209.629	209.629	0.00E+00	1.00E-02	1.00E-02	0.0575	1.446E+12
Cl-36	8.0297E-07	209.629	209.629	0.00E+00	1.68E-04	1.68E-04	0.0850	6.169E+11
Cm-243	1.2099E-04	209.629	209.629	0.00E+00	2.54E-02	2.54E-02	0.1250	4.024E+11
Cm-244	1.5560E-02	209.629	209.629	0.00E+00	3.26E+00	3.26E+00	0.2250	5.248E+11
Co-60	4.9580E-05	209.629	209.629	0.00E+00	1.04E-02	1.04E-02	0.3750	2.270E+11
Cs-134	1.7022E-09	209.629	209.629	0.00E+00	3.57E-07	3.57E-07	0.5750	5.405E+12
Cs-135	1.4433E-05	209.629	209.629	0.00E+00	3.03E-03	3.03E-03	0.8500	4.333E+10
Cs-137	6.9929E-07	209.629	209.629	0.00E+00	1.47E+02	1.47E+02	1.2500	2.026E+10
Eu-154	1.8023E-03	209.629	209.629	0.00E+00	3.78E-01	3.78E-01	1.7500	1.166E+09
Eu-155	2.6793E-05	209.629	209.629	0.00E+00	5.62E-03	5.62E-03	2.2500	2.057E+05
Fe-55	1.4580E-08	209.629	209.629	0.00E+00	3.06E-06	3.06E-06	2.7500	1.021E+06
H-3	3.8566E-03	209.629	209.629	0.00E+00	8.08E-01	8.08E-01	3.5000	5.091E+04
I-129	9.8288E-07	209.629	209.629	0.00E+00	2.06E-04	2.06E-04	5.0000	2.174E+04
Kr-85	4.0617E-03	209.629	209.629	0.00E+00	8.51E-01	8.51E-01	7.0000	2.503E+03
Np-237	1.2645E-05	209.629	209.629	0.00E+00	2.65E-03	2.65E-03	11.0000	2.872E+02
Pa-231	1.6376E-09	209.629	209.629	0.00E+00	3.43E-07	3.43E-07		
Pb-210	2.8795E-10	209.629	209.629	0.00E+00	6.04E-08	6.04E-08		
Pm-147	1.3264E-07	209.629	209.629	0.00E+00	2.78E-05	2.78E-05		
Pu-238	5.8882E-02	209.629	209.629	0.00E+00	1.23E+01	1.23E+01		
Pu-239	1.1613E-02	209.629	209.629	0.00E+00	2.43E+00	2.43E+00		
Pu-240	1.5142E-02	209.629	209.629	0.00E+00	3.17E+00	3.17E+00		
Pu-241	2.1269E-01	209.629	209.629	0.00E+00	4.46E+01	4.46E+01		
Pu-242	6.4260E-05	209.629	209.629	0.00E+00	1.35E-02	1.35E-02		
Ra-226	5.8689E-10	209.629	209.629	0.00E+00	1.23E-07	1.23E-07		
Ra-228	5.3036E-12	209.629	209.629	0.00E+00	1.11E-09	1.11E-09		
Ru-106	6.8136E-19	209.629	209.629	0.00E+00	1.43E-16	1.43E-16		
Se-79	1.2372E-05	209.629	209.629	0.00E+00	2.59E-03	2.59E-03		
Sn-126	2.5194E-05	209.629	209.629	0.00E+00	5.28E-03	5.28E-03		
Sr-90	4.4913E-01	209.629	209.629	0.00E+00	9.42E+01	9.42E+01		
Tc-99	3.9357E-04	209.629	209.629	0.00E+00	8.25E-02	8.25E-02		
Th-229	1.9331E-10	209.629	209.629	0.00E+00	4.05E-08	4.05E-08		
Th-230	3.5223E-08	209.629	209.629	0.00E+00	7.38E-06	7.38E-06		
Th-232	5.3085E-12	209.629	209.629	0.00E+00	1.11E-09	1.11E-09		
Th-208	1.3102E-07	209.629	209.629	0.00E+00	2.75E-05	2.75E-05		
U-232	3.5497E-07	209.629	209.629	0.00E+00	7.44E-05	7.44E-05		
U-233	2.6647E-08	209.629	209.629	0.00E+00	5.59E-06	5.59E-06		
U-234	5.5023E-05	209.629	209.629	0.00E+00	1.15E-02	1.15E-02		
U-235	-1.4485E-06	209.629	0.00	9.66E-03	9.36E-03	9.66E-03		
U-236	7.5969E-06	209.629	209.629	0.00E+00	1.59E-03	1.59E-03		
U-238	-2.6129E-07	209.629	0.00	4.54E-02	4.54E-02	4.54E-02		
Y-90	4.4913E-01	209.629	209.629	0.00E+00	9.42E+01	9.42E+01		
Other Radionuclides					1.42E+02	1.42E+02		

Thermal Power		
	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
	3.09E+00	3.08E+00
Total		Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		209.629	Nominal burnup set equal to bounding burnup. Bounding burnup taken from SFD and converted to MWd using BOL=139.752kg
Bounding:		209.629	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.04		1.00
Bounding:	0.04		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 790
 Fuel Units & Descr: 10 - TUBE
 Heavy Metal Mass: BOL = ; EOL=63.75kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x15"
 0.45

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	7.7980E-09	61,103.939	61,103.939	0.00E+00	4.76E-04	4.76E-04	Avg. MeV	
Am-241	2.3560E-02	61,103.939	61,103.939	0.00E+00	1.44E+03	1.44E+03	0.0150	2.091E+15
Am-242m	3.0880E-06	61,103.939	61,103.939	0.00E+00	1.89E-01	1.89E-01	0.0250	4.319E+14
Am-243	2.0520E-06	61,103.939	61,103.939	0.00E+00	1.25E-01	1.25E-01	0.0375	3.803E+14
C-14	1.1222E-03	61,103.939	61,103.939	0.00E+00	6.86E+01	6.86E+01	0.0575	4.212E+14
Cl-36	8.3760E-11	61,103.939	61,103.939	0.00E+00	5.12E-06	5.12E-06	0.0850	2.423E+14
Cm-243	2.4260E-07	61,103.939	61,103.939	0.00E+00	1.48E-02	1.48E-02	0.1250	1.575E+14
Cm-244	3.3140E-06	61,103.939	61,103.939	0.00E+00	2.02E-01	2.02E-01	0.2250	2.086E+14
Co-60	1.2454E-03	61,103.939	61,103.939	0.00E+00	7.61E+01	7.61E+01	0.3750	9.083E+13
Cs-134	3.3040E-10	61,103.939	61,103.939	0.00E+00	2.02E-05	2.02E-05	0.5750	1.625E+15
Cs-135	7.9140E-06	61,103.939	61,103.939	0.00E+00	4.84E-01	4.84E-01	0.8500	1.552E+13
Cs-137	7.1580E-01	61,103.939	61,103.939	0.00E+00	4.37E+04	4.37E+04	1.2500	1.122E+13
Eu-154	6.0500E-04	61,103.939	61,103.939	0.00E+00	3.70E+01	3.70E+01	1.7500	4.011E+11
Eu-155	9.4860E-06	61,103.939	61,103.939	0.00E+00	5.80E-01	5.80E-01	2.2500	7.217E+07
Fe-55	1.9322E-08	61,103.939	61,103.939	0.00E+00	1.18E-03	1.18E-03	2.7500	7.497E+07
H-3	4.4180E-03	61,103.939	61,103.939	0.00E+00	2.70E+02	2.70E+02	3.5000	3.055E+05
I-129	7.5020E-07	61,103.939	61,103.939	0.00E+00	4.58E-02	4.58E-02	5.0000	1.282E+05
Kr-85	5.4940E-03	61,103.939	61,103.939	0.00E+00	3.36E+02	3.36E+02	7.0000	1.441E+04
Np-237	5.8040E-06	61,103.939	61,103.939	0.00E+00	3.55E-01	3.55E-01	11.0000	1.635E+03
Pa-231	1.1096E-08	61,103.939	61,103.939	0.00E+00	6.78E-04	6.78E-04		
Pb-210	1.4712E-08	61,103.939	61,103.939	0.00E+00	8.99E-04	8.99E-04		
Pm-147	3.5920E-07	61,103.939	61,103.939	0.00E+00	2.19E-02	2.19E-02		
Pu-238	5.0700E-03	61,103.939	61,103.939	0.00E+00	3.10E+02	3.10E+02		
Pu-239	1.8728E-02	61,103.939	61,103.939	0.00E+00	1.14E+03	1.14E+03		
Pu-240	8.3280E-03	61,103.939	61,103.939	0.00E+00	5.09E+02	5.09E+02		
Pu-241	3.4460E-02	61,103.939	61,103.939	0.00E+00	2.11E+03	2.11E+03		
Pu-242	2.0380E-06	61,103.939	61,103.939	0.00E+00	1.25E-01	1.25E-01		
Ra-226	2.9640E-08	61,103.939	61,103.939	0.00E+00	1.81E-03	1.81E-03		
Ra-228	1.1922E-09	61,103.939	61,103.939	0.00E+00	7.28E-05	7.28E-05		
Ru-106	3.5780E-19	61,103.939	61,103.939	0.00E+00	2.19E-14	2.19E-14		
Se-79	1.2520E-05	61,103.939	61,103.939	0.00E+00	7.65E-01	7.65E-01		
Sn-126	1.2050E-05	61,103.939	61,103.939	0.00E+00	7.36E-01	7.36E-01		
Sr-90	6.1880E-01	61,103.939	61,103.939	0.00E+00	3.78E+04	3.78E+04		
Tc-99	4.4120E-04	61,103.939	61,103.939	0.00E+00	2.70E+01	2.70E+01		
Th-229	6.9280E-09	61,103.939	61,103.939	0.00E+00	4.23E-04	4.23E-04		
Th-230	1.7084E-06	61,103.939	61,103.939	0.00E+00	1.04E-01	1.04E-01		
Th-232	1.1926E-09	61,103.939	61,103.939	0.00E+00	7.29E-05	7.29E-05		
Th-208	3.4740E-08	61,103.939	61,103.939	0.00E+00	2.12E-03	2.12E-03		
U-232	9.2940E-08	61,103.939	61,103.939	0.00E+00	5.68E-03	5.68E-03		
U-233	9.1680E-07	61,103.939	61,103.939	0.00E+00	5.60E-02	5.60E-02		
U-234	2.3440E-03	61,103.939	61,103.939	0.00E+00	1.43E+02	1.43E+02		
U-235	-2.3296E-06	61,103.939	0.000	1.38E-02	0.00E+00	1.38E-02		
U-236	2.6620E-05	61,103.939	61,103.939	0.00E+00	1.63E+00	1.63E+00		
U-238	-1.3291E-07	61,103.939	0.000	4.03E-02	3.22E-02	4.03E-02		
Y-90	6.1900E-01	61,103.939	61,103.939	0.00E+00	3.78E+04	3.78E+04		
Other Radionuclides					4.19E+04	4.19E+04		

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.80E+02	5.80E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	HEAVY WATER	HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
BOL HM Constituents:	ZIRC-2	ZIRC	
BOL Enrichment %:	U METAL	U	
		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:		61,103.939	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
		61,103.939	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Bounding:	32.83		2.59
	32.83		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: HW/CTR SOT
 SNF ID #: 120
 Fuel Units & Descr: 96 - TUBE
 Heavy Metal Mass: BOL= : EOL=249.72kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 1.09

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	7.7980E-09	239,374.531	239,374.531	0.00E+00	1.87E-03	1.87E-03	0.0150	8.193E+15
Am-241	2.3560E-02	239,374.531	239,374.531	0.00E+00	5.64E+03	5.64E+03	0.0250	1.692E+15
Am-242m	3.0880E-06	239,374.531	239,374.531	0.00E+00	7.39E-01	7.39E-01	0.0375	1.490E+15
Am-243	2.0520E-06	239,374.531	239,374.531	0.00E+00	4.91E-01	4.91E-01	0.0575	1.650E+15
C-14	1.1222E-03	239,374.531	239,374.531	0.00E+00	2.69E+02	2.69E+02	0.0850	9.492E+14
Cl-36	8.3760E-11	239,374.531	239,374.531	0.00E+00	2.01E-05	2.01E-05	0.1250	6.169E+14
Co-243	2.4260E-07	239,374.531	239,374.531	0.00E+00	5.81E-02	5.81E-02	0.2250	8.170E+14
Co-244	3.3140E-06	239,374.531	239,374.531	0.00E+00	7.93E-01	7.93E-01	0.3750	3.558E+14
Co-60	1.2454E-03	239,374.531	239,374.531	0.00E+00	2.98E+02	2.98E+02	0.5750	6.365E+15
Cs-134	3.3040E-10	239,374.531	239,374.531	0.00E+00	7.91E-05	7.91E-05	0.8500	6.080E+13
Cs-135	7.9140E-06	239,374.531	239,374.531	0.00E+00	1.89E+00	1.89E+00	1.2500	4.394E+13
Cs-137	7.1580E-01	239,374.531	239,374.531	0.00E+00	1.71E+05	1.71E+05	1.7500	1.571E+12
Eu-154	6.0500E-04	239,374.531	239,374.531	0.00E+00	1.45E+02	1.45E+02	2.2500	2.827E+08
Eu-155	9.4860E-06	239,374.531	239,374.531	0.00E+00	2.27E+00	2.27E+00	2.7500	2.937E+08
Fe-55	1.9322E-08	239,374.531	239,374.531	0.00E+00	4.63E-03	4.63E-03	3.5000	1.197E+06
H-3	4.4180E-03	239,374.531	239,374.531	0.00E+00	1.06E+03	1.06E+03	5.0000	5.022E+05
I-129	7.5020E-07	239,374.531	239,374.531	0.00E+00	1.80E-01	1.80E-01	7.0000	5.647E+04
Kr-85	5.4940E-03	239,374.531	239,374.531	0.00E+00	1.32E+03	1.32E+03	11.0000	6.407E+03
Np-237	5.8040E-06	239,374.531	239,374.531	0.00E+00	1.39E+00	1.39E+00		
Pa-231	1.1096E-08	239,374.531	239,374.531	0.00E+00	2.66E-03	2.66E-03		
Pb-210	1.4712E-08	239,374.531	239,374.531	0.00E+00	3.52E-03	3.52E-03		
Pm-147	3.5920E-07	239,374.531	239,374.531	0.00E+00	8.60E-02	8.60E-02		
Pu-238	5.0700E-03	239,374.531	239,374.531	0.00E+00	1.21E+03	1.21E+03		
Pu-239	1.8728E-02	239,374.531	239,374.531	0.00E+00	4.48E+03	4.48E+03		
Pu-240	8.3280E-03	239,374.531	239,374.531	0.00E+00	1.99E+03	1.99E+03		
Pu-241	3.4460E-02	239,374.531	239,374.531	0.00E+00	8.25E+03	8.25E+03		
Pu-242	2.0380E-06	239,374.531	239,374.531	0.00E+00	4.88E-01	4.88E-01		
Ra-226	2.9640E-08	239,374.531	239,374.531	0.00E+00	7.10E-03	7.10E-03		
Ra-228	1.1922E-09	239,374.531	239,374.531	0.00E+00	2.85E-04	2.85E-04		
Ru-106	3.5780E-19	239,374.531	239,374.531	0.00E+00	8.56E-14	8.56E-14		
Se-79	1.2520E-05	239,374.531	239,374.531	0.00E+00	3.00E+00	3.00E+00		
Sn-126	1.2050E-05	239,374.531	239,374.531	0.00E+00	2.88E+00	2.88E+00		
Sr-90	6.1880E-01	239,374.531	239,374.531	0.00E+00	1.48E+05	1.48E+05		
Tc-99	4.4120E-04	239,374.531	239,374.531	0.00E+00	1.06E+02	1.06E+02		
Th-229	6.9280E-09	239,374.531	239,374.531	0.00E+00	1.66E-03	1.66E-03		
Th-230	1.7084E-06	239,374.531	239,374.531	0.00E+00	4.09E-01	4.09E-01		
Th-232	1.1926E-09	239,374.531	239,374.531	0.00E+00	2.85E-04	2.85E-04		
Ti-208	3.4740E-08	239,374.531	239,374.531	0.00E+00	8.32E-03	8.32E-03		
U-232	9.2940E-08	239,374.531	239,374.531	0.00E+00	2.22E-02	2.22E-02		
U-233	9.1680E-07	239,374.531	239,374.531	0.00E+00	2.19E-01	2.19E-01		
U-234	2.3440E-03	239,374.531	239,374.531	0.00E+00	5.61E+02	5.61E+02		
U-235	-2.3296E-06	239,374.531	0.000	5.40E-02	0.00E+00	5.40E-02		
U-236	2.6620E-05	239,374.531	239,374.531	0.00E+00	6.37E+00	6.37E+00		
U-238	-1.3291E-07	239,374.531	0.000	1.58E-01	1.26E-01	1.58E-01		
Y-90	6.1900E-01	239,374.531	239,374.531	0.00E+00	1.48E+05	1.48E+05		
Other Radionuclides					1.64E+05	1.64E+05		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		239,374.531	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		239,374.531	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	32.83		2.59
Bounding:	32.83		

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

²Total burnup for all fuel associated with this worksheet must be 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	¹ Fuel decay start date: 1964
SNF ID #: 783	Estimates as of: 2030
Fuel Units & Descr: 56 - TUBE	Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
Heavy Metal Mass: BOL= : EOL=437.68kg	² Template Burnup(MWd): 5
ROD Storage Site: INEEL	Template BOL Heavy Metal Mass (MT): 0.00034251
	Template Decay Time: 65 years

Estimated Canister usage: 18"x15" 2.55
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II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		Avg. MeV
Ac-227	7.7980E-09	419,538.842	419,538.842	0.00E+00	3.27E-03	3.27E-03		
Am-241	2.3560E-02	419,538.842	419,538.842	0.00E+00	9.88E+03	9.88E+03	0.0150	1.436E+16
Am-242m	3.0880E-06	419,538.842	419,538.842	0.00E+00	1.30E+00	1.30E+00	0.0250	2.965E+15
Am-243	2.0520E-06	419,538.842	419,538.842	0.00E+00	8.61E-01	8.61E-01	0.0375	2.611E+15
C-14	1.1222E-03	419,538.842	419,538.842	0.00E+00	4.71E+02	4.71E+02	0.0575	2.892E+15
Cl-36	8.3760E-11	419,538.842	419,538.842	0.00E+00	3.51E-05	3.51E-05	0.0850	1.664E+15
Co-243	2.4260E-07	419,538.842	419,538.842	0.00E+00	1.02E-01	1.02E-01	0.1250	1.081E+15
Co-244	3.3140E-06	419,538.842	419,538.842	0.00E+00	1.39E+00	1.39E+00	0.2250	1.432E+15
Co-60	1.2454E-03	419,538.842	419,538.842	0.00E+00	5.22E+02	5.22E+02	0.3750	6.236E+14
Cs-134	3.3040E-10	419,538.842	419,538.842	0.00E+00	1.39E-04	1.39E-04	0.5750	1.116E+16
Cs-135	7.9140E-06	419,538.842	419,538.842	0.00E+00	3.32E+00	3.32E+00	0.8500	1.066E+14
Cs-137	7.1580E-01	419,538.842	419,538.842	0.00E+00	3.00E+05	3.00E+05	1.2500	7.700E+13
Eu-154	6.0500E-04	419,538.842	419,538.842	0.00E+00	2.54E+02	2.54E+02	1.7500	2.754E+12
Eu-155	9.4860E-06	419,538.842	419,538.842	0.00E+00	3.98E+00	3.98E+00	2.2500	4.955E+08
Fe-55	1.9322E-08	419,538.842	419,538.842	0.00E+00	8.11E-03	8.11E-03	2.7500	5.147E+08
H-3	4.4180E-03	419,538.842	419,538.842	0.00E+00	1.85E+03	1.85E+03	3.5000	2.098E+06
I-129	7.5020E-07	419,538.842	419,538.842	0.00E+00	3.15E-01	3.15E-01	5.0000	8.802E+05
Kr-85	5.4940E-03	419,538.842	419,538.842	0.00E+00	2.30E+03	2.30E+03	7.0000	9.897E+04
Np-237	5.8040E-06	419,538.842	419,538.842	0.00E+00	2.44E+00	2.44E+00	11.0000	1.123E+04
Pa-231	1.1096E-08	419,538.842	419,538.842	0.00E+00	4.66E-03	4.66E-03		
Pb-210	1.4712E-08	419,538.842	419,538.842	0.00E+00	6.17E-03	6.17E-03		
Pm-147	3.5920E-07	419,538.842	419,538.842	0.00E+00	1.51E-01	1.51E-01		
Pu-238	5.0700E-03	419,538.842	419,538.842	0.00E+00	2.13E+03	2.13E+03		
Pu-239	1.8728E-02	419,538.842	419,538.842	0.00E+00	7.86E+03	7.86E+03		
Pu-240	8.3280E-03	419,538.842	419,538.842	0.00E+00	3.49E+03	3.49E+03		
Pu-241	3.4460E-02	419,538.842	419,538.842	0.00E+00	1.45E+04	1.45E+04		
Pu-242	2.0380E-06	419,538.842	419,538.842	0.00E+00	8.55E-01	8.55E-01		
Ra-226	2.9640E-08	419,538.842	419,538.842	0.00E+00	1.24E-02	1.24E-02		
Ra-228	1.1922E-09	419,538.842	419,538.842	0.00E+00	5.00E-04	5.00E-04		
Ru-106	3.5780E-19	419,538.842	419,538.842	0.00E+00	1.50E-13	1.50E-13		
Se-79	1.2520E-05	419,538.842	419,538.842	0.00E+00	5.25E+00	5.25E+00		
Sn-126	1.2050E-05	419,538.842	419,538.842	0.00E+00	5.06E+00	5.06E+00		
Sr-90	6.1880E-01	419,538.842	419,538.842	0.00E+00	2.60E+05	2.60E+05		
Tc-99	4.4120E-04	419,538.842	419,538.842	0.00E+00	1.85E+02	1.85E+02		
Th-229	6.9280E-09	419,538.842	419,538.842	0.00E+00	2.91E-03	2.91E-03		
Th-230	1.7084E-06	419,538.842	419,538.842	0.00E+00	7.17E-01	7.17E-01		
Th-232	1.1926E-09	419,538.842	419,538.842	0.00E+00	5.00E-04	5.00E-04		
Ti-208	3.4740E-08	419,538.842	419,538.842	0.00E+00	1.46E-02	1.46E-02		
U-232	9.2940E-08	419,538.842	419,538.842	0.00E+00	3.90E-02	3.90E-02		
U-233	9.1680E-07	419,538.842	419,538.842	0.00E+00	3.85E-01	3.85E-01		
U-234	2.3440E-03	419,538.842	419,538.842	0.00E+00	9.83E+02	9.83E+02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-235	-2.3296E-06	419,538.842	0.000	9.46E-02	0.00E+00	9.46E-02	3.98E+03	3.98E+03
U-236	2.6620E-05	419,538.842	419,538.842	0.00E+00	1.12E+01	1.12E+01	Total	Total
U-238	-1.3291E-07	419,538.842	0.000	2.77E-01	2.21E-01	2.77E-01		
Y-90	6.1900E-01	419,538.842	419,538.842	0.00E+00	2.60E+05	2.60E+05		
Other Radionuclides					2.87E+05	2.87E+05		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Reactor Moderator:	From SFD: HEAVY WATER	Used: HEAVY WATER	
Fuel Cladding:	ZIRC	ZIRC	
BOL HM Constituents:	U-Zr 2%	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			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.
	From SFD	Estimated	
Nominal:		419,538.842	
Bounding:		419,538.842	

Checks			Estimated EOL HM/Given EOL HM 2.59
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	32.83		
Bounding:	32.83		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 772
 Fuel Units & Desc: 48 - TUBE
 Heavy Metal Mass: BOL= : EOL=180.92kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.55

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	7.7980E-09	173,422.997	173,422.997	0.00E+00	1.35E-03	1.35E-03	Avg. MeV	
Am-241	2.3560E-02	173,422.997	173,422.997	0.00E+00	4.09E+03	4.09E+03	0.0150	5.998E+15
Am-242m	3.0880E-06	173,422.997	173,422.997	0.00E+00	5.36E-01	5.36E-01	0.0250	1.226E+15
Am-243	2.0520E-06	173,422.997	173,422.997	0.00E+00	3.56E-01	3.56E-01	0.0375	1.079E+15
C-14	1.1222E-03	173,422.997	173,422.997	0.00E+00	1.95E+02	1.95E+02	0.0575	1.195E+15
Cl-36	8.3760E-11	173,422.997	173,422.997	0.00E+00	1.45E-05	1.45E-05	0.0850	6.877E+14
Cm-243	2.4260E-07	173,422.997	173,422.997	0.00E+00	4.21E-02	4.21E-02	0.1250	4.469E+14
Cm-244	3.3140E-06	173,422.997	173,422.997	0.00E+00	5.75E-01	5.75E-01	0.2250	5.919E+14
Co-60	1.2454E-03	173,422.997	173,422.997	0.00E+00	2.16E+02	2.16E+02	0.3750	2.578E+14
Cs-134	3.3040E-10	173,422.997	173,422.997	0.00E+00	5.73E-05	5.73E-05	0.5750	4.611E+15
Cs-135	7.9140E-06	173,422.997	173,422.997	0.00E+00	1.37E+00	1.37E+00	0.8500	4.405E+13
Cs-137	7.1580E-01	173,422.997	173,422.997	0.00E+00	1.24E+05	1.24E+05	1.2500	3.183E+13
Eu-154	6.0500E-04	173,422.997	173,422.997	0.00E+00	1.05E+02	1.05E+02	1.7500	1.138E+12
Eu-155	9.4860E-06	173,422.997	173,422.997	0.00E+00	1.65E+00	1.65E+00	2.2500	2.048E+08
Fe-55	1.9322E-08	173,422.997	173,422.997	0.00E+00	3.35E-03	3.35E-03	2.7500	2.128E+08
H-3	4.4180E-03	173,422.997	173,422.997	0.00E+00	7.66E+02	7.66E+02	3.5000	8.672E+05
I-129	7.5020E-07	173,422.997	173,422.997	0.00E+00	1.30E-01	1.30E-01	5.0000	3.638E+05
Kr-85	5.4940E-03	173,422.997	173,422.997	0.00E+00	9.53E+02	9.53E+02	7.0000	4.091E+04
Np-237	5.8040E-06	173,422.997	173,422.997	0.00E+00	1.01E+00	1.01E+00	11.0000	4.642E+03
Pa-231	1.1096E-08	173,422.997	173,422.997	0.00E+00	1.92E-03	1.92E-03		
Pb-210	1.4712E-08	173,422.997	173,422.997	0.00E+00	2.55E-03	2.55E-03		
Pm-147	3.5920E-07	173,422.997	173,422.997	0.00E+00	6.23E-02	6.23E-02		
Pu-238	5.0700E-03	173,422.997	173,422.997	0.00E+00	8.79E+02	8.79E+02		
Pu-239	1.8728E-02	173,422.997	173,422.997	0.00E+00	3.25E+03	3.25E+03		
Pu-240	8.3280E-03	173,422.997	173,422.997	0.00E+00	1.44E+03	1.44E+03		
Pu-241	3.4460E-02	173,422.997	173,422.997	0.00E+00	5.98E+03	5.98E+03		
Pu-242	2.0380E-06	173,422.997	173,422.997	0.00E+00	3.53E-01	3.53E-01		
Ra-226	2.9640E-08	173,422.997	173,422.997	0.00E+00	5.14E-03	5.14E-03		
Ra-228	1.1922E-09	173,422.997	173,422.997	0.00E+00	2.07E-04	2.07E-04		
Ru-106	3.5780E-19	173,422.997	173,422.997	0.00E+00	6.21E-14	6.21E-14		
Se-79	1.2520E-05	173,422.997	173,422.997	0.00E+00	2.17E+00	2.17E+00		
Sn-126	1.2050E-05	173,422.997	173,422.997	0.00E+00	2.09E+00	2.09E+00		
Sr-90	6.1880E-01	173,422.997	173,422.997	0.00E+00	1.07E+05	1.07E+05		
Tc-99	4.4120E-04	173,422.997	173,422.997	0.00E+00	7.65E+01	7.65E+01		
Th-229	6.9280E-09	173,422.997	173,422.997	0.00E+00	1.20E-03	1.20E-03		
Th-230	1.7084E-06	173,422.997	173,422.997	0.00E+00	2.96E-01	2.96E-01		
Th-232	1.1926E-09	173,422.997	173,422.997	0.00E+00	2.07E-04	2.07E-04		
Tl-208	3.4740E-08	173,422.997	173,422.997	0.00E+00	6.02E-03	6.02E-03		
U-232	9.2940E-08	173,422.997	173,422.997	0.00E+00	1.61E-02	1.61E-02		
U-233	9.1680E-07	173,422.997	173,422.997	0.00E+00	1.59E-01	1.59E-01		
U-234	2.3440E-03	173,422.997	173,422.997	0.00E+00	4.07E+02	4.07E+02		
U-235	-2.3296E-06	173,422.997	0.00	3.91E-02	0.00E+00	3.91E-02		
U-236	2.6620E-05	173,422.997	173,422.997	0.00E+00	4.62E+00	4.62E+00		
U-238	-1.3291E-07	173,422.997	0.00	1.14E-01	9.13E-02	1.14E-01		
Y-90	6.1900E-01	173,422.997	173,422.997	0.00E+00	1.07E+05	1.07E+05		
Other Radionuclides					1.19E+05	1.19E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.65E+03	1.65E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	HEAVY WATER	HEAVY WATER	
BOL HM Constituents:	ZIRC	ZIRC	
BOL Enrichment %:	UO2	U	
		0 to 5	

Burnup Summary (MWd) ²			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.
	From SFD	Estimated	
Nomina:		173,422.997	
Bounding:		173,422.997	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nomina:	32.83		
Bounding:	32.83		
			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
 SNF ID #: 978
 Fuel Units & Descr: 5 - TUBE
 Heavy Metal Mass: BOL = : EOL=89.36kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, SST, 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.06

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	9.2380E-09	85,315.001	85,315.001	0.00E+00	7.88E-04	7.88E-04	Avg. MeV	
Am-241	2.2020E-01	85,315.001	85,315.001	0.00E+00	1.88E+04	1.88E+04	0.0150	2.731E+15
Am-242m	8.9860E-05	85,315.001	85,315.001	0.00E+00	7.67E+00	7.67E+00	0.0250	5.281E+14
Am-243	5.2240E-05	85,315.001	85,315.001	0.00E+00	4.46E+00	4.46E+00	0.0375	4.712E+14
C-14	2.2080E-02	85,315.001	85,315.001	0.00E+00	1.88E+03	1.88E+03	0.9575	7.267E+14
Cl-36	4.1880E-04	85,315.001	85,315.001	0.00E+00	3.57E+01	3.57E+01	0.0850	2.818E+14
Cm-243	8.0820E-06	85,315.001	85,315.001	0.00E+00	6.90E-01	6.90E-01	0.1250	1.830E+14
Cm-244	2.3260E-04	85,315.001	85,315.001	0.00E+00	1.98E+01	1.98E+01	0.2250	2.405E+14
Co-60	9.9520E-02	85,315.001	85,315.001	0.00E+00	8.49E+03	8.49E+03	0.3750	1.044E+14
Cs-134	7.2160E-10	85,315.001	85,315.001	0.00E+00	6.16E-05	6.16E-05	0.5750	2.274E+15
Cs-135	3.7480E-06	85,315.001	85,315.001	0.00E+00	3.20E-01	3.20E-01	0.8500	1.928E+13
Cs-137	7.2140E-01	85,315.001	85,315.001	0.00E+00	6.15E+04	6.15E+04	1.2500	6.352E+14
Eu-154	8.2120E-04	85,315.001	85,315.001	0.00E+00	7.01E+01	7.01E+01	1.7500	4.758E+11
Eu-155	1.2284E-05	85,315.001	85,315.001	0.00E+00	1.05E+00	1.05E+00	2.2500	3.381E+09
Fe-55	1.8062E-05	85,315.001	85,315.001	0.00E+00	1.54E+00	1.54E+00	2.7500	3.553E+08
H-3	8.2700E-03	85,315.001	85,315.001	0.00E+00	7.06E+02	7.06E+02	3.5000	1.794E+06
I-129	9.1660E-07	85,315.001	85,315.001	0.00E+00	7.82E-02	7.82E-02	5.0000	7.449E+05
Kr-85	4.6540E-03	85,315.001	85,315.001	0.00E+00	3.97E+02	3.97E+02	7.0000	8.294E+04
Np-237	2.1800E-05	85,315.001	85,315.001	0.00E+00	1.86E+00	1.86E+00	11.0000	9.350E+03
Pa-231	1.2982E-08	85,315.001	85,315.001	0.00E+00	1.11E-03	1.11E-03		
Pb-210	1.3604E-08	85,315.001	85,315.001	0.00E+00	1.16E-03	1.16E-03		
Pm-147	2.8480E-07	85,315.001	85,315.001	0.00E+00	2.43E-02	2.43E-02		
Pu-238	2.8680E-02	85,315.001	85,315.001	0.00E+00	2.45E+03	2.45E+03		
Pu-239	6.5040E-02	85,315.001	85,315.001	0.00E+00	5.55E+03	5.55E+03		
Pu-240	2.6620E-02	85,315.001	85,315.001	0.00E+00	2.27E+03	2.27E+03		
Pu-241	3.2120E-01	85,315.001	85,315.001	0.00E+00	2.74E+04	2.74E+04		
Pu-242	1.6742E-05	85,315.001	85,315.001	0.00E+00	1.43E+00	1.43E+00		
Ra-226	2.7420E-08	85,315.001	85,315.001	0.00E+00	2.34E-03	2.34E-03		
Ra-228	2.0880E-10	85,315.001	85,315.001	0.00E+00	1.78E-05	1.78E-05		
Ru-106	8.1300E-19	85,315.001	85,315.001	0.00E+00	6.94E-14	6.94E-14		
Se-79	2.8480E-05	85,315.001	85,315.001	0.00E+00	2.43E+00	2.43E+00		
Sn-126	1.7790E-05	85,315.001	85,315.001	0.00E+00	1.52E+00	1.52E+00		
Sr-90	5.0780E-01	85,315.001	85,315.001	0.00E+00	4.33E+04	4.33E+04		
Tc-99	4.3360E-04	85,315.001	85,315.001	0.00E+00	3.70E+01	3.70E+01		
Th-229	3.1120E-09	85,315.001	85,315.001	0.00E+00	2.66E-04	2.66E-04		
Th-230	1.5812E-06	85,315.001	85,315.001	0.00E+00	1.35E-01	1.35E-01		
Th-232	2.0900E-10	85,315.001	85,315.001	0.00E+00	1.78E-05	1.78E-05		
Tl-208	1.1448E-07	85,315.001	85,315.001	0.00E+00	9.77E-03	9.77E-03		
U-232	3.1000E-07	85,315.001	85,315.001	0.00E+00	2.64E-02	2.64E-02		
U-233	4.1460E-07	85,315.001	85,315.001	0.00E+00	3.54E-02	3.54E-02		
U-234	2.1720E-03	85,315.001	85,315.001	0.00E+00	1.85E+02	1.85E+02		
U-235	-1.7016E-06	85,315.001	0.000	1.93E-02	0.00E+00	1.93E-02		
U-236	2.6100E-05	85,315.001	85,315.001	0.00E+00	2.23E+00	2.23E+00		
U-238	-5.1291E-07	85,315.001	0.000	5.65E-02	1.27E-02	5.65E-02		
Y-90	5.0800E-01	85,315.001	85,315.001	0.00E+00	4.33E+04	4.33E+04		
Other Radionuclides					5.52E+05	5.52E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.90E+03	1.90E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	HEAVY WATER	HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
BOL HM Constituents:	SST	SST	
BOL Enrichment %:	UO2	U	
		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:		85,315.001	Nominal burnup set equal to bounding burnup.
		85,315.001	Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks			
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Bounding:	32.70	32.70	

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

² Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 115
 Fuel Units & Desc: 3 - TUBE
 Heavy Metal Mass: BOL= ; EOL=6.50kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.08

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	7.7980E-09	6,229.542	6,229.542	0.00E+00	4.86E-05	4.86E-05	Avg. MeV	
Am-241	2.3560E-02	6,229.542	6,229.542	0.00E+00	1.47E+02	1.47E+02	0.0150	2.132E+14
Am-242m	3.0880E-06	6,229.542	6,229.542	0.00E+00	1.92E-02	1.92E-02	0.0250	4.403E+13
Am-243	2.0520E-06	6,229.542	6,229.542	0.00E+00	1.28E-02	1.28E-02	0.0375	3.877E+13
C-14	1.1222E-03	6,229.542	6,229.542	0.00E+00	6.99E+00	6.99E+00	0.0575	4.294E+13
Cl-36	8.3760E-11	6,229.542	6,229.542	0.00E+00	5.22E-07	5.22E-07	0.0850	2.470E+13
Cm-243	2.4260E-07	6,229.542	6,229.542	0.00E+00	1.51E-03	1.51E-03	0.1250	1.605E+13
Cm-244	3.3140E-06	6,229.542	6,229.542	0.00E+00	2.06E-02	2.06E-02	0.2250	2.126E+13
Co-60	1.2454E-03	6,229.542	6,229.542	0.00E+00	7.76E+00	7.76E+00	0.3750	9.260E+12
Cs-134	3.3040E-10	6,229.542	6,229.542	0.00E+00	2.06E-06	2.06E-06	0.5750	1.656E+14
Cs-135	7.9140E-06	6,229.542	6,229.542	0.00E+00	4.93E-02	4.93E-02	0.8500	1.582E+12
Cs-137	7.1580E-01	6,229.542	6,229.542	0.00E+00	4.46E+03	4.46E+03	1.2500	1.143E+12
Eu-154	6.0500E-04	6,229.542	6,229.542	0.00E+00	3.77E+00	3.77E+00	1.7500	4.089E+10
Eu-155	9.4860E-06	6,229.542	6,229.542	0.00E+00	5.91E-02	5.91E-02	2.2500	7.358E+06
Fe-55	1.9322E-08	6,229.542	6,229.542	0.00E+00	1.20E-04	1.20E-04	2.7500	7.643E+06
H-3	4.4180E-03	6,229.542	6,229.542	0.00E+00	2.75E+01	2.75E+01	3.5000	3.115E+04
I-129	7.5020E-07	6,229.542	6,229.542	0.00E+00	4.67E-03	4.67E-03	5.0000	1.307E+04
Kr-85	5.4940E-03	6,229.542	6,229.542	0.00E+00	3.42E+01	3.42E+01	7.0000	1.470E+03
Np-237	5.8040E-06	6,229.542	6,229.542	0.00E+00	3.62E-02	3.62E-02	11.0000	1.667E+02
Pa-231	1.1096E-08	6,229.542	6,229.542	0.00E+00	6.91E-05	6.91E-05		
Pb-210	1.4712E-08	6,229.542	6,229.542	0.00E+00	9.16E-05	9.16E-05		
Pm-147	3.5920E-07	6,229.542	6,229.542	0.00E+00	2.24E-03	2.24E-03		
Pu-238	5.0700E-03	6,229.542	6,229.542	0.00E+00	3.16E+01	3.16E+01		
Pu-239	1.8728E-02	6,229.542	6,229.542	0.00E+00	1.17E+02	1.17E+02		
Pu-240	8.3280E-03	6,229.542	6,229.542	0.00E+00	5.19E+01	5.19E+01		
Pu-241	3.4460E-02	6,229.542	6,229.542	0.00E+00	2.15E+02	2.15E+02		
Pu-242	2.0380E-06	6,229.542	6,229.542	0.00E+00	1.27E-02	1.27E-02		
Ra-226	2.9640E-08	6,229.542	6,229.542	0.00E+00	1.85E-04	1.85E-04		
Ra-228	1.1922E-09	6,229.542	6,229.542	0.00E+00	7.43E-06	7.43E-06		
Ru-106	3.5780E-19	6,229.542	6,229.542	0.00E+00	2.23E-15	2.23E-15		
Se-79	1.2520E-05	6,229.542	6,229.542	0.00E+00	7.80E-02	7.80E-02		
Sn-126	1.2050E-05	6,229.542	6,229.542	0.00E+00	7.51E-02	7.51E-02		
Sr-90	6.1880E-01	6,229.542	6,229.542	0.00E+00	3.85E+03	3.85E+03		
Tc-99	4.4120E-04	6,229.542	6,229.542	0.00E+00	2.75E+00	2.75E+00		
Th-229	6.9280E-09	6,229.542	6,229.542	0.00E+00	4.32E-05	4.32E-05		
Th-230	1.7084E-06	6,229.542	6,229.542	0.00E+00	1.06E-02	1.06E-02		
Th-232	1.1926E-09	6,229.542	6,229.542	0.00E+00	7.43E-06	7.43E-06		
Th-208	3.4740E-08	6,229.542	6,229.542	0.00E+00	2.16E-04	2.16E-04		
U-232	9.2940E-08	6,229.542	6,229.542	0.00E+00	5.79E-04	5.79E-04		
U-233	9.1680E-07	6,229.542	6,229.542	0.00E+00	5.71E-03	5.71E-03		
U-234	2.3440E-03	6,229.542	6,229.542	0.00E+00	1.46E+01	1.46E+01		
U-235	-2.3296E-06	6,229.542	0.000	1.40E-03	0.00E+00	1.40E-03		
U-236	2.6620E-05	6,229.542	6,229.542	0.00E+00	1.66E-01	1.66E-01		
U-238	-1.3291E-07	6,229.542	0.000	4.11E-03	3.28E-03	4.11E-03		
Y-90	6.1900E-01	6,229.542	6,229.542	0.00E+00	3.86E+03	3.86E+03		
Other Radionuclides					4.27E+03	4.27E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.91E+01	5.91E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	HEAVY WATER	HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
BOL HM Constituents:	ZIRC-4	ZIRC	
BOL Enrichment %:	UO2	U	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:	6,229.542	6,229.542	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
Bounding:	32.83	32.83	2.59

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 880
 Fuel Units & Descr: 11 - TUBE
 Heavy Metal Mass: BOL = : EOL=162.08kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x15"
 0.50

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)		Avg. MeV
Ac-227	7.7980E-09	155,363.948	155,363.948	0.00E+00	1.21E-03	1.21E-03		
Am-241	2.3560E-02	155,363.948	155,363.948	0.00E+00	3.66E+03	3.66E+03	0.0150	5.318E+15
Am-242m	3.0880E-06	155,363.948	155,363.948	0.00E+00	4.80E-01	4.80E-01	0.0250	1.098E+15
Am-243	2.0520E-06	155,363.948	155,363.948	0.00E+00	3.19E-01	3.19E-01	0.0375	9.669E+14
C-14	1.1222E-03	155,363.948	155,363.948	0.00E+00	1.74E+02	1.74E+02	0.0575	1.071E+15
Cl-36	8.3760E-11	155,363.948	155,363.948	0.00E+00	1.30E-05	1.30E-05	0.0850	6.160E+14
Cr-243	2.4260E-07	155,363.948	155,363.948	0.00E+00	3.77E-02	3.77E-02	0.1250	4.004E+14
Cr-244	3.3140E-06	155,363.948	155,363.948	0.00E+00	5.15E-01	5.15E-01	0.2250	5.303E+14
Co-60	1.2454E-03	155,363.948	155,363.948	0.00E+00	1.93E+02	1.93E+02	0.3750	2.309E+14
Cs-134	3.3040E-10	155,363.948	155,363.948	0.00E+00	5.13E-05	5.13E-05	0.5750	4.131E+15
Cs-135	7.9140E-06	155,363.948	155,363.948	0.00E+00	1.23E+00	1.23E+00	0.8500	3.946E+13
Cs-137	7.1580E-01	155,363.948	155,363.948	0.00E+00	1.11E+05	1.11E+05	1.2500	2.852E+13
Eu-154	6.0500E-04	155,363.948	155,363.948	0.00E+00	9.40E+01	9.40E+01	1.7500	1.020E+12
Eu-155	9.4860E-06	155,363.948	155,363.948	0.00E+00	1.47E+00	1.47E+00	2.2500	1.835E+08
Fe-55	1.9322E-08	155,363.948	155,363.948	0.00E+00	3.00E-03	3.00E-03	2.7500	1.906E+08
H-3	4.4180E-03	155,363.948	155,363.948	0.00E+00	6.86E+02	6.86E+02	3.5000	7.769E+05
I-129	7.5020E-07	155,363.948	155,363.948	0.00E+00	1.17E-01	1.17E-01	5.0000	3.260E+05
Kr-85	5.4940E-03	155,363.948	155,363.948	0.00E+00	8.54E+02	8.54E+02	7.0000	3.665E+04
Np-237	5.8040E-06	155,363.948	155,363.948	0.00E+00	9.02E-01	9.02E-01	11.0000	4.158E+03
Pa-231	1.1096E-08	155,363.948	155,363.948	0.00E+00	1.72E-03	1.72E-03		
Pb-210	1.4712E-08	155,363.948	155,363.948	0.00E+00	2.29E-03	2.29E-03		
Pm-147	3.5920E-07	155,363.948	155,363.948	0.00E+00	5.58E-02	5.58E-02		
Pu-238	5.0700E-03	155,363.948	155,363.948	0.00E+00	7.88E+02	7.88E+02		
Pu-239	1.8728E-02	155,363.948	155,363.948	0.00E+00	2.91E+03	2.91E+03		
Pu-240	8.3280E-03	155,363.948	155,363.948	0.00E+00	1.29E+03	1.29E+03		
Pu-241	3.4460E-02	155,363.948	155,363.948	0.00E+00	5.35E+03	5.35E+03		
Pu-242	2.0380E-06	155,363.948	155,363.948	0.00E+00	3.17E-01	3.17E-01		
Ra-226	2.9640E-08	155,363.948	155,363.948	0.00E+00	4.60E-03	4.60E-03		
Ra-228	1.1922E-09	155,363.948	155,363.948	0.00E+00	1.85E-04	1.85E-04		
Ru-106	3.5780E-19	155,363.948	155,363.948	0.00E+00	5.56E-14	5.56E-14		
Se-79	1.2520E-05	155,363.948	155,363.948	0.00E+00	1.95E+00	1.95E+00		
Sn-126	1.2050E-05	155,363.948	155,363.948	0.00E+00	1.87E+00	1.87E+00		
Sr-90	6.1880E-01	155,363.948	155,363.948	0.00E+00	9.61E+04	9.61E+04		
Tc-99	4.4120E-04	155,363.948	155,363.948	0.00E+00	6.85E+01	6.85E+01		
Th-229	6.9280E-09	155,363.948	155,363.948	0.00E+00	1.08E-03	1.08E-03		
Th-230	1.7084E-06	155,363.948	155,363.948	0.00E+00	2.65E-01	2.65E-01		
Th-232	1.1926E-09	155,363.948	155,363.948	0.00E+00	1.85E-04	1.85E-04		
Tl-208	3.4740E-08	155,363.948	155,363.948	0.00E+00	5.40E-03	5.40E-03		
U-232	9.2940E-08	155,363.948	155,363.948	0.00E+00	1.44E-02	1.44E-02		
U-233	9.1680E-07	155,363.948	155,363.948	0.00E+00	1.42E-01	1.42E-01		
U-234	2.3440E-03	155,363.948	155,363.948	0.00E+00	3.64E+02	3.64E+02		
U-235	-2.3296E-06	155,363.948	0.000	3.50E-02	0.00E+00	3.50E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	2.6620E-05	155,363.948	155,363.948	0.00E+00	4.14E+00	4.14E+00	1.47E+03	1.47E+03
U-238	-1.3291E-07	155,363.948	0.000	1.02E-01	8.18E-02	1.02E-01	Total	Total
Y-90	6.1900E-01	155,363.948	155,363.948	0.00E+00	9.62E+04	9.62E+04		
Other Radionuclides					1.06E+05	1.06E+05		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: HEAVY WATER	Used: HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC	ZIRC	
BOL HM Constituents:	U-Zr 2%	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 155,363.948	Estimated: 155,363.948	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		155,363.948	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier: 32.83	Estimated Burnup/Given Burnup	2.59
Bounding:	32.83		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 112
 Fuel Units & Descr: 2 - TUBE
 Heavy Metal Mass: BOL= : EOL=77.91kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x15"
 0.09

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.6528E-06	273.694	547.387	0.00E+00	7.26E-04	1.45E-03	Avg. MeV	
Am-241	8.6432E+00	273.694	547.387	0.00E+00	2.37E+03	4.73E+03	0.0150	3.426E+14
Am-242m	1.4688E-02	273.694	547.387	0.00E+00	4.02E+00	8.04E+00	0.0250	6.503E+13
Am-243	1.6272E-02	273.694	547.387	0.00E+00	4.45E+00	8.91E+00	0.0375	5.347E+13
C-14	1.2046E-01	273.694	547.387	0.00E+00	3.30E+01	6.59E+01	0.0575	1.215E+14
Cl-36	2.2849E-03	273.694	547.387	0.00E+00	6.25E-01	1.25E+00	0.0850	3.424E+13
Cm-243	4.1760E-04	273.694	547.387	0.00E+00	1.14E-01	2.29E-01	0.1250	2.391E+13
Cm-244	5.3440E-02	273.694	547.387	0.00E+00	1.46E+01	2.93E+01	0.2250	2.944E+13
Co-60	5.4296E-01	273.694	547.387	0.00E+00	1.49E+02	2.97E+02	0.3750	1.281E+13
Cs-134	1.4346E-08	273.694	547.387	0.00E+00	3.93E-06	7.85E-06	0.5750	2.147E+14
Cs-135	4.3976E-04	273.694	547.387	0.00E+00	1.20E-01	2.41E-01	0.8500	3.212E+12
Cs-137	1.0528E+01	273.694	547.387	0.00E+00	2.88E+03	5.76E+03	1.2500	2.391E+13
Eu-154	1.1156E-01	273.694	547.387	0.00E+00	3.05E+01	6.11E+01	1.7500	8.931E+10
Eu-155	1.0445E-03	273.694	547.387	0.00E+00	2.86E-01	5.72E-01	2.2500	1.237E+08
Fe-55	9.8542E-05	273.694	547.387	0.00E+00	2.70E-02	5.39E-02	2.7500	1.262E+09
H-3	4.5119E-02	273.694	547.387	0.00E+00	1.23E+01	2.47E+01	3.5000	6.506E+05
I-129	1.0618E-05	273.694	547.387	0.00E+00	2.91E-03	5.81E-03	5.0000	2.731E+05
Kr-85	8.6191E-02	273.694	547.387	0.00E+00	2.36E+01	4.72E+01	7.0000	3.086E+04
Np-237	2.0592E-04	273.694	547.387	0.00E+00	5.64E-02	1.13E-01	11.0000	3.505E+03
Pa-231	2.8720E-06	273.694	547.387	0.00E+00	7.86E-04	1.57E-03		
Pb-210	8.0265E-08	273.694	547.387	0.00E+00	2.20E-05	4.39E-05		
Pm-147	6.1354E-06	273.694	547.387	0.00E+00	1.68E-03	3.36E-03		
Pu-238	2.3536E+00	273.694	547.387	0.00E+00	6.44E+02	1.29E+03		
Pu-239	4.1616E-01	273.694	547.387	0.00E+00	1.14E+02	2.28E+02		
Pu-240	2.9200E-01	273.694	547.387	0.00E+00	7.99E+01	1.60E+02		
Pu-241	1.1490E+01	273.694	547.387	0.00E+00	3.14E+03	6.29E+03		
Pu-242	2.4560E-03	273.694	547.387	0.00E+00	6.72E-01	1.34E+00		
Ra-226	1.6171E-07	273.694	547.387	0.00E+00	4.43E-05	8.85E-05		
Ra-228	6.0192E-07	273.694	547.387	0.00E+00	1.65E-04	3.29E-04		
Ru-106	1.3163E-15	273.694	547.387	0.00E+00	3.60E-13	7.21E-13		
Se-79	1.9176E-04	273.694	547.387	0.00E+00	5.25E-02	1.05E-01		
Sn-126	1.6666E-04	273.694	547.387	0.00E+00	4.56E-02	9.12E-02		
Sr-90	9.7004E+00	273.694	547.387	0.00E+00	2.65E+03	5.31E+03		
Tc-99	6.7654E-03	273.694	547.387	0.00E+00	1.85E+00	3.70E+00		
Th-229	2.7664E-06	273.694	547.387	0.00E+00	7.57E-04	1.51E-03		
Th-230	9.3206E-06	273.694	547.387	0.00E+00	2.55E-03	5.10E-03		
Th-232	-4.2431E-09	273.694	0.000	1.59E-03	1.58E-03	1.59E-03		
Tl-208	6.5604E-05	273.694	547.387	0.00E+00	1.80E-02	3.59E-02		
U-232	1.7765E-04	273.694	547.387	0.00E+00	4.86E-02	9.72E-02		
U-233	3.6128E-04	273.694	547.387	0.00E+00	9.89E-02	1.98E-01		
U-234	1.2788E-02	273.694	547.387	0.00E+00	3.50E+00	7.00E+00		
U-235	5.7486E-04	273.694	547.387	3.36E-02	1.91E-01	3.48E-01		
U-236	2.3485E-04	273.694	547.387	0.00E+00	6.43E-02	1.29E-01		
U-238	1.1581E-04	273.694	547.387	4.19E-03	3.59E-02	6.76E-02		
Y-90	9.7028E+00	273.694	547.387	0.00E+00	2.66E+03	5.31E+03		
Other Radionuclides					1.19E+04	2.37E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.45E+02	2.90E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	HEAVY WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
BOL HM Constituents:	ZIRC-2	SST/Inconel	
BOL Enrichment %:	U-Th Metal	U, Th, & Pu	
		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:		273.694	Nominal burnup taken from SFD and converted to MWd using BOL=78.198kg Bounding burnup assumed to be twice nominal burnup.
		547.387	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
Bounding:	0.10		2.74
	0.21		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 791
 Fuel Units & Descr: 15 - TUBE
 Heavy Metal Mass: BOL= : EOL=321.82kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Zirc., 0 to 5%, U)
²Template Burnup(MWd): 5
 Template BOL Heavy Metal Mass (MT): 0.00034251
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x15"
 0.68

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	7.7980E-09	308,482.102	308,482.102	0.00E+00	2.41E-03	2.41E-03		
Am-241	2.3560E-02	308,482.102	308,482.102	0.00E+00	7.27E+03	7.27E+03	0.0150	1.056E+16
Am-242m	3.0880E-06	308,482.102	308,482.102	0.00E+00	9.53E-01	9.53E-01	0.0250	2.180E+15
Am-243	2.0520E-06	308,482.102	308,482.102	0.00E+00	6.33E-01	6.33E-01	0.0375	1.920E+15
C-14	1.1222E-03	308,482.102	308,482.102	0.00E+00	3.46E+02	3.46E+02	0.0575	2.126E+15
Cl-36	8.3760E-11	308,482.102	308,482.102	0.00E+00	2.58E-05	2.58E-05	0.0850	1.223E+15
Cm-243	2.4260E-07	308,482.102	308,482.102	0.00E+00	7.48E-02	7.48E-02	0.1250	7.950E+14
Cm-244	3.3140E-06	308,482.102	308,482.102	0.00E+00	1.02E+00	1.02E+00	0.2250	1.053E+15
Co-60	1.2454E-03	308,482.102	308,482.102	0.00E+00	3.84E+02	3.84E+02	0.3750	4.585E+14
Cs-134	3.3040E-10	308,482.102	308,482.102	0.00E+00	1.02E-04	1.02E-04	0.5750	8.202E+15
Cs-135	7.9140E-06	308,482.102	308,482.102	0.00E+00	2.44E+00	2.44E+00	0.8500	7.835E+13
Cs-137	7.1580E-01	308,482.102	308,482.102	0.00E+00	2.21E+05	2.21E+05	1.2500	5.662E+13
Eu-154	6.0500E-04	308,482.102	308,482.102	0.00E+00	1.87E+02	1.87E+02	1.7500	2.025E+12
Eu-155	9.4860E-06	308,482.102	308,482.102	0.00E+00	2.93E+00	2.93E+00	2.2500	3.644E+08
Fe-55	1.9322E-08	308,482.102	308,482.102	0.00E+00	5.96E-03	5.96E-03	2.7500	3.785E+08
H-3	4.4180E-03	308,482.102	308,482.102	0.00E+00	1.36E+03	1.36E+03	3.5000	1.543E+06
I-129	7.5020E-07	308,482.102	308,482.102	0.00E+00	2.31E-01	2.31E-01	5.0000	6.472E+05
Kr-85	5.4940E-03	308,482.102	308,482.102	0.00E+00	1.69E+03	1.69E+03	7.0000	7.277E+04
Np-237	5.8040E-06	308,482.102	308,482.102	0.00E+00	1.79E+00	1.79E+00	11.0000	8.257E+03
Pa-231	1.1096E-08	308,482.102	308,482.102	0.00E+00	3.42E-03	3.42E-03		
Pb-210	1.4712E-08	308,482.102	308,482.102	0.00E+00	4.54E-03	4.54E-03		
Pm-147	3.5920E-07	308,482.102	308,482.102	0.00E+00	1.11E-01	1.11E-01		
Pu-238	5.0700E-03	308,482.102	308,482.102	0.00E+00	1.56E+03	1.56E+03		
Pu-239	1.8728E-02	308,482.102	308,482.102	0.00E+00	5.78E+03	5.78E+03		
Pu-240	8.3280E-03	308,482.102	308,482.102	0.00E+00	2.57E+03	2.57E+03		
Pu-241	3.4460E-02	308,482.102	308,482.102	0.00E+00	1.06E+04	1.06E+04		
Pu-242	2.0380E-06	308,482.102	308,482.102	0.00E+00	6.29E-01	6.29E-01		
Ra-226	2.9640E-08	308,482.102	308,482.102	0.00E+00	9.14E-03	9.14E-03		
Ra-228	1.1922E-09	308,482.102	308,482.102	0.00E+00	3.68E-04	3.68E-04		
Ru-106	3.5780E-19	308,482.102	308,482.102	0.00E+00	1.10E-13	1.10E-13		
Sr-90	1.2520E-05	308,482.102	308,482.102	0.00E+00	3.86E+00	3.86E+00		
Sn-126	1.2050E-05	308,482.102	308,482.102	0.00E+00	3.72E+00	3.72E+00		
Sr-90	6.1880E-01	308,482.102	308,482.102	0.00E+00	1.91E+05	1.91E+05		
Tc-99	4.4120E-04	308,482.102	308,482.102	0.00E+00	1.36E+02	1.36E+02		
Th-229	6.9280E-09	308,482.102	308,482.102	0.00E+00	2.14E-03	2.14E-03		
Th-230	1.7084E-06	308,482.102	308,482.102	0.00E+00	5.27E-01	5.27E-01		
Th-232	1.1926E-09	308,482.102	308,482.102	0.00E+00	3.68E-04	3.68E-04		
Th-232	3.4740E-08	308,482.102	308,482.102	0.00E+00	1.07E-02	1.07E-02		
U-232	9.2940E-08	308,482.102	308,482.102	0.00E+00	2.87E-02	2.87E-02		
U-233	9.1680E-07	308,482.102	308,482.102	0.00E+00	2.83E-01	2.83E-01		
U-234	2.3440E-03	308,482.102	308,482.102	0.00E+00	7.23E+02	7.23E+02		
U-235	2.3296E-06	308,482.102	0.000	6.96E-02	0.00E+00	6.96E-02		
U-236	2.6620E-05	308,482.102	308,482.102	0.00E+00	8.21E+00	8.21E+00		
U-238	-1.3291E-07	308,482.102	0.000	2.03E-01	1.62E-01	2.03E-01		
Y-90	6.1900E-01	308,482.102	308,482.102	0.00E+00	1.91E+05	1.91E+05		
Other Radionuclides					2.11E+05	2.11E+05		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ZIRC	ZIRC	
BOL HM Constituents:	U METAL	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			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.
	From SFD	Estimated	
Nominal:		308,482.102	
Bounding:		308,482.102	

Checks			Estimated EOL HM/Given EOL HM 2.59
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	32.83		
Bounding:	32.83		

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

² Total burnup for all fuel associated with this worksheet must be 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) 1Fuel decay start date: 1994
 SNF ID #: 596 Estimates as of: 2030
 Fuel Units & Descr: 16 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=2.54kg ; EOL=2.43kg 2Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
Canister usage:
18"x10"
0.67

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	104.551	209.102	0.00E+00	2.10E-07	4.20E-07	0.0150	1.540E+13
Am-241	2.5251E-03	104.551	209.102	0.00E+00	2.64E-01	5.28E-01	0.0250	3.198E+12
Am-242m	3.9624E-07	104.551	209.102	0.00E+00	4.14E-05	8.29E-05	0.0375	2.780E+12
Am-243	1.4880E-06	104.551	209.102	0.00E+00	1.56E-04	3.11E-04	0.0575	2.992E+12
C-14	5.7053E-09	104.551	209.102	0.00E+00	5.96E-07	1.19E-06	0.0850	1.803E+12
Cl-36	1.3124E-32	104.551	209.102	0.00E+00	1.37E-30	2.74E-30	0.1250	1.191E+12
Cm-243	1.1419E-07	104.551	209.102	0.00E+00	1.19E-05	2.39E-05	0.2250	1.556E+12
Cm-244	1.6522E-05	104.551	209.102	0.00E+00	1.73E-03	3.45E-03	0.3750	6.770E+11
Co-60	7.4047E-07	104.551	209.102	0.00E+00	7.74E-05	1.55E-04	0.5750	1.119E+13
Cs-134	2.0455E-05	104.551	209.102	0.00E+00	2.14E-03	4.28E-03	0.8500	1.367E+11
Cs-135	3.4477E-06	104.551	209.102	0.00E+00	3.60E-04	7.21E-04	1.2500	6.611E+10
Cs-137	1.4365E+00	104.551	209.102	0.00E+00	1.50E+02	3.00E+02	1.7500	3.722E+09
Eu-154	7.3230E-03	104.551	209.102	0.00E+00	7.66E-01	1.53E+00	2.2500	3.112E+05
Eu-155	5.9259E-04	104.551	209.102	0.00E+00	6.20E-02	1.24E-01	2.7500	2.969E+05
Fe-55	2.2791E-06	104.551	209.102	0.00E+00	2.38E-04	4.77E-04	3.5000	1.724E+02
H-3	1.9698E-03	104.551	209.102	0.00E+00	2.06E-01	4.12E-01	5.0000	7.046E+01
I-129	7.5300E-07	104.551	209.102	0.00E+00	7.87E-05	1.57E-04	7.0000	7.713E+00
Kr-85	4.1176E-02	104.551	209.102	0.00E+00	4.31E+00	8.61E+00	11.0000	8.599E-01
Np-237	9.5752E-06	104.551	209.102	0.00E+00	1.00E-03	2.00E-03		
Pa-231	3.9379E-09	104.551	209.102	0.00E+00	4.12E-07	8.23E-07		
Pb-210	3.3115E-10	104.551	209.102	0.00E+00	3.46E-08	6.92E-08		
Pm-147	9.2402E-04	104.551	209.102	0.00E+00	9.66E-02	1.93E-01		
Pu-238	1.6217E-02	104.551	209.102	0.00E+00	1.70E+00	3.39E+00		
Pu-239	4.2810E-04	104.551	209.102	0.00E+00	4.48E-02	8.95E-02		
Pu-240	2.4333E-04	104.551	209.102	0.00E+00	2.54E-02	5.09E-02		
Pu-241	1.6242E-02	104.551	209.102	0.00E+00	1.70E+00	3.40E+00		
Pu-242	3.6329E-07	104.551	209.102	0.00E+00	3.80E-05	7.60E-05		
Ra-226	9.0114E-10	104.551	209.102	0.00E+00	9.42E-08	1.88E-07		
Ra-228	3.1019E-14	104.551	209.102	0.00E+00	3.24E-12	6.49E-12		
Ru-106	2.1225E-10	104.551	209.102	0.00E+00	2.22E-08	4.44E-08		
Se-79	1.2930E-05	104.551	209.102	0.00E+00	1.35E-03	2.70E-03		
Sn-126	1.1571E-05	104.551	209.102	0.00E+00	1.21E-03	2.42E-03		
Sr-90	1.3472E+00	104.551	209.102	0.00E+00	1.41E+02	2.82E+02		
Tc-99	4.2239E-04	104.551	209.102	0.00E+00	4.42E-02	8.83E-02		
Th-229	1.2407E-11	104.551	209.102	0.00E+00	1.30E-09	2.59E-09		
Th-230	8.3497E-08	104.551	209.102	0.00E+00	8.73E-06	1.75E-05		
Th-232	3.8371E-14	104.551	209.102	0.00E+00	4.01E-12	8.02E-12		
Tl-208	4.0414E-08	104.551	209.102	0.00E+00	4.23E-06	8.45E-06		
U-232	1.0948E-07	104.551	209.102	0.00E+00	1.14E-05	2.29E-05		
U-233	3.6275E-09	104.551	209.102	0.00E+00	3.79E-07	7.59E-07		
U-234	1.8562E-04	104.551	209.102	0.00E+00	1.94E-02	3.88E-02		
U-235	-2.7235E-06	104.551	0.000	5.11E-03	4.82E-03	5.11E-03		
U-236	1.5493E-05	104.551	209.102	0.00E+00	1.62E-03	3.24E-03		
U-238	-4.2851E-09	104.551	0.000	5.79E-05	5.75E-05	5.79E-05		
Y-90	1.3475E+00	104.551	209.102	0.00E+00	1.41E+02	2.82E+02		
Other Radionuclides					1.43E+02	2.86E+02		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.20235261	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		104.551	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		209.102	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.13		1.00
Bounding:	0.26		

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

²Total burnup for all fuel associated with this worksheet must be 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=.69kg ; EOL=.69kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1996
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.21

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.1465E-09	12.974	25.948	0.00E+00	1.49E-08	2.98E-08	Avg. MeV	
Am-241	2.3056E-03	12.974	25.948	0.00E+00	2.99E-02	5.98E-02	0.0150	2.428E+12
Am-242m	4.1476E-07	12.974	25.948	0.00E+00	5.38E-06	1.08E-05	0.0250	5.044E+11
Am-243	1.4894E-06	12.974	25.948	0.00E+00	1.93E-05	3.86E-05	0.0375	4.393E+11
C-14	5.7108E-09	12.974	25.948	0.00E+00	7.41E-08	1.48E-07	0.0575	4.717E+11
Cl-36	1.3124E-32	12.974	25.948	0.00E+00	1.70E-31	3.41E-31	0.0850	2.846E+11
Cm-243	1.4562E-07	12.974	25.948	0.00E+00	1.89E-06	3.78E-06	0.1250	1.906E+11
Cm-244	2.4221E-05	12.974	25.948	0.00E+00	3.14E-04	6.28E-04	0.2250	2.458E+11
Co-60	2.7560E-06	12.974	25.948	0.00E+00	3.58E-05	7.15E-05	0.3750	1.068E+11
Cs-134	5.8851E-04	12.974	25.948	0.00E+00	7.64E-03	1.53E-02	0.5750	1.751E+12
Cs-135	3.4477E-06	12.974	25.948	0.00E+00	4.47E-05	8.95E-05	0.8500	2.524E+10
Cs-137	1.8099E-02	12.974	25.948	0.00E+00	2.35E+01	4.70E+01	1.2500	1.404E+10
Eu-154	1.6386E-00	12.974	25.948	0.00E+00	2.13E-01	4.25E-01	1.7500	6.935E+08
Eu-155	2.3957E-03	12.974	25.948	0.00E+00	3.11E-02	6.22E-02	2.2500	4.944E+04
Fa-55	3.2707E-05	12.974	25.948	0.00E+00	4.24E-04	8.49E-04	2.7500	4.046E+04
H-3	3.4504E-03	12.974	25.948	0.00E+00	4.48E-02	8.95E-02	3.5000	3.067E+01
I-129	7.5300E-07	12.974	25.948	0.00E+00	9.77E-06	1.95E-05	5.0000	1.032E+01
Kr-85	7.8540E-02	12.974	25.948	0.00E+00	1.02E+00	2.04E+00	7.0000	1.136E+00
Np-237	9.5615E-06	12.974	25.948	0.00E+00	1.24E-04	2.48E-04	11.0000	1.271E-01
Pa-231	2.7968E-09	12.974	25.948	0.00E+00	3.63E-08	7.26E-08		
Pb-210	1.2612E-10	12.974	25.948	0.00E+00	1.64E-09	3.27E-09		
Pm-147	1.2952E-02	12.974	25.948	0.00E+00	1.68E-01	3.36E-01		
Pu-238	1.7549E-02	12.974	25.948	0.00E+00	2.28E-01	4.55E-01		
Pu-239	4.2810E-04	12.974	25.948	0.00E+00	5.55E-03	1.11E-02		
Pu-240	2.4357E-04	12.974	25.948	0.00E+00	3.16E-03	6.32E-03		
Pu-241	2.6277E-02	12.974	25.948	0.00E+00	3.41E-01	6.82E-01		
Pu-242	3.6329E-07	12.974	25.948	0.00E+00	4.71E-06	9.43E-06		
Ra-226	4.4444E-10	12.974	25.948	0.00E+00	5.77E-09	1.15E-08		
Ra-228	1.9714E-14	12.974	25.948	0.00E+00	2.56E-13	5.12E-13		
Ru-106	2.0477E-07	12.974	25.948	0.00E+00	2.66E-06	5.31E-06		
Se-79	1.2933E-05	12.974	25.948	0.00E+00	1.68E-04	3.36E-04		
Sn-126	1.1574E-05	12.974	25.948	0.00E+00	1.50E-04	3.00E-04		
Sr-90	1.7092E+00	12.974	25.948	0.00E+00	2.22E+01	4.43E+01		
Tc-99	4.2239E-04	12.974	25.948	0.00E+00	5.48E-03	1.10E-02		
Th-229	7.7260E-12	12.974	25.948	0.00E+00	1.00E-10	2.00E-10		
Th-230	5.8497E-08	12.974	25.948	0.00E+00	7.59E-07	1.52E-06		
Th-232	2.6906E-14	12.974	25.948	0.00E+00	3.49E-13	6.98E-13		
Tl-208	4.4336E-08	12.974	25.948	0.00E+00	5.75E-07	1.15E-06		
U-232	1.2037E-07	12.974	25.948	0.00E+00	1.56E-06	3.12E-06		
U-233	3.0011E-09	12.974	25.948	0.00E+00	3.89E-08	7.79E-08		
U-234	1.8497E-04	12.974	25.948	0.00E+00	2.40E-03	4.80E-03		
U-235	-2.7235E-06	12.974	0.000	1.38E-03	1.34E-03	1.38E-03		
U-236	1.5493E-05	12.974	25.948	0.00E+00	2.01E-04	4.02E-04		
U-238	-4.2851E-09	12.974	0.000	1.62E-05	1.62E-05	1.62E-05		
Y-90	1.7094E+00	12.974	25.948	0.00E+00	2.22E+01	4.44E+01		
Other Radionuclides					2.24E+01	4.47E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.74E-01	5.48E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.95939437	60 to 100	

Burnup Summary (MWd) ²			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.
	From SFD	Estimated	
Nominal:		12.974	
Bounding:		25.948	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.06	
Bounding:	0.12	
	Estimated EOL HM/Given EOL HM	
	0.98	

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

²Total burnup for all fuel associated with this worksheet must be 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 (BRAZIL)	¹ Fuel decay start date: 1998	Estimated Canister usage: 18"x10"
SNF ID #: 954	Estimates as of: 2030	1.19
Fuel Units & Descr: 43 - ASSEMBLY	Template: ATR (Light Water, Alum., 60 to 100%, U)	
Heavy Metal Mass: BOL=8.29kg ; EOL=4.98kg	² Template Burnup(MWd): 367.2	
ROD Storage Site: SRS	Template BOL Heavy Metal Mass (MT): 0.00116689	
	Template Decay Time: 25 years	

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.1465E-09	3,143.726	6,287.451	0.00E+00	3.60E-06	7.21E-06		
Am-241	2.3056E-03	3,143.726	6,287.451	0.00E+00	7.25E+00	1.45E+01	0.0150	5.883E+14
Am-242m	4.1476E-07	3,143.726	6,287.451	0.00E+00	1.30E-03	2.61E-03	0.0250	1.222E+14
Am-243	1.4894E-06	3,143.726	6,287.451	0.00E+00	4.68E-03	9.36E-03	0.0375	1.064E+14
C-14	5.7108E-09	3,143.726	6,287.451	0.00E+00	1.80E-05	3.59E-05	0.0575	1.143E+14
Cl-36	1.3124E-32	3,143.726	6,287.451	0.00E+00	4.13E-29	8.25E-29	0.0850	6.897E+13
Co-243	1.4562E-07	3,143.726	6,287.451	0.00E+00	4.58E-04	9.16E-04	0.1250	4.619E+13
Co-244	2.4221E-05	3,143.726	6,287.451	0.00E+00	7.61E-02	1.52E-01	0.2250	5.954E+13
Co-60	2.7560E-06	3,143.726	6,287.451	0.00E+00	8.66E-03	1.73E-02	0.3750	2.588E+13
Cs-134	5.8851E-04	3,143.726	6,287.451	0.00E+00	1.85E+00	3.70E+00	0.5750	4.244E+14
Cs-135	3.4477E-06	3,143.726	6,287.451	0.00E+00	1.08E-02	2.17E-02	0.8500	6.115E+12
Cs-137	1.8099E+00	3,143.726	6,287.451	0.00E+00	5.69E+03	1.14E+04	1.2500	3.401E+12
Eu-154	1.6386E-02	3,143.726	6,287.451	0.00E+00	5.15E+01	1.03E+02	1.7500	1.680E+11
Eu-155	2.3957E-03	3,143.726	6,287.451	0.00E+00	7.53E+00	1.51E+01	2.2500	1.198E+07
Fe-55	3.2707E-05	3,143.726	6,287.451	0.00E+00	1.03E-01	2.06E-01	2.7500	9.804E+06
H-3	3.4504E-03	3,143.726	6,287.451	0.00E+00	1.08E+01	2.17E+01	3.5000	7.400E+03
I-129	7.5300E-07	3,143.726	6,287.451	0.00E+00	2.37E-03	4.73E-03	5.0000	2.488E+03
Kr-85	7.8540E-02	3,143.726	6,287.451	0.00E+00	2.47E+02	4.94E+02	7.0000	2.739E+02
Np-237	9.5615E-06	3,143.726	6,287.451	0.00E+00	3.01E-02	6.01E-02	11.0000	3.063E+01
Pa-231	2.7968E-09	3,143.726	6,287.451	0.00E+00	8.79E-06	1.76E-05		
Pb-210	1.2612E-10	3,143.726	6,287.451	0.00E+00	3.96E-07	7.93E-07		
Pm-147	1.2952E-02	3,143.726	6,287.451	0.00E+00	4.07E+01	8.14E+01		
Pu-238	1.7549E-02	3,143.726	6,287.451	0.00E+00	5.52E+01	1.10E+02		
Pu-239	4.2810E-04	3,143.726	6,287.451	0.00E+00	1.35E+00	2.69E+00		
Pu-240	2.4357E-04	3,143.726	6,287.451	0.00E+00	7.66E-01	1.53E+00		
Pu-241	2.6277E-02	3,143.726	6,287.451	0.00E+00	8.26E+01	1.65E+02		
Pu-242	3.6329E-07	3,143.726	6,287.451	0.00E+00	1.14E-03	2.28E-03		
Ra-226	4.4444E-10	3,143.726	6,287.451	0.00E+00	1.40E-06	2.79E-06		
Ra-228	1.9714E-14	3,143.726	6,287.451	0.00E+00	6.20E-11	1.24E-10		
Ru-106	2.0477E-07	3,143.726	6,287.451	0.00E+00	6.44E-04	1.29E-03		
Se-79	1.2933E-05	3,143.726	6,287.451	0.00E+00	4.07E-02	8.13E-02		
Sn-126	1.1574E-05	3,143.726	6,287.451	0.00E+00	3.64E-02	7.28E-02		
Sr-90	1.7092E+00	3,143.726	6,287.451	0.00E+00	5.37E+03	1.07E+04		
Tc-99	4.2239E-04	3,143.726	6,287.451	0.00E+00	1.33E+00	2.66E+00		
Th-229	7.7260E-12	3,143.726	6,287.451	0.00E+00	2.43E-08	4.86E-08		
Th-230	5.8497E-08	3,143.726	6,287.451	0.00E+00	1.84E-04	3.68E-04		
Th-232	2.6906E-14	3,143.726	6,287.451	0.00E+00	8.46E-11	1.69E-10		
Tl-208	4.4336E-08	3,143.726	6,287.451	0.00E+00	1.39E-04	2.79E-04		
U-232	1.2037E-07	3,143.726	6,287.451	0.00E+00	3.78E-04	7.57E-04		
U-233	3.0011E-09	3,143.726	6,287.451	0.00E+00	9.43E-06	1.89E-05		
U-234	1.8497E-04	3,143.726	6,287.451	0.00E+00	5.81E-01	1.16E+00		
U-235	-2.7235E-06	3,143.726	0.000	1.67E-02	8.13E-03	1.67E-02		
U-236	1.5493E-05	3,143.726	6,287.451	0.00E+00	4.87E-02	9.74E-02		
U-238	-4.2851E-09	3,143.726	0.000	1.92E-04	1.79E-04	1.92E-04		
Y-90	1.7094E+00	3,143.726	6,287.451	0.00E+00	5.37E+03	1.07E+04		
Other Radionuclides					5.42E+03	1.08E+04		

Gamma Sources	
Photon Energy Group	Total Photons/sec (bounding)
Avg. MeV	
0.0150	5.883E+14
0.0250	1.222E+14
0.0375	1.064E+14
0.0575	1.143E+14
0.0850	6.897E+13
0.1250	4.619E+13
0.2250	5.954E+13
0.3750	2.588E+13
0.5750	4.244E+14
0.8500	6.115E+12
1.2500	3.401E+12
1.7500	1.680E+11
2.2500	1.198E+07
2.7500	9.804E+06
3.5000	7.400E+03
5.0000	2.488E+03
7.0000	2.739E+02
11.0000	3.063E+01

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.65E+01	1.33E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.10655847	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		3,143.726	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		6,287.451	

Checks		
	Burnup Multiplier	Estimated Burnup/Given Burnup
Nominal:	1.20	
Bounding:	2.41	

Estimated EOL HM/Given EOL HM	
	1.04

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

²Total burnup for all fuel associated with this worksheet must be 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 (BRAZIL) ¹Fuel decay start date: 1998
 SNF ID #: 545 Estimates as of: 2030
 Fuel Units & Descr: 84 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=63.55kg ; EOL=61.73kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 3.50

Radionuclide	II. Estimates						Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	1.1465E-09	1,726.227	3,452.454	0.00E+00	1.98E-06	3.96E-06		
Am-241	2.3056E-03	1,726.227	3,452.454	0.00E+00	3.98E+00	7.96E+00	0.0150	3.231E+14
Am-242m	4.1476E-07	1,726.227	3,452.454	0.00E+00	7.16E-04	1.43E-03	0.0250	6.712E+13
Am-243	1.4894E-06	1,726.227	3,452.454	0.00E+00	2.57E-03	5.14E-03	0.0375	5.845E+13
C-14	5.7108E-09	1,726.227	3,452.454	0.00E+00	9.86E-06	1.97E-05	0.0675	6.276E+13
Cl-36	1.3124E-32	1,726.227	3,452.454	0.00E+00	2.27E-29	4.53E-29	0.0850	3.787E+13
Cm-243	1.4562E-07	1,726.227	3,452.454	0.00E+00	2.51E-04	5.03E-04	0.1250	2.536E+13
Cm-244	2.4221E-05	1,726.227	3,452.454	0.00E+00	4.18E-02	8.36E-02	0.2250	3.270E+13
Co-60	2.7560E-06	1,726.227	3,452.454	0.00E+00	4.76E-03	9.51E-03	0.3750	1.421E+13
Cs-134	5.8851E-04	1,726.227	3,452.454	0.00E+00	1.02E+00	2.03E+00	0.5750	2.390E+14
Cs-135	3.4477E-06	1,726.227	3,452.454	0.00E+00	5.95E-03	1.19E-02	0.8500	3.358E+12
Cs-137	1.8099E+00	1,726.227	3,452.454	0.00E+00	3.12E+03	6.25E+03	1.2500	1.867E+12
Eu-154	1.6386E-02	1,726.227	3,452.454	0.00E+00	2.83E+01	5.66E+01	1.7500	9.227E+10
Eu-155	2.3957E-03	1,726.227	3,452.454	0.00E+00	4.14E+00	8.27E+00	2.2500	6.578E+06
Fe-55	3.2707E-05	1,726.227	3,452.454	0.00E+00	5.65E-02	1.13E-01	2.7500	5.384E+06
H-3	3.4504E-03	1,726.227	3,452.454	0.00E+00	5.96E+00	1.19E+01	3.5000	4.155E+03
I-129	7.5300E-07	1,726.227	3,452.454	0.00E+00	1.30E-03	2.60E-03	5.0000	1.406E+03
Kr-85	7.8540E-02	1,726.227	3,452.454	0.00E+00	1.36E+02	2.71E+02	7.0000	1.549E+02
Np-237	9.5615E-06	1,726.227	3,452.454	0.00E+00	1.65E-02	3.30E-02	11.0000	1.734E+01
Pa-231	2.7968E-09	1,726.227	3,452.454	0.00E+00	4.83E-06	9.66E-06		
Pb-210	1.2612E-10	1,726.227	3,452.454	0.00E+00	2.18E-07	4.35E-07		
Pm-147	1.2952E-02	1,726.227	3,452.454	0.00E+00	2.24E+01	4.47E+01		
Pu-238	1.7549E-02	1,726.227	3,452.454	0.00E+00	3.03E+01	6.06E+01		
Pu-239	4.2810E-04	1,726.227	3,452.454	0.00E+00	7.39E-01	1.48E+00		
Pu-240	2.4357E-04	1,726.227	3,452.454	0.00E+00	4.20E-01	8.41E-01		
Pu-241	2.6277E-02	1,726.227	3,452.454	0.00E+00	4.54E+01	9.07E+01		
Pu-242	3.6329E-07	1,726.227	3,452.454	0.00E+00	6.27E-04	1.25E-03		
Ra-226	4.4444E-10	1,726.227	3,452.454	0.00E+00	7.67E-07	1.53E-06		
Ra-228	1.9714E-14	1,726.227	3,452.454	0.00E+00	3.40E-11	6.81E-11		
Ru-106	2.0477E-07	1,726.227	3,452.454	0.00E+00	3.53E-04	7.07E-04		
Se-79	1.2933E-05	1,726.227	3,452.454	0.00E+00	2.23E-02	4.47E-02		
Sn-126	1.1574E-05	1,726.227	3,452.454	0.00E+00	2.00E-02	4.00E-02		
Sr-90	1.7092E+00	1,726.227	3,452.454	0.00E+00	2.95E+03	5.90E+03		
Tc-99	4.2239E-04	1,726.227	3,452.454	0.00E+00	7.29E-01	1.46E+00		
Th-229	7.7260E-12	1,726.227	3,452.454	0.00E+00	1.33E-08	2.67E-08		
Th-230	5.8497E-08	1,726.227	3,452.454	0.00E+00	1.01E-04	2.02E-04		
Th-232	2.6906E-14	1,726.227	3,452.454	0.00E+00	4.64E-11	9.29E-11		
Tl-208	4.4336E-08	1,726.227	3,452.454	0.00E+00	7.65E-05	1.53E-04		
U-232	1.2037E-07	1,726.227	3,452.454	0.00E+00	2.08E-04	4.16E-04		
U-233	3.0011E-09	1,726.227	3,452.454	0.00E+00	5.18E-06	1.04E-05		
U-234	1.8497E-04	1,726.227	3,452.454	0.00E+00	3.19E-01	6.39E-01		
U-235	-2.7235E-06	1,726.227	0.000	2.70E-02	2.23E-02	2.70E-02		
U-236	1.5493E-05	1,726.227	3,452.454	0.00E+00	2.67E-02	5.35E-02		
U-238	-4.2851E-09	1,726.227	0.000	1.72E-02	1.72E-02	1.72E-02		
Y-90	1.7094E+00	1,726.227	3,452.454	0.00E+00	2.95E+03	5.90E+03		
Other Radionuclides					2.97E+03	5.95E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.65E+01	7.30E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	19.66156126	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,726.227	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		3,452.454	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.09		
Bounding:	0.17		

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

²Total burnup for all fuel associated with this worksheet must be 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 (BRAZIL)
 SNF ID #: 1076
 Fuel Units & Descr: 39 - ASSEMBLY
 Heavy Metal Mass: BOL=29.51kg ; EOL=28.66kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1998
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 1.63

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.1465E-09	801.463	1,602.925	0.00E+00	9.19E-07	1.84E-06	Avg. MeV	
Am-241	2.3056E-03	801.463	1,602.925	0.00E+00	1.85E+00	3.70E+00	0.0150	1.500E+14
Am-242m	4.1476E-07	801.463	1,602.925	0.00E+00	3.32E-04	6.65E-04	0.0250	3.116E+13
Am-243	1.4894E-06	801.463	1,602.925	0.00E+00	1.19E-03	2.39E-03	0.0375	2.714E+13
C-14	5.7108E-09	801.463	1,602.925	0.00E+00	4.58E-06	9.15E-06	0.0575	2.914E+13
Cl-36	1.3124E-32	801.463	1,602.925	0.00E+00	1.05E-29	2.10E-29	0.0850	1.758E+13
Cm-243	1.4562E-07	801.463	1,602.925	0.00E+00	1.17E-04	2.33E-04	0.1250	1.178E+13
Cm-244	2.4221E-05	801.463	1,602.925	0.00E+00	1.94E-02	3.88E-02	0.2250	1.518E+13
Co-60	2.7560E-06	801.463	1,602.925	0.00E+00	2.21E-03	4.42E-03	0.3750	6.599E+12
Cs-134	5.8851E-04	801.463	1,602.925	0.00E+00	4.72E-01	9.43E-01	0.5750	1.082E+14
Cs-135	3.4477E-06	801.463	1,602.925	0.00E+00	2.76E-03	5.53E-03	0.8500	1.559E+12
Cs-137	1.8099E+00	801.463	1,602.925	0.00E+00	1.45E+03	2.90E+03	1.2500	8.670E+11
Eu-154	1.6386E-02	801.463	1,602.925	0.00E+00	1.31E+01	2.63E+01	1.7500	4.284E+10
Eu-155	2.3957E-03	801.463	1,602.925	0.00E+00	1.92E+00	3.84E+00	2.2500	3.054E+06
Fe-55	3.2707E-05	801.463	1,602.925	0.00E+00	2.62E-02	5.24E-02	2.7500	2.500E+06
H-3	3.4504E-03	801.463	1,602.925	0.00E+00	2.77E+00	5.53E+00	3.5000	1.929E+03
I-129	7.5300E-07	801.463	1,602.925	0.00E+00	6.03E-04	1.21E-03	5.0000	6.526E+02
Kr-85	7.8540E-02	801.463	1,602.925	0.00E+00	6.29E+01	1.26E+02	7.0000	7.192E+01
Np-237	9.5615E-06	801.463	1,602.925	0.00E+00	7.66E-03	1.53E-02	11.0000	8.051E+00
Pa-231	2.7968E-09	801.463	1,602.925	0.00E+00	2.24E-06	4.48E-06		
Pb-210	1.2612E-10	801.463	1,602.925	0.00E+00	1.01E-07	2.02E-07		
Pm-147	1.2952E-02	801.463	1,602.925	0.00E+00	1.04E+01	2.08E+01		
Pu-238	1.7549E-02	801.463	1,602.925	0.00E+00	1.41E+01	2.81E+01		
Pu-239	4.2810E-04	801.463	1,602.925	0.00E+00	3.43E-01	6.86E-01		
Pu-240	2.4357E-04	801.463	1,602.925	0.00E+00	1.95E-01	3.90E-01		
Pu-241	2.6277E-02	801.463	1,602.925	0.00E+00	2.11E+01	4.21E+01		
Pu-242	3.6329E-07	801.463	1,602.925	0.00E+00	2.91E-04	5.82E-04		
Ra-226	4.4444E-10	801.463	1,602.925	0.00E+00	3.56E-07	7.12E-07		
Ra-228	1.9714E-14	801.463	1,602.925	0.00E+00	1.58E-11	3.16E-11		
Ru-106	2.0477E-07	801.463	1,602.925	0.00E+00	1.64E-04	3.28E-04		
Se-79	1.2933E-05	801.463	1,602.925	0.00E+00	1.04E-02	2.07E-02		
Sn-126	1.1574E-05	801.463	1,602.925	0.00E+00	9.28E-03	1.86E-02		
Sr-90	1.7092E+00	801.463	1,602.925	0.00E+00	1.37E+03	2.74E+03		
Tc-99	4.2239E-04	801.463	1,602.925	0.00E+00	3.39E-01	6.77E-01		
Th-229	7.7260E-12	801.463	1,602.925	0.00E+00	6.19E-09	1.24E-08		
Th-230	5.8497E-08	801.463	1,602.925	0.00E+00	4.69E-05	9.38E-05		
Th-232	2.6906E-14	801.463	1,602.925	0.00E+00	2.16E-11	4.31E-11		
Ti-208	4.4336E-08	801.463	1,602.925	0.00E+00	3.55E-05	7.11E-05		
U-232	1.2037E-07	801.463	1,602.925	0.00E+00	9.65E-05	1.93E-04		
U-233	3.0011E-09	801.463	1,602.925	0.00E+00	2.41E-06	4.81E-06		
U-234	1.8497E-04	801.463	1,602.925	0.00E+00	1.48E-01	2.96E-01		
U-235	-2.7235E-06	801.463	0.000	1.25E-02	1.04E-02	1.25E-02		
U-236	1.5493E-05	801.463	1,602.925	0.00E+00	1.24E-02	2.48E-02		
U-238	-4.2851E-09	801.463	0.000	7.97E-03	7.96E-03	7.97E-03		
Y-90	1.7094E+00	801.463	1,602.925	0.00E+00	1.37E+03	2.74E+03		
Other Radionuclides					1.38E+03	2.76E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.70E+01	3.39E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	19.66156126	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		801.463	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,602.925	

Checks			
	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.09		
Bounding:	0.17		

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

²Total burnup for all fuel associated with this worksheet must be 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. 1Fuel decay start date: 1996
 SNF ID #: 792 Estimates as of: 2030
 Fuel Units & Descr: 22 - FLAT PLATES IN CAN Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=3.48kg ; EOL=3.47kg 2Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.61

II. Estimates		m	x _n	x _b	b	y _n	y _b	Gamma Sources	
Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)	Avg. MeV
Ac-227	1.1465E-09	4.167	8.334	0.00E+00	4.78E-09	9.55E-09			
Am-241	2.3056E-03	4.167	8.334	0.00E+00	9.61E-03	1.92E-02	0.0150	7.800E+11	
Am-242m	4.1476E-07	4.167	8.334	0.00E+00	1.73E-06	3.46E-06	0.0250	1.620E+11	
Am-243	1.4894E-06	4.167	8.334	0.00E+00	6.21E-06	1.24E-05	0.0375	1.411E+11	
C-14	5.7108E-09	4.167	8.334	0.00E+00	2.38E-08	4.76E-08	0.0575	1.515E+11	
Cl-36	1.3124E-32	4.167	8.334	0.00E+00	5.47E-32	1.09E-31	0.0850	9.143E+10	
Cm-243	1.4562E-07	4.167	8.334	0.00E+00	6.07E-07	1.21E-06	0.1250	6.127E+10	
Cm-244	2.4221E-05	4.167	8.334	0.00E+00	1.01E-04	2.02E-04	0.2250	7.906E+10	
Co-60	2.7560E-06	4.167	8.334	0.00E+00	1.15E-05	2.30E-05	0.3750	3.431E+10	
Cs-134	5.8851E-04	4.167	8.334	0.00E+00	2.45E-03	4.90E-03	0.5750	5.625E+11	
Cs-135	3.4477E-06	4.167	8.334	0.00E+00	1.44E-05	2.87E-05	0.8500	8.105E+09	
Cs-137	1.8099E+00	4.167	8.334	0.00E+00	7.54E+00	1.51E+01	1.2500	4.508E+09	
Eu-154	1.6386E-02	4.167	8.334	0.00E+00	6.83E-02	1.37E-01	1.7500	2.227E+08	
Eu-155	2.3957E-03	4.167	8.334	0.00E+00	9.98E-03	2.00E-02	2.2500	1.588E+04	
Fe-55	3.2707E-05	4.167	8.334	0.00E+00	1.36E-04	2.73E-04	2.7500	1.300E+04	
H-3	3.4504E-03	4.167	8.334	0.00E+00	1.44E-02	2.88E-02	3.5000	1.046E+01	
I-129	7.5300E-07	4.167	8.334	0.00E+00	3.14E-06	6.28E-06	5.0000	3.572E+00	
Kr-85	7.8540E-02	4.167	8.334	0.00E+00	3.27E-01	6.55E-01	7.0000	3.938E-01	
Np-237	9.5615E-06	4.167	8.334	0.00E+00	3.98E-05	7.97E-05	11.0000	4.410E-02	
Pa-231	2.7968E-09	4.167	8.334	0.00E+00	1.17E-08	2.33E-08			
Pb-210	1.2612E-10	4.167	8.334	0.00E+00	5.26E-10	1.05E-09			
Pm-147	1.2952E-02	4.167	8.334	0.00E+00	5.40E-02	1.08E-01			
Pu-238	1.7549E-02	4.167	8.334	0.00E+00	7.31E-02	1.46E-01			
Pu-239	4.2810E-04	4.167	8.334	0.00E+00	1.78E-03	3.57E-03			
Pu-240	2.4357E-04	4.167	8.334	0.00E+00	1.01E-03	2.03E-03			
Pu-241	2.6277E-02	4.167	8.334	0.00E+00	1.09E-01	2.19E-01			
Pu-242	3.6329E-07	4.167	8.334	0.00E+00	1.51E-06	3.03E-06			
Ra-226	4.4444E-10	4.167	8.334	0.00E+00	1.85E-09	3.70E-09			
Ra-228	1.9714E-14	4.167	8.334	0.00E+00	8.21E-14	1.64E-13			
Ru-106	2.0477E-07	4.167	8.334	0.00E+00	8.53E-07	1.71E-06			
Se-79	1.2933E-05	4.167	8.334	0.00E+00	5.39E-05	1.08E-04			
Sn-126	1.1574E-05	4.167	8.334	0.00E+00	4.82E-05	9.65E-05			
Sr-90	1.7092E+00	4.167	8.334	0.00E+00	7.12E+00	1.42E+01			
Tc-99	4.2239E-04	4.167	8.334	0.00E+00	1.76E-03	3.52E-03			
Th-229	7.7260E-12	4.167	8.334	0.00E+00	3.22E-11	6.44E-11			
Th-230	5.8497E-08	4.167	8.334	0.00E+00	2.44E-07	4.87E-07			
Th-232	2.6906E-14	4.167	8.334	0.00E+00	1.12E-13	2.24E-13			
Tl-208	4.4336E-08	4.167	8.334	0.00E+00	1.85E-07	3.69E-07			
U-232	1.2037E-07	4.167	8.334	0.00E+00	5.02E-07	1.00E-06			
U-233	3.0011E-09	4.167	8.334	0.00E+00	1.25E-08	2.50E-08			
U-234	1.8497E-04	4.167	8.334	0.00E+00	7.71E-04	1.54E-03			
U-235	2.7235E-06	4.167	0.000	7.01E-03	7.00E-03	7.01E-03			
U-236	1.5493E-05	4.167	8.334	0.00E+00	6.46E-05	1.29E-04			
U-238	4.2851E-09	4.167	0.000	7.82E-05	7.82E-05	7.82E-05			
Y-90	1.7094E+00	4.167	8.334	0.00E+00	7.12E+00	1.42E+01			
Other Radionuclides					7.18E+00	1.44E+01			

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.83E-02	1.78E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.30981127	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		4.167	
Bounding:		8.334	

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

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

²Total burnup for all fuel associated with this worksheet must be 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. ¹Fuel decay start date: 1998
 SNF ID #: 953 Estimates as of: 2030
 Fuel Units & Descr: 24 - 24 FLAT PLATES Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=19.20kg ; EOL=19.20kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.67

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.1465E-09	9.091	18.183	0.00E+00	1.04E-08	2.08E-08	Avg. MeV	
Am-241	2.3056E-03	9.091	18.183	0.00E+00	2.10E-02	4.19E-02	0.0150	1.702E+12
Am-242m	4.1476E-07	9.091	18.183	0.00E+00	3.77E-06	7.54E-06	0.0250	3.535E+11
Am-243	1.4894E-06	9.091	18.183	0.00E+00	1.35E-05	2.71E-05	0.0375	3.078E+11
C-14	5.7108E-09	9.091	18.183	0.00E+00	5.19E-08	1.04E-07	0.0575	3.305E+11
Cl-36	1.3124E-32	9.091	18.183	0.00E+00	1.19E-31	2.39E-31	0.0850	1.995E+11
Cm-243	1.4562E-07	9.091	18.183	0.00E+00	1.32E-06	2.65E-06	0.1250	1.336E+11
Cm-244	2.4221E-05	9.091	18.183	0.00E+00	2.20E-04	4.40E-04	0.2250	1.724E+11
Co-60	2.7560E-06	9.091	18.183	0.00E+00	2.51E-05	5.01E-05	0.3750	7.486E+10
Cs-134	5.8851E-04	9.091	18.183	0.00E+00	5.35E-03	1.07E-02	0.5750	1.227E+12
Cs-135	3.4477E-06	9.091	18.183	0.00E+00	3.13E-05	6.27E-05	0.8500	1.768E+10
Cs-137	1.8099E+00	9.091	18.183	0.00E+00	1.65E+01	3.29E+01	1.2500	9.835E+09
Eu-154	1.6386E-02	9.091	18.183	0.00E+00	1.49E-01	2.98E-01	1.7500	4.860E+08
Eu-155	2.3957E-03	9.091	18.183	0.00E+00	2.18E-02	4.36E-02	2.2500	3.470E+04
Fe-55	3.2707E-05	9.091	18.183	0.00E+00	2.97E-04	5.95E-04	2.7500	2.838E+04
H-3	3.4504E-03	9.091	18.183	0.00E+00	3.14E-02	6.27E-02	3.5000	4.926E+01
I-129	7.5300E-07	9.091	18.183	0.00E+00	6.85E-06	1.37E-05	5.0000	1.917E+01
Kr-85	7.8540E-02	9.091	18.183	0.00E+00	7.14E-01	1.43E+00	7.0000	2.170E+00
Np-237	9.5615E-06	9.091	18.183	0.00E+00	8.69E-05	1.74E-04	11.0000	2.470E-01
Pa-231	2.7968E-09	9.091	18.183	0.00E+00	2.54E-08	5.09E-08		
Pb-210	1.2612E-10	9.091	18.183	0.00E+00	1.15E-09	2.29E-09		
Pm-147	1.2952E-02	9.091	18.183	0.00E+00	1.18E-01	2.36E-01		
Pu-238	1.7549E-02	9.091	18.183	0.00E+00	1.60E-01	3.19E-01		
Pu-239	4.2810E-04	9.091	18.183	0.00E+00	3.89E-03	7.78E-03		
Pu-240	2.4357E-04	9.091	18.183	0.00E+00	2.21E-03	4.43E-03		
Pu-241	2.6277E-02	9.091	18.183	0.00E+00	2.39E-01	4.78E-01		
Pu-242	3.6329E-07	9.091	18.183	0.00E+00	3.30E-06	6.61E-06		
Ra-226	4.4444E-10	9.091	18.183	0.00E+00	4.04E-09	8.08E-09		
Ra-228	1.9714E-14	9.091	18.183	0.00E+00	1.79E-13	3.58E-13		
Ru-106	2.0477E-07	9.091	18.183	0.00E+00	1.86E-06	3.72E-06		
Se-79	1.2933E-05	9.091	18.183	0.00E+00	1.18E-04	2.35E-04		
Sn-126	1.1574E-05	9.091	18.183	0.00E+00	1.05E-04	2.10E-04		
Sr-90	1.7092E+00	9.091	18.183	0.00E+00	1.55E+01	3.11E+01		
Tc-99	4.2239E-04	9.091	18.183	0.00E+00	3.84E-03	7.68E-03		
Th-229	7.7260E-12	9.091	18.183	0.00E+00	7.02E-11	1.40E-10		
Th-230	5.8497E-08	9.091	18.183	0.00E+00	5.32E-07	1.06E-06		
Th-232	2.6906E-14	9.091	18.183	0.00E+00	2.45E-13	4.89E-13		
Tl-208	4.4336E-08	9.091	18.183	0.00E+00	4.03E-07	8.06E-07		
U-232	1.2037E-07	9.091	18.183	0.00E+00	1.09E-06	2.19E-06		
U-233	3.0011E-09	9.091	18.183	0.00E+00	2.73E-08	5.46E-08		
U-234	1.8497E-04	9.091	18.183	0.00E+00	1.68E-03	3.36E-03		
U-235	-2.7235E-06	9.091	0.000	8.20E-03	8.18E-03	8.20E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.5493E-05	9.091	18.183	0.00E+00	1.41E-04	2.82E-04	1.93E-01	3.85E-01
U-238	-4.2851E-09	9.091	0.000	5.18E-03	5.18E-03	5.18E-03	Total	Total
Y-90	1.7094E+00	9.091	18.183	0.00E+00	1.55E+01	3.11E+01		
Other Radionuclides					1.57E+01	3.13E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
BOL HM Constituents:	ALUM (6061)	ALUM	
BOL Enrichment %:	U3Si2	U	
	19.76527712	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:	0.019	9.091	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
		18.183	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Bounding:	0.00	473.39	1.00
	0.00		

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

²Total burnup for all fuel associated with this worksheet must be 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 (SPAIN)
 SNF ID #: 749
 Fuel Units & Descr: 18 - 16 CURVED PLATES
 Heavy Metal Mass: BOL=12.64kg ; EOL=12.45kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1995
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.75

II. Estimates

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.0068E-09	182.396	364.792	0.00E+00	3.66E-07	7.32E-07	Avg. MeV	
Am-241	2.5251E-03	182.396	364.792	0.00E+00	4.61E-01	9.21E-01	0.0150	2.687E+13
Am-242m	3.9624E-07	182.396	364.792	0.00E+00	7.23E-05	1.45E-04	0.0250	5.579E+12
Am-243	1.4880E-06	182.396	364.792	0.00E+00	2.71E-04	5.43E-04	0.0375	4.849E+12
C-14	5.7053E-09	182.396	364.792	0.00E+00	1.04E-06	2.08E-06	0.0575	5.220E+12
Cl-36	1.3124E-32	182.396	364.792	0.00E+00	2.39E-30	4.79E-30	0.0850	3.145E+12
Cm-243	1.1419E-07	182.396	364.792	0.00E+00	2.08E-05	4.17E-05	0.1250	2.077E+12
Cm-244	1.6522E-05	182.396	364.792	0.00E+00	3.01E-03	6.03E-03	0.2250	2.715E+12
Co-60	7.4047E-07	182.396	364.792	0.00E+00	1.35E-04	2.70E-04	0.3750	1.181E+12
Cs-134	2.0455E-05	182.396	364.792	0.00E+00	3.73E-03	7.46E-03	0.5750	1.952E+13
Cs-135	3.4477E-06	182.396	364.792	0.00E+00	6.29E-04	1.26E-03	0.8500	2.384E+11
Cs-137	1.4365E+00	182.396	364.792	0.00E+00	2.62E+02	5.24E+02	1.2500	1.153E+11
Eu-154	7.3230E-03	182.396	364.792	0.00E+00	1.34E+00	2.67E+00	1.7500	6.492E+09
Eu-155	5.9259E-04	182.396	364.792	0.00E+00	1.08E-01	2.16E-01	2.2500	5.429E+05
Fe-55	2.2791E-06	182.396	364.792	0.00E+00	4.16E-04	8.31E-04	2.7500	5.180E+05
H-3	1.9698E-03	182.396	364.792	0.00E+00	3.59E-01	7.19E-01	3.5000	3.185E+02
I-129	7.5300E-07	182.396	364.792	0.00E+00	1.37E-04	2.75E-04	5.0000	1.305E+02
Kr-85	4.1176E-02	182.396	364.792	0.00E+00	7.51E+00	1.50E+01	7.0000	1.433E+01
Np-237	9.5752E-06	182.396	364.792	0.00E+00	1.75E-03	3.49E-03	11.0000	1.601E+00
Pa-231	3.9379E-09	182.396	364.792	0.00E+00	7.18E-07	1.44E-06		
Pb-210	3.3115E-10	182.396	364.792	0.00E+00	6.04E-08	1.21E-07		
Pm-147	9.2402E-04	182.396	364.792	0.00E+00	1.89E-01	3.77E-01		
Pu-238	1.6217E-02	182.396	364.792	0.00E+00	2.96E+00	5.92E+00		
Pu-239	4.2810E-04	182.396	364.792	0.00E+00	7.81E-02	1.56E-01		
Pu-240	2.4333E-04	182.396	364.792	0.00E+00	4.44E-02	8.88E-02		
Pu-241	1.6242E-02	182.396	364.792	0.00E+00	2.96E+00	5.92E+00		
Pu-242	3.6329E-07	182.396	364.792	0.00E+00	6.63E-05	1.33E-04		
Ra-226	9.0114E-10	182.396	364.792	0.00E+00	1.64E-07	3.29E-07		
Ra-228	3.1019E-14	182.396	364.792	0.00E+00	5.66E-12	1.13E-11		
Ru-106	2.1225E-10	182.396	364.792	0.00E+00	3.87E-08	7.74E-08		
Se-79	1.2930E-05	182.396	364.792	0.00E+00	2.36E-03	4.72E-03		
Sn-126	1.1571E-05	182.396	364.792	0.00E+00	2.11E-03	4.22E-03		
Sr-90	1.3472E+00	182.396	364.792	0.00E+00	2.46E+02	4.91E+02		
Tc-99	4.2239E-04	182.396	364.792	0.00E+00	7.70E-02	1.54E-01		
Th-229	1.2407E-11	182.396	364.792	0.00E+00	2.26E-09	4.53E-09		
Th-230	8.3497E-08	182.396	364.792	0.00E+00	1.52E-05	3.05E-05		
Th-232	3.8371E-14	182.396	364.792	0.00E+00	7.00E-12	1.40E-11		
Tl-208	4.0414E-08	182.396	364.792	0.00E+00	7.37E-06	1.47E-05		
U-232	1.0948E-07	182.396	364.792	0.00E+00	2.00E-05	3.99E-05		
U-233	3.6275E-09	182.396	364.792	0.00E+00	6.62E-07	1.32E-06		
U-234	1.8562E-04	182.396	364.792	0.00E+00	3.39E-02	6.77E-02		
U-235	-2.7235E-06	182.396	0.000	5.25E-03	4.75E-03	5.25E-03		
U-236	1.5493E-05	182.396	364.792	0.00E+00	2.83E-03	5.65E-03		
U-238	-4.2851E-09	182.396	0.000	3.43E-03	3.43E-03	3.43E-03		
Y-90	1.3475E+00	182.396	364.792	0.00E+00	2.46E+02	4.92E+02		
Other Radionuclides					2.50E+02	4.99E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.05E+00	6.11E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
LIGHT WATER	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	19.22438767	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
182.396		182.396	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
364.792		364.792	

Checks			
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
0.05			
0.09			

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

²Total burnup for all fuel associated with this worksheet must be 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 (SPAIN)
 SNF ID #: 795
 Fuel Units & Descr: 23 - 16 CURVED PLATES
 Heavy Metal Mass: BOL=4.00kg ; EOL=3.78kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1995
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.96

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	Total
Ac-227	2.0068E-09	206.924	413.847	0.00E+00	4.15E-07	8.31E-07		
Am-241	2.5251E-03	206.924	413.847	0.00E+00	5.22E-01	1.04E+00	0.0150	3.048E+13
Am-242m	3.9624E-07	206.924	413.847	0.00E+00	8.20E-05	1.64E-04	0.0250	6.329E+12
Am-243	1.4880E-06	206.924	413.847	0.00E+00	3.08E-04	6.16E-04	0.0375	5.502E+12
C-14	5.7053E-09	206.924	413.847	0.00E+00	1.18E-06	2.36E-06	0.0575	5.922E+12
Cl-36	1.3124E-32	206.924	413.847	0.00E+00	2.72E-30	5.43E-30	0.0850	3.568E+12
Cr-243	1.1419E-07	206.924	413.847	0.00E+00	2.36E-05	4.73E-05	0.1250	2.357E+12
Cr-244	1.6522E-05	206.924	413.847	0.00E+00	3.42E-03	6.84E-03	0.2250	3.080E+12
Co-60	7.4047E-07	206.924	413.847	0.00E+00	1.53E-04	3.06E-04	0.3750	1.340E+12
Cs-134	2.0455E-05	206.924	413.847	0.00E+00	4.23E-03	8.47E-03	0.5750	2.215E+13
Cs-135	3.4477E-06	206.924	413.847	0.00E+00	7.13E-04	1.43E-03	0.8500	2.705E+11
Cs-137	1.4365E+00	206.924	413.847	0.00E+00	2.97E+02	5.95E+02	1.2500	1.308E+11
Eu-154	7.3230E-03	206.924	413.847	0.00E+00	1.52E+00	3.03E+00	1.7500	7.366E+09
Eu-155	5.9259E-04	206.924	413.847	0.00E+00	1.23E-01	2.45E-01	2.2500	6.159E+05
Fe-55	2.2791E-06	206.924	413.847	0.00E+00	4.72E-04	9.43E-04	2.7500	5.876E+05
H-3	1.9698E-03	206.924	413.847	0.00E+00	4.08E-01	8.15E-01	3.5000	3.422E+02
I-129	7.5300E-07	206.924	413.847	0.00E+00	1.56E-04	3.12E-04	5.0000	1.398E+02
Kr-85	4.1176E-02	206.924	413.847	0.00E+00	8.52E+00	1.70E+01	7.0000	1.531E+01
Np-237	9.5752E-06	206.924	413.847	0.00E+00	1.98E-03	3.96E-03	11.0000	1.707E+00
Pa-231	3.9379E-09	206.924	413.847	0.00E+00	8.15E-07	1.63E-06		
Pb-210	3.3115E-10	206.924	413.847	0.00E+00	6.85E-08	1.37E-07		
Pm-147	9.2402E-04	206.924	413.847	0.00E+00	1.91E-01	3.82E-01		
Pu-238	1.6217E-02	206.924	413.847	0.00E+00	3.36E+00	6.71E+00		
Pu-239	4.2810E-04	206.924	413.847	0.00E+00	8.86E-02	1.77E-01		
Pu-240	2.4333E-04	206.924	413.847	0.00E+00	5.04E-02	1.01E-01		
Pu-241	1.6242E-02	206.924	413.847	0.00E+00	3.36E+00	6.72E+00		
Pu-242	3.6329E-07	206.924	413.847	0.00E+00	7.52E-05	1.50E-04		
Ra-226	9.0114E-10	206.924	413.847	0.00E+00	1.86E-07	3.73E-07		
Ra-228	3.1019E-14	206.924	413.847	0.00E+00	6.42E-12	1.28E-11		
Ru-106	2.1225E-10	206.924	413.847	0.00E+00	4.39E-08	8.78E-08		
Se-79	1.2930E-05	206.924	413.847	0.00E+00	2.68E-03	5.35E-03		
Sn-126	1.1571E-05	206.924	413.847	0.00E+00	2.39E-03	4.79E-03		
Sr-90	1.3472E+00	206.924	413.847	0.00E+00	2.79E+02	5.58E+02		
Tc-99	4.2239E-04	206.924	413.847	0.00E+00	8.74E-02	1.75E-01		
Th-229	1.2407E-11	206.924	413.847	0.00E+00	2.57E-09	5.13E-09		
Th-230	8.3497E-08	206.924	413.847	0.00E+00	1.73E-05	3.46E-05		
Th-232	3.8371E-14	206.924	413.847	0.00E+00	7.94E-12	1.59E-11		
Ti-208	4.0414E-08	206.924	413.847	0.00E+00	8.36E-06	1.67E-05		
U-232	1.0948E-07	206.924	413.847	0.00E+00	2.27E-05	4.53E-05		
U-233	3.6275E-09	206.924	413.847	0.00E+00	7.51E-07	1.50E-06		
U-234	1.8562E-04	206.924	413.847	0.00E+00	3.84E-02	7.68E-02		
U-235	-2.7235E-06	206.924	0.000	6.71E-03	6.15E-03	6.71E-03		
U-236	1.5493E-05	206.924	413.847	0.00E+00	3.21E-03	6.41E-03		
U-238	-4.2851E-09	206.924	0.000	3.01E-04	3.01E-04	3.01E-04		
Y-90	1.3475E+00	206.924	413.847	0.00E+00	2.79E+02	5.58E+02		
Other Radionuclides					2.83E+02	5.66E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.46E+00	6.93E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	77.58892697	60 to 100	

Burnup Summary (MWd) ²		Basis for burnup used in estimate:	
	From SFD		Estimated
Nominal:		206.924	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		413.847	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.16		1.00
Bounding:	0.33		

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN)
 SNF ID #: 123
 Fuel Units & Descr: 152 - MTR TYPE
 Heavy Metal Mass: BOL=44.38kg ; EOL=37.21kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1989
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 4.22

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	6,794.296	13,588.592	0.00E+00	1.36E-05	2.73E-05	0.0150	1.001E+15
Am-241	2.5251E-03	6,794.296	13,588.592	0.00E+00	1.72E+01	3.43E+01	0.0250	2.078E+14
Am-242m	3.9624E-07	6,794.296	13,588.592	0.00E+00	2.69E-03	5.38E-03	0.0375	1.806E+14
Am-243	1.4880E-06	6,794.296	13,588.592	0.00E+00	1.01E-02	2.02E-02	0.0575	1.944E+14
C-14	5.7053E-09	6,794.296	13,588.592	0.00E+00	3.88E-05	7.75E-05	0.0850	1.172E+14
Cl-36	1.3124E-32	6,794.296	13,588.592	0.00E+00	8.92E-29	1.78E-28	0.1250	7.738E+13
Cm-243	1.1419E-07	6,794.296	13,588.592	0.00E+00	7.76E-04	1.55E-03	0.2250	1.011E+14
Cm-244	1.6522E-05	6,794.296	13,588.592	0.00E+00	1.12E-01	2.25E-01	0.3750	4.400E+13
Co-60	7.4047E-07	6,794.296	13,588.592	0.00E+00	5.03E-03	1.01E-02	0.5750	7.272E+14
Cs-134	2.0455E-05	6,794.296	13,588.592	0.00E+00	1.39E-01	2.78E-01	0.8500	8.882E+12
Cs-135	3.4477E-06	6,794.296	13,588.592	0.00E+00	2.34E-02	4.68E-02	1.2500	4.296E+12
Cs-137	1.4365E+00	6,794.296	13,588.592	0.00E+00	9.76E+03	1.95E+04	1.7500	2.418E+11
Eu-154	7.3230E-03	6,794.296	13,588.592	0.00E+00	4.98E+01	9.95E+01	2.2500	2.022E+07
Eu-155	5.9259E-07	6,794.296	13,588.592	0.00E+00	4.03E+00	8.05E+00	2.7500	1.929E+07
Fe-55	2.2791E-06	6,794.296	13,588.592	0.00E+00	1.55E-02	3.10E-02	3.5000	1.118E+04
H-3	1.9698E-03	6,794.296	13,588.592	0.00E+00	1.34E+01	2.68E+01	5.0000	4.569E+03
I-129	7.5300E-07	6,794.296	13,588.592	0.00E+00	5.12E-03	1.02E-02	7.0000	5.001E+02
Kr-85	4.1176E-02	6,794.296	13,588.592	0.00E+00	2.80E+02	5.60E+02	11.0000	5.576E+01
Np-237	9.5752E-06	6,794.296	13,588.592	0.00E+00	6.51E-02	1.30E-01		
Pa-231	3.9379E-09	6,794.296	13,588.592	0.00E+00	2.68E-05	5.35E-05		
Pb-210	3.3115E-10	6,794.296	13,588.592	0.00E+00	2.25E-06	4.50E-06		
Pm-147	9.2402E-04	6,794.296	13,588.592	0.00E+00	6.28E+00	1.26E+01		
Pu-238	1.6217E-02	6,794.296	13,588.592	0.00E+00	1.10E+02	2.20E+02		
Pu-239	4.2810E-04	6,794.296	13,588.592	0.00E+00	2.91E+00	5.82E+00		
Pu-240	2.4333E-04	6,794.296	13,588.592	0.00E+00	1.65E+00	3.31E+00		
Pu-241	1.6242E-02	6,794.296	13,588.592	0.00E+00	1.10E+02	2.21E+02		
Pu-242	3.6329E-07	6,794.296	13,588.592	0.00E+00	2.47E-03	4.94E-03		
Ra-226	9.0114E-10	6,794.296	13,588.592	0.00E+00	6.12E-06	1.22E-05		
Ra-228	3.1019E-14	6,794.296	13,588.592	0.00E+00	2.11E-10	4.21E-10		
Ru-106	2.1225E-10	6,794.296	13,588.592	0.00E+00	1.44E-06	2.88E-06		
Se-79	1.2930E-05	6,794.296	13,588.592	0.00E+00	8.79E-02	1.76E-01		
Sn-126	1.1571E-05	6,794.296	13,588.592	0.00E+00	7.86E-02	1.57E-01		
Sr-90	1.3472E+00	6,794.296	13,588.592	0.00E+00	9.15E+03	1.83E+04		
Tc-99	4.2239E-04	6,794.296	13,588.592	0.00E+00	2.87E+00	5.74E+00		
Th-229	1.2407E-11	6,794.296	13,588.592	0.00E+00	8.43E-08	1.69E-07		
Th-230	8.3497E-08	6,794.296	13,588.592	0.00E+00	5.67E-04	1.13E-03		
Th-232	3.8371E-14	6,794.296	13,588.592	0.00E+00	2.61E-10	5.21E-10		
Tl-208	4.0414E-08	6,794.296	13,588.592	0.00E+00	2.75E-04	5.49E-04		
U-232	1.0948E-07	6,794.296	13,588.592	0.00E+00	7.44E-04	1.49E-03		
U-233	3.6275E-09	6,794.296	13,588.592	0.00E+00	2.46E-05	4.93E-05		
U-234	1.8562E-04	6,794.296	13,588.592	0.00E+00	1.26E+00	2.52E+00		
U-235	-2.7235E-06	6,794.296	0.000	8.94E-02	7.09E-02	8.94E-02		
U-236	1.5493E-05	6,794.296	13,588.592	0.00E+00	1.05E-01	2.11E-01		
U-238	-4.2851E-09	6,794.296	0.000	1.02E-03	9.87E-04	1.02E-03		
Y-90	1.3475E+00	6,794.296	13,588.592	0.00E+00	9.16E+03	1.83E+04		
Other Radionuclides					9.30E+03	1.86E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.18522593	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		6,794.296	
Bounding:		13,588.592	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.49		
Bounding:	0.97		

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: JMTR (JAPAN) ¹Fuel decay start date: 1989
 SNF ID #: 886 Estimates as of: 2030
 Fuel Units & Descr: 570 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=349.35kg ; EOL=323.59kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
Canister usage:
18"x10"
15.83

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	24,399.008	48,798.016	0.00E+00	4.90E-05	9.79E-05		
Am-241	2.5251E-03	24,399.008	48,798.016	0.00E+00	6.16E+01	1.23E+02	0.0150	3.594E+15
Am-242m	3.9624E-07	24,399.008	48,798.016	0.00E+00	9.67E-03	1.93E-02	0.0250	7.469E+14
Am-243	1.4880E-06	24,399.008	48,798.016	0.00E+00	3.63E-02	7.26E-02	0.0375	6.487E+14
C-14	5.7053E-09	24,399.008	48,798.016	0.00E+00	1.39E-04	2.78E-04	0.0575	6.982E+14
Cl-36	1.3124E-32	24,399.008	48,798.016	0.00E+00	3.20E-28	6.40E-28	0.0850	4.207E+14
Co-243	1.1419E-07	24,399.008	48,798.016	0.00E+00	2.79E-03	5.57E-03	0.1250	2.779E+14
Co-244	1.6522E-05	24,399.008	48,798.016	0.00E+00	4.03E-01	8.06E-01	0.2250	3.632E+14
Co-60	7.4047E-07	24,399.008	48,798.016	0.00E+00	1.81E-02	3.61E-02	0.3750	1.580E+14
Cs-134	2.0455E-05	24,399.008	48,798.016	0.00E+00	4.99E-01	9.98E-01	0.5750	2.611E+15
Cs-135	3.4477E-06	24,399.008	48,798.016	0.00E+00	8.41E-02	1.68E-01	0.8500	3.190E+13
Cs-137	1.4365E+00	24,399.008	48,798.016	0.00E+00	3.51E+04	7.01E+04	1.2500	1.543E+13
Eu-154	7.3230E-03	24,399.008	48,798.016	0.00E+00	1.79E+02	3.57E+02	1.7500	8.685E+11
Eu-155	5.9259E-04	24,399.008	48,798.016	0.00E+00	1.45E+01	2.89E+01	2.2500	7.263E+07
Fe-55	2.2791E-06	24,399.008	48,798.016	0.00E+00	5.56E-02	1.11E-01	2.7500	6.929E-07
H-3	1.9698E-03	24,399.008	48,798.016	0.00E+00	4.81E+01	9.61E+01	3.5000	4.049E+04
I-129	7.5300E-07	24,399.008	48,798.016	0.00E+00	1.84E-02	3.67E-02	5.0000	1.655E+04
Kr-85	4.1176E-02	24,399.008	48,798.016	0.00E+00	1.00E+03	2.01E+03	7.0000	1.812E+03
Np-237	9.5752E-06	24,399.008	48,798.016	0.00E+00	2.34E-01	4.67E-01	11.0000	2.021E-02
Pa-231	3.9379E-09	24,399.008	48,798.016	0.00E+00	9.61E-05	1.92E-04		
Pb-210	3.3115E-10	24,399.008	48,798.016	0.00E+00	8.08E-06	1.62E-05		
Pm-147	9.2402E-04	24,399.008	48,798.016	0.00E+00	2.25E+01	4.51E+01		
Pu-238	1.6217E-02	24,399.008	48,798.016	0.00E+00	3.96E+02	7.91E+02		
Pu-239	4.2810E-04	24,399.008	48,798.016	0.00E+00	1.04E+01	2.09E+01		
Pu-240	2.4339E-04	24,399.008	48,798.016	0.00E+00	5.94E+00	1.19E+01		
Pu-241	1.6242E-02	24,399.008	48,798.016	0.00E+00	3.96E+02	7.93E+02		
Pu-242	3.6329E-07	24,399.008	48,798.016	0.00E+00	8.86E-03	1.77E-02		
Ra-226	9.0114E-10	24,399.008	48,798.016	0.00E+00	2.20E-05	4.40E-05		
Ra-228	3.1019E-14	24,399.008	48,798.016	0.00E+00	7.57E-10	1.51E-09		
Ru-106	2.1225E-10	24,399.008	48,798.016	0.00E+00	5.18E-06	1.04E-05		
Se-79	1.2930E-05	24,399.008	48,798.016	0.00E+00	3.15E-01	6.31E-01		
Sn-126	1.1571E-05	24,399.008	48,798.016	0.00E+00	2.82E-01	5.65E-01		
Sr-90	1.3472E+00	24,399.008	48,798.016	0.00E+00	3.29E+04	6.57E+04		
Tc-99	4.2239E-04	24,399.008	48,798.016	0.00E+00	1.03E+01	2.06E+01		
Th-229	1.2407E-11	24,399.008	48,798.016	0.00E+00	3.03E-07	6.05E-07		
Th-230	8.3497E-08	24,399.008	48,798.016	0.00E+00	2.04E-03	4.07E-03		
Th-232	3.8371E-14	24,399.008	48,798.016	0.00E+00	9.36E-10	1.87E-09		
Tl-208	4.0414E-08	24,399.008	48,798.016	0.00E+00	9.86E-04	1.97E-03		
U-232	1.0948E-07	24,399.008	48,798.016	0.00E+00	2.67E-03	5.34E-03		
U-233	3.6275E-09	24,399.008	48,798.016	0.00E+00	8.85E-05	1.77E-04		
U-234	1.8562E-04	24,399.008	48,798.016	0.00E+00	4.53E+00	9.06E+00		
U-235	-2.7235E-06	24,399.008	0.000	3.40E-01	2.73E-01	3.40E-01		
U-236	1.5493E-05	24,399.008	48,798.016	0.00E+00	3.78E-01	7.56E-01		
U-238	-4.2851E-09	24,399.008	0.000	6.46E-02	6.45E-02	6.46E-02		
Y-90	1.3475E+00	24,399.008	48,798.016	0.00E+00	3.29E+04	6.58E+04		
Other Radionuclides					3.34E+04	6.68E+04		
Thermal Power							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							4.08E+02	8.17E+02
Total							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons:
Fuel Cladding:	ALUM	ALUM	This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	45.01144391	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		24,399.008	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		48,798.016	

Checks		
	Burnup Multiplier	Estimated Burnup/Given Burnup
Nominal:	0.22	
Bounding:	0.44	

Estimated EOL HM/Given EOL HM **1.00**

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN)	¹ Fuel decay start date: 1983
SNF ID #: 507	Estimate as of: 2030
Fuel Units & Descr: 574 - ASSEMBLY	Template: ATR (Light Water, Alum., 60 to 100%, U)
Heavy Metal Mass: BOL=1176.70kg ; EOL=1106.10kg	² Template Burnup(MWd): 367.2
ROD Storage Site: SRS	Template BOL Heavy Metal Mass (MT): 0.00116689
	Template Decay Time: 35 years

Estimated
Canister usage:
18"x10"
23.92

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	66,861,467	133,722,933	0.00E+00	1.34E-04	2.68E-04		
Am-241	2.5251E-03	66,861,467	133,722,933	0.00E+00	1.69E+02	3.38E+02	0.0150	9.849E+15
Am-242m	3.9624E-07	66,861,467	133,722,933	0.00E+00	2.65E-02	5.30E-02	0.0250	2.045E+15
Am-243	1.4880E-06	66,861,467	133,722,933	0.00E+00	9.95E-02	1.99E-01	0.0375	1.778E+15
C-14	5.7053E-09	66,861,467	133,722,933	0.00E+00	3.81E-04	7.63E-04	0.0575	1.913E+15
Cl-36	1.3124E-32	66,861,467	133,722,933	0.00E+00	8.77E-28	1.75E-27	0.0850	1.153E+15
Cm-243	1.1419E-07	66,861,467	133,722,933	0.00E+00	7.63E-03	1.53E-02	0.1250	7.615E+14
Cm-244	1.6522E-05	66,861,467	133,722,933	0.00E+00	1.10E+00	2.21E+00	0.2250	9.953E+14
Co-60	7.4047E-07	66,861,467	133,722,933	0.00E+00	4.95E-02	9.90E-02	0.3750	4.330E+14
Cs-134	2.0455E-05	66,861,467	133,722,933	0.00E+00	1.37E+00	2.74E+00	0.5750	7.156E+15
Cs-135	3.4477E-06	66,861,467	133,722,933	0.00E+00	2.31E-01	4.61E-01	0.8500	8.741E+13
Cs-137	1.4365E+00	66,861,467	133,722,933	0.00E+00	9.60E+04	1.92E+05	1.2500	4.228E+13
Eu-154	7.3230E-03	66,861,467	133,722,933	0.00E+00	4.90E+02	9.79E+02	1.7500	2.380E+12
Eu-155	5.9259E-04	66,861,467	133,722,933	0.00E+00	3.96E+01	7.92E+01	2.2500	1.990E+08
Fe-55	2.2791E-06	66,861,467	133,722,933	0.00E+00	1.52E-01	3.05E-01	2.7500	1.899E+08
H-3	1.9698E-03	66,861,467	133,722,933	0.00E+00	1.32E+02	2.63E+02	3.5000	1.117E+05
I-129	7.5300E-07	66,861,467	133,722,933	0.00E+00	5.03E-02	1.01E-01	5.0000	4.566E+04
Kr-85	4.1176E-02	66,861,467	133,722,933	0.00E+00	2.75E+03	5.51E+03	7.0000	5.002E+03
Np-237	9.5752E-06	66,861,467	133,722,933	0.00E+00	6.40E-01	1.28E+00	11.0000	5.579E+02
Pa-231	3.9379E-09	66,861,467	133,722,933	0.00E+00	2.63E-04	5.27E-04		
Pb-210	3.3115E-10	66,861,467	133,722,933	0.00E+00	2.21E-05	4.43E-05		
Pm-147	9.2402E-04	66,861,467	133,722,933	0.00E+00	6.18E+01	1.24E+02		
Pu-238	1.6217E-02	66,861,467	133,722,933	0.00E+00	1.08E+03	2.17E+03		
Pu-239	4.2810E-04	66,861,467	133,722,933	0.00E+00	2.86E+01	5.72E+01		
Pu-240	2.4333E-04	66,861,467	133,722,933	0.00E+00	1.63E+01	3.25E+01		
Pu-241	1.6242E-02	66,861,467	133,722,933	0.00E+00	1.09E+03	2.17E+03		
Pu-242	3.6329E-07	66,861,467	133,722,933	0.00E+00	2.43E-02	4.86E-02		
Ra-226	9.0114E-10	66,861,467	133,722,933	0.00E+00	6.03E-05	1.21E-04		
Ra-228	3.1019E-14	66,861,467	133,722,933	0.00E+00	2.07E-09	4.15E-09		
Ru-106	2.1225E-10	66,861,467	133,722,933	0.00E+00	1.42E-05	2.84E-05		
Se-79	1.2930E-05	66,861,467	133,722,933	0.00E+00	8.65E-01	1.73E+00		
Sn-126	1.1571E-05	66,861,467	133,722,933	0.00E+00	7.74E-01	1.55E+00		
Sr-90	1.3472E+00	66,861,467	133,722,933	0.00E+00	9.01E+04	1.80E+05		
Tc-99	4.2239E-04	66,861,467	133,722,933	0.00E+00	2.82E+01	5.65E+01		
Th-229	1.2407E-11	66,861,467	133,722,933	0.00E+00	8.30E-07	1.66E-06		
Th-230	8.3497E-08	66,861,467	133,722,933	0.00E+00	5.58E-03	1.12E-02		
Th-232	3.8371E-14	66,861,467	133,722,933	0.00E+00	2.57E-09	5.13E-09		
Ti-208	4.0414E-08	66,861,467	133,722,933	0.00E+00	2.70E-03	5.40E-03		
U-232	1.0948E-07	66,861,467	133,722,933	0.00E+00	7.32E-03	1.46E-02		
U-233	3.6275E-09	66,861,467	133,722,933	0.00E+00	2.43E-04	4.85E-04		
U-234	1.8562E-04	66,861,467	133,722,933	0.00E+00	1.24E+01	2.48E+01		
U-235	-2.7235E-06	66,861,467	0.000	5.09E-01	3.26E-01	5.09E-01		
U-236	1.5493E-05	66,861,467	133,722,933	0.00E+00	1.04E+00	2.07E+00		
U-238	-4.2851E-09	66,861,467	0.000	3.16E-01	3.16E-01	3.16E-01	1.12E+03	2.24E+03
Y-90	1.3475E+00	66,861,467	133,722,933	0.00E+00	9.01E+04	1.80E+05	Total	Total
Other Radionuclides					9.15E+04	1.83E+05		

Thermal Power
Nominal Heat Output (Watts) 1.12E+03
Bounding Heat Output (Watts) 2.24E+03
Total Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20.00000029	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		66,861,467	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		133,722,933	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.18	
Bounding:	0.36	
		Estimated EOL HM/Given EOL HM
		1.00

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN)
 SNF ID #: 885
 Fuel Units & Descr: 144 - 12 CURVED PLATES
 Heavy Metal Mass: BOL=70.23kg ; EOL=62.50kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1989
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 35 years

 Estimated
 Canister usage:
 18"x10"
4.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	9.5869E-10	7,122.705	14,245.411	0.00E+00	6.83E-06	1.37E-05		
Am-241	1.0109E-02	7,122.705	14,245.411	0.00E+00	7.20E+01	1.44E+02	0.0150	1.052E+15
Am-242m	1.2789E-06	7,122.705	14,245.411	0.00E+00	9.11E-03	1.82E-02	0.0250	2.162E+14
Am-243	3.7047E-05	7,122.705	14,245.411	0.00E+00	2.64E-01	5.28E-01	0.0375	1.895E+14
C-14	2.6416E-08	7,122.705	14,245.411	0.00E+00	1.88E-04	3.76E-04	0.0575	2.039E+14
Ci-36	4.4441E-31	7,122.705	14,245.411	0.00E+00	3.17E-27	6.33E-27	0.0850	1.220E+14
Cm-243	3.9605E-06	7,122.705	14,245.411	0.00E+00	2.82E-02	5.64E-02	0.1250	8.227E+13
Cm-244	2.6227E-03	7,122.705	14,245.411	0.00E+00	1.87E+01	3.74E+01	0.2250	1.054E+14
Co-60	6.7740E-06	7,122.705	14,245.411	0.00E+00	4.82E-02	9.65E-02	0.3750	4.575E+13
Cs-134	6.8894E-05	7,122.705	14,245.411	0.00E+00	4.91E-01	9.81E-01	0.5750	7.642E+14
Cs-135	4.2564E-06	7,122.705	14,245.411	0.00E+00	3.03E-02	6.06E-02	0.8500	1.132E+13
Cs-137	1.4399E+00	7,122.705	14,245.411	0.00E+00	1.03E+04	2.05E+04	1.2500	6.763E+12
Eu-154	1.5522E-02	7,122.705	14,245.411	0.00E+00	1.11E+02	2.21E+02	1.7500	3.200E+11
Eu-155	1.7588E-03	7,122.705	14,245.411	0.00E+00	1.25E+01	2.51E+01	2.2500	2.216E+07
Fe-55	2.4933E-05	7,122.705	14,245.411	0.00E+00	1.78E-01	3.55E-01	2.7500	2.226E+07
H-3	1.9945E-03	7,122.705	14,245.411	0.00E+00	1.42E+01	2.84E+01	3.5000	5.921E+05
I-129	6.6403E-07	7,122.705	14,245.411	0.00E+00	4.73E-03	9.46E-03	5.0000	2.515E+05
Kr-85	4.1002E-02	7,122.705	14,245.411	0.00E+00	2.92E+02	5.84E+02	7.0000	2.880E+04
Np-237	3.1610E-05	7,122.705	14,245.411	0.00E+00	2.25E-01	4.50E-01	11.0000	3.296E+03
Pa-231	1.8876E-09	7,122.705	14,245.411	0.00E+00	1.34E-05	2.69E-05		
Pb-210	8.3840E-11	7,122.705	14,245.411	0.00E+00	5.97E-07	1.19E-06		
Pm-147	4.6501E-04	7,122.705	14,245.411	0.00E+00	3.31E+00	6.62E+00		
Pu-238	1.3645E-01	7,122.705	14,245.411	0.00E+00	9.72E+02	1.94E+03		
Pu-239	6.9502E-04	7,122.705	14,245.411	0.00E+00	4.95E+00	9.90E+00		
Pu-240	3.8183E-04	7,122.705	14,245.411	0.00E+00	2.72E+00	5.44E+00		
Pu-241	6.5310E-02	7,122.705	14,245.411	0.00E+00	4.65E+02	9.30E+02		
Pu-242	3.0911E-06	7,122.705	14,245.411	0.00E+00	2.20E-02	4.40E-02		
Ra-226	2.3512E-10	7,122.705	14,245.411	0.00E+00	1.67E-06	3.35E-06		
Ra-228	3.3366E-14	7,122.705	14,245.411	0.00E+00	2.38E-10	4.75E-10		
Ru-106	2.4490E-10	7,122.705	14,245.411	0.00E+00	1.74E-06	3.49E-06		
Se-79	1.2333E-05	7,122.705	14,245.411	0.00E+00	8.78E-02	1.76E-01		
Sn-126	1.0194E-05	7,122.705	14,245.411	0.00E+00	7.26E-02	1.45E-01		
Sr-90	1.3348E-04	7,122.705	14,245.411	0.00E+00	9.51E+03	1.90E+04		
Tc-99	3.8056E+00	7,122.705	14,245.411	0.00E+00	2.71E+00	5.42E+00		
Th-229	1.7868E-11	7,122.705	14,245.411	0.00E+00	1.27E-07	2.55E-07		
Th-230	2.3348E-08	7,122.705	14,245.411	0.00E+00	1.66E-04	3.33E-04		
Th-232	4.1288E-14	7,122.705	14,245.411	0.00E+00	2.94E-10	5.88E-10		
Ti-208	4.3190E-08	7,122.705	14,245.411	0.00E+00	3.08E-04	6.15E-04		
U-232	1.1707E-07	7,122.705	14,245.411	0.00E+00	8.34E-04	1.67E-03		
U-233	7.2175E-09	7,122.705	14,245.411	0.00E+00	5.14E-05	1.03E-04		
U-234	6.1543E-05	7,122.705	14,245.411	0.00E+00	4.38E-01	8.77E-01		
U-235	-2.8661E-06	7,122.705	0.000	6.82E-02	4.78E-02	6.82E-02		
U-236	1.6701E-05	7,122.705	14,245.411	0.00E+00	1.19E-01	2.38E-01	1.50E+02	3.00E+02
U-238	-9.4194E-09	7,122.705	0.000	1.30E-02	1.29E-02	1.30E-02	Total	Total
Y-90	1.3348E+00	7,122.705	14,245.411	0.00E+00	9.51E+03	1.90E+04		
Other Radionuclides					9.83E+03	1.97E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.50E+02	3.00E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	44.93930164	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		7,122.705	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		14,245.411	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.23		1.00
Bounding:	0.46		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN) ¹Fuel decay start date: 1989
 SNF ID #: 606 Estimates as of: 2030
 Fuel Units & Descr: 34 - 17 FLAT PLATES Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
 Heavy Metal Mass: BOL=6.94kg ; EOL=5.22kg ²Template Burnup(MWd): 164.6
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.94

II. Estimates		m	x _n	x _b	b	y _n	y _b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)	
Ac-227	9.5869E-10	1,584.666	3,169.331	0.00E+00	1.52E-06	3.04E-06	Avg. MeV		
Am-241	1.0109E-02	1,584.666	3,169.331	0.00E+00	1.60E+01	3.20E+01	0.0150	2.341E+14	
Am-242m	1.2789E-06	1,584.666	3,169.331	0.00E+00	2.03E-03	4.05E-03	0.0250	4.810E+13	
Am-243	3.7047E-05	1,584.666	3,169.331	0.00E+00	5.87E-02	1.17E-01	0.0375	4.216E+13	
C-14	2.6416E-08	1,584.666	3,169.331	0.00E+00	4.19E-05	8.37E-05	0.0575	4.536E+13	
Cf-252	4.4441E-31	1,584.666	3,169.331	0.00E+00	7.04E-28	1.41E-27	0.0850	2.714E+13	
Cm-243	3.9605E-06	1,584.666	3,169.331	0.00E+00	6.28E-03	1.26E-02	0.1250	1.830E+13	
Cm-244	2.6227E-03	1,584.666	3,169.331	0.00E+00	4.16E+00	8.31E+00	0.2250	2.345E+13	
Co-60	6.7740E-06	1,584.666	3,169.331	0.00E+00	1.07E-02	2.15E-02	0.3750	1.018E+13	
Cs-134	6.8894E-05	1,584.666	3,169.331	0.00E+00	1.09E-01	2.18E-01	0.5750	1.700E+14	
Cs-135	4.2564E-06	1,584.666	3,169.331	0.00E+00	6.74E-03	1.35E-02	0.8500	2.518E+12	
Cs-137	1.4399E+00	1,584.666	3,169.331	0.00E+00	2.28E+03	4.56E+03	1.2500	1.505E+12	
Eu-154	1.5522E-02	1,584.666	3,169.331	0.00E+00	2.46E+01	4.92E+01	1.7500	7.119E+10	
Eu-155	1.7588E-03	1,584.666	3,169.331	0.00E+00	2.79E+00	5.57E+00	2.2500	4.929E+06	
Fe-55	2.4933E-05	1,584.666	3,169.331	0.00E+00	3.95E-02	7.90E-02	2.7500	4.953E+06	
H-3	1.9945E-03	1,584.666	3,169.331	0.00E+00	3.16E+00	6.32E+00	3.5000	1.317E+05	
I-129	6.6403E-07	1,584.666	3,169.331	0.00E+00	1.05E-03	2.10E-03	5.0000	5.596E+04	
Kr-85	4.1002E-02	1,584.666	3,169.331	0.00E+00	6.50E+01	1.30E+02	7.0000	6.407E+03	
Np-237	3.1610E-05	1,584.666	3,169.331	0.00E+00	5.01E-02	1.00E-01	11.0000	7.332E+02	
Pa-231	1.8876E-09	1,584.666	3,169.331	0.00E+00	2.99E-06	5.98E-06			
Pb-210	8.3840E-11	1,584.666	3,169.331	0.00E+00	1.33E-07	2.66E-07			
Pm-147	4.6501E-04	1,584.666	3,169.331	0.00E+00	7.37E-01	1.47E+00			
Pu-238	1.3645E-01	1,584.666	3,169.331	0.00E+00	2.16E+02	4.32E+02			
Pu-239	6.9502E-04	1,584.666	3,169.331	0.00E+00	1.10E+00	2.20E+00			
Pu-240	3.8183E-04	1,584.666	3,169.331	0.00E+00	6.05E-01	1.21E+00			
Pu-241	6.5310E-02	1,584.666	3,169.331	0.00E+00	1.03E+02	2.07E+02			
Pu-242	3.0911E-06	1,584.666	3,169.331	0.00E+00	4.90E-03	9.80E-03			
Ra-226	2.3512E-10	1,584.666	3,169.331	0.00E+00	3.73E-07	7.45E-07			
Ra-228	3.3366E-14	1,584.666	3,169.331	0.00E+00	5.29E-11	1.06E-10			
Ru-106	2.4490E-10	1,584.666	3,169.331	0.00E+00	3.88E-07	7.76E-07			
Se-79	1.2333E-05	1,584.666	3,169.331	0.00E+00	1.95E-02	3.91E-02			
Sn-126	1.0194E-05	1,584.666	3,169.331	0.00E+00	1.62E-02	3.23E-02			
Sr-90	1.3348E+00	1,584.666	3,169.331	0.00E+00	2.12E+03	4.23E+03			
Tc-99	3.8058E-04	1,584.666	3,169.331	0.00E+00	6.03E-01	1.21E+00			
Th-229	1.7868E-11	1,584.666	3,169.331	0.00E+00	2.83E-08	5.66E-08			
Th-230	2.3348E-08	1,584.666	3,169.331	0.00E+00	3.70E-05	7.40E-05			
Th-232	4.1288E-14	1,584.666	3,169.331	0.00E+00	6.54E-11	1.31E-10			
Ti-208	4.3190E-08	1,584.666	3,169.331	0.00E+00	6.84E-05	1.37E-04			
U-232	1.1707E-07	1,584.666	3,169.331	0.00E+00	1.86E-04	3.71E-04			
U-233	7.2175E-09	1,584.666	3,169.331	0.00E+00	1.14E-05	2.29E-05			
U-234	6.1543E-05	1,584.666	3,169.331	0.00E+00	9.75E-02	1.95E-01			
U-235	-2.8661E-06	1,584.666	0.000	1.40E-02	9.41E-03	1.40E-02			
U-236	1.6701E-05	1,584.666	3,169.331	0.00E+00	2.65E-02	5.29E-02			
U-238	-9.4194E-09	1,584.666	0.000	1.63E-04	1.48E-04	1.63E-04			
Y-90	1.3348E+00	1,584.666	3,169.331	0.00E+00	2.12E+03	4.23E+03			
Other Radionuclides					2.19E+03	4.37E+03			

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.34E+01	6.68E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.01903552	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,584.666	
Bounding:		3,169.331	

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

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN) ¹Fuel decay start date: 1989
 SNF ID #: 1070 Estimates as of: 2030
 Fuel Units & Descr: 11 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=1.96kg ; EOL=1.62kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.31

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	323.975	647.951	0.00E+00	6.50E-07	1.30E-06	0.0150	4.772E+13
Am-241	2.5251E-03	323.975	647.951	0.00E+00	8.18E-01	1.64E+00	0.0250	9.910E+12
Am-242m	3.9624E-07	323.975	647.951	0.00E+00	1.28E-04	2.57E-04	0.0375	8.614E+12
Am-243	1.4880E-06	323.975	647.951	0.00E+00	4.82E-04	9.64E-04	0.0575	9.271E+12
C-14	5.7053E-09	323.975	647.951	0.00E+00	1.85E-06	3.70E-06	0.0850	5.586E+12
Cl-36	1.3124E-32	323.975	647.951	0.00E+00	4.25E-30	8.50E-30	0.1250	3.690E+12
Cm-243	1.1419E-07	323.975	647.951	0.00E+00	3.70E-05	7.40E-05	0.2250	4.823E+12
Cm-244	1.6522E-05	323.975	647.951	0.00E+00	5.35E-03	1.07E-02	0.3750	2.098E+12
Co-60	7.4047E-07	323.975	647.951	0.00E+00	2.40E-04	4.80E-04	0.5750	3.467E+12
Cs-134	2.0455E-05	323.975	647.951	0.00E+00	6.63E-03	1.33E-02	0.8500	4.235E+11
Cs-135	3.4477E-06	323.975	647.951	0.00E+00	1.12E-03	2.23E-03	1.2500	2.049E+11
Cs-137	1.4365E+00	323.975	647.951	0.00E+00	4.65E+02	9.31E+02	1.7500	1.153E+10
Eu-154	7.3230E-03	323.975	647.951	0.00E+00	2.37E+00	4.74E+00	2.2500	9.643E+05
Eu-155	5.9259E-04	323.975	647.951	0.00E+00	1.92E-01	3.84E-01	2.7500	9.200E+05
Fe-55	2.2791E-06	323.975	647.951	0.00E+00	7.38E-04	1.48E-03	3.5000	5.332E+02
H-3	1.9698E-03	323.975	647.951	0.00E+00	6.38E-01	1.28E+00	5.0000	2.179E+02
I-129	7.5300E-07	323.975	647.951	0.00E+00	2.44E-04	4.88E-04	7.0000	2.385E+01
Kr-85	4.1176E-02	323.975	647.951	0.00E+00	1.33E+01	2.67E+01	11.0000	2.659E+00
Np-237	9.5752E-06	323.975	647.951	0.00E+00	3.10E-03	6.20E-03		
Pa-231	3.9379E-09	323.975	647.951	0.00E+00	1.28E-06	2.56E-06		
Pb-210	3.3115E-10	323.975	647.951	0.00E+00	1.07E-07	2.15E-07		
Pm-147	9.2402E-04	323.975	647.951	0.00E+00	2.99E-01	5.99E-01		
Pu-238	1.6217E-02	323.975	647.951	0.00E+00	5.25E+00	1.05E+01		
Pu-239	4.2810E-04	323.975	647.951	0.00E+00	1.39E-01	2.77E-01		
Pu-240	2.4333E-04	323.975	647.951	0.00E+00	7.88E-02	1.58E-01		
Pu-241	1.6242E-02	323.975	647.951	0.00E+00	5.26E+00	1.05E+01		
Pu-242	3.6329E-07	323.975	647.951	0.00E+00	1.18E-04	2.35E-04		
Ra-226	9.0114E-10	323.975	647.951	0.00E+00	2.92E-07	5.84E-07		
Ra-228	3.1019E-14	323.975	647.951	0.00E+00	1.00E-11	2.01E-11		
Ru-106	2.1225E-10	323.975	647.951	0.00E+00	6.88E-08	1.38E-07		
Se-79	1.2930E-05	323.975	647.951	0.00E+00	4.19E-03	8.38E-03		
Sn-126	1.1571E-05	323.975	647.951	0.00E+00	3.75E-03	7.50E-03		
Sr-90	1.3472E+00	323.975	647.951	0.00E+00	4.36E+02	8.73E+02		
Tc-99	4.2239E-04	323.975	647.951	0.00E+00	1.37E-01	2.74E-01		
Th-229	1.2407E-11	323.975	647.951	0.00E+00	4.02E-09	8.04E-09		
Th-230	8.3497E-08	323.975	647.951	0.00E+00	2.71E-05	5.41E-05		
Th-232	3.8371E-14	323.975	647.951	0.00E+00	1.24E-11	2.49E-11		
Tl-208	4.0414E-08	323.975	647.951	0.00E+00	1.31E-05	2.62E-05		
U-232	1.0948E-07	323.975	647.951	0.00E+00	3.55E-05	7.09E-05		
U-233	3.6275E-09	323.975	647.951	0.00E+00	1.18E-06	2.35E-06		
U-234	1.8562E-04	323.975	647.951	0.00E+00	6.01E-02	1.20E-01		
U-235	-2.7235E-06	323.975	0.000	3.95E-03	3.07E-03	3.95E-03		
U-236	1.5493E-05	323.975	647.951	0.00E+00	5.02E-03	1.00E-02		
U-238	-4.2851E-09	323.975	0.000	4.60E-05	4.46E-05	4.60E-05		
Y-90	1.3475E+00	323.975	647.951	0.00E+00	4.37E+02	8.73E+02		
Other Radionuclides					4.43E+02	8.87E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.42E+00	1.08E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.03204799	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		323.975	
Bounding:		647.951	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.52		
Bounding:	1.05		

Estimated EOL HM/Given EOL HM: 1.01

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN)
 SNF ID #: 1071
 Fuel Units & Desc: 47 - ASSEMBLY
 Heavy Metal Mass: BOL=47.00kg ; EOL=44.65kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1989
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 1.96

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.0068E-09	2,221.045	4,442.089	0.00E+00	4.46E-06	8.91E-06	0.0150	3.272E+14
Am-241	2.5251E-03	2,221.045	4,442.089	0.00E+00	5.61E+00	1.12E+01	0.0250	6.794E+13
Am-242m	3.9624E-07	2,221.045	4,442.089	0.00E+00	8.80E-04	1.76E-03	0.0375	5.905E+13
Am-243	1.4880E-06	2,221.045	4,442.089	0.00E+00	3.30E-03	6.61E-03	0.0575	6.356E+13
C-14	5.7053E-09	2,221.045	4,442.089	0.00E+00	1.27E-05	2.53E-05	0.0850	3.830E+13
Cl-36	1.3124E-32	2,221.045	4,442.089	0.00E+00	2.91E-29	5.83E-29	0.1250	2.529E+13
Cm-243	1.1419E-07	2,221.045	4,442.089	0.00E+00	2.54E-04	5.07E-04	0.2250	3.306E+13
Cm-244	1.6522E-05	2,221.045	4,442.089	0.00E+00	3.67E-02	7.34E-02	0.3750	1.438E+13
Co-60	7.4047E-07	2,221.045	4,442.089	0.00E+00	1.64E-03	3.29E-03	0.5750	2.377E+14
Cs-134	2.0455E-05	2,221.045	4,442.089	0.00E+00	4.54E-02	9.09E-02	0.8500	2.904E+12
Cs-135	3.4477E-06	2,221.045	4,442.089	0.00E+00	7.66E-03	1.53E-02	1.2500	1.404E+12
Cs-137	1.4365E+00	2,221.045	4,442.089	0.00E+00	3.19E+03	6.38E+03	1.7500	7.906E+10
Eu-154	7.3230E-03	2,221.045	4,442.089	0.00E+00	1.63E+01	3.25E+01	2.2500	6.611E+06
Eu-155	5.9259E-04	2,221.045	4,442.089	0.00E+00	1.32E+00	2.63E+00	2.7500	6.307E+06
Fe-55	2.2791E-06	2,221.045	4,442.089	0.00E+00	5.06E-03	1.01E-02	3.5000	3.721E+03
H-3	1.9698E-03	2,221.045	4,442.089	0.00E+00	4.37E+00	8.75E+00	5.0000	1.522E+03
I-129	7.5300E-07	2,221.045	4,442.089	0.00E+00	1.67E-03	3.34E-03	7.0000	1.667E+02
Kr-85	4.1176E-02	2,221.045	4,442.089	0.00E+00	9.15E+01	1.83E+02	11.0000	1.860E-01
Np-237	9.5752E-06	2,221.045	4,442.089	0.00E+00	2.13E-02	4.25E-02		
Pa-231	3.9379E-09	2,221.045	4,442.089	0.00E+00	8.75E-06	1.75E-05		
Pb-210	3.3115E-10	2,221.045	4,442.089	0.00E+00	7.36E-07	1.47E-06		
Pm-147	9.2402E-04	2,221.045	4,442.089	0.00E+00	2.05E+00	4.10E+00		
Pu-238	1.6217E-02	2,221.045	4,442.089	0.00E+00	3.60E+01	7.20E+01		
Pu-239	4.2810E-04	2,221.045	4,442.089	0.00E+00	9.51E-01	1.90E+00		
Pu-240	2.4333E-04	2,221.045	4,442.089	0.00E+00	5.40E-01	1.08E+00		
Pu-241	1.6242E-02	2,221.045	4,442.089	0.00E+00	3.61E+01	7.21E+01		
Pu-242	3.6329E-07	2,221.045	4,442.089	0.00E+00	8.07E-04	1.61E-03		
Ra-226	9.0114E-10	2,221.045	4,442.089	0.00E+00	2.00E-06	4.00E-06		
Ra-228	3.1019E-14	2,221.045	4,442.089	0.00E+00	6.89E-11	1.38E-10		
Ru-106	2.1225E-10	2,221.045	4,442.089	0.00E+00	4.71E-07	9.43E-07		
Se-79	1.2930E-05	2,221.045	4,442.089	0.00E+00	2.87E-02	5.74E-02		
Sn-126	1.1571E-05	2,221.045	4,442.089	0.00E+00	2.57E-02	5.14E-02		
Sr-90	1.3472E+00	2,221.045	4,442.089	0.00E+00	2.99E+03	5.98E+03		
Tc-99	4.2239E-04	2,221.045	4,442.089	0.00E+00	9.38E-01	1.88E+00		
Th-229	1.2407E-11	2,221.045	4,442.089	0.00E+00	2.76E-08	5.51E-08		
Th-230	8.3497E-08	2,221.045	4,442.089	0.00E+00	1.85E-04	3.71E-04		
Th-232	3.8371E-14	2,221.045	4,442.089	0.00E+00	8.52E-11	1.70E-10		
Tl-208	4.0414E-08	2,221.045	4,442.089	0.00E+00	8.98E-05	1.80E-04		
U-232	1.0948E-07	2,221.045	4,442.089	0.00E+00	2.43E-04	4.86E-04		
U-233	3.6275E-09	2,221.045	4,442.089	0.00E+00	8.06E-06	1.61E-05		
U-234	1.8562E-04	2,221.045	4,442.089	0.00E+00	4.12E-01	8.25E-01		
U-235	-2.7235E-06	2,221.045	0.000	2.03E-02	1.43E-02	2.03E-02		
U-236	1.5493E-05	2,221.045	4,442.089	0.00E+00	3.44E-02	6.88E-02		
U-238	-4.2851E-09	2,221.045	0.000	1.26E-02	1.26E-02	1.26E-02		
Y-90	1.3475E+00	2,221.045	4,442.089	0.00E+00	2.99E+03	5.99E+03		
Other Radionuclides					3.04E+03	6.08E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.72E+01	7.43E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	USSI2	U	
	20	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,221.045	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		4,442.089	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.15		1.00
Bounding:	0.30		

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN) 1Fuel decay start date: 1989
 SNF ID #: 505 Estimates as of: 2030
 Fuel Units & Descr: 43 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=7.68kg ; EOL=6.34kg 2Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 1.19

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.0068E-09	1,266.449	2,532.898	0.00E+00	2.54E-06	5.08E-06	0.0150	1.865E+14
Am-241	2.5251E-03	1,266.449	2,532.898	0.00E+00	3.20E+00	6.40E+00	0.0250	3.874E+13
Am-242m	3.9624E-07	1,266.449	2,532.898	0.00E+00	5.02E-04	1.00E-03	0.0375	3.367E+13
Am-243	1.4880E-06	1,266.449	2,532.898	0.00E+00	1.88E-03	3.77E-03	0.0575	3.624E+13
C-14	5.7053E-09	1,266.449	2,532.898	0.00E+00	7.23E-06	1.45E-05	0.0850	2.184E+13
Cl-36	1.3124E-32	1,266.449	2,532.898	0.00E+00	1.66E-29	3.32E-29	0.1250	1.442E+13
Cm-243	1.1419E-07	1,266.449	2,532.898	0.00E+00	1.45E-04	2.89E-04	0.2250	1.895E+13
Cm-244	1.6522E-05	1,266.449	2,532.898	0.00E+00	2.09E-02	4.18E-02	0.3750	8.201E+12
Co-60	7.4047E-07	1,266.449	2,532.898	0.00E+00	9.38E-04	1.88E-03	0.5750	1.355E+14
Cs-134	2.0455E-05	1,266.449	2,532.898	0.00E+00	2.59E-02	5.18E-02	0.8500	1.656E+12
Cs-135	3.4477E-06	1,266.449	2,532.898	0.00E+00	4.37E-03	8.73E-03	1.2500	8.008E+11
Cs-137	1.4365E+00	1,266.449	2,532.898	0.00E+00	1.82E+03	3.64E+03	1.7500	4.508E+10
Eu-154	7.3230E-03	1,266.449	2,532.898	0.00E+00	9.27E+00	1.85E+01	2.2500	3.770E+06
Eu-155	5.9259E-04	1,266.449	2,532.898	0.00E+00	7.50E-01	1.50E+00	2.7500	3.596E+06
Fe-55	2.2791E-06	1,266.449	2,532.898	0.00E+00	2.89E-03	5.77E-03	3.5000	2.094E+03
H-3	1.9698E-03	1,266.449	2,532.898	0.00E+00	2.49E+00	4.99E+00	5.0000	8.517E+02
I-129	7.5300E-07	1,266.449	2,532.898	0.00E+00	9.54E-04	1.91E-03	7.0000	9.322E+01
Kr-85	4.1176E-02	1,266.449	2,532.898	0.00E+00	5.21E+01	1.04E+02	11.0000	1.039E+01
Np-237	9.5752E-06	1,266.449	2,532.898	0.00E+00	1.21E-02	2.43E-02		
Pa-231	3.9379E-09	1,266.449	2,532.898	0.00E+00	4.99E-06	9.97E-06		
Pb-210	3.3115E-10	1,266.449	2,532.898	0.00E+00	4.19E-07	8.39E-07		
Pm-147	9.2402E-04	1,266.449	2,532.898	0.00E+00	1.17E+00	2.34E+00		
Pu-238	1.6217E-02	1,266.449	2,532.898	0.00E+00	2.05E+01	4.11E+01		
Pu-239	4.2810E-04	1,266.449	2,532.898	0.00E+00	5.42E-01	1.08E+00		
Pu-240	2.4333E-04	1,266.449	2,532.898	0.00E+00	3.08E-01	6.16E-01		
Pu-241	1.6242E-02	1,266.449	2,532.898	0.00E+00	2.06E+01	4.11E+01		
Pu-242	3.6329E-07	1,266.449	2,532.898	0.00E+00	4.60E-04	9.20E-04		
Ra-226	9.0114E-10	1,266.449	2,532.898	0.00E+00	1.14E-06	2.28E-06		
Ra-228	3.1019E-14	1,266.449	2,532.898	0.00E+00	3.93E-11	7.86E-11		
Ru-106	2.1225E-10	1,266.449	2,532.898	0.00E+00	2.69E-07	5.38E-07		
Se-79	1.2930E-05	1,266.449	2,532.898	0.00E+00	1.64E-02	3.28E-02		
Sn-126	1.1571E-05	1,266.449	2,532.898	0.00E+00	1.47E-02	2.93E-02		
Sr-90	1.3472E+00	1,266.449	2,532.898	0.00E+00	1.71E+03	3.41E+03		
Tc-99	4.2239E-04	1,266.449	2,532.898	0.00E+00	5.35E-01	1.07E+00		
Th-229	1.2407E-11	1,266.449	2,532.898	0.00E+00	1.57E-08	3.14E-08		
Th-230	8.3497E-08	1,266.449	2,532.898	0.00E+00	1.06E-04	2.11E-04		
Th-232	3.8371E-14	1,266.449	2,532.898	0.00E+00	4.86E-11	9.72E-11		
Tl-208	4.0414E-08	1,266.449	2,532.898	0.00E+00	5.12E-05	1.02E-04		
U-232	1.0948E-07	1,266.449	2,532.898	0.00E+00	1.39E-04	2.77E-04		
U-233	3.6275E-09	1,266.449	2,532.898	0.00E+00	4.59E-06	9.19E-06		
U-234	1.8562E-04	1,266.449	2,532.898	0.00E+00	2.35E-01	4.70E-01		
U-235	2.7235E-06	1,266.449	0.000	1.54E-02	1.20E-02	1.54E-02		
U-236	1.5493E-05	1,266.449	2,532.898	0.00E+00	1.96E-02	3.92E-02		
U-238	4.2851E-09	1,266.449	0.000	1.80E-04	1.74E-04	1.80E-04		
Y-90	1.3475E+00	1,266.449	2,532.898	0.00E+00	1.71E+03	3.41E+03		
Other Radionuclides					1.73E+03	3.47E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.12E+01	4.24E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.03204799	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,266.449	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		2,532.898	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.52		1.01
Bounding:	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: KEMA
 SNF ID #: 861
 Fuel Units & Descr: 14 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=243.78kg ; EOL=243.76kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1979
 Estimates as of: 2030
 Template: LWBR (Light Water, Zirc. 60 to 100%, Th and U)
²Template Burnup(MWd): 10269.14
 Template BOL Heavy Metal Mass (MT): 0.45991251
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 1.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.0595E-04	27.249	54.497	0.00E+00	2.89E-03	5.77E-03	0.0150	3.414E+12
Am-241	2.4968E-04	27.249	54.497	0.00E+00	6.80E-03	1.36E-02	0.0250	6.486E+11
Am-242m	1.3847E-06	27.249	54.497	0.00E+00	3.77E-05	7.55E-05	0.0375	5.568E+11
Am-243	3.1103E-07	27.249	54.497	0.00E+00	8.48E-06	1.70E-05	0.0575	6.058E+11
C-14	9.2267E-05	27.249	54.497	0.00E+00	2.51E-03	5.03E-03	0.0850	3.929E+11
Ci-36	1.8103E-06	27.249	54.497	0.00E+00	4.93E-05	9.87E-05	0.1250	2.406E+11
Cm-243	2.1248E-07	27.249	54.497	0.00E+00	5.79E-06	1.16E-05	0.2250	3.550E+11
Cm-244	7.9666E-06	27.249	54.497	0.00E+00	2.17E-04	4.34E-04	0.3750	1.402E+12
Co-60	1.2143E-04	27.249	54.497	0.00E+00	3.31E-03	6.62E-03	0.5750	2.152E+12
Cs-134	1.6535E-07	27.249	54.497	0.00E+00	4.51E-06	9.01E-06	0.8500	3.701E+10
Cs-135	2.8639E-05	27.249	54.497	0.00E+00	7.80E-04	1.56E-03	1.2500	1.126E+10
Cs-137	1.049E+00	27.249	54.497	0.00E+00	2.85E+01	5.69E+01	1.7500	2.947E+09
Eu-154	2.5679E-03	27.249	54.497	0.00E+00	7.00E-02	1.40E-01	2.2500	6.715E+04
Eu-155	8.1175E-05	27.249	54.497	0.00E+00	2.21E-03	4.42E-03	2.7500	2.312E+10
Fe-55	4.2194E-08	27.249	54.497	0.00E+00	1.15E-06	2.30E-06	3.5000	6.434E+02
H-3	9.1673E-04	27.249	54.497	0.00E+00	2.50E-02	5.00E-02	5.0000	1.931E+02
I-129	1.5853E-06	27.249	54.497	0.00E+00	4.32E-05	8.64E-05	7.0000	1.271E+01
Kr-85	2.3741E-02	27.249	54.497	0.00E+00	6.47E-01	1.29E+00	11.0000	8.248E-01
Np-237	1.2747E-07	27.249	54.497	0.00E+00	3.47E-06	6.95E-06		
Pa-231	1.2007E-04	27.249	54.497	0.00E+00	3.27E-03	6.54E-03		
Pb-210	1.8424E-08	27.249	54.497	0.00E+00	5.02E-07	1.00E-06		
Pm-147	4.9829E-06	27.249	54.497	0.00E+00	1.36E-04	2.72E-04		
Pu-238	3.7744E-04	27.249	54.497	0.00E+00	1.03E-02	2.06E-02		
Pu-239	2.7510E-05	27.249	54.497	0.00E+00	7.50E-04	1.50E-03		
Pu-240	1.6175E-05	27.249	54.497	0.00E+00	4.41E-04	8.81E-04		
Pu-241	7.1379E-04	27.249	54.497	0.00E+00	1.94E-02	3.89E-02		
Pu-242	4.0831E-08	27.249	54.497	0.00E+00	1.11E-06	2.23E-06		
Ra-226	2.9038E-08	27.249	54.497	0.00E+00	7.91E-07	1.58E-06		
Ra-228	4.6352E-06	27.249	54.497	0.00E+00	1.26E-04	2.53E-04		
Ru-106	1.3321E-15	27.249	54.497	0.00E+00	3.63E-14	7.26E-14		
Se-79	3.5407E-05	27.249	54.497	0.00E+00	9.65E-04	1.93E-03		
Sn-126	3.9838E-05	27.249	54.497	0.00E+00	1.09E-03	2.17E-03		
Sr-90	1.0449E+00	27.249	54.497	0.00E+00	2.85E+01	5.69E+01		
Tc-99	3.2525E-04	27.249	54.497	0.00E+00	8.86E-03	1.77E-02		
Th-229	8.2305E-05	27.249	54.497	0.00E+00	2.24E-03	4.49E-03		
Th-230	1.2533E-06	27.249	54.497	0.00E+00	3.41E-05	6.83E-05		
Th-232	-9.0328E-08	27.249	0.000	2.57E-02	2.57E-02	2.57E-02		
Tl-208	1.2085E-02	27.249	54.497	0.00E+00	3.29E-01	6.59E-01		
U-232	3.2729E-02	27.249	54.497	0.00E+00	8.92E-01	1.78E+00		
U-233	-3.3244E-03	27.249	0.000	8.66E+01	8.66E+01	8.66E+01		
U-234	8.1769E-04	27.249	54.497	0.00E+00	2.23E-02	4.46E-02		
U-235	5.7813E-08	27.249	54.497	1.77E-05	1.93E-05	2.09E-05		
U-236	1.3273E-07	27.249	54.497	0.00E+00	3.62E-06	7.23E-06		
U-238	-3.1121E-10	27.249	0.000	1.13E-05	1.13E-05	1.13E-05		
Y-90	1.0449E+00	27.249	54.497	0.00E+00	2.85E+01	5.69E+01		
Other Radionuclides					3.33E+01	6.67E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.07E+00	3.62E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except cladding.
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	NONE	ZIRC	
BOL HM Constituents:	ThO2-UO2	Th and U	
BOL Enrichment %:	89.89548858	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		27.249	
Bounding:		54.497	

Checks			Estimated EOL HM/Given EOL HM 1.00
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.01		
Bounding:	0.01		

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

²Total burnup for all fuel associated with this worksheet must be 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 (JAPAN) ¹Fuel decay start date: 2006
 SNF ID #: 601 Estimates as of: 2030
 Fuel Units & Descr: 240 - 18 CURVED PLATES Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=40.82kg ; EOL=33.48kg ²Template 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"
 6.67

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	6,954.910	13,909.821	0.00E+00	4.61E-06	9.22E-06		
Am-241	2.0060E-03	6,954.910	13,909.821	0.00E+00	1.40E+01	2.79E+01	0.0150	1.468E+15
Am-242m	4.2429E-07	6,954.910	13,909.821	0.00E+00	2.95E-03	5.90E-03	0.0250	3.053E+14
Am-243	1.4899E-06	6,954.910	13,909.821	0.00E+00	1.04E-02	2.07E-02	0.0375	2.663E+14
C-14	5.7135E-09	6,954.910	13,909.821	0.00E+00	3.97E-05	7.95E-05	0.0575	2.852E+14
Cl-36	1.3124E-32	6,954.910	13,909.821	0.00E+00	9.13E-29	1.83E-28	0.0850	1.724E+14
Cm-243	1.6443E-07	6,954.910	13,909.821	0.00E+00	1.14E-03	2.29E-03	0.1250	1.166E+14
Cm-244	2.9330E-05	6,954.910	13,909.821	0.00E+00	2.04E-01	4.08E-01	0.2250	1.487E+14
Co-60	5.3186E-06	6,954.910	13,909.821	0.00E+00	3.70E-02	7.40E-02	0.3750	6.474E+13
Cs-134	3.1563E-03	6,954.910	13,909.821	0.00E+00	2.20E+01	4.39E+01	0.5750	1.056E+15
Cs-135	3.4477E-06	6,954.910	13,909.821	0.00E+00	2.40E-02	4.80E-02	0.8500	1.785E+13
Cs-137	2.0313E+00	6,954.910	13,909.821	0.00E+00	1.41E+04	2.83E+04	1.2500	1.020E+13
Eu-154	2.4513E-02	6,954.910	13,909.821	0.00E+00	1.70E+02	3.41E+02	1.7500	4.680E+11
Eu-155	4.8175E-03	6,954.910	13,909.821	0.00E+00	3.35E+01	6.70E+01	2.2500	4.106E+07
Fe-55	1.2397E-04	6,954.910	13,909.821	0.00E+00	8.62E-01	1.72E+00	2.7500	2.320E+07
H-3	4.5697E-03	6,954.910	13,909.821	0.00E+00	3.18E+01	6.36E+01	3.5000	1.066E+05
I-129	7.5300E-07	6,954.910	13,909.821	0.00E+00	5.24E-03	1.05E-02	5.0000	6.028E+03
Kr-85	1.0850E-01	6,954.910	13,909.821	0.00E+00	7.55E+02	1.51E+03	7.0000	6.856E+02
Np-237	9.5561E-06	6,954.910	13,909.821	0.00E+00	6.65E-02	1.33E-01	11.0000	7.459E+01
Pa-231	2.0359E-09	6,954.910	13,909.821	0.00E+00	1.42E-05	2.83E-05		
Pb-210	4.9728E-11	6,954.910	13,909.821	0.00E+00	3.46E-07	6.92E-07		
Pm-147	4.8502E-02	6,954.910	13,909.821	0.00E+00	3.37E+02	6.75E+02		
Pu-238	1.8254E-02	6,954.910	13,909.821	0.00E+00	1.27E+02	2.54E+02		
Pu-239	4.2810E-04	6,954.910	13,909.821	0.00E+00	2.98E+00	5.95E+00		
Pu-240	2.4368E-04	6,954.910	13,909.821	0.00E+00	1.69E+00	3.39E+00		
Pu-241	3.3415E-02	6,954.910	13,909.821	0.00E+00	2.32E+02	4.65E+02		
Pu-242	3.6329E-07	6,954.910	13,909.821	0.00E+00	2.53E-03	5.05E-03		
Ra-226	2.2854E-10	6,954.910	13,909.821	0.00E+00	1.59E-06	3.18E-06		
Ra-228	1.2426E-14	6,954.910	13,909.821	0.00E+00	8.64E-11	1.73E-10		
Ru-106	6.3589E-06	6,954.910	13,909.821	0.00E+00	4.42E-02	8.85E-02		
Se-79	1.2933E-05	6,954.910	13,909.821	0.00E+00	8.99E-02	1.80E-01		
Sn-126	1.1574E-05	6,954.910	13,909.821	0.00E+00	8.05E-02	1.61E-01		
Sr-90	1.9248E+00	6,954.910	13,909.821	0.00E+00	1.34E+04	2.68E+04		
Tc-99	4.2239E+04	6,954.910	13,909.821	0.00E+00	2.94E+00	5.88E+00		
Th-229	5.0953E-12	6,954.910	13,909.821	0.00E+00	3.54E-08	7.09E-08		
Th-230	4.1885E-08	6,954.910	13,909.821	0.00E+00	2.91E-04	5.83E-04		
Th-232	1.9270E-14	6,954.910	13,909.821	0.00E+00	1.34E-10	2.68E-10		
Tl-208	4.6024E-08	6,954.910	13,909.821	0.00E+00	3.20E-04	6.40E-04		
U-232	1.2582E-07	6,954.910	13,909.821	0.00E+00	8.75E-04	1.75E-03		
U-233	2.5825E-09	6,954.910	13,909.821	0.00E+00	1.80E-05	3.59E-05		
U-234	1.8450E-04	6,954.910	13,909.821	0.00E+00	1.28E+00	2.57E+00		
U-235	-2.7235E-06	6,954.910	0.000	8.22E-02	6.33E-02	8.22E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.5493E-05	6,954.910	13,909.821	0.00E+00	1.08E-01	2.16E-01	1.66E+02	3.32E+02
U-238	-4.2851E-09	6,954.910	0.000	9.36E-04	9.07E-04	9.36E-04	Total	Total
Y-90	1.9254E+00	6,954.910	13,909.821	0.00E+00	1.34E+04	2.68E+04		
Other Radionuclides					1.35E+04	2.69E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.1749132	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		6,954.910	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		13,909.821	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.54	
Bounding:	1.08	
		Estimated EOL HM/Given EOL HM
		1.01

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: LOFT CENTER FUEL MODULE (A1,A2,A3,F1) ¹Fuel decay start date: 1975
 SNF ID #: 127 Estimates as of: 2030
 Fuel Units & Descr: 4 - 15 X 15 ROD ARRAY Template: PWR (Light Water, Zirc, 0 to 5%, U)
 Heavy Metal Mass: BOL=814.00kg ; EOL=813.29kg ²Template 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"x10"
 4.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.0733E-09	803.419	1,358.721	0.00E+00	8.62E-07	1.46E-06	Avg. MeV	
Am-241	1.4751E-01	803.419	1,358.721	0.00E+00	1.19E+02	2.00E+02	0.0150	5.170E+13
Am-242m	2.6809E-04	803.419	1,358.721	0.00E+00	2.15E-01	3.64E-01	0.0250	1.036E+13
Am-243	6.2484E-04	803.419	1,358.721	0.00E+00	5.02E-01	8.49E-01	0.0375	9.763E+12
C-14	4.7820E-05	803.419	1,358.721	0.00E+00	3.84E-02	6.50E-02	0.0575	1.222E+13
Cl-36	8.0297E-07	803.419	1,358.721	0.00E+00	6.45E-04	1.09E-03	0.0850	5.708E+12
Cm-243	1.7426E-04	803.419	1,358.721	0.00E+00	1.40E-01	2.37E-01	0.1250	3.798E+12
Cm-244	2.7616E-02	803.419	1,358.721	0.00E+00	2.22E+01	3.75E+01	0.2250	4.875E+12
Co-60	3.5610E-04	803.419	1,358.721	0.00E+00	2.86E-01	4.84E-01	0.3750	2.105E+12
Cs-134	2.6260E-07	803.419	1,358.721	0.00E+00	2.11E-04	3.57E-04	0.5750	4.957E+13
Cs-135	1.4433E-05	803.419	1,358.721	0.00E+00	1.16E-02	1.96E-02	0.8500	4.840E+11
Cs-137	9.8870E-01	803.419	1,358.721	0.00E+00	7.94E+02	1.34E+03	1.2500	3.080E+11
Eu-154	6.0320E-03	803.419	1,358.721	0.00E+00	4.85E+00	8.20E+00	1.7500	1.354E+10
Eu-155	2.1770E-04	803.419	1,358.721	0.00E+00	1.75E-01	2.96E-01	2.2500	2.228E+06
Fe-55	7.9296E-07	803.419	1,358.721	0.00E+00	6.37E-04	1.08E-03	2.7500	7.844E+06
H-3	8.9486E-03	803.419	1,358.721	0.00E+00	7.19E+00	1.22E+01	3.5000	5.611E+05
I-129	9.8288E-07	803.419	1,358.721	0.00E+00	7.90E-04	1.34E-03	5.0000	2.397E+05
Kr-85	1.0707E-02	803.419	1,358.721	0.00E+00	8.60E+00	1.45E+01	7.0000	2.762E+04
Np-237	1.1927E-05	803.419	1,358.721	0.00E+00	9.58E-03	1.62E-02	11.0000	3.171E+03
Pa-231	1.4703E-09	803.419	1,358.721	0.00E+00	1.18E-06	2.00E-06		
Pb-210	1.6828E-10	803.419	1,358.721	0.00E+00	1.35E-07	2.29E-07		
Pm-147	6.9606E-06	803.419	1,358.721	0.00E+00	5.59E-03	9.46E-03		
Pu-238	6.6263E-02	803.419	1,358.721	0.00E+00	5.32E+01	9.00E+01		
Pu-239	1.1618E-02	803.419	1,358.721	0.00E+00	9.33E+00	1.58E+01		
Pu-240	1.5142E-02	803.419	1,358.721	0.00E+00	1.22E+01	2.06E+01		
Pu-241	4.3766E-01	803.419	1,358.721	0.00E+00	3.52E+02	5.95E+02		
Pu-242	6.4260E-05	803.419	1,358.721	0.00E+00	5.16E-02	8.73E-02		
Ra-226	3.8501E-10	803.419	1,358.721	0.00E+00	3.09E-07	5.23E-07		
Ra-228	5.2955E-12	803.419	1,358.721	0.00E+00	4.25E-09	7.20E-09		
Ru-106	2.0413E-14	803.419	1,358.721	0.00E+00	1.64E-11	2.77E-11		
Se-79	1.2376E-05	803.419	1,358.721	0.00E+00	9.94E-03	1.68E-02		
Sn-126	2.5210E-05	803.419	1,358.721	0.00E+00	2.03E-02	3.43E-02		
Sr-90	6.4163E-01	803.419	1,358.721	0.00E+00	5.16E+02	8.72E+02		
Tc-99	3.9357E-04	803.419	1,358.721	0.00E+00	3.16E-01	5.35E-01		
Th-229	1.5644E-10	803.419	1,358.721	0.00E+00	1.26E-07	2.13E-07		
Th-230	2.7972E-08	803.419	1,358.721	0.00E+00	2.25E-05	3.80E-05		
Th-232	5.3036E-12	803.419	1,358.721	0.00E+00	4.26E-09	7.21E-09		
Th-208	1.5136E-07	803.419	1,358.721	0.00E+00	1.22E-04	2.06E-04		
U-232	4.1005E-07	803.419	1,358.721	0.00E+00	3.29E-04	5.57E-04		
U-233	2.5856E-08	803.419	1,358.721	0.00E+00	2.08E-05	3.51E-05		
U-234	5.2665E-05	803.419	1,358.721	0.00E+00	4.23E-02	7.16E-02		
U-235	-1.4487E-06	803.419	0.000	7.12E-02	7.00E-02	7.12E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	7.5888E-06	803.419	1,358.721	0.00E+00	6.10E-03	1.03E-02	1.45E+01	2.46E+01
U-238	-2.6129E-07	803.419	0.000	2.63E-01	2.62E-01	2.63E-01	Total	Total
Y-90	6.4180E-01	803.419	1,358.721	0.00E+00	5.16E+02	8.72E+02		
Other Radionuclides					7.66E+02	1.29E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	4.046614577	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	803.419	679.361	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:	1,108.669	1,358.721	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.03	0.85	1.00
Bounding:	0.05	1.23	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: LOFT CENTER FUEL MODULE (FP-1) ¹Fuel decay start date: 1975
 SNF ID #: 1061 Estimates as of: 2030
 Fuel Units & Descr: 1 - 15 X 15 ROD ARRAY Template: PWR (Light Water, Zirc, 0 to 5%, U)
 Heavy Metal Mass: BOL=203.50kg ; EOL=203.32kg ²Template 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"x10"
0.50

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.0733E-09	200.855	339.680	0.00E+00	2.16E-07	3.65E-07	0.0150	1.293E+13
Am-241	1.4751E-01	200.855	339.680	0.00E+00	2.96E+01	5.01E+01	0.0250	2.590E+12
Am-242m	2.6809E-04	200.855	339.680	0.00E+00	5.38E-02	9.11E-02	0.0375	2.441E+12
Am-243	6.2484E-04	200.855	339.680	0.00E+00	1.26E-01	2.12E-01	0.0575	3.054E+12
C-14	4.7820E-05	200.855	339.680	0.00E+00	9.60E-03	1.62E-02	0.0850	1.427E+12
Cl-36	8.0297E-07	200.855	339.680	0.00E+00	1.61E-04	2.73E-04	0.1250	9.495E+11
Cm-243	1.7426E-04	200.855	339.680	0.00E+00	3.50E-02	5.92E-02	0.2250	1.219E+12
Cm-244	2.7616E-02	200.855	339.680	0.00E+00	5.55E+00	9.38E+00	0.3750	5.261E+11
Co-60	3.5610E-04	200.855	339.680	0.00E+00	7.15E-02	1.21E-01	0.5750	1.239E+13
Cs-134	2.6260E-07	200.855	339.680	0.00E+00	5.27E-05	8.92E-05	0.8500	1.210E+11
Cs-135	1.4433E-05	200.855	339.680	0.00E+00	2.90E-03	4.90E-03	1.2500	7.699E+10
Cs-137	9.8870E-01	200.855	339.680	0.00E+00	1.99E+02	3.36E+02	1.7500	3.386E+09
Eu-154	6.0320E-03	200.855	339.680	0.00E+00	1.21E+00	2.05E+00	2.2500	5.571E+05
Eu-155	2.1770E-04	200.855	339.680	0.00E+00	4.37E-02	7.39E-02	2.7500	1.961E+06
Fe-55	7.9296E-07	200.855	339.680	0.00E+00	1.59E-04	2.69E-04	3.5000	1.403E+05
H-3	8.9486E-03	200.855	339.680	0.00E+00	1.80E+00	3.04E+00	5.0000	5.994E+04
I-129	9.8288E-07	200.855	339.680	0.00E+00	1.97E-04	3.34E-04	7.0000	6.905E+03
Kr-85	1.0707E-02	200.855	339.680	0.00E+00	2.15E+00	3.64E+00	11.0000	7.928E+02
Np-237	1.1927E-05	200.855	339.680	0.00E+00	2.40E-03	4.05E-03		
Pa-231	1.4703E-09	200.855	339.680	0.00E+00	2.95E-07	4.99E-07		
Pb-210	1.6828E-10	200.855	339.680	0.00E+00	3.38E-08	5.72E-08		
Pm-147	6.9606E-06	200.855	339.680	0.00E+00	1.40E-03	2.36E-03		
Pu-238	6.6263E-02	200.855	339.680	0.00E+00	1.33E+01	2.25E+01		
Pu-239	1.1618E-02	200.855	339.680	0.00E+00	2.33E+00	3.95E+00		
Pu-240	1.5142E-02	200.855	339.680	0.00E+00	3.04E+00	5.14E+00		
Pu-241	4.3766E-01	200.855	339.680	0.00E+00	8.79E+01	1.49E+02		
Pu-242	6.4260E-05	200.855	339.680	0.00E+00	1.29E-02	2.18E-02		
Ra-226	3.8501E-10	200.855	339.680	0.00E+00	7.73E-08	1.31E-07		
Ra-228	5.2955E-12	200.855	339.680	0.00E+00	1.06E-09	1.80E-09		
Ru-106	2.0413E-14	200.855	339.680	0.00E+00	4.10E-12	6.93E-12		
Se-79	1.2376E-05	200.855	339.680	0.00E+00	2.49E-03	4.20E-03		
Sn-126	2.5210E-05	200.855	339.680	0.00E+00	5.06E-03	8.56E-03		
Sr-90	6.4163E-01	200.855	339.680	0.00E+00	1.29E+02	2.18E+02		
Tc-99	3.9357E-04	200.855	339.680	0.00E+00	7.91E-02	1.34E-01		
Th-229	1.5644E-10	200.855	339.680	0.00E+00	3.14E-08	5.31E-08		
Th-230	2.7972E-08	200.855	339.680	0.00E+00	5.62E-06	9.50E-06		
Th-232	5.3036E-12	200.855	339.680	0.00E+00	1.07E-09	1.80E-09		
Tl-208	1.5136E-07	200.855	339.680	0.00E+00	3.04E-05	5.14E-05		
U-232	4.1005E-07	200.855	339.680	0.00E+00	8.24E-05	1.39E-04		
U-233	2.5856E-08	200.855	339.680	0.00E+00	5.19E-06	8.78E-06		
U-234	5.2665E-05	200.855	339.680	0.00E+00	1.06E-02	1.79E-02		
U-235	-1.4487E-06	200.855	0.000	1.78E-02	1.75E-02	1.78E-02		
U-236	7.5888E-06	200.855	339.680	0.00E+00	1.52E-03	2.58E-03		
U-238	-2.6129E-07	200.855	0.000	6.56E-02	6.56E-02	6.56E-02		
Y-90	6.4180E-01	200.855	339.680	0.00E+00	1.29E+02	2.18E+02		
Other Radionuclides					1.91E+02	3.24E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.63E+00	6.15E+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-4	ZIRC
BOL HM Constituents:	UO2	U
BOL Enrichment %:	4.046614577	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:	200.855	169.840
Bounding:	277.167	339.680

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:	0.03	0.85
Bounding:	0.05	1.23

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: LOFT CENTER FUEL MODULE FP-2 REMAINS
 SNF ID #: 923
 Fuel Units & Descr: 10 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=99.95kg ; EOL=99.90kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1975
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 1.00

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.0733E-09	49.450	98.899	0.00E+00	5.31E-08	1.06E-07	0.0150	3.764E+12
Am-241	1.4751E-01	49.450	98.899	0.00E+00	7.29E+00	1.46E+01	0.0250	7.542E+11
Am-242m	2.6809E-04	49.450	98.899	0.00E+00	1.33E-02	2.65E-02	0.0375	7.107E+11
Am-243	6.2484E-04	49.450	98.899	0.00E+00	3.09E-02	6.18E-02	0.0575	8.892E+11
C-14	4.7820E-05	49.450	98.899	0.00E+00	2.36E-03	4.73E-03	0.0850	4.156E+11
Ci-36	8.0297E-07	49.450	98.899	0.00E+00	3.97E-05	7.94E-05	0.1250	2.765E+11
Cm-243	1.7426E-04	49.450	98.899	0.00E+00	8.62E-03	1.72E-02	0.2250	3.552E+11
Cm-244	2.7616E-02	49.450	98.899	0.00E+00	1.37E+00	2.73E+00	0.3750	1.532E+11
Co-60	3.5610E-04	49.450	98.899	0.00E+00	1.76E-02	3.52E-02	0.5750	3.608E+12
Cs-134	2.6260E-07	49.450	98.899	0.00E+00	1.30E-05	2.60E-05	0.8500	3.523E+10
Cs-135	1.4433E-05	49.450	98.899	0.00E+00	7.14E-04	1.43E-03	1.2500	2.242E+10
Cs-137	9.8870E-01	49.450	98.899	0.00E+00	4.89E+01	9.78E+01	1.7500	9.857E+08
Eu-154	6.0320E-03	49.450	98.899	0.00E+00	2.98E-01	5.97E-01	2.2500	1.623E+05
Eu-155	2.1770E-04	49.450	98.899	0.00E+00	1.08E-02	2.15E-02	2.7500	5.711E+05
Fe-55	7.9296E-07	49.450	98.899	0.00E+00	3.92E-05	7.84E-05	3.5000	4.090E+04
H-3	8.9486E-03	49.450	98.899	0.00E+00	4.43E-01	8.85E-01	5.0000	1.748E+04
I-129	9.8288E-07	49.450	98.899	0.00E+00	4.86E-05	9.72E-05	7.0000	2.013E+03
Kr-85	1.0707E-02	49.450	98.899	0.00E+00	5.29E-01	1.06E+00	11.0000	2.312E+02
Np-237	1.1927E-05	49.450	98.899	0.00E+00	5.90E-04	1.18E-03		
Pa-231	1.4703E-09	49.450	98.899	0.00E+00	7.27E-08	1.45E-07		
Pb-210	1.6828E-10	49.450	98.899	0.00E+00	8.32E-09	1.66E-08		
Pm-147	6.9606E-06	49.450	98.899	0.00E+00	3.44E-04	6.88E-04		
Pu-238	6.6263E-02	49.450	98.899	0.00E+00	3.28E+00	6.55E+00		
Pu-239	1.1618E-02	49.450	98.899	0.00E+00	5.75E-01	1.15E+00		
Pu-240	1.5142E-02	49.450	98.899	0.00E+00	7.49E-01	1.50E+00		
Pu-241	4.3766E-01	49.450	98.899	0.00E+00	2.16E+01	4.33E+01		
Pu-242	6.4260E-05	49.450	98.899	0.00E+00	3.18E-03	6.36E-03		
Ra-226	3.8501E-10	49.450	98.899	0.00E+00	1.90E-08	3.81E-08		
Ra-228	5.2955E-12	49.450	98.899	0.00E+00	2.62E-10	5.24E-10		
Ru-106	2.0413E-14	49.450	98.899	0.00E+00	1.01E-12	2.02E-12		
Se-79	1.2376E-05	49.450	98.899	0.00E+00	6.12E-04	1.22E-03		
Sn-126	2.5210E-05	49.450	98.899	0.00E+00	1.25E-03	2.49E-03		
Sr-90	6.4163E-01	49.450	98.899	0.00E+00	3.17E+01	6.35E+01		
Tc-99	3.9357E-04	49.450	98.899	0.00E+00	1.95E-02	3.89E-02		
Th-229	1.5644E-10	49.450	98.899	0.00E+00	7.74E-09	1.55E-08		
Th-230	2.7972E-08	49.450	98.899	0.00E+00	1.38E-06	2.77E-06		
Th-232	5.3036E-12	49.450	98.899	0.00E+00	2.62E-10	5.25E-10		
Ti-208	1.5136E-07	49.450	98.899	0.00E+00	7.48E-06	1.50E-05		
U-232	4.1005E-07	49.450	98.899	0.00E+00	2.03E-05	4.06E-05		
U-233	2.5856E-08	49.450	98.899	0.00E+00	1.28E-06	2.56E-06		
U-234	5.2665E-05	49.450	98.899	0.00E+00	2.60E-03	5.21E-03		
U-235	-1.4487E-06	49.450	0.000	2.10E-02	2.10E-02	2.10E-02		
U-236	7.5888E-06	49.450	98.899	0.00E+00	3.75E-04	7.51E-04		
U-238	-2.6129E-07	49.450	0.000	3.03E-02	3.03E-02	3.03E-02		
Y-90	6.4180E-01	49.450	98.899	0.00E+00	3.17E+01	6.35E+01		
Other Radionuclides					4.71E+01	9.42E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.96E-01	1.79E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches PWR Template on all but one parameter (enrichment) making PWR a reasonable match.
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	9.739772489	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	47.477	49.450	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		98.899	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.01	1.04	1.00
Bounding:	0.03		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: LOFT CORNER FUEL MODULE
 SNF ID #: 128
 Fuel Units & Descr: 4 - 11 X 11 ROD ARRAY
 Heavy Metal Mass: BOL=279.86kg ; EOL=279.05kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1975
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 2.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	1.0733E-09	780.261	1,560.522	0.00E+00	8.37E-07	1.67E-06	0.0150	5.938E+13
Am-241	1.4751E-01	780.261	1,560.522	0.00E+00	1.15E+02	2.30E+02	0.0250	1.190E+13
Am-242m	2.6809E-04	780.261	1,560.522	0.00E+00	2.09E-01	4.18E-01	0.0375	1.121E+13
Am-243	6.2484E-04	780.261	1,560.522	0.00E+00	4.88E-01	9.75E-01	0.0575	1.403E+13
C-14	4.7820E-05	780.261	1,560.522	0.00E+00	3.73E-02	7.46E-02	0.0850	6.556E+12
Cl-36	8.0297E-07	780.261	1,560.522	0.00E+00	6.27E-04	1.25E-03	0.1250	4.362E+12
Cm-243	1.7426E-04	780.261	1,560.522	0.00E+00	1.36E-01	2.72E-01	0.2250	5.588E+12
Cm-244	2.7616E-02	780.261	1,560.522	0.00E+00	2.15E+01	4.31E+01	0.3750	2.417E+12
Co-60	3.5610E-04	780.261	1,560.522	0.00E+00	2.78E-01	5.58E-01	0.5750	5.693E+13
Cs-134	2.6260E-07	780.261	1,560.522	0.00E+00	2.05E-04	4.10E-04	0.8500	5.558E+11
Cs-135	1.4433E-05	780.261	1,560.522	0.00E+00	1.13E-02	2.25E-02	1.2500	3.537E+11
Cs-137	9.8870E-01	780.261	1,560.522	0.00E+00	7.71E+02	1.54E+03	1.7500	1.555E+10
Eu-154	6.0320E-03	780.261	1,560.522	0.00E+00	4.71E+00	9.41E+00	2.2500	2.557E+06
Eu-155	2.1770E-04	780.261	1,560.522	0.00E+00	1.70E-01	3.40E-01	2.7500	9.008E+06
Fe-55	7.9296E-07	780.261	1,560.522	0.00E+00	6.19E-04	1.24E-03	3.5000	6.433E+05
H-3	8.9486E-03	780.261	1,560.522	0.00E+00	6.98E+00	1.40E+01	5.0000	2.749E+05
I-129	9.8288E-07	780.261	1,560.522	0.00E+00	7.67E-04	1.53E-03	7.0000	3.167E+04
Kr-85	1.0707E-02	780.261	1,560.522	0.00E+00	8.35E+00	1.67E+01	11.0000	3.636E+03
Np-237	1.1927E-05	780.261	1,560.522	0.00E+00	9.31E-03	1.86E-02		
Pb-210	1.4703E-09	780.261	1,560.522	0.00E+00	1.15E-06	2.29E-06		
Pb-210	1.6828E-10	780.261	1,560.522	0.00E+00	1.31E-07	2.63E-07		
Pm-147	6.9606E-06	780.261	1,560.522	0.00E+00	5.43E-03	1.09E-02		
Pu-238	6.6263E-02	780.261	1,560.522	0.00E+00	5.17E+01	1.03E+02		
Pu-239	1.1618E-02	780.261	1,560.522	0.00E+00	9.07E+00	1.81E+01		
Pu-240	1.5142E-02	780.261	1,560.522	0.00E+00	1.18E+01	2.36E+01		
Pu-241	4.3766E-01	780.261	1,560.522	0.00E+00	3.41E+02	6.83E+02		
Pu-242	6.4260E-05	780.261	1,560.522	0.00E+00	5.01E-02	1.00E-01		
Ra-226	3.8501E-10	780.261	1,560.522	0.00E+00	3.00E-07	6.01E-07		
Ra-228	5.2955E-12	780.261	1,560.522	0.00E+00	4.13E-09	8.26E-09		
Ru-106	2.0413E-14	780.261	1,560.522	0.00E+00	1.59E-11	3.19E-11		
Se-79	1.2376E-05	780.261	1,560.522	0.00E+00	9.66E-03	1.93E-02		
Sn-126	2.5210E-05	780.261	1,560.522	0.00E+00	1.97E-02	3.93E-02		
Sr-90	6.4163E-01	780.261	1,560.522	0.00E+00	5.01E+02	1.00E+03		
Tc-99	3.9357E-04	780.261	1,560.522	0.00E+00	3.07E-01	6.14E-01		
Th-229	1.5644E-10	780.261	1,560.522	0.00E+00	1.22E-07	2.44E-07		
Th-230	2.7972E-08	780.261	1,560.522	0.00E+00	2.18E-05	4.37E-05		
Th-232	5.3036E-12	780.261	1,560.522	0.00E+00	4.14E-09	8.28E-09		
Th-208	1.5136E-07	780.261	1,560.522	0.00E+00	1.18E-04	2.36E-04		
U-232	4.1005E-07	780.261	1,560.522	0.00E+00	3.20E-04	6.40E-04		
U-233	2.5856E-08	780.261	1,560.522	0.00E+00	2.02E-05	4.03E-05		
U-234	5.2665E-05	780.261	1,560.522	0.00E+00	4.11E-02	8.22E-02		
U-235	-1.4487E-06	780.261	0.000	2.42E-02	2.31E-02	2.42E-02		
U-236	7.5888E-06	780.261	1,560.522	0.00E+00	5.92E-03	1.18E-02		
U-238	-2.6129E-07	780.261	0.000	9.03E-02	9.01E-02	9.03E-02		
Y-90	6.4180E-01	780.261	1,560.522	0.00E+00	5.01E+02	1.00E+03		
Other Radionuclides					7.44E+02	1.49E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	4.000514536	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	780.261	771.413	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		1,560.522	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.08	0.99	
Bounding:	0.16		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: LOFT FUEL RODS
 SNF ID #: 924
 Fuel Units & Descr: 2 - ROD
 Heavy Metal Mass: BOL= : EOL=1.90kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1975
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.67

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	1.0733E-09	11.826	23.652	0.00E+00	1.27E-08	2.54E-08	0.0150	9.000E+11
Am-241	1.4751E-01	11.826	23.652	0.00E+00	1.74E+00	3.49E+00	0.0250	1.804E+11
Am-242m	2.6809E-04	11.826	23.652	0.00E+00	3.17E-03	6.34E-03	0.0375	1.700E+11
Am-243	6.2484E-04	11.826	23.652	0.00E+00	7.39E-03	1.48E-02	0.0575	2.126E+11
C-14	4.7820E-05	11.826	23.652	0.00E+00	5.66E-04	1.13E-03	0.0850	9.937E+10
Cl-36	8.0297E-07	11.826	23.652	0.00E+00	9.50E-06	1.90E-05	0.1250	6.611E+10
Cm-243	1.7426E-04	11.826	23.652	0.00E+00	2.06E-03	4.12E-03	0.2250	8.484E+10
Cm-244	2.7616E-02	11.826	23.652	0.00E+00	3.27E-01	6.53E-01	0.3750	3.664E+10
Co-60	3.5610E-04	11.826	23.652	0.00E+00	4.21E-03	8.42E-03	0.5750	8.628E+11
Cs-134	2.6260E-07	11.826	23.652	0.00E+00	3.11E-06	6.21E-06	0.8500	8.424E+09
Cs-135	1.4433E-05	11.826	23.652	0.00E+00	1.71E-04	3.41E-04	1.2500	5.361E+09
Cs-137	9.8870E-01	11.826	23.652	0.00E+00	1.17E+01	2.34E+01	1.7500	2.357E+08
Eu-154	6.0320E-03	11.826	23.652	0.00E+00	7.13E-02	1.43E-01	2.2500	3.875E+04
Eu-155	2.1770E-04	11.826	23.652	0.00E+00	2.57E-03	5.15E-03	2.7500	1.365E+05
Fe-55	7.9296E-07	11.826	23.652	0.00E+00	9.38E-06	1.88E-05	3.5000	9.746E+03
H-3	8.9486E-03	11.826	23.652	0.00E+00	1.06E-01	2.12E-01	5.0000	4.164E+03
I-129	9.8288E-07	11.826	23.652	0.00E+00	1.16E-05	2.32E-05	7.0000	4.797E+02
Kr-85	1.0707E-02	11.826	23.652	0.00E+00	1.27E-01	2.53E-01	11.0000	5.509E+01
Np-237	1.1927E-05	11.826	23.652	0.00E+00	1.41E-04	2.82E-04		
Pa-231	1.4703E-09	11.826	23.652	0.00E+00	1.74E-08	3.48E-08		
Pb-210	1.6828E-10	11.826	23.652	0.00E+00	1.99E-09	3.98E-09		
Pm-147	6.9606E-06	11.826	23.652	0.00E+00	8.23E-05	1.65E-04		
Pu-238	6.6263E-02	11.826	23.652	0.00E+00	7.84E-01	1.57E+00		
Pu-239	1.1618E-02	11.826	23.652	0.00E+00	1.37E-01	2.75E-01		
Pu-240	1.5142E-02	11.826	23.652	0.00E+00	1.79E-01	3.58E-01		
Pu-241	4.3766E-01	11.826	23.652	0.00E+00	5.18E+00	1.04E+01		
Pu-242	6.4260E-05	11.826	23.652	0.00E+00	7.60E-04	1.52E-03		
Ra-226	3.8501E-10	11.826	23.652	0.00E+00	4.55E-09	9.11E-09		
Ra-228	5.2955E-12	11.826	23.652	0.00E+00	6.26E-11	1.25E-10		
Ru-106	2.0413E-14	11.826	23.652	0.00E+00	2.41E-13	4.83E-13		
Se-79	1.2376E-05	11.826	23.652	0.00E+00	1.46E-04	2.93E-04		
Sn-126	2.5210E-05	11.826	23.652	0.00E+00	2.98E-04	5.96E-04		
Sr-90	6.4163E-01	11.826	23.652	0.00E+00	7.59E+00	1.52E+01		
Tc-99	3.9357E-04	11.826	23.652	0.00E+00	4.65E-03	9.31E-03		
Th-229	1.5644E-10	11.826	23.652	0.00E+00	1.85E-09	3.70E-09		
Th-230	2.7972E-08	11.826	23.652	0.00E+00	3.31E-07	6.62E-07		
Th-232	5.3036E-12	11.826	23.652	0.00E+00	6.27E-11	1.25E-10		
Ti-208	1.5136E-07	11.826	23.652	0.00E+00	1.79E-06	3.58E-06		
U-232	4.1005E-07	11.826	23.652	0.00E+00	4.85E-06	9.70E-06		
U-233	2.5856E-08	11.826	23.652	0.00E+00	3.06E-07	6.12E-07		
U-234	5.2665E-05	11.826	23.652	0.00E+00	6.23E-04	1.25E-03		
U-235	-1.4487E-06	11.826	0.000	1.32E-04	1.15E-04	1.32E-04		
U-236	7.5888E-06	11.826	23.652	0.00E+00	8.97E-05	1.79E-04		
U-238	-2.6129E-07	11.826	0.000	6.20E-04	6.17E-04	6.20E-04		
Y-90	6.4180E-01	11.826	23.652	0.00E+00	7.59E+00	1.52E+01		
Other Radionuclides					1.13E+01	2.25E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 11.826	Estimated: 11.826	Nominal burnup taken from SFD and converted to MWd using BOL=1.907kg Bounding burnup assumed to be twice nominal burnup.
Bounding:		23.652	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier: 0.18	Estimated Burnup/Given Burnup:	1.00
Bounding:	0.35		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: LOFT SQUARE FUEL MODULE	¹Fuel decay start date: 1975	Estimated Canister usage: 18"x10" 4.00
SNF ID #: 129	Estimates as of: 2030	
Fuel Units & Descr: 4 - 15 X 15 ROD ARRAY	Template: PWR (Light Water, Zirc, 0 to 5%, U)	
Heavy Metal Mass: BOL=815.60kg ; EOL=813.03kg	²Template Burnup(MWd): 61.92	
ROD Storage Site: INEEL	Template BOL Heavy Metal Mass (MT): 0.00176911	
	Template Decay Time: 50 years	

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	1.0733E-09	2,447.372	4,894.744	0.00E+00	2.63E-06	5.25E-06	Avg. MeV	
Am-241	1.4751E-01	2,447.372	4,894.744	0.00E+00	3.61E+02	7.22E+02	0.0150	1.862E+14
Am-242m	2.6809E-04	2,447.372	4,894.744	0.00E+00	6.56E-01	1.31E+00	0.0250	3.733E+13
Am-243	6.2484E-04	2,447.372	4,894.744	0.00E+00	1.53E+00	3.06E+00	0.0375	3.517E+13
C-14	4.7820E-05	2,447.372	4,894.744	0.00E+00	1.17E-01	2.34E-01	0.0575	4.401E+13
Cl-36	8.0297E-07	2,447.372	4,894.744	0.00E+00	1.97E-03	3.93E-03	0.0850	2.056E+13
Cm-243	1.7426E-04	2,447.372	4,894.744	0.00E+00	4.26E-01	8.53E-01	0.1250	1.368E+13
Cm-244	2.7616E-02	2,447.372	4,894.744	0.00E+00	6.78E+01	1.35E+02	0.2250	1.756E+13
Co-60	3.5610E-04	2,447.372	4,894.744	0.00E+00	8.72E-01	1.74E+00	0.3750	7.582E+12
Cs-134	2.6260E-07	2,447.372	4,894.744	0.00E+00	6.43E-04	1.29E-03	0.5750	1.786E+14
Cs-135	1.4433E-05	2,447.372	4,894.744	0.00E+00	3.53E-02	7.06E-02	0.8500	1.743E+12
Cs-137	9.8870E-01	2,447.372	4,894.744	0.00E+00	2.42E+03	4.84E+03	1.2500	1.109E+12
Eu-154	6.0320E-03	2,447.372	4,894.744	0.00E+00	1.48E+01	2.95E+01	1.7500	4.879E+10
Eu-155	2.1770E-04	2,447.372	4,894.744	0.00E+00	5.33E-01	1.07E+00	2.2500	8.020E+06
Fe-55	7.9296E-07	2,447.372	4,894.744	0.00E+00	1.94E-03	3.88E-03	2.7500	2.826E+07
H-3	8.9486E-03	2,447.372	4,894.744	0.00E+00	2.19E+01	4.38E+01	3.5000	2.018E+06
I-129	9.8288E-07	2,447.372	4,894.744	0.00E+00	2.41E-03	4.81E-03	5.0000	8.621E+05
Kr-85	1.0707E-02	2,447.372	4,894.744	0.00E+00	2.62E+01	5.24E+01	7.0000	9.932E+04
Np-237	1.1927E-05	2,447.372	4,894.744	0.00E+00	2.92E-02	5.84E-02	11.0000	1.140E+04
Pa-231	1.4703E-09	2,447.372	4,894.744	0.00E+00	3.60E-06	7.20E-06		
Pb-210	1.6828E-10	2,447.372	4,894.744	0.00E+00	4.12E-07	8.24E-07		
Pm-147	6.9606E-06	2,447.372	4,894.744	0.00E+00	1.70E-02	3.41E-02		
Pu-238	6.6263E-02	2,447.372	4,894.744	0.00E+00	1.62E+02	3.24E+02		
Pu-239	1.1618E-02	2,447.372	4,894.744	0.00E+00	2.84E+01	5.69E+01		
Pu-240	1.5142E-02	2,447.372	4,894.744	0.00E+00	3.71E+01	7.41E+01		
Pu-241	4.3766E-01	2,447.372	4,894.744	0.00E+00	1.07E+03	2.14E+03		
Pu-242	6.4260E-05	2,447.372	4,894.744	0.00E+00	1.57E-01	3.15E-01		
Ra-226	3.8501E-10	2,447.372	4,894.744	0.00E+00	9.42E-07	1.88E-06		
Ra-228	5.2955E-12	2,447.372	4,894.744	0.00E+00	1.30E-08	2.59E-08		
Ru-106	2.0413E-14	2,447.372	4,894.744	0.00E+00	5.00E-11	9.99E-11		
Se-79	1.2376E-05	2,447.372	4,894.744	0.00E+00	3.03E-02	6.06E-02		
Sn-126	2.5210E-05	2,447.372	4,894.744	0.00E+00	6.17E-02	1.23E-01		
Sr-90	6.4163E-01	2,447.372	4,894.744	0.00E+00	1.57E+03	3.14E+03		
Tc-99	3.9357E-04	2,447.372	4,894.744	0.00E+00	9.63E-01	1.93E+00		
Th-229	1.5644E-10	2,447.372	4,894.744	0.00E+00	3.83E-07	7.66E-07		
Th-230	2.7972E-08	2,447.372	4,894.744	0.00E+00	6.85E-05	1.37E-04		
Th-232	5.3036E-12	2,447.372	4,894.744	0.00E+00	1.30E-08	2.60E-08		
Tl-208	1.5136E-07	2,447.372	4,894.744	0.00E+00	3.70E-04	7.41E-04		
U-232	4.1005E-07	2,447.372	4,894.744	0.00E+00	1.00E-03	2.01E-03		
U-233	2.5856E-08	2,447.372	4,894.744	0.00E+00	6.33E-05	1.27E-04		
U-234	5.2665E-05	2,447.372	4,894.744	0.00E+00	1.29E-01	2.58E-01		
U-235	-1.4487E-06	2,447.372	0.000	7.05E-02	6.70E-02	7.05E-02		
U-236	7.5888E-06	2,447.372	4,894.744	0.00E+00	1.86E-02	3.71E-02		
U-238	-2.6129E-07	2,447.372	0.000	2.63E-01	2.63E-01	2.63E-01		
Y-90	6.4180E-01	2,447.372	4,894.744	0.00E+00	1.57E+03	3.14E+03		
Other Radionuclides					2.33E+03	4.66E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.43E+01	8.85E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	4	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	2,418.254	2,447.372	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		4,894.744	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.09	1.01	1.00
Bounding:	0.17		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: LOOSE FUEL ROD STORAGE BASKET (LFRSB) 1 Fuel decay start date: 1983
 SNF ID #: 126 Estimates as of: 2030
 Fuel Units & Descr: 1 - SCRAP Template: Pathfinder (Light Water, SST, 60 to 100%, U)
 Heavy Metal Mass: BOL= ; EOL=311.11kg 2 Template Burnup(MWd): 6.01
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00012882
Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 1.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.3344E-08	293,891.204	293,891.204	0.00E+00	6.86E-03	6.86E-03		
Am-241	1.1135E-04	293,891.204	293,891.204	0.00E+00	3.27E+01	3.27E+01	0.0150	2.194E+16
Am-242m	8.5075E-09	293,891.204	293,891.204	0.00E+00	2.50E-03	2.50E-03	0.0250	4.558E+15
Am-243	9.8519E-10	293,891.204	293,891.204	0.00E+00	2.90E-04	2.90E-04	0.0375	3.943E+15
C-14	2.3012E-04	293,891.204	293,891.204	0.00E+00	6.76E+01	6.76E+01	0.0575	4.250E+15
Cl-36	1.2261E-06	293,891.204	293,891.204	0.00E+00	3.60E-01	3.60E-01	0.0850	2.568E+15
Cm-243	2.4875E-10	293,891.204	293,891.204	0.00E+00	7.31E-05	7.31E-05	0.1250	1.667E+15
Cm-244	2.3178E-09	293,891.204	293,891.204	0.00E+00	6.81E-04	6.81E-04	0.2250	2.210E+15
Co-60	7.0849E-02	293,891.204	293,891.204	0.00E+00	2.08E+04	2.08E+04	0.3750	9.640E+14
Cs-134	3.0266E-06	293,891.204	293,891.204	0.00E+00	8.89E-01	8.89E-01	0.5750	1.588E+16
Cs-135	3.0316E-05	293,891.204	293,891.204	0.00E+00	8.91E+00	8.91E+00	0.8500	1.608E+14
Cs-137	1.4511E+00	293,891.204	293,891.204	0.00E+00	4.26E+05	4.26E+05	1.2500	1.598E+15
Eu-154	6.6955E-04	293,891.204	293,891.204	0.00E+00	1.97E+02	1.97E+02	1.7500	4.148E+12
Eu-155	6.9850E-04	293,891.204	293,891.204	0.00E+00	2.05E+02	2.05E+02	2.2500	8.609E+09
Fe-55	1.2318E-03	293,891.204	293,891.204	0.00E+00	3.62E+02	3.62E+02	2.7500	2.488E+08
H-3	2.5141E-03	293,891.204	293,891.204	0.00E+00	7.39E+02	7.39E+02	3.5000	1.755E+04
I-129	7.3195E-07	293,891.204	293,891.204	0.00E+00	2.15E-01	2.15E-01	5.0000	7.216E+03
Kr-85	4.1281E-02	293,891.204	293,891.204	0.00E+00	1.21E+04	1.21E+04	7.0000	7.968E+02
Np-237	1.1489E-06	293,891.204	293,891.204	0.00E+00	3.38E-01	3.38E-01	11.0000	8.941E+01
Pa-231	4.5241E-08	293,891.204	293,891.204	0.00E+00	1.33E-02	1.33E-02		
Pb-210	6.4476E-13	293,891.204	293,891.204	0.00E+00	1.89E-07	1.89E-07		
Pm-147	1.1651E-03	293,891.204	293,891.204	0.00E+00	3.42E+02	3.42E+02		
Pu-238	2.9517E-04	293,891.204	293,891.204	0.00E+00	8.67E+01	8.67E+01		
Pu-239	6.6772E-04	293,891.204	293,891.204	0.00E+00	1.96E+02	1.96E+02		
Pu-240	8.6839E-05	293,891.204	293,891.204	0.00E+00	2.55E+01	2.55E+01		
Pu-241	7.1514E-04	293,891.204	293,891.204	0.00E+00	2.10E+02	2.10E+02		
Pu-242	1.9717E-09	293,891.204	293,891.204	0.00E+00	5.79E-04	5.79E-04		
Ra-226	1.7654E-12	293,891.204	293,891.204	0.00E+00	5.19E-07	5.19E-07		
Ra-228	8.2928E-12	293,891.204	293,891.204	0.00E+00	2.44E-06	2.44E-06		
Ru-106	1.8419E-10	293,891.204	293,891.204	0.00E+00	5.41E-05	5.41E-05		
Se-79	1.3223E-05	293,891.204	293,891.204	0.00E+00	3.89E+00	3.89E+00		
Sn-126	1.1493E-05	293,891.204	293,891.204	0.00E+00	3.38E+00	3.38E+00		
Sr-90	1.3649E+00	293,891.204	293,891.204	0.00E+00	4.01E+05	4.01E+05		
Tc-99	4.6656E-04	293,891.204	293,891.204	0.00E+00	1.37E+02	1.37E+02		
Th-229	1.4547E-11	293,891.204	293,891.204	0.00E+00	4.28E-06	4.28E-06		
Th-230	1.6617E-10	293,891.204	293,891.204	0.00E+00	4.88E-05	4.88E-05		
Th-232	8.3361E-12	293,891.204	293,891.204	0.00E+00	2.45E-06	2.45E-06		
Tl-208	2.1664E-08	293,891.204	293,891.204	0.00E+00	6.37E-03	6.37E-03		
U-232	5.8669E-08	293,891.204	293,891.204	0.00E+00	1.72E-02	1.72E-02		
U-233	3.1847E-09	293,891.204	293,891.204	0.00E+00	9.36E-04	9.36E-04		
U-234	3.8769E-07	293,891.204	293,891.204	0.00E+00	1.14E-01	1.14E-01		
U-235	-2.7761E-06	293,891.204	0.000	1.26E+00	4.41E-01	1.26E+00	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.6190E-05	293,891.204	293,891.204	0.00E+00	4.76E+00	4.76E+00	5.13E+03	5.13E+03
U-238	-2.8547E-09	293,891.204	0.000	1.36E-02	1.27E-02	1.36E-02	Total	Total
Y-90	1.3652E+00	293,891.204	293,891.204	0.00E+00	4.01E+05	4.01E+05		
Other Radionuclides					4.85E+05	4.85E+05		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative) and enrichment (unknown).
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	UNKNOWN	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		60 to 100	

Burnup Summary (MWd) ²			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.
	From SFD	Estimated	
Nominal:		293,891.204	
Bounding:		293,891.204	

Checks			Estimated EOL HM/Given EOL HM 1.02
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	10.12		
Bounding:	10.12		

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

²Total burnup for all fuel associated with this worksheet must be 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 COMMERCIAL FUEL
 SNF ID #: 130
 Fuel Units & Descr: 6 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL= : EOL=63.89kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1982
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 35 years

Estimated
 Canister usage:
 HIC
 3.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.7758E-10	60,759.031	60,759.031	0.00E+00	5.33E-05	5.33E-05	0.0150	3.269E+15
Am-241	1.4352E-01	60,759.031	60,759.031	0.00E+00	8.72E+03	8.72E+03	0.0250	6.592E+14
Am-242m	2.8698E-04	60,759.031	60,759.031	0.00E+00	1.74E+01	1.74E+01	0.0375	6.288E+14
Am-243	6.2565E-04	60,759.031	60,759.031	0.00E+00	3.80E+01	3.80E+01	0.0575	7.265E+14
C-14	4.7901E-05	60,759.031	60,759.031	0.00E+00	2.91E+00	2.91E+00	0.0850	3.658E+14
Cl-36	8.0297E-07	60,759.031	60,759.031	0.00E+00	4.88E-02	4.88E-02	0.1250	2.538E+14
Cm-243	2.5081E-04	60,759.031	60,759.031	0.00E+00	1.52E+01	1.52E+01	0.2250	3.137E+14
Cm-244	4.9015E-02	60,759.031	60,759.031	0.00E+00	2.98E+03	2.98E+03	0.3750	1.349E+14
Co-60	2.5581E-03	60,759.031	60,759.031	0.00E+00	1.55E+02	1.55E+02	0.5750	3.137E+15
Cs-134	4.0536E-05	60,759.031	60,759.031	0.00E+00	2.46E+00	2.46E+00	0.8500	4.340E+13
Cs-135	1.4433E-05	60,759.031	60,759.031	0.00E+00	8.77E-01	8.77E-01	1.2500	4.263E+13
Cs-137	1.3979E+00	60,759.031	60,759.031	0.00E+00	8.49E+04	8.49E+04	1.7500	1.277E+12
Eu-154	2.0203E-02	60,759.031	60,759.031	0.00E+00	1.23E+03	1.23E+03	2.2500	2.056E+08
Eu-155	1.7684E-03	60,759.031	60,759.031	0.00E+00	1.07E+02	1.07E+02	2.7500	4.211E+08
Fe-55	4.3136E-05	60,759.031	60,759.031	0.00E+00	2.62E+00	2.62E+00	3.5000	4.337E+07
H-3	2.0769E-02	60,759.031	60,759.031	0.00E+00	1.26E+03	1.26E+03	5.0000	1.854E+07
I-129	9.8288E-07	60,759.031	60,759.031	0.00E+00	5.97E-02	5.97E-02	7.0000	2.137E+06
Kr-85	2.8214E-02	60,759.031	60,759.031	0.00E+00	1.71E+03	1.71E+03	11.0000	2.454E+05
Np-237	1.1218E-05	60,759.031	60,759.031	0.00E+00	6.82E-01	6.82E-01		
Pa-231	1.3036E-09	60,759.031	60,759.031	0.00E+00	7.92E-05	7.92E-05		
Pb-210	8.5078E-11	60,759.031	60,759.031	0.00E+00	5.17E-06	5.17E-06		
Pm-147	3.6531E-04	60,759.031	60,759.031	0.00E+00	2.22E+01	2.22E+01		
Pu-238	7.4564E-02	60,759.031	60,759.031	0.00E+00	4.53E+03	4.53E+03		
Pu-239	1.1623E-02	60,759.031	60,759.031	0.00E+00	7.06E+02	7.06E+02		
Pu-240	1.5132E-02	60,759.031	60,759.031	0.00E+00	9.19E+02	9.19E+02		
Pu-241	9.0036E-01	60,759.031	60,759.031	0.00E+00	5.47E+04	5.47E+04		
Pu-242	6.4260E-05	60,759.031	60,759.031	0.00E+00	3.90E+00	3.90E+00		
Ra-226	2.2804E-10	60,759.031	60,759.031	0.00E+00	1.39E-05	1.39E-05		
Ra-228	5.2713E-12	60,759.031	60,759.031	0.00E+00	3.20E-07	3.20E-07		
Ru-106	6.1160E-10	60,759.031	60,759.031	0.00E+00	3.72E-05	3.72E-05		
Se-79	1.2377E-05	60,759.031	60,759.031	0.00E+00	7.52E-01	7.52E-01		
Sn-126	2.5210E-05	60,759.031	60,759.031	0.00E+00	1.53E+00	1.53E+00		
Sr-90	9.1667E-01	60,759.031	60,759.031	0.00E+00	5.57E+04	5.57E+04		
Tc-99	3.9357E-04	60,759.031	60,759.031	0.00E+00	2.39E+01	2.39E+01		
Th-229	1.2057E-10	60,759.031	60,759.031	0.00E+00	7.33E-06	7.33E-06		
Th-230	2.1043E-08	60,759.031	60,759.031	0.00E+00	1.28E-03	1.28E-03		
Th-232	5.2972E-12	60,759.031	60,759.031	0.00E+00	3.22E-07	3.22E-07		
Th-208	1.7474E-07	60,759.031	60,759.031	0.00E+00	1.06E-02	1.06E-02		
U-232	4.7368E-07	60,759.031	60,759.031	0.00E+00	2.88E-02	2.88E-02		
U-233	2.5097E-08	60,759.031	60,759.031	0.00E+00	1.52E-03	1.52E-03		
U-234	5.0000E-05	60,759.031	60,759.031	0.00E+00	3.04E+00	3.04E+00		
U-235	-1.4489E-06	60,759.031	0.000	8.84E-03	0.00E+00	8.84E-03		
U-236	7.5824E-06	60,759.031	60,759.031	0.00E+00	4.61E-01	4.61E-01		
U-238	-2.6129E-07	60,759.031	0.000	4.16E-02	2.57E-02	4.16E-02		
Y-90	9.1699E-01	60,759.031	60,759.031	0.00E+00	5.57E+04	5.57E+04		
Other Radionuclides					8.16E+04	8.16E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.40E+03	1.40E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		Basis for Parameter Differences:
From SFD	Used	
Reactor Moderator:	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC	
BOL HM Constituents:	UO ₂	
BOL Enrichment %:	0 to 5	

Burnup Summary (MWd) ²		Basis for burnup used in estimate:
From SFD	Estimated	
Nominal:	60,759.031	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:	60,759.031	

Checks		Estimated EOL HM/Given EOL HM
Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	13.58	1.58
Bounding:	13.58	

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

²Total burnup for all fuel associated with this worksheet must be 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 (MOX)
 SNF ID #: 134
 Fuel Units & Descr: 5 - ROD
 Heavy Metal Mass: BOL= ; EOL=12.74kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1966
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 0.18

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/(sec (bounding))
	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)	Avg. MeV	
Ac-227	2.5200E-06	12,107.491	12,107.491	0.00E+00	3.05E-02	3.05E-02	0.0150	1.026E+16
Am-241	8.6432E+00	12,107.491	12,107.491	0.00E+00	1.05E+05	1.05E+05	0.0250	2.027E+15
Am-242m	1.5728E-02	12,107.491	12,107.491	0.00E+00	1.90E+02	1.90E+02	0.0375	1.714E+15
Am-243	1.6288E-02	12,107.491	12,107.491	0.00E+00	1.97E+02	1.97E+02	0.0575	3.236E+15
C-14	1.2068E-01	12,107.491	12,107.491	0.00E+00	1.46E+03	1.46E+03	0.0850	1.085E+15
Cf-254	2.2849E-03	12,107.491	12,107.491	0.00E+00	2.77E+01	2.77E+01	0.1250	7.676E+14
Cm-243	6.0144E-04	12,107.491	12,107.491	0.00E+00	7.28E+00	7.28E+00	0.2250	9.390E+14
Cm-244	9.4880E-02	12,107.491	12,107.491	0.00E+00	1.15E+03	1.15E+03	0.3750	4.064E+14
Co-60	3.9052E+00	12,107.491	12,107.491	0.00E+00	4.73E+04	4.73E+04	0.5750	6.726E+15
Cs-134	2.2139E-06	12,107.491	12,107.491	0.00E+00	2.68E-02	2.68E-02	0.8500	1.473E+15
Cs-135	4.3976E-04	12,107.491	12,107.491	0.00E+00	5.32E+00	5.32E+00	1.2500	3.611E+14
Cs-137	1.4887E+01	12,107.491	12,107.491	0.00E+00	1.80E+05	1.80E+05	1.7500	4.340E+12
Eu-154	3.7342E-01	12,107.491	12,107.491	0.00E+00	4.52E+03	4.52E+03	2.2500	1.876E+10
Eu-155	8.4893E-03	12,107.491	12,107.491	0.00E+00	1.03E+02	1.03E+02	2.7500	3.230E+10
Fe-55	5.3750E-03	12,107.491	12,107.491	0.00E+00	6.51E+01	6.51E+01	3.5000	1.759E+07
H-3	1.0472E-01	12,107.491	12,107.491	0.00E+00	1.27E+03	1.27E+03	5.0000	7.432E+06
I-129	1.0618E-05	12,107.491	12,107.491	0.00E+00	1.29E-01	1.29E-01	7.0000	8.464E+05
Kr-85	2.2717E-01	12,107.491	12,107.491	0.00E+00	2.75E+03	2.75E+03	11.0000	9.654E+04
Np-237	1.6400E-04	12,107.491	12,107.491	0.00E+00	1.99E+00	1.99E+00		
Pa-231	2.8688E-06	12,107.491	12,107.491	0.00E+00	3.47E-02	3.47E-02		
Pb-210	4.7312E-08	12,107.491	12,107.491	0.00E+00	5.73E-04	5.73E-04		
Pm-147	3.2198E-04	12,107.491	12,107.491	0.00E+00	3.90E+00	3.90E+00		
Pu-238	-1.1924E+00	12,107.491	0.000	3.27E+03	0.00E+00	3.27E+03		
Pu-239	-4.8600E-02	12,107.491	0.000	3.96E+02	0.00E+00	3.96E+02		
Pu-240	-3.0127E-01	12,107.491	0.000	5.06E+02	0.00E+00	5.06E+02		
Pu-241	-1.2917E+02	12,107.491	0.000	1.30E+05	0.00E+00	1.30E+05		
Pu-242	-1.1381E-04	12,107.491	0.000	2.19E+00	8.12E-01	2.19E+00		
Ra-226	1.0760E-07	12,107.491	12,107.491	0.00E+00	1.30E-03	1.30E-03		
Ra-228	6.0160E-07	12,107.491	12,107.491	0.00E+00	7.28E-03	7.28E-03		
Ru-106	1.3388E-13	12,107.491	12,107.491	0.00E+00	1.62E-09	1.62E-09		
Se-79	1.9179E-04	12,107.491	12,107.491	0.00E+00	2.32E+00	2.32E+00		
Sn-126	1.6669E-04	12,107.491	12,107.491	0.00E+00	2.02E+00	2.02E+00		
Sr-90	1.3859E+01	12,107.491	12,107.491	0.00E+00	1.68E+05	1.68E+05		
Tc-99	6.7678E-03	12,107.491	12,107.491	0.00E+00	8.19E+01	8.19E+01		
Th-229	2.2592E-06	12,107.491	12,107.491	0.00E+00	2.74E-02	2.74E-02		
Th-230	7.5955E-06	12,107.491	12,107.491	0.00E+00	9.20E-02	9.20E-02		
Th-232	6.0208E-07	12,107.491	12,107.491	0.00E+00	7.29E-03	7.29E-03		
Tl-208	7.5795E-05	12,107.491	12,107.491	0.00E+00	9.18E-01	9.18E-01		
U-232	2.0521E-04	12,107.491	12,107.491	0.00E+00	2.48E+00	2.48E+00		
U-233	3.6128E-04	12,107.491	12,107.491	0.00E+00	4.37E+00	4.37E+00		
U-234	1.2788E-02	12,107.491	12,107.491	0.00E+00	1.55E+02	1.55E+02		
U-235	5.7486E-04	12,107.491	12,107.491	1.10E-02	6.97E+00	6.97E+00		
U-236	2.3485E-04	12,107.491	12,107.491	0.00E+00	2.84E+00	2.84E+00		
U-238	1.1581E-04	12,107.491	12,107.491	1.36E-03	1.40E+00	1.40E+00		
Y-90	1.3861E+01	12,107.491	12,107.491	0.00E+00	1.68E+05	1.68E+05		
Other Radionuclides					6.22E+05	6.22E+05		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	ZIRC OR SST	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		12,107.491	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		12,107.491	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	14.21		591.64
Bounding:	14.21		

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

²Total burnup for all fuel associated with this worksheet must be 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 SCRAP
 SNF ID #: 309
 Fuel Units & Descr: 1 - SCRAP
 Heavy Metal Mass: BOL=76.55kg ; EOL=75.31kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1963
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 65 years

Estimated
 Canister usage:
 HIC
 1.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	1.2581E-09	2,143.506	2,449.722	0.00E+00	2.70E-06	3.08E-06	0.0150	6.632E+13
Am-241	1.4761E-01	2,143.506	2,449.722	0.00E+00	3.16E+02	3.62E+02	0.0250	1.317E+13
Am-242m	2.5032E-04	2,143.506	2,449.722	0.00E+00	5.37E-01	6.13E-01	0.0375	1.231E+13
Am-243	6.2387E-04	2,143.506	2,449.722	0.00E+00	1.34E+00	1.53E+00	0.0575	1.690E+13
C-14	4.7739E-05	2,143.506	2,449.722	0.00E+00	1.02E-01	1.17E-01	0.0850	7.209E+12
Cl-36	8.0297E-07	2,143.506	2,449.722	0.00E+00	1.72E-03	1.97E-03	0.1250	4.702E+12
Cm-243	1.2099E-04	2,143.506	2,449.722	0.00E+00	2.59E-01	2.96E-01	0.2250	6.131E+12
Cm-244	1.5560E-02	2,143.506	2,449.722	0.00E+00	3.34E+01	3.81E+01	0.3750	2.653E+12
Co-60	4.9580E-05	2,143.506	2,449.722	0.00E+00	1.06E-01	1.21E-01	0.5750	6.316E+13
Cs-134	1.7022E-09	2,143.506	2,449.722	0.00E+00	3.65E-06	4.17E-06	0.8500	5.063E+11
Cs-135	1.4433E-05	2,143.506	2,449.722	0.00E+00	3.09E-02	3.54E-02	1.2500	2.367E+11
Cs-137	6.9929E-01	2,143.506	2,449.722	0.00E+00	1.50E+03	1.71E+03	1.7500	1.362E+10
Eu-154	1.8023E-03	2,143.506	2,449.722	0.00E+00	3.86E+00	4.42E+00	2.2500	2.399E+06
Eu-155	2.6793E-05	2,143.506	2,449.722	0.00E+00	5.74E-02	6.56E-02	2.7500	1.193E+07
Fe-55	1.4580E-08	2,143.506	2,449.722	0.00E+00	3.13E-05	3.57E-05	3.5000	5.923E+05
H-3	3.8566E-03	2,143.506	2,449.722	0.00E+00	8.27E+00	9.45E+00	5.0000	2.529E+05
I-129	9.8288E-07	2,143.506	2,449.722	0.00E+00	2.11E-03	2.41E-03	7.0000	2.911E+04
Kr-85	4.0617E-03	2,143.506	2,449.722	0.00E+00	8.71E+00	9.95E+00	11.0000	3.341E+03
Np-237	1.2645E-05	2,143.506	2,449.722	0.00E+00	2.71E-02	3.10E-02		
Pa-231	1.6376E-09	2,143.506	2,449.722	0.00E+00	3.51E-06	4.01E-06		
Pb-210	2.8795E-10	2,143.506	2,449.722	0.00E+00	6.17E-07	7.05E-07		
Pm-147	1.3264E-07	2,143.506	2,449.722	0.00E+00	2.84E-04	3.25E-04		
Pu-238	5.8882E-02	2,143.506	2,449.722	0.00E+00	1.26E+02	1.44E+02		
Pu-239	1.1613E-02	2,143.506	2,449.722	0.00E+00	2.49E+01	2.84E+01		
Pu-240	1.5142E-02	2,143.506	2,449.722	0.00E+00	3.25E+01	3.71E+01		
Pu-241	2.1269E-01	2,143.506	2,449.722	0.00E+00	4.56E+02	5.21E+02		
Pu-242	6.4260E-05	2,143.506	2,449.722	0.00E+00	1.38E-01	1.57E-01		
Ra-226	5.8689E-10	2,143.506	2,449.722	0.00E+00	1.26E-06	1.44E-06		
Ra-228	5.3036E-12	2,143.506	2,449.722	0.00E+00	1.14E-08	1.30E-08		
Ru-106	6.8136E-19	2,143.506	2,449.722	0.00E+00	1.46E-15	1.67E-15		
Se-79	1.2372E-05	2,143.506	2,449.722	0.00E+00	2.65E-02	3.03E-02		
Sn-126	2.5194E-05	2,143.506	2,449.722	0.00E+00	5.40E-02	6.17E-02		
Sr-90	4.4913E-01	2,143.506	2,449.722	0.00E+00	9.63E+02	1.10E+03		
Tc-99	3.9357E-04	2,143.506	2,449.722	0.00E+00	8.44E-01	9.64E-01		
Th-229	1.9331E-10	2,143.506	2,449.722	0.00E+00	4.14E-07	4.74E-07		
Th-230	3.5223E-08	2,143.506	2,449.722	0.00E+00	7.55E-05	8.63E-05		
Th-232	5.3085E-12	2,143.506	2,449.722	0.00E+00	1.14E-08	1.30E-08		
Tl-208	1.3102E-07	2,143.506	2,449.722	0.00E+00	2.81E-04	3.21E-04		
U-232	3.5497E-07	2,143.506	2,449.722	0.00E+00	7.61E-04	8.70E-04		
U-233	2.6647E-08	2,143.506	2,449.722	0.00E+00	5.71E-05	6.53E-05		
U-234	5.5023E-05	2,143.506	2,449.722	0.00E+00	1.18E-01	1.35E-01		
U-235	-1.4485E-06	2,143.506	0.000	4.58E-03	1.47E-03	4.58E-03		
U-236	7.5969E-06	2,143.506	2,449.722	0.00E+00	1.63E-02	1.86E-02		
U-238	-2.6129E-07	2,143.506	0.000	2.50E-02	2.45E-02	2.50E-02		
Y-90	4.4913E-01	2,143.506	2,449.722	0.00E+00	9.63E+02	1.10E+03		
Other Radionuclides					1.45E+03	1.66E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.15E+01	3.59E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-2	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.766740402	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	2,143.506	1,182.795	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup taken directly from SFD (converted to MWd).
Bounding:	2,449.722	2,365.590	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.80	0.55	
Bounding:	0.91	0.97	

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

²Total burnup for all fuel associated with this worksheet must be 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 SNF SCRAP
SNF ID #: 940
Fuel Units & Descr: 9 - CANISTER OF SCRAP
Heavy Metal Mass: BOL=161.86kg ; EOL=154.22kg
ROD Storage Site: INEEL

Fuel decay start date: 1983
Estimates as of: 2030
Template: PWR (Light Water, Zirc, 0 to 5%, U)
Template Burnup(MWd): 61.92
Template BOL Heavy Metal Mass (MT): 0.00176911
Template Decay Time: 35 years

Estimated Canister usage: 18"x10" 0.69

Table with columns: II. Estimates (m, Xn, Xb, b, Yn, Yb), Gamma Sources (Photon Energy Group, Total Photons/sec), and various radionuclide data rows including Ac-227, Am-241, C-14, etc.

III. Template Selection Summary, Burnup Summary, and Checks

Table for Template Selection Summary with columns: From SFD, Used, and Basis for Parameter Differences.

Table for Burnup Summary (MWd) with columns: From SFD, Estimated, and Basis for burnup used in estimate.

Table for Checks with columns: Burnup Multiplier, Estimated Burnup/Given Burnup, and Estimated EOL HM/Given EOL HM.

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: MACMASTER (CANADA)
 SNF ID #: 614
 Fuel Units & Descr: 83 - 18 CURVED PLATES
 Heavy Metal Mass: BOL=14.78kg ; EOL=10.43kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2006
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 2.31

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	4,118.777	8,237.554	0.00E+00	2.73E-06	5.46E-06	0.0150	8.695E+14
Am-241	2.0060E-03	4,118.777	8,237.554	0.00E+00	8.26E+00	1.65E+01	0.0250	1.808E+14
Am-242m	4.2429E-07	4,118.777	8,237.554	0.00E+00	1.75E-03	3.50E-03	0.0375	1.577E+14
Am-243	1.4899E-06	4,118.777	8,237.554	0.00E+00	6.14E-03	1.23E-02	0.0675	1.689E+14
C-14	5.7135E-09	4,118.777	8,237.554	0.00E+00	2.35E-05	4.71E-05	0.0850	1.021E+14
Cl-36	1.3124E-32	4,118.777	8,237.554	0.00E+00	5.41E-29	1.08E-28	0.1250	6.907E+13
Cm-243	1.6443E-07	4,118.777	8,237.554	0.00E+00	6.77E-04	1.35E-03	0.2250	8.808E+13
Cm-244	2.9330E-05	4,118.777	8,237.554	0.00E+00	1.21E-01	2.42E-01	0.3750	3.834E+13
Co-60	5.3186E-06	4,118.777	8,237.554	0.00E+00	2.19E-02	4.38E-02	0.5750	6.254E+14
Cs-134	3.1563E-03	4,118.777	8,237.554	0.00E+00	1.30E+01	2.60E+01	0.8500	1.057E+13
Cs-135	3.4477E-06	4,118.777	8,237.554	0.00E+00	1.42E-02	2.84E-02	1.2500	6.038E+12
Cs-137	2.0313E+00	4,118.777	8,237.554	0.00E+00	8.37E+03	1.67E+04	1.7500	2.772E+11
Eu-154	2.4513E-02	4,118.777	8,237.554	0.00E+00	1.01E+02	2.02E+02	2.2500	2.431E+07
Eu-155	4.8175E-03	4,118.777	8,237.554	0.00E+00	1.98E+01	3.97E+01	2.7500	1.374E+07
Fe-55	1.2397E-04	4,118.777	8,237.554	0.00E+00	5.11E-01	1.02E+00	3.5000	6.315E+04
H-3	4.5697E-03	4,118.777	8,237.554	0.00E+00	1.88E+01	3.76E+01	5.0000	3.569E+03
I-129	7.5300E-07	4,118.777	8,237.554	0.00E+00	3.10E-03	6.20E-03	7.0000	3.941E+02
Kr-85	1.0850E-01	4,118.777	8,237.554	0.00E+00	4.47E+02	8.94E+02	11.0000	4.416E+01
Np-237	9.5561E-06	4,118.777	8,237.554	0.00E+00	3.94E-02	7.87E-02		
Pa-231	2.0359E-09	4,118.777	8,237.554	0.00E+00	8.39E-06	1.68E-05		
Pb-210	4.9728E-11	4,118.777	8,237.554	0.00E+00	2.05E-07	4.10E-07		
Pm-147	4.8502E-02	4,118.777	8,237.554	0.00E+00	2.00E+02	4.00E+02		
Pu-238	1.8254E-02	4,118.777	8,237.554	0.00E+00	7.52E+01	1.50E+02		
Pu-239	4.2810E-04	4,118.777	8,237.554	0.00E+00	1.78E+00	3.53E+00		
Pu-240	2.4368E-04	4,118.777	8,237.554	0.00E+00	1.00E+00	2.01E+00		
Pu-241	3.3415E-02	4,118.777	8,237.554	0.00E+00	1.38E+02	2.75E+02		
Pu-242	3.6329E-07	4,118.777	8,237.554	0.00E+00	1.50E-03	2.99E-03		
Ra-226	2.2854E-10	4,118.777	8,237.554	0.00E+00	9.41E-07	1.88E-06		
Ra-228	1.2426E-14	4,118.777	8,237.554	0.00E+00	5.12E-11	1.02E-10		
Ru-106	6.3589E-06	4,118.777	8,237.554	0.00E+00	2.62E-02	5.24E-02		
Se-79	1.2933E-05	4,118.777	8,237.554	0.00E+00	5.33E-02	1.07E-01		
Sn-126	1.1574E-05	4,118.777	8,237.554	0.00E+00	4.77E-02	9.53E-02		
Sr-90	1.9248E+00	4,118.777	8,237.554	0.00E+00	7.93E+03	1.59E+04		
Tc-99	4.2239E-04	4,118.777	8,237.554	0.00E+00	1.74E+00	3.48E+00		
Th-229	5.0953E-12	4,118.777	8,237.554	0.00E+00	2.10E-08	4.20E-08		
Th-230	4.1885E-08	4,118.777	8,237.554	0.00E+00	1.73E-04	3.45E-04		
Th-232	1.9270E-14	4,118.777	8,237.554	0.00E+00	7.94E-11	1.59E-10		
Tl-208	4.6024E-08	4,118.777	8,237.554	0.00E+00	1.90E-04	3.79E-04		
U-232	1.2582E-07	4,118.777	8,237.554	0.00E+00	5.18E-04	1.04E-03		
U-233	2.5825E-09	4,118.777	8,237.554	0.00E+00	1.06E-05	2.13E-05		
U-234	1.8450E-04	4,118.777	8,237.554	0.00E+00	7.60E-01	1.52E+00		
U-235	-2.7235E-06	4,118.777	0.000	2.97E-02	1.85E-02	2.97E-02		
U-236	1.5493E-05	4,118.777	8,237.554	0.00E+00	6.38E-02	1.28E-01		
U-238	-4.2851E-09	4,118.777	0.000	3.42E-04	3.24E-04	3.42E-04		
Y-90	1.9254E+00	4,118.777	8,237.554	0.00E+00	7.93E+03	1.59E+04		
Other Radionuclides					7.97E+03	1.59E+04		

Thermal Power		
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)	
9.82E+01	1.96E+02	
Total	Total	

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.11672336	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		4,118.777	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		8,237.554	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.89		
Bounding:	1.77		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: MISCELLANEOUS RSWF FUEL
SNF ID #: 366
Fuel Units & Descr: 1 - UNKNOWN
Heavy Metal Mass: BOL = : EOL=4161.52kg
ROD Storage Site: INEEL

Fuel decay start date: 1963
Estimates as of: 2030
Template: FFTF (FAST, SST, 10 to 30%, Pu & U)
Template Burnup(MWd): 5011.2
Template BOL Heavy Metal Mass (MT): 0.0329181
Template Decay Time: 65 years

Estimated Canister usage: 18"x10" 2.00

Table with columns: Radionuclide, Ci/MWd From Template, Nominal Fuel Burnup (MWd), Bounding Fuel Burnup (MWd), Initial Activity (Ci), Nominal Fuel Inventories(Ci), Bounding Fuel Inventories(Ci), Photon Energy Group, Total Photons/sec (bounding), Gamma Sources.

III. Template Selection Summary, Burnup Summary, and Checks

Table for Template Selection Summary with columns: From SFD, Used, Basis for Parameter Differences.

Table for Burnup Summary (MWd) with columns: From SFD, Estimated, Basis for burnup used in estimate.

Table for Checks with columns: Burnup Multiplier, Estimated EOL HM/Given Burnup, Estimated EOL HM/Given EOL HM.

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: MISCELLANEOUS TREAT FUEL
 SNF ID #: 369
 Fuel Units & Descr: 1 - UNKNOWN
 Heavy Metal Mass: BOL = : EOL = .12kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.01

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.3072E-06	114.137	114.137	0.00E+00	2.63E-04	2.63E-04	0.0150	1.399E+14
Am-241	8.4448E+00	114.137	114.137	0.00E+00	9.64E+02	9.64E+02	0.0250	2.783E+13
Am-242m	1.6848E-02	114.137	114.137	0.00E+00	1.92E+00	1.92E+00	0.0375	2.431E+13
Am-243	1.6320E-02	114.137	114.137	0.00E+00	1.86E+00	1.86E+00	0.0575	3.825E+13
C-14	1.2090E-01	114.137	114.137	0.00E+00	1.38E+01	1.38E+01	0.0850	1.493E+13
Cf-254	2.2849E-03	114.137	114.137	0.00E+00	2.61E-01	2.61E-01	0.1250	1.170E+13
Cm-243	8.6624E-04	114.137	114.137	0.00E+00	9.89E-02	9.89E-02	0.2250	1.294E+13
Cm-244	1.6848E-01	114.137	114.137	0.00E+00	1.92E+01	1.92E+01	0.3750	5.532E+12
Co-60	2.8086E+01	114.137	114.137	0.00E+00	3.21E+03	3.21E+03	0.5750	8.997E+13
Cs-134	3.4148E-04	114.137	114.137	0.00E+00	3.90E-02	3.90E-02	0.8500	3.438E+12
Cs-135	4.3976E-04	114.137	114.137	0.00E+00	5.02E-02	5.02E-02	1.2500	2.403E+14
Cs-137	2.1049E+01	114.137	114.137	0.00E+00	2.40E+03	2.40E+03	1.7500	1.063E+11
Eu-154	1.2500E+00	114.137	114.137	0.00E+00	1.43E+02	1.43E+02	2.2500	1.260E+09
Eu-155	6.8986E-02	114.137	114.137	0.00E+00	7.87E+00	7.87E+00	2.7500	3.551E+08
Fe-55	2.9308E-01	114.137	114.137	0.00E+00	3.35E+01	3.35E+01	3.5000	2.843E+05
H-3	2.4311E-01	114.137	114.137	0.00E+00	2.77E+01	2.77E+01	5.0000	1.207E+05
I-129	1.0618E-05	114.137	114.137	0.00E+00	1.21E-03	1.21E-03	7.0000	1.382E+04
Kr-85	5.9882E-01	114.137	114.137	0.00E+00	6.83E+01	6.83E+01	11.0000	1.582E+03
Np-237	1.5668E-04	114.137	114.137	0.00E+00	1.79E-02	1.79E-02		
Pa-231	2.8656E-06	114.137	114.137	0.00E+00	3.27E-04	3.27E-04		
Pb-210	2.3918E-08	114.137	114.137	0.00E+00	2.73E-06	2.73E-06		
Pm-147	1.6900E-02	114.137	114.137	0.00E+00	1.93E+00	1.93E+00		
Pu-238	-8.6123E-01	114.137	0.000	3.09E+01	0.00E+00	3.09E+01		
Pu-239	-4.8440E-02	114.137	0.000	3.74E+00	0.00E+00	3.74E+00		
Pu-240	-3.0095E-01	114.137	0.000	4.77E+00	0.00E+00	4.77E+00		
Pu-241	-1.0411E+02	114.137	0.000	1.23E+03	0.00E+00	1.23E+03		
Pu-242	-1.1381E-04	114.137	0.000	2.06E-02	7.66E-03	2.06E-02		
Ra-226	6.4400E-08	114.137	114.137	0.00E+00	7.35E-06	7.35E-06		
Ra-228	5.9952E-07	114.137	114.137	0.00E+00	6.84E-05	6.84E-05		
Ru-106	8.5526E-07	114.137	114.137	0.00E+00	9.76E-05	9.76E-05		
Se-79	1.9181E-04	114.137	114.137	0.00E+00	2.19E-02	2.19E-02		
Sn-126	1.6671E-04	114.137	114.137	0.00E+00	1.90E-02	1.90E-02		
Sr-90	1.9799E+01	114.137	114.137	0.00E+00	2.26E+03	2.26E+03		
Tc-99	6.7678E-03	114.137	114.137	0.00E+00	7.72E-01	7.72E-01		
Th-229	1.7488E-06	114.137	114.137	0.00E+00	2.00E-04	2.00E-04		
Th-230	5.8704E-06	114.137	114.137	0.00E+00	6.70E-04	6.70E-04		
Th-232	6.0208E-07	114.137	114.137	0.00E+00	6.87E-05	6.87E-05		
Tl-208	8.7573E-05	114.137	114.137	0.00E+00	1.00E-02	1.00E-02		
U-232	2.3706E-04	114.137	114.137	0.00E+00	2.71E-02	2.71E-02		
U-233	3.6128E-04	114.137	114.137	0.00E+00	4.12E-02	4.12E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-234	1.2788E-02	114.137	114.137	0.00E+00	1.46E+00	1.46E+00	1.12E+02	1.14E+02
U-235	5.7486E-04	114.137	114.137	1.03E-04	6.57E-02	6.57E-02	Total	Total
U-236	2.3485E-04	114.137	114.137	0.00E+00	2.68E-02	2.68E-02		
U-238	1.1581E-04	114.137	114.137	1.29E-05	1.32E-02	1.32E-02		
Y-90	1.9804E+01	114.137	114.137	0.00E+00	2.26E+03	2.26E+03		
Other Radionuclides					7.04E+03	7.04E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	UNKNOWN	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		114.137	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		114.137	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	14.21		
Bounding:	14.21		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: MISCELLANEOUS TREAT FUEL
 SNF ID #: 905
 Fuel Units & Descr: 1 - UNKNOWN
 Heavy Metal Mass: BOL= : EOL=.12kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: N-Reactor (Graphite, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 69600
 Template BOL Heavy Metal Mass (MT): 11.6
 Template Decay Time: 35 years

Estimated
 Canister usage:
18"x10"
 0.01

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4.2184E-10	126.700	126.700	0.00E+00	5.34E-08	5.34E-08	Avg. MeV	
Am-241	9.6379E-02	126.700	126.700	0.00E+00	1.22E+01	1.22E+01	0.0150	6.156E+12
Am-242m	5.8463E-05	126.700	126.700	0.00E+00	7.41E-03	7.41E-03	0.0250	1.258E+12
Am-243	4.6279E-05	126.700	126.700	0.00E+00	5.86E-03	5.86E-03	0.0375	1.164E+12
C-14	9.2026E-05	126.700	126.700	0.00E+00	1.17E-02	1.17E-02	0.0575	1.328E+12
Cf-36	0.0000E+00	126.700	126.700	0.00E+00	0.00E+00	0.00E+00	0.0850	6.986E+11
Cm-243	0.0000E+00	126.700	126.700	0.00E+00	0.00E+00	0.00E+00	0.1250	4.639E+11
Cm-244	4.5445E-04	126.700	126.700	0.00E+00	5.76E-02	5.76E-02	0.2250	5.993E+11
Co-60	6.3707E-05	126.700	126.700	0.00E+00	8.07E-03	8.07E-03	0.3750	2.593E+11
Cs-134	1.4042E-05	126.700	126.700	0.00E+00	1.78E-03	1.78E-03	0.5750	5.595E+12
Cs-135	1.0066E-05	126.700	126.700	0.00E+00	1.28E-03	1.28E-03	0.8500	5.684E+10
Cs-137	1.1945E+00	126.700	126.700	0.00E+00	1.51E+02	1.51E+02	1.2500	3.101E+10
Eu-154	6.6451E-03	126.700	126.700	0.00E+00	8.42E-01	8.42E-01	1.7500	1.573E+09
Eu-155	2.9052E-04	126.700	126.700	0.00E+00	3.68E-02	3.68E-02	2.2500	1.270E+05
Fe-55	2.8807E-06	126.700	126.700	0.00E+00	3.65E-04	3.65E-04	2.7500	2.965E+03
H-3	2.1063E-03	126.700	126.700	0.00E+00	2.67E-01	2.67E-01	3.5000	2.622E+03
I-129	8.6006E-07	126.700	126.700	0.00E+00	1.09E-04	1.09E-04	5.0000	1.106E+03
Kr-85	2.6739E-02	126.700	126.700	0.00E+00	3.39E+00	3.39E+00	7.0000	1.254E+02
Np-237	8.5589E-06	126.700	126.700	0.00E+00	1.08E-03	1.08E-03	11.0000	1.428E+01
Pa-231	1.2500E-09	126.700	126.700	0.00E+00	1.58E-07	1.58E-07		
Pb-210	2.3017E-11	126.700	126.700	0.00E+00	2.92E-09	2.92E-09		
Pm-147	5.9856E-04	126.700	126.700	0.00E+00	7.58E-02	7.58E-02		
Pu-238	2.0029E-02	126.700	126.700	0.00E+00	2.54E+00	2.54E+00		
Pu-239	2.8836E-02	126.700	126.700	0.00E+00	3.65E+00	3.65E+00		
Pu-240	2.2802E-02	126.700	126.700	0.00E+00	2.89E+00	2.89E+00		
Pu-241	6.1020E-01	126.700	126.700	0.00E+00	7.73E+01	7.73E+01		
Pu-242	1.4526E-05	126.700	126.700	0.00E+00	1.84E-03	1.84E-03		
Ra-226	9.7701E-11	126.700	126.700	0.00E+00	1.24E-08	1.24E-08		
Ra-228	1.1068E-14	126.700	126.700	0.00E+00	1.40E-12	1.40E-12		
Ru-106	5.9224E-10	126.700	126.700	0.00E+00	7.50E-08	7.50E-08		
Se-79	1.0899E-05	126.700	126.700	0.00E+00	1.38E-03	1.38E-03		
Sn-126	0.0000E+00	126.700	126.700	0.00E+00	0.00E+00	0.00E+00		
Sr-90	8.4899E-01	126.700	126.700	0.00E+00	1.08E+02	1.08E+02		
Tc-99	3.6494E-04	126.700	126.700	0.00E+00	4.62E-02	4.62E-02		
Th-229	1.2928E-12	126.700	126.700	0.00E+00	1.64E-10	1.64E-10		
Th-230	1.6293E-08	126.700	126.700	0.00E+00	2.06E-06	2.06E-06		
Th-232	1.6451E-14	126.700	126.700	0.00E+00	2.08E-12	2.08E-12		
Tl-208	3.4382E-15	126.700	126.700	0.00E+00	4.36E-13	4.36E-13		
U-232	0.0000E+00	126.700	126.700	0.00E+00	0.00E+00	0.00E+00		
U-233	9.9425E-10	126.700	126.700	0.00E+00	1.26E-07	1.26E-07		
U-234	6.5575E-05	126.700	126.700	0.00E+00	8.31E-03	8.31E-03		
U-235	-1.2944E-06	126.700	0.000	4.92E-06	0.00E+00	4.92E-06		
U-236	1.1951E-05	126.700	126.700	0.00E+00	1.51E-03	1.51E-03		
U-238	-3.0619E-07	126.700	0.000	7.99E-05	4.11E-05	7.99E-05		
Y-90	8.4928E-01	126.700	126.700	0.00E+00	1.08E+02	1.08E+02		
Other Radionuclides					1.45E+02	1.45E+02		

Thermal Power	
Nominal Heat	Bounding
Output (Watts)	Heat Output (Watts)
2.16E+00	2.16E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	GRAPHITE	This Template was used for the following reasons: This fuel matches on all parameters except cladding (unknown) and enrichment (unknown).
Fuel Cladding:	UNKNOWN	ZIRC	
BOL HM Constituents:	U METAL	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		126.700	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		126.700	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	87.91		
Bounding:	87.91		

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

² Total burnup for all fuel associated with this worksheet must be 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=43.03kg
ROD Storage Site: SRS

¹Fuel decay start date: 1994
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
Canister usage:
18"x10"
4.00

Radionuclide	II. Estimates		Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n					Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.0068E-09	21,239.751	42,479.502	0.00E+00	4.26E-05	8.52E-05	Avg. MeV	
Am-241	2.5251E-03	21,239.751	42,479.502	0.00E+00	5.36E+01	1.07E+02	0.0150	3.129E+15
Am-242m	3.9624E-07	21,239.751	42,479.502	0.00E+00	8.42E-03	1.68E-02	0.0250	6.497E+14
Am-243	1.4880E-06	21,239.751	42,479.502	0.00E+00	3.16E-02	6.32E-02	0.0375	5.647E+14
C-14	5.7053E-09	21,239.751	42,479.502	0.00E+00	1.21E-04	2.42E-04	0.0675	6.078E+14
Cl-36	1.3124E-32	21,239.751	42,479.502	0.00E+00	2.79E-28	5.57E-28	0.0850	3.662E+14
Cr-243	1.1419E-07	21,239.751	42,479.502	0.00E+00	2.43E-03	4.85E-03	0.1250	2.419E+14
Cr-244	1.6522E-05	21,239.751	42,479.502	0.00E+00	3.51E-01	7.02E-01	0.2250	3.162E+14
Co-60	7.4047E-07	21,239.751	42,479.502	0.00E+00	1.57E-02	3.15E-02	0.3750	1.375E+14
Cs-134	2.0455E-05	21,239.751	42,479.502	0.00E+00	4.34E-01	8.69E-01	0.5750	2.273E+15
Cs-135	3.4477E-06	21,239.751	42,479.502	0.00E+00	7.32E-02	1.46E-01	0.8500	2.777E+13
Cs-137	1.4365E+00	21,239.751	42,479.502	0.00E+00	3.05E+04	6.10E+04	1.2500	1.343E+13
Eu-154	7.3230E-03	21,239.751	42,479.502	0.00E+00	1.56E+02	3.11E+02	1.7500	7.560E+11
Eu-155	5.9259E-04	21,239.751	42,479.502	0.00E+00	1.26E+01	2.52E+01	2.2500	6.322E+07
Fe-55	2.2791E-06	21,239.751	42,479.502	0.00E+00	4.84E-02	9.68E-02	2.7500	6.032E+07
H-3	1.9698E-03	21,239.751	42,479.502	0.00E+00	4.18E+01	8.37E+01	3.5000	3.495E+04
I-129	7.5300E-07	21,239.751	42,479.502	0.00E+00	1.60E-02	3.20E-02	5.0000	1.428E+04
Kr-85	4.1176E-02	21,239.751	42,479.502	0.00E+00	8.75E+02	1.75E+03	7.0000	1.563E+03
Np-237	9.5752E-06	21,239.751	42,479.502	0.00E+00	2.03E-01	4.07E-01	11.0000	1.742E+02
Pa-231	3.9379E-09	21,239.751	42,479.502	0.00E+00	8.36E-05	1.67E-04		
Pb-210	3.3115E-10	21,239.751	42,479.502	0.00E+00	7.03E-06	1.41E-05		
Pm-147	9.2402E-04	21,239.751	42,479.502	0.00E+00	1.96E+01	3.93E+01		
Pu-238	1.6217E-02	21,239.751	42,479.502	0.00E+00	3.44E+02	6.89E+02		
Pu-239	4.2810E-04	21,239.751	42,479.502	0.00E+00	9.09E+00	1.82E+01		
Pu-240	2.4333E-04	21,239.751	42,479.502	0.00E+00	5.17E+00	1.03E+01		
Pu-241	1.6242E-02	21,239.751	42,479.502	0.00E+00	3.45E+02	6.90E+02		
Pu-242	3.6329E-07	21,239.751	42,479.502	0.00E+00	7.72E-03	1.54E-02		
Ra-226	9.0114E-10	21,239.751	42,479.502	0.00E+00	1.91E-05	3.83E-05		
Ra-228	3.1019E-14	21,239.751	42,479.502	0.00E+00	6.59E-10	1.32E-09		
Ru-106	2.1225E-10	21,239.751	42,479.502	0.00E+00	4.51E-06	9.02E-06		
Se-79	1.2930E-05	21,239.751	42,479.502	0.00E+00	2.75E-01	5.49E-01		
Sn-126	1.1571E-05	21,239.751	42,479.502	0.00E+00	2.46E-01	4.92E-01		
Sr-90	1.3472E+00	21,239.751	42,479.502	0.00E+00	2.86E+04	5.72E+04		
Tc-99	4.2239E-04	21,239.751	42,479.502	0.00E+00	8.97E+00	1.79E+01		
Th-229	1.2407E-11	21,239.751	42,479.502	0.00E+00	2.64E-07	5.27E-07		
Th-230	8.3497E-08	21,239.751	42,479.502	0.00E+00	1.77E-03	3.55E-03		
Th-232	3.8371E-14	21,239.751	42,479.502	0.00E+00	8.15E-10	1.63E-09		
Ti-208	4.0414E-08	21,239.751	42,479.502	0.00E+00	8.58E-04	1.72E-03		
U-232	1.0948E-07	21,239.751	42,479.502	0.00E+00	2.33E-03	4.65E-03		
U-233	3.6275E-09	21,239.751	42,479.502	0.00E+00	7.70E-05	1.54E-04		
U-234	1.8562E-04	21,239.751	42,479.502	0.00E+00	3.94E+00	7.89E+00		
U-235	-2.7235E-06	21,239.751	0.000	1.32E-01	7.39E-02	1.32E-01		
U-236	1.5493E-05	21,239.751	42,479.502	0.00E+00	3.29E-01	6.58E-01		
U-238	-4.2851E-09	21,239.751	0.000	1.51E-03	1.42E-03	1.51E-03		
Y-90	1.3475E+00	21,239.751	42,479.502	0.00E+00	2.86E+04	5.72E+04		
Other Radionuclides					2.91E+04	5.81E+04		

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.55E+02	7.11E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.145832	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		21,239.751	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		42,479.502	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	1.03		1.03
Bounding:	2.06		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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: 451 - 15 FLAT PLATES
 Heavy Metal Mass: BOL=245.70kg ; EOL=187.53kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 15.03

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.4545E-10	82,311.108	164,622.216	0.00E+00	1.20E-05	2.39E-05	Avg. MeV	
Am-241	1.1190E-03	82,311.108	164,622.216	0.00E+00	9.21E+01	1.84E+02	0.0150	3.176E+16
Am-242m	4.5425E-07	82,311.108	164,622.216	0.00E+00	3.74E-02	7.48E-02	0.0250	6.842E+15
Am-243	1.4921E-06	82,311.108	164,622.216	0.00E+00	1.23E-01	2.46E-01	0.0375	6.314E+15
C-14	5.7244E-09	82,311.108	164,622.216	0.00E+00	4.71E-04	9.42E-04	0.0575	6.209E+15
Cl-36	1.3124E-32	82,311.108	164,622.216	0.00E+00	1.08E-27	2.16E-27	0.0850	3.958E+15
Cm-243	2.3676E-07	82,311.108	164,622.216	0.00E+00	1.95E-02	3.90E-02	0.1250	3.427E+15
Cm-244	5.2042E-05	82,311.108	164,622.216	0.00E+00	4.28E+00	8.57E+00	0.2250	3.355E+15
Co-60	3.8208E-05	82,311.108	164,622.216	0.00E+00	3.14E+00	6.29E+00	0.3750	1.624E+15
Cs-134	4.8693E-01	82,311.108	164,622.216	0.00E+00	4.01E+04	8.02E+04	0.5750	2.230E+16
Cs-135	3.4477E-06	82,311.108	164,622.216	0.00E+00	2.84E-01	5.68E-01	0.8500	3.123E+15
Cs-137	2.8731E+00	82,311.108	164,622.216	0.00E+00	2.36E+05	4.73E+05	1.2500	5.811E+14
Eu-154	8.2053E-02	82,311.108	164,622.216	0.00E+00	6.75E+03	1.35E+04	1.7500	2.437E+13
Eu-155	3.9134E-02	82,311.108	164,622.216	0.00E+00	3.22E+03	6.44E+03	2.2500	5.112E+13
Fe-55	6.7429E-03	82,311.108	164,622.216	0.00E+00	5.55E+02	1.11E+03	2.7500	2.941E+11
H-3	1.0599E-02	82,311.108	164,622.216	0.00E+00	8.72E+02	1.74E+03	3.5000	3.262E+10
I-129	7.5300E-07	82,311.108	164,622.216	0.00E+00	6.20E-02	1.24E-01	5.0000	9.751E+04
Kr-85	2.8595E-01	82,311.108	164,622.216	0.00E+00	2.35E+04	4.71E+04	7.0000	1.087E+04
Np-237	9.5479E-06	82,311.108	164,622.216	0.00E+00	7.86E-01	1.57E+00	11.0000	1.225E+03
Pa-231	8.9297E-10	82,311.108	164,622.216	0.00E+00	7.35E-05	1.47E-04		
Pb-210	3.7609E-12	82,311.108	164,622.216	0.00E+00	3.10E-07	6.19E-07		
Pm-147	2.5452E+00	82,311.108	164,622.216	0.00E+00	2.09E+05	4.19E+05		
Pu-238	2.0550E-02	82,311.108	164,622.216	0.00E+00	1.69E+03	3.38E+03		
Pu-239	4.2838E-04	82,311.108	164,622.216	0.00E+00	3.53E+01	7.05E+01		
Pu-240	2.4401E-04	82,311.108	164,622.216	0.00E+00	2.01E+01	4.02E+01		
Pu-241	6.8764E-02	82,311.108	164,622.216	0.00E+00	5.66E+03	1.13E+04		
Pu-242	3.6329E-07	82,311.108	164,622.216	0.00E+00	2.99E-02	5.98E-02		
Ra-226	3.8045E-11	82,311.108	164,622.216	0.00E+00	3.13E-06	6.26E-06		
Ra-228	2.9902E-15	82,311.108	164,622.216	0.00E+00	2.46E-10	4.92E-10		
Ru-106	1.9055E-01	82,311.108	164,622.216	0.00E+00	1.57E+04	3.14E+04		
Se-79	1.2936E-05	82,311.108	164,622.216	0.00E+00	1.06E+00	2.13E+00		
Sn-126	1.1574E-05	82,311.108	164,622.216	0.00E+00	9.53E-01	1.91E+00		
Sr-90	2.7505E+00	82,311.108	164,622.216	0.00E+00	2.26E+05	4.53E+05		
Tc-99	4.2239E-04	82,311.108	164,622.216	0.00E+00	3.48E+01	6.95E+01		
Th-229	1.8848E-12	82,311.108	164,622.216	0.00E+00	1.55E-07	3.10E-07		
Th-230	1.7042E-08	82,311.108	164,622.216	0.00E+00	1.40E-03	2.81E-03		
Th-232	7.8132E-15	82,311.108	164,622.216	0.00E+00	6.43E-10	1.29E-09		
Tl-208	4.4063E-08	82,311.108	164,622.216	0.00E+00	3.63E-03	7.25E-03		
U-232	1.3151E-07	82,311.108	164,622.216	0.00E+00	1.08E-02	2.16E-02		
U-233	1.9564E-09	82,311.108	164,622.216	0.00E+00	1.61E-04	3.22E-04		
U-234	1.8371E-04	82,311.108	164,622.216	0.00E+00	1.51E+01	3.02E+01		
U-235	-2.7235E-06	82,311.108	0.000	4.94E-01	2.70E-01	4.94E-01		
U-236	1.5493E-05	82,311.108	164,622.216	0.00E+00	1.28E+00	2.55E+00		
U-238	-4.2851E-09	82,311.108	0.000	5.68E-03	5.32E-03	5.68E-03		
Y-90	2.7505E+00	82,311.108	164,622.216	0.00E+00	2.26E+05	4.53E+05		
Other Radionuclides					4.23E+05	8.47E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.17E+03	8.35E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.1245618	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	82,311.108	55,096.642	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:		164,622.216	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.06	0.67	0.87
Bounding:	2.13		

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

²Total burnup for all fuel associated with this worksheet must be 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=58.63kg ; EOL=58.29kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1965
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 3.72

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	4.5940E-08	316.457	632.914	0.00E+00	1.45E-05	2.91E-05	0.0150	2.310E+13
Am-241	1.1471E-04	316.457	632.914	0.00E+00	3.63E-02	7.26E-02	0.0250	4.800E+12
Am-242m	7.4210E-09	316.457	632.914	0.00E+00	2.35E-06	4.70E-06	0.0375	4.171E+12
Am-243	9.8236E-10	316.457	632.914	0.00E+00	3.11E-07	6.22E-07	0.0575	4.476E+12
C-14	2.2928E-04	316.457	632.914	0.00E+00	7.26E-02	1.45E-01	0.0850	2.704E+12
Cl-36	1.2260E-06	316.457	632.914	0.00E+00	3.88E-04	7.76E-04	0.1250	1.753E+12
Cm-243	1.2000E-10	316.457	632.914	0.00E+00	3.80E-08	7.59E-08	0.2250	2.332E+12
Cm-244	7.3577E-10	316.457	632.914	0.00E+00	2.33E-07	4.66E-07	0.3750	1.016E+12
Co-60	1.3732E-03	316.457	632.914	0.00E+00	4.35E-01	8.69E-01	0.5750	1.710E+13
Cs-134	1.2709E-10	316.457	632.914	0.00E+00	4.02E-08	8.04E-08	0.8500	1.660E+11
Cs-135	3.0316E-05	316.457	632.914	0.00E+00	9.59E-03	1.92E-02	1.2500	1.202E+11
Cs-137	7.2579E-01	316.457	632.914	0.00E+00	2.30E+02	4.59E+02	1.7500	4.272E+09
Eu-154	5.9750E-05	316.457	632.914	0.00E+00	1.89E-02	3.78E-02	2.2500	8.079E+05
Eu-155	1.0577E-05	316.457	632.914	0.00E+00	3.35E-03	6.69E-03	2.7500	3.617E+05
Fe-55	4.1631E-07	316.457	632.914	0.00E+00	1.32E-04	2.63E-04	3.5000	4.749E+01
H-3	4.6722E-04	316.457	632.914	0.00E+00	1.48E-01	2.96E-01	5.0000	1.969E+01
I-129	7.3195E-07	316.457	632.914	0.00E+00	2.32E-04	4.63E-04	7.0000	2.186E+00
Kr-85	5.9418E-03	316.457	632.914	0.00E+00	1.88E+00	3.76E+00	11.0000	2.462E-01
Np-237	1.1499E-06	316.457	632.914	0.00E+00	3.64E-04	7.28E-04		
Pa-231	7.0899E-08	316.457	632.914	0.00E+00	2.24E-05	4.49E-05		
Pb-210	2.2363E-12	316.457	632.914	0.00E+00	7.08E-10	1.42E-09		
Pm-147	4.2296E-07	316.457	632.914	0.00E+00	1.34E-04	2.68E-04		
Pu-238	2.3295E-04	316.457	632.914	0.00E+00	7.37E-02	1.47E-01		
Pu-239	6.6722E-04	316.457	632.914	0.00E+00	2.11E-01	4.22E-01		
Pu-240	8.6556E-05	316.457	632.914	0.00E+00	2.74E-02	5.48E-02		
Pu-241	1.6889E-04	316.457	632.914	0.00E+00	5.34E-02	1.07E-01		
Pu-242	1.9717E-09	316.457	632.914	0.00E+00	6.24E-07	1.25E-06		
Ra-226	4.5740E-12	316.457	632.914	0.00E+00	1.45E-09	2.89E-09		
Ra-228	8.3511E-12	316.457	632.914	0.00E+00	2.64E-09	5.29E-09		
Ru-106	2.0516E-19	316.457	632.914	0.00E+00	6.49E-17	1.30E-16		
Se-79	1.3220E-05	316.457	632.914	0.00E+00	4.18E-03	8.37E-03		
Sn-126	1.1489E-05	316.457	632.914	0.00E+00	3.64E-03	7.27E-03		
Sr-90	6.6872E-01	316.457	632.914	0.00E+00	2.12E+02	4.23E+02		
Tc-99	4.6639E-04	316.457	632.914	0.00E+00	1.48E-01	2.95E-01		
Th-229	2.3727E-11	316.457	632.914	0.00E+00	7.51E-09	1.50E-08		
Th-230	2.7354E-10	316.457	632.914	0.00E+00	8.66E-08	1.73E-07		
Th-232	8.3594E-12	316.457	632.914	0.00E+00	2.65E-09	5.29E-09		
Tl-208	1.6228E-08	316.457	632.914	0.00E+00	5.14E-06	1.03E-05		
U-232	4.3960E-08	316.457	632.914	0.00E+00	1.39E-05	2.78E-05		
U-233	3.3344E-09	316.457	632.914	0.00E+00	1.06E-06	2.11E-06		
U-234	4.0749E-07	316.457	632.914	0.00E+00	1.29E-04	2.58E-04		
U-235	-2.7761E-06	316.457	0.000	1.18E-01	1.17E-01	1.18E-01		
U-236	1.6190E-05	316.457	632.914	0.00E+00	5.12E-03	1.02E-02		
U-238	-2.8547E-09	316.457	0.000	1.35E-03	1.35E-03	1.35E-03		
Y-90	6.6889E-01	316.457	632.914	0.00E+00	2.12E+02	4.23E+02		
Other Radionuclides								
							2.88E+02	5.75E+02

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.58E+00	5.16E+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:	HASTELLOY-X	SST
BOL HM Constituents:	UO ₂ -BeO ₂	U
BOL Enrichment %:	93.14285714	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:		316.457
Bounding:		632.914

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

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (CANADA)
 SNF ID #: 1064
 Fuel Units & Descr: 11 - 18 CURVED PLATES
 Heavy Metal Mass: BOL=1.96kg ; EOL=1.38kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2006
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.31

Radionuclide	II. Estimates			Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n	x _b				Photon Energy Group	Total Photons/sec (bounding)
	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²				Avg. MeV	
Ac-227	6.6313E-10	545.862	1,091.724	0.00E+00	3.62E-07	7.24E-07		
Am-241	2.0060E-03	545.862	1,091.724	0.00E+00	1.09E+00	2.19E+00	0.0150	1.152E+14
Am-242m	4.2429E-07	545.862	1,091.724	0.00E+00	2.32E-04	4.63E-04	0.0250	2.396E+13
Am-243	1.4899E-06	545.862	1,091.724	0.00E+00	8.13E-04	1.63E-03	0.0375	2.090E+13
C-14	5.7135E-09	545.862	1,091.724	0.00E+00	3.12E-06	6.24E-06	0.0575	2.239E+13
Cl-36	1.3124E-32	545.862	1,091.724	0.00E+00	7.16E-30	1.43E-29	0.0850	1.353E+13
Cm-243	1.6443E-07	545.862	1,091.724	0.00E+00	8.98E-05	1.80E-04	0.1250	9.154E+12
Cm-244	2.9330E-05	545.862	1,091.724	0.00E+00	1.60E-02	3.20E-02	0.2250	1.167E+13
Co-60	5.3186E-06	545.862	1,091.724	0.00E+00	2.90E-03	5.81E-03	0.3750	5.081E+12
Cs-134	3.1563E-03	545.862	1,091.724	0.00E+00	1.72E+00	3.45E+00	0.5750	8.289E+13
Cs-135	3.4477E-06	545.862	1,091.724	0.00E+00	1.88E-03	3.76E-03	0.8500	1.401E+12
Cs-137	2.0313E+00	545.862	1,091.724	0.00E+00	1.11E+03	2.22E+03	1.2500	8.002E+11
Eu-154	2.4513E-02	545.862	1,091.724	0.00E+00	1.34E+01	2.68E+01	1.7500	3.673E+10
Eu-155	4.8175E-03	545.862	1,091.724	0.00E+00	2.63E+00	5.26E+00	2.2500	3.222E+06
Fe-55	1.2397E-04	545.862	1,091.724	0.00E+00	6.77E-02	1.35E-01	2.7500	1.821E+06
H-3	4.5697E-03	545.862	1,091.724	0.00E+00	2.49E+00	4.99E+00	3.5000	8.369E+03
I-129	7.5300E-07	545.862	1,091.724	0.00E+00	4.11E-04	8.22E-04	5.0000	4.730E+02
Kr-85	1.0850E-01	545.862	1,091.724	0.00E+00	5.92E+01	1.18E+02	7.0000	5.223E+01
Np-237	9.5561E-06	545.862	1,091.724	0.00E+00	5.22E-03	1.04E-02	11.0000	5.853E+00
Pa-231	2.0359E-09	545.862	1,091.724	0.00E+00	1.11E-06	2.22E-06		
Pb-210	4.9728E-11	545.862	1,091.724	0.00E+00	2.71E-08	5.43E-08		
Pm-147	4.8502E-02	545.862	1,091.724	0.00E+00	2.65E+01	5.30E+01		
Pu-238	1.8254E-02	545.862	1,091.724	0.00E+00	9.96E+00	1.99E+01		
Pu-239	4.2810E-04	545.862	1,091.724	0.00E+00	2.34E-01	4.67E-01		
Pu-240	2.4368E-04	545.862	1,091.724	0.00E+00	1.33E-01	2.66E-01		
Pu-241	3.3415E-02	545.862	1,091.724	0.00E+00	1.82E+01	3.65E+01		
Pu-242	3.6329E-07	545.862	1,091.724	0.00E+00	1.98E-04	3.97E-04		
Ra-226	2.2854E-10	545.862	1,091.724	0.00E+00	1.25E-07	2.50E-07		
Ra-228	1.2426E-14	545.862	1,091.724	0.00E+00	6.78E-12	1.36E-11		
Ru-106	6.3589E-06	545.862	1,091.724	0.00E+00	3.47E-03	6.94E-03		
Se-79	1.2933E-05	545.862	1,091.724	0.00E+00	7.06E-03	1.41E-02		
Sn-126	1.1574E-05	545.862	1,091.724	0.00E+00	6.32E-03	1.26E-02		
Sr-90	1.9248E+00	545.862	1,091.724	0.00E+00	1.05E+03	2.10E+03		
Tc-99	4.2239E-04	545.862	1,091.724	0.00E+00	2.31E-01	4.61E-01		
Th-229	5.0953E-12	545.862	1,091.724	0.00E+00	2.78E-09	5.56E-09		
Th-230	4.1885E-08	545.862	1,091.724	0.00E+00	2.29E-05	4.57E-05		
Th-232	1.9270E-14	545.862	1,091.724	0.00E+00	1.05E-11	2.10E-11		
Th-208	4.6024E-08	545.862	1,091.724	0.00E+00	2.51E-05	5.02E-05		
U-232	1.2582E-07	545.862	1,091.724	0.00E+00	6.87E-05	1.37E-04		
U-233	2.5825E-09	545.862	1,091.724	0.00E+00	1.41E-06	2.82E-06		
U-234	1.8450E-04	545.862	1,091.724	0.00E+00	1.01E-01	2.01E-01		
U-235	-2.7235E-06	545.862	0.000	3.94E-03	2.46E-03	3.94E-03		
U-236	1.5493E-05	545.862	1,091.724	0.00E+00	8.46E-03	1.69E-02		
U-238	-4.2851E-09	545.862	0.000	4.53E-05	4.30E-05	4.53E-05		
Y-90	1.9254E+00	545.862	1,091.724	0.00E+00	1.05E+03	2.10E+03		
Other Radionuclides					1.06E+03	2.11E+03		
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							1.30E+01	2.60E+01
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.11672336	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		545.862	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,091.724	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.89		1.02
Bounding:	1.77		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: MOX SCRAP SNF
 SNF ID #: 368
 Fuel Units & Decr: 1 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL= ; EOL=106.34kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: FFTF (FAST, SST, 10 to 30%, Pu & U)
²Template Burnup(MWd): 5011.2
 Template BOL Heavy Metal Mass (MT): 0.0329181
 Template Decay Time: 35 years

Estimated
 Canister usage:
HIC
 1.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.1822E-12	106,140.239	106,140.239	0.00E+00	6.56E-07	6.56E-07	0.0150	3.432E+15
Am-241	1.1066E-01	106,140.239	106,140.239	4.10E+02	1.22E+04	1.22E+04	0.0250	6.897E+14
Am-242m	1.9247E-03	106,140.239	106,140.239	0.00E+00	2.04E+02	2.04E+02	0.0375	8.020E+14
Am-243	1.0740E-04	106,140.239	106,140.239	0.00E+00	1.14E+01	1.14E+01	0.0575	7.886E+14
C-14	2.6042E-05	106,140.239	106,140.239	0.00E+00	2.76E+00	2.76E+00	0.0850	3.841E+14
Cf-254	3.4243E-10	106,140.239	106,140.239	0.00E+00	3.63E-05	3.63E-05	0.1250	2.703E+14
Cm-243	4.0629E-04	106,140.239	106,140.239	0.00E+00	4.31E+01	4.31E+01	0.2250	3.100E+14
Cm-244	1.6024E-03	106,140.239	106,140.239	0.00E+00	1.70E+02	1.70E+02	0.3750	1.344E+14
Co-60	3.4283E-03	106,140.239	106,140.239	0.00E+00	3.64E+02	3.64E+02	0.5750	5.445E+15
Co-134	1.5565E-03	106,140.239	106,140.239	0.00E+00	1.65E+02	1.65E+02	0.8500	5.688E+13
Cs-135	4.7693E-05	106,140.239	106,140.239	0.00E+00	5.06E+00	5.06E+00	1.2500	6.809E+13
Cs-137	1.4007E+00	106,140.239	106,140.239	0.00E+00	1.49E+05	1.49E+05	1.7500	1.540E+12
Eu-154	1.6184E-02	106,140.239	106,140.239	0.00E+00	1.72E+03	1.72E+03	2.2500	3.048E+08
Eu-155	1.3775E-02	106,140.239	106,140.239	0.00E+00	1.46E+03	1.46E+03	2.7500	1.575E+09
Fe-55	3.8035E-04	106,140.239	106,140.239	0.00E+00	4.04E+01	4.04E+01	3.5000	6.516E+06
H-3	3.8454E-03	106,140.239	106,140.239	0.00E+00	4.08E+02	4.08E+02	5.0000	2.062E+06
I-129	1.2891E-06	106,140.239	106,140.239	0.00E+00	1.37E-01	1.37E-01	7.0000	2.355E+05
Kr-85	2.7858E-02	106,140.239	106,140.239	0.00E+00	2.96E+03	2.96E+03	11.0000	2.695E+04
Np-237	3.7516E-06	106,140.239	106,140.239	0.00E+00	3.98E-01	3.98E-01		
Pa-231	1.2488E-11	106,140.239	106,140.239	0.00E+00	1.33E-06	1.33E-06		
Pb-210	2.4206E-12	106,140.239	106,140.239	0.00E+00	2.57E-07	2.57E-07		
Pm-147	1.5671E-02	106,140.239	106,140.239	0.00E+00	1.66E+03	1.66E+03		
Pu-238	1.4877E-02	106,140.239	106,140.239	0.00E+00	1.58E+03	1.58E+03		
Pu-239	-3.5520E-02	106,140.239	0.000	3.37E+03	0.00E+00	3.37E+03		
Pu-240	2.0690E-02	106,140.239	106,140.239	1.71E+03	3.91E+03	3.91E+03		
Pu-241	-1.4799E+00	106,140.239	0.000	7.68E+04	0.00E+00	7.68E+04		
Pu-242	1.1252E-05	106,140.239	106,140.239	4.56E-01	1.65E+00	1.65E+00		
Ra-226	7.8524E-12	106,140.239	106,140.239	0.00E+00	8.33E-07	8.33E-07		
Ra-228	2.4086E-16	106,140.239	106,140.239	0.00E+00	2.56E-11	2.56E-11		
Ru-106	1.5066E-05	106,140.239	106,140.239	0.00E+00	1.60E+00	1.60E+00		
Se-79	1.0127E-05	106,140.239	106,140.239	0.00E+00	1.07E+00	1.07E+00		
Sn-126	4.3902E-05	106,140.239	106,140.239	0.00E+00	4.66E+00	4.66E+00		
Sr-90	5.0088E-01	106,140.239	106,140.239	0.00E+00	5.32E+04	5.32E+04		
Tc-99	3.9412E-04	106,140.239	106,140.239	0.00E+00	4.18E+01	4.18E+01		
Th-229	2.7219E-12	106,140.239	106,140.239	0.00E+00	2.89E-07	2.89E-07		
Th-230	1.0441E-09	106,140.239	106,140.239	0.00E+00	1.11E-04	1.11E-04		
Th-232	3.1689E-16	106,140.239	106,140.239	0.00E+00	3.36E-11	3.36E-11		
Tl-208	4.6636E-07	106,140.239	106,140.239	0.00E+00	4.95E-02	4.95E-02		
U-232	1.2638E-06	106,140.239	106,140.239	0.00E+00	1.34E-01	1.34E-01		
U-233	5.7451E-10	106,140.239	106,140.239	0.00E+00	6.10E-05	6.10E-05		
U-234	4.3044E-06	106,140.239	106,140.239	0.00E+00	4.57E-01	4.57E-01		
U-235	-7.7765E-09	106,140.239	0.000	6.91E-04	0.00E+00	6.91E-04		
U-236	1.8050E-07	106,140.239	106,140.239	0.00E+00	1.92E-02	1.92E-02		
U-238	-1.7914E-07	106,140.239	0.000	5.03E-02	3.13E-02	5.03E-02		
Y-90	5.0088E-01	106,140.239	106,140.239	0.00E+00	5.32E+04	5.32E+04		
Other Radionuclides					1.50E+05	1.50E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.89E+03	1.80E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative) and enrichment (unknown).
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	FAST	FAST	
BOL HM Constituents:	UNKNOWN	SST	
BOL Enrichment %:	PuO ₂ -UO ₂	Pu and U	
		10 to 30	

Burnup Summary (MWd) ²			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.
	From SFD	Estimated	
Nominal:		106,140.239	
Bounding:		106,140.239	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	3.28		1.05
Bounding:	3.28		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: MTR CANAL SCRAP
 SNF ID #: 1062
 Fuel Units & Descr: 105 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL = : EOL=265.98kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1979
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 HIC
 105.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.0733E-09	266.255	532.511	0.00E+00	2.86E-07	5.72E-07	Avg. MeV	
Am-241	1.4751E-01	266.255	532.511	0.00E+00	3.93E+01	7.86E+01	0.0150	2.026E+13
Am-242m	2.6809E-04	266.255	532.511	0.00E+00	7.14E-02	1.43E-01	0.0250	4.061E+12
Am-243	6.2484E-04	266.255	532.511	0.00E+00	1.66E-01	3.33E-01	0.0375	3.826E+12
C-14	4.7820E-05	266.255	532.511	0.00E+00	1.27E-02	2.55E-02	0.0575	4.789E+12
Cl-36	8.0297E-07	266.255	532.511	0.00E+00	2.14E-04	4.28E-04	0.0850	2.237E+12
Cm-243	1.7426E-04	266.255	532.511	0.00E+00	4.64E-02	9.28E-02	0.1250	1.488E+12
Cm-244	2.7616E-02	266.255	532.511	0.00E+00	7.35E+00	1.47E+01	0.2250	1.910E+12
Co-60	3.5610E-04	266.255	532.511	0.00E+00	9.48E-02	1.90E-01	0.3750	8.248E+11
Cs-134	2.6260E-07	266.255	532.511	0.00E+00	6.99E-05	1.40E-04	0.5750	1.943E+11
Cs-135	1.4433E-05	266.255	532.511	0.00E+00	3.84E-03	7.69E-03	0.8500	1.897E+11
Cs-137	9.8870E-01	266.255	532.511	0.00E+00	2.63E+02	5.26E+02	1.2500	1.207E+11
Eu-154	6.0320E-03	266.255	532.511	0.00E+00	1.61E+00	3.21E+00	1.7500	5.308E+09
Eu-155	2.1770E-04	266.255	532.511	0.00E+00	5.80E-02	1.16E-01	2.2500	8.732E+05
Fe-55	7.9296E-07	266.255	532.511	0.00E+00	2.11E-04	4.22E-04	2.7500	3.074E+06
H-3	8.9486E-03	266.255	532.511	0.00E+00	2.38E+00	4.77E+00	3.5000	2.198E+05
I-129	9.8288E-07	266.255	532.511	0.00E+00	2.62E-04	5.23E-04	5.0000	9.392E+04
Kr-85	1.0707E-02	266.255	532.511	0.00E+00	2.85E+00	5.70E+00	7.0000	1.082E+04
Np-237	1.1927E-05	266.255	532.511	0.00E+00	3.18E-03	6.35E-03	11.0000	1.242E+03
Pa-231	1.4703E-09	266.255	532.511	0.00E+00	3.91E-07	7.83E-07		
Pb-210	1.6828E-10	266.255	532.511	0.00E+00	4.48E-08	8.96E-08		
Pm-147	6.9606E-06	266.255	532.511	0.00E+00	1.85E-03	3.71E-03		
Pu-238	6.6263E-02	266.255	532.511	0.00E+00	1.76E+01	3.53E+01		
Pu-239	1.1618E-02	266.255	532.511	0.00E+00	3.09E+00	6.19E+00		
Pu-240	1.5142E-02	266.255	532.511	0.00E+00	4.03E+00	8.06E+00		
Pu-241	4.3766E-01	266.255	532.511	0.00E+00	1.17E+02	2.33E+02		
Pu-242	6.4260E-05	266.255	532.511	0.00E+00	1.71E-02	3.42E-02		
Ra-226	3.8501E-10	266.255	532.511	0.00E+00	1.03E-07	2.05E-07		
Ra-228	5.2955E-12	266.255	532.511	0.00E+00	1.41E-09	2.82E-09		
Ru-106	2.0413E-14	266.255	532.511	0.00E+00	5.44E-12	1.09E-11		
Se-79	1.2376E-05	266.255	532.511	0.00E+00	3.30E-03	6.59E-03		
Sn-126	2.5210E-05	266.255	532.511	0.00E+00	6.71E-03	1.34E-02		
Sr-90	6.4163E-01	266.255	532.511	0.00E+00	1.71E+02	3.42E+02		
Tc-99	3.9357E-04	266.255	532.511	0.00E+00	1.05E-01	2.10E-01		
Th-229	1.5644E-10	266.255	532.511	0.00E+00	4.17E-08	8.33E-08		
Th-230	2.7972E-08	266.255	532.511	0.00E+00	7.45E-06	1.49E-05		
Th-232	5.3036E-12	266.255	532.511	0.00E+00	1.41E-09	2.82E-09		
Tl-208	1.5136E-07	266.255	532.511	0.00E+00	4.03E-05	8.06E-05		
U-232	4.1005E-07	266.255	532.511	0.00E+00	1.09E-04	2.18E-04		
U-233	2.5856E-08	266.255	532.511	0.00E+00	6.88E-06	1.38E-05		
U-234	5.2665E-05	266.255	532.511	0.00E+00	1.40E-02	2.80E-02		
U-235	-1.4487E-06	266.255	0.000	1.84E-02	1.80E-02	1.84E-02		
U-236	7.5888E-06	266.255	532.511	0.00E+00	2.02E-03	4.04E-03		
U-238	-2.6129E-07	266.255	0.000	8.66E-02	8.65E-02	8.66E-02		
Y-90	6.4180E-01	266.255	532.511	0.00E+00	1.71E+02	3.42E+02		
Other Radionuclides					2.54E+02	5.07E+02		
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							4.82E+00	9.63E+00
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		266.255	Nominal burnup taken from SFD and converted to MWd using BOL=266.255kg Bounding burnup assumed to be twice nominal burnup.
Bounding:		532.511	

Checks			Estimated EOL HM/ Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.03		1.00
Bounding:	0.06		

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

²Total burnup for all fuel associated with this worksheet must be 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 (COLUMBIA)
 SNF ID #: 144
 Fuel Units & Descr: 953 - 24 CURVED PLATES
 Heavy Metal Mass: BOL=791.94kg ; EOL=689.69kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 26.47

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.4545E-10	96,839.268	193,678.536	0.00E+00	1.41E-05	2.82E-05	Avg. MeV	
Am-241	1.1190E-03	96,839.268	193,678.536	0.00E+00	1.08E+02	2.17E+02	0.0150	3.737E+16
Am-242m	4.5425E-07	96,839.268	193,678.536	0.00E+00	4.40E-02	8.80E-02	0.0250	8.050E+15
Am-243	1.4921E-06	96,839.268	193,678.536	0.00E+00	1.44E-01	2.89E-01	0.0375	7.429E+15
C-14	5.7244E-09	96,839.268	193,678.536	0.00E+00	5.54E-04	1.11E-03	0.0575	7.304E+15
Cl-36	1.3124E-32	96,839.268	193,678.536	0.00E+00	1.27E-27	2.54E-27	0.0850	4.656E+15
Cm-243	2.3676E-07	96,839.268	193,678.536	0.00E+00	2.29E-02	4.59E-02	0.1250	4.032E+15
Cm-244	5.2042E-05	96,839.268	193,678.536	0.00E+00	5.04E+00	1.01E+01	0.2250	3.947E+15
Co-60	3.8208E-05	96,839.268	193,678.536	0.00E+00	3.70E+00	7.40E+00	0.3750	1.910E+15
Cs-134	4.8693E-01	96,839.268	193,678.536	0.00E+00	4.72E+04	9.43E+04	0.5750	2.624E+16
Cs-135	3.4477E-06	96,839.268	193,678.536	0.00E+00	3.34E-01	6.68E-01	0.8500	3.674E+15
Cs-137	2.8731E+00	96,839.268	193,678.536	0.00E+00	2.78E+05	5.56E+05	1.2500	6.837E+14
Eu-154	8.2059E-02	96,839.268	193,678.536	0.00E+00	7.95E+03	1.59E+04	1.7500	2.867E+13
Eu-155	3.9134E-02	96,839.268	193,678.536	0.00E+00	3.79E+03	7.58E+03	2.2500	6.014E+13
Fe-55	6.7429E-03	96,839.268	193,678.536	0.00E+00	6.53E+02	1.31E+03	2.7500	3.460E+11
H-3	1.0599E-02	96,839.268	193,678.536	0.00E+00	1.03E+03	2.05E+03	3.5000	3.838E+10
I-129	7.5300E-07	96,839.268	193,678.536	0.00E+00	7.29E-02	1.46E-01	5.0000	1.148E+05
Kr-85	2.8595E-01	96,839.268	193,678.536	0.00E+00	2.77E+04	5.54E+04	7.0000	1.279E+04
Np-237	9.5479E-06	96,839.268	193,678.536	0.00E+00	9.25E-01	1.85E+00	11.0000	1.442E+03
Pa-231	8.9297E-10	96,839.268	193,678.536	0.00E+00	8.65E-05	1.73E-04		
Pb-210	3.7609E-12	96,839.268	193,678.536	0.00E+00	3.64E-07	7.28E-07		
Pm-147	2.5452E+00	96,839.268	193,678.536	0.00E+00	2.46E+05	4.93E+05		
Pu-238	2.0550E-02	96,839.268	193,678.536	0.00E+00	1.99E+03	3.98E+03		
Pu-239	4.2838E-04	96,839.268	193,678.536	0.00E+00	4.15E+01	8.30E+01		
Pu-240	2.4401E-04	96,839.268	193,678.536	0.00E+00	2.36E+01	4.73E+01		
Pu-241	6.8764E-02	96,839.268	193,678.536	0.00E+00	6.66E+03	1.33E+04		
Pu-242	3.6329E-07	96,839.268	193,678.536	0.00E+00	3.52E-02	7.04E-02		
Ra-226	3.8045E-11	96,839.268	193,678.536	0.00E+00	3.68E-06	7.37E-06		
Ra-228	2.9902E-15	96,839.268	193,678.536	0.00E+00	2.90E-10	5.79E-10		
Ru-106	1.9055E-01	96,839.268	193,678.536	0.00E+00	1.85E+04	3.69E+04		
Se-79	1.2936E-05	96,839.268	193,678.536	0.00E+00	1.25E+00	2.51E+00		
Sn-126	1.1574E-05	96,839.268	193,678.536	0.00E+00	1.12E+00	2.24E+00		
Sr-90	2.7505E+00	96,839.268	193,678.536	0.00E+00	2.66E+05	5.33E+05		
Tc-99	4.2239E-04	96,839.268	193,678.536	0.00E+00	4.09E+01	8.18E+01		
Th-229	1.8848E-12	96,839.268	193,678.536	0.00E+00	1.83E-07	3.65E-07		
Th-230	1.7042E-08	96,839.268	193,678.536	0.00E+00	1.65E-03	3.30E-03		
Th-232	7.8132E-15	96,839.268	193,678.536	0.00E+00	7.57E-10	1.51E-09		
Tl-208	4.4063E-08	96,839.268	193,678.536	0.00E+00	4.27E-03	8.53E-03		
U-232	1.3151E-07	96,839.268	193,678.536	0.00E+00	1.27E-02	2.55E-02		
U-233	1.9564E-09	96,839.268	193,678.536	0.00E+00	1.89E-04	3.79E-04		
U-234	1.8371E-04	96,839.268	193,678.536	0.00E+00	1.78E+01	3.56E+01		
U-235	-2.7235E-06	96,839.268	0.000	1.60E+00	1.33E+00	1.60E+00		
U-236	1.5493E-05	96,839.268	193,678.536	0.00E+00	1.50E+00	3.00E+00		
U-238	-4.2851E-09	96,839.268	0.000	1.79E-02	1.75E-02	1.79E-02		
Y-90	2.7505E+00	96,839.268	193,678.536	0.00E+00	2.66E+05	5.33E+05		
Other Radionuclides					4.98E+05	9.96E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.91E+03	9.82E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.26113117	60 to 100	

Burnup Summary (MWd) ¹			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		96,839.268	
Bounding:		193,678.536	

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:	0.78	
		Estimated EOL HM/Given EOL HM
		1.01

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

²Total burnup for all fuel associated with this worksheet must be 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 (COLUMBIA) ¹Fuel decay start date: 1985
 SNF ID #: 962 Estimates as of: 2030
 Fuel Units & Descr: 24 - 24 CURVED PLATES Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=18.84kg ; EOL=16.29kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.67

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	3,391.200	6,782.400	0.00E+00	6.81E-06	1.36E-05		
Am-241	2.5251E-03	3,391.200	6,782.400	0.00E+00	8.56E+00	1.71E+01	0.0150	4.995E+14
Am-242m	3.9624E-07	3,391.200	6,782.400	0.00E+00	1.34E-03	2.69E-03	0.0250	1.037E+14
Am-243	1.4880E-06	3,391.200	6,782.400	0.00E+00	5.05E-03	1.01E-02	0.0375	9.016E+13
C-14	5.7053E-09	3,391.200	6,782.400	0.00E+00	1.93E-05	3.87E-05	0.0575	9.705E+13
Cl-36	1.3124E-32	3,391.200	6,782.400	0.00E+00	4.45E-29	8.90E-29	0.0850	5.847E+13
Cm-243	1.1419E-07	3,391.200	6,782.400	0.00E+00	3.87E-04	7.74E-04	0.1250	3.862E+13
Cm-244	1.6522E-05	3,391.200	6,782.400	0.00E+00	5.60E-02	1.12E-01	0.2250	5.048E+13
Co-60	7.4047E-07	3,391.200	6,782.400	0.00E+00	2.51E-03	5.02E-03	0.3750	2.196E+13
Cs-134	2.0455E-05	3,391.200	6,782.400	0.00E+00	6.94E-02	1.39E-01	0.5750	3.630E+14
Cs-135	3.4477E-06	3,391.200	6,782.400	0.00E+00	1.17E-02	2.34E-02	0.8500	4.433E+12
Cs-137	1.4365E+00	3,391.200	6,782.400	0.00E+00	4.87E+03	9.74E+03	1.2500	2.144E+12
Eu-154	7.3230E-03	3,391.200	6,782.400	0.00E+00	2.48E+01	4.97E+01	1.7500	1.207E+11
Eu-155	5.9259E-04	3,391.200	6,782.400	0.00E+00	2.01E+00	4.02E+00	2.2500	1.099E+07
Fe-55	2.2791E-06	3,391.200	6,782.400	0.00E+00	7.73E-03	1.55E-02	2.7500	9.630E+06
H-3	1.9698E-03	3,391.200	6,782.400	0.00E+00	6.68E+00	1.34E+01	3.5000	5.581E+03
I-129	7.5300E-07	3,391.200	6,782.400	0.00E+00	2.55E-03	5.11E-03	5.0000	2.280E+03
Kr-85	4.1176E-02	3,391.200	6,782.400	0.00E+00	1.40E+02	2.79E+02	7.0000	2.496E+02
Np-237	9.5752E-06	3,391.200	6,782.400	0.00E+00	3.25E-02	6.49E-02	11.0000	2.793E+01
Pa-231	3.9379E-09	3,391.200	6,782.400	0.00E+00	1.34E-05	2.67E-05		
Pb-210	3.3115E-10	3,391.200	6,782.400	0.00E+00	1.12E-06	2.25E-06		
Pm-147	9.2402E-04	3,391.200	6,782.400	0.00E+00	3.13E+00	6.27E+00		
Pu-238	1.6217E-02	3,391.200	6,782.400	0.00E+00	5.50E+01	1.10E+02		
Pu-239	4.2810E-04	3,391.200	6,782.400	0.00E+00	1.45E+00	2.90E+00		
Pu-240	2.4333E-04	3,391.200	6,782.400	0.00E+00	8.25E-01	1.65E+00		
Pu-241	1.6242E-02	3,391.200	6,782.400	0.00E+00	5.51E+01	1.10E+02		
Pu-242	3.6329E-07	3,391.200	6,782.400	0.00E+00	1.23E-03	2.46E-03		
Ra-226	9.0114E-10	3,391.200	6,782.400	0.00E+00	3.06E-06	6.11E-06		
Ra-228	3.1019E-14	3,391.200	6,782.400	0.00E+00	1.05E-10	2.10E-10		
Ru-106	2.1225E-10	3,391.200	6,782.400	0.00E+00	7.20E-07	1.44E-06		
Se-79	1.2930E-05	3,391.200	6,782.400	0.00E+00	4.38E-02	8.77E-02		
Sn-126	1.1571E-05	3,391.200	6,782.400	0.00E+00	3.92E-02	7.85E-02		
Sr-90	1.3472E+00	3,391.200	6,782.400	0.00E+00	4.57E+03	9.14E+03		
Tc-99	4.2239E-04	3,391.200	6,782.400	0.00E+00	1.43E+00	2.86E+00		
Th-229	1.2407E-11	3,391.200	6,782.400	0.00E+00	4.21E-08	8.42E-08		
Th-230	8.3497E-08	3,391.200	6,782.400	0.00E+00	2.83E-04	5.66E-04		
Th-232	3.8371E-14	3,391.200	6,782.400	0.00E+00	1.30E-10	2.60E-10		
Tl-208	4.0414E-08	3,391.200	6,782.400	0.00E+00	1.37E-04	2.74E-04		
U-232	1.0948E-07	3,391.200	6,782.400	0.00E+00	3.71E-04	7.43E-04		
U-233	3.6275E-09	3,391.200	6,782.400	0.00E+00	1.23E-05	2.46E-05		
U-234	1.8562E-04	3,391.200	6,782.400	0.00E+00	6.29E-01	1.26E+00		
U-235	-2.7235E-06	3,391.200	0.000	3.81E-02	2.88E-02	3.81E-02		
U-236	1.5493E-05	3,391.200	6,782.400	0.00E+00	5.25E-02	1.05E-01		
U-238	-4.2851E-09	3,391.200	0.000	4.12E-04	3.97E-04	4.12E-04		
Y-90	1.3475E+00	3,391.200	6,782.400	0.00E+00	4.57E+03	9.14E+03		
Other Radionuclides					4.64E+03	9.28E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.68E+01	1.14E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.5	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	3,391.200	2,411.490	
Bounding:		6,782.400	

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:	0.57	0.71
Bounding:	1.14	

Estimated EOL HM/ Given EOL HM 0.95

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

²Total burnup for all fuel associated with this worksheet must be 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 (COLUMBIA)
 SNF ID #: 143
 Fuel Units & Descr: 312 - 24 CURVED PLATES
 Heavy Metal Mass: BOL=259.02kg ; EOL=213.06kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1990
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 13.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	43,522.739	87,045.478	0.00E+00	8.73E-05	1.75E-04		
Am-241	2.5251E-03	43,522.739	87,045.478	0.00E+00	1.10E+02	2.20E+02	0.0150	6.411E+15
Am-242m	3.9624E-07	43,522.739	87,045.478	0.00E+00	1.72E-02	3.45E-02	0.0250	1.331E+15
Am-243	1.4880E-06	43,522.739	87,045.478	0.00E+00	6.48E-02	1.30E-01	0.0375	1.157E+15
C-14	5.7053E-09	43,522.739	87,045.478	0.00E+00	2.48E-04	4.97E-04	0.0575	1.245E+15
Cl-36	1.3124E-32	43,522.739	87,045.478	0.00E+00	5.71E-28	1.14E-27	0.0850	7.504E+14
Cm-243	1.1419E-07	43,522.739	87,045.478	0.00E+00	4.97E-03	9.94E-03	0.1250	4.957E+14
Cm-244	1.6522E-05	43,522.739	87,045.478	0.00E+00	7.19E-01	1.44E+00	0.2250	6.479E+14
Co-60	7.4047E-07	43,522.739	87,045.478	0.00E+00	3.22E-02	6.45E-02	0.3750	2.818E+14
Cs-134	2.0455E-05	43,522.739	87,045.478	0.00E+00	8.90E-01	1.78E+00	0.5750	4.658E+15
Cs-135	3.4477E-06	43,522.739	87,045.478	0.00E+00	1.50E-01	3.00E-01	0.8500	5.690E+13
Cs-137	1.4365E+00	43,522.739	87,045.478	0.00E+00	6.25E+04	1.25E+05	1.2500	2.752E+13
Eu-154	7.3230E-03	43,522.739	87,045.478	0.00E+00	3.19E+02	6.37E+02	1.7500	1.549E+12
Eu-155	5.9259E-04	43,522.739	87,045.478	0.00E+00	2.58E+01	5.16E+01	2.2500	1.295E+08
Fe-55	2.2791E-06	43,522.739	87,045.478	0.00E+00	9.92E-02	1.98E-01	2.7500	1.236E+08
H-3	1.9698E-03	43,522.739	87,045.478	0.00E+00	8.57E+01	1.71E+02	3.5000	7.163E+04
I-129	7.5300E-07	43,522.739	87,045.478	0.00E+00	3.28E-02	6.55E-02	5.0000	2.927E+04
Kr-85	4.1176E-02	43,522.739	87,045.478	0.00E+00	1.79E+03	3.58E+03	7.0000	3.203E+03
Np-237	9.5752E-06	43,522.739	87,045.478	0.00E+00	4.17E-01	8.33E-01	11.0000	3.571E+02
Pa-231	3.9379E-09	43,522.739	87,045.478	0.00E+00	1.71E-04	3.43E-04		
Pb-210	3.3115E-10	43,522.739	87,045.478	0.00E+00	1.44E-05	2.88E-05		
Pm-147	9.2402E-04	43,522.739	87,045.478	0.00E+00	4.02E+01	8.04E+01		
Pu-238	1.6217E-02	43,522.739	87,045.478	0.00E+00	7.06E+02	1.41E+03		
Pu-239	4.2810E-04	43,522.739	87,045.478	0.00E+00	1.86E+01	3.73E+01		
Pu-240	2.4333E-04	43,522.739	87,045.478	0.00E+00	1.06E+01	2.12E+01		
Pu-241	1.6242E-02	43,522.739	87,045.478	0.00E+00	7.07E+02	1.41E+03		
Pu-242	3.6329E-07	43,522.739	87,045.478	0.00E+00	1.58E-02	3.16E-02		
Ra-226	9.0114E-10	43,522.739	87,045.478	0.00E+00	3.92E-05	7.84E-05		
Ra-228	3.1019E-14	43,522.739	87,045.478	0.00E+00	1.35E-09	2.70E-09		
Ru-106	2.1225E-10	43,522.739	87,045.478	0.00E+00	9.24E-06	1.85E-05		
Se-79	1.2930E-05	43,522.739	87,045.478	0.00E+00	5.63E-01	1.13E+00		
Sn-126	1.1571E-05	43,522.739	87,045.478	0.00E+00	5.04E-01	1.01E+00		
Sr-90	1.3472E+00	43,522.739	87,045.478	0.00E+00	5.86E+04	1.17E+05		
Tc-99	4.2239E-04	43,522.739	87,045.478	0.00E+00	1.84E+01	3.68E+01		
Th-229	1.2407E-11	43,522.739	87,045.478	0.00E+00	5.40E-07	1.08E-06		
Th-230	8.3497E-08	43,522.739	87,045.478	0.00E+00	3.63E-03	7.27E-03		
Th-232	3.8371E-14	43,522.739	87,045.478	0.00E+00	1.67E-09	3.34E-09		
Ti-208	4.0414E-08	43,522.739	87,045.478	0.00E+00	1.76E-03	3.52E-03		
U-232	1.0948E-07	43,522.739	87,045.478	0.00E+00	4.76E-03	9.53E-03		
U-233	3.6275E-09	43,522.739	87,045.478	0.00E+00	1.58E-04	3.16E-04		
U-234	1.8562E-04	43,522.739	87,045.478	0.00E+00	8.08E+00	1.62E+01		
U-235	-2.7235E-06	43,522.739	0.000	5.21E-01	4.03E-01	5.21E-01		
U-236	1.5493E-05	43,522.739	87,045.478	0.00E+00	6.74E-01	1.35E+00		
U-238	-4.2851E-09	43,522.739	0.000	5.97E-03	5.79E-03	5.97E-03		
Y-90	1.3475E+00	43,522.739	87,045.478	0.00E+00	5.86E+04	1.17E+05		
Other Radionuclides					5.96E+04	1.19E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.28E+02	1.46E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.13704494	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		43,522.739	
Bounding:		87,045.478	

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

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.53	
Bounding:	1.07	
		Estimated EOL HM/ Given EOL HM
		1.01

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (COLUMBIA)
 SNF ID #: 142
 Fuel Units & Descr: 32 - 24 CURVED PLATES
 Heavy Metal Mass: BOL=25.12kg ; EOL=21.72kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1985
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.89

Radionuclide	m		x _n		x _b		b		y _n		y _b		Gamma Sources	
	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)	Avg. MeV					
Ac-227	2.0068E-09	4,521.600	9,043.200	0.00E+00	9.07E-06	1.81E-05								
Am-241	2.5251E-03	4,521.600	9,043.200	0.00E+00	1.14E+01	2.28E+01	0.0150	6.660E+14						
Am-242m	3.9624E-07	4,521.600	9,043.200	0.00E+00	1.79E-03	3.58E-03	0.0250	1.383E+14						
Am-243	1.4880E-06	4,521.600	9,043.200	0.00E+00	6.73E-03	1.35E-02	0.0375	1.202E+14						
C-14	5.7053E-09	4,521.600	9,043.200	0.00E+00	2.58E-05	5.16E-05	0.0575	1.294E+14						
Cl-36	1.3124E-32	4,521.600	9,043.200	0.00E+00	5.93E-29	1.19E-28	0.0850	7.796E+13						
Cm-243	1.1419E-07	4,521.600	9,043.200	0.00E+00	5.16E-04	1.03E-03	0.1250	5.149E+13						
Cm-244	1.6522E-05	4,521.600	9,043.200	0.00E+00	7.47E-02	1.49E-01	0.2250	6.731E+13						
Co-60	7.4047E-07	4,521.600	9,043.200	0.00E+00	3.35E-03	6.70E-03	0.3750	2.928E+13						
Cs-134	2.0455E-05	4,521.600	9,043.200	0.00E+00	9.25E-02	1.85E-01	0.5750	4.839E+14						
Cs-135	3.4477E-06	4,521.600	9,043.200	0.00E+00	1.56E-02	3.12E-02	0.8500	5.911E+12						
Cs-137	1.4365E+00	4,521.600	9,043.200	0.00E+00	6.50E+03	1.30E+04	1.2500	2.859E+12						
Eu-154	7.3230E-03	4,521.600	9,043.200	0.00E+00	3.31E+01	6.62E+01	1.7500	1.609E+11						
Eu-155	5.9259E-04	4,521.600	9,043.200	0.00E+00	2.68E+00	5.36E+00	2.2500	1.346E+07						
Fe-55	2.2791E-06	4,521.600	9,043.200	0.00E+00	1.03E-02	2.06E-02	2.7500	1.284E+07						
H-3	1.9698E-03	4,521.600	9,043.200	0.00E+00	8.91E+00	1.78E+01	3.5000	7.442E+03						
I-129	7.5300E-07	4,521.600	9,043.200	0.00E+00	3.40E-03	6.81E-03	5.0000	3.040E+03						
Kr-85	4.1176E-02	4,521.600	9,043.200	0.00E+00	1.86E+02	3.72E+02	7.0000	3.328E+02						
Np-237	9.5752E-06	4,521.600	9,043.200	0.00E+00	4.33E-02	8.66E-02	11.0000	3.710E+01						
Pa-231	3.9379E-09	4,521.600	9,043.200	0.00E+00	1.78E-05	3.56E-05								
Pb-210	3.3115E-10	4,521.600	9,043.200	0.00E+00	1.50E-06	2.99E-06								
Pm-147	9.2402E-04	4,521.600	9,043.200	0.00E+00	4.18E+00	8.36E+00								
Pu-238	1.6217E-02	4,521.600	9,043.200	0.00E+00	7.33E+01	1.47E+02								
Pu-239	4.2810E-04	4,521.600	9,043.200	0.00E+00	1.94E+00	3.87E+00								
Pu-240	2.4333E-04	4,521.600	9,043.200	0.00E+00	1.10E+00	2.20E+00								
Pu-241	1.6242E-02	4,521.600	9,043.200	0.00E+00	7.34E+01	1.47E+02								
Pu-242	3.6329E-07	4,521.600	9,043.200	0.00E+00	1.64E-03	3.29E-03								
Ra-226	9.0114E-10	4,521.600	9,043.200	0.00E+00	4.07E-06	8.15E-06								
Ra-228	3.1019E-14	4,521.600	9,043.200	0.00E+00	1.40E-10	2.81E-10								
Ru-106	2.1225E-10	4,521.600	9,043.200	0.00E+00	9.60E-07	1.92E-06								
Se-79	1.2930E-05	4,521.600	9,043.200	0.00E+00	5.85E-02	1.17E-01								
Sn-126	1.1571E-05	4,521.600	9,043.200	0.00E+00	5.23E-02	1.05E-01								
Sr-90	1.3472E+00	4,521.600	9,043.200	0.00E+00	6.09E+03	1.22E+04								
Tc-99	4.2239E-04	4,521.600	9,043.200	0.00E+00	1.91E+00	3.82E+00								
Th-229	1.2407E-11	4,521.600	9,043.200	0.00E+00	5.61E-08	1.12E-07								
Th-230	8.3497E-08	4,521.600	9,043.200	0.00E+00	3.78E-04	7.55E-04								
Th-232	3.8371E-14	4,521.600	9,043.200	0.00E+00	1.74E-10	3.47E-10								
Tl-208	4.0414E-08	4,521.600	9,043.200	0.00E+00	1.83E-04	3.65E-04								
U-232	1.0948E-07	4,521.600	9,043.200	0.00E+00	4.95E-04	9.90E-04								
U-233	3.6275E-09	4,521.600	9,043.200	0.00E+00	1.64E-05	3.28E-05								
U-234	1.8562E-04	4,521.600	9,043.200	0.00E+00	8.39E-01	1.68E+00								
U-235	-2.7235E-06	4,521.600	0.000	5.08E-02	3.84E-02	5.08E-02								
U-236	1.5493E-05	4,521.600	9,043.200	0.00E+00	7.01E-02	1.40E-01								
U-238	-4.2851E-09	4,521.600	0.000	5.49E-04	5.29E-04	5.49E-04								
Y-90	1.3475E+00	4,521.600	9,043.200	0.00E+00	6.09E+03	1.22E+04								
Other Radionuclides					6.19E+03	1.24E+04								

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.57E+01	1.51E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.5	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	4,521.600	3,215.320	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:		9,043.200	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.57	0.71	0.95
Bounding:	1.14		

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

²Total burnup for all fuel associated with this worksheet must be 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 REACTOR
 SNF ID #: 991
 Fuel Units & Descr: 103680 - 2 CONCENTRIC TUBES
 Heavy Metal Mass: BOL=2103003.65kg ; EOL=2096202.24kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1971
 Estimates as of: 2030
 Template: N-Reactor (Graphite, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 69600
 Template BOL Heavy Metal Mass (MT): 11.6
 Template Decay Time: 50 years

Estimated
 Canister usage:
 MCO
 400.00

II. Estimates							Gamma Sources	
	m	x _a	x _b	b	y _a	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	8.7399E-10	7,175,192.979	14,350,385.959	0.00E+00	6.27E-03	1.25E-02	Avg. MeV	
Am-241	9.9095E-02	7,175,192.979	14,350,385.959	0.00E+00	7.11E+05	1.42E+06	0.0150	4.922E+17
Am-242m	5.4598E-05	7,175,192.979	14,350,385.959	0.00E+00	3.92E+02	7.83E+02	0.0250	1.001E+17
Am-243	4.6221E-05	7,175,192.979	14,350,385.959	0.00E+00	3.32E+02	6.63E+02	0.0375	9.217E+16
C-14	9.1853E-05	7,175,192.979	14,350,385.959	0.00E+00	6.59E+02	1.32E+03	0.0575	1.114E+17
Cl-36	0.0000E+00	7,175,192.979	14,350,385.959	0.00E+00	0.00E+00	0.00E+00	0.0850	5.530E+16
Cm-243	0.0000E+00	7,175,192.979	14,350,385.959	0.00E+00	0.00E+00	0.00E+00	0.1250	3.616E+16
Cm-244	2.5589E-04	7,175,192.979	14,350,385.959	0.00E+00	1.84E+03	3.67E+03	0.2250	4.736E+16
Co-60	8.8563E-06	7,175,192.979	14,350,385.959	0.00E+00	6.35E+01	1.27E+02	0.3750	2.053E+16
Cs-134	9.0661E-08	7,175,192.979	14,350,385.959	0.00E+00	6.51E-01	1.30E+00	0.5750	4.478E+17
Cs-135	1.0066E-05	7,175,192.979	14,350,385.959	0.00E+00	7.22E+01	1.44E+02	0.8500	3.824E+15
Cs-137	8.4454E-01	7,175,192.979	14,350,385.959	0.00E+00	6.06E+06	1.21E+07	1.2500	1.669E+15
Eu-154	1.9842E-03	7,175,192.979	14,350,385.959	0.00E+00	1.42E+04	2.85E+04	1.7500	1.023E+14
Eu-155	3.5690E-05	7,175,192.979	14,350,385.959	0.00E+00	2.56E+02	5.12E+02	2.2500	9.967E+09
Fe-55	5.2802E-08	7,175,192.979	14,350,385.959	0.00E+00	3.79E-01	7.58E-01	2.7500	2.933E+08
H-3	9.0776E-04	7,175,192.979	14,350,385.959	0.00E+00	6.51E+03	1.30E+04	3.5000	2.595E+08
I-129	8.6006E-07	7,175,192.979	14,350,385.959	0.00E+00	6.17E+00	1.23E+01	5.0000	1.093E+08
Kr-85	1.0138E-02	7,175,192.979	14,350,385.959	0.00E+00	7.27E+04	1.45E+05	7.0000	1.235E+07
Np-237	9.0345E-09	7,175,192.979	14,350,385.959	0.00E+00	6.48E+01	1.30E+02	11.0000	1.405E+06
Pa-231	1.9210E-09	7,175,192.979	14,350,385.959	0.00E+00	1.38E-02	2.76E-02		
Pb-210	7.5862E-11	7,175,192.979	14,350,385.959	0.00E+00	5.44E-04	1.09E-03		
Pm-147	1.1372E-05	7,175,192.979	14,350,385.959	0.00E+00	8.16E+01	1.63E+02		
Pu-238	1.7802E-02	7,175,192.979	14,350,385.959	0.00E+00	1.28E+05	2.55E+05		
Pu-239	2.8822E-02	7,175,192.979	14,350,385.959	0.00E+00	2.07E+05	4.14E+05		
Pu-240	2.2759E-02	7,175,192.979	14,350,385.959	0.00E+00	1.63E+05	3.27E+05		
Pu-241	2.9641E-01	7,175,192.979	14,350,385.959	0.00E+00	2.13E+06	4.25E+06		
Pu-242	1.4526E-05	7,175,192.979	14,350,385.959	0.00E+00	1.04E+02	2.08E+02		
Ra-226	2.3132E-10	7,175,192.979	14,350,385.959	0.00E+00	1.66E-03	3.32E-03		
Ra-228	1.9655E-14	7,175,192.979	14,350,385.959	0.00E+00	1.41E-07	2.82E-07		
Ru-106	1.9612E-14	7,175,192.979	14,350,385.959	0.00E+00	1.41E-07	2.81E-07		
Se-79	1.0897E-05	7,175,192.979	14,350,385.959	0.00E+00	7.82E+01	1.56E+02		
Sn-126	0.0000E+00	7,175,192.979	14,350,385.959	0.00E+00	0.00E+00	0.00E+00		
Sr-90	5.9411E-01	7,175,192.979	14,350,385.959	0.00E+00	4.26E+06	8.53E+06		
Tc-99	3.6494E-04	7,175,192.979	14,350,385.959	0.00E+00	2.62E+03	5.24E+03		
Th-229	3.1063E-12	7,175,192.979	14,350,385.959	0.00E+00	2.23E-05	4.46E-05		
Th-230	2.5187E-08	7,175,192.979	14,350,385.959	0.00E+00	1.81E-01	3.61E-01		
Th-232	2.5287E-14	7,175,192.979	14,350,385.959	0.00E+00	1.81E-07	3.63E-07		
Ti-208	6.4885E-15	7,175,192.979	14,350,385.959	0.00E+00	4.66E-08	9.31E-08		
U-232	0.0000E+00	7,175,192.979	14,350,385.959	0.00E+00	0.00E+00	0.00E+00		
U-233	1.5704E-09	7,175,192.979	14,350,385.959	0.00E+00	1.13E-02	2.25E-02		
U-234	6.6293E-05	7,175,192.979	14,350,385.959	0.00E+00	4.76E+02	9.51E+02		
U-235	-1.2930E-06	7,175,192.979	0.000	5.68E+01	4.75E+01	5.68E+01		
U-236	1.1961E-05	7,175,192.979	14,350,385.959	0.00E+00	8.58E+01	1.72E+02		
U-238	-3.0619E-07	7,175,192.979	0.000	6.98E+02	6.96E+02	6.98E+02		
Y-90	5.9425E-01	7,175,192.979	14,350,385.959	0.00E+00	4.26E+06	8.53E+06		
Other Radionuclides					5.84E+06	1.17E+07		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.75E+04	1.95E+05
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	GRAPHITE	GRAPHITE
Fuel Cladding:	ZIRC-2	ZIRC
BOL HM Constituents:	U METAL	U
BOL Enrichment %:	1.250000197	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:	5,061,929.781	7,175,192.979
Bounding:	12,618,021.888	14,350,385.959

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

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.57	1.42
Bounding:	1.14	1.14

Estimated EOL HM/ Given EOL HM: 1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 854
 Fuel Units & Descr: 12 - UNKNOWN
 Heavy Metal Mass: BOL= ; EOL=21.09kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1963
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc. 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 12.00

Radionuclide	II. Estimates		Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n						Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.2581E-09	31.685	31.685	31.685	0.00E+00	3.99E-08	3.99E-08	Avg. MeV	
Am-241	1.4761E-01	31.685	31.685	31.685	0.00E+00	4.68E+00	4.68E+00	0.0150	8.578E+11
Am-242m	2.5032E-04	31.685	31.685	31.685	0.00E+00	7.93E-03	7.93E-03	0.0250	1.704E+11
Am-243	6.2387E-04	31.685	31.685	31.685	0.00E+00	1.98E-02	1.98E-02	0.0375	1.593E+11
C-14	4.7739E-05	31.685	31.685	31.685	0.00E+00	1.51E-03	1.51E-03	0.0575	2.185E+11
Cf-252	8.0297E-07	31.685	31.685	31.685	0.00E+00	2.54E-05	2.54E-05	0.0850	9.324E+10
Cm-243	1.2099E-04	31.685	31.685	31.685	0.00E+00	3.83E-03	3.83E-03	0.1250	6.083E+10
Cm-244	1.5560E-02	31.685	31.685	31.685	0.00E+00	4.93E-01	4.93E-01	0.2250	7.932E+10
Co-60	4.9580E-05	31.685	31.685	31.685	0.00E+00	1.57E-03	1.57E-03	0.3750	3.432E+10
Cs-134	1.7022E-09	31.685	31.685	31.685	0.00E+00	5.39E-08	5.39E-08	0.5750	8.169E+11
Cs-135	1.4433E-05	31.685	31.685	31.685	0.00E+00	4.57E-04	4.57E-04	0.8500	6.549E+09
Cs-137	6.9929E-01	31.685	31.685	31.685	0.00E+00	2.22E+01	2.22E+01	1.2500	3.062E+09
Eu-154	1.8023E-03	31.685	31.685	31.685	0.00E+00	5.71E-02	5.71E-02	1.7500	1.762E+08
Eu-155	2.6793E-05	31.685	31.685	31.685	0.00E+00	8.49E-04	8.49E-04	2.2500	3.110E+04
Fe-55	1.4580E-08	31.685	31.685	31.685	0.00E+00	4.62E-07	4.62E-07	2.7500	1.543E+05
H-3	3.8566E-03	31.685	31.685	31.685	0.00E+00	1.22E-01	1.22E-01	3.5000	7.695E+03
I-129	9.8288E-07	31.685	31.685	31.685	0.00E+00	3.11E-05	3.11E-05	5.0000	3.286E+03
Kr-85	4.0617E-03	31.685	31.685	31.685	0.00E+00	1.29E-01	1.29E-01	7.0000	3.783E+02
Np-237	1.2645E-05	31.685	31.685	31.685	0.00E+00	4.01E-04	4.01E-04	11.0000	4.342E+01
Pa-231	1.6376E-09	31.685	31.685	31.685	0.00E+00	5.19E-08	5.19E-08		
Pb-210	2.8795E-10	31.685	31.685	31.685	0.00E+00	9.12E-09	9.12E-09		
Pm-147	1.3264E-07	31.685	31.685	31.685	0.00E+00	4.20E-06	4.20E-06		
Pu-238	5.8882E-02	31.685	31.685	31.685	0.00E+00	1.87E+00	1.87E+00		
Pu-239	1.1613E-02	31.685	31.685	31.685	0.00E+00	3.68E-01	3.68E-01		
Pu-240	1.5142E-02	31.685	31.685	31.685	0.00E+00	4.80E-01	4.80E-01		
Pu-241	2.1269E-01	31.685	31.685	31.685	0.00E+00	6.74E+00	6.74E+00		
Pu-242	6.4260E-05	31.685	31.685	31.685	0.00E+00	2.04E-03	2.04E-03		
Ra-226	5.8689E-10	31.685	31.685	31.685	0.00E+00	1.86E-08	1.86E-08		
Ra-228	5.3036E-12	31.685	31.685	31.685	0.00E+00	1.68E-10	1.68E-10		
Ru-106	6.8136E-19	31.685	31.685	31.685	0.00E+00	2.16E-17	2.16E-17		
Se-79	1.2372E-05	31.685	31.685	31.685	0.00E+00	3.92E-04	3.92E-04		
Sn-126	2.5194E-05	31.685	31.685	31.685	0.00E+00	7.98E-04	7.98E-04		
Sr-90	4.4913E-01	31.685	31.685	31.685	0.00E+00	1.42E+01	1.42E+01		
Tc-99	3.9357E-04	31.685	31.685	31.685	0.00E+00	1.25E-02	1.25E-02		
Th-229	1.9331E-10	31.685	31.685	31.685	0.00E+00	6.13E-09	6.13E-09		
Th-230	3.5223E-08	31.685	31.685	31.685	0.00E+00	1.12E-06	1.12E-06		
Th-232	5.3085E-12	31.685	31.685	31.685	0.00E+00	1.68E-10	1.68E-10		
Tl-208	1.3102E-07	31.685	31.685	31.685	0.00E+00	4.15E-06	4.15E-06		
U-232	3.5497E-07	31.685	31.685	31.685	0.00E+00	1.12E-05	1.12E-05		
U-233	2.6647E-08	31.685	31.685	31.685	0.00E+00	8.44E-07	8.44E-07		
U-234	5.5023E-05	31.685	31.685	31.685	0.00E+00	1.74E-03	1.74E-03		
U-235	1.4485E-06	31.685	0.000	0.000	1.46E-03	1.41E-03	1.46E-03		
U-236	7.5969E-06	31.685	31.685	31.685	0.00E+00	2.41E-04	2.41E-04		
U-238	-2.6129E-07	31.685	0.000	0.000	6.87E-03	6.86E-03	6.87E-03		
Y-90	4.4913E-01	31.685	31.685	31.685	0.00E+00	1.42E+01	1.42E+01		
Other Radionuclides						2.15E+01	2.15E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.65E-01	4.65E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		31.685	Nominal burnup set equal to bounding burnup. Bounding burnup taken from SFD and converted to MWd using BOL=21.123kg
Bounding:		31.685	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.04		1.00
Bounding:	0.04		

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

²Total burnup for all fuel associated with this worksheet must be 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) 1Fuel decay start date: 1982
 SNF ID #: 751 Estimates as of: 2030
 Fuel Units & Descr: 46 - 12 CURVED PLATES Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL= ; EOL=35.42kg 2Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 1.92

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	21.265	42.531	0.00E+00	4.27E-08	8.54E-08		
Am-241	2.5251E-03	21.265	42.531	0.00E+00	5.37E-02	1.07E-01	0.0150	3.134E+12
Am-242m	3.9624E-07	21.265	42.531	0.00E+00	8.43E-06	1.69E-05	0.0250	6.505E+11
Am-243	1.4880E-06	21.265	42.531	0.00E+00	3.16E-05	6.33E-05	0.0375	5.654E+11
C-14	5.7053E-09	21.265	42.531	0.00E+00	1.21E-07	2.43E-07	0.0575	6.086E+11
Cl-36	1.3124E-32	21.265	42.531	0.00E+00	2.79E-31	5.58E-31	0.0850	3.669E+11
Cm-243	1.1419E-07	21.265	42.531	0.00E+00	2.43E-06	4.86E-06	0.1250	2.426E+11
Cm-244	1.6522E-05	21.265	42.531	0.00E+00	3.51E-04	7.03E-04	0.2250	3.180E+11
Co-60	7.4047E-07	21.265	42.531	0.00E+00	1.57E-05	3.15E-05	0.3750	1.377E+11
Cs-134	2.0455E-05	21.265	42.531	0.00E+00	4.35E-04	8.70E-04	0.5750	2.276E+12
Cs-135	3.4477E-06	21.265	42.531	0.00E+00	7.33E-05	1.47E-04	0.8500	2.780E+12
Cs-137	1.4365E+00	21.265	42.531	0.00E+00	3.05E+01	6.11E+01	1.2500	1.345E+10
Eu-154	7.3230E-03	21.265	42.531	0.00E+00	1.56E-01	3.11E-01	1.7500	7.570E+08
Eu-155	5.9259E-04	21.265	42.531	0.00E+00	1.26E-02	2.52E-02	2.2500	6.331E+04
Fe-55	2.2791E-06	21.265	42.531	0.00E+00	4.85E-05	9.69E-05	2.7500	6.040E+04
H-3	1.9698E-03	21.265	42.531	0.00E+00	4.19E-02	8.38E-02	3.5000	4.116E+01
I-129	7.5300E-07	21.265	42.531	0.00E+00	1.60E-05	3.20E-05	5.0000	1.689E+01
Kr-85	4.1176E-02	21.265	42.531	0.00E+00	8.76E-01	1.75E+00	7.0000	1.856E+00
Np-237	9.5752E-06	21.265	42.531	0.00E+00	2.04E-04	4.07E-04	11.0000	2.075E-01
Pa-231	3.9379E-09	21.265	42.531	0.00E+00	8.37E-08	1.67E-07		
Pb-210	3.3115E-10	21.265	42.531	0.00E+00	7.04E-09	1.41E-08		
Pm-147	9.2402E-04	21.265	42.531	0.00E+00	1.96E-02	3.93E-02		
Pu-238	1.6217E-02	21.265	42.531	0.00E+00	3.45E-01	6.90E-01		
Pu-239	4.2810E-04	21.265	42.531	0.00E+00	9.10E-03	1.82E-02		
Pu-240	2.4333E-04	21.265	42.531	0.00E+00	5.17E-03	1.03E-02		
Pu-241	1.6242E-02	21.265	42.531	0.00E+00	3.45E-01	6.91E-01		
Pu-242	3.6329E-07	21.265	42.531	0.00E+00	7.73E-06	1.55E-05		
Ra-226	9.0114E-10	21.265	42.531	0.00E+00	1.92E-08	3.83E-08		
Ra-228	3.1019E-14	21.265	42.531	0.00E+00	6.60E-13	1.32E-12		
Ru-106	2.1225E-10	21.265	42.531	0.00E+00	4.51E-09	9.03E-09		
Se-79	1.2930E-05	21.265	42.531	0.00E+00	2.75E-04	5.50E-04		
Sn-126	1.1571E-05	21.265	42.531	0.00E+00	2.46E-04	4.92E-04		
Sr-90	1.3472E+00	21.265	42.531	0.00E+00	2.86E+01	5.73E+01		
Tc-99	4.2239E-04	21.265	42.531	0.00E+00	8.98E-03	1.80E-02		
Th-229	1.2407E-11	21.265	42.531	0.00E+00	2.64E-10	5.28E-10		
Th-230	8.3497E-08	21.265	42.531	0.00E+00	1.78E-06	3.55E-06		
Th-232	3.8371E-14	21.265	42.531	0.00E+00	8.16E-13	1.63E-12		
Tl-208	4.0414E-08	21.265	42.531	0.00E+00	8.59E-07	1.72E-06		
U-232	1.0948E-07	21.265	42.531	0.00E+00	2.33E-06	4.66E-06		
U-233	3.6275E-09	21.265	42.531	0.00E+00	7.71E-08	1.54E-07		
U-234	1.8562E-04	21.265	42.531	0.00E+00	3.95E-03	7.89E-03		
U-235	-2.7235E-06	21.265	0.000	7.06E-02	7.05E-02	7.06E-02		
U-236	1.5493E-05	21.265	42.531	0.00E+00	3.29E-04	6.59E-04		
U-238	-4.2851E-09	21.265	0.000	7.14E-04	7.14E-04	7.14E-04		
Y-90	1.3475E+00	21.265	42.531	0.00E+00	2.87E+01	5.73E+01		
Other Radionuclides					2.91E+01	5.82E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.58E-01	7.14E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons:
Fuel Cladding:	ALUM	ALUM	This fuel matches on all parameters except enrichment (unknown).
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:		60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		21.265	Nominal burnup taken from SFD and converted to MWd using BOL=35.442kg
Bounding:		42.531	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

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

²Total burnup for all fuel associated with this worksheet must be 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 #: 752
 Fuel Units & Descr: 420 - 17 CURVED PLATES
 Heavy Metal Mass: BOL=72.16kg ; EOL=33.89kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1997
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 11.67

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	5.4520E-10	36,405.155	66,463.108	0.00E+00	1.98E-05	3.62E-05	0.0150	6.231E+15
Am-241	9.2284E-03	36,405.155	66,463.108	0.00E+00	3.36E+02	6.13E+02	0.0250	1.282E+15
Am-242m	1.3390E-06	36,405.155	66,463.108	0.00E+00	4.87E-02	8.90E-02	0.0375	1.132E+15
Am-243	3.7084E-05	36,405.155	66,463.108	0.00E+00	1.35E+00	2.46E+00	0.0575	1.208E+15
C-14	2.6452E-08	36,405.155	66,463.108	0.00E+00	9.63E-04	1.76E-03	0.0850	7.269E+14
Ct-36	4.4441E-31	36,405.155	66,463.108	0.00E+00	1.62E-26	2.95E-26	0.1250	5.044E+14
Cm-243	5.0498E-06	36,405.155	66,463.108	0.00E+00	1.84E-01	3.36E-01	0.2250	6.274E+14
Cm-244	3.8451E-03	36,405.155	66,463.108	0.00E+00	1.40E+02	2.56E+02	0.3750	2.716E+14
Co-60	2.5225E-05	36,405.155	66,463.108	0.00E+00	9.18E-01	1.68E+00	0.5750	4.504E+14
Cs-134	1.9830E-03	36,405.155	66,463.108	0.00E+00	7.22E+01	1.32E+02	0.8500	8.870E+13
Cs-135	4.2564E-06	36,405.155	66,463.108	0.00E+00	1.55E-01	2.83E-01	1.2500	5.987E+13
Cs-137	1.8141E+00	36,405.155	66,463.108	0.00E+00	6.60E+04	1.21E+05	1.7500	2.478E+12
Eu-154	3.4733E-02	36,405.155	66,463.108	0.00E+00	1.26E+03	2.31E+03	2.2500	1.336E+08
Eu-155	7.1081E-03	36,405.155	66,463.108	0.00E+00	2.59E+02	4.72E+02	2.7500	1.148E+08
Fe-55	3.5790E-04	36,405.155	66,463.108	0.00E+00	1.30E+01	2.38E+01	3.5000	3.943E+06
H-3	3.4945E-03	36,405.155	66,463.108	0.00E+00	1.27E+02	2.32E+02	5.0000	1.671E+06
I-129	6.6403E-07	36,405.155	66,463.108	0.00E+00	2.42E-02	4.41E-02	7.0000	1.917E+05
Kr-85	7.8250E-02	36,405.155	66,463.108	0.00E+00	2.85E+03	5.20E+03	11.0000	2.195E+04
Np-237	3.1567E-05	36,405.155	66,463.108	0.00E+00	1.15E+00	2.10E+00		
Pa-231	1.3372E-09	36,405.155	66,463.108	0.00E+00	4.87E-05	8.89E-05		
Pb-210	3.0644E-11	36,405.155	66,463.108	0.00E+00	1.12E-06	2.04E-06		
Pm-147	6.5188E-03	36,405.155	66,463.108	0.00E+00	2.37E+02	4.33E+02		
Pu-238	1.4769E-01	36,405.155	66,463.108	0.00E+00	5.38E+03	9.82E+03		
Pu-239	6.9502E-04	36,405.155	66,463.108	0.00E+00	2.53E+01	4.62E+01		
Pu-240	3.7928E-04	36,405.155	66,463.108	0.00E+00	1.38E+01	2.52E+01		
Pu-241	1.0565E-01	36,405.155	66,463.108	0.00E+00	3.85E+03	7.02E+03		
Pu-242	3.0911E-06	36,405.155	66,463.108	0.00E+00	1.13E-01	2.05E-01		
Ra-226	1.1081E-10	36,405.155	66,463.108	0.00E+00	4.03E-06	7.37E-06		
Ra-228	2.1185E-14	36,405.155	66,463.108	0.00E+00	7.71E-10	1.41E-09		
Ru-106	2.3621E-07	36,405.155	66,463.108	0.00E+00	8.60E-03	1.57E-02		
Se-79	1.2339E-05	36,405.155	66,463.108	0.00E+00	4.49E-01	8.20E-01		
Sn-126	1.0194E-05	36,405.155	66,463.108	0.00E+00	3.71E-01	6.78E-01		
Sr-90	1.6932E+00	36,405.155	66,463.108	0.00E+00	6.16E+04	1.13E+05		
Tc-99	3.8056E-04	36,405.155	66,463.108	0.00E+00	1.39E+01	2.53E+01		
Th-229	9.1252E-12	36,405.155	66,463.108	0.00E+00	3.32E-07	6.06E-07		
Th-230	1.5407E-08	36,405.155	66,463.108	0.00E+00	5.61E-04	1.02E-03		
Th-232	2.8937E-14	36,405.155	66,463.108	0.00E+00	1.05E-09	1.92E-09		
Ti-208	4.7272E-08	36,405.155	66,463.108	0.00E+00	1.72E-03	3.14E-03		
U-232	1.2855E-07	36,405.155	66,463.108	0.00E+00	4.68E-03	8.54E-03		
U-233	5.1470E-09	36,405.155	66,463.108	0.00E+00	1.87E-04	3.42E-04		
U-234	5.6069E-05	36,405.155	66,463.108	0.00E+00	2.04E+00	3.73E+00		
U-235	-2.8661E-06	36,405.155	0.000	1.45E-01	4.09E-02	1.45E-01		
U-236	1.6701E-05	36,405.155	66,463.108	0.00E+00	6.08E-01	1.11E+00		
U-238	-9.4194E-09	36,405.155	0.000	1.66E-03	1.31E-03	1.66E-03		
Y-90	1.6932E+00	36,405.155	66,463.108	0.00E+00	6.16E+04	1.13E+05		
Other Radionuclides					6.32E+04	1.15E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.44E+02	1.72E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.17430199	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	36,405.155	35,243.243	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup calculated assuming all BOL heavy metal burned.
Bounding:	39,175.874	66,463.108	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.16	0.97	0.99
Bounding:	2.11	1.70	

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

²Total burnup for all fuel associated with this worksheet must be 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=367.50kg ; EOL=159.74kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1997
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWD): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 27.22

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	5.4520E-10	191,368.359	338,505.353	0.00E+00	1.04E-04	1.85E-04	Avg. MeV	
Am-241	9.2284E-03	191,368.359	338,505.353	0.00E+00	1.77E+03	3.12E+03	0.0150	3.173E+16
Am-242m	1.3390E-06	191,368.359	338,505.353	0.00E+00	2.56E-01	4.53E-01	0.0250	6.532E+15
Am-243	3.7084E-05	191,368.359	338,505.353	0.00E+00	7.10E+00	1.26E+01	0.0375	5.767E+15
C-14	2.6452E-08	191,368.359	338,505.353	0.00E+00	5.06E-03	8.95E-03	0.0575	6.151E+15
Cl-36	4.4441E-31	191,368.359	338,505.353	0.00E+00	8.50E-26	1.50E-25	0.0850	3.702E+15
Cm-243	5.0498E-06	191,368.359	338,505.353	0.00E+00	9.66E-01	1.71E+00	0.1250	2.569E+15
Cm-244	3.8451E-03	191,368.359	338,505.353	0.00E+00	7.36E+02	1.30E+03	0.2250	3.196E+15
Co-60	2.5225E-05	191,368.359	338,505.353	0.00E+00	4.83E+00	8.54E+00	0.3750	1.383E+15
Cs-134	1.9830E-03	191,368.359	338,505.353	0.00E+00	3.79E+02	6.71E+02	0.5750	2.294E+16
Cs-135	4.2564E-06	191,368.359	338,505.353	0.00E+00	8.15E-01	1.44E+00	0.8500	4.518E+14
Cs-137	1.8141E+00	191,368.359	338,505.353	0.00E+00	3.47E+05	6.14E+05	1.2500	3.050E+14
Eu-154	3.4733E-02	191,368.359	338,505.353	0.00E+00	6.65E+03	1.18E+04	1.7500	1.262E+13
Eu-155	7.1081E-03	191,368.359	338,505.353	0.00E+00	1.36E+03	2.41E+03	2.2500	6.805E+08
Fe-55	3.5790E-04	191,368.359	338,505.353	0.00E+00	6.85E+01	1.21E+02	2.7500	5.848E+08
H-3	3.4945E-03	191,368.359	338,505.353	0.00E+00	6.69E+02	1.18E+03	3.5000	2.008E+07
I-129	6.6403E-07	191,368.359	338,505.353	0.00E+00	1.27E-01	2.25E-01	5.0000	8.510E+06
Kr-85	7.8250E-02	191,368.359	338,505.353	0.00E+00	1.50E+04	2.65E+04	7.0000	9.762E+05
Np-237	3.1567E-05	191,368.359	338,505.353	0.00E+00	6.04E+00	1.07E+01	11.0000	1.118E+05
Pa-231	1.3372E-09	191,368.359	338,505.353	0.00E+00	2.56E-04	4.53E-04		
Pb-210	3.0644E-11	191,368.359	338,505.353	0.00E+00	5.86E-06	1.04E-05		
Pm-147	6.5188E-03	191,368.359	338,505.353	0.00E+00	1.25E+03	2.21E+03		
Pu-238	1.4769E-01	191,368.359	338,505.353	0.00E+00	2.83E+04	5.00E+04		
Pu-239	6.9502E-04	191,368.359	338,505.353	0.00E+00	1.33E+02	2.35E+02		
Pu-240	3.7928E-04	191,368.359	338,505.353	0.00E+00	7.26E+01	1.28E+02		
Pu-241	1.0565E-01	191,368.359	338,505.353	0.00E+00	2.02E+04	3.58E+04		
Pu-242	3.0911E-06	191,368.359	338,505.353	0.00E+00	5.92E-01	1.05E+00		
Ra-226	1.1081E-10	191,368.359	338,505.353	0.00E+00	2.12E-05	3.75E-05		
Ra-228	2.1185E-14	191,368.359	338,505.353	0.00E+00	4.05E-09	7.17E-09		
Ru-106	2.3621E-07	191,368.359	338,505.353	0.00E+00	4.52E-02	8.00E-02		
Se-79	1.2339E-05	191,368.359	338,505.353	0.00E+00	2.36E+00	4.18E+00		
Sn-126	1.0194E-05	191,368.359	338,505.353	0.00E+00	1.95E+00	3.45E+00		
Sr-90	1.6932E+00	191,368.359	338,505.353	0.00E+00	3.24E+05	5.73E+05		
Tc-99	3.8056E-04	191,368.359	338,505.353	0.00E+00	7.28E+01	1.29E+02		
Th-229	9.1252E-12	191,368.359	338,505.353	0.00E+00	1.75E-06	3.09E-06		
Th-230	1.5407E-08	191,368.359	338,505.353	0.00E+00	2.95E-03	5.22E-03		
Th-232	2.8937E-14	191,368.359	338,505.353	0.00E+00	5.54E-09	9.80E-09		
Th-208	4.7272E-08	191,368.359	338,505.353	0.00E+00	9.05E-03	1.60E-02		
U-232	1.2855E-07	191,368.359	338,505.353	0.00E+00	2.46E-02	4.35E-02		
U-233	5.1470E-09	191,368.359	338,505.353	0.00E+00	9.85E-04	1.74E-03		
U-234	5.6069E-05	191,368.359	338,505.353	0.00E+00	1.07E+01	1.90E+01		
U-235	-2.8661E-06	191,368.359	0.000	7.41E-01	1.93E-01	7.41E-01		
U-236	1.6701E-05	191,368.359	338,505.353	0.00E+00	3.20E+00	5.65E+00		
U-238	-9.4194E-09	191,368.359	0.000	8.23E-03	6.43E-03	8.23E-03		
Y-90	1.6932E+00	191,368.359	338,505.353	0.00E+00	3.24E+05	5.73E+05		
Other Radionuclides					3.32E+05	5.88E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.96E+03	8.78E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	HEAVY WATER	HEAVY WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.33333333	40 to 100	

Burnup Summary (MWD) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	185,416.245	191,368.359	
Bounding:	199,527.878	338,505.353	

Nominal burnup calculated from the heavy metal mass destroyed.
 Bounding burnup calculated assuming all BOL heavy metal burned.

Checks		
	Bumup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	1.19	1.03
Bounding:	2.11	1.70

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: OCONEE
 SNF ID #: 156
 Fuel Units & Descr: 14 - ROD
 Heavy Metal Mass: BOL=39.20kg ; EOL=31.98kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1986
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.78

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.7758E-10	6,863.026	13,726.051	0.00E+00	6.02E-06	1.20E-05		
Am-241	1.4352E-01	6,863.026	13,726.051	0.00E+00	9.85E+02	1.97E+03	0.0150	7.385E+14
Am-242m	2.8698E-04	6,863.026	13,726.051	0.00E+00	1.97E+00	3.94E+00	0.0250	1.489E+14
Am-243	6.2565E-04	6,863.026	13,726.051	0.00E+00	4.29E+00	8.59E+00	0.0375	1.420E+14
C-14	4.7901E-05	6,863.026	13,726.051	0.00E+00	3.29E-01	6.57E-01	0.0575	1.641E+14
Ci-36	8.0297E-07	6,863.026	13,726.051	0.00E+00	5.51E-03	1.10E-02	0.0850	8.264E+13
Cm-243	2.5081E-04	6,863.026	13,726.051	0.00E+00	1.72E+00	3.44E+00	0.1250	5.734E+13
Cm-244	4.9015E-02	6,863.026	13,726.051	0.00E+00	3.36E+02	6.73E+02	0.2250	7.086E+13
Co-60	2.5581E-03	6,863.026	13,726.051	0.00E+00	1.76E+01	3.51E+01	0.3750	3.047E+13
Cs-134	4.0536E-05	6,863.026	13,726.051	0.00E+00	2.78E-01	5.56E-01	0.5750	7.087E+14
Cs-135	1.4433E-05	6,863.026	13,726.051	0.00E+00	9.91E-02	1.98E-01	0.8500	9.804E+12
Cs-137	1.3979E+00	6,863.026	13,726.051	0.00E+00	9.59E+03	1.92E+04	1.2500	9.631E+12
Eu-154	2.0203E-02	6,863.026	13,726.051	0.00E+00	1.39E+02	2.77E+02	1.7500	2.884E+11
Eu-155	1.7684E-03	6,863.026	13,726.051	0.00E+00	1.21E+01	2.43E+01	2.2500	4.644E+07
Fe-55	4.3136E-05	6,863.026	13,726.051	0.00E+00	2.96E-01	5.92E-01	2.7500	9.514E+07
H-3	2.0769E-02	6,863.026	13,726.051	0.00E+00	1.43E+02	2.85E+02	3.5000	9.798E+06
I-129	9.8288E-07	6,863.026	13,726.051	0.00E+00	6.75E-03	1.35E-02	5.0000	4.189E+06
Kr-85	2.8214E-02	6,863.026	13,726.051	0.00E+00	1.94E+02	3.87E+02	7.0000	4.828E+05
Np-237	1.1218E-05	6,863.026	13,726.051	0.00E+00	7.70E-02	1.54E-01	11.0000	5.545E+04
Pa-231	1.3036E-09	6,863.026	13,726.051	0.00E+00	8.95E-06	1.79E-05		
Pb-210	8.5078E-11	6,863.026	13,726.051	0.00E+00	5.84E-07	1.17E-06		
Pm-147	3.6531E-04	6,863.026	13,726.051	0.00E+00	2.51E+00	5.01E+00		
Pu-238	7.4564E-02	6,863.026	13,726.051	0.00E+00	5.12E+02	1.02E+03		
Pu-239	1.1623E-02	6,863.026	13,726.051	0.00E+00	7.98E+01	1.60E+02		
Pu-240	1.5132E-02	6,863.026	13,726.051	0.00E+00	1.04E+02	2.08E+02		
Pu-241	9.0036E-01	6,863.026	13,726.051	0.00E+00	6.18E+03	1.24E+04		
Pu-242	6.4260E-05	6,863.026	13,726.051	0.00E+00	4.41E-01	8.82E-01		
Ra-226	2.2804E-10	6,863.026	13,726.051	0.00E+00	1.57E-06	3.13E-06		
Ra-228	5.2713E-12	6,863.026	13,726.051	0.00E+00	3.62E-08	7.24E-08		
Ru-106	6.1160E-10	6,863.026	13,726.051	0.00E+00	4.20E-06	8.39E-06		
Se-79	1.2377E-05	6,863.026	13,726.051	0.00E+00	8.49E-02	1.70E-01		
Sn-126	2.5210E-05	6,863.026	13,726.051	0.00E+00	1.73E-01	3.46E-01		
Sr-90	9.1667E-01	6,863.026	13,726.051	0.00E+00	6.29E+03	1.26E+04		
Tc-99	3.9357E-04	6,863.026	13,726.051	0.00E+00	2.70E+00	5.40E+00		
Th-229	1.2057E-10	6,863.026	13,726.051	0.00E+00	8.28E-07	1.66E-06		
Th-230	2.1043E-08	6,863.026	13,726.051	0.00E+00	1.44E-04	2.89E-04		
Th-232	5.2972E-12	6,863.026	13,726.051	0.00E+00	3.64E-08	7.27E-08		
Tl-208	1.7474E-07	6,863.026	13,726.051	0.00E+00	1.20E-03	2.40E-03		
U-232	4.7368E-07	6,863.026	13,726.051	0.00E+00	3.25E-03	6.50E-03		
U-233	2.5097E-08	6,863.026	13,726.051	0.00E+00	1.72E-04	3.44E-04		
U-234	5.0000E-05	6,863.026	13,726.051	0.00E+00	3.43E-01	6.86E-01		
U-235	-1.4489E-06	6,863.026	0.000	1.75E-03	0.00E+00	1.75E-03		
U-236	7.5824E-06	6,863.026	13,726.051	0.00E+00	5.20E-02	1.04E-01	1.58E+02	3.16E+02
U-238	-2.6129E-07	6,863.026	0.000	1.29E-02	1.11E-02	1.29E-02	Total	Total
Y-90	9.1699E-01	6,863.026	13,726.051	0.00E+00	6.29E+03	1.26E+04		
Other Radionuclides					9.21E+03	1.84E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.0625	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	1,326.332	6,863.026	
Bounding:	1,960.000	13,726.051	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	5.00	5.17	
Bounding:	10.00	7.00	

Estimated EOL HM/Given EOL HM: 1.12

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 158
 Fuel Units & Descr: 30 - 18 FLAT PLATES
 Heavy Metal Mass: BOL=26.15kg ; EOL=26.15kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 1.25

II. Estimates

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.4545E-10	495.310	990.620	0.00E+00	7.20E-08	1.44E-07	Avg. MeV	
Am-241	1.1190E-03	495.310	990.620	0.00E+00	5.54E-01	1.11E+00	0.0150	1.911E+14
Am-242m	4.5425E-07	495.310	990.620	0.00E+00	2.25E-04	4.50E-04	0.0250	4.117E+13
Am-243	1.4921E-06	495.310	990.620	0.00E+00	7.39E-04	1.48E-03	0.0375	3.800E+13
C-14	5.7244E-09	495.310	990.620	0.00E+00	2.84E-06	5.67E-06	0.0575	3.736E+13
Cl-36	1.3124E-32	495.310	990.620	0.00E+00	6.50E-30	1.30E-29	0.0850	2.382E+13
Cm-243	2.3676E-07	495.310	990.620	0.00E+00	1.17E-04	2.35E-04	0.1250	2.063E+13
Cm-244	5.2042E-05	495.310	990.620	0.00E+00	2.58E-02	5.16E-02	0.2250	2.019E+13
Co-60	3.8208E-05	495.310	990.620	0.00E+00	1.89E-02	3.78E-02	0.3750	9.771E+12
Cs-134	4.8693E-01	495.310	990.620	0.00E+00	2.41E+02	4.82E+02	0.5750	1.342E+14
Cs-135	3.4477E-06	495.310	990.620	0.00E+00	1.71E-03	3.42E-03	0.8500	1.879E+13
Cs-137	2.8731E+00	495.310	990.620	0.00E+00	1.42E+03	2.85E+03	1.2500	3.497E+12
Eu-154	8.2053E-02	495.310	990.620	0.00E+00	4.06E+01	8.13E+01	1.7500	1.467E+11
Eu-155	3.9134E-02	495.310	990.620	0.00E+00	1.94E+01	3.88E+01	2.2500	3.076E+11
Fe-55	6.7429E-03	495.310	990.620	0.00E+00	3.34E+00	6.68E+00	2.7500	1.770E+09
H-3	1.0599E-02	495.310	990.620	0.00E+00	5.25E+00	1.05E+01	3.5000	1.963E+08
I-129	7.5300E-07	495.310	990.620	0.00E+00	3.73E-04	7.46E-04	5.0000	6.029E+02
Kr-85	2.8595E-01	495.310	990.620	0.00E+00	1.42E+02	2.83E+02	7.0000	6.728E+01
Np-237	9.5479E-06	495.310	990.620	0.00E+00	4.73E-03	9.46E-03	11.0000	7.588E+00
Pa-231	8.9297E-10	495.310	990.620	0.00E+00	4.42E-07	8.85E-07		
Pb-210	3.7609E-12	495.310	990.620	0.00E+00	1.86E-09	3.73E-09		
Pm-147	2.5452E+00	495.310	990.620	0.00E+00	1.26E+03	2.52E+03		
Pu-238	2.0550E-02	495.310	990.620	0.00E+00	1.02E+01	2.04E+01		
Pu-239	4.2838E-04	495.310	990.620	0.00E+00	2.12E-01	4.24E-01		
Pu-240	2.4401E-04	495.310	990.620	0.00E+00	1.21E-01	2.42E-01		
Pu-241	6.8764E-02	495.310	990.620	0.00E+00	3.41E+01	6.81E+01		
Pu-242	3.6329E-07	495.310	990.620	0.00E+00	1.80E-04	3.60E-04		
Ra-226	3.8045E-11	495.310	990.620	0.00E+00	1.88E-08	3.77E-08		
Ra-228	2.9902E-15	495.310	990.620	0.00E+00	1.48E-12	2.96E-12		
Ru-106	1.9055E-01	495.310	990.620	0.00E+00	9.44E+01	1.89E+02		
Se-79	1.2936E-05	495.310	990.620	0.00E+00	6.41E-03	1.28E-02		
Sn-126	1.1574E-05	495.310	990.620	0.00E+00	5.73E-03	1.15E-02		
Sr-90	2.7505E+00	495.310	990.620	0.00E+00	1.36E+03	2.72E+03		
Tc-99	4.2239E-04	495.310	990.620	0.00E+00	2.09E-01	4.18E-01		
Th-229	1.8848E-12	495.310	990.620	0.00E+00	9.34E-10	1.87E-09		
Th-230	1.7042E-08	495.310	990.620	0.00E+00	8.44E-06	1.69E-05		
Th-232	7.8132E-15	495.310	990.620	0.00E+00	3.87E-12	7.74E-12		
Th-232	4.4063E-08	495.310	990.620	0.00E+00	2.18E-05	4.36E-05		
U-232	1.3151E-07	495.310	990.620	0.00E+00	6.51E-05	1.30E-04		
U-233	1.9564E-09	495.310	990.620	0.00E+00	9.69E-07	1.94E-06		
U-234	1.8371E-04	495.310	990.620	0.00E+00	9.10E-02	1.82E-01		
U-235	-2.7235E-06	495.310	0.000	1.12E-02	9.82E-03	1.12E-02		
U-236	1.5493E-05	495.310	990.620	0.00E+00	7.67E-03	1.53E-02		
U-238	-4.2851E-09	495.310	0.000	7.05E-03	7.05E-03	7.05E-03		
Y-90	2.7505E+00	495.310	990.620	0.00E+00	1.36E+03	2.72E+03		
Other Radionuclides					2.55E+03	5.09E+03		

Thermal Power	
Nominal Heat (Watts)	Bounding Heat Output (Watts)
2.51E+01	5.02E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM (6061) ALUM	
BOL HM Constituents:	U3Si2 U	
BOL Enrichment %:	19.76578383 60 to 100	

Burnup Summary (MWd) ²		Basis for burnup used in estimate:
Nominal:	From SFD: 495.310 Estimated: 495.310	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
Bounding:	990.620	

Checks		Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier: 0.06 Estimated Burnup/ Given Burnup	0.98
Bounding:	0.12	

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

² Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 157
 Fuel Units & Descr: 24 - 18 FLAT PLATES
 Heavy Metal Mass: BOL=3.41kg ; EOL=3.41kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1995
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.67

H. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	64.594	129.189	0.00E+00	1.30E-07	2.59E-07	0.0150	9.515E+12
Am-241	2.5251E-03	64.594	129.189	0.00E+00	1.63E-01	3.26E-01	0.0250	1.976E+12
Am-242m	3.9624E-07	64.594	129.189	0.00E+00	2.56E-05	5.12E-05	0.0375	1.717E+12
Am-243	1.4880E-06	64.594	129.189	0.00E+00	9.61E-05	1.92E-04	0.0575	1.849E+12
C-14	5.7053E-09	64.594	129.189	0.00E+00	3.69E-07	7.37E-07	0.0850	1.114E+12
Cl-36	1.3124E-32	64.594	129.189	0.00E+00	8.48E-31	1.70E-30	0.1250	7.357E+11
Cm-243	1.1419E-07	64.594	129.189	0.00E+00	7.38E-06	1.48E-05	0.2250	9.616E+11
Cm-244	1.6522E-05	64.594	129.189	0.00E+00	1.07E-03	2.13E-03	0.3750	4.183E+11
Co-60	7.4047E-07	64.594	129.189	0.00E+00	4.78E-05	9.57E-05	0.5750	6.913E+12
Cs-134	2.0455E-05	64.594	129.189	0.00E+00	1.32E-03	2.64E-03	0.8500	8.444E+10
Cs-135	3.4477E-06	64.594	129.189	0.00E+00	2.23E-04	4.45E-04	1.2500	4.085E+10
Cs-137	1.4365E+00	64.594	129.189	0.00E+00	9.28E+01	1.86E+02	1.7500	2.299E+09
Eu-154	7.3230E-03	64.594	129.189	0.00E+00	4.73E-01	9.46E-01	2.2500	1.923E+05
Eu-155	5.9259E-04	64.594	129.189	0.00E+00	3.83E-02	7.66E-02	2.7500	1.834E+05
Fe-55	2.2791E-06	64.594	129.189	0.00E+00	1.47E-04	2.94E-04	3.5000	1.069E+02
H-3	1.9698E-03	64.594	129.189	0.00E+00	1.27E-01	2.54E-01	5.0000	4.368E+01
I-129	7.5300E-07	64.594	129.189	0.00E+00	4.86E-05	9.73E-05	7.0000	4.781E+00
Kr-85	4.1176E-02	64.594	129.189	0.00E+00	2.66E+00	5.32E+00	11.0000	5.331E-01
Np-237	9.5752E-06	64.594	129.189	0.00E+00	6.19E-04	1.24E-03		
Pa-231	3.9379E-09	64.594	129.189	0.00E+00	2.54E-07	5.09E-07		
Pb-210	3.3115E-10	64.594	129.189	0.00E+00	2.14E-08	4.28E-08		
Pm-147	9.2402E-04	64.594	129.189	0.00E+00	5.97E-02	1.19E-01		
Pu-238	1.6217E-02	64.594	129.189	0.00E+00	1.05E+00	2.10E+00		
Pu-239	4.2810E-04	64.594	129.189	0.00E+00	2.77E-02	5.53E-02		
Pu-240	2.4333E-04	64.594	129.189	0.00E+00	1.57E-02	3.14E-02		
Pu-241	1.6242E-02	64.594	129.189	0.00E+00	1.05E+00	2.10E+00		
Pu-242	3.6329E-07	64.594	129.189	0.00E+00	2.35E-05	4.69E-05		
Ra-226	9.0114E-10	64.594	129.189	0.00E+00	5.82E-08	1.16E-07		
Ra-228	3.1019E-14	64.594	129.189	0.00E+00	2.00E-12	4.01E-12		
Ru-106	2.1225E-10	64.594	129.189	0.00E+00	1.37E-08	2.74E-08		
Se-79	1.2930E-05	64.594	129.189	0.00E+00	8.35E-04	1.67E-03		
Sn-126	1.1571E-05	64.594	129.189	0.00E+00	7.47E-04	1.49E-03		
Sr-90	1.3472E+00	64.594	129.189	0.00E+00	8.70E+01	1.74E+02		
Tc-99	4.2239E-04	64.594	129.189	0.00E+00	2.73E-02	5.46E-02		
Th-229	1.2407E-11	64.594	129.189	0.00E+00	8.01E-10	1.60E-09		
Th-230	8.3497E-08	64.594	129.189	0.00E+00	5.39E-06	1.08E-05		
Th-232	3.8371E-14	64.594	129.189	0.00E+00	2.48E-12	4.96E-12		
Th-230	4.0414E-08	64.594	129.189	0.00E+00	2.61E-06	5.22E-06		
U-232	1.0948E-07	64.594	129.189	0.00E+00	7.07E-06	1.41E-05		
U-233	3.6275E-09	64.594	129.189	0.00E+00	2.34E-07	4.69E-07		
U-234	1.8562E-04	64.594	129.189	0.00E+00	1.20E-02	2.40E-02		
U-235	-2.7235E-06	64.594	0.000	6.87E-03	6.70E-03	6.87E-03		
U-236	1.5493E-05	64.594	129.189	0.00E+00	1.00E-03	2.00E-03		
U-238	-4.2851E-09	64.594	0.000	7.73E-05	7.70E-05	7.73E-05		
Y-90	1.3475E+00	64.594	129.189	0.00E+00	8.70E+01	1.74E+02		
Other Radionuclides					8.84E+01	1.77E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.08E+00	2.16E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.25425219	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		64.594	Nominal burnup assumed to be 2% of BOL heavy metal mass.
Bounding:		129.189	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

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

²Total burnup for all fuel associated with this worksheet must be 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=3.26kg ; EOL=2.52kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1992
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.67

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.0068E-09	871.974	1,743.949	0.00E+00	1.75E-06	3.50E-06	Avg. MeV	
Am-241	2.5251E-03	871.974	1,743.949	0.00E+00	2.20E+00	4.40E+00	0.0150	1.284E+14
Am-242m	3.9624E-07	871.974	1,743.949	0.00E+00	3.46E-04	6.91E-04	0.0250	2.667E+13
Am-243	1.4880E-06	871.974	1,743.949	0.00E+00	1.30E-03	2.60E-03	0.0375	2.318E+13
C-14	5.7053E-09	871.974	1,743.949	0.00E+00	4.97E-06	9.95E-06	0.0575	2.495E+13
Ci-36	1.3124E-32	871.974	1,743.949	0.00E+00	1.14E-29	2.29E-29	0.0850	1.504E+13
Cm-243	1.1419E-07	871.974	1,743.949	0.00E+00	9.96E-05	1.99E-04	0.1250	9.931E+12
Cm-244	1.6522E-05	871.974	1,743.949	0.00E+00	1.44E-02	2.88E-02	0.2250	1.298E+13
Co-60	7.4047E-07	871.974	1,743.949	0.00E+00	6.48E-04	1.29E-03	0.3750	5.646E+12
Cs-134	2.0455E-05	871.974	1,743.949	0.00E+00	1.78E-02	3.57E-02	0.5750	9.332E+13
Cs-135	3.4477E-06	871.974	1,743.949	0.00E+00	3.01E-03	6.01E-03	0.8500	1.140E+12
Cs-137	1.4365E+00	871.974	1,743.949	0.00E+00	1.25E+03	2.51E+03	1.2500	5.514E+11
Eu-154	7.3230E-03	871.974	1,743.949	0.00E+00	6.39E+00	1.28E+01	1.7500	3.104E+10
Eu-155	5.9259E-04	871.974	1,743.949	0.00E+00	5.17E-01	1.03E+00	2.2500	2.595E+06
Fe-55	2.2791E-06	871.974	1,743.949	0.00E+00	1.99E-03	3.97E-03	2.7500	2.476E+06
H-3	1.9698E-03	871.974	1,743.949	0.00E+00	1.72E+00	3.44E+00	3.5000	1.435E+03
I-129	7.5300E-07	871.974	1,743.949	0.00E+00	6.57E-04	1.31E-03	5.0000	5.862E+02
Kr-85	4.1176E-02	871.974	1,743.949	0.00E+00	3.59E+01	7.18E+01	7.0000	6.416E+01
Np-237	9.5752E-06	871.974	1,743.949	0.00E+00	8.35E-03	1.67E-02	11.0000	7.153E+00
Pa-231	3.9379E-09	871.974	1,743.949	0.00E+00	3.43E-06	6.87E-06		
Pb-210	3.3115E-10	871.974	1,743.949	0.00E+00	2.89E-07	5.78E-07		
Pm-147	9.2402E-04	871.974	1,743.949	0.00E+00	8.06E-01	1.61E+00		
Pu-238	1.6217E-02	871.974	1,743.949	0.00E+00	1.41E+01	2.83E+01		
Pu-239	4.2810E-04	871.974	1,743.949	0.00E+00	3.73E-01	7.47E-01		
Pu-240	2.4333E-04	871.974	1,743.949	0.00E+00	2.12E-01	4.24E-01		
Pu-241	1.6242E-02	871.974	1,743.949	0.00E+00	1.42E+01	2.83E+01		
Pu-242	3.6329E-07	871.974	1,743.949	0.00E+00	3.17E-04	6.34E-04		
Ra-226	9.0114E-10	871.974	1,743.949	0.00E+00	7.86E-07	1.57E-06		
Ra-228	3.1019E-14	871.974	1,743.949	0.00E+00	2.70E-11	5.41E-11		
Ru-106	2.1225E-10	871.974	1,743.949	0.00E+00	1.85E-07	3.70E-07		
Se-79	1.2930E-05	871.974	1,743.949	0.00E+00	1.13E-02	2.25E-02		
Sn-126	1.1571E-05	871.974	1,743.949	0.00E+00	1.01E-02	2.02E-02		
Sr-90	1.3472E+00	871.974	1,743.949	0.00E+00	1.17E+03	2.35E+03		
Tc-99	4.2239E-04	871.974	1,743.949	0.00E+00	3.68E-01	7.37E-01		
Th-229	1.2407E-11	871.974	1,743.949	0.00E+00	1.08E-08	2.16E-08		
Th-230	8.3497E-08	871.974	1,743.949	0.00E+00	7.28E-05	1.46E-04		
Th-232	3.8371E-14	871.974	1,743.949	0.00E+00	3.35E-11	6.69E-11		
Tl-208	4.0414E-08	871.974	1,743.949	0.00E+00	3.52E-05	7.05E-05		
U-232	1.0948E-07	871.974	1,743.949	0.00E+00	9.55E-05	1.91E-04		
U-233	3.6275E-09	871.974	1,743.949	0.00E+00	3.16E-06	6.33E-06		
U-234	1.8562E-04	871.974	1,743.949	0.00E+00	1.62E-01	3.24E-01		
U-235	-2.7235E-06	871.974	0.000	6.57E-03	4.19E-03	6.57E-03		
U-236	1.5493E-05	871.974	1,743.949	0.00E+00	1.35E-02	2.70E-02		
U-238	-4.2851E-09	871.974	0.000	7.53E-05	7.16E-05	7.53E-05		
Y-90	1.3475E+00	871.974	1,743.949	0.00E+00	1.17E+03	2.35E+03		
Other Radionuclides					1.19E+03	2.39E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.46E+01	2.92E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.1372549	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	871.974	700.037	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,743.949	

Checks			
	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.85	0.80	0.95
Bounding:	1.70		

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

²Total burnup for all fuel associated with this worksheet must be 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)	¹ Fuel decay start date: 1992	Estimated Canister usage: 18"x10" 1.83
SNF ID #: 407	Estimates as of: 2030	
Fuel Units & Desc: 44 - 18 OR 19 FLAT PLATES	Template: ATR (Light Water, Alum., 60 to 100%, U)	
Heavy Metal Mass: BOL=10.38kg ; EOL=7.26kg	² Template Burnup(MWd): 367.2	
ROD Storage Site: SRS	Template BOL Heavy Metal Mass (MT): 0.00116689	
	Template Decay Time: 35 years	

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.0068E-09	3,788.935	7,577.869	0.00E+00	7.60E-06	1.52E-05	0.0150	5.581E+14
Am-241	2.5251E-03	3,788.935	7,577.869	0.00E+00	9.57E+00	1.91E+01	0.0250	1.159E+14
Am-242m	3.9624E-07	3,788.935	7,577.869	0.00E+00	1.50E-03	3.00E-03	0.0375	1.007E+14
Am-243	1.4880E-06	3,788.935	7,577.869	0.00E+00	5.64E-03	1.13E-02	0.0575	1.084E+14
C-14	5.7053E-09	3,788.935	7,577.869	0.00E+00	2.16E-05	4.32E-05	0.0850	6.533E+13
Cl-36	1.3124E-32	3,788.935	7,577.869	0.00E+00	4.97E-29	9.94E-29	0.1250	4.315E+13
Cm-243	1.1419E-07	3,788.935	7,577.869	0.00E+00	4.33E-04	8.65E-04	0.2250	5.640E+13
Cm-244	1.6522E-05	3,788.935	7,577.869	0.00E+00	6.26E-02	1.25E-01	0.3750	2.453E+13
Co-60	7.4047E-07	3,788.935	7,577.869	0.00E+00	2.81E-03	5.61E-03	0.5750	4.055E+14
Cs-134	2.0455E-05	3,788.935	7,577.869	0.00E+00	7.75E-02	1.55E-01	0.8500	4.953E+12
Cs-135	3.4477E-06	3,788.935	7,577.869	0.00E+00	1.31E-02	2.61E-02	1.2500	2.396E+12
Cs-137	1.4365E+00	3,788.935	7,577.869	0.00E+00	5.44E+03	1.09E+04	1.7500	1.349E+11
Eu-154	7.3230E-03	3,788.935	7,577.869	0.00E+00	2.77E+01	5.55E+01	2.2500	1.128E+07
Eu-155	5.9259E-04	3,788.935	7,577.869	0.00E+00	2.25E+00	4.49E+00	2.7500	1.076E+07
Fe-55	2.2791E-06	3,788.935	7,577.869	0.00E+00	8.64E-03	1.73E-02	3.5000	6.234E+03
H-3	1.9698E-03	3,788.935	7,577.869	0.00E+00	7.46E+00	1.49E+01	5.0000	2.547E+03
I-129	7.5300E-07	3,788.935	7,577.869	0.00E+00	2.85E-03	5.71E-03	7.0000	2.788E+02
Kr-85	4.1176E-02	3,788.935	7,577.869	0.00E+00	1.56E+02	3.12E+02	11.0000	3.108E+01
Np-237	9.5752E-06	3,788.935	7,577.869	0.00E+00	3.63E-02	7.26E-02		
Pa-231	3.9379E-09	3,788.935	7,577.869	0.00E+00	1.49E-05	2.98E-05		
Pb-210	3.3115E-10	3,788.935	7,577.869	0.00E+00	1.25E-06	2.51E-06		
Pm-147	9.2402E-04	3,788.935	7,577.869	0.00E+00	3.50E+00	7.00E+00		
Pu-238	1.6217E-02	3,788.935	7,577.869	0.00E+00	6.14E+01	1.23E+02		
Pu-239	4.2810E-04	3,788.935	7,577.869	0.00E+00	1.62E+00	3.24E+00		
Pu-240	2.4333E-04	3,788.935	7,577.869	0.00E+00	9.22E-01	1.84E+00		
Pu-241	1.6242E-02	3,788.935	7,577.869	0.00E+00	6.15E+01	1.23E+02		
Pu-242	3.6329E-07	3,788.935	7,577.869	0.00E+00	1.38E-03	2.75E-03		
Ra-226	9.0114E-10	3,788.935	7,577.869	0.00E+00	3.41E-06	6.83E-06		
Ra-228	3.1019E-14	3,788.935	7,577.869	0.00E+00	1.18E-10	2.35E-10		
Ru-106	2.1225E-10	3,788.935	7,577.869	0.00E+00	8.04E-07	1.61E-06		
Se-79	1.2930E-05	3,788.935	7,577.869	0.00E+00	4.90E-02	9.80E-02		
Sn-126	1.1571E-05	3,788.935	7,577.869	0.00E+00	4.38E-02	8.77E-02		
Sr-90	1.3472E+00	3,788.935	7,577.869	0.00E+00	5.10E+03	1.02E+04		
Tc-99	4.2239E-04	3,788.935	7,577.869	0.00E+00	1.60E+00	3.20E+00		
Th-229	1.2407E-11	3,788.935	7,577.869	0.00E+00	4.70E-08	9.40E-08		
Th-230	8.3497E-08	3,788.935	7,577.869	0.00E+00	3.16E-04	6.33E-04		
Th-232	3.8371E-14	3,788.935	7,577.869	0.00E+00	1.45E-10	2.91E-10		
Tl-208	4.0414E-08	3,788.935	7,577.869	0.00E+00	1.53E-04	3.06E-04		
U-232	1.0948E-07	3,788.935	7,577.869	0.00E+00	4.15E-04	8.30E-04		
U-233	3.6275E-09	3,788.935	7,577.869	0.00E+00	1.37E-05	2.75E-05		
U-234	1.8562E-04	3,788.935	7,577.869	0.00E+00	7.03E-01	1.41E+00		
U-235	-2.7235E-06	3,788.935	0.000	2.09E-02	1.06E-02	2.09E-02		
U-236	1.5493E-05	3,788.935	7,577.869	0.00E+00	5.87E-02	1.17E-01		
U-238	-4.2851E-09	3,788.935	0.000	2.37E-04	2.20E-04	2.37E-04		
Y-90	1.3475E+00	3,788.935	7,577.869	0.00E+00	5.11E+03	1.02E+04		
Other Radionuclides					5.18E+03	1.04E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.34E+01	1.27E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.22033898	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	3,788.935	2,954.322	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:		7,577.869	

Checks			
	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	1.16	0.78	
Bounding:	2.32		

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

²Total burnup for all fuel associated with this worksheet must be 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=5.20kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1992
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 1.13

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.0068E-09	1,594.343	3,188.687	0.00E+00	3.20E-06	6.40E-06	Avg. MeV	
Am-241	2.5251E-03	1,594.343	3,188.687	0.00E+00	4.03E+00	8.05E+00	0.0150	2,348E+14
Am-242m	3.9624E-07	1,594.343	3,188.687	0.00E+00	6.32E-04	1.26E-03	0.0250	4,877E+13
Am-243	1.4880E-06	1,594.343	3,188.687	0.00E+00	2.37E-03	4.74E-03	0.0375	4,239E+13
C-14	5.7053E-09	1,594.343	3,188.687	0.00E+00	9.10E-06	1.82E-05	0.0575	4,563E+13
Cl-36	1.3124E-32	1,594.343	3,188.687	0.00E+00	2.09E-29	4.18E-29	0.0850	2,749E+13
Cm-243	1.1419E-07	1,594.343	3,188.687	0.00E+00	1.82E-04	3.64E-04	0.1250	1,819E+13
Cm-244	1.6522E-05	1,594.343	3,188.687	0.00E+00	2.63E-02	5.27E-02	0.2250	2,373E+13
Co-60	7.4047E-07	1,594.343	3,188.687	0.00E+00	1.18E-03	2.36E-03	0.3750	1,032E+13
Cs-134	2.0455E-05	1,594.343	3,188.687	0.00E+00	3.26E-02	6.52E-02	0.5750	1,706E+14
Cs-135	3.4477E-06	1,594.343	3,188.687	0.00E+00	5.50E-03	1.10E-02	0.8500	2,084E+12
Cs-137	1.4365E+00	1,594.343	3,188.687	0.00E+00	2.29E+03	4.58E+03	1.2500	1,008E+12
Eu-154	7.3230E-04	1,594.343	3,188.687	0.00E+00	1.17E+01	2.34E+01	1.7500	5,675E+10
Eu-155	5.9259E-04	1,594.343	3,188.687	0.00E+00	9.45E-01	1.89E+00	2.2500	4,746E+06
Fe-55	2.2791E-06	1,594.343	3,188.687	0.00E+00	3.63E-03	7.27E-03	2.7500	4,528E+06
H-3	1.9698E-03	1,594.343	3,188.687	0.00E+00	3.14E+00	6.28E+00	3.5000	2,624E+03
I-129	7.5300E-07	1,594.343	3,188.687	0.00E+00	1.20E-03	2.40E-03	5.0000	1,072E+03
Kr-85	4.1176E-02	1,594.343	3,188.687	0.00E+00	6.56E+01	1.31E+02	7.0000	1.173E+02
Np-237	9.5752E-06	1,594.343	3,188.687	0.00E+00	1.53E-02	3.05E-02	11.0000	1.308E+01
Pa-231	3.9379E-09	1,594.343	3,188.687	0.00E+00	6.28E-06	1.26E-05		
Pb-210	3.3115E-10	1,594.343	3,188.687	0.00E+00	5.28E-07	1.06E-06		
Pm-147	9.2402E-04	1,594.343	3,188.687	0.00E+00	1.47E+00	2.95E+00		
Pu-238	1.6217E-02	1,594.343	3,188.687	0.00E+00	2.59E+01	5.17E+01		
Pu-239	4.2810E-04	1,594.343	3,188.687	0.00E+00	6.83E-01	1.37E+00		
Pu-240	2.4333E-04	1,594.343	3,188.687	0.00E+00	3.88E-01	7.76E-01		
Pu-241	1.6242E-02	1,594.343	3,188.687	0.00E+00	2.59E+01	5.18E+01		
Pu-242	3.6329E-07	1,594.343	3,188.687	0.00E+00	5.79E-04	1.16E-03		
Ra-226	9.0114E-10	1,594.343	3,188.687	0.00E+00	1.44E-06	2.87E-06		
Ra-228	3.1019E-14	1,594.343	3,188.687	0.00E+00	4.95E-11	9.89E-11		
Ru-106	2.1225E-10	1,594.343	3,188.687	0.00E+00	3.38E-07	6.77E-07		
Se-79	1.2930E-05	1,594.343	3,188.687	0.00E+00	2.06E-02	4.12E-02		
Sn-126	1.1571E-05	1,594.343	3,188.687	0.00E+00	1.84E-02	3.69E-02		
Sr-90	1.3472E+00	1,594.343	3,188.687	0.00E+00	2.15E+03	4.30E+03		
Tc-99	4.2239E-04	1,594.343	3,188.687	0.00E+00	6.73E-01	1.35E+00		
Th-229	1.2407E-11	1,594.343	3,188.687	0.00E+00	1.98E-08	3.96E-08		
Th-230	8.3497E-08	1,594.343	3,188.687	0.00E+00	1.33E-04	2.66E-04		
Th-232	3.8371E-14	1,594.343	3,188.687	0.00E+00	6.12E-11	1.22E-10		
Tl-208	4.0414E-08	1,594.343	3,188.687	0.00E+00	6.44E-05	1.29E-04		
U-232	1.0948E-07	1,594.343	3,188.687	0.00E+00	1.75E-04	3.49E-04		
U-233	3.6275E-09	1,594.343	3,188.687	0.00E+00	5.78E-06	1.16E-05		
U-234	1.8562E-04	1,594.343	3,188.687	0.00E+00	2.96E-01	5.92E-01		
U-235	-2.7235E-06	1,594.343	0.000	1.36E-02	9.23E-03	1.36E-02		
U-236	1.5493E-05	1,594.343	3,188.687	0.00E+00	2.47E-02	4.94E-02		
U-238	-4.2851E-09	1,594.343	0.000	1.58E-04	1.51E-04	1.58E-04		
Y-90	1.3475E+00	1,594.343	3,188.687	0.00E+00	2.15E+03	4.30E+03		
Other Radionuclides					2.18E+03	4.36E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.67E+01	5.34E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	UO8	U	
BOL Enrichment %:	93.048	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	1,594.343	1,467.691	
Bounding:		3,188.687	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.75	0.92	
Bounding:	1.50		

0.99

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 753
 Fuel Units & Descr: 4 - 19 CURVED PLATES
 Heavy Metal Mass: BOL=72kg ; EOL=31kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1966
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.11

Radionuclide	II. Estimates						Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.9739E-09	386.763	678.066	0.00E+00	1.15E-06	2.02E-06	0.0150	3.494E+13
Am-241	2.5986E-03	386.763	678.066	0.00E+00	1.01E+00	1.76E+00	0.0250	7.252E+12
Am-242m	3.7010E-07	386.763	678.066	0.00E+00	1.43E-04	2.51E-04	0.0375	6.302E+12
Am-243	1.4858E-06	386.763	678.066	0.00E+00	5.75E-04	1.01E-03	0.0575	6.789E+12
C-14	5.6944E-09	386.763	678.066	0.00E+00	2.20E-06	3.86E-06	0.0850	4.086E+12
Cl-36	1.3124E-32	386.763	678.066	0.00E+00	5.08E-30	8.90E-30	0.1250	2.669E+12
Cl-243	7.9303E-08	386.763	678.066	0.00E+00	3.07E-05	5.38E-05	0.2250	3.524E+12
Cm-244	9.3083E-06	386.763	678.066	0.00E+00	3.60E-03	6.31E-03	0.3750	1.535E+12
Co-60	1.0310E-07	386.763	678.066	0.00E+00	3.99E-05	6.99E-05	0.5750	2.565E+13
Cs-134	1.3254E-07	386.763	678.066	0.00E+00	5.13E-05	8.99E-05	0.8500	2.748E+11
Cs-135	3.4477E-06	386.763	678.066	0.00E+00	1.33E-03	2.34E-03	1.2500	1.111E+11
Cs-137	1.0161E+00	386.763	678.066	0.00E+00	3.93E+02	6.89E+02	1.7500	7.282E+09
Eu-154	2.1879E-03	386.763	678.066	0.00E+00	8.46E-01	1.48E+00	2.2500	7.063E+05
Eu-155	7.2930E-05	386.763	678.066	0.00E+00	2.82E-02	4.95E-02	2.7500	8.336E+05
Fe-55	4.1912E-08	386.763	678.066	0.00E+00	1.62E-05	2.84E-05	3.5000	4.572E+02
H-3	8.4913E-04	386.763	678.066	0.00E+00	3.28E-01	5.76E-01	5.0000	1.859E+02
I-129	7.5300E-07	386.763	678.066	0.00E+00	2.91E-04	5.11E-04	7.0000	2.022E+01
Kr-85	1.5615E-02	386.763	678.066	0.00E+00	6.04E+00	1.06E+01	11.0000	2.245E+00
Np-237	9.5861E-06	386.763	678.066	0.00E+00	3.71E-03	6.50E-03		
Pa-231	5.0790E-09	386.763	678.066	0.00E+00	1.96E-06	3.44E-06		
Pb-210	6.6176E-10	386.763	678.066	0.00E+00	2.56E-07	4.49E-07		
Pm-147	1.7606E-05	386.763	678.066	0.00E+00	6.81E-03	1.19E-02		
Pu-238	1.4406E-02	386.763	678.066	0.00E+00	5.57E+00	9.77E+00		
Pu-239	4.2783E-04	386.763	678.066	0.00E+00	1.65E-01	2.90E-01		
Pu-240	2.4297E-04	386.763	678.066	0.00E+00	9.40E-02	1.65E-01		
Pu-241	7.8949E-03	386.763	678.066	0.00E+00	3.05E+00	5.35E+00		
Pu-242	3.6329E-07	386.763	678.066	0.00E+00	1.41E-04	2.46E-04		
Ra-226	1.5169E-09	386.763	678.066	0.00E+00	5.87E-07	1.03E-06		
Ra-228	4.2429E-14	386.763	678.066	0.00E+00	1.64E-11	2.88E-11		
Ru-106	7.0833E-15	386.763	678.066	0.00E+00	2.74E-12	4.80E-12		
Se-79	1.2928E-05	386.763	678.066	0.00E+00	5.00E-03	8.77E-03		
Sn-126	1.1571E-05	386.763	678.066	0.00E+00	4.48E-03	7.85E-03		
Sr-90	9.4308E-01	386.763	678.066	0.00E+00	3.65E+02	6.39E+02		
Tc-99	4.2239E-04	386.763	678.066	0.00E+00	1.63E-01	2.86E-01		
Th-229	1.7968E-11	386.763	678.066	0.00E+00	6.95E-09	1.22E-08		
Th-230	1.0855E-07	386.763	678.066	0.00E+00	4.20E-05	7.36E-05		
Th-232	4.9809E-14	386.763	678.066	0.00E+00	1.93E-11	3.38E-11		
Ti-208	3.4995E-08	386.763	678.066	0.00E+00	1.35E-05	2.37E-05		
U-232	9.4798E-08	386.763	678.066	0.00E+00	3.67E-05	6.43E-05		
U-233	4.2538E-09	386.763	678.066	0.00E+00	1.65E-06	2.88E-06		
U-234	1.8617E-04	386.763	678.066	0.00E+00	7.20E-02	1.26E-01		
U-235	-2.7235E-06	386.763	0.000	1.44E-03	3.90E-04	1.44E-03		
U-236	1.5493E-05	386.763	678.066	0.00E+00	5.99E-03	1.05E-02		
U-238	-4.2851E-09	386.763	0.000	1.61E-05	1.45E-05	1.61E-05		
Y-90	9.4308E-01	386.763	678.066	0.00E+00	3.65E+02	6.39E+02		
Other Radionuclides					3.75E+02	6.58E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.59E+00	8.04E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	UO8	U	
BOL Enrichment %:	93.29608939	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		386.763 Nominal burnup calculated from the heavy metal mass destroyed.	
Bounding:		678.066 Bounding burnup calculated assuming all BOL heavy metal burned.	

Checks			
	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	1.72		1.08
Bounding:	3.01		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 903
 Fuel Units & Descr: 97 - 19 CURVED PLATES
 Heavy Metal Mass: BOL=29.64kg ; EOL=20.78kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1966
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 2.69

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.9739E-09	8,396.085	16,792.169	0.00E+00	2.50E-05	4.99E-05		
Am-241	2.5986E-03	8,396.085	16,792.169	0.00E+00	2.18E+01	4.36E+01	0.0150	8.652E+14
Am-242m	3.7010E-07	8,396.085	16,792.169	0.00E+00	3.11E-03	6.21E-03	0.0250	1.796E+14
Am-243	1.4858E-06	8,396.085	16,792.169	0.00E+00	1.25E-02	2.50E-02	0.0375	1.561E+14
C-14	5.6944E-09	8,396.085	16,792.169	0.00E+00	4.78E-05	9.56E-05	0.0575	1.681E+14
Cl-36	1.3124E-32	8,396.085	16,792.169	0.00E+00	1.10E-28	2.20E-28	0.0850	1.012E+14
Co-243	7.9303E-08	8,396.085	16,792.169	0.00E+00	6.66E-04	1.33E-03	0.1250	6.611E+13
Co-244	9.3083E-06	8,396.085	16,792.169	0.00E+00	7.82E-02	1.56E-01	0.2250	8.728E+13
Co-60	1.0310E-07	8,396.085	16,792.169	0.00E+00	8.66E-04	1.73E-03	0.3750	3.802E+13
Cs-134	1.3254E-07	8,396.085	16,792.169	0.00E+00	1.11E-03	2.23E-03	0.5750	6.353E+14
Cs-135	3.4477E-06	8,396.085	16,792.169	0.00E+00	2.89E-02	5.79E-02	0.8500	6.805E+12
Cs-137	1.0161E+00	8,396.085	16,792.169	0.00E+00	8.53E+03	1.71E+04	1.2500	2.752E+12
Eu-154	2.1879E-03	8,396.085	16,792.169	0.00E+00	1.84E+01	3.67E+01	1.7500	1.803E+11
Eu-155	7.2930E-05	8,396.085	16,792.169	0.00E+00	6.12E-01	1.22E+00	2.2500	1.749E+07
Fe-55	4.1912E-08	8,396.085	16,792.169	0.00E+00	3.52E-04	7.04E-04	2.7500	2.064E+07
H-3	8.4913E-04	8,396.085	16,792.169	0.00E+00	7.13E+00	1.43E+01	3.5000	1.133E+04
I-129	7.5300E-07	8,396.085	16,792.169	0.00E+00	6.32E-03	1.26E-02	5.0000	4.604E+03
Kr-85	1.5615E-02	8,396.085	16,792.169	0.00E+00	1.31E+02	2.62E+02	7.0000	5.008E+02
Np-237	9.5861E-06	8,396.085	16,792.169	0.00E+00	8.05E-02	1.61E-01	11.0000	5.562E+01
Pa-231	5.0790E-09	8,396.085	16,792.169	0.00E+00	4.26E-05	8.53E-05		
Pb-210	6.6176E-10	8,396.085	16,792.169	0.00E+00	5.56E-06	1.11E-05		
Pm-147	1.7606E-05	8,396.085	16,792.169	0.00E+00	1.48E-01	2.96E-01		
Pu-238	1.4406E-02	8,396.085	16,792.169	0.00E+00	1.21E+02	2.42E+02		
Pu-239	4.2783E-04	8,396.085	16,792.169	0.00E+00	3.59E+00	7.18E+00		
Pu-240	2.4297E-04	8,396.085	16,792.169	0.00E+00	2.04E+00	4.08E+00		
Pu-241	7.8949E-03	8,396.085	16,792.169	0.00E+00	6.63E+01	1.33E+02		
Pu-242	3.6329E-07	8,396.085	16,792.169	0.00E+00	3.05E-03	6.10E-03		
Ra-226	1.5169E-09	8,396.085	16,792.169	0.00E+00	1.27E-05	2.55E-05		
Ra-228	4.2429E-14	8,396.085	16,792.169	0.00E+00	3.56E-10	7.12E-10		
Ru-106	7.0833E-15	8,396.085	16,792.169	0.00E+00	5.95E-11	1.19E-10		
Se-79	1.2928E-05	8,396.085	16,792.169	0.00E+00	1.09E-01	2.17E-01		
Sn-126	1.1571E-05	8,396.085	16,792.169	0.00E+00	9.72E-02	1.94E-01		
Sr-90	9.4308E-01	8,396.085	16,792.169	0.00E+00	7.92E+03	1.58E+04		
Tc-99	4.2239E-04	8,396.085	16,792.169	0.00E+00	3.55E+00	7.09E+00		
Th-229	1.7968E-11	8,396.085	16,792.169	0.00E+00	1.51E-07	3.02E-07		
Th-230	1.0855E-07	8,396.085	16,792.169	0.00E+00	9.11E-04	1.82E-03		
Th-232	4.9809E-14	8,396.085	16,792.169	0.00E+00	4.18E-10	8.36E-10		
Ti-208	3.4995E-08	8,396.085	16,792.169	0.00E+00	2.94E-04	5.88E-04		
U-232	9.4798E-08	8,396.085	16,792.169	0.00E+00	7.96E-04	1.59E-03		
U-233	4.2538E-09	8,396.085	16,792.169	0.00E+00	3.57E-05	7.14E-05	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-234	1.8617E-04	8,396.085	16,792.169	0.00E+00	1.56E+00	3.13E+00	9.95E+01	1.99E+02
U-235	-2.7235E-06	8,396.085	0.000	5.97E-02	3.68E-02	5.97E-02	Total	Total
U-236	1.5493E-05	8,396.085	16,792.169	0.00E+00	1.30E-01	2.60E-01		
U-238	-4.2851E-09	8,396.085	0.000	6.82E-04	6.46E-04	6.82E-04		
Y-90	9.4308E-01	8,396.085	16,792.169	0.00E+00	7.92E+03	1.58E+04		
Other Radionuclides					8.14E+03	1.63E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.15626243	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		8,396.085	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		16,792.169	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.90		1.02
Bounding:	1.80		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 944
 Fuel Units & Descr: 33 - 19 CURVED PLATES
 Heavy Metal Mass: BOL=56.54kg ; EOL=53.65kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1987
 Estimates as of: 2030
 Template: ATR (Light Water, Alum.. 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 1.38

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	2,731.393	5,462.787	0.00E+00	5.48E-06	1.10E-05	0.0150	4.023E+14
Am-241	2.5251E-03	2,731.393	5,462.787	0.00E+00	6.90E+00	1.38E+01	0.0250	8.355E+13
Am-242m	3.9624E-07	2,731.393	5,462.787	0.00E+00	1.08E-03	2.16E-03	0.0375	7.262E+13
Am-243	1.4880E-06	2,731.393	5,462.787	0.00E+00	4.06E-03	8.13E-03	0.0575	7.816E+13
C-14	5.7053E-09	2,731.393	5,462.787	0.00E+00	1.56E-05	3.12E-05	0.0850	4.710E+13
Cl-36	1.3124E-32	2,731.393	5,462.787	0.00E+00	3.58E-29	7.17E-29	0.1250	3.111E+13
Cm-243	1.1419E-07	2,731.393	5,462.787	0.00E+00	3.12E-04	6.24E-04	0.2250	4.066E+13
Cm-244	1.6522E-05	2,731.393	5,462.787	0.00E+00	4.51E-02	9.03E-02	0.3750	1.769E+13
Co-60	7.4047E-07	2,731.393	5,462.787	0.00E+00	2.02E-03	4.05E-03	0.5750	2.923E+14
Cs-134	2.0455E-05	2,731.393	5,462.787	0.00E+00	5.59E-02	1.12E-01	0.8500	3.571E+12
Cs-135	3.4477E-06	2,731.393	5,462.787	0.00E+00	9.42E-03	1.88E-02	1.2500	1.727E+12
Cs-137	1.4365E+00	2,731.393	5,462.787	0.00E+00	3.92E+03	7.85E+03	1.7500	9.723E+10
Eu-154	7.3230E-03	2,731.393	5,462.787	0.00E+00	2.00E+01	4.00E+01	2.2500	8.190E+06
Eu-155	5.9259E-04	2,731.393	5,462.787	0.00E+00	1.62E+00	3.24E+00	2.7500	7.757E+06
Fe-55	2.2791E-06	2,731.393	5,462.787	0.00E+00	6.23E-03	1.25E-02	3.5000	4.574E+03
H-3	1.9698E-03	2,731.393	5,462.787	0.00E+00	5.38E+00	1.08E+01	5.0000	1.871E+03
I-129	7.5300E-07	2,731.393	5,462.787	0.00E+00	2.06E-03	4.11E-03	7.0000	2.050E+02
Kr-85	4.1176E-02	2,731.393	5,462.787	0.00E+00	1.12E+02	2.25E+02	11.0000	2.286E+01
Np-237	9.5752E-06	2,731.393	5,462.787	0.00E+00	2.62E-02	5.23E-02		
Pa-231	3.9379E-09	2,731.393	5,462.787	0.00E+00	1.08E-05	2.15E-05		
Pb-210	3.3115E-10	2,731.393	5,462.787	0.00E+00	9.05E-07	1.81E-06		
Pm-147	9.2402E-04	2,731.393	5,462.787	0.00E+00	2.52E+00	5.05E+00		
Pu-238	1.6217E-02	2,731.393	5,462.787	0.00E+00	4.43E+01	8.86E+01		
Pu-239	4.2810E-04	2,731.393	5,462.787	0.00E+00	1.17E+00	2.34E+00		
Pu-240	2.4333E-04	2,731.393	5,462.787	0.00E+00	6.65E-01	1.33E+00		
Pu-241	1.6242E-02	2,731.393	5,462.787	0.00E+00	4.44E+01	8.87E+01		
Pu-242	3.6329E-07	2,731.393	5,462.787	0.00E+00	9.92E-04	1.98E-03		
Ra-226	9.0114E-10	2,731.393	5,462.787	0.00E+00	2.46E-06	4.92E-06		
Ra-228	3.1019E-14	2,731.393	5,462.787	0.00E+00	8.47E-11	1.69E-10		
Ru-106	2.1225E-10	2,731.393	5,462.787	0.00E+00	5.80E-07	1.16E-06		
Se-79	1.2930E-05	2,731.393	5,462.787	0.00E+00	3.53E-02	7.06E-02		
Sn-126	1.1571E-05	2,731.393	5,462.787	0.00E+00	3.16E-02	6.32E-02		
Sr-90	1.3472E+00	2,731.393	5,462.787	0.00E+00	3.68E+03	7.36E+03		
Tc-99	4.2239E-04	2,731.393	5,462.787	0.00E+00	1.15E+00	2.31E+00		
Th-229	1.2407E-11	2,731.393	5,462.787	0.00E+00	3.39E-08	6.78E-08		
Th-230	8.3497E-08	2,731.393	5,462.787	0.00E+00	2.28E-04	4.56E-04		
Th-232	3.8371E-14	2,731.393	5,462.787	0.00E+00	1.05E-10	2.10E-10		
Ti-208	4.0414E-08	2,731.393	5,462.787	0.00E+00	1.10E-04	2.21E-04		
U-232	1.0948E-07	2,731.393	5,462.787	0.00E+00	2.99E-04	5.98E-04		
U-233	3.6275E-09	2,731.393	5,462.787	0.00E+00	9.91E-06	1.98E-05		
U-234	1.8562E-04	2,731.393	5,462.787	0.00E+00	5.07E-01	1.01E+00		
U-235	-2.7235E-06	2,731.393	0.000	2.42E-02	1.68E-02	2.42E-02		
U-236	1.5493E-05	2,731.393	5,462.787	0.00E+00	4.23E-02	8.46E-02		
U-238	-4.2851E-09	2,731.393	0.000	1.52E-02	1.52E-02	1.52E-02		
Y-90	1.3475E+00	2,731.393	5,462.787	0.00E+00	3.68E+03	7.36E+03		
Other Radionuclides					3.74E+03	7.48E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.57E+01	9.14E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.8176038	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,731.393	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		5,462.787	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.15		1.00
Bounding:	0.31		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 165
 Fuel Units & Descr: 52 - 19 CURVED PLATES
 Heavy Metal Mass: BOL=87.95kg ; EOL=83.29kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1987
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 1.44

II. Estimates		m	x _n	x _b	b	y _n	y _b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)	Avg. MeV
Ac-227	2.0068E-09	4,412.353	8,824.706	0.00E+00	8.85E-06	1.77E-05			
Am-241	2.5251E-03	4,412.353	8,824.706	0.00E+00	1.11E+01	2.23E+01		0.0150	6.499E+14
Am-242m	3.9624E-07	4,412.353	8,824.706	0.00E+00	1.75E-03	3.50E-03		0.0250	1.350E+14
Am-243	1.4880E-06	4,412.353	8,824.706	0.00E+00	6.57E-03	1.31E-02		0.0375	1.173E+14
C-14	5.7053E-09	4,412.353	8,824.706	0.00E+00	2.52E-05	5.03E-05		0.0575	1.263E+14
Cl-36	1.3124E-32	4,412.353	8,824.706	0.00E+00	5.79E-29	1.16E-28		0.0850	7.608E+13
Co-243	1.1419E-07	4,412.353	8,824.706	0.00E+00	5.04E-04	1.01E-03		0.1250	5.025E+13
Co-244	1.6522E-05	4,412.353	8,824.706	0.00E+00	7.29E-02	1.46E-01		0.2250	6.568E+13
Co-60	7.4047E-07	4,412.353	8,824.706	0.00E+00	3.27E-03	6.53E-03		0.3750	2.857E+13
Cs-134	2.0455E-05	4,412.353	8,824.706	0.00E+00	9.03E-02	1.81E-01		0.5750	4.722E+14
Cs-135	3.4477E-06	4,412.353	8,824.706	0.00E+00	1.52E-02	3.04E-02		0.8500	5.768E+12
Cs-137	1.4365E+00	4,412.353	8,824.706	0.00E+00	6.34E+03	1.27E+04		1.2500	2.790E+12
Eu-154	7.3230E-03	4,412.353	8,824.706	0.00E+00	3.23E+01	6.46E+01		1.7500	1.571E+11
Eu-155	5.9259E-04	4,412.353	8,824.706	0.00E+00	2.61E+00	5.23E+00		2.2500	1.313E+07
Fe-55	2.2791E-06	4,412.353	8,824.706	0.00E+00	1.01E-02	2.01E-02		2.7500	1.253E+07
H-3	1.9698E-03	4,412.353	8,824.706	0.00E+00	8.69E+00	1.74E+01		3.5000	7.384E+03
I-129	7.5300E-07	4,412.353	8,824.706	0.00E+00	3.32E-03	6.64E-03		5.0000	3.020E+03
Kr-85	4.1176E-02	4,412.353	8,824.706	0.00E+00	1.82E+02	3.63E+02		7.0000	3.308E+02
Np-237	9.5752E-06	4,412.353	8,824.706	0.00E+00	4.22E-02	8.45E-02		11.0000	3.690E+01
Pa-231	3.9379E-09	4,412.353	8,824.706	0.00E+00	1.74E-05	3.48E-05			
Pb-210	3.3115E-10	4,412.353	8,824.706	0.00E+00	1.46E-06	2.92E-06			
Pm-147	9.2402E-04	4,412.353	8,824.706	0.00E+00	4.08E+00	8.15E+00			
Pu-238	1.6217E-02	4,412.353	8,824.706	0.00E+00	7.16E+01	1.43E+02			
Pu-239	4.2810E-04	4,412.353	8,824.706	0.00E+00	1.89E+00	3.78E+00			
Pu-240	2.4333E-04	4,412.353	8,824.706	0.00E+00	1.07E+00	2.15E+00			
Pu-241	1.6242E-02	4,412.353	8,824.706	0.00E+00	7.17E+01	1.43E+02			
Pu-242	3.6329E-07	4,412.353	8,824.706	0.00E+00	1.60E-03	3.21E-03			
Ra-226	9.0114E-10	4,412.353	8,824.706	0.00E+00	3.98E-06	7.95E-06			
Ra-228	3.1019E-14	4,412.353	8,824.706	0.00E+00	1.37E-10	2.74E-10			
Ru-106	2.1225E-10	4,412.353	8,824.706	0.00E+00	9.37E-07	1.87E-06			
Se-79	1.2930E-05	4,412.353	8,824.706	0.00E+00	5.71E-02	1.14E-01			
Sn-126	1.1571E-05	4,412.353	8,824.706	0.00E+00	5.11E-02	1.02E-01			
Sr-90	1.3472E+00	4,412.353	8,824.706	0.00E+00	5.94E+03	1.19E+04			
Tc-99	4.2239E-04	4,412.353	8,824.706	0.00E+00	1.86E+00	3.73E+00			
Th-229	1.2407E-11	4,412.353	8,824.706	0.00E+00	5.47E-08	1.09E-07			
Th-230	8.3497E-08	4,412.353	8,824.706	0.00E+00	3.68E-04	7.37E-04			
Th-232	3.8371E-14	4,412.353	8,824.706	0.00E+00	1.69E-10	3.39E-10			
Ti-208	4.0414E-08	4,412.353	8,824.706	0.00E+00	1.78E-04	3.57E-04			
U-232	1.0948E-07	4,412.353	8,824.706	0.00E+00	4.83E-04	9.66E-04			
U-233	3.6275E-09	4,412.353	8,824.706	0.00E+00	1.60E-05	3.20E-05			
U-234	1.8562E-04	4,412.353	8,824.706	0.00E+00	8.19E-01	1.64E+00			
U-235	-2.7235E-06	4,412.353	0.000	3.81E-02	2.61E-02	3.81E-02			
U-236	1.5493E-05	4,412.353	8,824.706	0.00E+00	6.84E-02	1.37E-01			
U-238	-4.2851E-09	4,412.353	0.000	2.36E-02	2.36E-02	2.36E-02			
Y-90	1.3475E+00	4,412.353	8,824.706	0.00E+00	5.95E+03	1.19E+04			
Other Radionuclides					6.04E+03	1.21E+04			

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	20.03831236	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		4,412.353	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		8,824.706	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.16		1.00
Bounding:	0.32		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 461
 Fuel Units & Descr: 17 - 19 CURVED PLATES
 Heavy Metal Mass: BOL=4.98kg ; EOL=3.25kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1985
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.47

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.0068E-09	1,637.302	3,274.604	0.00E+00	3.29E-06	6.57E-06	Avg. MeV	
Am-241	2.5251E-03	1,637.302	3,274.604	0.00E+00	4.13E+00	8.27E+00	0.0150	2.412E+14
Am-242m	3.9624E-07	1,637.302	3,274.604	0.00E+00	6.49E-04	1.30E-03	0.0250	5.008E+13
Am-243	1.4880E-06	1,637.302	3,274.604	0.00E+00	2.44E-03	4.87E-03	0.0375	4.353E+13
C-14	5.7053E-09	1,637.302	3,274.604	0.00E+00	9.34E-06	1.87E-05	0.0575	4.685E+13
Cl-36	1.3124E-32	1,637.302	3,274.604	0.00E+00	2.15E-29	4.30E-29	0.0850	2.823E+13
Cm-243	1.1419E-07	1,637.302	3,274.604	0.00E+00	1.87E-04	3.74E-04	0.1250	1.865E+13
Cm-244	1.6522E-05	1,637.302	3,274.604	0.00E+00	2.71E-02	5.41E-02	0.2250	2.437E+13
Co-60	7.4047E-07	1,637.302	3,274.604	0.00E+00	1.21E-03	2.42E-03	0.3750	1.060E+13
Cs-134	2.0455E-05	1,637.302	3,274.604	0.00E+00	3.35E-02	6.70E-02	0.5750	1.752E+14
Cs-135	3.4477E-06	1,637.302	3,274.604	0.00E+00	5.64E-03	1.13E-02	0.8500	2.140E+12
Cs-137	1.4365E+00	1,637.302	3,274.604	0.00E+00	2.35E+03	4.70E+03	1.2500	1.035E+12
Eu-154	7.3230E-03	1,637.302	3,274.604	0.00E+00	1.20E+01	2.40E+01	1.7500	5.828E+10
Eu-155	5.9259E-04	1,637.302	3,274.604	0.00E+00	9.70E-01	1.94E+00	2.2500	4.873E+06
Fe-55	2.2791E-06	1,637.302	3,274.604	0.00E+00	3.73E-03	7.46E-03	2.7500	4.650E+06
H-3	1.9698E-03	1,637.302	3,274.604	0.00E+00	3.23E+00	6.45E+00	3.5000	2.694E+03
I-129	7.5300E-07	1,637.302	3,274.604	0.00E+00	1.23E-03	2.47E-03	5.0000	1.101E+03
Kr-85	4.1176E-02	1,637.302	3,274.604	0.00E+00	6.74E+01	1.35E+02	7.0000	1.205E+02
Np-237	9.5752E-06	1,637.302	3,274.604	0.00E+00	1.57E-02	3.14E-02	11.0000	1.343E+01
Pa-231	3.9379E-09	1,637.302	3,274.604	0.00E+00	6.45E-06	1.29E-05		
Pb-210	3.3115E-10	1,637.302	3,274.604	0.00E+00	5.42E-07	1.08E-06		
Pm-147	9.2402E-04	1,637.302	3,274.604	0.00E+00	1.51E+00	3.03E+00		
Pu-238	1.6217E-02	1,637.302	3,274.604	0.00E+00	2.66E+01	5.31E+01		
Pu-239	4.2810E-04	1,637.302	3,274.604	0.00E+00	7.01E-01	1.40E+00		
Pu-240	2.4333E-04	1,637.302	3,274.604	0.00E+00	3.98E-01	7.97E-01		
Pu-241	1.6242E-02	1,637.302	3,274.604	0.00E+00	2.66E+01	5.32E+01		
Pu-242	3.6329E-07	1,637.302	3,274.604	0.00E+00	5.95E-04	1.19E-03		
Ra-226	9.0114E-10	1,637.302	3,274.604	0.00E+00	1.48E-06	2.95E-06		
Ra-228	3.1019E-14	1,637.302	3,274.604	0.00E+00	5.08E-11	1.02E-10		
Ru-106	2.1225E-10	1,637.302	3,274.604	0.00E+00	3.48E-07	6.95E-07		
Se-79	1.2930E-05	1,637.302	3,274.604	0.00E+00	2.12E-02	4.23E-02		
Sn-126	1.1571E-05	1,637.302	3,274.604	0.00E+00	1.89E-02	3.79E-02		
Sr-90	1.3472E+00	1,637.302	3,274.604	0.00E+00	2.21E+03	4.41E+03		
Tc-99	4.2239E-04	1,637.302	3,274.604	0.00E+00	6.92E-01	1.38E+00		
Th-229	1.2407E-11	1,637.302	3,274.604	0.00E+00	2.03E-08	4.06E-08		
Th-230	8.3497E-08	1,637.302	3,274.604	0.00E+00	1.37E-04	2.73E-04		
Th-232	3.8371E-14	1,637.302	3,274.604	0.00E+00	6.28E-11	1.26E-10		
Tl-208	4.0414E-08	1,637.302	3,274.604	0.00E+00	6.62E-05	1.32E-04		
U-232	1.0948E-07	1,637.302	3,274.604	0.00E+00	1.79E-04	3.58E-04		
U-233	3.6275E-09	1,637.302	3,274.604	0.00E+00	5.94E-06	1.19E-05		
U-234	1.8562E-04	1,637.302	3,274.604	0.00E+00	3.04E-01	6.08E-01		
U-235	-2.7235E-06	1,637.302	0.000	1.00E-02	5.57E-03	1.00E-02		
U-236	1.5493E-05	1,637.302	3,274.604	0.00E+00	2.54E-02	5.07E-02		
U-238	-4.2851E-09	1,637.302	0.000	1.14E-04	1.07E-04	1.14E-04		
Y-90	1.3475E+00	1,637.302	3,274.604	0.00E+00	2.21E+03	4.41E+03		
Other Radionuclides					2.24E+03	4.48E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.74E+01	5.48E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	93.19412969	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	0.473	1,637.302	
Bounding:		3,274.604	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.04	3,460.10	
Bounding:	2.09		

Estimated EOL HM/Given EOL HM: 1.03

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 850
 Fuel Units & Descr: 11 - ASSEMBLY
 Heavy Metal Mass: BOL=11.08kg ; EOL=9.91kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1966
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 50 years

Estimated
 Canister usage:
18"x10"
 0.31

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.9739E-09	1,106.308	2,212.616	0.00E+00	3.29E-06	6.58E-06	Avg. MeV	
Am-241	2.5986E-03	1,106.308	2,212.616	0.00E+00	2.87E+00	5.75E+00	0.0150	1.140E+14
Am-242m	3.7010E-07	1,106.308	2,212.616	0.00E+00	4.09E-04	8.19E-04	0.0250	2.366E+13
Am-243	1.4858E-06	1,106.308	2,212.616	0.00E+00	1.64E-03	3.29E-03	0.0375	2.057E+13
C-14	5.6944E-09	1,106.308	2,212.616	0.00E+00	6.30E-06	1.26E-05	0.0575	2.215E+13
Cl-36	1.3124E-32	1,106.308	2,212.616	0.00E+00	1.45E-29	2.90E-29	0.0850	1.333E+13
Cm-243	7.9303E-08	1,106.308	2,212.616	0.00E+00	8.77E-05	1.75E-04	0.1250	8.711E+12
Cm-244	9.3083E-06	1,106.308	2,212.616	0.00E+00	1.03E-02	2.06E-02	0.2250	1.150E+13
Co-60	1.0310E-07	1,106.308	2,212.616	0.00E+00	1.14E-04	2.28E-04	0.3750	5.009E+12
Cs-134	1.3254E-07	1,106.308	2,212.616	0.00E+00	1.47E-04	2.93E-04	0.5750	8.370E+13
Cs-135	3.4477E-06	1,106.308	2,212.616	0.00E+00	3.81E-03	7.63E-03	0.8500	8.967E+11
Cs-137	1.0161E+00	1,106.308	2,212.616	0.00E+00	1.12E+03	2.25E+03	1.2500	3.626E+11
Eu-154	2.1879E-03	1,106.308	2,212.616	0.00E+00	2.42E+00	4.84E+00	1.7500	2.376E+10
Eu-155	7.2930E-05	1,106.308	2,212.616	0.00E+00	8.07E-02	1.61E-01	2.2500	2.305E+06
Fe-55	4.1912E-08	1,106.308	2,212.616	0.00E+00	4.64E-05	9.27E-05	2.7500	2.720E+06
H-3	8.4913E-04	1,106.308	2,212.616	0.00E+00	9.39E-01	1.88E+00	3.5000	1.508E+03
I-129	7.5300E-07	1,106.308	2,212.616	0.00E+00	8.33E-04	1.67E-03	5.0000	6.133E+02
Kr-85	1.5615E-02	1,106.308	2,212.616	0.00E+00	1.73E+01	3.46E+01	7.0000	6.674E+01
Np-237	9.5861E-06	1,106.308	2,212.616	0.00E+00	1.06E-02	2.12E-02	11.0000	7.416E+00
Pa-231	5.0790E-09	1,106.308	2,212.616	0.00E+00	5.62E-06	1.12E-05		
Pb-210	6.6178E-10	1,106.308	2,212.616	0.00E+00	7.32E-07	1.46E-06		
Pm-147	1.7606E-05	1,106.308	2,212.616	0.00E+00	1.95E-02	3.90E-02		
Pu-238	1.4406E-02	1,106.308	2,212.616	0.00E+00	1.59E+01	3.19E+01		
Pu-239	4.2783E-04	1,106.308	2,212.616	0.00E+00	4.73E-01	9.47E-01		
Pu-240	2.4297E-04	1,106.308	2,212.616	0.00E+00	2.69E-01	5.38E-01		
Pu-241	7.8949E-03	1,106.308	2,212.616	0.00E+00	8.73E+00	1.75E+01		
Pu-242	3.6329E-07	1,106.308	2,212.616	0.00E+00	4.02E-04	8.04E-04		
Ra-226	1.5169E-09	1,106.308	2,212.616	0.00E+00	1.68E-06	3.36E-06		
Ra-228	4.2429E-14	1,106.308	2,212.616	0.00E+00	4.69E-11	9.39E-11		
Ru-106	7.0833E-15	1,106.308	2,212.616	0.00E+00	7.84E-12	1.57E-11		
Se-79	1.2928E-05	1,106.308	2,212.616	0.00E+00	1.43E-02	2.86E-02		
Sn-126	1.1571E-05	1,106.308	2,212.616	0.00E+00	1.28E-02	2.56E-02		
Sr-90	9.4308E-01	1,106.308	2,212.616	0.00E+00	1.04E+03	2.09E+03		
Tc-99	4.2239E-04	1,106.308	2,212.616	0.00E+00	4.67E-01	9.35E-01		
Th-229	1.7968E-11	1,106.308	2,212.616	0.00E+00	1.99E-08	3.98E-08		
Th-230	1.0855E-07	1,106.308	2,212.616	0.00E+00	1.20E-04	2.40E-04		
Th-232	4.9809E-14	1,106.308	2,212.616	0.00E+00	5.51E-11	1.10E-10		
Tl-208	3.4995E-08	1,106.308	2,212.616	0.00E+00	3.87E-05	7.74E-05		
U-232	9.4798E-08	1,106.308	2,212.616	0.00E+00	1.05E-04	2.10E-04		
U-233	4.2538E-09	1,106.308	2,212.616	0.00E+00	4.71E-06	9.41E-06		
U-234	1.8617E-04	1,106.308	2,212.616	0.00E+00	2.06E-01	4.12E-01		
U-235	-2.7235E-06	1,106.308	0.000	4.74E-03	1.73E-03	4.74E-03		
U-236	1.5493E-05	1,106.308	2,212.616	0.00E+00	1.71E-02	3.43E-02		
U-238	-4.2851E-09	1,106.308	0.000	2.99E-03	2.98E-03	2.99E-03		
Y-90	9.4308E-01	1,106.308	2,212.616	0.00E+00	1.04E+03	2.09E+03		
Other Radionuclides					1.07E+03	2.15E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.31E+01	2.62E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.81328831	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,106.308	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		2,212.616	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.32		1.01
Bounding:	0.63		

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

²Total burnup for all fuel associated with this worksheet must be 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 EXPERIMENTS
 SNF ID #: 1086
 Fuel Units & Descr: 1 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL= ; EOL=1.05kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1987
 Estimates as of: 2030
 Template: FERMI (Fast, Zirc, 10 to 40%, U)
²Template Burnup(MWd): 58.6725048
 Template BOL Heavy Metal Mass (MT): 0.018774
 Template Decay Time: 35 years

Estimated
 Canister usage:
 HIC
 1.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	9.6110E-08	92.205	92.205	0.00E+00	8.86E-06	8.86E-06	Avg. MeV	
Am-241	6.5601E-07	92.205	92.205	0.00E+00	6.05E-05	6.05E-05	0.0150	6.101E+12
Am-242m	0.0000E+00	92.205	92.205	0.00E+00	0.00E+00	0.00E+00	0.0250	1.267E+12
Am-243	8.3770E-15	92.205	92.205	0.00E+00	7.72E-13	7.72E-13	0.0375	1.115E+12
C-14	2.1714E-05	92.205	92.205	0.00E+00	2.00E-03	2.00E-03	0.0575	1.181E+12
Cl-36	5.5188E-08	92.205	92.205	0.00E+00	5.09E-06	5.09E-06	0.0850	7.143E+11
Cm-243	1.5496E-14	92.205	92.205	0.00E+00	1.43E-12	1.43E-12	0.1250	4.626E+11
Cm-244	5.2375E-16	92.205	92.205	0.00E+00	4.83E-14	4.83E-14	0.2250	6.131E+11
Co-60	2.0947E-03	92.205	92.205	0.00E+00	1.93E-01	1.93E-01	0.3750	2.671E+11
Cs-134	6.2448E-07	92.205	92.205	0.00E+00	5.76E-05	5.76E-05	0.5750	4.719E+12
Cs-135	4.4996E-05	92.205	92.205	0.00E+00	4.15E-03	4.15E-03	0.8500	4.358E+10
Cs-137	1.3775E+00	92.205	92.205	0.00E+00	1.27E+02	1.27E+02	1.2500	2.891E+10
Eu-154	1.8510E-04	92.205	92.205	0.00E+00	1.71E-02	1.71E-02	1.7500	1.125E+09
Eu-155	1.4163E-03	92.205	92.205	0.00E+00	1.31E-01	1.31E-01	2.2500	1.984E+05
Fe-55	1.4179E-05	92.205	92.205	0.00E+00	1.31E-03	1.31E-03	2.7500	1.912E+04
H-3	3.5383E-03	92.205	92.205	0.00E+00	3.26E-01	3.26E-01	3.5000	1.709E+01
I-129	1.1426E-06	92.205	92.205	0.00E+00	1.05E-04	1.05E-04	5.0000	5.778E+00
Kr-85	3.8604E-02	92.205	92.205	0.00E+00	3.56E+00	3.56E+00	7.0000	4.873E-01
Np-237	3.3099E-06	92.205	92.205	0.00E+00	3.05E-04	3.05E-04	11.0000	4.422E-02
Pa-231	1.8953E-07	92.205	92.205	0.00E+00	1.75E-05	1.75E-05		
Pb-210	8.9531E-12	92.205	92.205	0.00E+00	8.26E-10	8.26E-10		
Pm-147	1.1588E-03	92.205	92.205	0.00E+00	1.07E-01	1.07E-01		
Pu-238	1.7146E-04	92.205	92.205	0.00E+00	1.58E-02	1.58E-02		
Pu-239	1.9464E-02	92.205	92.205	0.00E+00	1.79E+00	1.79E+00		
Pu-240	6.7919E-05	92.205	92.205	0.00E+00	6.26E-03	6.26E-03		
Pu-241	4.1774E-06	92.205	92.205	0.00E+00	3.85E-04	3.85E-04		
Pu-242	4.3751E-13	92.205	92.205	0.00E+00	4.03E-11	4.03E-11		
Ra-226	2.4219E-11	92.205	92.205	0.00E+00	2.23E-09	2.23E-09		
Ra-228	2.3572E-11	92.205	92.205	0.00E+00	2.17E-09	2.17E-09		
Ru-106	3.0951E-10	92.205	92.205	0.00E+00	2.85E-08	2.85E-08		
Se-79	1.6488E-05	92.205	92.205	0.00E+00	1.52E-03	1.52E-03		
Sn-126	3.7564E-05	92.205	92.205	0.00E+00	3.46E-03	3.46E-03		
Sr-90	1.2052E+00	92.205	92.205	0.00E+00	1.11E+02	1.11E+02		
Tc-99	4.4825E-04	92.205	92.205	0.00E+00	4.13E-02	4.13E-02		
Th-229	4.6478E-11	92.205	92.205	0.00E+00	4.29E-09	4.29E-09		
Th-230	2.2259E-09	92.205	92.205	0.00E+00	2.05E-07	2.05E-07		
Th-232	2.3691E-11	92.205	92.205	0.00E+00	2.18E-09	2.18E-09		
Tl-208	5.8256E-09	92.205	92.205	0.00E+00	5.37E-07	5.37E-07		
U-232	1.5759E-08	92.205	92.205	0.00E+00	1.45E-06	1.45E-06		
U-233	1.0110E-08	92.205	92.205	0.00E+00	9.32E-07	9.32E-07		
U-234	4.9001E-06	92.205	92.205	0.00E+00	4.52E-04	4.52E-04		
U-235	-2.3191E-06	92.205	0.000	6.38E-04	4.24E-04	6.38E-04		
U-236	1.2633E-05	92.205	92.205	0.00E+00	1.16E-03	1.16E-03		
U-238	-9.5407E-08	92.205	0.000	2.88E-04	2.79E-04	2.88E-04		
Y-90	1.2053E+00	92.205	92.205	0.00E+00	1.11E+02	1.11E+02		
Other Radionuclides					1.26E+02	1.26E+02		

Thermal Power		
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)	
1.42E+00	1.42E+00	
Total	Total	

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: FAST	This Template was used for the following reasons:
Fuel Cladding:	ALUM	ZIRC	This fuel matches on all parameters except cladding and enrichment (unknown).
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:		10 to 40	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 92.205	Estimated: 92.205	Nominal burnup set equal to bounding burnup.
Bounding:		92.205	Bounding burnup taken from SFD and converted to MWd using BOL=1.153kg

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	25.60		1.03
Bounding:	25.60		

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

² Total burnup for all fuel associated with this worksheet must be 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=22.05kg ; EOL=18.48kg
ROD Storage Site: SRS

¹Fuel decay start date: 1966
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup (MWD): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 50 years

Estimated
Canister usage:
18"x10"
0.31

Radionuclide	m	x _a	x _b	b	y _a	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.9739E-09	3,376.219	6,752.438	0.00E+00	1.00E-05	2.01E-05	Avg. MeV	
Am-241	2.5986E-03	3,376.219	6,752.438	0.00E+00	8.77E+00	1.75E+01	0.0150	3.479E+14
Am-242m	3.7010E-07	3,376.219	6,752.438	0.00E+00	1.25E-03	2.50E-03	0.0250	7.221E+13
Am-243	1.4858E-06	3,376.219	6,752.438	0.00E+00	5.02E-03	1.00E-02	0.0375	6.276E+13
C-14	5.6944E-09	3,376.219	6,752.438	0.00E+00	1.92E-05	3.85E-05	0.0575	6.760E+13
Ci-36	1.3124E-32	3,376.219	6,752.438	0.00E+00	4.43E-29	8.86E-29	0.0850	4.069E+13
Cm-243	7.9303E-08	3,376.219	6,752.438	0.00E+00	2.68E-04	5.35E-04	0.1250	2.658E+13
Cm-244	9.3083E-06	3,376.219	6,752.438	0.00E+00	3.14E-02	6.29E-02	0.2250	3.510E+13
Co-60	1.0310E-07	3,376.219	6,752.438	0.00E+00	3.48E-04	6.96E-04	0.3750	1.529E+13
Cs-134	1.3254E-07	3,376.219	6,752.438	0.00E+00	4.47E-04	8.95E-04	0.5750	2.554E+14
Cs-135	3.4477E-06	3,376.219	6,752.438	0.00E+00	1.16E-02	2.33E-02	0.8500	2.737E+12
Cs-137	1.0161E+00	3,376.219	6,752.438	0.00E+00	3.43E+03	6.86E+03	1.2500	1.107E+12
Eu-154	2.1879E-03	3,376.219	6,752.438	0.00E+00	7.39E+00	1.48E+01	1.7500	7.251E+10
Eu-155	7.2930E-05	3,376.219	6,752.438	0.00E+00	2.46E-01	4.92E-01	2.2500	7.034E+06
Fe-55	4.1912E-08	3,376.219	6,752.438	0.00E+00	1.42E-04	2.83E-04	2.7500	8.302E+06
H-3	8.4913E-04	3,376.219	6,752.438	0.00E+00	2.87E+00	5.73E+00	3.5000	4.582E+03
I-129	7.5300E-07	3,376.219	6,752.438	0.00E+00	2.54E-03	5.08E-03	5.0000	1.864E+03
Kr-85	1.5615E-02	3,376.219	6,752.438	0.00E+00	5.27E+01	1.05E+02	7.0000	2.028E+02
Np-237	9.5861E-06	3,376.219	6,752.438	0.00E+00	3.24E-02	6.47E-02	11.0000	2.253E+01
Pa-231	5.0790E-09	3,376.219	6,752.438	0.00E+00	1.71E-05	3.43E-05		
Pb-210	6.6176E-10	3,376.219	6,752.438	0.00E+00	2.23E-06	4.47E-06		
Pm-147	1.7606E-05	3,376.219	6,752.438	0.00E+00	5.94E-02	1.19E-01		
Pu-238	1.4406E-02	3,376.219	6,752.438	0.00E+00	4.86E+01	9.73E+01		
Pu-239	4.2783E-04	3,376.219	6,752.438	0.00E+00	1.44E+00	2.89E+00		
Pu-240	2.4297E-04	3,376.219	6,752.438	0.00E+00	8.20E-01	1.64E+00		
Pu-241	7.8949E-03	3,376.219	6,752.438	0.00E+00	2.67E+01	5.33E+01		
Pu-242	3.6329E-07	3,376.219	6,752.438	0.00E+00	1.23E-03	2.45E-03		
Ra-226	1.5169E-09	3,376.219	6,752.438	0.00E+00	5.12E-06	1.02E-05		
Ra-228	4.2429E-14	3,376.219	6,752.438	0.00E+00	1.43E-10	2.87E-10		
Ru-106	7.0833E-15	3,376.219	6,752.438	0.00E+00	2.39E-11	4.78E-11		
Se-79	1.2928E-05	3,376.219	6,752.438	0.00E+00	4.36E-02	8.73E-02		
Sn-126	1.1571E-05	3,376.219	6,752.438	0.00E+00	3.91E-02	7.81E-02		
Sr-90	9.4308E-01	3,376.219	6,752.438	0.00E+00	3.18E+03	6.37E+03		
Tc-99	4.2239E-04	3,376.219	6,752.438	0.00E+00	1.43E+00	2.85E+00		
Th-229	1.7968E-11	3,376.219	6,752.438	0.00E+00	6.07E-08	1.21E-07		
Th-230	1.0855E-07	3,376.219	6,752.438	0.00E+00	3.66E-04	7.33E-04		
Th-232	4.9809E-14	3,376.219	6,752.438	0.00E+00	1.68E-10	3.36E-10		
Ti-208	3.4995E-08	3,376.219	6,752.438	0.00E+00	1.18E-04	2.36E-04		
U-232	9.4798E-08	3,376.219	6,752.438	0.00E+00	3.20E-04	6.40E-04		
U-233	4.2538E-09	3,376.219	6,752.438	0.00E+00	1.44E-05	2.87E-05		
U-234	1.8617E-04	3,376.219	6,752.438	0.00E+00	6.29E-01	1.26E+00		
U-235	-2.7235E-06	3,376.219	0.000	1.13E-02	2.07E-03	1.13E-02		
U-236	1.5493E-05	3,376.219	6,752.438	0.00E+00	5.23E-02	1.05E-01		
U-238	-4.2851E-09	3,376.219	0.000	5.66E-03	5.64E-03	5.66E-03		
Y-90	9.4308E-01	3,376.219	6,752.438	0.00E+00	3.18E+03	6.37E+03		
Other Radionuclides					3.27E+03	6.55E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.00E+01	8.01E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	UO8	U	
BOL Enrichment %:	23.64708607	60 to 100	

Burnup Summary (MWD) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		3,376.219	
Bounding:		6,752.438	

Checks			Estimated EOL HM/Given EOL HM 1.01
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.49		
Bounding:	0.97		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 160
 Fuel Units & Descr: 1 - 19 CURVED PLATES
 Heavy Metal Mass: BOL = : EOL = .07kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1966
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.03

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.5200E-06	66.525	66.525	0.00E+00	1.68E-04	1.68E-04	0.0150	5.639E+13
Am-241	8.6432E+00	66.525	66.525	0.00E+00	5.75E+02	5.75E+02	0.0250	1.114E+13
Am-242m	1.5728E-02	66.525	66.525	0.00E+00	1.05E+00	1.05E+00	0.0375	9.415E+12
Am-243	1.6288E-02	66.525	66.525	0.00E+00	1.08E+00	1.08E+00	0.0575	1.778E+13
C-14	1.2068E-01	66.525	66.525	0.00E+00	8.03E+00	8.03E+00	0.0850	5.961E+12
Cl-36	2.2849E-03	66.525	66.525	0.00E+00	1.52E-01	1.52E-01	0.1250	4.218E+12
Cm-243	6.0144E-04	66.525	66.525	0.00E+00	4.00E-02	4.00E-02	0.2250	5.159E+12
Cm-244	9.4880E-02	66.525	66.525	0.00E+00	6.31E+00	6.31E+00	0.3750	2.233E+12
Co-60	3.9052E+00	66.525	66.525	0.00E+00	2.60E+02	2.60E+02	0.5750	3.695E+13
Cs-134	2.2139E-06	66.525	66.525	0.00E+00	1.47E-04	1.47E-04	0.8500	8.093E+11
Cs-135	4.3976E-04	66.525	66.525	0.00E+00	2.93E-02	2.93E-02	1.2500	1.984E+13
Cs-137	1.4887E+01	66.525	66.525	0.00E+00	9.90E+02	9.90E+02	1.7500	2.385E+10
Eu-154	3.7342E-01	66.525	66.525	0.00E+00	2.48E+01	2.48E+01	2.2500	1.031E+08
Eu-155	8.4893E-03	66.525	66.525	0.00E+00	5.65E-01	5.65E-01	2.7500	1.775E+08
Fe-55	5.3750E-03	66.525	66.525	0.00E+00	3.58E-01	3.58E-01	3.5000	9.664E+04
H-3	1.0472E-01	66.525	66.525	0.00E+00	6.97E+00	6.97E+00	5.0000	4.083E+04
I-129	1.0618E-05	66.525	66.525	0.00E+00	7.06E-04	7.06E-04	7.0000	4.651E+03
Kr-85	2.2717E-01	66.525	66.525	0.00E+00	1.51E+01	1.51E+01	11.0000	5.305E+02
Np-237	1.6400E-04	66.525	66.525	0.00E+00	1.09E-02	1.09E-02		
Pa-231	2.8688E-06	66.525	66.525	0.00E+00	1.91E-04	1.91E-04		
Pb-210	4.7312E-08	66.525	66.525	0.00E+00	3.15E-06	3.15E-06		
Pm-147	3.2198E-04	66.525	66.525	0.00E+00	2.14E-02	2.14E-02		
Pu-238	-1.1924E+00	66.525	0.000	1.80E+01	0.00E+00	1.80E+01		
Pu-239	-4.8600E-02	66.525	0.000	2.18E+00	0.00E+00	2.18E+00		
Pu-240	-3.0127E-01	66.525	0.000	2.78E+00	0.00E+00	2.78E+00		
Pu-241	-1.2917E+02	66.525	0.000	7.16E+02	0.00E+00	7.16E+02		
Pu-242	-1.1381E-04	66.525	0.000	1.20E-02	4.46E-03	1.20E-02		
Ra-226	1.0760E-07	66.525	66.525	0.00E+00	7.16E-06	7.16E-06		
Ra-228	6.0160E-07	66.525	66.525	0.00E+00	4.00E-05	4.00E-05		
Ru-106	1.3388E-13	66.525	66.525	0.00E+00	8.91E-12	8.91E-12		
Se-79	1.9179E-04	66.525	66.525	0.00E+00	1.28E-02	1.28E-02		
Sn-126	1.6669E-04	66.525	66.525	0.00E+00	1.11E-02	1.11E-02		
Sr-90	1.3859E+01	66.525	66.525	0.00E+00	9.22E+02	9.22E+02		
Tc-99	6.7678E-03	66.525	66.525	0.00E+00	4.50E-01	4.50E-01		
Th-229	2.2592E-06	66.525	66.525	0.00E+00	1.50E-04	1.50E-04		
Th-230	7.5955E-06	66.525	66.525	0.00E+00	5.05E-04	5.05E-04		
Th-232	6.0208E-07	66.525	66.525	0.00E+00	4.01E-05	4.01E-05		
Ti-208	7.5795E-05	66.525	66.525	0.00E+00	5.04E-03	5.04E-03		
U-232	2.0521E-04	66.525	66.525	0.00E+00	1.37E-02	1.37E-02		
U-233	3.6128E-04	66.525	66.525	0.00E+00	2.40E-02	2.40E-02		
U-234	1.2788E-02	66.525	66.525	0.00E+00	8.51E-01	8.51E-01		
U-235	5.7486E-04	66.525	66.525	8.02E-05	3.83E-02	3.83E-02		
U-236	2.3485E-04	66.525	66.525	0.00E+00	1.56E-02	1.56E-02		
U-238	1.1581E-04	66.525	66.525	7.49E-06	7.71E-03	7.71E-03		
Y-90	1.3861E+01	66.525	66.525	0.00E+00	9.22E+02	9.22E+02		
Other Radionuclides					3.42E+03	3.42E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.57E+01	3.65E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
From SFD	Used		
Reactor Moderator:	LIGHT WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	SST	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
From SFD	Estimated		
Nominal:	66.525	Nominal burnup set equal to bounding burnup.	
Bounding:	66.525	Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	14.21		
Bounding:	14.21		

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: PATHFINDER (SUPERHEATER)
 SNF ID #: 814
 Fuel Units & Descr: 6 - ROD
 Heavy Metal Mass: BOL= .80kg ; EOL= .80kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1967
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.05

Radionuclide	m Ci/MWd From Template	x _n Nominal Fuel Burnup (MWd) ²	x _b Bounding Fuel Burnup (MWd) ²	b Initial Activity (Ci)	y _n Nominal Fuel Inventories(Ci)	y _b Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.4276E-08	15.088	30.176	0.00E+00	5.17E-07	1.03E-06	Avg. MeV	
Am-241	1.1458E-04	15.088	30.176	0.00E+00	1.73E-03	3.46E-03	0.0150	1.573E+12
Am-242m	7.9468E-09	15.088	30.176	0.00E+00	1.20E-07	2.40E-07	0.0250	3.270E+11
Am-243	9.8386E-10	15.088	30.176	0.00E+00	1.48E-08	2.97E-08	0.0375	2.835E+11
C-14	2.2978E-04	15.088	30.176	0.00E+00	3.47E-03	6.93E-03	0.0575	3.049E+11
Cl-36	1.2261E-06	15.088	30.176	0.00E+00	1.85E-05	3.70E-05	0.0850	1.842E+11
Cm-243	1.7271E-10	15.088	30.176	0.00E+00	2.61E-09	5.21E-09	0.1250	1.195E+11
Cm-244	1.3058E-09	15.088	30.176	0.00E+00	1.97E-08	3.94E-08	0.2250	1.588E+11
Co-60	9.8636E-03	15.088	30.176	0.00E+00	1.49E-01	2.98E-01	0.3750	6.923E+10
Cs-134	1.9617E-08	15.088	30.176	0.00E+00	2.96E-07	5.92E-07	0.5750	1.153E+12
Cs-135	3.0316E-05	15.088	30.176	0.00E+00	4.57E-04	9.15E-04	0.8500	1.138E+10
Cs-137	1.0263E+00	15.088	30.176	0.00E+00	1.55E+01	3.10E+01	1.2500	2.592E+10
Eu-154	2.0017E-04	15.088	30.176	0.00E+00	3.02E-03	6.04E-03	1.7500	2.931E+08
Eu-155	8.5957E-05	15.088	30.176	0.00E+00	1.30E-03	2.59E-03	2.2500	1.485E+05
Fe-55	2.2646E-05	15.088	30.176	0.00E+00	3.42E-04	6.83E-04	2.7500	2.023E+04
H-3	1.0835E-03	15.088	30.176	0.00E+00	1.63E-02	3.27E-02	3.5000	1.909E+00
I-129	7.3195E-07	15.088	30.176	0.00E+00	1.10E-05	2.21E-05	5.0000	7.889E-01
Kr-85	1.5661E-02	15.088	30.176	0.00E+00	2.36E-01	4.73E-01	7.0000	8.728E-02
Np-237	1.1494E-06	15.088	30.176	0.00E+00	1.73E-05	3.47E-05	11.0000	9.806E-03
Pa-231	5.8070E-08	15.088	30.176	0.00E+00	8.76E-07	1.75E-06		
Pb-210	1.2985E-12	15.088	30.176	0.00E+00	1.96E-11	3.92E-11		
Pm-147	2.2196E-05	15.088	30.176	0.00E+00	3.35E-04	6.70E-04		
Pu-238	2.6223E-04	15.088	30.176	0.00E+00	3.96E-03	7.91E-03		
Pu-239	6.6739E-04	15.088	30.176	0.00E+00	1.01E-02	2.01E-02		
Pu-240	8.6705E-05	15.088	30.176	0.00E+00	1.31E-03	2.62E-03		
Pu-241	3.4759E-04	15.088	30.176	0.00E+00	5.24E-03	1.05E-02		
Pu-242	1.9717E-09	15.088	30.176	0.00E+00	2.97E-08	5.95E-08		
Ra-226	3.0000E-12	15.088	30.176	0.00E+00	4.53E-11	9.05E-11		
Ra-228	8.3328E-12	15.088	30.176	0.00E+00	1.26E-10	2.51E-10		
Ru-106	6.1464E-15	15.088	30.176	0.00E+00	9.27E-14	1.85E-13		
Se-79	1.3221E-05	15.088	30.176	0.00E+00	1.99E-04	3.99E-04		
Sn-126	1.1491E-05	15.088	30.176	0.00E+00	1.73E-04	3.47E-04		
Sr-90	9.5541E-01	15.088	30.176	0.00E+00	1.44E+01	2.88E+01		
Tc-99	4.6656E-04	15.088	30.176	0.00E+00	7.04E-03	1.41E-02		
Th-229	1.9085E-11	15.088	30.176	0.00E+00	2.88E-10	5.76E-10		
Th-230	2.1913E-10	15.088	30.176	0.00E+00	3.31E-09	6.61E-09		
Th-232	8.3478E-12	15.088	30.176	0.00E+00	1.26E-10	2.52E-10		
Ti-208	1.8752E-08	15.088	30.176	0.00E+00	2.83E-07	5.66E-07		
U-232	5.0782E-08	15.088	30.176	0.00E+00	7.66E-07	1.53E-06		
U-233	3.2596E-09	15.088	30.176	0.00E+00	4.92E-08	9.84E-08		
U-234	3.9817E-07	15.088	30.176	0.00E+00	6.01E-06	1.20E-05		
U-235	-2.7761E-06	15.088	0.000	1.61E-03	1.57E-03	1.61E-03		
U-236	1.6190E-05	15.088	30.176	0.00E+00	2.44E-04	4.89E-04		
U-238	-2.8547E-09	15.088	0.000	1.84E-05	1.83E-05	1.84E-05	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
Y-90	9.5557E-01	15.088	30.176	0.00E+00	1.44E+01	2.88E+01	1.76E-01	3.52E-01
Other Radionuclides					1.84E+01	3.68E+01	Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	SST (316L)	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	93.1500181	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		15.088	Nominal burnup assumed to be 2% of BOL heavy metal mass.
Bounding:		30.176	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.40		0.98
Bounding:	0.81		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PATHFINDER (SUPERHEATER)
 SNF ID #: 166
 Fuel Units & Descr: 411 - ROD
 Heavy Metal Mass: BOL=54.70kg ; EOL=52.61kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1967
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 50 years

Estimated
 Cansister usage:
 18"x10"
 3.57

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)			
Ac-227	3.4276E-08	1,980.076	3,960.152	0.00E+00	6.79E-05	1.36E-04	Avg. MeV	
Am-241	1.1458E-04	1,980.076	3,960.152	0.00E+00	2.27E-01	4.54E-01	0.0150	2.065E+14
Am-242m	7.9468E-09	1,980.076	3,960.152	0.00E+00	1.57E-05	3.15E-05	0.0250	4.291E+13
Am-243	9.8386E-10	1,980.076	3,960.152	0.00E+00	1.95E-06	3.90E-06	0.0375	3.721E+13
C-14	2.2978E-04	1,980.076	3,960.152	0.00E+00	4.55E-01	9.10E-01	0.0575	4.002E+13
Cl-36	1.2261E-06	1,980.076	3,960.152	0.00E+00	2.43E-03	4.86E-03	0.0850	2.417E+13
Co-243	1.7271E-10	1,980.076	3,960.152	0.00E+00	3.42E-07	6.84E-07	0.1250	1.568E+12
Co-244	1.3058E-09	1,980.076	3,960.152	0.00E+00	2.59E-06	5.17E-06	0.2250	2.983E+13
Co-60	9.8636E-03	1,980.076	3,960.152	0.00E+00	1.95E+01	3.91E+01	0.3750	9.088E+12
Cs-134	1.9617E-08	1,980.076	3,960.152	0.00E+00	3.88E-05	7.77E-05	0.5750	1.513E+14
Cs-135	3.0316E-05	1,980.076	3,960.152	0.00E+00	6.00E-02	1.20E-01	0.8500	1.494E+12
Cs-137	1.0263E+00	1,980.076	3,960.152	0.00E+00	2.03E+03	4.06E+03	1.2500	3.402E+12
Eu-154	2.0017E-04	1,980.076	3,960.152	0.00E+00	3.96E-01	7.93E-01	1.7500	3.847E+10
Eu-155	8.5957E-05	1,980.076	3,960.152	0.00E+00	1.70E-01	3.40E-01	2.2500	1.949E+07
Fe-55	2.2646E-05	1,980.076	3,960.152	0.00E+00	4.48E-02	8.97E-02	2.7500	2.655E+06
H-3	1.0835E-03	1,980.076	3,960.152	0.00E+00	2.15E+00	4.29E+00	3.5000	2.409E+02
I-129	7.3195E-07	1,980.076	3,960.152	0.00E+00	1.45E-03	2.90E-03	5.0000	9.952E+01
Kr-85	1.5661E-02	1,980.076	3,960.152	0.00E+00	3.10E+01	6.20E+01	7.0000	1.100E+01
Np-237	1.1494E-06	1,980.076	3,960.152	0.00E+00	2.28E-03	4.55E-03	11.0000	1.235E+00
Pa-231	5.8070E-08	1,980.076	3,960.152	0.00E+00	1.15E-04	2.30E-04		
Pb-210	1.2985E-12	1,980.076	3,960.152	0.00E+00	2.57E-09	5.14E-09		
Pm-147	2.2196E-05	1,980.076	3,960.152	0.00E+00	4.40E-02	8.79E-02		
Pu-238	2.6223E-04	1,980.076	3,960.152	0.00E+00	5.19E-01	1.04E+00		
Pu-239	6.6739E-04	1,980.076	3,960.152	0.00E+00	1.32E+00	2.64E+00		
Pu-240	8.6705E-05	1,980.076	3,960.152	0.00E+00	1.72E-01	3.43E-01		
Pu-241	3.4759E-04	1,980.076	3,960.152	0.00E+00	6.88E-01	1.38E+00		
Pu-242	1.9717E-09	1,980.076	3,960.152	0.00E+00	3.90E-06	7.81E-06		
Ra-226	3.0000E-12	1,980.076	3,960.152	0.00E+00	5.94E-09	1.19E-08		
Ra-228	8.3328E-12	1,980.076	3,960.152	0.00E+00	1.65E-08	3.30E-08		
Ru-106	6.1464E-15	1,980.076	3,960.152	0.00E+00	1.22E-11	2.43E-11		
Se-79	1.3221E-05	1,980.076	3,960.152	0.00E+00	2.62E-02	5.24E-02		
Sn-126	1.1491E-05	1,980.076	3,960.152	0.00E+00	2.28E-02	4.55E-02		
Sr-90	9.5541E-01	1,980.076	3,960.152	0.00E+00	1.89E+03	3.78E+03		
Tc-99	4.6656E-04	1,980.076	3,960.152	0.00E+00	9.24E-01	1.85E+00		
Th-229	1.9085E-11	1,980.076	3,960.152	0.00E+00	3.78E-08	7.56E-08		
Th-230	2.1913E-10	1,980.076	3,960.152	0.00E+00	4.34E-07	8.68E-07		
Th-232	8.3478E-12	1,980.076	3,960.152	0.00E+00	1.65E-08	3.31E-08		
Ti-208	1.8752E-08	1,980.076	3,960.152	0.00E+00	3.71E-05	7.43E-05		
U-232	5.0782E-08	1,980.076	3,960.152	0.00E+00	1.01E-04	2.01E-04		
U-233	3.2596E-09	1,980.076	3,960.152	0.00E+00	6.45E-06	1.29E-05		
U-234	3.9817E-07	1,980.076	3,960.152	0.00E+00	7.88E-04	1.58E-03		
U-235	2.7761E-06	1,980.076	0.000	1.10E-01	1.05E-01	1.10E-01		
U-236	1.6190E-05	1,980.076	3,960.152	0.00E+00	3.21E-02	6.41E-02		
U-238	2.8547E-09	1,980.076	0.000	1.26E-03	1.25E-03	1.26E-03		
Y-90	9.5557E-01	1,980.076	3,960.152	0.00E+00	1.89E+03	3.78E+03		
Other Radionuclides					2.41E+03	4.83E+03		

Thermal Power		
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)	Total
2.31E+01	4.62E+01	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	
BOL HM Constituents:	SST (316L)	SST	
BOL Enrichment %:	UO2	U	
	93.1500181	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:		1,980.076	Nominal burnup calculated from the heavy metal mass destroyed.
		3,960.152	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Bounding:	0.78		1.00
	1.55		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PBF DRIVER CORE
 SNF ID #: 167
 Fuel Units & Descr: 2425 - ROD
 Heavy Metal Mass: BOL=571.82kg ; EOL=561.63kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1985
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 8.98

II. Estimates		m	x _n	x _b	b	y _n	y _b	Gamma Sources		
Radionuclide	CI/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)		
Ac-227	2.3344E-08	9,621.236	19,242.472	0.00E+00	2.25E-04	4.49E-04	Avg. MeV			
Am-241	1.1135E-04	9,621.236	19,242.472	0.00E+00	1.07E+00	2.14E+00	0.0150	1.436E+15		
Am-242m	8.5075E-09	9,621.236	19,242.472	0.00E+00	8.19E-05	1.64E-04	0.0250	2.985E+14		
Am-243	9.8519E-10	9,621.236	19,242.472	0.00E+00	9.48E-06	1.90E-05	0.0375	2.582E+14		
C-14	2.3012E-04	9,621.236	19,242.472	0.00E+00	2.21E+00	4.43E+00	0.0575	2.783E+14		
Cl-36	1.2261E-06	9,621.236	19,242.472	0.00E+00	1.18E-02	2.36E-02	0.0850	1.681E+14		
Cm-243	2.4875E-10	9,621.236	19,242.472	0.00E+00	2.39E-06	4.79E-06	0.1250	1.092E+14		
Cm-244	2.3178E-09	9,621.236	19,242.472	0.00E+00	2.23E-05	4.46E-05	0.2250	1.447E+14		
Co-60	7.0849E-02	9,621.236	19,242.472	0.00E+00	6.82E+02	1.36E+03	0.3750	6.312E+13		
Cs-134	3.0266E-06	9,621.236	19,242.472	0.00E+00	2.91E-02	5.82E-02	0.5750	1.040E+15		
Cs-135	3.0316E-05	9,621.236	19,242.472	0.00E+00	2.92E-01	5.83E-01	0.8500	1.053E+13		
Cs-137	1.4511E+00	9,621.236	19,242.472	0.00E+00	1.40E+04	2.79E+04	1.2500	1.046E+14		
Eu-154	6.6955E-04	9,621.236	19,242.472	0.00E+00	6.44E+00	1.29E+01	1.7500	2.716E+14		
Eu-155	6.9850E-04	9,621.236	19,242.472	0.00E+00	6.72E+00	1.34E+01	2.2500	5.637E+08		
Fe-55	1.2318E-03	9,621.236	19,242.472	0.00E+00	1.19E+01	2.37E+01	2.7500	1.629E+07		
H-3	2.5141E-03	9,621.236	19,242.472	0.00E+00	2.42E+01	4.84E+01	3.5000	1.984E+03		
I-129	7.3195E-07	9,621.236	19,242.472	0.00E+00	7.04E-03	1.41E-02	5.0000	8.312E+02		
Kr-85	4.1281E-02	9,621.236	19,242.472	0.00E+00	3.97E+02	7.94E+02	7.0000	9.347E+01		
Np-237	1.1489E-06	9,621.236	19,242.472	0.00E+00	1.11E-02	2.21E-02	11.0000	1.060E+01		
Pa-231	4.5241E-08	9,621.236	19,242.472	0.00E+00	4.35E-04	8.71E-04				
Pb-210	6.4476E-13	9,621.236	19,242.472	0.00E+00	6.20E-09	1.24E-08				
Pm-147	1.1651E-03	9,621.236	19,242.472	0.00E+00	1.12E+01	2.24E+01				
Pu-238	2.9517E-04	9,621.236	19,242.472	0.00E+00	2.84E+00	5.68E+00				
Pu-239	6.6772E-04	9,621.236	19,242.472	0.00E+00	6.42E+00	1.28E+01				
Pu-240	8.6839E-05	9,621.236	19,242.472	0.00E+00	8.35E-01	1.67E+00				
Pu-241	7.1514E-04	9,621.236	19,242.472	0.00E+00	6.88E+00	1.38E+01				
Pu-242	1.9717E-09	9,621.236	19,242.472	0.00E+00	1.90E-05	3.79E-05				
Ra-226	1.7654E-12	9,621.236	19,242.472	0.00E+00	1.70E-08	3.40E-08				
Ra-228	8.2928E-12	9,621.236	19,242.472	0.00E+00	7.98E-08	1.60E-07				
Ru-106	1.8419E-10	9,621.236	19,242.472	0.00E+00	1.77E-06	3.54E-06				
Se-79	1.3223E-05	9,621.236	19,242.472	0.00E+00	1.27E-01	2.54E-01				
Sn-126	1.1493E-05	9,621.236	19,242.472	0.00E+00	1.11E-01	2.21E-01				
Sr-90	1.3649E+00	9,621.236	19,242.472	0.00E+00	1.31E+04	2.63E+04				
Tc-99	4.6656E-04	9,621.236	19,242.472	0.00E+00	4.49E+00	8.98E+00				
Th-229	1.4547E-11	9,621.236	19,242.472	0.00E+00	1.40E-07	2.80E-07				
Th-230	1.6617E-10	9,621.236	19,242.472	0.00E+00	1.60E-06	3.20E-06				
Th-232	8.3361E-12	9,621.236	19,242.472	0.00E+00	8.02E-08	1.60E-07				
Th-208	2.1664E-08	9,621.236	19,242.472	0.00E+00	2.08E-04	4.17E-04				
U-232	5.8669E-08	9,621.236	19,242.472	0.00E+00	5.64E-04	1.13E-03				
U-233	3.1847E-09	9,621.236	19,242.472	0.00E+00	3.06E-05	6.13E-05				
U-234	3.8769E-07	9,621.236	19,242.472	0.00E+00	3.73E-03	7.46E-03				
U-235	-2.7761E-06	9,621.236	0.000	2.28E-01	2.02E-01	2.28E-01				
U-236	1.6190E-05	9,621.236	19,242.472	0.00E+00	1.56E-01	3.12E-01				
U-238	-2.8547E-09	9,621.236	0.000	1.57E-01	1.57E-01	1.57E-01				
Y-90	1.3652E+00	9,621.236	19,242.472	0.00E+00	1.31E+04	2.63E+04				
Other Radionuclides								1.59E+04	3.18E+04	
								Thermal Power		
								Nominal Heat Output (Watts)	Bounding Heat Output (Watts)	
								1.68E+02	3.36E+02	
Total								Total	Total	

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches Pathfinder Template on all but one parameter (enrichment) making Pathfinder a reasonable match.
Fuel Cladding:	SST (304L)	SST	
BOL HM Constituents:	UO ₂	U	
BOL Enrichment %:	18.49024597	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 297.344	Estimated: 9,621.236	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:	623.278	19,242.472	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier: 0.36	Estimated Burnup/Given Burnup: 32.36	1.00
Bounding:	0.72	30.87	

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PEACH BOTTOM (ASSEMBLY)
 SNF ID #: 385
 Fuel Units & Descr: 2 - 7 X 7 ROD ARRAY
 Heavy Metal Mass: BOL=288.34kg ; EOL=285.31kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1976
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc. 0 to 5%, U)

²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 1.00

II. Estimates							Gamma Sources	
	m	x _a	x _b	b	y _a	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.0733E-09	2,955.434	5,762.773	0.00E+00	3.17E-06	6.19E-06		
Am-241	1.4751E-01	2,955.434	5,762.773	0.00E+00	4.36E+02	8.50E+02	0.0150	2.193E+14
Am-242m	2.6809E-04	2,955.434	5,762.773	0.00E+00	7.92E-01	1.54E+00	0.0250	4.394E+13
Am-243	6.2484E-04	2,955.434	5,762.773	0.00E+00	1.85E+00	3.60E+00	0.0375	4.141E+13
C-14	4.7820E-05	2,955.434	5,762.773	0.00E+00	1.41E-01	2.76E-01	0.0575	5.181E+13
Cl-36	8.0297E-07	2,955.434	5,762.773	0.00E+00	2.37E-03	4.63E-03	0.0850	2.421E+13
Cm-243	1.7426E-04	2,955.434	5,762.773	0.00E+00	5.15E-01	1.00E+00	0.1250	1.611E+13
Cm-244	2.7616E-02	2,955.434	5,762.773	0.00E+00	8.16E+01	1.59E+02	0.2250	2.067E+13
Co-60	3.5610E-04	2,955.434	5,762.773	0.00E+00	1.05E+00	2.05E+00	0.3750	8.926E+12
Cs-134	2.6260E-07	2,955.434	5,762.773	0.00E+00	7.76E-04	1.51E-03	0.5750	2.102E+14
Cs-135	1.4433E-05	2,955.434	5,762.773	0.00E+00	4.27E-02	8.32E-02	0.8500	2.053E+12
Cs-137	9.8870E-01	2,955.434	5,762.773	0.00E+00	2.92E+03	5.70E+03	1.2500	1.306E+12
Eu-154	6.0320E-03	2,955.434	5,762.773	0.00E+00	1.78E+01	3.48E+01	1.7500	5.744E+10
Eu-155	2.1770E-04	2,955.434	5,762.773	0.00E+00	6.43E-01	1.25E+00	2.2500	9.441E+06
Fe-55	7.9296E-07	2,955.434	5,762.773	0.00E+00	2.34E-03	4.57E-03	2.7500	3.326E+07
H-3	8.9486E-03	2,955.434	5,762.773	0.00E+00	2.64E+01	5.16E+01	3.5000	2.374E+06
I-129	9.8288E-07	2,955.434	5,762.773	0.00E+00	2.90E-03	5.66E-03	5.0000	1.015E+06
Kr-85	1.0707E-02	2,955.434	5,762.773	0.00E+00	3.16E+01	6.17E+01	7.0000	1.169E+05
Np-237	1.1927E-05	2,955.434	5,762.773	0.00E+00	3.52E-02	6.87E-02	11.0000	1.342E+04
Pa-231	1.4703E-09	2,955.434	5,762.773	0.00E+00	4.35E-06	8.47E-06		
Pb-210	1.6828E-10	2,955.434	5,762.773	0.00E+00	4.97E-07	9.70E-07		
Pm-147	6.9606E-06	2,955.434	5,762.773	0.00E+00	2.06E-02	4.01E-02		
Pu-238	6.6263E-02	2,955.434	5,762.773	0.00E+00	1.96E+02	3.82E+02		
Pu-239	1.1618E-02	2,955.434	5,762.773	0.00E+00	3.43E+01	6.70E+01		
Pu-240	1.5142E-02	2,955.434	5,762.773	0.00E+00	4.48E+01	8.73E+01		
Pu-241	4.3766E-01	2,955.434	5,762.773	0.00E+00	1.29E+03	2.52E+03		
Pu-242	6.4260E-05	2,955.434	5,762.773	0.00E+00	1.90E-01	3.70E-01		
Ra-226	3.8501E-10	2,955.434	5,762.773	0.00E+00	1.14E-06	2.22E-06		
Ra-228	5.2955E-12	2,955.434	5,762.773	0.00E+00	1.57E-08	3.05E-08		
Ru-106	2.0413E-14	2,955.434	5,762.773	0.00E+00	6.03E-11	1.18E-10		
Se-79	1.2376E-05	2,955.434	5,762.773	0.00E+00	3.66E-02	7.13E-02		
Sn-126	2.5210E-05	2,955.434	5,762.773	0.00E+00	7.45E-02	1.45E-01		
Sr-90	6.4163E-01	2,955.434	5,762.773	0.00E+00	1.90E+03	3.70E+03		
Tc-99	3.9357E-04	2,955.434	5,762.773	0.00E+00	1.16E+00	2.27E+00		
Th-229	1.5644E-10	2,955.434	5,762.773	0.00E+00	4.62E-07	9.02E-07		
Th-230	2.7972E-08	2,955.434	5,762.773	0.00E+00	8.27E-05	1.61E-04		
Th-232	5.3036E-12	2,955.434	5,762.773	0.00E+00	1.57E-08	3.06E-08		
Tl-208	1.5136E-07	2,955.434	5,762.773	0.00E+00	4.47E-04	8.72E-04		
U-232	4.1005E-07	2,955.434	5,762.773	0.00E+00	1.21E-03	2.36E-03		
U-233	2.5856E-08	2,955.434	5,762.773	0.00E+00	7.64E-05	1.49E-04		
U-234	5.2665E-05	2,955.434	5,762.773	0.00E+00	1.56E-01	3.03E-01		
U-235	-1.4487E-06	2,955.434	0.000	1.51E-02	1.09E-02	1.51E-02		
U-236	7.5888E-06	2,955.434	5,762.773	0.00E+00	2.24E-02	4.37E-02		
U-238	-2.6129E-07	2,955.434	0.000	9.46E-02	9.38E-02	9.46E-02	5.35E+01	1.04E+02
Y-90	6.4180E-01	2,955.434	5,762.773	0.00E+00	1.90E+03	3.70E+03	Total	Total
Other Radionuclides					2.82E+03	5.49E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-2	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.429812544	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	2,955.434	2,881.387	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:	3,431.187	5,762.773	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.29	0.97	1.00
Bounding:	0.57	1.68	

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PEACH BOTTOM RODS
 SNF ID #: 386
 Fuel Unit's & Descr: 20 - ROD
 Heavy Metal Mass: BOL=79.00kg ; EOL=71.12kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1976
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 HIC
0.57

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)		Avg. MeV
Ac-227	1.0733E-09	7,493.507	14,987.015	0.00E+00	8.04E-06	1.61E-05		
Am-241	1.4751E-01	7,493.507	14,987.015	0.00E+00	1.11E+03	2.21E+03	0.0150	5.703E+14
Am-242m	2.6809E-04	7,493.507	14,987.015	0.00E+00	2.01E+00	4.02E+00	0.0250	1.143E+14
Am-243	6.2484E-04	7,493.507	14,987.015	0.00E+00	4.68E+00	9.36E+00	0.0375	1.077E+14
C-14	4.7820E-05	7,493.507	14,987.015	0.00E+00	3.58E-01	7.17E-01	0.0575	1.347E+14
Ci-36	8.0297E-07	7,493.507	14,987.015	0.00E+00	6.02E-03	1.20E-02	0.0850	6.296E+13
Cm-243	1.7426E-04	7,493.507	14,987.015	0.00E+00	1.31E+00	2.61E+00	0.1250	4.189E+13
Cm-244	2.7616E-02	7,493.507	14,987.015	0.00E+00	2.07E+02	4.14E+02	0.2250	5.375E+13
Co-60	3.5610E-04	7,493.507	14,987.015	0.00E+00	2.67E+00	5.34E+00	0.3750	2.321E+13
Cs-134	2.6260E-07	7,493.507	14,987.015	0.00E+00	1.97E-03	3.94E-03	0.5750	5.467E+14
Cs-135	1.4433E-05	7,493.507	14,987.015	0.00E+00	1.08E-01	2.16E-01	0.8500	5.338E+12
Cs-137	9.8870E-01	7,493.507	14,987.015	0.00E+00	7.41E+03	1.48E+04	1.2500	3.397E+12
Eu-154	6.0320E-03	7,493.507	14,987.015	0.00E+00	4.52E+01	9.04E+01	1.7500	1.494E+11
Eu-155	2.1770E-04	7,493.507	14,987.015	0.00E+00	1.63E+00	3.26E+00	2.2500	2.455E+07
Fe-55	7.9296E-07	7,493.507	14,987.015	0.00E+00	5.94E-03	1.19E-02	2.7500	8.651E+07
H-3	8.9486E-03	7,493.507	14,987.015	0.00E+00	6.71E+01	1.34E+02	3.5000	6.174E+06
I-129	9.8288E-07	7,493.507	14,987.015	0.00E+00	7.37E-03	1.47E-02	5.0000	2.638E+06
Kr-85	1.0707E-02	7,493.507	14,987.015	0.00E+00	8.02E+01	1.60E+02	7.0000	3.039E+05
Np-237	1.1927E-05	7,493.507	14,987.015	0.00E+00	8.94E-02	1.79E-01	11.0000	3.489E+04
Pa-231	1.4703E-09	7,493.507	14,987.015	0.00E+00	1.10E-05	2.20E-05		
Pb-210	1.6828E-10	7,493.507	14,987.015	0.00E+00	1.26E-06	2.52E-06		
Pm-147	6.9606E-06	7,493.507	14,987.015	0.00E+00	5.22E-02	1.04E-01		
Pu-238	6.6263E-02	7,493.507	14,987.015	0.00E+00	4.97E+02	9.93E+02		
Pu-239	1.1618E-02	7,493.507	14,987.015	0.00E+00	8.71E+01	1.74E+02		
Pu-240	1.5142E-02	7,493.507	14,987.015	0.00E+00	1.13E+02	2.27E+02		
Pu-241	4.3766E-01	7,493.507	14,987.015	0.00E+00	3.28E+03	6.56E+03		
Pu-242	6.4260E-05	7,493.507	14,987.015	0.00E+00	4.82E-01	9.63E-01		
Ra-226	3.8501E-10	7,493.507	14,987.015	0.00E+00	2.89E-06	5.77E-06		
Ra-228	5.2955E-12	7,493.507	14,987.015	0.00E+00	3.97E-08	7.94E-08		
Ru-106	2.0413E-14	7,493.507	14,987.015	0.00E+00	1.53E-10	3.06E-10		
Se-79	1.2376E-05	7,493.507	14,987.015	0.00E+00	9.27E-02	1.85E-01		
Sn-126	2.5210E-05	7,493.507	14,987.015	0.00E+00	1.89E-01	3.78E-01		
Sr-90	6.4163E-01	7,493.507	14,987.015	0.00E+00	4.81E+03	9.62E+03		
Tc-99	3.9357E-04	7,493.507	14,987.015	0.00E+00	2.95E+00	5.90E+00		
Th-229	1.5644E-10	7,493.507	14,987.015	0.00E+00	1.17E-06	2.34E-06		
Th-230	2.7972E-08	7,493.507	14,987.015	0.00E+00	2.10E-04	4.19E-04		
Th-232	5.3036E-12	7,493.507	14,987.015	0.00E+00	3.97E-08	7.95E-08		
Th-232	1.5136E-07	7,493.507	14,987.015	0.00E+00	1.13E-03	2.27E-03		
U-232	4.1005E-07	7,493.507	14,987.015	0.00E+00	3.07E-03	6.15E-03		
U-233	2.5856E-08	7,493.507	14,987.015	0.00E+00	1.94E-04	3.88E-04		
U-234	5.2665E-05	7,493.507	14,987.015	0.00E+00	3.95E-01	7.89E-01		
U-235	-1.4487E-06	7,493.507	0.000	4.15E-03	0.00E+00	4.15E-03		
U-236	7.5888E-06	7,493.507	14,987.015	0.00E+00	5.69E-02	1.14E-01		
U-238	-2.6129E-07	7,493.507	0.000	2.59E-02	2.39E-02	2.59E-02		
Y-90	6.4180E-01	7,493.507	14,987.015	0.00E+00	4.81E+03	9.62E+03		
Other Radionuclides					7.14E+03	1.43E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.36E+02	2.71E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-2	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.43	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	809.750	7,493.507	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:	940.100	14,987.015	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	2.71	9.25	
Bounding:	5.42	15.94	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PEACH BOTTOM UNIT 1 CORE 1
 SNF ID #: 169
 Fuel Units & Descr: 2 - ELEMENT
 Heavy Metal Mass: BOL=4.28kg ; EOL=3.44kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1969
 Estimates as of: 2030
 Template: FSV (Graphite, Graphite, 60 to 100%, Th & U)
²Template Burnup(MWd): 1270.275
 Template BOL Heavy Metal Mass (MT): 0.012702752
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 0.15

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4.2062E-06	793.653	1,587.306	0.00E+00	3.34E-03	6.68E-03	Avg. MeV	
Am-241	3.2229E-03	793.653	1,587.306	0.00E+00	2.56E+00	5.12E+00	0.0150	7.813E+13
Am-242m	2.2381E-06	793.653	1,587.306	0.00E+00	1.78E-03	3.55E-03	0.0250	1.595E+13
Am-243	4.6006E-05	793.653	1,587.306	0.00E+00	3.65E-02	7.30E-02	0.0375	1.385E+13
C-14	2.3082E-05	793.653	1,587.306	0.00E+00	1.83E-02	3.66E-02	0.0575	1.496E+13
Cl-36	1.0667E-06	793.653	1,587.306	0.00E+00	8.47E-04	1.69E-03	0.0850	9.025E+12
Cm-243	1.7602E-05	793.653	1,587.306	0.00E+00	1.40E-02	2.79E-02	0.1250	5.937E+12
Cm-244	3.6307E-03	793.653	1,587.306	0.00E+00	2.88E+00	5.76E+00	0.2250	7.815E+12
Co-60	6.2585E-05	793.653	1,587.306	0.00E+00	4.97E-02	9.93E-02	0.3750	3.385E+12
Cs-134	2.4585E-07	793.653	1,587.306	0.00E+00	1.95E-04	3.90E-04	0.5750	5.555E+13
Cs-135	2.4711E-05	793.653	1,587.306	0.00E+00	1.96E-02	3.92E-02	0.8500	6.944E+11
Cs-137	9.3838E-01	793.653	1,587.306	0.00E+00	7.45E+02	1.49E+03	1.2500	3.353E+11
Eu-154	4.6887E-03	793.653	1,587.306	0.00E+00	3.72E+00	7.44E+00	1.7500	2.132E+10
Eu-155	1.2793E-04	793.653	1,587.306	0.00E+00	1.02E-01	2.03E-01	2.2500	1.774E+06
Fe-55	8.1951E-10	793.653	1,587.306	0.00E+00	6.50E-07	1.30E-06	2.7500	2.871E+10
H-3	1.6839E-03	793.653	1,587.306	0.00E+00	1.34E+00	2.67E+00	3.5000	9.473E+04
I-129	1.0092E-06	793.653	1,587.306	0.00E+00	8.01E-04	1.60E-03	5.0000	4.032E+04
Kr-85	1.4981E-02	793.653	1,587.306	0.00E+00	1.19E+01	2.38E+01	7.0000	4.626E+03
Np-237	1.2556E-05	793.653	1,587.306	0.00E+00	9.97E-03	1.99E-02	11.0000	5.299E+02
Pa-231	4.7360E-06	793.653	1,587.306	0.00E+00	3.76E-03	7.52E-03		
Pb-210	2.1901E-09	793.653	1,587.306	0.00E+00	1.74E-06	3.48E-06		
Pm-147	2.8781E-06	793.653	1,587.306	0.00E+00	2.28E-03	4.57E-03		
Pu-238	1.4430E-01	793.653	1,587.306	0.00E+00	1.15E+02	2.29E+02		
Pu-239	1.3572E-04	793.653	1,587.306	0.00E+00	1.08E-01	2.15E-01		
Pu-240	2.7537E-04	793.653	1,587.306	0.00E+00	2.19E-01	4.37E-01		
Pu-241	9.3995E-03	793.653	1,587.306	0.00E+00	7.46E+00	1.49E+01		
Pu-242	3.8866E-06	793.653	1,587.306	0.00E+00	3.08E-03	6.17E-03		
Ra-226	4.1243E-09	793.653	1,587.306	0.00E+00	3.27E-06	6.55E-06		
Ra-228	9.1949E-07	793.653	1,587.306	0.00E+00	7.30E-04	1.46E-03		
Ru-106	1.1667E-15	793.653	1,587.306	0.00E+00	9.26E-13	1.85E-12		
Se-79	2.1074E-05	793.653	1,587.306	0.00E+00	1.67E-02	3.35E-02		
Sn-126	2.2192E-05	793.653	1,587.306	0.00E+00	1.76E-02	3.52E-02		
Sr-90	8.8642E-01	793.653	1,587.306	0.00E+00	7.04E+02	1.41E+03		
Tc-99	3.3323E-04	793.653	1,587.306	0.00E+00	2.64E-01	5.29E-01		
Th-229	1.3517E-05	793.653	1,587.306	0.00E+00	1.07E-02	2.15E-02		
Th-230	2.2822E-07	793.653	1,587.306	0.00E+00	1.81E-04	3.62E-04		
Th-232	-6.9673E-08	793.653	0.000	4.23E-04	3.68E-04	4.23E-04		
Ti-208	5.1524E-04	793.653	1,587.306	0.00E+00	4.09E-01	8.18E-01		
U-232	1.3950E-03	793.653	1,587.306	0.00E+00	1.11E+00	2.21E+00		
U-233	2.0602E-03	793.653	1,587.306	0.00E+00	1.64E+00	3.27E+00		
U-234	2.9513E-04	793.653	1,587.306	0.00E+00	2.34E-01	4.68E-01		
U-235	-1.7343E-06	793.653	0.000	8.46E-04	0.00E+00	8.46E-04		
U-236	8.6281E-06	793.653	1,587.306	0.00E+00	6.85E-03	1.37E-02		
U-238	-5.6065E-09	793.653	0.000	8.41E-06	3.96E-06	8.41E-06		
Y-90	8.8642E-01	793.653	1,587.306	0.00E+00	7.04E+02	1.41E+03		
Other Radionuclides					7.17E+02	1.43E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.27E+01	2.54E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	GRAPHITE	
Fuel Cladding:	PYROLYTIC CARBON IN	GRAPHITE	
BOL HM Constituents:	ThC2-UC2	Th and U	
BOL Enrichment %:	93.1526	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		793.653	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:	131.655	1,587.306	Bounding burnup assumed to be twice nominal burnup.

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	1.86	
Bounding:	3.71	12.06

Estimated EOL HM/Given EOL HM
1.07

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PEACH BOTTOM UNIT 1 CORE I
 SNF ID #: 170
 Fuel Units & Descr: 814 - ELEMENT
 Heavy Metal Mass: BOL=1707.37kg ; EOL=1646.48kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1969
 Estimates as of: 2030
 Template: FSV (Graphite, Graphite, 60 to 100%, Th & U)
²Template Burnup(MWd): 1270.275
 Template BOL Heavy Metal Mass (MT): 0.012702752
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 62.62

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	4.2062E-06	57,582.590	115,165.180	0.00E+00	2.42E-01	4.84E-01	0.0150	5.669E+15
Am-241	3.2229E-03	57,582.590	115,165.180	0.00E+00	1.86E+02	3.71E+02	0.0250	1.157E+15
Am-242m	2.2381E-06	57,582.590	115,165.180	0.00E+00	1.29E-01	2.58E-01	0.0375	1.005E+15
Am-243	4.6006E-05	57,582.590	115,165.180	0.00E+00	2.65E+00	5.30E+00	0.0575	1.085E+15
C-14	2.3082E-05	57,582.590	115,165.180	0.00E+00	1.33E+00	2.66E+00	0.0850	6.548E+14
Cl-36	1.0667E-06	57,582.590	115,165.180	0.00E+00	6.14E-02	1.23E-01	0.1250	4.308E+14
Cm-243	1.7602E-05	57,582.590	115,165.180	0.00E+00	1.01E+00	2.03E+00	0.2250	5.670E+14
Cm-244	3.6307E-03	57,582.590	115,165.180	0.00E+00	2.09E+02	4.18E+02	0.3750	2.456E+14
Co-60	6.2585E-05	57,582.590	115,165.180	0.00E+00	3.60E+00	7.21E+00	0.5750	4.030E+15
Cs-134	2.4585E-07	57,582.590	115,165.180	0.00E+00	1.42E-02	2.83E-02	0.8500	5.038E+13
Cs-135	2.4711E-05	57,582.590	115,165.180	0.00E+00	1.42E+00	2.85E+00	1.2500	2.432E+13
Cs-137	9.3838E-01	57,582.590	115,165.180	0.00E+00	5.40E+04	1.08E+05	1.7500	1.547E+12
Eu-154	4.6887E-04	57,582.590	115,165.180	0.00E+00	2.70E+02	5.40E+02	2.2500	1.287E+08
Eu-155	1.2793E-03	57,582.590	115,165.180	0.00E+00	7.37E+00	1.47E+01	2.7500	2.083E+12
Fe-55	8.1951E-10	57,582.590	115,165.180	0.00E+00	4.72E-05	9.44E-05	3.5000	6.873E+06
H-3	1.6839E-03	57,582.590	115,165.180	0.00E+00	9.70E+01	1.94E+02	5.0000	2.925E+06
I-129	1.0092E-06	57,582.590	115,165.180	0.00E+00	5.81E-02	1.16E-01	7.0000	3.356E+05
Kr-85	1.4981E-02	57,582.590	115,165.180	0.00E+00	8.63E+02	1.73E+03	11.0000	3.845E+04
Np-237	1.2556E-05	57,582.590	115,165.180	0.00E+00	7.23E-01	1.45E+00		
Pa-231	4.7360E-06	57,582.590	115,165.180	0.00E+00	2.73E-01	5.45E-01		
Pb-210	2.1901E-09	57,582.590	115,165.180	0.00E+00	1.26E-04	2.52E-04		
Pm-147	2.8781E-06	57,582.590	115,165.180	0.00E+00	1.66E-01	3.31E-01		
Pu-238	1.4430E-01	57,582.590	115,165.180	0.00E+00	8.31E+03	1.66E+04		
Pu-239	1.3572E-04	57,582.590	115,165.180	0.00E+00	7.82E+00	1.56E+01		
Pu-240	2.7537E-04	57,582.590	115,165.180	0.00E+00	1.59E+01	3.17E+01		
Pu-241	9.3995E-03	57,582.590	115,165.180	0.00E+00	5.41E+02	1.08E+03		
Pu-242	3.8866E-06	57,582.590	115,165.180	0.00E+00	2.24E-01	4.48E-01		
Ra-226	4.1243E-09	57,582.590	115,165.180	0.00E+00	2.37E-04	4.75E-04		
Ra-228	9.1949E-07	57,582.590	115,165.180	0.00E+00	5.29E-02	1.06E-01		
Ru-106	1.1667E-15	57,582.590	115,165.180	0.00E+00	6.72E-11	1.34E-10		
Se-79	2.1074E-05	57,582.590	115,165.180	0.00E+00	1.21E+00	2.43E+00		
Sn-126	2.2192E-05	57,582.590	115,165.180	0.00E+00	1.28E+00	2.56E+00		
Sr-90	8.8642E-01	57,582.590	115,165.180	0.00E+00	5.10E+04	1.02E+05		
Tc-99	3.3323E-04	57,582.590	115,165.180	0.00E+00	1.92E+01	3.84E+01		
Th-229	1.3517E-05	57,582.590	115,165.180	0.00E+00	7.78E-01	1.56E+00		
Th-230	2.2822E-07	57,582.590	115,165.180	0.00E+00	1.31E-02	2.63E-02		
Th-231	-6.9673E-08	57,582.590	0.000	1.69E-01	1.65E-01	1.69E-01		
Th-208	5.1524E-04	57,582.590	115,165.180	0.00E+00	2.97E+01	5.93E+01		
U-232	1.3950E-03	57,582.590	115,165.180	0.00E+00	8.03E+01	1.61E+02		
U-233	2.0602E-03	57,582.590	115,165.180	0.00E+00	1.19E+02	2.37E+02		
U-234	2.9513E-04	57,582.590	115,165.180	0.00E+00	1.70E+01	3.40E+01		
U-235	-1.7343E-06	57,582.590	0.000	3.38E-01	2.38E-01	3.38E-01		
U-236	8.6281E-06	57,582.590	115,165.180	0.00E+00	4.97E-01	9.94E-01		
U-238	-5.6065E-09	57,582.590	0.000	3.36E-03	3.04E-03	3.36E-03		
Y-90	8.8642E-01	57,582.590	115,165.180	0.00E+00	5.10E+04	1.02E+05		
Other Radionuclides					5.20E+04	1.04E+05		

Thermal Power		
	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
	9.20E+02	1.84E+03
Total	Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	GRAPHITE	
Fuel Cladding:	PYROLYTIC CARBON IN	GRAPHITE	
BOL HM Constituents:	ThC2-UC2	Th and U	
BOL Enrichment %:	93.1525882	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		57,582.590	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:	52,578.305	115,165.180	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.34		1.00
Bounding:	0.67	2.19	

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PEACH BOTTOM UNIT 1 CORE 1 (PTE-1)
 SNF ID #: 1C85
 Fuel Units & Descr: 1 - ELEMENT
 Heavy Metal Mass: BOL=2.25kg ; EOL=2.25kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1969
 Estimates as of: 2030
 Template: FSV (Graphite, Graphite, 60 to 100%, Th & U)
²Template Burnup(MWd): 1270.275
 Template BOL Heavy Metal Mass (MT): 0.012702752
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 0.08

II. Estimates		m	x _n	x _b	b	y _n	y _b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)	Avg. MeV
Ac-227	4.2062E-06	42.633	85.267	0.00E+00	1.79E-04	3.59E-04			
Am-241	3.2229E-03	42.633	85.267	0.00E+00	1.37E-01	2.75E-01	0.0150	4.197E+12	
Am-242m	2.2381E-06	42.633	85.267	0.00E+00	9.54E-05	1.91E-04	0.0250	8.568E+11	
Am-243	4.6006E-05	42.633	85.267	0.00E+00	1.96E-03	3.92E-03	0.0375	7.438E+11	
C-14	2.3082E-05	42.633	85.267	0.00E+00	9.84E-04	1.97E-03	0.0575	8.035E+11	
Cl-36	1.0667E-06	42.633	85.267	0.00E+00	4.55E-05	9.10E-05	0.0850	4.848E+11	
Cm-243	1.7602E-05	42.633	85.267	0.00E+00	7.50E-04	1.50E-03	0.1250	3.189E+11	
Cm-244	3.6307E-03	42.633	85.267	0.00E+00	1.55E-01	3.10E-01	0.2250	4.198E+11	
Co-60	6.2585E-05	42.633	85.267	0.00E+00	2.67E-03	5.34E-03	0.3750	1.818E+11	
Cs-134	2.4585E-07	42.633	85.267	0.00E+00	1.05E-05	2.10E-05	0.5750	2.984E+12	
Cs-135	2.4711E-05	42.633	85.267	0.00E+00	1.05E-03	2.11E-03	0.8500	3.730E+10	
Cs-137	9.3838E-01	42.633	85.267	0.00E+00	4.00E+01	8.00E+01	1.2500	1.801E+10	
Eu-154	4.6887E-03	42.633	85.267	0.00E+00	2.00E-01	4.00E-01	1.7500	1.145E+09	
Eu-155	1.2793E-04	42.633	85.267	0.00E+00	5.45E-03	1.09E-02	2.2500	9.529E+04	
Fe-55	8.1951E-10	42.633	85.267	0.00E+00	3.49E-08	6.99E-08	2.7500	1.542E+09	
H-3	1.6839E-03	42.633	85.267	0.00E+00	7.18E-02	1.44E-01	3.5000	5.088E+03	
I-129	1.0092E-06	42.633	85.267	0.00E+00	4.30E-05	8.61E-05	5.0000	2.166E+03	
Kr-85	1.4981E-02	42.633	85.267	0.00E+00	6.39E-01	1.28E+00	7.0000	2.485E+02	
Np-237	1.2556E-05	42.633	85.267	0.00E+00	5.35E-04	1.07E-03	11.0000	2.846E+01	
Pa-231	4.7360E-06	42.633	85.267	0.00E+00	2.02E-04	4.04E-04			
Pb-210	2.1901E-09	42.633	85.267	0.00E+00	9.34E-08	1.87E-07			
Pm-147	2.8781E-06	42.633	85.267	0.00E+00	1.23E-04	2.45E-04			
Pu-238	1.4430E-01	42.633	85.267	0.00E+00	6.15E+00	1.23E+01			
Pu-239	1.3572E-04	42.633	85.267	0.00E+00	5.79E-03	1.16E-02			
Pu-240	2.7537E-04	42.633	85.267	0.00E+00	1.17E-02	2.35E-02			
Pu-241	9.3995E-03	42.633	85.267	0.00E+00	4.01E-01	8.01E-01			
Pu-242	3.8866E-06	42.633	85.267	0.00E+00	1.66E-04	3.31E-04			
Ra-226	4.1243E-09	42.633	85.267	0.00E+00	1.76E-07	3.52E-07			
Ra-228	9.1949E-07	42.633	85.267	0.00E+00	3.92E-05	7.84E-05			
Ru-106	1.1667E-15	42.633	85.267	0.00E+00	4.97E-14	9.95E-14			
Se-79	2.1074E-05	42.633	85.267	0.00E+00	8.88E-04	1.80E-03			
Sn-126	2.2192E-05	42.633	85.267	0.00E+00	9.46E-04	1.89E-03			
Sr-90	8.8642E-01	42.633	85.267	0.00E+00	3.78E+01	7.56E+01			
Tc-99	3.3323E-04	42.633	85.267	0.00E+00	1.42E-02	2.84E-02			
Th-229	1.3517E-05	42.633	85.267	0.00E+00	5.76E-04	1.15E-03			
Th-230	2.2822E-07	42.633	85.267	0.00E+00	9.73E-06	1.95E-05			
Th-232	-6.9673E-08	42.633	0.000	2.23E-04	2.20E-04	2.23E-04			
Tl-208	5.1524E-04	42.633	85.267	0.00E+00	2.20E-02	4.39E-02			
U-232	1.3950E-03	42.633	85.267	0.00E+00	5.95E-02	1.19E-01			
U-233	2.0602E-03	42.633	85.267	0.00E+00	8.78E-02	1.76E-01			
U-234	2.9513E-04	42.633	85.267	0.00E+00	1.26E-02	2.52E-02			
U-235	-1.7343E-06	42.633	0.000	4.46E-04	3.72E-04	4.46E-04			
U-236	8.6281E-06	42.633	85.267	0.00E+00	3.68E-04	7.36E-04			
U-238	-5.6065E-09	42.633	0.000	4.44E-06	4.20E-06	4.44E-06			
Y-90	8.8642E-01	42.633	85.267	0.00E+00	3.78E+01	7.56E+01			
Other Radionuclides									
						3.85E+01	7.71E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.81E-01	1.36E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	GRAPHITE	
Fuel Cladding:	PYROLYTIC CARBON IN	GRAPHITE	
BOL HM Constituents:	ThC2-UC2	Th and U	
BOL Enrichment %:	93.12359551	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		42.633	
Bounding:	69.412	85.267	

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	Estimated EOL HM/Given EOL HM	
Nominal:	0.19			0.98
Bounding:	0.38	1.23		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PEACH BOTTOM UNIT I CORE II
 SNF ID #: 171
 Fuel Units & Descr: 787 - CONCENTRIC TUBES
 Heavy Metal Mass: BOL=1389.06kg ; EOL=1281.16kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1973
 Estimates as of: 2030
 Template: FSV (Graphite, Graphite, 60 to 100%, Th & U)
²Template Burnup(MWd): 1270.275
 Template BOL Heavy Metal Mass (MT): 0.012702752
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 60.54

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	4.2062E-06	102,041.628	204,083.256	0.00E+00	4.29E-01	8.58E-01		
Am-241	3.2229E-03	102,041.628	204,083.256	0.00E+00	3.29E+02	6.58E+02	0.0150	1.005E+16
Am-242m	2.2381E-06	102,041.628	204,083.256	0.00E+00	2.28E-01	4.57E-01	0.0250	2.051E+15
Am-243	4.6006E-05	102,041.628	204,083.256	0.00E+00	4.69E+00	9.39E+00	0.0375	1.780E+15
C-14	2.3082E-05	102,041.628	204,083.256	0.00E+00	2.36E+00	4.71E+00	0.0575	1.923E+15
Cl-36	1.0667E-06	102,041.628	204,083.256	0.00E+00	1.09E-01	2.18E-01	0.0850	1.160E+15
Cm-243	1.7602E-05	102,041.628	204,083.256	0.00E+00	1.80E+00	3.59E+00	0.1250	7.634E+14
Cm-244	3.6307E-03	102,041.628	204,083.256	0.00E+00	3.70E+02	7.41E+02	0.2250	1.005E+15
Co-60	6.2585E-05	102,041.628	204,083.256	0.00E+00	6.39E+00	1.28E+01	0.3750	4.352E+14
Cs-134	2.4585E-07	102,041.628	204,083.256	0.00E+00	2.51E-02	5.02E-02	0.5750	7.142E+13
Cs-135	2.4711E-05	102,041.628	204,083.256	0.00E+00	2.52E+00	5.04E+00	0.8500	8.928E+13
Cs-137	9.3838E-01	102,041.628	204,083.256	0.00E+00	9.58E+04	1.92E+05	1.2500	4.310E+13
Eu-154	4.6887E-03	102,041.628	204,083.256	0.00E+00	4.78E+02	9.57E+02	1.7500	2.741E+12
Eu-155	1.2793E-04	102,041.628	204,083.256	0.00E+00	1.31E-01	2.61E-01	2.2500	2.281E+08
Fe-55	8.1951E-10	102,041.628	204,083.256	0.00E+00	8.36E-05	1.67E-04	2.7500	3.692E+12
H-3	1.6839E-03	102,041.628	204,083.256	0.00E+00	1.72E+02	3.44E+02	3.5000	1.218E+07
I-129	1.0092E-06	102,041.628	204,083.256	0.00E+00	1.03E-01	2.06E-01	5.0000	5.184E+06
Kr-85	1.4981E-02	102,041.628	204,083.256	0.00E+00	1.53E+03	3.06E+03	7.0000	5.947E+05
Np-237	1.2556E-05	102,041.628	204,083.256	0.00E+00	1.28E+00	2.56E+00	11.0000	6.813E+04
Pa-231	4.7360E-06	102,041.628	204,083.256	0.00E+00	4.83E-01	9.67E-01		
Pb-210	2.1901E-09	102,041.628	204,083.256	0.00E+00	2.23E-04	4.47E-04		
Pm-147	2.8781E-06	102,041.628	204,083.256	0.00E+00	2.94E-01	5.87E-01		
Pu-238	1.4430E-01	102,041.628	204,083.256	0.00E+00	1.47E+04	2.94E+04		
Pu-239	1.3572E-04	102,041.628	204,083.256	0.00E+00	1.38E+01	2.77E+01		
Pu-240	2.7537E-04	102,041.628	204,083.256	0.00E+00	2.81E+01	5.62E+01		
Pu-241	9.3995E-03	102,041.628	204,083.256	0.00E+00	9.59E+02	1.92E+03		
Pu-242	3.8866E-06	102,041.628	204,083.256	0.00E+00	3.97E-01	7.93E-01		
Ra-226	4.1243E-09	102,041.628	204,083.256	0.00E+00	4.21E-04	8.42E-04		
Ra-228	9.1949E-07	102,041.628	204,083.256	0.00E+00	9.38E-02	1.88E-01		
Ru-106	1.1667E-15	102,041.628	204,083.256	0.00E+00	1.19E-10	2.38E-10		
Se-79	2.1074E-05	102,041.628	204,083.256	0.00E+00	2.15E+00	4.30E+00		
Sn-126	2.2192E-05	102,041.628	204,083.256	0.00E+00	2.26E+00	4.53E+00		
Sr-90	8.8642E-01	102,041.628	204,083.256	0.00E+00	9.05E+04	1.81E+05		
Tc-99	3.3323E-04	102,041.628	204,083.256	0.00E+00	3.40E+01	6.80E+01		
Th-229	1.3517E-05	102,041.628	204,083.256	0.00E+00	1.38E+00	2.76E+00		
Th-230	2.2822E-07	102,041.628	204,083.256	0.00E+00	2.33E-02	4.66E-02		
Th-232	-6.9673E-08	102,041.628	0.000	1.37E-01	1.30E-01	1.37E-01		
Tl-208	5.1524E-04	102,041.628	204,083.256	0.00E+00	5.26E+01	1.05E+02		
U-232	1.3950E-03	102,041.628	204,083.256	0.00E+00	1.42E+02	2.85E+02		
U-233	2.0602E-03	102,041.628	204,083.256	0.00E+00	2.10E+02	4.20E+02		
U-234	2.9513E-04	102,041.628	204,083.256	0.00E+00	3.01E+01	6.02E+01		
U-235	-1.7343E-06	102,041.628	0.000	2.75E-01	9.79E-02	2.75E-01		
U-236	8.6281E-06	102,041.628	204,083.256	0.00E+00	8.80E-01	1.76E+00		
U-238	-5.6065E-09	102,041.628	0.000	2.73E-03	2.16E-03	2.73E-03		
Y-90	8.8642E-01	102,041.628	204,083.256	0.00E+00	9.05E+04	1.81E+05		
Other Radionuclides					9.22E+04	1.84E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.63E+03	3.26E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	GRAPHITE	
Fuel Cladding:	BISO IN GRAPHIT	GRAPHITE	
BOL HM Constituents:	ThC2 UC2	Th and U	
BOL Enrichment %:	93.1500286	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		102,041.628	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:	101,007.912	204,083.256	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.73		1.00
Bounding:	1.47	2.02	

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PEACH BOTTOM UNIT I CORE II (INTACT)
 SNF ID #: 206
 Fuel Units & Descr: 9 - CONCENTRIC TUBES
 Heavy Metal Mass: BOL=11.93kg ; EOL=10.74kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1974
 Estimates as of: 2030
 Template: FSV (Graphite, Graphite, 60 to 100%, Th & U)
²Template Burnup(MWd): 1270.275
 Template BOL Heavy Metal Mass (MT): 0.012702752
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 0.69

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	4.2062E-06	6,455.527	2,241.937	0.00E+00	2.72E-02	9.43E-03	0.0150	1.104E+14
Am-241	3.2229E-03	6,455.527	2,241.937	0.00E+00	2.08E+01	7.23E+00	0.0250	2.253E+13
Am-242m	2.2381E-06	6,455.527	2,241.937	0.00E+00	1.44E-02	5.02E-03	0.0375	1.956E+13
Am-243	4.6006E-05	6,455.527	2,241.937	0.00E+00	2.97E-01	1.03E-01	0.0575	2.113E+13
C-14	2.3082E-05	6,455.527	2,241.937	0.00E+00	1.49E-01	5.17E-02	0.0850	1.275E+13
Cl-36	1.0667E-06	6,455.527	2,241.937	0.00E+00	6.89E-03	2.39E-03	0.1250	8.386E+12
Cm-243	1.7602E-05	6,455.527	2,241.937	0.00E+00	1.14E-01	3.95E-02	0.2250	1.104E+13
Cm-244	3.6307E-03	6,455.527	2,241.937	0.00E+00	2.34E+01	8.14E+00	0.3750	4.780E+12
Co-60	6.2585E-05	6,455.527	2,241.937	0.00E+00	4.04E-01	1.40E-01	0.5750	7.846E+13
Cs-134	2.4585E-07	6,455.527	2,241.937	0.00E+00	1.59E-03	5.51E-04	0.8500	9.808E+11
Cs-135	2.4711E-05	6,455.527	2,241.937	0.00E+00	1.60E-01	5.54E-02	1.2500	4.735E+11
Cs-137	9.3838E-01	6,455.527	2,241.937	0.00E+00	6.06E+03	2.10E+03	1.7500	3.011E+10
Eu-154	4.6887E-03	6,455.527	2,241.937	0.00E+00	3.03E+01	1.05E+01	2.2500	2.505E+06
Eu-155	1.2793E-04	6,455.527	2,241.937	0.00E+00	8.26E-01	2.87E-01	2.7500	4.056E+10
Fe-55	8.1951E-10	6,455.527	2,241.937	0.00E+00	5.29E-06	1.84E-06	3.5000	1.338E+05
H-3	1.6839E-03	6,455.527	2,241.937	0.00E+00	1.09E+01	3.78E+00	5.0000	5.695E+04
I-129	1.0092E-06	6,455.527	2,241.937	0.00E+00	6.52E-03	2.26E-03	7.0000	6.533E+03
Kr-85	1.4981E-02	6,455.527	2,241.937	0.00E+00	9.67E+01	3.36E+01	11.0000	7.484E+02
Np-237	1.2556E-05	6,455.527	2,241.937	0.00E+00	8.11E-02	2.82E-02		
Pa-231	4.7360E-06	6,455.527	2,241.937	0.00E+00	3.06E-02	1.06E-02		
Pb-210	2.1901E-09	6,455.527	2,241.937	0.00E+00	1.41E-05	4.91E-06		
Pm-147	2.8781E-06	6,455.527	2,241.937	0.00E+00	1.86E-02	6.45E-03		
Pu-238	1.4430E-01	6,455.527	2,241.937	0.00E+00	9.32E+02	3.24E+02		
Pu-239	1.3572E-04	6,455.527	2,241.937	0.00E+00	8.76E-01	3.04E-01		
Pu-240	2.7537E-04	6,455.527	2,241.937	0.00E+00	1.78E+00	6.17E-01		
Pu-241	9.3995E-03	6,455.527	2,241.937	0.00E+00	6.07E+01	2.11E+01		
Pu-242	3.8866E-06	6,455.527	2,241.937	0.00E+00	2.51E-02	8.71E-03		
Ra-226	4.1243E-09	6,455.527	2,241.937	0.00E+00	2.66E-05	9.25E-06		
Ra-228	9.1949E-07	6,455.527	2,241.937	0.00E+00	5.94E-03	2.06E-03		
Ru-106	1.1667E-15	6,455.527	2,241.937	0.00E+00	7.53E-12	2.62E-12		
Se-79	2.1074E-05	6,455.527	2,241.937	0.00E+00	1.36E-01	4.72E-02		
Sn-126	2.2192E-05	6,455.527	2,241.937	0.00E+00	1.43E-01	4.98E-02		
Sr-90	8.8642E-01	6,455.527	2,241.937	0.00E+00	5.72E+03	1.99E+03		
Tc-99	3.3323E-04	6,455.527	2,241.937	0.00E+00	2.15E+00	7.47E-01		
Th-229	1.3517E-05	6,455.527	2,241.937	0.00E+00	8.73E-02	3.03E-02		
Th-230	2.2822E-07	6,455.527	2,241.937	0.00E+00	1.47E-03	5.12E-04		
Th-232	-6.9673E-08	6,455.527	0.000	1.18E-03	7.30E-04	1.18E-03		
Ti-208	5.1524E-04	6,455.527	2,241.937	0.00E+00	3.33E+00	1.16E+00		
U-232	1.3950E-03	6,455.527	2,241.937	0.00E+00	9.01E+00	3.13E+00		
U-233	2.0602E-03	6,455.527	2,241.937	0.00E+00	1.33E+01	4.62E+00		
U-234	2.9513E-04	6,455.527	2,241.937	0.00E+00	1.91E+00	6.62E-01		
U-235	-1.7343E-06	6,455.527	0.000	2.36E-03	0.00E+00	2.36E-03		
U-236	8.6281E-06	6,455.527	2,241.937	0.00E+00	5.57E-02	1.93E-02		
U-238	-5.6065E-09	6,455.527	0.000	2.35E-05	0.00E+00	2.35E-05		
Y-90	8.8642E-01	6,455.527	2,241.937	0.00E+00	5.72E+03	1.99E+03		
Other Radionuclides					5.83E+03	2.03E+03		
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							1.03E+02	3.58E+01
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	GRAPHITE	
Fuel Cladding:	BISO IN GRAPHIT	GRAPHITE	
BOL HM Constituents:	ThC2-UC2	Th and U	
BOL Enrichment %:	93.15206879	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nomina:	6,455.527	1,120.969	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:	867.055	2,241.937	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nomina:	5.41	0.17	0.86
Bounding:	1.88	2.59	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MIXED MATERIAL EXP.DCC-1
 SNF ID #: 430
 Fuel Units & Descr: 1 - EXPERIMENT CAPSULE
 Heavy Metal Mass: BOL= ; EOL=23.63kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1983
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.07

Radionuclide	II. Estimates		III. Gamma Sources					
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Avg. MeV	
Ac-227	2.3344E-08	22,320.134	22,320.134	0.00E+00	5.21E-04	5.21E-04	0.0150	1.666E+15
Am-241	1.1135E-04	22,320.134	22,320.134	0.00E+00	2.49E+00	2.49E+00	0.0250	3.462E+14
Am-242m	8.5075E-09	22,320.134	22,320.134	0.00E+00	1.90E-04	1.90E-04	0.0375	2.994E+14
Am-243	9.8519E-10	22,320.134	22,320.134	0.00E+00	2.20E-05	2.20E-05	0.0575	3.228E+14
C-14	2.3012E-04	22,320.134	22,320.134	0.00E+00	5.14E+00	5.14E+00	0.0850	1.950E+14
Cl-36	1.2261E-06	22,320.134	22,320.134	0.00E+00	2.74E-02	2.74E-02	0.1250	1.266E+14
Cm-243	2.4875E-10	22,320.134	22,320.134	0.00E+00	5.55E-06	5.55E-06	0.2250	1.679E+14
Cm-244	2.3178E-09	22,320.134	22,320.134	0.00E+00	5.17E-05	5.17E-05	0.3750	7.322E+13
Co-60	7.0849E-02	22,320.134	22,320.134	0.00E+00	1.58E+03	1.58E+03	0.5750	1.206E+15
Cs-134	3.0266E-06	22,320.134	22,320.134	0.00E+00	6.76E-02	6.76E-02	0.8500	1.221E+15
Cs-135	3.0316E-05	22,320.134	22,320.134	0.00E+00	6.77E-01	6.77E-01	1.2500	1.213E+14
Cs-137	1.4511E+00	22,320.134	22,320.134	0.00E+00	3.24E+04	3.24E+04	1.7500	3.150E+11
Eu-154	6.6955E-04	22,320.134	22,320.134	0.00E+00	1.49E+01	1.49E+01	2.2500	6.538E+08
Eu-155	6.9850E-04	22,320.134	22,320.134	0.00E+00	1.56E+01	1.56E+01	2.7500	1.890E+07
Fe-55	1.2318E-03	22,320.134	22,320.134	0.00E+00	2.75E+01	2.75E+01	3.5000	1.333E+03
H-3	2.5141E-03	22,320.134	22,320.134	0.00E+00	5.61E+01	5.61E+01	5.0000	5.480E+02
I-129	7.3195E-07	22,320.134	22,320.134	0.00E+00	1.63E-02	1.63E-02	7.0000	6.051E+01
Kr-85	4.1281E-02	22,320.134	22,320.134	0.00E+00	9.21E+02	9.21E+02	11.0000	6.791E+00
Np-237	1.1489E-06	22,320.134	22,320.134	0.00E+00	2.56E-02	2.56E-02		
Pa-231	4.5241E-08	22,320.134	22,320.134	0.00E+00	1.01E-03	1.01E-03		
Pb-210	6.4476E-13	22,320.134	22,320.134	0.00E+00	1.44E-08	1.44E-08		
Pm-147	1.1651E-03	22,320.134	22,320.134	0.00E+00	2.60E+01	2.60E+01		
Pu-238	2.9517E-04	22,320.134	22,320.134	0.00E+00	6.59E+00	6.59E+00		
Pu-239	6.6772E-04	22,320.134	22,320.134	0.00E+00	1.49E+01	1.49E+01		
Pu-240	8.6839E-05	22,320.134	22,320.134	0.00E+00	1.94E+00	1.94E+00		
Pu-241	7.1514E-04	22,320.134	22,320.134	0.00E+00	1.60E+01	1.60E+01		
Pu-242	1.9717E-09	22,320.134	22,320.134	0.00E+00	4.40E-05	4.40E-05		
Ra-226	1.7654E-12	22,320.134	22,320.134	0.00E+00	3.94E-08	3.94E-08		
Ra-228	8.2928E-12	22,320.134	22,320.134	0.00E+00	1.85E-07	1.85E-07		
Ru-106	1.8419E-10	22,320.134	22,320.134	0.00E+00	4.11E-06	4.11E-06		
Se-79	1.3223E-05	22,320.134	22,320.134	0.00E+00	2.95E-01	2.95E-01		
Sn-126	1.1493E-05	22,320.134	22,320.134	0.00E+00	2.57E-01	2.57E-01		
Sr-90	1.3649E+00	22,320.134	22,320.134	0.00E+00	3.05E+04	3.05E+04		
Tc-99	4.6656E-04	22,320.134	22,320.134	0.00E+00	1.04E+01	1.04E+01		
Th-229	1.4547E-11	22,320.134	22,320.134	0.00E+00	3.25E-07	3.25E-07		
Th-230	1.6617E-10	22,320.134	22,320.134	0.00E+00	3.71E-06	3.71E-06		
Th-232	8.3361E-12	22,320.134	22,320.134	0.00E+00	1.86E-07	1.86E-07		
Tl-208	2.1664E-08	22,320.134	22,320.134	0.00E+00	4.84E-04	4.84E-04		
U-232	5.8669E-08	22,320.134	22,320.134	0.00E+00	1.31E-03	1.31E-03		
U-233	3.1847E-09	22,320.134	22,320.134	0.00E+00	7.11E-05	7.11E-05		
U-234	3.8769E-07	22,320.134	22,320.134	0.00E+00	8.65E-03	8.65E-03		
U-235	-2.7761E-06	22,320.134	0.000	9.54E-02	3.35E-02	9.54E-02		
U-236	1.6190E-05	22,320.134	22,320.134	0.00E+00	3.61E-01	3.61E-01		
U-238	-2.8547E-09	22,320.134	0.000	1.03E-03	9.68E-04	1.03E-03		
Y-90	1.3652E+00	22,320.134	22,320.134	0.00E+00	3.05E+04	3.05E+04		
Other Radionuclides					3.68E+04	3.68E+04		

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.90E+02	3.90E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative) and enrichment (unknown).
Fuel Cladding:	NONE	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		22,320.134	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		22,320.134	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	10.12	
Bounding:	10.12	
		Estimated EOL HM/Given EOL HM
		1.02

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

<p>Fuel Name: PNL MIXED MATERIAL EXP.DCC-2 SNF ID #: 431 Fuel Units & Descr: 1 - EXPERIMENT CAPSULE Heavy Metal Mass: BOL= : EOL=20.63kg ROD Storage Site: INEEL</p>	<p>¹Fuel decay start date: 1984 Estimates as of: 2030 Template: Pathfinder (Light Water, SST, 60 to 100%, U) ²Template Burnup(MWd): 6.01 Template BOL Heavy Metal Mass (MT): 0.00012882 Template Decay Time: 35 years</p>	<p>Estimated Canister usage: 18"x15" 0.07</p>
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Radionuclide	II. Estimates						Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.3344E-08	19,489.025	19,489.025	0.00E+00	4.55E-04	4.55E-04		
Am-241	1.1135E-04	19,489.025	19,489.025	0.00E+00	2.17E+00	2.17E+00	0.0150	1.455E+15
Am-242m	8.5075E-09	19,489.025	19,489.025	0.00E+00	1.66E-04	1.66E-04	0.0250	3.023E+14
Am-243	9.8519E-10	19,489.025	19,489.025	0.00E+00	1.92E-05	1.92E-05	0.0375	2.615E+14
C-14	2.3012E-04	19,489.025	19,489.025	0.00E+00	4.48E+00	4.48E+00	0.0575	2.818E+14
Cl-36	1.2261E-06	19,489.025	19,489.025	0.00E+00	2.39E-02	2.39E-02	0.0850	1.703E+14
Cm-243	2.4875E-10	19,489.025	19,489.025	0.00E+00	4.85E-06	4.85E-06	0.1250	1.106E+14
Cm-244	2.3178E-09	19,489.025	19,489.025	0.00E+00	4.52E-05	4.52E-05	0.2250	1.466E+14
Co-60	7.0849E-02	19,489.025	19,489.025	0.00E+00	1.38E+03	1.38E+03	0.3750	6.393E+13
Cs-134	3.0266E-06	19,489.025	19,489.025	0.00E+00	5.90E-02	5.90E-02	0.5750	1.053E+15
Cs-135	3.0316E-05	19,489.025	19,489.025	0.00E+00	5.91E-01	5.91E-01	0.8500	1.066E+15
Cs-137	1.4511E+00	19,489.025	19,489.025	0.00E+00	2.83E+04	2.83E+04	1.2500	1.060E+14
Eu-154	6.6955E-04	19,489.025	19,489.025	0.00E+00	1.30E+01	1.30E+01	1.7500	2.750E+11
Eu-155	6.9850E-04	19,489.025	19,489.025	0.00E+00	1.36E+01	1.36E+01	2.2500	5.709E+08
Fe-55	1.2318E-03	19,489.025	19,489.025	0.00E+00	2.40E+01	2.40E+01	2.7500	1.650E+07
H-3	2.5141E-03	19,489.025	19,489.025	0.00E+00	4.90E+01	4.90E+01	3.5000	1.164E+03
I-129	7.3195E-07	19,489.025	19,489.025	0.00E+00	1.43E-02	1.43E-02	5.0000	4.785E+02
Kr-85	4.1281E-02	19,489.025	19,489.025	0.00E+00	8.05E+02	8.05E+02	7.0000	5.284E+01
Np-237	1.1489E-06	19,489.025	19,489.025	0.00E+00	2.24E-02	2.24E-02	11.0000	5.929E+00
Pg-231	4.5241E-08	19,489.025	19,489.025	0.00E+00	8.82E-04	8.82E-04		
Pb-210	6.4476E-13	19,489.025	19,489.025	0.00E+00	1.26E-08	1.26E-08		
Pm-147	1.1651E-03	19,489.025	19,489.025	0.00E+00	2.27E+01	2.27E+01		
Pu-238	2.9517E-04	19,489.025	19,489.025	0.00E+00	5.75E+00	5.75E+00		
Pu-239	6.6772E-04	19,489.025	19,489.025	0.00E+00	1.30E+01	1.30E+01		
Pu-240	8.6839E-05	19,489.025	19,489.025	0.00E+00	1.69E+00	1.69E+00		
Pu-241	7.1514E-04	19,489.025	19,489.025	0.00E+00	1.39E+01	1.39E+01		
Pu-242	1.9717E-09	19,489.025	19,489.025	0.00E+00	3.84E-05	3.84E-05		
Ra-226	1.7654E-12	19,489.025	19,489.025	0.00E+00	3.44E-08	3.44E-08		
Ra-228	8.2928E-12	19,489.025	19,489.025	0.00E+00	1.62E-07	1.62E-07		
Ru-106	1.8419E-10	19,489.025	19,489.025	0.00E+00	3.59E-06	3.59E-06		
Se-79	1.3223E-05	19,489.025	19,489.025	0.00E+00	2.58E-01	2.58E-01		
Sn-126	1.1493E-05	19,489.025	19,489.025	0.00E+00	2.24E-01	2.24E-01		
Sr-90	1.3649E+00	19,489.025	19,489.025	0.00E+00	2.66E+04	2.66E+04		
Tc-99	4.6656E-04	19,489.025	19,489.025	0.00E+00	9.09E+00	9.09E+00		
Th-229	1.4547E-11	19,489.025	19,489.025	0.00E+00	2.84E-07	2.84E-07		
Th-230	1.6617E-10	19,489.025	19,489.025	0.00E+00	3.24E-06	3.24E-06		
Th-232	8.3361E-12	19,489.025	19,489.025	0.00E+00	1.62E-07	1.62E-07		
Tl-208	2.1664E-08	19,489.025	19,489.025	0.00E+00	4.22E-04	4.22E-04		
U-232	5.8669E-08	19,489.025	19,489.025	0.00E+00	1.14E-03	1.14E-03		
U-233	3.1847E-09	19,489.025	19,489.025	0.00E+00	6.21E-05	6.21E-05		
U-234	3.8769E-07	19,489.025	19,489.025	0.00E+00	7.56E-03	7.56E-03		
U-235	-2.7761E-06	19,489.025	0.000	8.33E-02	2.92E-02	8.33E-02		
U-236	1.6190E-05	19,489.025	19,489.025	0.00E+00	3.16E-01	3.16E-01		
U-238	-2.8547E-09	19,489.025	0.000	9.01E-04	8.45E-04	9.01E-04		
Y-90	1.3652E+00	19,489.025	19,489.025	0.00E+00	2.66E+04	2.66E+04		
Other Radionuclides					3.22E+04	3.22E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative) and enrichment (unknown).
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	
Fuel Cladding:	NONE	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		60 to 100	

Burnup Summary (MWd) ²			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.
	From SFD	Estimated	
Nominal:		19,489.025	
Bounding:		19,489.025	

Checks			Estimated EOL HM/Given EOL HM 1.02
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	10.12		
Bounding:	10.12		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MIXED MATERIAL EXP.DCC-3
 SNF ID #: 432
 Fuel Units & Descr: 1 - FUEL MELTED IN EXP
 Heavy Metal Mass: BOL= ; EOL=20.36g
 ROD Storage Site: INEEL

¹Fuel decay start date: 1985
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.07

II. Estimates

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.3344E-08	19,237.748	19,237.748	0.00E+00	4.49E-04	4.49E-04	Avg. MeV	
Am-241	1.1135E-04	19,237.748	19,237.748	0.00E+00	2.14E+00	2.14E+00	0.0150	1.436E+15
Am-242m	8.5075E-09	19,237.748	19,237.748	0.00E+00	1.64E-04	1.64E-04	0.0250	2.984E+14
Am-243	9.8519E-10	19,237.748	19,237.748	0.00E+00	1.90E-05	1.90E-05	0.0375	2.581E+14
C-14	2.3012E-04	19,237.748	19,237.748	0.00E+00	4.43E+00	4.43E+00	0.0575	2.782E+14
Cl-36	1.2261E-06	19,237.748	19,237.748	0.00E+00	2.36E-02	2.36E-02	0.0850	1.691E+14
Cm-243	2.4875E-10	19,237.748	19,237.748	0.00E+00	4.79E-06	4.79E-06	0.1250	1.091E+14
Cm-244	2.3178E-09	19,237.748	19,237.748	0.00E+00	4.46E-05	4.46E-05	0.2250	1.447E+14
Co-60	7.0849E-02	19,237.748	19,237.748	0.00E+00	1.36E+03	1.36E+03	0.3750	6.310E+13
Cs-134	3.0266E-06	19,237.748	19,237.748	0.00E+00	5.82E-02	5.82E-02	0.5750	1.040E+15
Cs-135	3.0316E-05	19,237.748	19,237.748	0.00E+00	5.83E-01	5.83E-01	0.8500	1.052E+13
Cs-137	1.4511E+00	19,237.748	19,237.748	0.00E+00	2.79E+04	2.79E+04	1.2500	1.046E+14
Eu-154	6.6955E-04	19,237.748	19,237.748	0.00E+00	1.29E+01	1.29E+01	1.7500	2.715E+11
Eu-155	6.9850E-04	19,237.748	19,237.748	0.00E+00	1.34E+01	1.34E+01	2.2500	5.635E+08
Fe-55	1.2318E-03	19,237.748	19,237.748	0.00E+00	2.37E+01	2.37E+01	2.7500	1.629E+07
H-3	2.5141E-03	19,237.748	19,237.748	0.00E+00	4.84E+01	4.84E+01	3.5000	1.149E+03
I-129	7.3195E-07	19,237.748	19,237.748	0.00E+00	1.41E-02	1.41E-02	5.0000	4.723E+02
Kr-85	4.1281E-02	19,237.748	19,237.748	0.00E+00	7.94E+02	7.94E+02	7.0000	5.216E+01
Np-237	1.1489E-06	19,237.748	19,237.748	0.00E+00	2.21E-02	2.21E-02	11.0000	5.853E+00
Pa-231	4.5241E-08	19,237.748	19,237.748	0.00E+00	8.70E-04	8.70E-04		
Pb-210	6.4476E-13	19,237.748	19,237.748	0.00E+00	1.24E-08	1.24E-08		
Pm-147	1.1651E-03	19,237.748	19,237.748	0.00E+00	2.24E+01	2.24E+01		
Pu-238	2.9517E-04	19,237.748	19,237.748	0.00E+00	5.68E+00	5.68E+00		
Pu-239	6.8772E-04	19,237.748	19,237.748	0.00E+00	1.28E+01	1.28E+01		
Pu-240	8.6839E-05	19,237.748	19,237.748	0.00E+00	1.67E+00	1.67E+00		
Pu-241	7.1514E-04	19,237.748	19,237.748	0.00E+00	1.38E+01	1.38E+01		
Pu-242	1.9717E-09	19,237.748	19,237.748	0.00E+00	3.79E-05	3.79E-05		
Ra-226	1.7654E-12	19,237.748	19,237.748	0.00E+00	3.40E-08	3.40E-08		
Ra-228	8.2928E-12	19,237.748	19,237.748	0.00E+00	1.60E-07	1.60E-07		
Ru-106	1.8419E-10	19,237.748	19,237.748	0.00E+00	3.54E-06	3.54E-06		
Se-79	1.3223E-05	19,237.748	19,237.748	0.00E+00	2.54E-01	2.54E-01		
Sn-126	1.1493E-05	19,237.748	19,237.748	0.00E+00	2.21E-01	2.21E-01		
Sr-90	1.3649E+00	19,237.748	19,237.748	0.00E+00	2.63E+04	2.63E+04		
Tc-99	4.6656E-04	19,237.748	19,237.748	0.00E+00	8.98E+00	8.98E+00		
Th-229	1.4547E-11	19,237.748	19,237.748	0.00E+00	2.80E-07	2.80E-07		
Th-230	1.6617E-10	19,237.748	19,237.748	0.00E+00	3.20E-06	3.20E-06		
Th-232	8.3361E-12	19,237.748	19,237.748	0.00E+00	1.60E-07	1.60E-07		
Ti-208	2.1664E-08	19,237.748	19,237.748	0.00E+00	4.17E-04	4.17E-04		
U-232	5.8669E-08	19,237.748	19,237.748	0.00E+00	1.13E-03	1.13E-03		
U-233	3.1847E-09	19,237.748	19,237.748	0.00E+00	6.13E-05	6.13E-05		
U-234	3.8769E-07	19,237.748	19,237.748	0.00E+00	7.46E-03	7.46E-03		
U-235	-2.7761E-06	19,237.748	0.000	8.23E-02	2.89E-02	8.23E-02		
U-236	1.6190E-05	19,237.748	19,237.748	0.00E+00	3.11E-01	3.11E-01		
U-238	-2.8547E-09	19,237.748	0.000	8.89E-04	8.35E-04	8.89E-04		
Y-90	1.3652E+00	19,237.748	19,237.748	0.00E+00	2.63E+04	2.63E+04		
Other Radionuclides					3.18E+04	3.18E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.36E+02	3.36E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative) and enrichment (unknown).
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	NONE	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		60 to 100	

Burnup Summary (MWd) ²			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.
	From SFD	Estimated	
Nominal:		19,237.748	
Bounding:		19,237.748	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	10.12		1.02
Bounding:	10.12		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MOX FUEL
 SNF ID #: 414
 Fuel Units & Descr: 5 - SCRAP
 Heavy Metal Mass: BOL = 1; EOL = .23kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1988
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup (MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.36

Radionuclide	II. Estimates		III. Template Selection Summary, Burnup Summary, and Checks				Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.3072E-06	218.581	218.581	0.00E+00	5.04E-04	5.04E-04		
Am-241	8.4448E+00	218.581	218.581	0.00E+00	1.85E+03	1.85E+03	0.0150	2.678E+14
Am-242m	1.6848E-02	218.581	218.581	0.00E+00	3.68E+00	3.68E+00	0.0250	5.330E+13
Am-243	1.6320E-02	218.581	218.581	0.00E+00	3.57E+00	3.57E+00	0.0375	4.656E+13
C-14	1.2090E-01	218.581	218.581	0.00E+00	2.64E+01	2.64E+01	0.0575	7.326E+13
Cl-36	2.2849E-03	218.581	218.581	0.00E+00	4.99E-01	4.99E-01	0.0850	2.859E+13
Cm-243	8.6624E-04	218.581	218.581	0.00E+00	1.89E-01	1.89E-01	0.1250	2.241E+13
Cm-244	1.6848E-01	218.581	218.581	0.00E+00	3.68E+01	3.68E+01	0.2250	2.477E+13
Co-60	2.8086E+01	218.581	218.581	0.00E+00	6.14E+03	6.14E+03	0.3750	1.059E+13
Cs-134	3.4148E-04	218.581	218.581	0.00E+00	7.46E-02	7.46E-02	0.5750	1.723E+14
Cs-135	4.3976E-04	218.581	218.581	0.00E+00	9.61E-02	9.61E-02	0.8500	6.584E+12
Cs-137	2.1049E+01	218.581	218.581	0.00E+00	4.60E+03	4.60E+03	1.2500	4.603E+14
Eu-154	1.2500E+00	218.581	218.581	0.00E+00	2.73E+02	2.73E+02	1.7500	2.036E+11
Eu-155	6.8986E-02	218.581	218.581	0.00E+00	1.51E+01	1.51E+01	2.2500	2.414E+09
Fe-55	2.9308E-01	218.581	218.581	0.00E+00	6.41E+01	6.41E+01	2.7500	6.801E+08
H-3	2.4311E-01	218.581	218.581	0.00E+00	5.31E+01	5.31E+01	3.5000	5.444E+05
I-129	1.0618E-05	218.581	218.581	0.00E+00	2.32E-03	2.32E-03	5.0000	2.312E+05
Kr-85	5.9882E-01	218.581	218.581	0.00E+00	1.31E+02	1.31E+02	7.0000	2.647E+04
Np-237	1.5668E-04	218.581	218.581	0.00E+00	3.42E-02	3.42E-02	11.0000	3.029E+03
Pa-231	2.8656E-06	218.581	218.581	0.00E+00	6.26E-04	6.26E-04		
Pb-210	2.3918E-08	218.581	218.581	0.00E+00	5.23E-06	5.23E-06		
Pm-147	1.6900E-02	218.581	218.581	0.00E+00	3.69E+00	3.69E+00		
Pu-238	-8.6123E-01	218.581	0.000	5.91E+01	0.00E+00	5.91E+01		
Pu-239	-4.8440E-02	218.581	0.000	7.15E+00	0.00E+00	7.15E+00		
Pu-240	-3.0095E-01	218.581	0.000	9.13E+00	0.00E+00	9.13E+00		
Pu-241	-1.0411E+02	218.581	0.000	2.35E+03	0.00E+00	2.35E+03		
Pu-242	-1.1381E-04	218.581	0.000	3.95E-02	1.47E-02	3.95E-02		
Ra-226	6.4400E-08	218.581	218.581	0.00E+00	1.41E-05	1.41E-05		
Ra-228	5.9952E-07	218.581	218.581	0.00E+00	1.31E-04	1.31E-04		
Ru-106	8.5526E-07	218.581	218.581	0.00E+00	1.87E-04	1.87E-04		
Se-79	1.9181E-04	218.581	218.581	0.00E+00	4.19E-02	4.19E-02		
Sn-126	1.6671E-04	218.581	218.581	0.00E+00	3.64E-02	3.64E-02		
Sr-90	1.9799E+01	218.581	218.581	0.00E+00	4.33E+03	4.33E+03		
Tc-99	6.7678E-03	218.581	218.581	0.00E+00	1.48E+00	1.48E+00		
Th-229	1.7488E-06	218.581	218.581	0.00E+00	3.82E-04	3.82E-04		
Th-230	5.8704E-06	218.581	218.581	0.00E+00	1.28E-03	1.28E-03		
Th-232	6.0208E-07	218.581	218.581	0.00E+00	1.32E-04	1.32E-04		
Tl-208	8.7573E-05	218.581	218.581	0.00E+00	1.91E-02	1.91E-02		
U-232	2.3706E-04	218.581	218.581	0.00E+00	5.18E-02	5.18E-02		
U-233	3.6128E-04	218.581	218.581	0.00E+00	7.90E-02	7.90E-02		
U-234	1.2788E-02	218.581	218.581	0.00E+00	2.80E+00	2.80E+00		
U-235	5.7486E-04	218.581	218.581	1.98E-04	1.26E-01	1.26E-01		
U-236	2.3485E-04	218.581	218.581	0.00E+00	5.13E-02	5.13E-02		
U-238	1.1581E-04	218.581	218.581	2.46E-05	2.53E-02	2.53E-02		
Y-90	1.9804E+01	218.581	218.581	0.00E+00	4.33E+03	4.33E+03		
Other Radionuclides					1.35E+04	1.35E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.15E+02	2.18E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	SST	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		218.581	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		218.581	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	14.21		591.64
Bounding:	14.21		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MOX FUEL (7010)
 SNF ID #: 415
 Fuel Units & Descr: 7 - FUEL MELTED IN EXP
 Heavy Metal Mass: BOL= ; EOL=.01kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1988
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.51

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.3072E-06	9.313	9.313	0.00E+00	2.15E-05	2.15E-05		
Am-241	8.4448E+00	9.313	9.313	0.00E+00	7.87E+01	7.87E+01	0.0150	1.141E+13
Am-242m	1.6848E-02	9.313	9.313	0.00E+00	1.57E-01	1.57E-01	0.0250	2.271E+12
Am-243	1.6320E-02	9.313	9.313	0.00E+00	1.52E-01	1.52E-01	0.0375	1.984E+12
C-14	1.2090E-01	9.313	9.313	0.00E+00	1.13E+00	1.13E+00	0.0575	3.121E+12
Cl-36	2.2849E-03	9.313	9.313	0.00E+00	2.13E-02	2.13E-02	0.0850	1.218E+12
Cm-243	8.6624E-04	9.313	9.313	0.00E+00	8.07E-03	8.07E-03	0.1250	9.549E+11
Cm-244	1.6848E-01	9.313	9.313	0.00E+00	1.57E+00	1.57E+00	0.2250	1.056E+12
Co-60	2.8086E+01	9.313	9.313	0.00E+00	2.62E+02	2.62E+02	0.3750	4.514E+11
Cs-134	3.4148E-04	9.313	9.313	0.00E+00	3.18E-03	3.18E-03	0.5750	7.341E+11
Cs-135	4.3976E-04	9.313	9.313	0.00E+00	4.10E-03	4.10E-03	0.8500	2.805E+11
Cs-137	2.1049E+01	9.313	9.313	0.00E+00	1.96E+02	1.96E+02	1.2500	1.961E+13
Eu-154	1.2500E+00	9.313	9.313	0.00E+00	1.16E+01	1.16E+01	1.7500	8.675E+09
Eu-155	6.8986E-02	9.313	9.313	0.00E+00	6.42E-01	6.42E-01	2.2500	1.028E+08
Fe-55	2.9308E-01	9.313	9.313	0.00E+00	2.73E+00	2.73E+00	2.7500	2.898E+07
H-3	2.4311E-01	9.313	9.313	0.00E+00	2.26E+00	2.26E+00	3.5000	2.320E+04
I-129	1.0618E-05	9.313	9.313	0.00E+00	9.89E-05	9.89E-05	5.0000	9.850E+03
Kr-85	5.9882E-01	9.313	9.313	0.00E+00	5.58E+00	5.58E+00	7.0000	1.128E+03
Np-237	1.5668E-04	9.313	9.313	0.00E+00	1.46E-03	1.46E-03	11.0000	1.291E+02
Pa-231	2.8656E-06	9.313	9.313	0.00E+00	2.67E-05	2.67E-05		
Pb-210	2.3918E-08	9.313	9.313	0.00E+00	2.23E-07	2.23E-07		
Pm-147	1.6900E-02	9.313	9.313	0.00E+00	1.57E-01	1.57E-01		
Pu-238	-8.6123E-01	9.313	0.000	2.52E+00	0.00E+00	2.52E+00		
Pu-239	-4.8440E-02	9.313	0.000	3.05E-01	0.00E+00	3.05E-01		
Pu-240	-3.0095E-01	9.313	0.000	3.89E-01	0.00E+00	3.89E-01		
Pu-241	-1.0411E+02	9.313	0.000	1.00E+02	0.00E+00	1.00E+02		
Pu-242	-1.1381E-04	9.313	0.000	1.68E-03	6.25E-04	1.68E-03		
Ra-226	6.4400E-08	9.313	9.313	0.00E+00	6.00E-07	6.00E-07		
Ra-228	5.9952E-07	9.313	9.313	0.00E+00	5.58E-06	5.58E-06		
Ru-106	8.5526E-07	9.313	9.313	0.00E+00	7.97E-06	7.97E-06		
Se-79	1.9181E-04	9.313	9.313	0.00E+00	1.79E-03	1.79E-03		
Sr-90	1.6671E-04	9.313	9.313	0.00E+00	1.55E-03	1.55E-03		
Sr-90	1.9799E+01	9.313	9.313	0.00E+00	1.84E+02	1.84E+02		
Tc-99	6.7678E-03	9.313	9.313	0.00E+00	6.30E-02	6.30E-02		
Th-229	1.7488E-06	9.313	9.313	0.00E+00	1.63E-05	1.63E-05		
Th-230	5.8704E-06	9.313	9.313	0.00E+00	5.47E-05	5.47E-05		
Th-232	6.0208E-07	9.313	9.313	0.00E+00	5.61E-06	5.61E-06		
Ti-208	8.7573E-05	9.313	9.313	0.00E+00	8.16E-04	8.16E-04		
U-232	2.3706E-04	9.313	9.313	0.00E+00	2.21E-03	2.21E-03		
U-233	3.6128E-04	9.313	9.313	0.00E+00	3.36E-03	3.36E-03		
U-234	1.2788E-02	9.313	9.313	0.00E+00	1.19E-01	1.19E-01		
U-235	5.7486E-04	9.313	9.313	8.43E-06	5.36E-03	5.36E-03		
U-236	2.3485E-04	9.313	9.313	0.00E+00	2.19E-03	2.19E-03		
U-238	1.1581E-04	9.313	9.313	1.05E-06	1.08E-03	1.08E-03		
Y-90	1.9804E+01	9.313	9.313	0.00E+00	1.84E+02	1.84E+02		
Other Radionuclides					5.74E+02	5.74E+02		
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							9.18E+00	9.29E+00
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD LIGHT WATER	Used (Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	SST	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Nominal:		9.313	
Bounding:		9.313	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	14.21		
Bounding:	14.21		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MOX FUEL (7055)
 SNF ID #: 416
 Fuel Units & Descr: 12 - SCRAP
 Heavy Metal Mass: BOL = ; EOL = .06kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1988
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.88

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group Total Photons/sec (bounding) Avg. MeV
Ac-227	2.3072E-06	54.740	54.740	0.00E+00	1.26E-04	1.26E-04	0.0150
Am-241	8.4448E+00	54.740	54.740	0.00E+00	4.62E+02	4.62E+02	0.0250
Am-242m	1.6848E-02	54.740	54.740	0.00E+00	9.22E-01	9.22E-01	0.0375
Am-243	1.6320E-02	54.740	54.740	0.00E+00	8.93E-01	8.93E-01	0.0575
C-14	1.2090E-01	54.740	54.740	0.00E+00	6.62E+00	6.62E+00	0.0850
Cl-36	2.2849E-03	54.740	54.740	0.00E+00	1.25E-01	1.25E-01	0.1250
Cm-243	8.6624E-04	54.740	54.740	0.00E+00	4.74E-02	4.74E-02	0.2250
Cm-244	1.6848E-01	54.740	54.740	0.00E+00	9.22E+00	9.22E+00	0.3750
Co-60	2.8086E+01	54.740	54.740	0.00E+00	1.54E+03	1.54E+03	0.5750
Cs-134	3.4148E-04	54.740	54.740	0.00E+00	1.87E-02	1.87E-02	0.8500
Cs-135	4.3976E-04	54.740	54.740	0.00E+00	2.41E-02	2.41E-02	1.2500
Cs-137	2.1049E+01	54.740	54.740	0.00E+00	1.15E+03	1.15E+03	1.7500
Eu-154	1.2500E+00	54.740	54.740	0.00E+00	6.84E+01	6.84E+01	2.2500
Eu-155	6.8986E-02	54.740	54.740	0.00E+00	3.78E+00	3.78E+00	2.7500
Fe-55	2.9308E-01	54.740	54.740	0.00E+00	1.60E+01	1.60E+01	3.5000
H-3	2.4311E-01	54.740	54.740	0.00E+00	1.33E+01	1.33E+01	5.0000
I-129	1.0618E-05	54.740	54.740	0.00E+00	5.81E-04	5.81E-04	7.0000
Kr-85	5.9882E-01	54.740	54.740	0.00E+00	3.28E+01	3.28E+01	11.0000
Np-237	1.5668E-04	54.740	54.740	0.00E+00	8.58E-03	8.58E-03	
Pa-231	2.8656E-06	54.740	54.740	0.00E+00	1.57E-04	1.57E-04	
Pb-210	2.3918E-08	54.740	54.740	0.00E+00	1.31E-06	1.31E-06	
Pm-147	1.6900E-02	54.740	54.740	0.00E+00	9.25E-01	9.25E-01	
Pu-238	-8.6123E-01	54.740	0.000	1.48E+01	0.00E+00	1.48E+01	
Pu-239	-4.8440E-02	54.740	0.000	1.79E+00	0.00E+00	1.79E+00	
Pu-240	-3.0095E-01	54.740	0.000	2.29E+00	0.00E+00	2.29E+00	
Pu-241	-1.0411E+02	54.740	0.000	5.89E+02	0.00E+00	5.89E+02	
Pu-242	-1.1381E-04	54.740	0.000	9.90E-03	3.67E-03	9.90E-03	
Ra-226	6.4400E-08	54.740	54.740	0.00E+00	3.53E-06	3.53E-06	
Ra-228	5.9952E-07	54.740	54.740	0.00E+00	3.28E-05	3.28E-05	
Ru-106	8.5526E-07	54.740	54.740	0.00E+00	4.68E-05	4.68E-05	
Se-79	1.9181E-04	54.740	54.740	0.00E+00	1.05E-02	1.05E-02	
Sn-126	1.6671E-04	54.740	54.740	0.00E+00	9.13E-03	9.13E-03	
Sr-90	1.9799E+01	54.740	54.740	0.00E+00	1.08E+03	1.08E+03	
Tc-99	6.7678E-03	54.740	54.740	0.00E+00	3.70E-01	3.70E-01	
Th-229	1.7488E-06	54.740	54.740	0.00E+00	9.57E-05	9.57E-05	
Th-230	5.8704E-06	54.740	54.740	0.00E+00	3.21E-04	3.21E-04	
Th-232	6.0208E-07	54.740	54.740	0.00E+00	3.30E-05	3.30E-05	
Tl-208	8.7573E-05	54.740	54.740	0.00E+00	4.79E-03	4.79E-03	
U-232	2.3706E-04	54.740	54.740	0.00E+00	1.30E-02	1.30E-02	
U-233	3.6128E-04	54.740	54.740	0.00E+00	1.98E-02	1.98E-02	
U-234	1.2788E-02	54.740	54.740	0.00E+00	7.00E-01	7.00E-01	
U-235	5.7486E-04	54.740	54.740	4.96E-05	3.15E-02	3.15E-02	
U-236	2.3485E-04	54.740	54.740	0.00E+00	1.29E-02	1.29E-02	
U-238	1.1581E-04	54.740	54.740	6.17E-06	6.35E-03	6.35E-03	
Y-90	1.9804E+01	54.740	54.740	0.00E+00	1.08E+03	1.08E+03	
Other Radionuclides					3.38E+03	3.38E+03	

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.39E+01	5.46E+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:	PuO2-UO2	U, Th, & Pu
BOL Enrichment %:		0 to 100

Basis for Parameter Differences:
 This Template was used for the following reasons:
 This fuel didn't closely match any existing templates, therefore the worst case template was used.

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:		54.740
Bounding:		54.740

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: PNL MOX FUEL (7057)
 SNF ID #: 417
 Fuel Units & Descr: 4 - SCRAP
 Heavy Metal Mass: BOL= ; EOL=2.44kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1988
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.29

Radionuclide	m		x _n		x _b		b		y _n		y _b		Gamma Sources	
	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)						
Ac-227	2.3072E-06	2,318.860	2,318.860	0.00E+00	5.35E-03	5.35E-03	Avg. MeV							
Am-241	8.4448E+00	2,318.860	2,318.860	0.00E+00	1.96E+04	1.96E+04	0.0150	2.842E+15						
Am-242m	1.6848E-02	2,318.860	2,318.860	0.00E+00	3.91E+01	3.91E+01	0.0250	5.655E+14						
Am-243	1.6320E-02	2,318.860	2,318.860	0.00E+00	3.78E+01	3.78E+01	0.0375	4.939E+14						
C-14	1.2090E-01	2,318.860	2,318.860	0.00E+00	2.80E+02	2.80E+02	0.0575	7.772E+14						
Cl-36	2.2849E-03	2,318.860	2,318.860	0.00E+00	5.30E+00	5.30E+00	0.0850	3.034E+14						
Cm-243	8.6624E-04	2,318.860	2,318.860	0.00E+00	2.01E+00	2.01E+00	0.1250	2.378E+14						
Cm-244	1.6848E-01	2,318.860	2,318.860	0.00E+00	3.91E+02	3.91E+02	0.2250	2.628E+14						
Co-60	2.8086E+01	2,318.860	2,318.860	0.00E+00	6.51E+04	6.51E+04	0.3750	1.124E+14						
Cs-134	3.4148E-04	2,318.860	2,318.860	0.00E+00	7.92E-01	7.92E-01	0.5750	1.828E+15						
Cs-135	4.3976E-04	2,318.860	2,318.860	0.00E+00	1.02E+00	1.02E+00	0.8500	6.985E+13						
Cs-137	2.1049E+01	2,318.860	2,318.860	0.00E+00	4.88E+04	4.88E+04	1.2500	4.883E+15						
Eu-154	1.2500E+00	2,318.860	2,318.860	0.00E+00	2.90E+03	2.90E+03	1.7500	2.160E+12						
Eu-155	6.8986E-02	2,318.860	2,318.860	0.00E+00	1.60E+02	1.60E+02	2.2500	2.561E+10						
Fe-55	2.9308E-01	2,318.860	2,318.860	0.00E+00	6.80E+02	6.80E+02	2.7500	7.215E+09						
H-3	2.4311E-01	2,318.860	2,318.860	0.00E+00	5.64E+02	5.64E+02	3.5000	5.776E+06						
I-129	1.0618E-05	2,318.860	2,318.860	0.00E+00	2.46E-02	2.46E-02	5.0000	2.452E+06						
Kr-85	5.9882E-01	2,318.860	2,318.860	0.00E+00	1.39E+03	1.39E+03	7.0000	2.808E+05						
Np-237	1.5668E-04	2,318.860	2,318.860	0.00E+00	3.63E-01	3.63E-01	11.0000	3.214E+04						
Pa-231	2.8656E-06	2,318.860	2,318.860	0.00E+00	6.64E-03	6.64E-03								
Pb-210	2.3918E-08	2,318.860	2,318.860	0.00E+00	5.55E-05	5.55E-05								
Pm-147	1.6900E-02	2,318.860	2,318.860	0.00E+00	3.92E+01	3.92E+01								
Pu-238	-8.6123E-01	2,318.860	0.000	6.27E+02	0.00E+00	6.27E+02								
Pu-239	-4.8440E-02	2,318.860	0.000	7.59E+01	0.00E+00	7.59E+01								
Pu-240	-3.0095E-01	2,318.860	0.000	9.69E+01	0.00E+00	9.69E+01								
Pu-241	-1.0411E+02	2,318.860	0.000	2.49E+04	0.00E+00	2.49E+04								
Pu-242	-1.1381E-04	2,318.860	0.000	4.19E-01	1.56E-01	4.19E-01								
Ra-226	6.4400E-08	2,318.860	2,318.860	0.00E+00	1.49E-04	1.49E-04								
Ra-228	5.9952E-07	2,318.860	2,318.860	0.00E+00	1.39E-03	1.39E-03								
Ru-106	8.5526E-07	2,318.860	2,318.860	0.00E+00	1.98E-03	1.98E-03								
Se-79	1.9181E-04	2,318.860	2,318.860	0.00E+00	4.45E-01	4.45E-01								
Sn-126	1.6671E-04	2,318.860	2,318.860	0.00E+00	3.87E-01	3.87E-01								
Sr-90	1.9799E+01	2,318.860	2,318.860	0.00E+00	4.59E+04	4.59E+04								
Tc-99	6.7678E-03	2,318.860	2,318.860	0.00E+00	1.57E+01	1.57E+01								
Th-229	1.7488E-06	2,318.860	2,318.860	0.00E+00	4.06E-03	4.06E-03								
Th-230	5.8704E-06	2,318.860	2,318.860	0.00E+00	1.36E-02	1.36E-02								
Th-232	6.0208E-07	2,318.860	2,318.860	0.00E+00	1.40E-03	1.40E-03								
Tl-208	8.7573E-05	2,318.860	2,318.860	0.00E+00	2.03E-01	2.03E-01								
U-232	2.3706E-04	2,318.860	2,318.860	0.00E+00	5.50E-01	5.50E-01								
U-233	3.6128E-04	2,318.860	2,318.860	0.00E+00	8.38E-01	8.38E-01								
U-234	1.2788E-02	2,318.860	2,318.860	0.00E+00	2.97E+01	2.97E+01								
U-235	5.7486E-04	2,318.860	2,318.860	2.10E-03	1.34E+00	1.34E+00								
U-236	2.3485E-04	2,318.860	2,318.860	0.00E+00	5.45E-01	5.45E-01								
U-238	1.1581E-04	2,318.860	2,318.860	2.61E-04	2.69E-01	2.69E-01								
Y-90	1.9804E+01	2,318.860	2,318.860	0.00E+00	4.59E+04	4.59E+04								
Other Radionuclides					1.43E+05	1.43E+05								

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.29E+03	2.31E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	(Worst Case)	
Fuel Cladding:	UNKNOWN	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			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.
	From SFD	Estimated	
Nominal:		2,318.860	
Bounding:		2,318.860	

Checks			Estimated EOL HM/Given EOL HM 591.64
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	14.21		
Bounding:	14.21		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MOX PELLETS (7057)
 SNF ID #: 418
 Fuel Units & Descr: 1 - SCRAP
 Heavy Metal Mass: BOL = ; EOL = .65kg
 ROD Storage Sits: INEEL

¹Fuel decay start date: 1988
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.07

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.3072E-06	614.878	614.878	0.00E+00	1.42E-03	1.42E-03	Avg. MeV	
Am-241	8.4448E+00	614.878	614.878	0.00E+00	5.19E+03	5.19E+03	0.0150	7.535E+14
Am-242m	1.6848E-02	614.878	614.878	0.00E+00	1.04E+01	1.04E+01	0.0250	1.499E+14
Am-243	1.6320E-02	614.878	614.878	0.00E+00	1.00E+01	1.00E+01	0.0375	1.310E+14
C-14	1.2090E-01	614.878	614.878	0.00E+00	7.43E+01	7.43E+01	0.0575	2.061E+14
Cl-36	2.2849E-03	614.878	614.878	0.00E+00	1.40E+00	1.40E+00	0.0850	8.044E+13
Cm-243	8.6624E-04	614.878	614.878	0.00E+00	5.33E-01	5.33E-01	0.1250	6.304E+13
Cm-244	1.6848E-01	614.878	614.878	0.00E+00	1.04E+02	1.04E+02	0.2250	6.969E+13
Co-60	2.8086E+01	614.878	614.878	0.00E+00	1.73E+04	1.73E+04	0.3750	2.980E+13
Cs-134	3.4148E-04	614.878	614.878	0.00E+00	2.10E-01	2.10E-01	0.5750	4.847E+14
Cs-135	4.3976E-04	614.878	614.878	0.00E+00	2.70E-01	2.70E-01	0.8500	1.852E+13
Cs-137	2.1049E+01	614.878	614.878	0.00E+00	1.29E+04	1.29E+04	1.2500	1.295E+15
Eu-154	1.2500E+00	614.878	614.878	0.00E+00	7.69E+02	7.69E+02	1.7500	5.728E+11
Eu-155	6.8986E-02	614.878	614.878	0.00E+00	4.24E+01	4.24E+01	2.2500	6.790E+09
Fe-55	2.9308E-01	614.878	614.878	0.00E+00	1.80E+02	1.80E+02	2.7500	1.913E+09
H-3	2.4311E-01	614.878	614.878	0.00E+00	1.49E+02	1.49E+02	3.5000	1.532E+06
I-129	1.0618E-05	614.878	614.878	0.00E+00	6.53E-03	6.53E-03	5.0000	6.503E+05
Kr-85	5.9882E-01	614.878	614.878	0.00E+00	3.68E+02	3.68E+02	7.0000	7.447E+04
Np-237	1.5668E-04	614.878	614.878	0.00E+00	9.63E-02	9.63E-02	11.0000	8.521E+03
Pa-231	2.8656E-06	614.878	614.878	0.00E+00	1.76E-03	1.76E-03		
Pb-210	2.3918E-08	614.878	614.878	0.00E+00	1.47E-05	1.47E-05		
Pm-147	1.6900E-02	614.878	614.878	0.00E+00	1.04E+01	1.04E+01		
Pu-238	-8.6123E-01	614.878	0.000	1.66E+02	0.00E+00	1.66E+02		
Pu-239	-4.8440E-02	614.878	0.000	2.01E+01	0.00E+00	2.01E+01		
Pu-240	-3.0095E-01	614.878	0.000	2.57E+01	0.00E+00	2.57E+01		
Pu-241	-1.0411E+02	614.878	0.000	6.61E+03	0.00E+00	6.61E+03		
Pu-242	-1.1381E-04	614.878	0.000	1.11E-01	4.12E-02	1.11E-01		
Ra-226	6.4400E-08	614.878	614.878	0.00E+00	3.96E-05	3.96E-05		
Ra-228	5.9952E-07	614.878	614.878	0.00E+00	3.69E-04	3.69E-04		
Ru-106	8.5526E-07	614.878	614.878	0.00E+00	5.26E-04	5.26E-04		
Se-79	1.9181E-04	614.878	614.878	0.00E+00	1.18E-01	1.18E-01		
Sn-126	1.6671E-04	614.878	614.878	0.00E+00	1.03E-01	1.03E-01		
Sr-90	1.9799E+01	614.878	614.878	0.00E+00	1.22E+04	1.22E+04		
Tc-99	6.7678E-03	614.878	614.878	0.00E+00	4.16E+00	4.16E+00		
Th-229	1.7488E-06	614.878	614.878	0.00E+00	1.08E-03	1.08E-03		
Th-230	5.8704E-06	614.878	614.878	0.00E+00	3.61E-03	3.61E-03		
Th-232	6.0208E-07	614.878	614.878	0.00E+00	3.70E-04	3.70E-04		
Th-208	8.7573E-05	614.878	614.878	0.00E+00	5.38E-02	5.38E-02		
U-232	2.3706E-04	614.878	614.878	0.00E+00	1.46E-01	1.46E-01		
U-233	3.6128E-04	614.878	614.878	0.00E+00	2.22E-01	2.22E-01		
U-234	1.2788E-02	614.878	614.878	0.00E+00	7.86E+00	7.86E+00		
U-235	5.7486E-04	614.878	614.878	5.57E-04	3.54E-01	3.54E-01		
U-236	2.3485E-04	614.878	614.878	0.00E+00	1.44E-01	1.44E-01		
U-238	1.1581E-04	614.878	614.878	6.93E-05	7.13E-02	7.13E-02		
Y-90	1.9804E+01	614.878	614.878	0.00E+00	1.22E+04	1.22E+04		
Other Radionuclides					3.79E+04	3.79E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.06E+02	6.13E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	UNKNOWN	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		614.878	Nominal burnup set equal to bounding burnup.
Bounding:		614.878	Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	14.21		591.64
Bounding:	14.21		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MOX PINS (7057)
 SNF ID #: 419
 Fuel Units & Descr: 1 - SCRAP
 Heavy Metal Mass: BOL= : EOL=.00kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1988
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.07

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.3072E-06	4.752	4.752	0.00E+00	1.10E-05	1.10E-05	0.0150	5.823E+12
Am-241	8.4448E+00	4.752	4.752	0.00E+00	4.01E+01	4.01E+01	0.0250	1.159E+12
Am-242m	1.6848E-02	4.752	4.752	0.00E+00	8.01E-02	8.01E-02	0.0375	1.012E+12
Am-243	1.6320E-02	4.752	4.752	0.00E+00	7.75E-02	7.75E-02	0.0575	1.593E+12
C-14	1.2090E-01	4.752	4.752	0.00E+00	5.74E-01	5.74E-01	0.0850	6.216E+11
Cl-36	2.2849E-03	4.752	4.752	0.00E+00	1.09E-02	1.09E-02	0.1250	4.872E+11
Cl-243	8.6624E-04	4.752	4.752	0.00E+00	4.12E-03	4.12E-03	0.2250	5.385E+11
Cm-244	1.6848E-01	4.752	4.752	0.00E+00	8.01E-01	8.01E-01	0.3750	2.303E+11
Co-60	2.8086E+01	4.752	4.752	0.00E+00	1.33E+02	1.33E+02	0.5750	3.746E+11
Cs-134	3.4148E-04	4.752	4.752	0.00E+00	1.62E-03	1.62E-03	0.8500	1.431E+11
Cs-135	4.3976E-04	4.752	4.752	0.00E+00	2.09E-03	2.09E-03	1.2500	1.001E+13
Cs-137	2.1049E+01	4.752	4.752	0.00E+00	1.00E+02	1.00E+02	1.7500	4.426E+09
Eu-154	1.2500E+00	4.752	4.752	0.00E+00	5.94E+00	5.94E+00	2.2500	5.247E+07
Eu-155	6.8986E-02	4.752	4.752	0.00E+00	3.28E-01	3.28E-01	2.7500	1.479E+07
Fe-55	2.9308E-01	4.752	4.752	0.00E+00	1.39E+00	1.39E+00	3.5000	1.184E+04
H-3	2.4311E-01	4.752	4.752	0.00E+00	1.16E+00	1.16E+00	5.0000	5.025E+03
I-129	1.0618E-05	4.752	4.752	0.00E+00	5.05E-05	5.05E-05	7.0000	5.755E+02
Kr-85	5.9882E-01	4.752	4.752	0.00E+00	2.85E+00	2.85E+00	11.0000	6.585E+01
Np-237	1.5668E-04	4.752	4.752	0.00E+00	7.45E-04	7.45E-04		
Pa-231	2.8656E-06	4.752	4.752	0.00E+00	1.36E-05	1.36E-05		
Pb-210	2.3918E-08	4.752	4.752	0.00E+00	1.14E-07	1.14E-07		
Pm-147	1.6900E-02	4.752	4.752	0.00E+00	8.03E-02	8.03E-02		
Pu-238	-8.6123E-01	4.752	0.000	1.29E+00	0.00E+00	1.29E+00		
Pu-239	-4.8440E-02	4.752	0.000	1.55E-01	0.00E+00	1.55E-01		
Pu-240	-3.0095E-01	4.752	0.000	1.99E-01	0.00E+00	1.99E-01		
Pu-241	-1.0411E+02	4.752	0.000	5.11E+01	0.00E+00	5.11E+01		
Pu-242	-1.1381E-04	4.752	0.000	8.60E-04	3.19E-04	8.60E-04		
Ra-226	6.4400E-08	4.752	4.752	0.00E+00	3.06E-07	3.06E-07		
Ra-228	5.9952E-07	4.752	4.752	0.00E+00	2.85E-06	2.85E-06		
Ru-106	8.5526E-07	4.752	4.752	0.00E+00	4.06E-06	4.06E-06		
Se-79	1.9181E-04	4.752	4.752	0.00E+00	9.11E-04	9.11E-04		
Sn-126	1.6671E-04	4.752	4.752	0.00E+00	7.92E-04	7.92E-04		
Sr-90	1.9799E+01	4.752	4.752	0.00E+00	9.41E+01	9.41E+01		
Tc-99	6.7678E-03	4.752	4.752	0.00E+00	3.22E-02	3.22E-02		
Th-229	1.7488E-06	4.752	4.752	0.00E+00	8.31E-06	8.31E-06		
Th-230	5.8704E-06	4.752	4.752	0.00E+00	2.79E-05	2.79E-05		
Th-232	6.0208E-07	4.752	4.752	0.00E+00	2.86E-06	2.86E-06		
Ti-208	8.7573E-05	4.752	4.752	0.00E+00	4.16E-04	4.16E-04		
U-232	2.3706E-04	4.752	4.752	0.00E+00	1.13E-03	1.13E-03		
U-233	3.6128E-04	4.752	4.752	0.00E+00	1.72E-03	1.72E-03		
U-234	1.2788E-02	4.752	4.752	0.00E+00	6.08E-02	6.08E-02		
U-235	5.7486E-04	4.752	4.752	4.30E-06	2.74E-03	2.74E-03		
U-236	2.3485E-04	4.752	4.752	0.00E+00	1.12E-03	1.12E-03		
U-238	1.1581E-04	4.752	4.752	5.35E-07	5.51E-04	5.51E-04		
Y-90	1.9804E+01	4.752	4.752	0.00E+00	9.41E+01	9.41E+01		
Other Radionuclides					2.93E+02	2.93E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	UNKNOWN	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		4.752	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		4.752	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	14.21		591.64
Bounding:	14.21		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MOX STAR 3
 SNF ID #: 433
 Fuel Units & Descr: 1 - SCRAP
 Heavy Metal Mass: BOL = : EOL = 0.6kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1984
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup (MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.07

II. Estimates		m	x _n	x _b	b	y _n	y _b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories (Ci)	Bounding Fuel Inventories (Ci)	Photon Energy Group	Total Photons/sec (bounding)	Avg. MeV
Ac-227	2.3072E-06	52.269	52.269	0.00E+00	1.21E-04	1.21E-04	0.0150	6.405E+13	
Am-241	8.4448E+00	52.269	52.269	0.00E+00	4.41E+02	4.41E+02	0.0250	1.275E+13	
Am-242m	1.6848E-02	52.269	52.269	0.00E+00	8.81E-01	8.81E-01	0.0375	1.113E+13	
Am-243	1.6320E-02	52.269	52.269	0.00E+00	8.53E-01	8.53E-01	0.0575	1.752E+13	
C-14	1.2090E-01	52.269	52.269	0.00E+00	6.32E+00	6.32E+00	0.0850	6.838E+12	
Cf-252	2.2849E-03	52.269	52.269	0.00E+00	1.19E-01	1.19E-01	0.1250	5.359E+12	
Cm-243	8.6624E-04	52.269	52.269	0.00E+00	4.53E-02	4.53E-02	0.2250	5.924E+12	
Cm-244	1.6848E-01	52.269	52.269	0.00E+00	8.81E+00	8.81E+00	0.3750	2.534E+12	
Co-60	2.8086E+01	52.269	52.269	0.00E+00	1.47E+03	1.47E+03	0.5750	4.120E+13	
Cs-134	3.4148E-04	52.269	52.269	0.00E+00	1.78E-02	1.78E-02	0.8500	1.574E+12	
Cs-135	4.3976E-04	52.269	52.269	0.00E+00	2.30E-02	2.30E-02	1.2500	1.101E+14	
Cs-137	2.1049E+01	52.269	52.269	0.00E+00	1.10E+03	1.10E+03	1.7500	4.869E+10	
Eu-154	1.2500E+00	52.269	52.269	0.00E+00	6.53E+01	6.53E+01	2.2500	5.772E+08	
Eu-155	6.8986E-02	52.269	52.269	0.00E+00	3.61E+00	3.61E+00	2.7500	1.626E+08	
Fe-55	2.9308E-01	52.269	52.269	0.00E+00	1.53E+01	1.53E+01	3.5000	1.302E+05	
H-3	2.4311E-01	52.269	52.269	0.00E+00	1.27E+01	1.27E+01	5.0000	5.528E+04	
I-129	1.0618E-05	52.269	52.269	0.00E+00	5.55E-04	5.55E-04	7.0000	6.331E+03	
Kr-85	5.9882E-01	52.269	52.269	0.00E+00	3.13E+01	3.13E+01	11.0000	7.244E+02	
Np-237	1.5668E-04	52.269	52.269	0.00E+00	8.19E-03	8.19E-03			
Pa-231	2.8656E-06	52.269	52.269	0.00E+00	1.50E-04	1.50E-04			
Pb-210	2.3918E-08	52.269	52.269	0.00E+00	1.25E-06	1.25E-06			
Pm-147	1.6900E-02	52.269	52.269	0.00E+00	8.83E-01	8.83E-01			
Pu-238	-8.6123E-01	52.269	0.000	1.41E+01	0.00E+00	1.41E+01			
Pu-239	-4.8440E-02	52.269	0.000	1.71E+00	0.00E+00	1.71E+00			
Pu-240	-3.0095E-01	52.269	0.000	2.18E+00	0.00E+00	2.18E+00			
Pu-241	-1.0411E+02	52.269	0.000	5.62E+02	0.00E+00	5.62E+02			
Pu-242	-1.1381E-04	52.269	0.000	9.45E-03	3.51E-03	9.45E-03			
Ra-226	6.4400E-08	52.269	52.269	0.00E+00	3.37E-06	3.37E-06			
Ra-228	5.9952E-07	52.269	52.269	0.00E+00	3.13E-05	3.13E-05			
Ru-106	8.526E-07	52.269	52.269	0.00E+00	4.47E-05	4.47E-05			
Se-79	1.9181E-04	52.269	52.269	0.00E+00	1.00E-02	1.00E-02			
Sn-126	1.6671E-04	52.269	52.269	0.00E+00	8.71E-03	8.71E-03			
Sr-90	1.9799E+01	52.269	52.269	0.00E+00	1.03E+03	1.03E+03			
Tc-99	6.7678E-03	52.269	52.269	0.00E+00	3.54E-01	3.54E-01			
Th-229	1.7488E-06	52.269	52.269	0.00E+00	9.14E-05	9.14E-05			
Th-230	5.8704E-06	52.269	52.269	0.00E+00	3.07E-04	3.07E-04			
Th-232	6.0208E-07	52.269	52.269	0.00E+00	3.15E-05	3.15E-05			
Tl-208	8.7573E-05	52.269	52.269	0.00E+00	4.58E-03	4.58E-03			
U-232	2.3706E-04	52.269	52.269	0.00E+00	1.24E-02	1.24E-02			
U-233	3.6128E-04	52.269	52.269	0.00E+00	1.89E-02	1.89E-02			
U-234	1.2788E-02	52.269	52.269	0.00E+00	6.68E-01	6.68E-01			
U-235	5.7486E-04	52.269	52.269	4.73E-05	3.01E-02	3.01E-02			
U-236	2.3485E-04	52.269	52.269	0.00E+00	1.23E-02	1.23E-02			
U-238	1.1581E-04	52.269	52.269	5.89E-06	6.06E-03	6.06E-03			
Y-90	1.9804E+01	52.269	52.269	0.00E+00	1.04E+03	1.04E+03			
Other Radionuclides					3.22E+03	3.22E+03			

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.15E+01	5.21E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	SST (316)	SST/Inconel	
BOL HM Constituents:	PuO ₂ -UO ₂	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		52.269	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		52.269	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	14.21		591.64
Bounding:	14.21		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MOX STAR 4
 SNF ID #: 434
 Fuel Units & Descr: 1 - SCRAP
 Heavy Metal Mass: BOL = ; EOL=.06kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1984
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.07

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.3072E-06	57.021	57.021	0.00E+00	1.32E-04	1.32E-04	0.0150	6.987E+13
Am-241	8.4448E+00	57.021	57.021	0.00E+00	4.82E+02	4.82E+02	0.0250	1.391E+13
Am-242m	1.6848E-02	57.021	57.021	0.00E+00	9.61E-01	9.61E-01	0.0375	1.215E+13
Am-243	1.6320E-02	57.021	57.021	0.00E+00	9.31E-01	9.31E-01	0.0575	1.911E+13
C-14	1.2090E-01	57.021	57.021	0.00E+00	6.89E+00	6.89E+00	0.0850	7.459E+12
Cl-36	2.2849E-03	57.021	57.021	0.00E+00	1.30E-01	1.30E-01	0.1250	5.846E+12
Cm-243	8.6624E-04	57.021	57.021	0.00E+00	4.94E-02	4.94E-02	0.2250	6.462E+12
Cm-244	1.6848E-01	57.021	57.021	0.00E+00	9.61E+00	9.61E+00	0.3750	2.764E+12
Co-60	2.8086E+01	57.021	57.021	0.00E+00	1.60E+03	1.60E+03	0.5750	4.495E+12
Cs-134	3.4148E-04	57.021	57.021	0.00E+00	1.95E-02	1.95E-02	0.8500	1.718E+12
Cs-135	4.3976E-04	57.021	57.021	0.00E+00	2.51E-02	2.51E-02	1.2500	1.201E+14
Cs-137	2.1049E+01	57.021	57.021	0.00E+00	1.20E+03	1.20E+03	1.7500	5.311E+10
Eu-154	1.2500E+00	57.021	57.021	0.00E+00	7.13E+01	7.13E+01	2.2500	6.296E+08
Eu-155	6.8986E-02	57.021	57.021	0.00E+00	3.93E+00	3.93E+00	2.7500	1.774E+08
Fe-55	2.9308E-01	57.021	57.021	0.00E+00	1.67E+01	1.67E+01	3.5000	1.420E+05
H-3	2.4311E-01	57.021	57.021	0.00E+00	1.39E+01	1.39E+01	5.0000	6.031E+04
I-129	1.0618E-05	57.021	57.021	0.00E+00	6.05E-04	6.05E-04	7.0000	6.906E+03
Kr-85	5.9882E-01	57.021	57.021	0.00E+00	3.41E+01	3.41E+01	11.0000	7.902E+02
Np-237	1.5668E-04	57.021	57.021	0.00E+00	8.93E-03	8.93E-03		
Pa-231	2.8656E-06	57.021	57.021	0.00E+00	1.63E-04	1.63E-04		
Pb-210	2.3918E-08	57.021	57.021	0.00E+00	1.36E-06	1.36E-06		
Pm-147	1.6900E-02	57.021	57.021	0.00E+00	9.64E-01	9.64E-01		
Pu-238	-8.6123E-01	57.021	0.000	1.54E+01	0.00E+00	1.54E+01		
Pu-239	-4.8440E-02	57.021	0.000	1.87E+00	0.00E+00	1.87E+00		
Pu-240	-3.0095E-01	57.021	0.000	2.38E+00	0.00E+00	2.38E+00		
Pu-241	-1.0411E+02	57.021	0.000	6.13E+02	0.00E+00	6.13E+02		
Pu-242	-1.1381E-04	57.021	0.000	1.03E-02	3.82E-03	1.03E-02		
Ra-226	6.4400E-08	57.021	57.021	0.00E+00	3.67E-06	3.67E-06		
Ra-228	5.9952E-07	57.021	57.021	0.00E+00	3.42E-05	3.42E-05		
Ru-106	8.5526E-07	57.021	57.021	0.00E+00	4.88E-05	4.88E-05		
Se-79	1.9181E-04	57.021	57.021	0.00E+00	1.09E-02	1.09E-02		
Sn-126	1.6671E-04	57.021	57.021	0.00E+00	9.51E-03	9.51E-03		
Sr-90	1.9799E+01	57.021	57.021	0.00E+00	1.13E+03	1.13E+03		
Tc-99	6.7678E-03	57.021	57.021	0.00E+00	3.86E-01	3.86E-01		
Th-229	1.7488E-06	57.021	57.021	0.00E+00	9.97E-05	9.97E-05		
Th-230	5.8704E-06	57.021	57.021	0.00E+00	3.35E-04	3.35E-04		
Th-232	6.0208E-07	57.021	57.021	0.00E+00	3.43E-05	3.43E-05		
Ti-208	8.7573E-05	57.021	57.021	0.00E+00	4.99E-03	4.99E-03		
U-232	2.3706E-04	57.021	57.021	0.00E+00	1.35E-02	1.35E-02		
U-233	3.6128E-04	57.021	57.021	0.00E+00	2.06E-02	2.06E-02		
U-234	1.2788E-02	57.021	57.021	0.00E+00	7.29E-01	7.29E-01		
U-235	5.7486E-04	57.021	57.021	5.16E-05	3.28E-02	3.28E-02		
U-236	2.3485E-04	57.021	57.021	0.00E+00	1.34E-02	1.34E-02		
U-238	1.1581E-04	57.021	57.021	6.42E-06	6.61E-03	6.61E-03		
Y-90	1.9804E+01	57.021	57.021	0.00E+00	1.13E+03	1.13E+03		
Other Radionuclides					3.52E+03	3.52E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.62E+01	5.69E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	SST (316)	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		57.021	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		57.021	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	14.21	
Bounding:	14.21	
		Estimated EOL HM/Given EOL HM
		591.64

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MOX STAR 5
 SNF ID #: 435
 Fuel Units & Descr: 1 - SCRAP
 Heavy Metal Mass: BOL= ; EOL=.14kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1985
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.07

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.3072E-06	132.099	132.099	0.00E+00	3.05E-04	3.05E-04	Avg. MeV	
Am-241	8.4448E+00	132.099	132.099	0.00E+00	1.12E+03	1.12E+03	0.0150	1.619E+14
Am-242m	1.6848E-02	132.099	132.099	0.00E+00	2.23E+00	2.23E+00	0.0250	3.221E+13
Am-243	1.6320E-02	132.099	132.099	0.00E+00	2.16E+00	2.16E+00	0.0375	2.814E+13
C-14	1.2090E-01	132.099	132.099	0.00E+00	1.60E+01	1.60E+01	0.0575	4.427E+13
Cl-36	2.2849E-03	132.099	132.099	0.00E+00	3.02E-01	3.02E-01	0.0850	1.728E+13
Cm-243	8.6624E-04	132.099	132.099	0.00E+00	1.14E-01	1.14E-01	0.1250	1.354E+13
Cm-244	1.6848E-01	132.099	132.099	0.00E+00	2.23E+01	2.23E+01	0.2250	1.497E+13
Co-60	2.8086E+01	132.099	132.099	0.00E+00	3.71E+03	3.71E+03	0.3750	6.403E+12
Cs-134	3.4148E-04	132.099	132.099	0.00E+00	4.51E-02	4.51E-02	0.5750	1.041E+14
Cs-135	4.3976E-04	132.099	132.099	0.00E+00	5.81E-02	5.81E-02	0.8500	3.979E+12
Cs-137	2.1049E+01	132.099	132.099	0.00E+00	2.78E+03	2.78E+03	1.2500	2.782E+14
Eu-154	1.2500E+00	132.099	132.099	0.00E+00	1.65E+02	1.65E+02	1.7500	1.230E+11
Eu-155	6.8986E-02	132.099	132.099	0.00E+00	9.11E+00	9.11E+00	2.2500	1.459E+09
Fe-55	2.9308E-01	132.099	132.099	0.00E+00	3.87E+01	3.87E+01	2.7500	4.110E+08
H-3	2.4311E-01	132.099	132.099	0.00E+00	3.21E+01	3.21E+01	3.5000	3.290E+05
I-129	1.0618E-05	132.099	132.099	0.00E+00	1.40E-03	1.40E-03	5.0000	1.397E+02
Kr-85	5.9882E-01	132.099	132.099	0.00E+00	7.91E+01	7.91E+01	7.0000	1.600E+04
Np-237	1.5668E-04	132.099	132.099	0.00E+00	2.07E-02	2.07E-02	11.0000	1.831E+03
Pa-231	2.8656E-06	132.099	132.099	0.00E+00	3.79E-04	3.79E-04		
Pb-210	2.3918E-08	132.099	132.099	0.00E+00	3.16E-06	3.16E-06		
Pm-147	1.6900E-02	132.099	132.099	0.00E+00	2.23E+00	2.23E+00		
Pu-238	-8.6123E-01	132.099	0.000	3.57E+01	0.00E+00	3.57E+01		
Pu-239	-4.8440E-02	132.099	0.000	4.32E+00	0.00E+00	4.32E+00		
Pu-240	-3.0095E-01	132.099	0.000	5.52E+00	0.00E+00	5.52E+00		
Pu-241	-1.0411E+02	132.099	0.000	1.42E+03	0.00E+00	1.42E+03		
Pu-242	-1.1381E-04	132.099	0.000	2.39E-02	8.86E-03	2.39E-02		
Ra-226	6.4400E-08	132.099	132.099	0.00E+00	8.51E-06	8.51E-06		
Ra-228	5.9952E-07	132.099	132.099	0.00E+00	7.92E-05	7.92E-05		
Ru-106	8.5526E-07	132.099	132.099	0.00E+00	1.13E-04	1.13E-04		
Se-79	1.9181E-04	132.099	132.099	0.00E+00	2.53E-02	2.53E-02		
Sn-126	1.6671E-04	132.099	132.099	0.00E+00	2.20E-02	2.20E-02		
Sr-90	1.9799E+01	132.099	132.099	0.00E+00	2.62E+03	2.62E+03		
Tc-99	6.7678E-03	132.099	132.099	0.00E+00	8.94E-01	8.94E-01		
Th-229	1.7488E-06	132.099	132.099	0.00E+00	2.31E-04	2.31E-04		
Th-230	5.8704E-06	132.099	132.099	0.00E+00	7.75E-04	7.75E-04		
Th-232	6.0208E-07	132.099	132.099	0.00E+00	7.95E-05	7.95E-05		
Ti-208	8.7573E-05	132.099	132.099	0.00E+00	1.16E-02	1.16E-02		
U-232	2.3706E-04	132.099	132.099	0.00E+00	3.13E-02	3.13E-02		
U-233	3.6128E-04	132.099	132.099	0.00E+00	4.77E-02	4.77E-02		
U-234	1.2788E-02	132.099	132.099	0.00E+00	1.69E+00	1.69E+00		
U-235	5.7486E-04	132.099	132.099	1.20E-04	7.61E-02	7.61E-02		
U-236	2.3485E-04	132.099	132.099	0.00E+00	3.10E-02	3.10E-02		
U-238	1.1581E-04	132.099	132.099	1.49E-05	1.53E-02	1.53E-02		
Y-90	1.9804E+01	132.099	132.099	0.00E+00	2.62E+03	2.62E+03		
Other Radionuclides					8.15E+03	8.15E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.30E+02	1.32E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	SST (304)	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		132.099	Nominal burnup set equal to bounding burnup.
Bounding:		132.099	Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	14.21		591.64
Bounding:	14.21		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MOX STAR 6
 SNF ID #: 436
 Fuel Units & Descr: 1 - SCRAP
 Heavy Metal Mass: BOL= : EOL=.07kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1985
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 0.07

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.3072E-06	65.574	65.574	0.00E+00	1.51E-04	1.51E-04		
Am-241	8.4448E+00	65.574	65.574	0.00E+00	5.54E+02	5.54E+02	0.0150	8.035E+13
Am-242m	1.6848E-02	65.574	65.574	0.00E+00	1.10E+00	1.10E+00	0.0250	1.599E+13
Am-243	1.6320E-02	65.574	65.574	0.00E+00	1.07E+00	1.07E+00	0.0375	1.397E+13
C-14	1.2090E-01	65.574	65.574	0.00E+00	7.93E+00	7.93E+00	0.0575	2.198E+13
Cl-36	2.2849E-03	65.574	65.574	0.00E+00	1.50E-01	1.50E-01	0.0850	8.578E+12
Cm-243	8.6624E-04	65.574	65.574	0.00E+00	5.68E-02	5.68E-02	0.1250	6.723E+12
Cm-244	1.6848E-01	65.574	65.574	0.00E+00	1.10E+01	1.10E+01	0.2250	7.432E+12
Co-60	2.8086E+01	65.574	65.574	0.00E+00	1.84E+03	1.84E+03	0.3750	3.178E+12
Cs-134	3.4148E-04	65.574	65.574	0.00E+00	2.24E-02	2.24E-02	0.5750	5.169E+13
Cs-135	4.3976E-04	65.574	65.574	0.00E+00	2.88E-02	2.88E-02	0.8500	1.975E+12
Cs-137	2.1049E+01	65.574	65.574	0.00E+00	1.38E+03	1.38E+03	1.2500	1.381E+14
Eu-154	1.2500E+00	65.574	65.574	0.00E+00	8.20E+01	8.20E+01	1.7500	6.108E+10
Eu-155	6.8986E-02	65.574	65.574	0.00E+00	4.52E+00	4.52E+00	2.2500	7.241E+08
Fe-55	2.9308E-01	65.574	65.574	0.00E+00	1.92E+01	1.92E+01	2.7500	2.040E+08
H-3	2.4311E-01	65.574	65.574	0.00E+00	1.59E+01	1.59E+01	3.5000	1.633E+05
I-129	1.0618E-05	65.574	65.574	0.00E+00	6.96E-04	6.96E-04	5.0000	6.935E+04
Kr-85	5.9882E-01	65.574	65.574	0.00E+00	3.93E+01	3.93E+01	7.0000	7.942E+03
Np-237	1.5668E-04	65.574	65.574	0.00E+00	1.03E-02	1.03E-02	11.0000	9.087E+02
Pa-231	2.8656E-06	65.574	65.574	0.00E+00	1.88E-04	1.88E-04		
Pb-210	2.3918E-08	65.574	65.574	0.00E+00	1.57E-06	1.57E-06		
Pm-147	1.6900E-02	65.574	65.574	0.00E+00	1.11E+00	1.11E+00		
Pu-238	-8.6123E-01	65.574	0.000	1.77E+01	0.00E+00	1.77E+01		
Pu-239	-4.8440E-02	65.574	0.000	2.15E+00	0.00E+00	2.15E+00		
Pu-240	-3.0095E-01	65.574	0.000	2.74E+00	0.00E+00	2.74E+00		
Pu-241	-1.0411E+02	65.574	0.000	7.05E+02	0.00E+00	7.05E+02		
Pu-242	-1.1381E-04	65.574	0.000	1.19E-02	4.40E-03	1.19E-02		
Ra-226	6.4400E-08	65.574	65.574	0.00E+00	4.22E-06	4.22E-06		
Ra-228	5.9952E-07	65.574	65.574	0.00E+00	3.93E-05	3.93E-05		
Ru-106	8.5526E-07	65.574	65.574	0.00E+00	5.61E-05	5.61E-05		
Se-79	1.9181E-04	65.574	65.574	0.00E+00	1.26E-02	1.26E-02		
Sn-126	1.6671E-04	65.574	65.574	0.00E+00	1.09E-02	1.09E-02		
Sr-90	1.9799E+01	65.574	65.574	0.00E+00	1.30E+03	1.30E+03		
Tc-99	6.7678E-03	65.574	65.574	0.00E+00	4.44E-01	4.44E-01		
Th-229	1.7488E-06	65.574	65.574	0.00E+00	1.15E-04	1.15E-04		
Th-230	5.8704E-06	65.574	65.574	0.00E+00	3.85E-04	3.85E-04		
Th-232	6.0208E-07	65.574	65.574	0.00E+00	3.95E-05	3.95E-05		
Ti-208	8.7573E-05	65.574	65.574	0.00E+00	5.74E-03	5.74E-03		
U-232	2.3706E-04	65.574	65.574	0.00E+00	1.55E-02	1.55E-02		
U-233	3.6128E-04	65.574	65.574	0.00E+00	2.37E-02	2.37E-02		
U-234	1.2788E-02	65.574	65.574	0.00E+00	8.39E-01	8.39E-01		
U-235	5.7486E-04	65.574	65.574	5.94E-05	3.78E-02	3.78E-02		
U-236	2.3485E-04	65.574	65.574	0.00E+00	1.54E-02	1.54E-02		
U-238	1.1581E-04	65.574	65.574	7.39E-06	7.60E-03	7.60E-03		
Y-90	1.9804E+01	65.574	65.574	0.00E+00	1.30E+03	1.30E+03		
Other Radionuclides					4.04E+03	4.04E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.46E+01	6.54E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	SST (316)	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		65.574	Nominal burnup set equal to bounding burnup.
Bounding:		65.574	Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	14.21		591.64
Bounding:	14.21		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL MOX STAR 7
 SNF ID #: 422
 Fuel Units & Descr: 1 - SCRAP
 Heavy Metal Mass: BOL = ; EOL = .35kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1985
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
18"x15"
0.07

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.3072E-06	330.723	330.723	0.00E+00	7.63E-04	7.63E-04	Avg. MeV	
Am-241	8.4448E+00	330.723	330.723	0.00E+00	2.79E+03	2.79E+03	0.0150	4.053E+14
Am-242m	1.6848E-02	330.723	330.723	0.00E+00	5.57E+00	5.57E+00	0.0250	8.065E+13
Am-243	1.6320E-02	330.723	330.723	0.00E+00	5.40E+00	5.40E+00	0.0375	7.045E+13
C-14	1.2090E-01	330.723	330.723	0.00E+00	4.00E+01	4.00E+01	0.0575	1.108E+14
Cl-36	2.2849E-03	330.723	330.723	0.00E+00	7.56E-01	7.56E-01	0.0850	4.327E+13
Cm-243	8.6624E-04	330.723	330.723	0.00E+00	2.86E-01	2.86E-01	0.1250	3.391E+13
Cm-244	1.6848E-01	330.723	330.723	0.00E+00	5.57E+01	5.57E+01	0.2250	3.748E+13
Co-60	2.8086E+01	330.723	330.723	0.00E+00	9.29E+03	9.29E+03	0.3750	1.603E+13
Cs-134	3.4148E-04	330.723	330.723	0.00E+00	1.13E-01	1.13E-01	0.5750	2.607E+14
Cs-135	4.3976E-04	330.723	330.723	0.00E+00	1.45E-01	1.45E-01	0.8500	9.962E+12
Cs-137	2.1049E-03	330.723	330.723	0.00E+00	6.96E+03	6.96E+03	1.2500	6.964E+14
Eu-154	1.2500E+00	330.723	330.723	0.00E+00	4.13E+02	4.13E+02	1.7500	3.081E+11
Eu-155	6.8986E-02	330.723	330.723	0.00E+00	2.28E+01	2.28E+01	2.2500	3.652E+09
Fe-55	2.9308E-01	330.723	330.723	0.00E+00	9.69E+01	9.69E+01	2.7500	1.029E+09
H-3	2.4311E-01	330.723	330.723	0.00E+00	8.04E+01	8.04E+01	3.5000	8.237E+05
I-129	1.0618E-05	330.723	330.723	0.00E+00	3.51E-03	3.51E-03	5.0000	3.498E+05
Kr-85	5.9882E-01	330.723	330.723	0.00E+00	1.98E+02	1.98E+02	7.0000	4.006E+04
Np-237	1.5668E-04	330.723	330.723	0.00E+00	5.18E-02	5.18E-02	11.0000	4.583E+03
Pa-231	2.8656E-06	330.723	330.723	0.00E+00	9.48E-04	9.48E-04		
Pb-210	2.3918E-08	330.723	330.723	0.00E+00	7.91E-06	7.91E-06		
Pm-147	1.6900E-02	330.723	330.723	0.00E+00	5.59E+00	5.59E+00		
Pu-238	-8.6123E-01	330.723	0.000	8.94E+01	0.00E+00	8.94E+01		
Pu-239	-4.8440E-02	330.723	0.000	1.08E+01	0.00E+00	1.08E+01		
Pu-240	-3.0095E-01	330.723	0.000	1.38E+01	0.00E+00	1.38E+01		
Pu-241	-1.0411E+02	330.723	0.000	3.56E+03	0.00E+00	3.56E+03		
Pu-242	-1.1381E-04	330.723	0.000	5.98E-02	2.22E-02	5.98E-02		
Ra-226	6.4400E-08	330.723	330.723	0.00E+00	2.13E-05	2.13E-05		
Ra-228	5.9952E-07	330.723	330.723	0.00E+00	1.98E-04	1.98E-04		
Ru-106	8.5526E-07	330.723	330.723	0.00E+00	2.83E-04	2.83E-04		
Se-79	1.9181E-04	330.723	330.723	0.00E+00	6.34E-02	6.34E-02		
Sn-126	1.6671E-04	330.723	330.723	0.00E+00	5.51E-02	5.51E-02		
Sr-90	1.9799E+01	330.723	330.723	0.00E+00	6.55E+03	6.55E+03		
Tc-99	6.7678E-03	330.723	330.723	0.00E+00	2.24E+00	2.24E+00		
Th-229	1.7488E-06	330.723	330.723	0.00E+00	5.78E-04	5.78E-04		
Th-230	5.8704E-06	330.723	330.723	0.00E+00	1.94E-03	1.94E-03		
Th-232	6.0208E-07	330.723	330.723	0.00E+00	1.99E-04	1.99E-04		
Ti-208	8.7573E-05	330.723	330.723	0.00E+00	2.90E-02	2.90E-02		
U-232	2.3706E-04	330.723	330.723	0.00E+00	7.84E-02	7.84E-02		
U-233	3.6128E-04	330.723	330.723	0.00E+00	1.19E-01	1.19E-01		
U-234	1.2788E-02	330.723	330.723	0.00E+00	4.23E+00	4.23E+00		
U-235	5.7486E-04	330.723	330.723	2.99E-04	1.90E-01	1.90E-01		
U-236	2.3485E-04	330.723	330.723	0.00E+00	7.77E-02	7.77E-02		
U-238	1.1581E-04	330.723	330.723	3.73E-05	3.83E-02	3.83E-02		
Y-90	1.9804E+01	330.723	330.723	0.00E+00	6.55E+03	6.55E+03		
Other Radionuclides					2.04E+04	2.04E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.26E+02	3.30E+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 (316)	SST/Inconel
BOL HM Constituents:	PuO ₂ -UO ₂	U, Th, & Pu
BOL Enrichment %:		0 to 100

Basis for Parameter Differences:
 This Template was used for the following reasons:
 This fuel didn't closely match any existing templates, therefore the worst case template was used.

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:		330.723
Bounding:		330.723

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

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PNL-3
 SNF ID #: 420
 Fuel Units & Descr: 6 - ROD
 Heavy Metal Mass: BOL= ; EOL=.06kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1969
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 0.44

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.5200E-06	61.013	61.013	0.00E+00	1.54E-04	1.54E-04	Avg. MeV	
Am-241	8.6432E+00	61.013	61.013	0.00E+00	5.27E+02	5.27E+02	0.0150	5.172E+13
Am-242m	1.5728E-02	61.013	61.013	0.00E+00	9.60E-01	9.60E-01	0.0250	1.021E+13
Am-243	1.6288E-02	61.013	61.013	0.00E+00	9.94E-01	9.94E-01	0.0375	8.635E+12
C-14	1.2068E-01	61.013	61.013	0.00E+00	7.36E+00	7.36E+00	0.0575	1.631E+13
Cl-36	2.2849E-03	61.013	61.013	0.00E+00	1.39E-01	1.39E-01	0.0850	5.467E+12
Cm-243	6.0144E-04	61.013	61.013	0.00E+00	3.67E-02	3.67E-02	0.1250	3.868E+12
Cm-244	9.4880E-02	61.013	61.013	0.00E+00	5.79E+00	5.79E+00	0.2250	4.732E+12
Co-60	3.9052E+00	61.013	61.013	0.00E+00	2.38E+02	2.38E+02	0.3750	2.048E+12
Cs-134	2.2139E-06	61.013	61.013	0.00E+00	1.35E-04	1.35E-04	0.5750	3.389E+13
Cs-135	4.3976E-04	61.013	61.013	0.00E+00	2.68E-02	2.68E-02	0.8500	7.423E+11
Cs-137	1.4887E+01	61.013	61.013	0.00E+00	9.08E+02	9.08E+02	1.2500	1.819E+13
Eu-154	3.7342E-01	61.013	61.013	0.00E+00	2.28E+01	2.28E+01	1.7500	2.187E+10
Eu-155	8.4893E-03	61.013	61.013	0.00E+00	5.18E-01	5.18E-01	2.2500	9.455E+07
Fe-55	5.3750E-03	61.013	61.013	0.00E+00	3.28E-01	3.28E-01	2.7500	1.628E+08
H-3	1.0472E-01	61.013	61.013	0.00E+00	6.39E+00	6.39E+00	3.5000	8.863E+04
I-129	1.0618E-05	61.013	61.013	0.00E+00	6.48E-04	6.48E-04	5.0000	3.745E+04
Kr-85	2.2717E-01	61.013	61.013	0.00E+00	1.39E+01	1.39E+01	7.0000	4.265E+03
Np-237	1.6400E-04	61.013	61.013	0.00E+00	1.00E-02	1.00E-02	11.0000	4.865E+02
Pa-231	2.8688E-06	61.013	61.013	0.00E+00	1.75E-04	1.75E-04		
Pb-210	4.7312E-08	61.013	61.013	0.00E+00	2.89E-06	2.89E-06		
Pm-147	3.2198E-04	61.013	61.013	0.00E+00	1.96E-02	1.96E-02		
Pu-238	-1.1924E+00	61.013	0.000	1.65E+01	0.00E+00	1.65E+01		
Pu-239	-4.8600E-02	61.013	0.000	2.00E+00	0.00E+00	2.00E+00		
Pu-240	-3.0127E-01	61.013	0.000	2.55E+00	0.00E+00	2.55E+00		
Pu-241	-1.2917E+02	61.013	0.000	6.56E+02	0.00E+00	6.56E+02		
Pu-242	-1.1381E-04	61.013	0.000	1.10E-02	4.09E-03	1.10E-02		
Ra-226	1.0760E-07	61.013	61.013	0.00E+00	6.56E-06	6.56E-06		
Ra-228	6.0160E-07	61.013	61.013	0.00E+00	3.67E-05	3.67E-05		
Ru-106	1.3388E-13	61.013	61.013	0.00E+00	8.17E-12	8.17E-12		
Se-79	1.9179E-04	61.013	61.013	0.00E+00	1.17E-02	1.17E-02		
Sn-126	1.6669E-04	61.013	61.013	0.00E+00	1.02E-02	1.02E-02		
Sr-90	1.3859E+01	61.013	61.013	0.00E+00	8.46E+02	8.46E+02		
Tc-99	6.7678E-03	61.013	61.013	0.00E+00	4.13E-01	4.13E-01		
Th-229	2.2592E-06	61.013	61.013	0.00E+00	1.38E-04	1.38E-04		
Th-230	7.5955E-06	61.013	61.013	0.00E+00	4.63E-04	4.63E-04		
Th-232	6.0208E-07	61.013	61.013	0.00E+00	3.67E-05	3.67E-05		
Th-208	7.5795E-05	61.013	61.013	0.00E+00	4.62E-03	4.62E-03		
U-232	2.0521E-04	61.013	61.013	0.00E+00	1.25E-02	1.25E-02		
U-233	3.6128E-04	61.013	61.013	0.00E+00	2.20E-02	2.20E-02		
U-234	1.2788E-02	61.013	61.013	0.00E+00	7.80E-01	7.80E-01		
U-235	5.7486E-04	61.013	61.013	5.52E-05	3.51E-02	3.51E-02		
U-236	2.3485E-04	61.013	61.013	0.00E+00	1.43E-02	1.43E-02		
U-238	1.1581E-04	61.013	61.013	6.87E-06	7.07E-03	7.07E-03		
Y-90	1.3861E+01	61.013	61.013	0.00E+00	8.46E+02	8.46E+02		
Other Radionuclides					3.14E+03	3.14E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.27E+01	3.34E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	FAST	(Worst Case)
Fuel Cladding:	SST (316)	SST/Inconel
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu
BOL Enrichment %:		0 to 100

Basis for Parameter Differences:
 This Template was used for the following reasons:
 This fuel didn't closely match any existing templates, therefore the worst case template was used.

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:		61.013
Bounding:		61.013

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: POINT BEACH
 SNF ID #: 311
 Fuel Units & Descr: 3 - 14 X 14 ROD ARRAY
 Heavy Metal Mass: BOL=1167.00kg ; EOL=1161.50kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1981
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 1.50

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.7758E-10	38,160.900	38,160.900	0.00E+00	3.35E-05	3.35E-05	0.0150	2.053E+15
Am-241	1.4352E-01	38,160.900	38,160.900	0.00E+00	5.48E+03	5.48E+03	0.0250	4.141E+14
Am-242m	2.8698E-04	38,160.900	38,160.900	0.00E+00	1.10E+01	1.10E+01	0.0375	3.949E+14
Am-243	6.2565E-04	38,160.900	38,160.900	0.00E+00	2.39E+01	2.39E+01	0.0575	4.563E+14
C-14	4.7901E-05	38,160.900	38,160.900	0.00E+00	1.83E+00	1.83E+00	0.0850	2.297E+14
Cf-252	8.0297E-07	38,160.900	38,160.900	0.00E+00	3.06E-02	3.06E-02	0.1250	1.594E+14
Cm-243	2.5081E-04	38,160.900	38,160.900	0.00E+00	9.57E+00	9.57E+00	0.2250	1.970E+14
Cm-244	4.9015E-02	38,160.900	38,160.900	0.00E+00	1.87E+03	1.87E+03	0.3750	8.471E+13
Co-60	2.5581E-03	38,160.900	38,160.900	0.00E+00	9.76E+01	9.76E+01	0.5750	1.970E+15
Cs-134	4.0536E-05	38,160.900	38,160.900	0.00E+00	1.55E+00	1.55E+00	0.8500	2.726E+13
Cs-135	1.4433E-05	38,160.900	38,160.900	0.00E+00	5.51E-01	5.51E-01	1.2500	2.678E+13
Cs-137	1.3979E+00	38,160.900	38,160.900	0.00E+00	5.33E+04	5.33E+04	1.7500	8.019E+11
Eu-154	2.0203E-02	38,160.900	38,160.900	0.00E+00	7.71E+02	7.71E+02	2.2500	1.291E+08
Eu-155	1.7684E-03	38,160.900	38,160.900	0.00E+00	6.75E+01	6.75E+01	2.7500	2.645E+08
Fe-55	4.3136E-05	38,160.900	38,160.900	0.00E+00	1.65E+00	1.65E+00	3.5000	2.724E+07
H-3	2.0769E-02	38,160.900	38,160.900	0.00E+00	7.93E+02	7.93E+02	5.0000	1.165E+07
I-129	9.8288E-07	38,160.900	38,160.900	0.00E+00	3.75E-02	3.75E-02	7.0000	1.342E+06
Kr-85	2.8214E-02	38,160.900	38,160.900	0.00E+00	1.08E+03	1.08E+03	11.0000	1.542E+05
Np-237	1.1218E-05	38,160.900	38,160.900	0.00E+00	4.28E-01	4.28E-01		
Pa-231	1.3036E-09	38,160.900	38,160.900	0.00E+00	4.97E-05	4.97E-05		
Pb-210	8.5078E-11	38,160.900	38,160.900	0.00E+00	3.25E-06	3.25E-06		
Pm-147	3.6531E-04	38,160.900	38,160.900	0.00E+00	1.39E+01	1.39E+01		
Pu-238	7.4564E-02	38,160.900	38,160.900	0.00E+00	2.85E+03	2.85E+03		
Pu-239	1.1623E-02	38,160.900	38,160.900	0.00E+00	4.44E+02	4.44E+02		
Pu-240	1.5132E-02	38,160.900	38,160.900	0.00E+00	5.77E+02	5.77E+02		
Pu-241	9.0036E-01	38,160.900	38,160.900	0.00E+00	3.44E+04	3.44E+04		
Pu-242	6.4260E-05	38,160.900	38,160.900	0.00E+00	2.45E+00	2.45E+00		
Ra-226	2.2804E-10	38,160.900	38,160.900	0.00E+00	8.70E-06	8.70E-06		
Ra-228	5.2713E-12	38,160.900	38,160.900	0.00E+00	2.01E-07	2.01E-07		
Ru-106	6.1160E-10	38,160.900	38,160.900	0.00E+00	2.33E-05	2.33E-05		
Se-79	1.2377E-05	38,160.900	38,160.900	0.00E+00	4.72E-01	4.72E-01		
Sn-126	2.5210E-05	38,160.900	38,160.900	0.00E+00	9.62E-01	9.62E-01		
Sr-90	9.1667E-01	38,160.900	38,160.900	0.00E+00	3.50E+04	3.50E+04		
Tc-99	3.9357E-04	38,160.900	38,160.900	0.00E+00	1.50E+01	1.50E+01		
Th-229	1.2057E-10	38,160.900	38,160.900	0.00E+00	4.60E-06	4.60E-06		
Th-230	2.1043E-08	38,160.900	38,160.900	0.00E+00	8.03E-04	8.03E-04		
Th-232	5.2972E-12	38,160.900	38,160.900	0.00E+00	2.02E-07	2.02E-07		
Th-234	1.7474E-07	38,160.900	38,160.900	0.00E+00	6.67E-03	6.67E-03		
U-232	4.7368E-07	38,160.900	38,160.900	0.00E+00	1.81E-02	1.81E-02		
U-233	2.5097E-08	38,160.900	38,160.900	0.00E+00	9.58E-04	9.58E-04		
U-234	5.0000E-05	38,160.900	38,160.900	0.00E+00	1.91E+00	1.91E+00		
U-235	-1.4489E-06	38,160.900	0.000	6.30E-02	7.76E-03	6.30E-02		
U-236	7.5824E-06	38,160.900	38,160.900	0.00E+00	2.89E-01	2.89E-01		
U-238	-2.6129E-07	38,160.900	0.000	3.82E-01	3.72E-01	3.82E-01		
Y-90	9.1699E-01	38,160.900	38,160.900	0.00E+00	3.50E+04	3.50E+04		
Other Radionuclides					5.12E+04	5.12E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.78E+02	8.78E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.5	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	38,160.900	5,230.145	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:	38,160.900	10,460.290	Bounding burnup taken directly from SFD (converted to MWd).

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.93	0.14	0.97
Bounding:	0.93	0.27	

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

²Total burnup for all fuel associated with this worksheet must be 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 (PHILIPPINES) 1 Fuel decay start date: 1998
 SNF ID #: 638 Estimates as of: 2030
 Fuel Units & Descr: 21 - 18 FLAT PLATES Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=3.29kg ; EOL=3.29kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00018
Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.88

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.8271E-09	62.741	125.481	0.00E+00	2.40E-07	4.80E-07	Avg. MeV	
Am-241	4.4195E-03	62.741	125.481	0.00E+00	2.77E-01	5.55E-01	0.0150	1.134E+13
Am-242m	1.8195E-06	62.741	125.481	0.00E+00	1.14E-04	2.28E-04	0.0250	2.343E+12
Am-243	2.3278E-07	62.741	125.481	0.00E+00	1.46E-05	2.92E-05	0.0375	2.346E+12
C-14	4.3203E-05	62.741	125.481	0.00E+00	2.71E-03	5.42E-03	0.0575	2.250E+12
Cl-36	4.3023E-08	62.741	125.481	0.00E+00	2.70E-06	5.40E-06	0.0850	1.353E+12
Cm-243	1.6872E-07	62.741	125.481	0.00E+00	1.06E-05	2.12E-05	0.1250	1.376E+12
Cm-244	1.4660E-06	62.741	125.481	0.00E+00	9.20E-05	1.84E-04	0.2250	1.225E+12
Co-60	2.2376E-03	62.741	125.481	0.00E+00	1.40E-01	2.81E-01	0.3750	5.092E+11
Cs-134	1.2525E-04	62.741	125.481	0.00E+00	7.86E-03	1.57E-02	0.5750	8.237E+12
Cs-135	3.1549E-05	62.741	125.481	0.00E+00	1.98E-03	3.96E-03	0.8500	6.798E+11
Cs-137	1.7368E+00	62.741	125.481	0.00E+00	1.09E+02	2.18E+02	1.2500	7.134E+11
Eu-154	2.6947E-01	62.741	125.481	0.00E+00	1.69E+01	3.38E+01	1.7500	2.184E+10
Eu-155	2.6857E-02	62.741	125.481	0.00E+00	1.69E+00	3.37E+00	2.2500	3.351E+05
Fe-55	4.2105E-02	62.741	125.481	0.00E+00	2.64E-03	5.28E-03	2.7500	7.715E+04
H-3	3.5173E-03	62.741	125.481	0.00E+00	2.21E-01	4.41E-01	3.5000	1.809E+02
I-129	7.3805E-07	62.741	125.481	0.00E+00	4.63E-05	9.26E-05	5.0000	7.057E+01
Kr-85	6.9263E-02	62.741	125.481	0.00E+00	4.35E+00	8.69E+00	7.0000	7.959E+00
Np-237	1.4752E-06	62.741	125.481	0.00E+00	9.26E-05	1.85E-04	11.0000	9.047E-01
Pa-231	8.3970E-09	62.741	125.481	0.00E+00	5.27E-07	1.05E-06		
Pb-210	1.4995E-13	62.741	125.481	0.00E+00	9.41E-12	1.88E-11		
Pm-147	1.0567E-02	62.741	125.481	0.00E+00	6.63E-01	1.33E+00		
Pu-238	1.1543E-03	62.741	125.481	0.00E+00	7.24E-02	1.45E-01		
Pu-239	5.6917E-03	62.741	125.481	0.00E+00	3.57E-01	7.14E-01		
Pu-240	2.2602E-03	62.741	125.481	0.00E+00	1.42E-01	2.84E-01		
Pu-241	4.8045E-02	62.741	125.481	0.00E+00	3.01E+00	6.03E+00		
Pu-242	3.0602E-07	62.741	125.481	0.00E+00	1.92E-05	3.84E-05		
Ra-226	5.1293E-13	62.741	125.481	0.00E+00	3.22E-11	6.44E-11		
Ra-228	2.3323E-10	62.741	125.481	0.00E+00	1.46E-08	2.93E-08		
Ru-106	1.0075E-07	62.741	125.481	0.00E+00	6.32E-06	1.26E-05		
Se-79	1.2935E-05	62.741	125.481	0.00E+00	8.12E-04	1.62E-03		
Sn-126	1.2238E-05	62.741	125.481	0.00E+00	7.68E-04	1.54E-03		
Sr-90	1.6165E+00	62.741	125.481	0.00E+00	1.01E+02	2.03E+02		
Tc-99	4.4120E-04	62.741	125.481	0.00E+00	2.77E-02	5.54E-02		
Th-229	4.5684E-10	62.741	125.481	0.00E+00	2.87E-08	5.73E-08		
Th-230	6.8271E-11	62.741	125.481	0.00E+00	4.28E-09	8.57E-09		
Th-232	2.3744E-10	62.741	125.481	0.00E+00	1.49E-08	2.98E-08		
Tl-208	1.7368E-08	62.741	125.481	0.00E+00	1.09E-06	2.18E-06		
U-232	4.6797E-08	62.741	125.481	0.00E+00	2.94E-06	5.87E-06		
U-233	1.3146E-07	62.741	125.481	0.00E+00	8.25E-06	1.65E-05		
U-234	2.5729E-07	62.741	125.481	0.00E+00	1.61E-05	3.23E-05		
U-235	-2.6159E-06	62.741	0.000	6.62E-03	6.45E-03	6.62E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2719E-05	62.741	125.481	0.00E+00	7.98E-04	1.60E-03	1.40E+00	2.79E+00
U-238	-3.8857E-08	62.741	0.000	7.57E-05	7.33E-05	7.57E-05	Total	Total
Y-90	1.6165E+00	62.741	125.481	0.00E+00	1.01E+02	2.03E+02		
Other Radionuclides					1.18E+02	2.36E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.14680552	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		62.741	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
Bounding:		125.481	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.52		0.98
Bounding:	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: PRR-1 (PHILIPPINES) ¹Fuel decay start date: 1998
 SNF ID #: 558 Estimates as of: 2030
 Fuel Units & Descr: 30 - 17 FLAT PLATES Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=20.33kg ; EOL=19.71kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00018
Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 1.25

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	3.8271E-09	587.029	1,174.058	0.00E+00	2.25E-06	4.49E-06		
Am-241	4.4195E-03	587.029	1,174.058	0.00E+00	2.59E+00	5.19E+00	0.0150	1.061E+14
Am-242m	1.8195E-06	587.029	1,174.058	0.00E+00	1.07E-03	2.14E-03	0.0250	2.192E+13
Am-243	2.3278E-07	587.029	1,174.058	0.00E+00	1.37E-04	2.73E-04	0.0375	2.195E+13
C-14	4.3203E-05	587.029	1,174.058	0.00E+00	2.54E-02	5.07E-02	0.0575	2.105E+13
Cl-36	4.3023E-08	587.029	1,174.058	0.00E+00	2.63E-05	5.05E-05	0.0850	1.266E+13
Cm-243	1.6872E-07	587.029	1,174.058	0.00E+00	9.90E-05	1.98E-04	0.1250	1.287E+13
Cm-244	1.4660E-06	587.029	1,174.058	0.00E+00	8.61E-04	1.72E-03	0.2250	1.146E+13
Co-60	2.2376E-03	587.029	1,174.058	0.00E+00	1.31E+00	2.63E+00	0.3750	4.765E+12
Cs-134	1.2525E-04	587.029	1,174.058	0.00E+00	7.35E-02	1.47E-01	0.5750	7.707E+13
Cs-135	3.1549E-05	587.029	1,174.058	0.00E+00	1.85E-02	3.70E-02	0.8500	6.360E+12
Cs-137	1.7368E+00	587.029	1,174.058	0.00E+00	1.02E-03	2.04E+03	1.2500	6.675E+12
Eu-154	2.6947E-01	587.029	1,174.058	0.00E+00	1.58E+02	3.16E+02	1.7500	2.043E+11
Eu-155	2.6857E-02	587.029	1,174.058	0.00E+00	1.58E+01	3.15E+01	2.2500	3.135E+06
Fe-55	4.2105E-05	587.029	1,174.058	0.00E+00	2.47E-02	4.94E-02	2.7500	7.219E+05
H-3	3.5173E-03	587.029	1,174.058	0.00E+00	2.06E+00	4.13E+00	3.5000	1.716E+03
I-129	7.3805E-07	587.029	1,174.058	0.00E+00	4.33E-04	8.67E-04	5.0000	6.705E+02
Kr-85	6.9263E-02	587.029	1,174.058	0.00E+00	4.07E+01	8.13E+01	7.0000	7.565E+01
Np-237	1.4752E-06	587.029	1,174.058	0.00E+00	8.66E-04	1.73E-03	11.0000	8.601E+00
Pa-231	8.3970E-09	587.029	1,174.058	0.00E+00	4.93E-06	9.86E-06		
Pb-210	1.4995E-13	587.029	1,174.058	0.00E+00	8.80E-11	1.76E-10		
Pm-147	1.0567E-02	587.029	1,174.058	0.00E+00	6.20E+00	1.24E+01		
Pu-238	1.1543E-03	587.029	1,174.058	0.00E+00	6.78E-01	1.36E+00		
Pu-239	5.6917E-03	587.029	1,174.058	0.00E+00	3.34E+00	6.68E+00		
Pu-240	2.2602E-03	587.029	1,174.058	0.00E+00	1.33E+00	2.65E+00		
Pu-241	4.8045E-02	587.029	1,174.058	0.00E+00	2.82E+01	5.64E+01		
Pu-242	3.0602E-07	587.029	1,174.058	0.00E+00	1.80E-04	3.59E-04		
Ra-226	5.1293E-13	587.029	1,174.058	0.00E+00	3.01E-10	6.02E-10		
Ra-228	2.3323E-10	587.029	1,174.058	0.00E+00	1.37E-07	2.74E-07		
Ru-106	1.0075E-07	587.029	1,174.058	0.00E+00	5.91E-05	1.18E-04		
Se-79	1.2935E-05	587.029	1,174.058	0.00E+00	7.59E-03	1.52E-02		
Sn-126	1.2238E-05	587.029	1,174.058	0.00E+00	7.18E-03	1.44E-02		
Sr-90	1.6165E+00	587.029	1,174.058	0.00E+00	9.49E+02	1.90E+03		
Tc-99	4.4120E-04	587.029	1,174.058	0.00E+00	2.59E-01	5.18E-01		
Th-229	4.5684E-10	587.029	1,174.058	0.00E+00	2.68E-07	5.36E-07		
Th-230	6.8271E-11	587.029	1,174.058	0.00E+00	4.01E-08	8.02E-08		
Th-232	2.3744E-10	587.029	1,174.058	0.00E+00	1.39E-07	2.79E-07		
Ti-208	1.7368E-08	587.029	1,174.058	0.00E+00	1.02E-05	2.04E-05		
U-232	4.6797E-08	587.029	1,174.058	0.00E+00	2.75E-05	5.49E-05		
U-233	1.3146E-07	587.029	1,174.058	0.00E+00	7.72E-05	1.54E-04		
U-234	2.5729E-07	587.029	1,174.058	0.00E+00	1.51E-04	3.02E-04		
U-235	-2.6159E-06	587.029	0.000	8.73E-03	7.20E-03	8.73E-03		
U-236	1.2719E-05	587.029	1,174.058	0.00E+00	7.47E-03	1.49E-02		
U-238	-3.8857E-08	587.029	0.000	5.47E-03	5.45E-03	5.47E-03		
Y-90	1.6165E+00	587.029	1,174.058	0.00E+00	9.49E+02	1.90E+03		
Other Radionuclides					1.10E+03	2.21E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.31E+01	2.61E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	19.87821382	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		587.029	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,174.058	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.78		
Bounding:	1.56		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PULSTAR - BUFFALO
 SNF ID #: 174
 Fuel Units & Descr: 24 - CANISTER OF RODS
 Heavy Metal Mass: BOL=254.67kg ; EOL=252.20kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1978
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 2.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.0733E-09	2,348.473	4,696.946	0.00E+00	2.52E-06	5.04E-06	0.0150	1.787E+14
Am-241	1.4751E-01	2,348.473	4,696.946	0.00E+00	3.46E+02	6.93E+02	0.0250	3.582E+13
Am-242m	2.6809E-04	2,348.473	4,696.946	0.00E+00	6.30E-01	1.26E+00	0.0375	3.375E+13
Am-243	6.2484E-04	2,348.473	4,696.946	0.00E+00	1.47E+00	2.93E+00	0.0575	4.223E+13
C-14	4.7820E-05	2,348.473	4,696.946	0.00E+00	1.12E-01	2.25E-01	0.0850	1.973E+13
Cl-36	8.0297E-07	2,348.473	4,696.946	0.00E+00	1.89E-03	3.77E-03	0.1250	1.313E+13
Cm-243	1.7426E-04	2,348.473	4,696.946	0.00E+00	4.09E-01	8.18E-01	0.2250	1.685E+13
Cm-244	2.7616E-02	2,348.473	4,696.946	0.00E+00	6.49E+01	1.30E+02	0.3750	7.275E+12
Co-60	3.5610E-04	2,348.473	4,696.946	0.00E+00	8.36E-01	1.67E+00	0.5750	1.713E+14
Cs-134	2.6260E-07	2,348.473	4,696.946	0.00E+00	6.17E-04	1.23E-03	0.8500	1.673E+12
Cs-135	1.4433E-05	2,348.473	4,696.946	0.00E+00	3.39E-02	6.78E-02	1.2500	1.065E+12
Cs-137	9.8870E-01	2,348.473	4,696.946	0.00E+00	2.32E+03	4.64E+03	1.7500	4.681E+10
Eu-154	6.0320E-03	2,348.473	4,696.946	0.00E+00	1.42E+01	2.83E+01	2.2500	7.695E+06
Eu-155	2.1770E-04	2,348.473	4,696.946	0.00E+00	5.11E-01	1.02E+00	2.7500	2.711E+07
Fe-55	7.9296E-07	2,348.473	4,696.946	0.00E+00	1.86E-03	3.72E-03	3.5000	1.935E+06
H-3	8.9486E-03	2,348.473	4,696.946	0.00E+00	2.10E+01	4.20E+01	5.0000	8.269E+05
I-129	9.8288E-07	2,348.473	4,696.946	0.00E+00	2.31E-03	4.62E-03	7.0000	9.526E+04
Kr-85	1.0707E-02	2,348.473	4,696.946	0.00E+00	2.51E+01	5.03E+01	11.0000	1.094E+04
Np-237	1.1927E-05	2,348.473	4,696.946	0.00E+00	2.80E-02	5.60E-02		
Pa-231	1.4703E-09	2,348.473	4,696.946	0.00E+00	3.45E-06	6.91E-06		
Pb-210	1.6828E-10	2,348.473	4,696.946	0.00E+00	3.95E-07	7.90E-07		
Pm-147	6.9606E-06	2,348.473	4,696.946	0.00E+00	1.63E-02	3.27E-02		
Pu-238	6.6263E-02	2,348.473	4,696.946	0.00E+00	1.56E+02	3.11E+02		
Pu-239	1.1618E-02	2,348.473	4,696.946	0.00E+00	2.73E+01	5.46E+01		
Pu-240	1.5142E-02	2,348.473	4,696.946	0.00E+00	3.56E+01	7.11E+01		
Pu-241	4.3766E-01	2,348.473	4,696.946	0.00E+00	1.03E+03	2.06E+03		
Pu-242	6.4260E-05	2,348.473	4,696.946	0.00E+00	1.51E-01	3.02E-01		
Ra-226	3.8501E-10	2,348.473	4,696.946	0.00E+00	9.04E-07	1.81E-06		
Ra-228	5.2955E-12	2,348.473	4,696.946	0.00E+00	1.24E-08	2.49E-08		
Ru-106	2.0413E-14	2,348.473	4,696.946	0.00E+00	4.79E-11	9.59E-11		
Se-79	1.2376E-05	2,348.473	4,696.946	0.00E+00	2.91E-02	5.81E-02		
Sn-126	2.5210E-05	2,348.473	4,696.946	0.00E+00	5.92E-02	1.18E-01		
Sr-90	6.4163E-01	2,348.473	4,696.946	0.00E+00	1.51E+03	3.01E+03		
Tc-99	3.9357E-04	2,348.473	4,696.946	0.00E+00	9.24E-01	1.85E+00		
Th-229	1.5644E-10	2,348.473	4,696.946	0.00E+00	3.67E-07	7.35E-07		
Th-230	2.7972E-08	2,348.473	4,696.946	0.00E+00	6.57E-05	1.31E-04		
Th-232	5.3036E-12	2,348.473	4,696.946	0.00E+00	1.25E-08	2.49E-08		
Tl-208	1.5136E-07	2,348.473	4,696.946	0.00E+00	3.55E-04	7.11E-04		
U-232	4.1005E-07	2,348.473	4,696.946	0.00E+00	9.63E-04	1.93E-03		
U-233	2.5856E-08	2,348.473	4,696.946	0.00E+00	6.07E-05	1.21E-04		
U-234	5.2665E-05	2,348.473	4,696.946	0.00E+00	1.24E-01	2.47E-01		
U-235	-1.4487E-06	2,348.473	0.000	3.30E-02	2.96E-02	3.30E-02		
U-236	7.5888E-06	2,348.473	4,696.946	0.00E+00	1.78E-02	3.56E-02		
U-238	-2.6129E-07	2,348.473	0.000	8.05E-02	7.98E-02	8.05E-02		
Y-90	6.4180E-01	2,348.473	4,696.946	0.00E+00	1.51E+03	3.01E+03		
Other Radionuclides					2.24E+03	4.48E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.25E+01	8.50E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches PWR Template on all but one parameter (enrichment) making PWR a reasonable match.
Fuel Cladding:	ZIRC-2	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	5.99643776	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,348.473	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:	2,546.712	4,696.946	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.26		1.00
Bounding:	0.53	1.84	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PULSTAR-N.C. STATE UNIV.
 SNF ID #: 175
 Fuel Units & Descr: 25 - 5 X 5 ROD ARRAY
 Heavy Metal Mass: BOL=316.87kg ; EOL=315.90kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc. 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
³Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 1.25

Radionuclide	II. Estimates		x _b	b	y _n	y _b	Gamma Sources	
	m	x _n					Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.3547E-10	920.047	1,840.093	0.00E+00	2.17E-07	4.33E-07	Avg. MeV	
Am-241	6.5811E-02	920.047	1,840.093	0.00E+00	6.05E+01	1.21E+02	0.0150	2.626E+14
Am-242m	3.2913E-04	920.047	1,840.093	0.00E+00	3.03E-01	6.06E-01	0.0250	6.048E+13
Am-243	6.2742E-04	920.047	1,840.093	0.00E+00	5.77E-01	1.15E+00	0.0375	5.662E+13
C-14	4.8078E-05	920.047	1,840.093	0.00E+00	4.42E-02	8.85E-02	0.0575	5.276E+13
Cl-36	8.0313E-07	920.047	1,840.093	0.00E+00	7.39E-04	1.48E-03	0.0850	3.332E+13
Cm-243	5.2003E-04	920.047	1,840.093	0.00E+00	4.78E-01	9.57E-01	0.1250	3.016E+13
Cm-244	1.5441E-01	920.047	1,840.093	0.00E+00	1.42E+02	2.84E+02	0.2250	2.835E+13
Co-60	1.3196E-01	920.047	1,840.093	0.00E+00	1.21E+02	2.43E+02	0.3750	1.591E+13
Cs-134	9.6528E-01	920.047	1,840.093	0.00E+00	8.88E+02	1.78E+03	0.5750	2.933E+14
Cs-135	1.4433E-05	920.047	1,840.093	0.00E+00	1.33E-02	2.66E-02	0.8500	6.785E+13
Cs-137	2.7939E+00	920.047	1,840.093	0.00E+00	2.57E+03	5.14E+03	1.2500	3.156E+13
Eu-154	2.2626E-01	920.047	1,840.093	0.00E+00	2.08E+02	4.16E+02	1.7500	4.894E+11
Eu-155	1.1680E-01	920.047	1,840.093	0.00E+00	1.07E+02	2.15E+02	2.2500	2.456E+11
Fe-55	1.2760E-01	920.047	1,840.093	0.00E+00	1.17E+02	2.35E+02	2.7500	8.226E+09
H-3	1.1168E-01	920.047	1,840.093	0.00E+00	1.03E+02	2.05E+02	3.5000	1.055E+09
I-129	9.8288E-07	920.047	1,840.093	0.00E+00	9.04E-04	1.81E-03	5.0000	1.732E+06
Kr-85	1.9606E-01	920.047	1,840.093	0.00E+00	1.80E+02	3.61E+02	7.0000	1.997E+05
Np-237	9.6915E-06	920.047	1,840.093	0.00E+00	8.92E-03	1.78E-02	11.0000	2.294E+04
Pa-231	8.5917E-10	920.047	1,840.093	0.00E+00	7.90E-07	1.58E-06		
Pb-210	1.6247E-12	920.047	1,840.093	0.00E+00	1.49E-09	2.99E-09		
Pm-147	1.0063E+00	920.047	1,840.093	0.00E+00	9.26E+02	1.85E+03		
Pu-238	9.4428E-02	920.047	1,840.093	0.00E+00	8.69E+01	1.74E+02		
Pu-239	1.1631E-02	920.047	1,840.093	0.00E+00	1.07E+01	2.14E+01		
Pu-240	1.4919E-02	920.047	1,840.093	0.00E+00	1.37E+01	2.75E+01		
Pu-241	3.8130E+00	920.047	1,840.093	0.00E+00	3.51E+03	7.02E+03		
Pu-242	6.4260E-05	920.047	1,840.093	0.00E+00	5.91E-02	1.18E-01		
Ra-226	1.2608E-11	920.047	1,840.093	0.00E+00	1.16E-08	2.32E-08		
Ra-228	3.8986E-12	920.047	1,840.093	0.00E+00	3.59E-09	7.17E-09		
Ru-106	5.4910E-01	920.047	1,840.093	0.00E+00	5.05E+02	1.01E+03		
Se-79	1.2380E-05	920.047	1,840.093	0.00E+00	1.14E-02	2.28E-02		
Sn-126	2.5210E-05	920.047	1,840.093	0.00E+00	2.32E-02	4.64E-02		
Sr-90	1.8718E+00	920.047	1,840.093	0.00E+00	1.72E+03	3.44E+03		
Tc-99	3.9357E-04	920.047	1,840.093	0.00E+00	3.62E-01	7.24E-01		
Th-229	2.9603E-11	920.047	1,840.093	0.00E+00	2.72E-08	5.45E-08		
Th-230	4.5559E-09	920.047	1,840.093	0.00E+00	4.19E-06	8.38E-06		
Th-232	5.2826E-12	920.047	1,840.093	0.00E+00	4.86E-09	9.72E-09		
Tl-208	1.9654E-07	920.047	1,840.093	0.00E+00	1.81E-04	3.62E-04		
U-232	5.7607E-07	920.047	1,840.093	0.00E+00	5.30E-04	1.06E-03		
U-233	2.3288E-08	920.047	1,840.093	0.00E+00	2.14E-05	4.29E-05		
U-234	4.1182E-05	920.047	1,840.093	0.00E+00	3.79E-02	7.58E-02		
U-235	-1.4494E-06	920.047	0.000	2.76E-02	2.62E-02	2.76E-02		
U-236	7.5646E-06	920.047	1,840.093	0.00E+00	6.96E-03	1.39E-02		
U-238	-2.6129E-07	920.047	0.000	1.02E-01	1.02E-01	1.02E-01		
Y-90	1.8718E+00	920.047	1,840.093	0.00E+00	1.72E+03	3.44E+03		
Other Radionuclides								
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							5.64E+01	1.13E+02
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-2	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	4.025941269	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		920.047	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,840.093	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.09		1.00
Bounding:	0.17		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: PULSTAR-SUNY-BUFFALO
 SNF ID #: 176
 Fuel Units & Descr: 996 - ROD
 Heavy Metal Mass: BOL=537.54kg ; EOL=499.99kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1965
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc. 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 2.96

II. Estimates

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.2581E-09	35,707.513	71,415.026	0.00E+00	4.49E-05	8.98E-05	Avg. MeV	
Am-241	1.4761E-01	35,707.513	71,415.026	0.00E+00	5.27E+03	1.05E+04	0.0150	1.933E+15
Am-242m	2.5032E-04	35,707.513	71,415.026	0.00E+00	8.94E+00	1.79E+01	0.0250	3.840E+14
Am-243	6.2387E-04	35,707.513	71,415.026	0.00E+00	2.23E+01	4.46E+01	0.0375	3.590E+14
C-14	4.7739E-05	35,707.513	71,415.026	0.00E+00	1.70E+00	3.41E+00	0.0575	4.926E+14
Cl-36	8.0297E-07	35,707.513	71,415.026	0.00E+00	2.87E-02	5.73E-02	0.0850	2.101E+14
Cm-243	1.2099E-04	35,707.513	71,415.026	0.00E+00	4.32E+00	8.64E+00	0.1250	1.371E+14
Cm-244	1.5560E-02	35,707.513	71,415.026	0.00E+00	5.56E+02	1.11E+03	0.2250	1.787E+14
Co-60	4.9580E-05	35,707.513	71,415.026	0.00E+00	1.77E+00	3.54E+00	0.3750	7.735E+13
Cs-134	1.7022E-09	35,707.513	71,415.026	0.00E+00	6.08E-05	1.22E-04	0.5750	1.841E+15
Cs-135	1.4433E-05	35,707.513	71,415.026	0.00E+00	5.15E-01	1.03E+00	0.8500	1.476E+13
Cs-137	6.9929E-01	35,707.513	71,415.026	0.00E+00	2.50E+04	4.99E+04	1.2500	6.901E+12
Eu-154	1.8023E-03	35,707.513	71,415.026	0.00E+00	6.44E+01	1.29E+02	1.7500	3.971E+11
Eu-155	2.6793E-05	35,707.513	71,415.026	0.00E+00	9.57E-01	1.91E+00	2.2500	6.993E+07
Fe-55	1.4580E-08	35,707.513	71,415.026	0.00E+00	5.21E-04	1.04E-03	2.7500	3.477E+08
H-3	3.8566E-03	35,707.513	71,415.026	0.00E+00	1.38E+02	2.75E+02	3.5000	1.726E+07
I-129	9.8288E-07	35,707.513	71,415.026	0.00E+00	3.51E-02	7.02E-02	5.0000	7.371E+06
Kr-85	4.0617E-03	35,707.513	71,415.026	0.00E+00	1.45E+02	2.90E+02	7.0000	8.485E+05
Np-237	1.2645E-05	35,707.513	71,415.026	0.00E+00	4.52E-01	9.03E-01	11.0000	9.739E+04
Pa-231	1.6376E-09	35,707.513	71,415.026	0.00E+00	5.85E-05	1.17E-04		
Pb-210	2.8795E-10	35,707.513	71,415.026	0.00E+00	1.03E-05	2.06E-05		
Pm-147	1.3264E-07	35,707.513	71,415.026	0.00E+00	4.74E-03	9.47E-03		
Pu-238	5.8882E-02	35,707.513	71,415.026	0.00E+00	2.10E+03	4.21E+03		
Pu-239	1.1613E-02	35,707.513	71,415.026	0.00E+00	4.15E+02	8.29E+02		
Pu-240	1.5142E-02	35,707.513	71,415.026	0.00E+00	5.41E+02	1.08E+03		
Pu-241	2.1269E-01	35,707.513	71,415.026	0.00E+00	7.59E+03	1.52E+04		
Pu-242	6.4260E-05	35,707.513	71,415.026	0.00E+00	2.29E+00	4.59E+00		
Ra-226	5.8689E-10	35,707.513	71,415.026	0.00E+00	2.10E-05	4.19E-05		
Ra-228	5.3036E-12	35,707.513	71,415.026	0.00E+00	1.89E-07	3.79E-07		
Ru-106	6.8136E-19	35,707.513	71,415.026	0.00E+00	2.43E-14	4.87E-14		
Se-79	1.2372E-05	35,707.513	71,415.026	0.00E+00	4.42E-01	8.84E-01		
Sn-126	2.5194E-05	35,707.513	71,415.026	0.00E+00	9.00E-01	1.80E+00		
Sr-90	4.4913E-01	35,707.513	71,415.026	0.00E+00	1.60E+04	3.21E+04		
Tc-99	3.9357E-04	35,707.513	71,415.026	0.00E+00	1.41E+01	2.81E+01		
Th-229	1.9331E-10	35,707.513	71,415.026	0.00E+00	6.90E-06	1.38E-05		
Th-230	3.5223E-08	35,707.513	71,415.026	0.00E+00	1.26E-03	2.52E-03		
Th-232	5.3085E-12	35,707.513	71,415.026	0.00E+00	1.90E-07	3.79E-07		
Th-208	1.3102E-07	35,707.513	71,415.026	0.00E+00	4.68E-03	9.36E-03		
U-232	3.5497E-07	35,707.513	71,415.026	0.00E+00	1.27E-02	2.54E-02		
U-233	2.6647E-08	35,707.513	71,415.026	0.00E+00	9.52E-04	1.90E-03		
U-234	5.5023E-05	35,707.513	71,415.026	0.00E+00	1.96E+00	3.93E+00		
U-235	-1.4485E-06	35,707.513	0.000	6.93E-02	1.76E-02	6.93E-02		
U-236	7.5969E-06	35,707.513	71,415.026	0.00E+00	2.71E-01	5.43E-01		
U-238	-2.6129E-07	35,707.513	0.000	1.70E-01	1.61E-01	1.70E-01		
Y-90	4.4913E-01	35,707.513	71,415.026	0.00E+00	1.60E+04	3.21E+04		
Other Radionuclides					2.42E+04	4.84E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.24E+02	1.05E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches PWR Template on all but one parameter (enrichment) making PWR a reasonable match.
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	5.965123646	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		35,707.513	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		71,415.026	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	1.90		1.00
Bounding:	3.80		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 178
 Fuel Units & Desc: 16 - 10 FLAT PLATES
 Heavy Metal Mass: BOL=18.18kg ; EOL=18.18kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.44

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.4545E-10	344.382	688.763	0.00E+00	5.01E-08	1.00E-07	Avg. MeV	
Am-241	1.1190E-03	344.382	688.763	0.00E+00	3.85E-01	7.71E-01	0.0150	1.329E+14
Am-242m	4.5425E-07	344.382	688.763	0.00E+00	1.56E-04	3.13E-04	0.0250	2.863E+13
Am-243	1.4921E-06	344.382	688.763	0.00E+00	5.14E-04	1.03E-03	0.0375	2.642E+13
C-14	5.7244E-09	344.382	688.763	0.00E+00	1.97E-06	3.94E-06	0.0575	2.598E+13
Cl-36	1.3124E-32	344.382	688.763	0.00E+00	4.52E-30	9.04E-30	0.0850	1.656E+13
Cm-243	2.3676E-07	344.382	688.763	0.00E+00	8.15E-05	1.63E-04	0.1250	1.434E+13
Cm-244	5.2042E-05	344.382	688.763	0.00E+00	1.79E-02	3.58E-02	0.2250	1.404E+13
Co-60	3.8208E-05	344.382	688.763	0.00E+00	1.32E-02	2.63E-02	0.3750	6.794E+12
Cs-134	4.8693E-01	344.382	688.763	0.00E+00	1.68E+02	3.35E+02	0.5750	9.332E+13
Cs-135	3.4477E-06	344.382	688.763	0.00E+00	1.19E-03	2.37E-03	0.8500	1.307E+13
Cs-137	2.8731E+00	344.382	688.763	0.00E+00	9.89E+02	1.98E+03	1.2500	2.431E+12
Eu-154	8.2053E-02	344.382	688.763	0.00E+00	2.83E+01	5.65E+01	1.7500	1.020E+11
Eu-155	3.9134E-02	344.382	688.763	0.00E+00	1.35E+01	2.70E+01	2.2500	2.139E+11
Fe-55	6.7429E-03	344.382	688.763	0.00E+00	2.32E+00	4.64E+00	2.7500	1.230E+09
H-3	1.0599E-02	344.382	688.763	0.00E+00	3.65E+00	7.30E+00	3.5000	1.365E+08
I-129	7.5300E-07	344.382	688.763	0.00E+00	2.59E-04	5.19E-04	5.0000	4.193E+02
Kr-85	2.8595E-01	344.382	688.763	0.00E+00	9.85E+01	1.97E+02	7.0000	4.679E+01
Np-237	9.5479E-06	344.382	688.763	0.00E+00	3.29E-03	6.58E-03	11.0000	5.277E+00
Pa-231	8.9297E-10	344.382	688.763	0.00E+00	3.08E-07	6.15E-07		
Pb-210	3.7609E-12	344.382	688.763	0.00E+00	1.30E-09	2.59E-09		
Pm-147	2.5452E+00	344.382	688.763	0.00E+00	8.77E+02	1.75E+03		
Pu-238	2.0550E-02	344.382	688.763	0.00E+00	7.08E+00	1.42E+01		
Pu-239	4.2838E-04	344.382	688.763	0.00E+00	1.48E-01	2.95E-01		
Pu-240	2.4401E-04	344.382	688.763	0.00E+00	8.40E-02	1.68E-01		
Pu-241	6.8764E-02	344.382	688.763	0.00E+00	2.37E+01	4.74E+01		
Pu-242	3.6329E-07	344.382	688.763	0.00E+00	1.25E-04	2.50E-04		
Ra-226	3.8045E-11	344.382	688.763	0.00E+00	1.31E-08	2.62E-08		
Ra-228	2.9902E-15	344.382	688.763	0.00E+00	1.03E-12	2.06E-12		
Ru-106	1.9055E-01	344.382	688.763	0.00E+00	6.56E+01	1.31E+02		
Se-79	1.2936E-05	344.382	688.763	0.00E+00	4.45E-03	8.91E-03		
Sn-126	1.1574E-05	344.382	688.763	0.00E+00	3.99E-03	7.97E-03		
Sr-90	2.7505E+00	344.382	688.763	0.00E+00	9.47E+02	1.89E+03		
Tc-99	4.2239E-04	344.382	688.763	0.00E+00	1.45E-01	2.91E-01		
Th-229	1.8848E-12	344.382	688.763	0.00E+00	6.49E-10	1.30E-09		
Th-230	1.7042E-08	344.382	688.763	0.00E+00	5.87E-06	1.17E-05		
Th-232	7.8132E-15	344.382	688.763	0.00E+00	2.69E-12	5.38E-12		
Th-208	4.4063E-08	344.382	688.763	0.00E+00	1.52E-05	3.03E-05		
U-232	1.3151E-07	344.382	688.763	0.00E+00	4.53E-05	9.06E-05		
U-233	1.9564E-09	344.382	688.763	0.00E+00	6.74E-07	1.35E-06		
U-234	1.8371E-04	344.382	688.763	0.00E+00	6.33E-02	1.27E-01		
U-235	-2.7235E-06	344.382	0.000	7.47E-03	6.53E-03	7.47E-03		
U-236	1.5493E-05	344.382	688.763	0.00E+00	5.34E-03	1.07E-02		
U-238	-4.2851E-09	344.382	0.000	4.95E-03	4.95E-03	4.95E-03		
Y-90	2.7505E+00	344.382	688.763	0.00E+00	9.47E+02	1.89E+03		
Other Radionuclides					1.77E+03	3.54E+03		

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			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
LIGHT WATER	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.0001402	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
344.382	344.382	344.382	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
688.763	688.763	688.763	

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup
0.06	0.06	
Bounding:	0.12	
		Estimated EOL HM/Given EOL HM
		0.98

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 177
 Fuel Units & Descr: 124 - ELEMENT
 Heavy Metal Mass: BOL=2.22kg ; EOL=2.22kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%. U)
²Template 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	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Avg. MeV	
Ac-227	1.4545E-10	42.040	84.080	0.00E+00	6.11E-09	1.22E-08	0.0150	1.622E+13
Am-241	1.1190E-03	42.040	84.080	0.00E+00	4.70E-02	9.41E-02	0.0250	3.495E+12
Am-242m	4.5425E-07	42.040	84.080	0.00E+00	1.91E-05	3.82E-05	0.0375	3.225E+12
Am-243	1.4921E-06	42.040	84.080	0.00E+00	6.27E-05	1.25E-04	0.0575	3.171E+12
C-14	5.7244E-09	42.040	84.080	0.00E+00	2.41E-07	4.81E-07	0.0850	2.021E+12
Cl-36	1.3124E-32	42.040	84.080	0.00E+00	5.52E-31	1.10E-30	0.1250	1.751E+12
Cm-243	2.3676E-07	42.040	84.080	0.00E+00	9.95E-06	1.99E-05	0.2250	1.713E+12
Cm-244	5.2042E-05	42.040	84.080	0.00E+00	2.19E-03	4.38E-03	0.3750	8.293E+11
Co-60	3.8208E-05	42.040	84.080	0.00E+00	1.61E-03	3.21E-03	0.5750	1.139E+13
Cs-134	4.8693E-01	42.040	84.080	0.00E+00	2.05E+01	4.09E+01	0.8500	1.595E+12
Cs-135	3.4477E-06	42.040	84.080	0.00E+00	1.45E-04	2.90E-04	1.2500	2.968E+11
Cs-137	2.8731E+00	42.040	84.080	0.00E+00	1.21E+02	2.42E+02	1.7500	1.245E+10
Eu-154	8.2053E-02	42.040	84.080	0.00E+00	3.45E+00	6.90E+00	2.2500	2.611E+10
Eu-155	3.9134E-02	42.040	84.080	0.00E+00	1.65E+00	3.29E+00	2.7500	1.502E+08
Fe-55	6.7429E-03	42.040	84.080	0.00E+00	2.83E-01	5.67E-01	3.5000	1.666E+07
H-3	1.0599E-02	42.040	84.080	0.00E+00	4.46E-01	8.91E-01	5.0000	4.999E+01
I-129	7.5300E-07	42.040	84.080	0.00E+00	3.17E-05	6.33E-05	7.0000	5.574E+00
Kr-85	2.8595E-01	42.040	84.080	0.00E+00	1.20E+01	2.40E+01	11.0000	6.282E-01
Np-237	9.5479E-06	42.040	84.080	0.00E+00	4.01E-04	8.03E-04		
Pa-231	8.9297E-10	42.040	84.080	0.00E+00	3.75E-08	7.51E-08		
Pb-210	3.7609E-12	42.040	84.080	0.00E+00	1.58E-10	3.16E-10		
Pm-147	2.5452E+00	42.040	84.080	0.00E+00	1.07E+02	2.14E+02		
Pu-238	2.0550E-02	42.040	84.080	0.00E+00	8.64E-01	1.73E+00		
Pu-239	4.2838E-04	42.040	84.080	0.00E+00	1.80E-02	3.60E-02		
Pu-240	2.4401E-04	42.040	84.080	0.00E+00	1.03E-02	2.05E-02		
Pu-241	6.8764E-02	42.040	84.080	0.00E+00	2.89E+00	5.78E+00		
Pu-242	3.6329E-07	42.040	84.080	0.00E+00	1.53E-05	3.05E-05		
Ra-226	3.8045E-11	42.040	84.080	0.00E+00	1.60E-09	3.20E-09		
Ra-228	2.9902E-15	42.040	84.080	0.00E+00	1.26E-13	2.51E-13		
Ru-106	1.9055E-01	42.040	84.080	0.00E+00	8.01E+00	1.60E+01		
Se-79	1.2936E-05	42.040	84.080	0.00E+00	5.44E-04	1.09E-03		
Sn-126	1.1574E-05	42.040	84.080	0.00E+00	4.87E-04	9.73E-04		
Sr-90	2.7505E+00	42.040	84.080	0.00E+00	1.16E+02	2.31E+02		
Tc-99	4.2239E-04	42.040	84.080	0.00E+00	1.78E-02	3.55E-02		
Th-229	1.8848E-12	42.040	84.080	0.00E+00	7.92E-11	1.58E-10		
Th-230	1.7042E-08	42.040	84.080	0.00E+00	7.16E-07	1.43E-06		
Th-232	7.8132E-15	42.040	84.080	0.00E+00	3.28E-13	6.57E-13		
Tl-208	4.4063E-08	42.040	84.080	0.00E+00	1.85E-06	3.70E-06		
U-232	1.3151E-07	42.040	84.080	0.00E+00	5.53E-06	1.11E-05		
U-233	1.9564E-09	42.040	84.080	0.00E+00	8.22E-08	1.64E-07		
U-234	1.8371E-04	42.040	84.080	0.00E+00	7.72E-03	1.54E-02		
U-235	-2.7235E-06	42.040	0.000	4.41E-03	4.30E-03	4.41E-03		
U-236	1.5493E-05	42.040	84.080	0.00E+00	6.51E-04	1.30E-03		
U-238	-4.2851E-09	42.040	0.000	5.97E-05	5.95E-05	5.97E-05		
Y-90	2.7505E+00	42.040	84.080	0.00E+00	1.16E+02	2.31E+02		
Other Radionuclides					2.16E+02	4.32E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.13E+00	4.28E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.00045093	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		42.040	
Bounding:		84.080	

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 (SWEDEN)
 SNF ID #: 942
 Fuel Units & Descr: 183 - MTR TYPE
 Heavy Metal Mass: BOL=351.47kg ; EOL=308.98kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1996
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 5.08

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	1.1465E-09	40,241.317	80,482.633	0.00E+00	4.61E-05	9.23E-05	Avg. MeV	
Am-241	2.3056E-03	40,241.317	80,482.633	0.00E+00	9.28E+01	1.86E+02	0.0150	7.531E+15
Am-242m	4.1476E-07	40,241.317	80,482.633	0.00E+00	1.67E-02	3.34E-02	0.0250	1.565E+15
Am-243	1.4894E-06	40,241.317	80,482.633	0.00E+00	5.99E-02	1.20E-01	0.0375	1.363E+15
C-14	5.7108E-09	40,241.317	80,482.633	0.00E+00	2.30E-04	4.60E-04	0.0575	1.463E+15
Cl-36	1.3124E-32	40,241.317	80,482.633	0.00E+00	5.28E-28	1.06E-27	0.0850	8.828E+14
Cm-243	1.4562E-07	40,241.317	80,482.633	0.00E+00	5.86E-03	1.17E-02	0.1250	5.913E+14
Cm-244	2.4221E-05	40,241.317	80,482.633	0.00E+00	9.75E-01	1.95E+00	0.2250	7.622E+14
Co-60	2.7560E-06	40,241.317	80,482.633	0.00E+00	1.11E-01	2.22E-01	0.3750	3.313E+14
Cs-134	5.8851E-04	40,241.317	80,482.633	0.00E+00	2.37E+01	4.74E+01	0.5750	5.433E+15
Cs-135	3.4477E-06	40,241.317	80,482.633	0.00E+00	1.39E-01	2.77E-01	0.8500	7.828E+13
Cs-137	1.8099E+00	40,241.317	80,482.633	0.00E+00	7.28E+04	1.46E+05	1.2500	4.353E+13
Eu-154	1.6386E-02	40,241.317	80,482.633	0.00E+00	6.59E+02	1.32E+03	1.7500	2.151E+12
Eu-155	2.3957E-03	40,241.317	80,482.633	0.00E+00	9.64E+01	1.93E+02	2.2500	1.533E+08
Fe-55	3.2707E-05	40,241.317	80,482.633	0.00E+00	1.32E+00	2.63E+00	2.7500	1.255E+08
H-3	3.4504E-03	40,241.317	80,482.633	0.00E+00	1.39E+02	2.78E+02	3.5000	9.521E+04
I-129	7.5300E-07	40,241.317	80,482.633	0.00E+00	3.03E-02	6.06E-02	5.0000	3.206E+04
Kr-85	7.8540E-02	40,241.317	80,482.633	0.00E+00	3.16E+03	6.32E+03	7.0000	3.530E+03
Np-237	9.5615E-06	40,241.317	80,482.633	0.00E+00	3.85E-01	7.70E-01	11.0000	3.949E-02
Pa-231	2.7968E-09	40,241.317	80,482.633	0.00E+00	1.13E-04	2.25E-04		
Pb-210	1.2612E-10	40,241.317	80,482.633	0.00E+00	5.08E-06	1.02E-05		
Pm-147	1.2952E-02	40,241.317	80,482.633	0.00E+00	5.21E+02	1.04E+03		
Pu-238	1.7549E-02	40,241.317	80,482.633	0.00E+00	7.06E+02	1.41E+03		
Pu-239	4.2810E-04	40,241.317	80,482.633	0.00E+00	1.72E+01	3.45E+01		
Pu-240	2.4357E-04	40,241.317	80,482.633	0.00E+00	9.80E+00	1.96E+01		
Pu-241	2.6277E-02	40,241.317	80,482.633	0.00E+00	1.06E+03	2.11E+03		
Pu-242	3.6329E-07	40,241.317	80,482.633	0.00E+00	1.46E-02	2.92E-02		
Ra-226	4.4444E-10	40,241.317	80,482.633	0.00E+00	1.79E-05	3.58E-05		
Ra-228	1.9714E-14	40,241.317	80,482.633	0.00E+00	7.93E-10	1.59E-09		
Ru-106	2.0477E-07	40,241.317	80,482.633	0.00E+00	8.24E-03	1.65E-02		
Se-79	1.2933E-05	40,241.317	80,482.633	0.00E+00	5.20E-01	1.04E+00		
Sn-126	1.1574E-05	40,241.317	80,482.633	0.00E+00	4.66E-01	9.32E-01		
Sr-90	1.7092E+00	40,241.317	80,482.633	0.00E+00	6.88E+04	1.38E+05		
Tc-99	4.2239E-04	40,241.317	80,482.633	0.00E+00	1.70E+01	3.40E+01		
Th-229	7.7260E-12	40,241.317	80,482.633	0.00E+00	3.11E-07	6.22E-07		
Th-230	5.8497E-08	40,241.317	80,482.633	0.00E+00	2.35E-03	4.71E-03		
Th-232	2.6906E-14	40,241.317	80,482.633	0.00E+00	1.08E-09	2.17E-09		
Tl-208	4.4336E-08	40,241.317	80,482.633	0.00E+00	1.78E-03	3.57E-03		
U-232	1.2037E-07	40,241.317	80,482.633	0.00E+00	4.84E-03	9.69E-03		
U-233	3.0011E-09	40,241.317	80,482.633	0.00E+00	1.21E-04	2.42E-04		
U-234	1.8497E-04	40,241.317	80,482.633	0.00E+00	7.44E+00	1.49E+01		
U-235	-2.7235E-06	40,241.317	0.000	1.51E-01	4.11E-02	1.51E-01		
U-236	1.5493E-05	40,241.317	80,482.633	0.00E+00	6.23E-01	1.25E+00		
U-238	-4.2851E-09	40,241.317	0.000	9.47E-02	9.45E-02	9.47E-02	8.51E+02	1.70E+03
Y-90	1.7094E+00	40,241.317	80,482.633	0.00E+00	6.88E+04	1.38E+05	Total	Total
Other Radionuclides					6.93E+04	1.39E+05		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD LIGHT WATER	Used LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.84262055	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		40,241.317 80,482.633	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup	1.01
Bounding:	0.36 0.73		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (SWEDEN)
 SNF ID #: 801
 Fuel Units & Descr: 450 - MTR TYPE
 Heavy Metal Mass: BOL=111.02kg ; EOL=59.85kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1996
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 12.50

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.1465E-09	48,454.248	96,908.495	0.00E+00	5.56E-05	1.11E-04	0.0150	9.068E+15
Am-241	2.3056E-03	48,454.248	96,908.495	0.00E+00	1.12E+02	2.23E+02	0.0250	1.884E+15
Am-242m	4.1476E-07	48,454.248	96,908.495	0.00E+00	2.01E-02	4.02E-02	0.0375	1.641E+15
Am-243	1.4894E-06	48,454.248	96,908.495	0.00E+00	7.22E-02	1.44E-01	0.0575	1.762E+15
C-14	5.7108E-09	48,454.248	96,908.495	0.00E+00	2.77E-04	5.53E-04	0.0850	1.063E+15
Cl-36	1.3124E-32	48,454.248	96,908.495	0.00E+00	6.36E-28	1.27E-27	0.1250	7.120E+14
Cm-243	1.4562E-07	48,454.248	96,908.495	0.00E+00	7.06E-03	1.41E-02	0.2250	9.177E+14
Cm-244	2.4221E-05	48,454.248	96,908.495	0.00E+00	1.17E+00	2.35E+00	0.3750	3.990E+14
Co-60	2.7560E-06	48,454.248	96,908.495	0.00E+00	1.34E-01	2.67E-01	0.5750	6.541E+15
Cs-134	5.8851E-04	48,454.248	96,908.495	0.00E+00	2.85E+01	5.70E+01	0.8500	9.425E+13
Cs-135	3.4477E-06	48,454.248	96,908.495	0.00E+00	1.67E-01	3.34E-01	1.2500	5.242E+13
Cs-137	1.8099E+00	48,454.248	96,908.495	0.00E+00	8.77E+04	1.75E+05	1.7500	2.590E+12
Eu-154	1.6386E-02	48,454.248	96,908.495	0.00E+00	7.94E+02	1.59E+03	2.2500	1.846E+08
Eu-155	2.3957E-03	48,454.248	96,908.495	0.00E+00	1.16E+02	2.32E+02	2.7500	1.511E+08
Fe-55	3.2707E-05	48,454.248	96,908.495	0.00E+00	1.58E+00	3.17E+00	3.5000	1.141E+05
H-3	3.4504E-03	48,454.248	96,908.495	0.00E+00	1.67E-02	3.34E-02	5.0000	3.835E+04
I-129	7.5300E-07	48,454.248	96,908.495	0.00E+00	3.65E-02	7.30E-02	7.0000	4.221E+03
Kr-85	7.8540E-02	48,454.248	96,908.495	0.00E+00	3.81E+03	7.61E+03	11.0000	4.721E+02
Np-237	9.5615E-06	48,454.248	96,908.495	0.00E+00	4.63E-01	9.27E-01		
Pa-231	2.7968E-09	48,454.248	96,908.495	0.00E+00	1.36E-04	2.71E-04		
Pb-210	1.2612E-10	48,454.248	96,908.495	0.00E+00	6.11E-06	1.22E-05		
Pm-147	1.2952E-02	48,454.248	96,908.495	0.00E+00	6.28E+02	1.26E+03		
Pu-238	1.7549E-02	48,454.248	96,908.495	0.00E+00	8.50E+02	1.70E+03		
Pu-239	4.2810E-04	48,454.248	96,908.495	0.00E+00	2.07E+01	4.15E+01		
Pu-240	2.4357E-04	48,454.248	96,908.495	0.00E+00	1.18E+01	2.36E+01		
Pu-241	2.6277E-02	48,454.248	96,908.495	0.00E+00	1.27E+03	2.55E+03		
Pu-242	3.6329E-07	48,454.248	96,908.495	0.00E+00	1.76E-02	3.52E-02		
Ra-226	4.4444E-10	48,454.248	96,908.495	0.00E+00	2.15E-05	4.31E-05		
Ra-228	1.9714E-14	48,454.248	96,908.495	0.00E+00	9.55E-10	1.91E-09		
Ru-106	2.0477E-07	48,454.248	96,908.495	0.00E+00	9.92E-03	1.98E-02		
Se-79	1.2933E-05	48,454.248	96,908.495	0.00E+00	6.27E-01	1.25E+00		
Sn-126	1.1574E-05	48,454.248	96,908.495	0.00E+00	5.61E-01	1.12E+00		
Sr-90	1.7092E+00	48,454.248	96,908.495	0.00E+00	8.28E+04	1.66E+05		
Tc-99	4.2239E-04	48,454.248	96,908.495	0.00E+00	2.05E+01	4.09E+01		
Th-229	7.7260E-12	48,454.248	96,908.495	0.00E+00	3.74E-07	7.49E-07		
Th-230	5.8497E-08	48,454.248	96,908.495	0.00E+00	2.83E-03	5.67E-03		
Th-232	2.6906E-14	48,454.248	96,908.495	0.00E+00	1.30E-09	2.61E-09		
Th-234	4.4336E-08	48,454.248	96,908.495	0.00E+00	2.15E-03	4.30E-03		
U-232	1.2037E-07	48,454.248	96,908.495	0.00E+00	5.83E-03	1.17E-02		
U-233	3.0011E-09	48,454.248	96,908.495	0.00E+00	1.45E-04	2.91E-04		
U-234	1.8497E-04	48,454.248	96,908.495	0.00E+00	8.96E+00	1.79E+01		
U-235	-2.7235E-06	48,454.248	0.000	2.22E-01	9.00E-02	2.22E-01		
U-236	1.5493E-05	48,454.248	96,908.495	0.00E+00	7.51E-01	1.50E+00		
U-238	-4.2851E-09	48,454.248	0.000	2.79E-03	2.58E-03	2.79E-03		
Y-90	1.7094E+00	48,454.248	96,908.495	0.00E+00	8.28E+04	1.66E+05		
Other Radionuclides					8.35E+04	1.67E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.02E+03	2.05E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.5168132	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		48,454.248	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		96,908.495	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	1.39		1.05
Bounding:	2.77		

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

²Total burnup for all fuel associated with this worksheet must be 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 (ARGENTINA) ¹Fuel decay start date: 1987
 SNF ID #: 634 Estimates as of: 2030
 Fuel Units & Desc: 32 - 19 CURVED PLATES Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=5.72kg ; EOL=4.60kg ²Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 1.33

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	1,066.723	2,133.445	0.00E+00	2.14E-06	4.28E-06	0.0150	1.571E+14
Am-241	2.5251E-03	1,066.723	2,133.445	0.00E+00	2.69E+00	5.39E+00	0.0250	3.263E+13
Am-242m	3.9624E-07	1,066.723	2,133.445	0.00E+00	4.23E-04	8.45E-04	0.0375	2.836E+13
Am-243	1.4880E-06	1,066.723	2,133.445	0.00E+00	1.59E-03	3.17E-03	0.0575	3.053E+13
C-14	5.7053E-09	1,066.723	2,133.445	0.00E+00	6.09E-06	1.22E-05	0.0850	1.839E+13
Cl-36	1.3124E-32	1,066.723	2,133.445	0.00E+00	1.40E-29	2.80E-29	0.1250	1.215E+13
Cm-243	1.1419E-07	1,066.723	2,133.445	0.00E+00	1.22E-04	2.44E-04	0.2250	1.588E+13
Cm-244	1.6522E-05	1,066.723	2,133.445	0.00E+00	1.76E-02	3.52E-02	0.3750	6.907E+12
Co-60	7.4047E-07	1,066.723	2,133.445	0.00E+00	7.90E-04	1.58E-03	0.5750	1.142E+14
Cs-134	2.0455E-05	1,066.723	2,133.445	0.00E+00	2.18E-02	4.36E-02	0.8500	1.395E+12
Cs-135	3.4477E-06	1,066.723	2,133.445	0.00E+00	3.68E-03	7.36E-03	1.2500	6.745E+11
Cs-137	1.4365E+00	1,066.723	2,133.445	0.00E+00	1.53E+03	3.06E+03	1.7500	3.797E+10
Eu-154	7.3230E-03	1,066.723	2,133.445	0.00E+00	7.81E+00	1.56E+01	2.2500	3.175E+06
Eu-155	5.9259E-04	1,066.723	2,133.445	0.00E+00	6.32E-01	1.26E+00	2.7500	3.029E+06
Fe-55	2.2791E-06	1,066.723	2,133.445	0.00E+00	2.43E-03	4.86E-03	3.5000	1.756E+03
H-3	1.9698E-03	1,066.723	2,133.445	0.00E+00	2.10E+00	4.20E+00	5.0000	7.174E+02
I-129	7.5300E-07	1,066.723	2,133.445	0.00E+00	8.03E-04	1.61E-03	7.0000	7.853E+01
Kr-85	4.1176E-02	1,066.723	2,133.445	0.00E+00	4.39E+01	8.78E+01	11.0000	8.755E+00
Np-237	9.5752E-06	1,066.723	2,133.445	0.00E+00	1.02E-02	2.04E-02		
Pa-231	3.9379E-09	1,066.723	2,133.445	0.00E+00	4.20E-06	8.40E-06		
Pb-210	3.3115E-10	1,066.723	2,133.445	0.00E+00	3.53E-07	7.07E-07		
Pm-147	9.2402E-04	1,066.723	2,133.445	0.00E+00	9.86E-01	1.97E+00		
Pu-238	1.6217E-02	1,066.723	2,133.445	0.00E+00	1.73E+01	3.46E+01		
Pu-239	4.2810E-04	1,066.723	2,133.445	0.00E+00	4.57E-01	9.13E-01		
Pu-240	2.4333E-04	1,066.723	2,133.445	0.00E+00	2.60E-01	5.19E-01		
Pu-241	1.6242E-02	1,066.723	2,133.445	0.00E+00	1.73E+01	3.47E+01		
Pu-242	3.6329E-07	1,066.723	2,133.445	0.00E+00	3.88E-04	7.75E-04		
Ra-226	9.0114E-10	1,066.723	2,133.445	0.00E+00	9.61E-07	1.92E-06		
Ra-228	3.1019E-14	1,066.723	2,133.445	0.00E+00	3.31E-11	6.62E-11		
Ru-106	2.1225E-10	1,066.723	2,133.445	0.00E+00	2.26E-07	4.53E-07		
Se-79	1.2930E-05	1,066.723	2,133.445	0.00E+00	1.38E-02	2.76E-02		
Sn-126	1.1571E-05	1,066.723	2,133.445	0.00E+00	1.23E-02	2.47E-02		
Sr-90	1.3472E+00	1,066.723	2,133.445	0.00E+00	1.44E+03	2.87E+03		
Tc-99	4.2239E-04	1,066.723	2,133.445	0.00E+00	4.51E-01	9.01E-01		
Th-229	1.2407E-11	1,066.723	2,133.445	0.00E+00	1.32E-08	2.65E-08		
Th-230	8.3497E-08	1,066.723	2,133.445	0.00E+00	8.91E-05	1.78E-04		
Th-232	3.8371E-14	1,066.723	2,133.445	0.00E+00	4.09E-11	8.19E-11		
Tl-208	4.0414E-08	1,066.723	2,133.445	0.00E+00	4.31E-05	8.62E-05		
U-232	1.0948E-07	1,066.723	2,133.445	0.00E+00	1.17E-04	2.34E-04		
U-233	3.6275E-09	1,066.723	2,133.445	0.00E+00	3.87E-06	7.74E-06		
U-234	1.8562E-04	1,066.723	2,133.445	0.00E+00	1.98E-01	3.96E-01		
U-235	-2.7235E-06	1,066.723	0.000	1.11E-02	8.22E-03	1.11E-02		
U-236	1.5493E-05	1,066.723	2,133.445	0.00E+00	1.65E-02	3.31E-02		
U-238	-4.2851E-09	1,066.723	0.000	1.93E-04	1.88E-04	1.93E-04		
Y-90	1.3475E+00	1,066.723	2,133.445	0.00E+00	1.44E+03	2.87E+03		
Other Radionuclides					1.46E+03	2.92E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.79E+01	3.57E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	89.96321383	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,066.723	
Bounding:		2,133.445	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.59		
Bounding:	1.18		

Estimated EOL HM/Given EOL HM: 1.01

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (ARGENTINA)
 SNF ID #: 636
 Fuel Units & Descr: 207 - 19 CURVED PLATES
 Heavy Metal Mass: BOL=37.84kg : EOL=30.14kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1987
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 8.63

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.0068E-09	7,292.428	14,584.856	0.00E+00	1.46E-05	2.93E-05	Avg. MeV	
Am-241	2.5251E-03	7,292.428	14,584.856	0.00E+00	1.84E+01	3.68E+01	0.0150	1.074E+15
Am-242m	3.9624E-07	7,292.428	14,584.856	0.00E+00	2.89E-03	5.78E-03	0.0250	2.231E+14
Am-243	1.4880E-06	7,292.428	14,584.856	0.00E+00	1.09E-02	2.17E-02	0.0375	1.939E+14
C-14	5.7053E-09	7,292.428	14,584.856	0.00E+00	4.16E-05	8.32E-05	0.0575	2.087E+14
Cl-36	1.3124E-32	7,292.428	14,584.856	0.00E+00	9.57E-29	1.91E-28	0.0850	1.257E+14
Cm-243	1.1419E-07	7,292.428	14,584.856	0.00E+00	8.33E-04	1.67E-03	0.1250	8.305E+13
Cm-244	1.6522E-05	7,292.428	14,584.856	0.00E+00	1.20E-01	2.41E-01	0.2250	1.086E+14
Co-60	7.4047E-07	7,292.428	14,584.856	0.00E+00	5.40E-03	1.08E-02	0.3750	4.722E+13
Cs-134	2.0455E-05	7,292.428	14,584.856	0.00E+00	1.49E-01	2.98E-01	0.5750	7.805E+14
Cs-135	3.4477E-06	7,292.428	14,584.856	0.00E+00	2.51E-02	5.03E-02	0.8500	9.533E+12
Cs-137	1.4365E+00	7,292.428	14,584.856	0.00E+00	1.05E+04	2.10E+04	1.2500	4.611E+12
Eu-154	7.3230E-03	7,292.428	14,584.856	0.00E+00	5.34E+01	1.07E+02	1.7500	2.596E+11
Eu-155	5.9259E-04	7,292.428	14,584.856	0.00E+00	4.32E+00	8.64E+00	2.2500	2.171E+07
Fe-55	2.2791E-06	7,292.428	14,584.856	0.00E+00	1.66E-02	3.32E-02	2.7500	2.071E+07
H-3	1.9698E-03	7,292.428	14,584.856	0.00E+00	1.44E+01	2.87E+01	3.5000	1.200E+04
I-129	7.5300E-07	7,292.428	14,584.856	0.00E+00	5.49E-03	1.10E-02	5.0000	4.904E+03
Kr-85	4.1176E-02	7,292.428	14,584.856	0.00E+00	3.00E+02	6.01E+02	7.0000	5.368E+02
Np-237	9.5752E-06	7,292.428	14,584.856	0.00E+00	6.98E-02	1.40E-01	11.0000	5.985E+01
Pa-231	3.9379E-09	7,292.428	14,584.856	0.00E+00	2.87E-05	5.74E-05		
Pb-210	3.3115E-10	7,292.428	14,584.856	0.00E+00	2.41E-06	4.83E-06		
Pm-147	9.2402E-04	7,292.428	14,584.856	0.00E+00	6.74E+00	1.35E+01		
Pu-238	1.6217E-02	7,292.428	14,584.856	0.00E+00	1.18E+02	2.37E+02		
Pu-239	4.2810E-04	7,292.428	14,584.856	0.00E+00	3.12E+00	6.24E+00		
Pu-240	2.4333E-04	7,292.428	14,584.856	0.00E+00	1.77E+00	3.55E+00		
Pu-241	1.6242E-02	7,292.428	14,584.856	0.00E+00	1.18E+02	2.37E+02		
Pu-242	3.6329E-07	7,292.428	14,584.856	0.00E+00	2.65E-03	5.30E-03		
Ra-226	9.0114E-10	7,292.428	14,584.856	0.00E+00	6.57E-06	1.31E-05		
Ra-228	3.1019E-14	7,292.428	14,584.856	0.00E+00	2.26E-10	4.52E-10		
Ru-106	2.1225E-10	7,292.428	14,584.856	0.00E+00	1.55E-06	3.10E-06		
Se-79	1.2930E-05	7,292.428	14,584.856	0.00E+00	9.43E-02	1.89E-01		
Sn-126	1.1571E-05	7,292.428	14,584.856	0.00E+00	8.44E-02	1.69E-01		
Sr-90	1.3472E+00	7,292.428	14,584.856	0.00E+00	9.82E+03	1.96E+04		
Tc-99	4.2239E-04	7,292.428	14,584.856	0.00E+00	3.08E+00	6.16E+00		
Th-229	1.2407E-11	7,292.428	14,584.856	0.00E+00	9.05E-08	1.81E-07		
Th-230	8.3497E-08	7,292.428	14,584.856	0.00E+00	6.09E-04	1.22E-03		
Th-232	3.8371E-14	7,292.428	14,584.856	0.00E+00	2.80E-10	5.60E-10		
Th-208	4.0414E-08	7,292.428	14,584.856	0.00E+00	2.95E-04	5.89E-04		
U-232	1.0948E-07	7,292.428	14,584.856	0.00E+00	7.98E-04	1.60E-03		
U-233	3.6275E-09	7,292.428	14,584.856	0.00E+00	2.65E-05	5.29E-05		
U-234	1.8562E-04	7,292.428	14,584.856	0.00E+00	1.35E+00	2.71E+00		
U-235	-2.7235E-06	7,292.428	0.000	7.36E-02	5.37E-02	7.36E-02		
U-236	1.5493E-05	7,292.428	14,584.856	0.00E+00	1.13E-01	2.26E-01		
U-238	-4.2851E-09	7,292.428	0.000	1.27E-03	1.24E-03	1.27E-03		
Y-90	1.3475E+00	7,292.428	14,584.856	0.00E+00	9.83E+03	1.97E+04		
Other Radionuclides					9.98E+03	2.00E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.22E+02	2.44E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	89.97773401	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		7,292.428	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		14,584.856	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.61		
Bounding:	1.22		

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

² Total burnup for all fuel associated with this worksheet must be 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 (CHLE)
 SNF ID #: 708
 Fuel Units & Descr: 58 - MTR TYPE
 Heavy Metal Mass: BOL=11.87kg ; EOL=8.00kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1999
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 2.42

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	C/MWd From Template	Nominal Fuel Burnup (MWd)²	Bounding Fuel Burnup (MWd)²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Avg. MeV	
Ac-227	1.1465E-09	3,669.132	7,338.264	0.00E+00	4.21E-06	8.41E-06	0.0150	6.867E+14
Am-241	2.3056E-03	3,669.132	7,338.264	0.00E+00	8.46E+00	1.69E+01	0.0250	1.427E+14
Am-242m	4.1476E-07	3,669.132	7,338.264	0.00E+00	1.52E-03	3.04E-03	0.0375	1.242E+14
Am-243	1.4894E-06	3,669.132	7,338.264	0.00E+00	5.46E-03	1.09E-02	0.0575	1.334E+14
C-14	5.7108E-09	3,669.132	7,338.264	0.00E+00	2.10E-05	4.19E-05	0.0850	8.049E+13
Ci-36	1.3124E-32	3,669.132	7,338.264	0.00E+00	4.82E-29	9.63E-29	0.1250	5.391E+13
Cm-243	1.4562E-07	3,669.132	7,338.264	0.00E+00	5.34E-04	1.07E-03	0.2250	6.949E+13
Cm-244	2.4221E-05	3,669.132	7,338.264	0.00E+00	8.89E-02	1.78E-01	0.3750	3.021E+13
Co-60	2.7560E-06	3,669.132	7,338.264	0.00E+00	1.01E-02	2.02E-02	0.5750	4.953E+14
Cs-134	5.8851E-04	3,669.132	7,338.264	0.00E+00	2.16E+00	4.32E+00	0.8500	7.137E+12
Cs-135	3.4477E-06	3,669.132	7,338.264	0.00E+00	1.27E-02	2.53E-02	1.2500	3.969E+12
Cs-137	1.8099E+00	3,669.132	7,338.264	0.00E+00	6.64E+03	1.33E+04	1.7500	1.961E+11
Eu-154	1.6386E-02	3,669.132	7,338.264	0.00E+00	6.01E+01	1.20E+02	2.2500	1.398E+07
Eu-155	2.3957E-03	3,669.132	7,338.264	0.00E+00	8.79E+00	1.76E+01	2.7500	1.144E+07
Fe-55	3.2707E-05	3,669.132	7,338.264	0.00E+00	1.20E-01	2.40E-01	3.5000	8.640E+03
H-3	3.4504E-03	3,669.132	7,338.264	0.00E+00	1.27E+01	2.53E+01	5.0000	2.905E+03
I-129	7.5300E-07	3,669.132	7,338.264	0.00E+00	2.76E-03	5.53E-03	7.0000	3.198E+02
Kr-85	7.8540E-02	3,669.132	7,338.264	0.00E+00	2.88E+02	5.76E+02	11.0000	3.577E+01
Np-237	9.5615E-06	3,669.132	7,338.264	0.00E+00	3.51E-02	7.02E-02		
Pa-231	2.7968E-09	3,669.132	7,338.264	0.00E+00	1.03E-05	2.05E-05		
Pb-210	1.2612E-10	3,669.132	7,338.264	0.00E+00	4.63E-07	9.25E-07		
Pm-147	1.2952E-02	3,669.132	7,338.264	0.00E+00	4.75E+01	9.50E+01		
Pu-238	1.7549E-02	3,669.132	7,338.264	0.00E+00	6.44E+01	1.29E+02		
Pu-239	4.2810E-04	3,669.132	7,338.264	0.00E+00	1.57E+00	3.14E+00		
Pu-240	2.4357E-04	3,669.132	7,338.264	0.00E+00	8.94E-01	1.79E+00		
Pu-241	2.6277E-02	3,669.132	7,338.264	0.00E+00	9.64E+01	1.93E+02		
Pu-242	3.6329E-07	3,669.132	7,338.264	0.00E+00	1.33E-03	2.67E-03		
Ra-226	4.4444E-10	3,669.132	7,338.264	0.00E+00	1.63E-06	3.26E-06		
Ra-228	1.9714E-14	3,669.132	7,338.264	0.00E+00	7.23E-11	1.45E-10		
Ru-106	2.0477E-07	3,669.132	7,338.264	0.00E+00	7.51E-04	1.50E-03		
Se-79	1.2933E-05	3,669.132	7,338.264	0.00E+00	4.75E-02	9.49E-02		
Sn-126	1.1574E-05	3,669.132	7,338.264	0.00E+00	4.25E-02	8.49E-02		
Sr-90	1.7092E+00	3,669.132	7,338.264	0.00E+00	6.27E+03	1.25E+04		
Tc-99	4.2239E-04	3,669.132	7,338.264	0.00E+00	1.55E+00	3.10E+00		
Th-229	7.7260E-12	3,669.132	7,338.264	0.00E+00	2.83E-08	5.67E-08		
Th-230	5.8497E-08	3,669.132	7,338.264	0.00E+00	2.15E-04	4.29E-04		
Th-232	2.6906E-14	3,669.132	7,338.264	0.00E+00	9.87E-11	1.97E-10		
Ti-208	4.4336E-08	3,669.132	7,338.264	0.00E+00	1.63E-04	3.25E-04		
U-232	1.2037E-07	3,669.132	7,338.264	0.00E+00	4.42E-04	8.83E-04		
U-233	3.0011E-09	3,669.132	7,338.264	0.00E+00	1.10E-05	2.20E-05		
U-234	1.8497E-04	3,669.132	7,338.264	0.00E+00	6.79E-01	1.36E+00		
U-235	-2.7235E-06	3,669.132	0.000	2.05E-02	1.05E-02	2.05E-02		
U-236	1.5493E-05	3,669.132	7,338.264	0.00E+00	5.68E-02	1.14E-01		
U-238	-4.2851E-09	3,669.132	0.000	7.98E-04	7.83E-04	7.98E-04		
Y-90	1.7094E+00	3,669.132	7,338.264	0.00E+00	6.27E+03	1.25E+04		
Other Radionuclides					6.32E+03	1.26E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.76E+01	1.55E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	79.9939132	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		3,669.132	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		7,338.264	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.98		
Bounding:	1.96		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: RERTR MINIPLATES
 SNF ID #: 1090
 Fuel Units & Descr: 50 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL= : EOL= 35kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1980
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 50 years

Estimated
 Canister usage:
 HIC
 1.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.9739E-09	77.785	155.569	0.00E+00	2.31E-07	4.63E-07	Avg. MeV	
Am-241	2.5986E-03	77.785	155.569	0.00E+00	2.02E-01	4.04E-01	0.0150	8.015E+12
Am-242m	3.7010E-07	77.785	155.569	0.00E+00	2.88E-05	5.76E-05	0.0250	1.664E+12
Am-243	1.4858E-06	77.785	155.569	0.00E+00	1.16E-04	2.31E-04	0.0375	1.446E+12
C-14	5.6944E-09	77.785	155.569	0.00E+00	4.43E-07	8.86E-07	0.0575	1.558E+12
Cl-36	1.3124E-32	77.785	155.569	0.00E+00	1.02E-30	2.04E-30	0.0850	9.374E+11
Cm-243	7.9303E-08	77.785	155.569	0.00E+00	6.17E-06	1.23E-05	0.1250	6.125E+11
Cm-244	9.3083E-06	77.785	155.569	0.00E+00	7.24E-04	1.45E-03	0.2250	8.086E+11
Co-60	1.0310E-07	77.785	155.569	0.00E+00	8.02E-06	1.60E-05	0.3750	3.522E+11
Cs-134	1.3254E-07	77.785	155.569	0.00E+00	1.03E-05	2.06E-05	0.5750	5.885E+11
Cs-135	3.4477E-06	77.785	155.569	0.00E+00	2.68E-04	5.36E-04	0.8500	6.305E+11
Cs-137	1.0161E+00	77.785	155.569	0.00E+00	7.90E+01	1.58E+02	1.2500	2.550E+10
Eu-154	2.1879E-03	77.785	155.569	0.00E+00	1.70E-01	3.40E-01	1.7500	1.671E+09
Eu-155	7.2930E-05	77.785	155.569	0.00E+00	5.67E-03	1.13E-02	2.2500	1.620E+05
Fe-55	4.1912E-08	77.785	155.569	0.00E+00	3.26E-06	6.52E-06	2.7500	1.913E+05
H-3	8.4913E-04	77.785	155.569	0.00E+00	6.60E-02	1.32E-01	3.5000	1.049E+02
I-129	7.5300E-07	77.785	155.569	0.00E+00	5.86E-05	1.17E-04	5.0000	4.267E+01
Kr-85	1.5615E-02	77.785	155.569	0.00E+00	1.21E+00	2.43E+00	7.0000	4.640E+00
Np-237	9.5861E-06	77.785	155.569	0.00E+00	7.46E-04	1.49E-03	11.0000	5.154E-01
Pa-231	5.0790E-09	77.785	155.569	0.00E+00	3.95E-07	7.90E-07		
Pb-210	6.6176E-10	77.785	155.569	0.00E+00	5.15E-08	1.03E-07		
Pm-147	1.7606E-05	77.785	155.569	0.00E+00	1.37E-03	2.74E-03		
Pu-238	1.4406E-02	77.785	155.569	0.00E+00	1.12E+00	2.24E+00		
Pu-239	4.2783E-04	77.785	155.569	0.00E+00	3.33E-02	6.66E-02		
Pu-240	2.4297E-04	77.785	155.569	0.00E+00	1.89E-02	3.78E-02		
Pu-241	7.8949E-03	77.785	155.569	0.00E+00	6.14E-01	1.23E+00		
Pu-242	3.6329E-07	77.785	155.569	0.00E+00	2.83E-05	5.65E-05		
Ra-226	1.5169E-09	77.785	155.569	0.00E+00	1.18E-07	2.36E-07		
Ra-228	4.2429E-14	77.785	155.569	0.00E+00	3.30E-12	6.60E-12		
Ru-106	7.0833E-15	77.785	155.569	0.00E+00	5.51E-13	1.10E-12		
Se-79	1.2928E-05	77.785	155.569	0.00E+00	1.01E-03	2.01E-03		
Sn-126	1.1571E-05	77.785	155.569	0.00E+00	9.00E-04	1.80E-03		
Sr-90	9.4308E-01	77.785	155.569	0.00E+00	7.34E+01	1.47E+02		
Tc-99	4.2239E-04	77.785	155.569	0.00E+00	3.29E-02	6.57E-02		
Th-229	1.7968E-11	77.785	155.569	0.00E+00	1.40E-09	2.80E-09		
Th-230	1.0855E-07	77.785	155.569	0.00E+00	8.44E-06	1.69E-05		
Th-232	4.9809E-14	77.785	155.569	0.00E+00	3.87E-12	7.75E-12		
Th-208	3.4995E-08	77.785	155.569	0.00E+00	2.72E-06	5.44E-06		
U-232	9.4798E-08	77.785	155.569	0.00E+00	7.37E-06	1.47E-05		
U-233	4.2538E-09	77.785	155.569	0.00E+00	3.31E-07	6.62E-07		
U-234	1.8617E-04	77.785	155.569	0.00E+00	1.45E-02	2.90E-02		
U-235	-2.7235E-06	77.785	0.000	8.60E-04	6.48E-04	8.60E-04		
U-236	1.5493E-05	77.785	155.569	0.00E+00	1.21E-03	2.41E-03		
U-238	-4.2851E-09	77.785	0.000	8.70E-06	8.37E-06	8.70E-06		
Y-90	9.4308E-01	77.785	155.569	0.00E+00	7.34E+01	1.47E+02		
Other Radionuclides					7.54E+01	1.51E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.22E-01	1.84E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U METAL	U	
BOL Enrichment %:		60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		77.785	Nominal burnup taken from SFD and converted to MWd using BOL= 432kg Bounding burnup assumed to be twice nominal burnup.
Bounding:		155.569	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.57	
Bounding:	1.14	
		Estimated EOL HM/ Given EOL HM
		0.99

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: RESIDUE FAILED PBF RODS
 SNF ID #: 381
 Fuel Units & Desc: 1 - DEBRIS
 Heavy Metal Mass: BOL = ; EOL=1.11kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1985
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
³Template Decay Time: 35 years

Estimated
 Canister usage:
 HIC
 1.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.3344E-08	1,047.614	1,047.614	0.00E+00	2.45E-05	2.45E-05	0.0150	7.819E+13
Am-241	1.1135E-04	1,047.614	1,047.614	0.00E+00	1.17E-01	1.17E-01	0.0250	1.625E+13
Am-242m	8.5075E-09	1,047.614	1,047.614	0.00E+00	8.91E-06	8.91E-06	0.0375	1.405E+13
Am-243	9.8519E-10	1,047.614	1,047.614	0.00E+00	1.03E-06	1.03E-06	0.0575	1.515E+13
C-14	2.3012E-04	1,047.614	1,047.614	0.00E+00	2.41E-01	2.41E-01	0.0850	9.153E+12
Cl-36	1.2261E-06	1,047.614	1,047.614	0.00E+00	1.28E-03	1.28E-03	0.1250	5.943E+12
Cm-243	2.4875E-10	1,047.614	1,047.614	0.00E+00	2.61E-07	2.61E-07	0.2250	7.879E+12
Cm-244	2.3178E-09	1,047.614	1,047.614	0.00E+00	2.43E-06	2.43E-06	0.3750	3.436E+12
Co-60	7.0849E-02	1,047.614	1,047.614	0.00E+00	7.42E+01	7.42E+01	0.5750	5.661E+13
Cs-134	3.0266E-06	1,047.614	1,047.614	0.00E+00	3.17E-03	3.17E-03	0.8500	5.730E+11
Cs-135	3.0316E-05	1,047.614	1,047.614	0.00E+00	3.18E-02	3.18E-02	1.2500	5.696E+12
Cs-137	1.4511E+00	1,047.614	1,047.614	0.00E+00	1.52E+03	1.52E+03	1.7500	1.478E+10
Eu-154	6.6955E-04	1,047.614	1,047.614	0.00E+00	7.01E-01	7.01E-01	2.2500	3.069E+07
Eu-155	6.9850E-04	1,047.614	1,047.614	0.00E+00	7.32E-01	7.32E-01	2.7500	8.870E+05
Fe-55	1.2318E-03	1,047.614	1,047.614	0.00E+00	1.29E+00	1.29E+00	3.5000	6.255E+01
H-3	2.5141E-03	1,047.614	1,047.614	0.00E+00	2.63E+00	2.63E+00	5.0000	2.572E+01
I-129	7.3195E-07	1,047.614	1,047.614	0.00E+00	7.67E-04	7.67E-04	7.0000	2.840E+00
Kr-85	4.1281E-02	1,047.614	1,047.614	0.00E+00	4.32E+01	4.32E+01	11.0000	3.187E-01
Np-237	1.1489E-06	1,047.614	1,047.614	0.00E+00	1.20E-03	1.20E-03		
Pa-231	4.5241E-08	1,047.614	1,047.614	0.00E+00	4.74E-05	4.74E-05		
Pb-210	6.4476E-13	1,047.614	1,047.614	0.00E+00	6.75E-10	6.75E-10		
Pm-147	1.1651E-03	1,047.614	1,047.614	0.00E+00	1.22E+00	1.22E+00		
Pu-238	2.9517E-04	1,047.614	1,047.614	0.00E+00	3.09E-01	3.09E-01		
Pu-239	6.6772E-04	1,047.614	1,047.614	0.00E+00	7.00E-01	7.00E-01		
Pu-240	8.6839E-05	1,047.614	1,047.614	0.00E+00	9.10E-02	9.10E-02		
Pu-241	7.1514E-04	1,047.614	1,047.614	0.00E+00	7.49E-01	7.49E-01		
Pu-242	1.9717E-09	1,047.614	1,047.614	0.00E+00	2.07E-06	2.07E-06		
Ra-226	1.7654E-12	1,047.614	1,047.614	0.00E+00	1.85E-09	1.85E-09		
Ra-228	8.2928E-12	1,047.614	1,047.614	0.00E+00	8.69E-09	8.69E-09		
Ru-106	1.8419E-10	1,047.614	1,047.614	0.00E+00	1.93E-07	1.93E-07		
Se-79	1.3223E-05	1,047.614	1,047.614	0.00E+00	1.39E-02	1.39E-02		
Sn-126	1.1493E-05	1,047.614	1,047.614	0.00E+00	1.20E-02	1.20E-02		
Sr-90	1.3649E+00	1,047.614	1,047.614	0.00E+00	1.43E+03	1.43E+03		
Tc-99	4.6656E-04	1,047.614	1,047.614	0.00E+00	4.89E-01	4.89E-01		
Th-229	1.4547E-11	1,047.614	1,047.614	0.00E+00	1.52E-08	1.52E-08		
Th-230	1.6617E-10	1,047.614	1,047.614	0.00E+00	1.74E-07	1.74E-07		
Th-232	8.3361E-12	1,047.614	1,047.614	0.00E+00	8.73E-09	8.73E-09		
Tl-208	2.1664E-08	1,047.614	1,047.614	0.00E+00	2.27E-05	2.27E-05		
U-232	5.8669E-08	1,047.614	1,047.614	0.00E+00	6.15E-05	6.15E-05		
U-233	3.1847E-09	1,047.614	1,047.614	0.00E+00	3.34E-06	3.34E-06		
U-234	3.8769E-07	1,047.614	1,047.614	0.00E+00	4.06E-04	4.06E-04		
U-235	2.7761E-06	1,047.614	0.000	4.48E-03	1.57E-03	4.48E-03		
U-236	1.6190E-05	1,047.614	1,047.614	0.00E+00	1.70E-02	1.70E-02		
U-238	2.8547E-09	1,047.614	0.000	4.84E-05	4.54E-05	4.84E-05		
Y-90	1.3652E+00	1,047.614	1,047.614	0.00E+00	1.43E+03	1.43E+03		
Other Radionuclides					1.73E+03	1.73E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	SST	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 1,047.614	Estimated: 1,047.614	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		1,047.614	

Checks		
Nominal:	Burnup Multiplier: 10.12	Estimated Burnup/Given Burnup: 1.02
Bounding:	10.12	

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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=36.90kg ; EOL=25.51kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1989
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.67

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.0068E-09	10,786.551	21,573.102	0.00E+00	2.16E-05	4.33E-05	Avg. MeV	
Am-241	2.5251E-03	10,786.551	21,573.102	0.00E+00	2.72E+01	5.45E+01	0.0150	1.589E+15
Am-242m	3.9624E-07	10,786.551	21,573.102	0.00E+00	4.27E-03	8.55E-03	0.0250	3.299E+14
Am-243	1.4880E-06	10,786.551	21,573.102	0.00E+00	1.61E-02	3.21E-02	0.0375	2.868E+14
C-14	5.7053E-09	10,786.551	21,573.102	0.00E+00	6.15E-05	1.23E-04	0.0575	3.087E+14
Cf-252	1.3124E-32	10,786.551	21,573.102	0.00E+00	1.42E-28	2.83E-28	0.0850	1.860E+14
Cm-243	1.1419E-07	10,786.551	21,573.102	0.00E+00	1.23E-03	2.46E-03	0.1250	1.228E+14
Cm-244	1.6522E-05	10,786.551	21,573.102	0.00E+00	1.78E-01	3.56E-01	0.2250	1.606E+14
Co-60	7.4047E-07	10,786.551	21,573.102	0.00E+00	7.99E-03	1.60E-02	0.3750	6.985E+13
Cs-134	2.0455E-05	10,786.551	21,573.102	0.00E+00	2.21E-01	4.41E-01	0.5750	1.154E+15
Cs-135	3.4477E-06	10,786.551	21,573.102	0.00E+00	3.72E-02	7.44E-02	0.8500	1.410E+13
Cs-137	1.4365E+00	10,786.551	21,573.102	0.00E+00	1.55E+04	3.10E+04	1.2500	6.821E+12
Eu-154	7.3230E-03	10,786.551	21,573.102	0.00E+00	7.90E+01	1.58E+02	1.7500	3.840E+11
Eu-155	5.9259E-04	10,786.551	21,573.102	0.00E+00	6.39E+00	1.28E+01	2.2500	3.211E+07
Fe-55	2.2791E-06	10,786.551	21,573.102	0.00E+00	2.46E-02	4.92E-02	2.7500	3.063E+07
H-3	1.9698E-03	10,786.551	21,573.102	0.00E+00	2.12E+01	4.25E+01	3.5000	1.775E+04
I-129	7.5300E-07	10,786.551	21,573.102	0.00E+00	8.12E-03	1.62E-02	5.0000	7.251E+03
Kr-85	4.1176E-02	10,786.551	21,573.102	0.00E+00	4.44E+02	8.88E+02	7.0000	7.937E+02
Np-237	9.5752E-06	10,786.551	21,573.102	0.00E+00	1.03E-01	2.07E-01	11.0000	8.849E+01
Pa-231	3.9379E-09	10,786.551	21,573.102	0.00E+00	4.25E-05	8.50E-05		
Pb-210	3.3115E-10	10,786.551	21,573.102	0.00E+00	3.57E-06	7.14E-06		
Pm-147	9.2402E-04	10,786.551	21,573.102	0.00E+00	9.97E+00	1.99E+01		
Pu-238	1.6217E-02	10,786.551	21,573.102	0.00E+00	1.75E+02	3.50E+02		
Pu-239	4.2810E-04	10,786.551	21,573.102	0.00E+00	4.62E+00	9.24E+00		
Pu-240	2.4333E-04	10,786.551	21,573.102	0.00E+00	2.62E+00	5.25E+00		
Pu-241	1.6242E-02	10,786.551	21,573.102	0.00E+00	1.75E+02	3.50E+02		
Pu-242	3.6329E-07	10,786.551	21,573.102	0.00E+00	3.92E-03	7.84E-03		
Ra-226	9.0114E-10	10,786.551	21,573.102	0.00E+00	9.72E-06	1.94E-05		
Ra-228	3.1019E-14	10,786.551	21,573.102	0.00E+00	3.35E-10	6.69E-10		
Ru-106	2.1225E-10	10,786.551	21,573.102	0.00E+00	2.29E-06	4.58E-06		
Se-79	1.2930E-05	10,786.551	21,573.102	0.00E+00	1.39E-01	2.79E-01		
Sn-126	1.1571E-05	10,786.551	21,573.102	0.00E+00	1.25E-01	2.50E-01		
Sr-90	1.3472E+00	10,786.551	21,573.102	0.00E+00	1.45E+04	2.91E+04		
Tc-99	4.2239E-04	10,786.551	21,573.102	0.00E+00	4.56E+00	9.11E+00		
Th-229	1.2407E-11	10,786.551	21,573.102	0.00E+00	1.34E-07	2.68E-07		
Th-230	8.3497E-08	10,786.551	21,573.102	0.00E+00	9.01E-04	1.80E-03		
Th-232	3.8371E-14	10,786.551	21,573.102	0.00E+00	4.14E-10	8.28E-10		
Tl-208	4.0414E-08	10,786.551	21,573.102	0.00E+00	4.36E-04	8.72E-04		
U-232	1.0948E-07	10,786.551	21,573.102	0.00E+00	1.18E-03	2.36E-03		
U-233	3.6275E-09	10,786.551	21,573.102	0.00E+00	3.91E-05	7.83E-05		
U-234	1.8562E-04	10,786.551	21,573.102	0.00E+00	2.00E+00	4.00E+00		
U-235	-2.7235E-06	10,786.551	0.000	7.41E-02	4.48E-02	7.41E-02		
U-236	1.5493E-05	10,786.551	21,573.102	0.00E+00	1.67E-01	3.34E-01		
U-238	-4.2851E-09	10,786.551	0.000	8.72E-04	8.26E-04	8.72E-04		
Y-90	1.3475E+00	10,786.551	21,573.102	0.00E+00	1.45E+04	2.91E+04		
Other Radionuclides					1.48E+04	2.95E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.81E+02	3.61E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.97018459	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		10,786.551	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		21,573.102	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.93		1.03
Bounding:	1.86		

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

²Total burnup for all fuel associated with this worksheet must be 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 & Desc: 44 - 18 FLAT PLATES
 Heavy Metal Mass: BOL=61.12kg ; EOL=60.46kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 1.83

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
								Avg. MeV
Ac-227	1.4545E-10	620.866	1,241.732	0.00E+00	9.03E-08	1.81E-07		
Am-241	1.1190E-03	620.866	1,241.732	0.00E+00	6.95E-01	1.39E+00	0.0150	2.396E+14
Am-242m	4.5425E-07	620.866	1,241.732	0.00E+00	2.82E-04	5.64E-04	0.0250	5.161E+13
Am-243	1.4921E-06	620.866	1,241.732	0.00E+00	9.26E-04	1.85E-03	0.0375	4.763E+13
C-14	5.7244E-09	620.866	1,241.732	0.00E+00	3.55E-06	7.11E-06	0.0575	4.683E+13
Cl-36	1.3124E-32	620.866	1,241.732	0.00E+00	8.15E-30	1.63E-29	0.0850	2.985E+13
Cm-243	2.3676E-07	620.866	1,241.732	0.00E+00	1.47E-04	2.94E-04	0.1250	2.585E+13
Cm-244	5.2042E-05	620.866	1,241.732	0.00E+00	3.23E-02	6.46E-02	0.2250	2.530E+13
Co-60	3.8208E-05	620.866	1,241.732	0.00E+00	2.37E-02	4.74E-02	0.3750	1.225E+13
Cs-134	4.8693E-01	620.866	1,241.732	0.00E+00	3.02E+02	6.05E+02	0.5750	1.682E+14
Cs-135	3.4477E-06	620.866	1,241.732	0.00E+00	2.14E-03	4.28E-03	0.8500	2.356E+13
Cs-137	2.8731E+00	620.866	1,241.732	0.00E+00	1.78E+03	3.57E+03	1.2500	4.383E+13
Eu-154	8.2053E-02	620.866	1,241.732	0.00E+00	5.09E+01	1.02E+02	1.7500	1.838E+11
Eu-155	3.9134E-02	620.866	1,241.732	0.00E+00	2.43E+01	4.86E+01	2.2500	3.856E+11
Fe-55	6.7429E-03	620.866	1,241.732	0.00E+00	4.19E+00	8.37E+00	2.7500	2.218E+09
H-3	1.0599E-02	620.866	1,241.732	0.00E+00	6.58E+00	1.32E+01	3.5000	2.461E+08
I-129	7.5300E-07	620.866	1,241.732	0.00E+00	4.68E-04	9.35E-04	5.0000	7.734E+02
Kr-85	2.8595E-01	620.866	1,241.732	0.00E+00	1.78E+02	3.55E+02	7.0000	8.637E+01
Np-237	9.5479E-06	620.866	1,241.732	0.00E+00	5.93E-03	1.19E-02	11.0000	9.745E+00
Pa-231	8.9297E-10	620.866	1,241.732	0.00E+00	5.54E-07	1.11E-06		
Pb-210	3.7609E-12	620.866	1,241.732	0.00E+00	2.34E-09	4.67E-09		
Pm-147	2.5452E+00	620.866	1,241.732	0.00E+00	1.58E+03	3.16E+03		
Pu-238	2.0550E-02	620.866	1,241.732	0.00E+00	1.28E+01	2.55E+01		
Pu-239	4.2838E-04	620.866	1,241.732	0.00E+00	2.66E-01	5.32E-01		
Pu-240	2.4401E-04	620.866	1,241.732	0.00E+00	1.51E-01	3.03E-01		
Pu-241	6.8764E-02	620.866	1,241.732	0.00E+00	4.27E+01	8.54E+01		
Pu-242	3.6329E-07	620.866	1,241.732	0.00E+00	2.26E-04	4.51E-04		
Ra-226	3.8045E-11	620.866	1,241.732	0.00E+00	2.36E-08	4.72E-08		
Ra-228	2.9902E-15	620.866	1,241.732	0.00E+00	1.86E-12	3.71E-12		
Ru-106	1.9055E-01	620.866	1,241.732	0.00E+00	1.18E+02	2.37E+02		
Se-79	1.2936E-05	620.866	1,241.732	0.00E+00	8.03E-03	1.61E-02		
Sn-126	1.1574E-05	620.866	1,241.732	0.00E+00	7.19E-03	1.44E-02		
Sr-90	2.7505E+00	620.866	1,241.732	0.00E+00	1.71E+03	3.42E+03		
Tc-99	4.2239E-04	620.866	1,241.732	0.00E+00	2.62E-01	5.24E-01		
Th-229	1.8848E-12	620.866	1,241.732	0.00E+00	1.17E-09	2.34E-09		
Th-230	1.7042E-08	620.866	1,241.732	0.00E+00	1.06E-05	2.12E-05		
Th-232	7.8132E-15	620.866	1,241.732	0.00E+00	4.85E-12	9.70E-12		
Ti-208	4.4063E-08	620.866	1,241.732	0.00E+00	2.74E-05	5.47E-05		
U-232	1.3151E-07	620.866	1,241.732	0.00E+00	8.16E-05	1.63E-04		
U-233	1.9564E-09	620.866	1,241.732	0.00E+00	1.21E-06	2.43E-06		
U-234	1.8371E-04	620.866	1,241.732	0.00E+00	1.14E-01	2.28E-01		
U-235	-2.7235E-06	620.866	0.000	2.61E-02	2.44E-02	2.61E-02		
U-236	1.5493E-05	620.866	1,241.732	0.00E+00	9.62E-03	1.92E-02		
U-238	-4.2851E-09	620.866	0.000	1.65E-02	1.65E-02	1.65E-02		
Y-90	2.7505E+00	620.866	1,241.732	0.00E+00	1.71E+03	3.42E+03		
Other Radionuclides					3.19E+03	6.39E+03		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.7728395	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		620.866	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,241.732	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.03		1.00
Bounding:	0.06		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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=9.37kg ; EOL=8.50kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1992
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18" x 10"
 1.94

II. Estimates

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.0068E-09	822.013	1,644.026	0.00E+00	1.65E-06	3.30E-06	Avg. MeV	
Am-241	2.5251E-03	822.013	1,644.026	0.00E+00	2.08E+00	4.15E+00	0.0150	1.211E+14
Am-242m	3.9624E-07	822.013	1,644.026	0.00E+00	3.26E-04	6.51E-04	0.0250	2.514E+13
Am-243	1.4880E-06	822.013	1,644.026	0.00E+00	1.22E-03	2.45E-03	0.0375	2.186E+13
C-14	5.7053E-09	822.013	1,644.026	0.00E+00	4.69E-06	9.38E-06	0.0575	2.352E+13
Cl-36	1.3124E-32	822.013	1,644.026	0.00E+00	1.08E-29	2.16E-29	0.0850	1.417E+13
Cm-243	1.1419E-07	822.013	1,644.026	0.00E+00	9.39E-05	1.88E-04	0.1250	9.362E+12
Cm-244	1.6522E-05	822.013	1,644.026	0.00E+00	1.36E-02	2.72E-02	0.2250	1.224E+13
Co-60	7.4047E-07	822.013	1,644.026	0.00E+00	6.09E-04	1.22E-03	0.3750	5.323E+12
Cs-134	2.0455E-05	822.013	1,644.026	0.00E+00	1.68E-02	3.36E-02	0.5750	8.798E+13
Cs-135	3.4477E-06	822.013	1,644.026	0.00E+00	2.83E-03	5.67E-03	0.8500	1.075E+12
Cs-137	1.4365E-00	822.013	1,644.026	0.00E+00	1.18E+03	2.36E+03	1.2500	5.198E+11
Eu-154	7.3230E-03	822.013	1,644.026	0.00E+00	6.02E+00	1.20E+01	1.7500	2.926E+10
Eu-155	5.9259E-04	822.013	1,644.026	0.00E+00	4.87E-01	9.74E-01	2.2500	2.447E+06
Fe-55	2.2791E-06	822.013	1,644.026	0.00E+00	1.87E-03	3.75E-03	2.7500	2.334E+06
H-3	1.9698E-03	822.013	1,644.026	0.00E+00	1.62E+00	3.24E+00	3.5000	1.354E+03
I-129	7.5300E-07	822.013	1,644.026	0.00E+00	6.19E-04	1.24E-03	5.0000	5.531E+02
Kr-85	4.1176E-02	822.013	1,644.026	0.00E+00	3.38E+01	6.77E+01	7.0000	6.054E+01
Np-237	9.5752E-06	822.013	1,644.026	0.00E+00	7.87E-03	1.57E-02	11.0000	6.750E+00
Pa-231	3.9379E-09	822.013	1,644.026	0.00E+00	3.24E-06	6.47E-06		
Pb-210	3.3115E-10	822.013	1,644.026	0.00E+00	2.72E-07	5.44E-07		
Pm-147	9.2402E-04	822.013	1,644.026	0.00E+00	7.60E-01	1.52E+00		
Pu-238	1.6217E-02	822.013	1,644.026	0.00E+00	1.33E+01	2.67E+01		
Pu-239	4.2810E-04	822.013	1,644.026	0.00E+00	3.52E-01	7.04E-01		
Pu-240	2.4333E-04	822.013	1,644.026	0.00E+00	2.00E-01	4.00E-01		
Pu-241	1.6242E-02	822.013	1,644.026	0.00E+00	1.34E+01	2.67E+01		
Pu-242	3.6329E-07	822.013	1,644.026	0.00E+00	2.99E-04	5.97E-04		
Ra-226	9.0114E-10	822.013	1,644.026	0.00E+00	7.41E-07	1.48E-06		
Ra-228	3.1019E-14	822.013	1,644.026	0.00E+00	2.55E-11	5.10E-11		
Ru-106	2.1225E-10	822.013	1,644.026	0.00E+00	1.74E-07	3.49E-07		
Se-79	1.2930E-05	822.013	1,644.026	0.00E+00	1.06E-02	2.13E-02		
Sn-126	1.1571E-05	822.013	1,644.026	0.00E+00	9.51E-03	1.90E-02		
Sr-90	1.3472E+00	822.013	1,644.026	0.00E+00	1.11E+03	2.21E+03		
Tc-99	4.2239E-04	822.013	1,644.026	0.00E+00	3.47E-01	6.94E-01		
Th-229	1.2407E-11	822.013	1,644.026	0.00E+00	1.02E-08	2.04E-08		
Th-230	8.3497E-08	822.013	1,644.026	0.00E+00	6.86E-05	1.37E-04		
Th-232	3.8371E-14	822.013	1,644.026	0.00E+00	3.15E-11	6.31E-11		
Tl-208	4.0414E-08	822.013	1,644.026	0.00E+00	3.32E-05	6.64E-05		
U-232	1.0948E-07	822.013	1,644.026	0.00E+00	9.00E-05	1.80E-04		
U-233	3.6275E-09	822.013	1,644.026	0.00E+00	2.98E-06	5.96E-06		
U-234	1.8562E-04	822.013	1,644.026	0.00E+00	1.53E-01	3.05E-01		
U-235	-2.7235E-06	822.013	0.000	1.89E-02	1.66E-02	1.89E-02		
U-236	1.5493E-05	822.013	1,644.026	0.00E+00	1.27E-02	2.55E-02		
U-238	-4.2851E-09	822.013	0.000	2.16E-04	2.13E-04	2.16E-04		
Y-90	1.3475E+00	822.013	1,644.026	0.00E+00	1.11E+03	2.22E+03		
Other Radionuclides					1.12E+03	2.25E+03		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.13598185	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		822.013	
Bounding:	37.464	1,644.026	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.28		1.01
Bounding:	0.56	43.88	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: ROBERT E. GINNA
 SNF ID #: 182
 Fuel Units & Descr: 40 - 14 X 14 ROD ARRAY
 Heavy Metal Mass: BOL=15287.20kg ; EOL=15126.93kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1972
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc. 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 PWR
 1.00

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.0733E-09	154,660.602	304,822.182	0.00E+00	1.66E-04	3.27E-04	Avg. MeV	
Am-241	1.4751E-01	154,660.602	304,822.182	0.00E+00	2.28E+04	4.50E+04	0.0150	1.160E+16
Am-242m	2.6809E-04	154,660.602	304,822.182	0.00E+00	4.15E+01	8.17E+01	0.0250	2.324E+15
Am-243	6.2484E-04	154,660.602	304,822.182	0.00E+00	9.66E+01	1.90E+02	0.0375	2.190E+15
C-14	4.7820E-05	154,660.602	304,822.182	0.00E+00	7.40E+00	1.46E+01	0.0575	2.741E+15
Cl-36	8.0297E-07	154,660.602	304,822.182	0.00E+00	1.24E-01	2.45E-01	0.0850	1.281E+15
Cr-243	1.7426E-04	154,660.602	304,822.182	0.00E+00	2.70E+01	5.31E+01	0.1250	8.520E+14
Cr-244	2.7616E-02	154,660.602	304,822.182	0.00E+00	4.27E+03	8.42E+03	0.2250	1.093E+15
Co-60	3.5610E-04	154,660.602	304,822.182	0.00E+00	5.51E+01	1.09E+02	0.3750	4.722E+14
Cs-134	2.6260E-07	154,660.602	304,822.182	0.00E+00	4.06E-02	8.00E-02	0.5750	1.112E+16
Cs-135	1.4433E-05	154,660.602	304,822.182	0.00E+00	2.23E+00	4.40E+00	0.8500	1.086E+14
Cs-137	9.8870E-01	154,660.602	304,822.182	0.00E+00	1.53E+05	3.01E+05	1.2500	6.909E+13
Eu-154	6.0320E-03	154,660.602	304,822.182	0.00E+00	9.33E+02	1.84E+03	1.7500	3.038E+12
Eu-155	2.1770E-04	154,660.602	304,822.182	0.00E+00	3.37E+01	6.64E+01	2.2500	4.994E+08
Fe-55	7.9296E-07	154,660.602	304,822.182	0.00E+00	1.23E-01	2.42E-01	2.7500	1.760E+09
H-3	8.9486E-03	154,660.602	304,822.182	0.00E+00	1.38E+03	2.73E+03	3.5000	1.256E+08
I-129	9.8288E-07	154,660.602	304,822.182	0.00E+00	1.52E-01	3.00E-01	5.0000	5.368E+07
Kr-85	1.0707E-02	154,660.602	304,822.182	0.00E+00	1.66E+03	3.26E+03	7.0000	6.182E+06
Np-237	1.1927E-05	154,660.602	304,822.182	0.00E+00	1.84E+00	3.64E+00	11.0000	7.098E+05
Pa-231	1.4703E-09	154,660.602	304,822.182	0.00E+00	2.27E-04	4.48E-04		
Pb-210	1.6828E-10	154,660.602	304,822.182	0.00E+00	2.60E-05	5.13E-05		
Pm-147	6.9606E-06	154,660.602	304,822.182	0.00E+00	1.08E+00	2.12E+00		
Pu-238	6.6263E-02	154,660.602	304,822.182	0.00E+00	1.02E+04	2.02E+04		
Pu-239	1.1618E-02	154,660.602	304,822.182	0.00E+00	1.80E+03	3.54E+03		
Pu-240	1.5142E-02	154,660.602	304,822.182	0.00E+00	2.34E+03	4.62E+03		
Pu-241	4.3766E-01	154,660.602	304,822.182	0.00E+00	6.77E+04	1.33E+05		
Pu-242	6.4260E-05	154,660.602	304,822.182	0.00E+00	9.94E+00	1.96E+01		
Ra-226	3.8501E-10	154,660.602	304,822.182	0.00E+00	5.95E-05	1.17E-04		
Ra-228	5.2955E-12	154,660.602	304,822.182	0.00E+00	8.19E-07	1.61E-06		
Ru-106	2.0413E-14	154,660.602	304,822.182	0.00E+00	3.16E-09	6.22E-09		
Se-79	1.2376E-05	154,660.602	304,822.182	0.00E+00	1.91E+00	3.77E+00		
Sn-126	2.5210E-05	154,660.602	304,822.182	0.00E+00	3.90E+00	7.68E+00		
Sr-90	6.4163E-01	154,660.602	304,822.182	0.00E+00	9.92E+04	1.96E+05		
Tc-99	3.9357E-04	154,660.602	304,822.182	0.00E+00	6.09E+01	1.20E+02		
Th-229	1.5644E-10	154,660.602	304,822.182	0.00E+00	2.42E-05	4.77E-05		
Th-230	2.7972E-08	154,660.602	304,822.182	0.00E+00	4.33E-03	8.53E-03		
Th-232	5.3036E-12	154,660.602	304,822.182	0.00E+00	8.20E-07	1.62E-06		
Ti-208	1.5136E-07	154,660.602	304,822.182	0.00E+00	2.34E-02	4.61E-02		
U-232	4.1005E-07	154,660.602	304,822.182	0.00E+00	6.34E-02	1.25E-01		
U-233	2.5856E-08	154,660.602	304,822.182	0.00E+00	4.00E-03	7.88E-03		
U-234	5.2665E-05	154,660.602	304,822.182	0.00E+00	8.15E+00	1.61E+01		
U-235	-1.4487E-06	154,660.602	0.000	1.15E+00	9.26E-01	1.15E+00		
U-236	7.5888E-06	154,660.602	304,822.182	0.00E+00	1.17E+00	2.31E+00		
U-238	-2.6129E-07	154,660.602	0.000	4.96E+00	4.92E+00	4.96E+00		
Y-90	6.4180E-01	154,660.602	304,822.182	0.00E+00	9.93E+04	1.96E+05		
Other Radionuclides					1.47E+05	2.90E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.80E+03	5.51E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	3.480035585	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	154,660.602	152,411.091	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:	218,499.950	304,822.182	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.29	0.99	1.00
Bounding:	0.57	1.40	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: ROVER (UBM)
 SNF ID #: 840
 Fuel Units & Descr: 65 - PARTICULATE
 Heavy Metal Mass: BOL=119.78kg ; EOL=119.78kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 65 years

Estimated
 Canister usage:
18"x15"
 5.91

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.6528E-06	2,276.579	4,553.158	0.00E+00	6.04E-03	1.21E-02	Avg. MeV	
Am-241	8.6432E+00	2,276.579	4,553.158	0.00E+00	1.97E+04	3.94E+04	0.0150	2.850E+15
Am-242m	1.4688E-02	2,276.579	4,553.158	0.00E+00	3.34E+01	6.69E+01	0.0250	5.409E+14
Am-243	1.6272E-02	2,276.579	4,553.158	0.00E+00	3.70E+01	7.41E+01	0.0375	4.447E+14
C-14	1.2046E-01	2,276.579	4,553.158	0.00E+00	2.74E+02	5.48E+02	0.0575	1.010E+15
Cl-36	2.2849E-03	2,276.579	4,553.158	0.00E+00	5.20E+00	1.04E+01	0.0850	2.848E+14
Cm-243	4.1760E-04	2,276.579	4,553.158	0.00E+00	9.51E-01	1.90E+00	0.1250	1.914E+14
Cm-244	5.3440E-02	2,276.579	4,553.158	0.00E+00	1.22E+02	2.43E+02	0.2250	2.449E+14
Co-60	5.4296E-01	2,276.579	4,553.158	0.00E+00	1.24E+03	2.47E+03	0.3750	1.065E+14
Cs-134	1.4346E-08	2,276.579	4,553.158	0.00E+00	3.27E-05	6.53E-05	0.5750	1.786E+15
Cs-135	4.3976E-04	2,276.579	4,553.158	0.00E+00	1.00E+00	2.00E+00	0.8500	2.672E+13
Cs-137	1.0528E+01	2,276.579	4,553.158	0.00E+00	2.40E+04	4.79E+04	1.2500	1.989E+14
Eu-154	1.1156E-01	2,276.579	4,553.158	0.00E+00	2.54E+02	5.08E+02	1.7500	7.429E+11
Eu-155	1.0445E-03	2,276.579	4,553.158	0.00E+00	2.38E+00	4.76E+00	2.2500	1.029E+09
Fe-55	9.8542E-05	2,276.579	4,553.158	0.00E+00	2.24E-01	4.49E-01	2.7500	1.050E+10
H-3	4.5119E-02	2,276.579	4,553.158	0.00E+00	1.03E+02	2.05E+02	3.5000	5.411E+06
I-129	1.0618E-05	2,276.579	4,553.158	0.00E+00	2.42E-02	4.83E-02	5.0000	2.272E+06
Kr-85	8.6191E-02	2,276.579	4,553.158	0.00E+00	1.96E+02	3.92E+02	7.0000	2.567E+05
Np-237	2.0592E-04	2,276.579	4,553.158	0.00E+00	4.69E-01	9.38E-01	11.0000	2.915E+04
Pa-231	2.8720E-06	2,276.579	4,553.158	0.00E+00	6.54E-03	1.31E-02		
Pb-210	8.0265E-08	2,276.579	4,553.158	0.00E+00	1.83E-04	3.65E-04		
Pm-147	6.1354E-06	2,276.579	4,553.158	0.00E+00	1.40E-02	2.79E-02		
Pu-238	2.3536E+00	2,276.579	4,553.158	0.00E+00	5.36E+03	1.07E+04		
Pu-239	4.1616E-01	2,276.579	4,553.158	0.00E+00	9.47E+02	1.89E+03		
Pu-240	2.9200E-01	2,276.579	4,553.158	0.00E+00	6.65E+02	1.33E+03		
Pu-241	1.1490E-01	2,276.579	4,553.158	0.00E+00	2.62E+04	5.23E+04		
Pu-242	2.4560E-03	2,276.579	4,553.158	0.00E+00	5.59E+00	1.12E+01		
Ra-226	1.6171E-07	2,276.579	4,553.158	0.00E+00	3.68E-04	7.36E-04		
Ra-228	6.0192E-07	2,276.579	4,553.158	0.00E+00	1.37E-03	2.74E-03		
Ru-106	1.3163E-15	2,276.579	4,553.158	0.00E+00	3.00E-12	5.99E-12		
Se-79	1.9176E-04	2,276.579	4,553.158	0.00E+00	4.37E-01	8.73E-01		
Sn-126	1.6666E-04	2,276.579	4,553.158	0.00E+00	3.79E-01	7.59E-01		
Sr-90	9.7004E+00	2,276.579	4,553.158	0.00E+00	2.21E+04	4.42E+04		
Tc-99	6.7654E-03	2,276.579	4,553.158	0.00E+00	1.54E+01	3.08E+01		
Th-229	2.7664E-06	2,276.579	4,553.158	0.00E+00	6.30E-03	1.26E-02		
Th-230	9.3206E-06	2,276.579	4,553.158	0.00E+00	2.12E-02	4.24E-02		
Th-232	6.0208E-07	2,276.579	4,553.158	0.00E+00	1.37E-03	2.74E-03		
Tl-208	6.5604E-05	2,276.579	4,553.158	0.00E+00	1.49E-01	2.99E-01		
U-232	1.7765E-04	2,276.579	4,553.158	0.00E+00	4.04E-01	8.09E-01		
U-233	3.6128E-04	2,276.579	4,553.158	0.00E+00	8.22E-01	1.64E+00		
U-234	1.2788E-02	2,276.579	4,553.158	0.00E+00	2.91E+01	5.82E+01		
U-235	5.7486E-04	2,276.579	4,553.158	2.41E-01	1.55E+00	2.86E+00		
U-236	2.3485E-04	2,276.579	4,553.158	0.00E+00	5.35E-01	1.07E+00		
U-238	1.1581E-04	2,276.579	4,553.158	2.81E-03	2.66E-01	5.30E-01		
Y-90	9.7028E+00	2,276.579	4,553.158	0.00E+00	2.21E+04	4.42E+04		
Other Radionuclides					9.86E+04	1.97E+05		
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							1.21E+03	2.42E+03
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	GRAPHITE	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	NONE	SST/Inconel	
BOL HM Constituents:	U3O8	U, Th, & Pu	
BOL Enrichment %:	93.02375305	0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,276.579	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
Bounding:		4,553.158	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.57		
Bounding:	1.14		

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

²Total burnup for all fuel associated with this worksheet must be 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 (PORTUGAL)
 SNF ID #: 943
 Fuel Units & Descr: 39 - ASSEMBLY
 Heavy Metal Mass: BOL=30.38kg ; EOL=29.23kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1998
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 1.08

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.1465E-09	1,089.546	2,179.092	0.00E+00	1.25E-06	2.50E-06	0.0150	2.039E+14
Am-241	2.3056E-03	1,089.546	2,179.092	0.00E+00	2.51E+00	5.02E+00	0.0250	4.238E+13
Am-242m	4.1476E-07	1,089.546	2,179.092	0.00E+00	4.52E-04	9.04E-04	0.0375	3.689E+13
Am-243	1.4894E-06	1,089.546	2,179.092	0.00E+00	1.62E-03	3.25E-03	0.0575	3.961E+13
C-14	5.7108E-09	1,089.546	2,179.092	0.00E+00	6.22E-06	1.24E-05	0.0850	2.390E+13
Cf-252	1.3124E-32	1,089.546	2,179.092	0.00E+00	1.43E-29	2.86E-29	1.2500	1.179E+12
Cm-243	1.4562E-07	1,089.546	2,179.092	0.00E+00	1.59E-04	3.17E-04	0.1250	1.601E+13
Cm-244	2.4221E-05	1,089.546	2,179.092	0.00E+00	2.64E-02	5.28E-02	0.2250	2.064E+13
Co-60	2.7560E-06	1,089.546	2,179.092	0.00E+00	3.00E-03	6.01E-03	0.3750	8.971E+12
Cs-134	5.8851E-04	1,089.546	2,179.092	0.00E+00	6.41E-01	1.28E+00	0.5750	1.471E+14
Cs-135	3.4477E-06	1,089.546	2,179.092	0.00E+00	3.76E-03	7.51E-03	0.8500	2.119E+12
Cs-137	1.8099E+00	1,089.546	2,179.092	0.00E+00	1.97E+03	3.94E+03	1.2500	1.179E+12
Eu-154	1.6386E-02	1,089.546	2,179.092	0.00E+00	1.79E+01	3.57E+01	1.7500	5.824E+10
Eu-155	2.3957E-03	1,089.546	2,179.092	0.00E+00	2.61E+00	5.22E+00	2.2500	4.152E+06
Fe-55	3.2707E-05	1,089.546	2,179.092	0.00E+00	3.56E-02	7.13E-02	2.7500	3.398E+06
H-3	3.4504E-03	1,089.546	2,179.092	0.00E+00	3.76E+00	7.52E+00	3.5000	2.608E+03
I-129	7.5300E-07	1,089.546	2,179.092	0.00E+00	8.20E-04	1.64E-03	5.0000	8.811E+02
Kr-85	7.8540E-02	1,089.546	2,179.092	0.00E+00	8.56E+01	1.71E+02	7.0000	9.706E+01
Np-237	9.5615E-06	1,089.546	2,179.092	0.00E+00	1.04E-02	2.08E-02	11.0000	1.086E+01
Pa-231	2.7968E-09	1,089.546	2,179.092	0.00E+00	3.05E-06	6.09E-06		
Pb-210	1.2612E-10	1,089.546	2,179.092	0.00E+00	1.37E-07	2.75E-07		
Pm-147	1.2952E-02	1,089.546	2,179.092	0.00E+00	1.41E+01	2.82E+01		
Pu-238	1.7549E-02	1,089.546	2,179.092	0.00E+00	1.91E+01	3.82E+01		
Pu-239	4.2810E-04	1,089.546	2,179.092	0.00E+00	4.66E-01	9.33E-01		
Pu-240	2.4357E-04	1,089.546	2,179.092	0.00E+00	2.65E-01	5.31E-01		
Pu-241	2.6277E-02	1,089.546	2,179.092	0.00E+00	2.86E+01	5.73E+01		
Pu-242	3.6329E-07	1,089.546	2,179.092	0.00E+00	3.96E-04	7.92E-04		
Ra-226	4.4444E-10	1,089.546	2,179.092	0.00E+00	4.84E-07	9.68E-07		
Ra-228	1.9714E-14	1,089.546	2,179.092	0.00E+00	2.15E-11	4.30E-11		
Ru-106	2.0477E-07	1,089.546	2,179.092	0.00E+00	2.23E-04	4.46E-04		
Se-79	1.2933E-05	1,089.546	2,179.092	0.00E+00	1.41E-02	2.82E-02		
Sn-126	1.1574E-05	1,089.546	2,179.092	0.00E+00	1.26E-02	2.52E-02		
Sr-90	1.7092E+00	1,089.546	2,179.092	0.00E+00	1.86E+03	3.72E+03		
Tc-99	4.2239E-04	1,089.546	2,179.092	0.00E+00	4.60E-01	9.20E-01		
Th-229	7.7260E-12	1,089.546	2,179.092	0.00E+00	8.42E-09	1.68E-08		
Th-230	5.8497E-08	1,089.546	2,179.092	0.00E+00	6.37E-05	1.27E-04		
Th-232	2.6906E-14	1,089.546	2,179.092	0.00E+00	2.93E-11	5.86E-11		
Ti-208	4.4336E-08	1,089.546	2,179.092	0.00E+00	4.83E-05	9.66E-05		
U-232	1.2037E-07	1,089.546	2,179.092	0.00E+00	1.31E-04	2.62E-04		
U-233	3.0011E-09	1,089.546	2,179.092	0.00E+00	3.27E-06	6.54E-06		
U-234	1.8497E-04	1,089.546	2,179.092	0.00E+00	2.02E-01	4.03E-01		
U-235	-2.7235E-06	1,089.546	0.000	1.30E-02	1.01E-02	1.30E-02		
U-236	1.5493E-05	1,089.546	2,179.092	0.00E+00	1.69E-02	3.38E-02		
U-238	-4.2851E-09	1,089.546	0.000	8.19E-03	8.18E-03	8.19E-03		
Y-90	1.7094E+00	1,089.546	2,179.092	0.00E+00	1.86E+03	3.72E+03		
Other Radionuclides					1.88E+03	3.75E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	19.83094182	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,089.546	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		2,179.092	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.11		1.00
Bounding:	0.23		

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

²Total burnup for all fuel associated with this worksheet must be 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 (INDONESIA)
 SNF ID #: 288
 Fuel Units & Descr: 47 - ASSEMBLY
 Heavy Metal Mass: BOL=56.19kg ; EOL=51.48kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1999
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
18"x10"
 1.31

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	1.1465E-09	4,459.893	8,919.786	0.00E+00	5.11E-06	1.02E-05		
Am-241	2.3056E-03	4,459.893	8,919.786	0.00E+00	1.03E+01	2.06E+01	0.0150	8.346E+14
Am-242m	4.1476E-07	4,459.893	8,919.786	0.00E+00	1.85E-03	3.70E-03	0.0250	1.734E+14
Am-243	1.4894E-06	4,459.893	8,919.786	0.00E+00	6.64E-03	1.33E-02	0.0375	1.510E+14
C-14	5.7108E-09	4,459.893	8,919.786	0.00E+00	2.55E-05	5.09E-05	0.0575	1.622E+14
Cl-36	1.3124E-32	4,459.893	8,919.786	0.00E+00	5.85E-29	1.17E-28	0.0850	9.784E+13
Cm-243	1.4562E-07	4,459.893	8,919.786	0.00E+00	6.49E-04	1.30E-03	0.1250	6.553E+13
Cm-244	2.4221E-05	4,459.893	8,919.786	0.00E+00	1.08E-01	2.16E-01	0.2250	8.447E+13
Co-60	2.7560E-06	4,459.893	8,919.786	0.00E+00	1.23E-02	2.46E-02	0.3750	3.672E+13
Cs-134	5.8851E-04	4,459.893	8,919.786	0.00E+00	2.62E+00	5.25E+00	0.5750	6.021E+14
Cs-135	3.4477E-06	4,459.893	8,919.786	0.00E+00	1.54E-02	3.08E-02	0.8500	8.675E+12
Cs-137	1.8099E+00	4,459.893	8,919.786	0.00E+00	8.07E+03	1.61E+04	1.2500	4.825E+12
Eu-154	1.6386E-02	4,459.893	8,919.786	0.00E+00	7.31E+01	1.46E+02	1.7500	2.384E+11
Eu-155	2.3957E-03	4,459.893	8,919.786	0.00E+00	1.07E+01	2.14E+01	2.2500	1.699E+07
Fe-55	3.2707E-05	4,459.893	8,919.786	0.00E+00	1.46E-01	2.92E-01	2.7500	1.391E+07
H-3	3.4504E-03	4,459.893	8,919.786	0.00E+00	1.54E+01	3.08E+01	3.5000	1.058E+04
I-129	7.5300E-07	4,459.893	8,919.786	0.00E+00	3.36E-03	6.72E-03	5.0000	3.564E+03
Kr-85	7.8540E-02	4,459.893	8,919.786	0.00E+00	3.50E+02	7.01E+02	7.0000	3.924E+02
Np-237	9.5615E-06	4,459.893	8,919.786	0.00E+00	4.26E-02	8.53E-02	11.0000	4.391E+01
Pa-231	2.7968E-09	4,459.893	8,919.786	0.00E+00	1.25E-05	2.49E-05		
Pb-210	1.2612E-10	4,459.893	8,919.786	0.00E+00	5.62E-07	1.12E-06		
Pm-147	1.2952E-02	4,459.893	8,919.786	0.00E+00	5.78E+01	1.16E+02		
Pu-238	1.7549E-02	4,459.893	8,919.786	0.00E+00	7.83E+01	1.57E+02		
Pu-239	4.2810E-04	4,459.893	8,919.786	0.00E+00	1.91E+00	3.82E+00		
Pu-240	2.4357E-04	4,459.893	8,919.786	0.00E+00	1.09E+00	2.17E+00		
Pu-241	2.6277E-02	4,459.893	8,919.786	0.00E+00	1.17E+02	2.34E+02		
Pu-242	3.6329E-07	4,459.893	8,919.786	0.00E+00	1.62E-03	3.24E-03		
Ra-226	4.4444E-10	4,459.893	8,919.786	0.00E+00	1.98E-06	3.96E-06		
Ra-228	1.9714E-14	4,459.893	8,919.786	0.00E+00	8.79E-11	1.76E-10		
Ru-106	2.0477E-07	4,459.893	8,919.786	0.00E+00	9.13E-04	1.83E-03		
Se-79	1.2933E-05	4,459.893	8,919.786	0.00E+00	5.77E-02	1.15E-01		
Sn-126	1.1574E-05	4,459.893	8,919.786	0.00E+00	5.16E-02	1.03E-01		
Sr-90	1.7092E+00	4,459.893	8,919.786	0.00E+00	7.62E+03	1.52E+04		
Tc-99	4.2239E-04	4,459.893	8,919.786	0.00E+00	1.88E+00	3.77E+00		
Th-229	7.7260E-12	4,459.893	8,919.786	0.00E+00	3.45E-08	6.89E-08		
Th-230	5.8497E-08	4,459.893	8,919.786	0.00E+00	2.61E-04	5.22E-04		
Th-232	2.6906E-14	4,459.893	8,919.786	0.00E+00	1.20E-10	2.40E-10		
Ti-208	4.4336E-08	4,459.893	8,919.786	0.00E+00	1.98E-04	3.95E-04		
U-232	1.2037E-07	4,459.893	8,919.786	0.00E+00	5.37E-04	1.07E-03		
U-233	3.0011E-09	4,459.893	8,919.786	0.00E+00	1.34E-05	2.68E-05		
U-234	1.8497E-04	4,459.893	8,919.786	0.00E+00	8.25E-01	1.65E+00		
U-235	-2.7235E-06	4,459.893	0.000	2.39E-02	1.18E-02	2.39E-02		
U-236	1.5493E-05	4,459.893	8,919.786	0.00E+00	6.91E-02	1.38E-01		
U-238	-4.2851E-09	4,459.893	0.000	1.52E-02	1.51E-02	1.52E-02		
Y-90	1.7094E+00	4,459.893	8,919.786	0.00E+00	7.62E+03	1.52E+04		
Other Radionuclides					7.68E+03	1.54E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.43E+01	1.89E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3O8	U	
BOL Enrichment %:	19.68299334	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		4,459.893	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		8,919.786	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.25		1.01
Bounding:	0.50		

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

² Total burnup for all fuel associated with this worksheet must be 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 (URAGUAY)
 SNF ID #: 557
 Fuel Units & Descr: 4 - ASSEMBLY
 Heavy Metal Mass: BOL=2.11kg ; EOL=2.11kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1998
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.11

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.1465E-09	1.894	3.788	0.00E+00	2.17E-09	4.34E-09	0.0150	3.545E+11
Am-241	2.3056E-03	1.894	3.788	0.00E+00	4.37E-03	8.73E-03	0.0250	7.264E+10
Am-242m	4.1476E-07	1.894	3.788	0.00E+00	7.86E-07	1.57E-06	0.0375	6.413E+10
Am-243	1.4894E-06	1.894	3.788	0.00E+00	2.82E-06	5.64E-06	0.0575	6.886E+10
C-14	5.7108E-09	1.894	3.788	0.00E+00	1.08E-08	2.16E-08	0.0850	4.155E+10
Cl-36	1.3124E-32	1.894	3.788	0.00E+00	2.49E-32	4.97E-32	0.1250	2.784E+10
Cm-243	1.4562E-07	1.894	3.788	0.00E+00	2.76E-07	5.52E-07	0.2250	3.589E+10
Cm-244	2.4221E-05	1.894	3.788	0.00E+00	4.59E-05	9.18E-05	0.3750	1.559E+10
Co-60	2.7560E-06	1.894	3.788	0.00E+00	5.22E-06	1.04E-05	0.5750	2.557E+11
Cs-134	5.8851E-04	1.894	3.788	0.00E+00	1.11E-03	2.23E-03	0.8500	3.684E+09
Cs-135	3.4477E-06	1.894	3.788	0.00E+00	6.53E-06	1.31E-05	1.2500	2.049E+09
Cs-137	1.8099E+00	1.894	3.788	0.00E+00	3.43E+00	6.86E+00	1.7500	1.012E+08
Eu-154	1.6386E-02	1.894	3.788	0.00E+00	3.10E-02	6.21E-02	2.2500	7.223E+03
Eu-155	2.3957E-03	1.894	3.788	0.00E+00	4.54E-03	9.08E-03	2.7500	5.910E+03
Fe-55	3.2707E-05	1.894	3.788	0.00E+00	6.19E-05	1.24E-04	3.5000	7.521E+00
H-3	3.4504E-03	1.894	3.788	0.00E+00	6.54E-03	1.31E-02	5.0000	2.815E+00
I-129	7.5300E-07	1.894	3.788	0.00E+00	1.43E-06	2.85E-06	7.0000	3.164E-01
Kr-85	7.8540E-02	1.894	3.788	0.00E+00	1.49E-01	2.98E-01	11.0000	3.587E-02
Np-237	9.5615E-06	1.894	3.788	0.00E+00	1.81E-05	3.62E-05		
Pa-231	2.7968E-09	1.894	3.788	0.00E+00	5.30E-09	1.06E-08		
Pb-210	1.2612E-10	1.894	3.788	0.00E+00	2.39E-10	4.78E-10		
Pm-147	1.2952E-02	1.894	3.788	0.00E+00	2.45E-02	4.91E-02		
Pu-238	1.7549E-02	1.894	3.788	0.00E+00	3.32E-02	6.65E-02		
Pu-239	4.2810E-04	1.894	3.788	0.00E+00	8.11E-04	1.62E-03		
Pu-240	2.4357E-04	1.894	3.788	0.00E+00	4.61E-04	9.23E-04		
Pu-241	2.6277E-02	1.894	3.788	0.00E+00	4.98E-02	9.95E-02		
Pu-242	3.6329E-07	1.894	3.788	0.00E+00	6.88E-07	1.38E-06		
Ra-226	4.4444E-10	1.894	3.788	0.00E+00	8.42E-10	1.68E-09		
Ra-228	1.9714E-14	1.894	3.788	0.00E+00	3.73E-14	7.47E-14		
Ru-106	2.0477E-07	1.894	3.788	0.00E+00	3.88E-07	7.76E-07		
Se-79	1.2933E-05	1.894	3.788	0.00E+00	2.45E-05	4.90E-05		
Sn-126	1.1574E-05	1.894	3.788	0.00E+00	2.19E-05	4.38E-05		
Sr-90	1.7092E+00	1.894	3.788	0.00E+00	3.24E+00	6.47E+00		
Tc-99	4.2239E-04	1.894	3.788	0.00E+00	8.00E-04	1.60E-03		
Th-229	7.7260E-12	1.894	3.788	0.00E+00	1.46E-11	2.93E-11		
Th-230	5.8497E-08	1.894	3.788	0.00E+00	1.11E-07	2.22E-07		
Th-232	2.6906E-14	1.894	3.788	0.00E+00	5.10E-14	1.02E-13		
Th-238	4.4336E-08	1.894	3.788	0.00E+00	8.40E-08	1.68E-07		
U-232	1.2037E-07	1.894	3.788	0.00E+00	2.28E-07	4.56E-07		
U-233	3.0011E-09	1.894	3.788	0.00E+00	5.68E-09	1.14E-08		
U-234	1.8497E-04	1.894	3.788	0.00E+00	3.50E-04	7.01E-04		
U-235	-2.7235E-06	1.894	0.000	9.04E-04	8.99E-04	9.04E-04		
U-236	1.5493E-05	1.894	3.788	0.00E+00	2.93E-05	5.87E-05		
U-238	-4.2851E-09	1.894	0.000	5.69E-04	5.69E-04	5.69E-04		
Y-90	1.7094E+00	1.894	3.788	0.00E+00	3.24E+00	6.48E+00		
Other Radionuclides					3.26E+00	6.53E+00		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	19.81060606	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	0.004	1.894	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		3.788	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.00	448.40	1.00
Bounding:	0.01		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (URAGUAY)
SNF ID #: 1073

Fuel Units & Descr: 15 - ASSEMBLY
Heavy Metal Mass: BOL=7.92kg : EOL=7.91kg
ROD Storage Site: SRS

¹Fuel decay start date: 1998
Estimates as of: 2030
Template: ATR (Light Water, Alum., 60 to 100%, U)

²Template Burnup(MWd): 367.2
Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 25 years

Estimated
Canister usage:
18"x10"
0.42

II. Estimates		m	x _n	x _b	b	y _n	y _b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)	Avg. MeV
Ac-227	1.1465E-09	7.103	14.205	0.00E+00	8.14E-09	1.63E-08			
Am-241	2.3056E-03	7.103	14.205	0.00E+00	1.64E-02	3.28E-02	0.0150	1.329E+12	
Am-242m	4.1476E-07	7.103	14.205	0.00E+00	2.95E-06	5.89E-06	0.0250	2.761E+11	
Am-243	1.4894E-06	7.103	14.205	0.00E+00	1.06E-05	2.12E-05	0.0375	2.405E+11	
C-14	5.7108E-09	7.103	14.205	0.00E+00	4.06E-08	8.11E-08	0.0575	2.582E+11	
Cf-252	1.3124E-32	7.103	14.205	0.00E+00	9.32E-32	1.86E-31	0.0850	1.558E+11	
Cm-243	1.4562E-07	7.103	14.205	0.00E+00	1.03E-06	2.07E-06	0.1250	1.044E+11	
Cm-244	2.4221E-05	7.103	14.205	0.00E+00	1.72E-04	3.44E-04	0.2250	1.346E+11	
Co-60	2.7560E-06	7.103	14.205	0.00E+00	1.96E-05	3.91E-05	0.3750	5.848E+10	
Cs-134	5.8851E-04	7.103	14.205	0.00E+00	4.18E-03	8.36E-03	0.5750	9.588E+11	
Cs-135	3.4477E-06	7.103	14.205	0.00E+00	2.45E-05	4.90E-05	0.8500	1.382E+10	
Cs-137	1.8099E+00	7.103	14.205	0.00E+00	1.29E+01	2.57E+01	1.2500	7.684E+09	
Eu-154	1.6386E-02	7.103	14.205	0.00E+00	1.16E-01	2.33E-01	1.7500	3.797E+08	
Eu-155	2.3957E-03	7.103	14.205	0.00E+00	1.70E-02	3.40E-02	2.2500	2.709E+04	
Fe-55	3.2707E-05	7.103	14.205	0.00E+00	2.32E-04	4.65E-04	2.7500	2.216E+04	
H-3	3.4504E-03	7.103	14.205	0.00E+00	2.45E-02	4.90E-02	3.5000	2.820E+01	
I-129	7.5300E-07	7.103	14.205	0.00E+00	5.35E-06	1.07E-05	5.0000	1.055E+01	
Kr-85	7.8540E-02	7.103	14.205	0.00E+00	5.58E-01	1.12E+00	7.0000	1.187E+00	
Np-237	9.5615E-06	7.103	14.205	0.00E+00	6.79E-05	1.36E-04	11.0000	1.345E-01	
Pa-231	2.7968E-09	7.103	14.205	0.00E+00	1.99E-08	3.97E-08			
Pb-210	1.2612E-10	7.103	14.205	0.00E+00	8.96E-10	1.79E-09			
Pm-147	1.2952E-02	7.103	14.205	0.00E+00	9.20E-02	1.84E-01			
Pu-238	1.7549E-02	7.103	14.205	0.00E+00	1.25E-01	2.49E-01			
Pu-239	4.2810E-04	7.103	14.205	0.00E+00	3.04E-03	6.08E-03			
Pu-240	2.4357E-04	7.103	14.205	0.00E+00	1.73E-03	3.46E-03			
Pu-241	2.6277E-02	7.103	14.205	0.00E+00	1.87E-01	3.73E-01			
Pu-242	3.6329E-07	7.103	14.205	0.00E+00	2.58E-06	5.16E-06			
Ra-226	4.4444E-10	7.103	14.205	0.00E+00	3.16E-09	6.31E-09			
Ra-228	1.9714E-14	7.103	14.205	0.00E+00	1.40E-13	2.80E-13			
Ru-106	2.0477E-07	7.103	14.205	0.00E+00	1.45E-06	2.91E-06			
Se-79	1.2933E-05	7.103	14.205	0.00E+00	9.19E-05	1.84E-04			
Sn-126	1.1574E-05	7.103	14.205	0.00E+00	8.22E-05	1.64E-04			
Sr-90	1.7092E+00	7.103	14.205	0.00E+00	1.21E+01	2.43E+01			
Tc-99	4.2239E-04	7.103	14.205	0.00E+00	3.00E-03	6.00E-03			
Th-229	7.7260E-12	7.103	14.205	0.00E+00	5.49E-11	1.10E-10			
Th-230	5.8497E-08	7.103	14.205	0.00E+00	4.15E-07	8.31E-07			
Th-232	2.6906E-14	7.103	14.205	0.00E+00	1.91E-13	3.82E-13			
Ti-208	4.4336E-08	7.103	14.205	0.00E+00	3.15E-07	6.30E-07			
U-232	1.2037E-07	7.103	14.205	0.00E+00	8.55E-07	1.71E-06			
U-233	3.0011E-09	7.103	14.205	0.00E+00	2.13E-08	4.26E-08			
U-234	1.8497E-04	7.103	14.205	0.00E+00	1.31E-03	2.63E-03			
U-235	-2.7235E-06	7.103	0.000	3.39E-03	3.37E-03	3.39E-03			
U-236	1.5493E-05	7.103	14.205	0.00E+00	1.10E-04	2.20E-04			
U-238	-4.2851E-09	7.103	0.000	2.13E-03	2.13E-03	2.13E-03			
Y-90	1.7094E+00	7.103	14.205	0.00E+00	1.21E+01	2.43E+01			
Other Radionuclides					1.22E+01	2.45E+01			

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.50E-01	3.01E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			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.
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U-ALX	U	
	19.81060606	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:	0.016	7.103	
Bounding:		14.205	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.00	448.40	
Bounding:	0.01		
			1.00

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

²Total burnup for all fuel associated with this worksheet must be 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 (VENEZUELA) ¹Fuel decay start date: 1997
 SNF ID #: 816 Estimate as of: 2030
 Fuel Units & Descr: 56 - MTR TYPE Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=39.70kg ; EOL=38.71kg ²Template Burnup(MWd): 367.2
 ROD Storage Sits: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 2.33

Radionuclide	H. Estimates		Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n						Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.1465E-09	933.382	1,866.765	0.00E+00	1.07E-06	2.14E-06	Avg. MeV		
Am-241	2.3056E-03	933.382	1,866.765	0.00E+00	2.15E+00	4.30E+00	0.0150	1.747E+14	
Am-242m	4.1476E-07	933.382	1,866.765	0.00E+00	3.87E-04	7.74E-04	0.0250	3.629E+13	
Am-243	1.4894E-06	933.382	1,866.765	0.00E+00	1.39E-03	2.78E-03	0.0375	3.161E+13	
C-14	5.7108E-09	933.382	1,866.765	0.00E+00	5.33E-06	1.07E-05	0.0575	3.394E+13	
Cl-36	1.3124E-32	933.382	1,866.765	0.00E+00	1.22E-29	2.45E-29	0.0850	2.048E+13	
Cm-243	1.4562E-07	933.382	1,866.765	0.00E+00	1.36E-04	2.72E-04	0.1250	1.371E+13	
Cm-244	2.4221E-05	933.382	1,866.765	0.00E+00	2.26E-02	4.52E-02	0.2250	1.768E+13	
Co-60	2.7560E-06	933.382	1,866.765	0.00E+00	2.57E-03	5.14E-03	0.3750	7.685E+12	
Cs-134	5.8851E-04	933.382	1,866.765	0.00E+00	5.49E-01	1.10E+00	0.5750	1.260E+14	
Cs-135	3.4477E-06	933.382	1,866.765	0.00E+00	3.22E-03	6.44E-03	0.8500	1.816E+12	
Cs-137	1.8099E+00	933.382	1,866.765	0.00E+00	1.69E+03	3.38E+03	1.2500	1.010E+12	
Eu-154	1.6386E-02	933.382	1,866.765	0.00E+00	1.53E+01	3.06E+01	1.7500	4.989E+10	
Eu-155	2.3957E-03	933.382	1,866.765	0.00E+00	2.24E+00	4.47E+00	2.2500	3.557E+06	
Fe-55	3.2707E-05	933.382	1,866.765	0.00E+00	3.05E-02	6.11E-02	2.7500	2.911E+06	
H-3	3.4504E-03	933.382	1,866.765	0.00E+00	3.22E+00	6.44E+00	3.5000	2.255E+03	
I-129	7.5300E-07	933.382	1,866.765	0.00E+00	7.03E-04	1.41E-03	5.0000	7.635E+02	
Kr-85	7.8540E-02	933.382	1,866.765	0.00E+00	7.33E+01	1.47E+02	7.0000	8.416E+01	
Np-237	9.5615E-06	933.382	1,866.765	0.00E+00	8.92E-03	1.78E-02	11.0000	9.422E+00	
Pu-231	2.7968E-09	933.382	1,866.765	0.00E+00	2.61E-06	5.22E-06			
Pu-210	1.2612E-10	933.382	1,866.765	0.00E+00	1.18E-07	2.35E-07			
Pm-147	1.2952E-02	933.382	1,866.765	0.00E+00	1.21E+01	2.42E+01			
Pu-238	1.7549E-02	933.382	1,866.765	0.00E+00	1.64E+01	3.28E+01			
Pu-239	4.2810E-04	933.382	1,866.765	0.00E+00	4.00E-01	7.99E-01			
Pu-240	2.4357E-04	933.382	1,866.765	0.00E+00	2.27E-01	4.55E-01			
Pu-241	2.6277E-02	933.382	1,866.765	0.00E+00	2.45E+01	4.91E+01			
Pu-242	3.6329E-07	933.382	1,866.765	0.00E+00	3.39E-04	6.78E-04			
Ra-226	4.4444E-10	933.382	1,866.765	0.00E+00	4.15E-07	8.30E-07			
Ra-228	1.9714E-14	933.382	1,866.765	0.00E+00	1.84E-11	3.68E-11			
Ru-106	2.0477E-07	933.382	1,866.765	0.00E+00	1.91E-04	3.82E-04			
Se-79	1.2933E-05	933.382	1,866.765	0.00E+00	1.21E-02	2.41E-02			
Sn-126	1.1574E-05	933.382	1,866.765	0.00E+00	1.08E-02	2.16E-02			
Sr-90	1.7092E+00	933.382	1,866.765	0.00E+00	1.60E+03	3.19E+03			
Tc-99	4.2239E-04	933.382	1,866.765	0.00E+00	3.94E-01	7.88E-01			
Th-229	7.7260E-12	933.382	1,866.765	0.00E+00	7.21E-09	1.44E-08			
Th-230	5.8497E-08	933.382	1,866.765	0.00E+00	5.46E-05	1.09E-04			
Th-232	2.6906E-14	933.382	1,866.765	0.00E+00	2.51E-11	5.02E-11			
Tl-208	4.4336E-08	933.382	1,866.765	0.00E+00	4.14E-05	8.28E-05			
U-232	1.2037E-07	933.382	1,866.765	0.00E+00	1.12E-04	2.25E-04			
U-233	3.0011E-09	933.382	1,866.765	0.00E+00	2.80E-06	5.60E-06			
U-234	1.8497E-04	933.382	1,866.765	0.00E+00	1.73E-01	3.45E-01			
U-235	-2.7235E-06	933.382	0.000	1.64E-02	1.39E-02	1.64E-02			
U-236	1.5493E-05	933.382	1,866.765	0.00E+00	1.45E-02	2.89E-02			
U-238	-4.2851E-09	933.382	0.000	1.08E-02	1.08E-02	1.08E-02			
Y-90	1.7094E+00	933.382	1,866.765	0.00E+00	1.60E+03	3.19E+03			
Other Radionuclides					1.61E+03	3.22E+03			

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.97E+01	3.95E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			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.
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U-ALX	U	
	19.1126847	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		933.382	
Bounding:		1,866.765	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.07		1.00
Bounding:	0.15		

¹ Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: SAPHIR (SWITZERLAND)
 SNF ID #: 444
 Fuel Units & Descr: 76 - MTR TYPE
 Heavy Metal Mass: BOL=21.45kg ; EOL=12.00kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1993
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 3.17

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.0068E-09	8,946.303	17,892.606	0.00E+00	1.80E-05	3.59E-05	Avg. MeV	
Am-241	2.5251E-03	8,946.303	17,892.606	0.00E+00	2.26E+01	4.52E+01	0.0150	1.318E+15
Am-242m	3.9624E-07	8,946.303	17,892.606	0.00E+00	3.54E-03	7.09E-03	0.0250	2.736E+14
Am-243	1.4880E-06	8,946.303	17,892.606	0.00E+00	1.33E-02	2.66E-02	0.0375	2.379E+14
C-14	5.7053E-09	8,946.303	17,892.606	0.00E+00	5.10E-05	1.02E-04	0.0575	2.560E+14
Cl-36	1.3124E-32	8,946.303	17,892.606	0.00E+00	1.17E-28	2.35E-28	0.0850	1.543E+14
Cm-243	1.1419E-07	8,946.303	17,892.606	0.00E+00	1.02E-03	2.04E-03	0.1250	1.019E+14
Cm-244	1.6522E-05	8,946.303	17,892.606	0.00E+00	1.48E-01	2.96E-01	0.2250	1.332E+14
Co-60	7.4047E-07	8,946.303	17,892.606	0.00E+00	6.62E-03	1.32E-02	0.3750	5.793E+13
Cs-134	2.0455E-05	8,946.303	17,892.606	0.00E+00	1.83E-01	3.66E-01	0.5750	9.575E+14
Cs-135	3.4477E-06	8,946.303	17,892.606	0.00E+00	3.08E-02	6.17E-02	0.8500	1.170E+13
Cs-137	1.4365E+00	8,946.303	17,892.606	0.00E+00	1.29E+04	2.57E+04	1.2500	5.657E+12
Eu-154	7.3230E-03	8,946.303	17,892.606	0.00E+00	6.55E+01	1.31E+02	1.7500	3.184E+11
Eu-155	5.9259E-04	8,946.303	17,892.606	0.00E+00	5.30E+00	1.06E+01	2.2500	2.663E+07
Fe-55	2.2791E-06	8,946.303	17,892.606	0.00E+00	2.04E-02	4.08E-02	2.7500	2.541E+07
H-3	1.9698E-03	8,946.303	17,892.606	0.00E+00	1.76E+01	3.52E+01	3.5000	1.472E+04
I-129	7.5300E-07	8,946.303	17,892.606	0.00E+00	6.74E-03	1.35E-02	5.0000	6.014E+03
Kr-85	4.1176E-02	8,946.303	17,892.606	0.00E+00	3.68E+02	7.37E+02	7.0000	6.582E+02
Np-237	9.5752E-06	8,946.303	17,892.606	0.00E+00	8.57E-02	1.71E-01	11.0000	7.339E+01
Pa-231	3.9379E-09	8,946.303	17,892.606	0.00E+00	3.52E-05	7.05E-05		
Pb-210	3.3115E-10	8,946.303	17,892.606	0.00E+00	2.96E-06	5.93E-06		
Pm-147	9.2402E-04	8,946.303	17,892.606	0.00E+00	8.27E+00	1.65E+01		
Pu-238	1.6217E-02	8,946.303	17,892.606	0.00E+00	1.45E+02	2.90E+02		
Pu-239	4.2810E-04	8,946.303	17,892.606	0.00E+00	3.83E+00	7.66E+00		
Pu-240	2.4333E-04	8,946.303	17,892.606	0.00E+00	2.18E+00	4.35E+00		
Pu-241	1.6242E-02	8,946.303	17,892.606	0.00E+00	1.45E+02	2.91E+02		
Pu-242	3.6329E-07	8,946.303	17,892.606	0.00E+00	3.25E-03	6.50E-03		
Ra-226	9.0114E-10	8,946.303	17,892.606	0.00E+00	8.06E-06	1.61E-05		
Ra-228	3.1019E-14	8,946.303	17,892.606	0.00E+00	2.78E-10	5.55E-10		
Ru-106	2.1225E-10	8,946.303	17,892.606	0.00E+00	1.90E-06	3.80E-06		
Se-79	1.2930E-05	8,946.303	17,892.606	0.00E+00	1.16E-01	2.31E-01		
Sn-126	1.1571E-05	8,946.303	17,892.606	0.00E+00	1.04E-01	2.07E-01		
Sr-90	1.3472E+00	8,946.303	17,892.606	0.00E+00	1.21E+04	2.41E+04		
Tc-99	4.2239E-04	8,946.303	17,892.606	0.00E+00	3.78E+00	7.56E+00		
Th-229	1.2407E-11	8,946.303	17,892.606	0.00E+00	1.11E-07	2.22E-07		
Th-230	8.3497E-08	8,946.303	17,892.606	0.00E+00	7.47E-04	1.49E-03		
Th-232	3.8371E-14	8,946.303	17,892.606	0.00E+00	3.43E-10	6.87E-10		
Tl-208	4.0414E-08	8,946.303	17,892.606	0.00E+00	3.62E-04	7.23E-04		
U-232	1.0948E-07	8,946.303	17,892.606	0.00E+00	9.79E-04	1.96E-03		
U-233	3.6275E-09	8,946.303	17,892.606	0.00E+00	3.25E-05	6.49E-05		
U-234	1.8562E-04	8,946.303	17,892.606	0.00E+00	1.66E+00	3.32E+00		
U-235	-2.7235E-06	8,946.303	0.000	4.20E-02	1.76E-02	4.20E-02		
U-236	1.5493E-05	8,946.303	17,892.606	0.00E+00	1.39E-01	2.77E-01		
U-238	-4.2851E-09	8,946.303	0.000	6.76E-04	6.38E-04	6.76E-04		
Y-90	1.3475E+00	8,946.303	17,892.606	0.00E+00	1.21E+04	2.41E+04		
Other Radionuclides					1.22E+04	2.45E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.50E+02	2.99E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	90.62318257	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		8,946.303	
Bounding:		17,892.606	

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:	1.33	
Bounding:	2.65	

Estimated EOL HM/ Given EOL HM: 1.05

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

²Total burnup for all fuel associated with this worksheet must be 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 (SWITZERLAND)
 SNF ID #: 443
 Fuel Units & Descr: 39 - MTR TYPE
 Heavy Metal Mass: BOL=79.73kg ; EOL=71.19kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1993
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 1.63

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.0068E-09	8,088.493	16,176.985	0.00E+00	1.62E-05	3.25E-05	Avg. MeV	
Am-241	2.5251E-03	8,088.493	16,176.985	0.00E+00	2.04E+01	4.08E+01	0.0150	1.191E+15
Am-242m	3.9624E-07	8,088.493	16,176.985	0.00E+00	3.20E-03	6.41E-03	0.0250	2.474E+14
Am-243	1.4880E-06	8,088.493	16,176.985	0.00E+00	1.20E-02	2.41E-02	0.0375	2.151E+14
C-14	5.7053E-09	8,088.493	16,176.985	0.00E+00	4.61E-05	9.23E-05	0.0575	2.315E+14
Cl-36	1.3124E-32	8,088.493	16,176.985	0.00E+00	1.06E-28	2.12E-28	0.0850	1.395E+14
Cm-243	1.1419E-07	8,088.493	16,176.985	0.00E+00	9.24E-04	1.85E-03	0.1250	9.212E+13
Cm-244	1.6522E-05	8,088.493	16,176.985	0.00E+00	1.34E-01	2.67E-01	0.2250	1.204E+14
Co-60	7.4047E-07	8,088.493	16,176.985	0.00E+00	5.99E-03	1.20E-02	0.3750	5.238E+13
Cs-134	2.0455E-05	8,088.493	16,176.985	0.00E+00	1.65E-01	3.31E-01	0.5750	8.657E+14
Cs-135	3.4477E-06	8,088.493	16,176.985	0.00E+00	2.79E-02	5.58E-02	0.8500	1.057E+13
Cs-137	1.4365E+00	8,088.493	16,176.985	0.00E+00	1.16E+04	2.32E+04	1.2500	5.115E+12
Eu-154	7.3230E-03	8,088.493	16,176.985	0.00E+00	5.92E+01	1.18E+02	1.7500	2.879E+11
Eu-155	5.9259E-04	8,088.493	16,176.985	0.00E+00	4.79E+00	9.59E+00	2.2500	2.408E+07
Fe-55	2.2791E-06	8,088.493	16,176.985	0.00E+00	1.84E-02	3.69E-02	2.7500	2.297E+07
H-3	1.9698E-03	8,088.493	16,176.985	0.00E+00	1.59E+01	3.19E+01	3.5000	1.342E+04
I-129	7.5300E-07	8,088.493	16,176.985	0.00E+00	6.09E-03	1.22E-02	5.0000	5.485E+03
Kr-85	4.1176E-02	8,088.493	16,176.985	0.00E+00	3.33E+02	6.66E+02	7.0000	6.006E+02
Np-237	9.5752E-06	8,088.493	16,176.985	0.00E+00	7.74E-02	1.55E-01	11.0000	6.698E+01
Pa-231	3.9379E-09	8,088.493	16,176.985	0.00E+00	3.19E-05	6.37E-05		
Pb-210	3.3115E-10	8,088.493	16,176.985	0.00E+00	2.68E-06	5.36E-06		
Pm-147	9.2402E-04	8,088.493	16,176.985	0.00E+00	7.47E+00	1.49E+01		
Pu-238	1.6217E-02	8,088.493	16,176.985	0.00E+00	1.31E+02	2.62E+02		
Pu-239	4.2810E-04	8,088.493	16,176.985	0.00E+00	3.46E+00	6.93E+00		
Pu-240	2.4333E-04	8,088.493	16,176.985	0.00E+00	1.97E+00	3.94E+00		
Pu-241	1.6242E-02	8,088.493	16,176.985	0.00E+00	1.31E+02	2.63E+02		
Pu-242	3.6329E-07	8,088.493	16,176.985	0.00E+00	2.94E-03	5.88E-03		
Ra-226	9.0114E-10	8,088.493	16,176.985	0.00E+00	7.29E-06	1.46E-05		
Ra-228	3.1019E-14	8,088.493	16,176.985	0.00E+00	2.51E-10	5.02E-10		
Ru-106	2.1225E-10	8,088.493	16,176.985	0.00E+00	1.72E-06	3.43E-06		
Se-79	1.2930E-05	8,088.493	16,176.985	0.00E+00	1.05E-01	2.09E-01		
Sn-126	1.1571E-05	8,088.493	16,176.985	0.00E+00	9.36E-02	1.87E-01		
Sr-90	1.3472E+00	8,088.493	16,176.985	0.00E+00	1.09E+04	2.18E+04		
Tc-99	4.2239E-04	8,088.493	16,176.985	0.00E+00	3.42E+00	6.83E+00		
Th-229	1.2407E-11	8,088.493	16,176.985	0.00E+00	1.00E-07	2.01E-07		
Th-230	8.3497E-08	8,088.493	16,176.985	0.00E+00	6.75E-04	1.35E-03		
Th-232	3.8371E-14	8,088.493	16,176.985	0.00E+00	3.10E-10	6.21E-10		
Ti-208	4.0414E-08	8,088.493	16,176.985	0.00E+00	3.27E-04	6.54E-04		
U-232	1.0948E-07	8,088.493	16,176.985	0.00E+00	8.86E-04	1.77E-03		
U-233	3.6275E-09	8,088.493	16,176.985	0.00E+00	2.93E-05	5.87E-05		
U-234	1.8562E-04	8,088.493	16,176.985	0.00E+00	1.50E+00	3.00E+00		
U-235	-2.7235E-06	8,088.493	0.000	3.42E-02	1.22E-02	3.42E-02		
U-236	1.5493E-05	8,088.493	16,176.985	0.00E+00	1.25E-01	2.51E-01		
U-238	-4.2851E-09	8,088.493	0.000	2.15E-02	2.14E-02	2.15E-02		
Y-90	1.3475E+00	8,088.493	16,176.985	0.00E+00	1.09E+04	2.18E+04		
Other Radionuclides					1.11E+04	2.21E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.35E+02	2.71E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			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.
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.83740991	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		8,088.493	
Bounding:		16,176.985	

Checks			Estimated EOL HM/Given EOL HM 1.01
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.32		
Bounding:	0.64		

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

²Total burnup for all fuel associated with this worksheet must be 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 (SWITZERLAND)
 SNF ID #: 945
 Fuel Units & Descr: 52 - MTR TYPE
 Heavy Metal Mass: BOL=35.98kg ; EOL=28.81kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1993
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100% U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 2.17

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.0068E-09	6,795.811	13,591.622	0.00E+00	1.36E-05	2.73E-05	0.0150	1.001E+15
Am-241	2.5251E-03	6,795.811	13,591.622	0.00E+00	1.72E+01	3.43E+01	0.0250	2.079E+14
Am-242m	3.9624E-07	6,795.811	13,591.622	0.00E+00	2.69E-03	5.39E-03	0.0375	1.807E+14
Am-243	1.4880E-06	6,795.811	13,591.622	0.00E+00	1.01E-02	2.02E-02	0.0575	1.945E+14
C-14	5.7053E-09	6,795.811	13,591.622	0.00E+00	3.88E-05	7.75E-05	0.0850	1.772E+14
Cl-36	1.3124E-32	6,795.811	13,591.622	0.00E+00	8.92E-29	1.78E-28	0.1250	7.739E+13
Cm-243	1.1419E-07	6,795.811	13,591.622	0.00E+00	7.76E-04	1.55E-03	0.2250	1.012E+14
Cm-244	1.6522E-05	6,795.811	13,591.622	0.00E+00	1.12E-01	2.25E-01	0.3750	4.401E+13
Co-60	7.4047E-07	6,795.811	13,591.622	0.00E+00	5.03E-03	1.01E-02	0.5750	7.273E+14
Cs-134	2.0455E-05	6,795.811	13,591.622	0.00E+00	1.39E-01	2.78E-01	0.8500	8.884E+12
Cs-135	3.4477E-06	6,795.811	13,591.622	0.00E+00	2.34E-02	4.69E-02	1.2500	4.297E+12
Cs-137	1.4365E+00	6,795.811	13,591.622	0.00E+00	9.76E+03	1.95E+04	1.7500	2.419E+11
Eu-154	7.3230E-03	6,795.811	13,591.622	0.00E+00	4.98E+01	9.95E+01	2.2500	2.023E+07
Eu-155	5.9259E-04	6,795.811	13,591.622	0.00E+00	4.03E+00	8.05E+00	2.7500	1.930E+07
Fe-55	2.2791E-06	6,795.811	13,591.622	0.00E+00	1.55E-02	3.10E-02	3.5000	1.121E+04
H-3	1.9698E-03	6,795.811	13,591.622	0.00E+00	1.34E+01	2.68E+01	5.0000	4.582E+03
I-129	7.5300E-07	6,795.811	13,591.622	0.00E+00	5.12E-03	1.02E-02	7.0000	5.016E+02
Kr-85	4.1176E-02	6,795.811	13,591.622	0.00E+00	2.80E+02	5.60E+02	11.0000	5.593E+01
Np-237	9.5752E-06	6,795.811	13,591.622	0.00E+00	6.51E-02	1.30E-01		
Pa-231	3.9379E-09	6,795.811	13,591.622	0.00E+00	2.68E-05	5.35E-05		
Pb-210	3.3115E-10	6,795.811	13,591.622	0.00E+00	2.25E-06	4.50E-06		
Pm-147	9.2402E-04	6,795.811	13,591.622	0.00E+00	6.28E+00	1.26E+01		
Pu-238	1.6217E-02	6,795.811	13,591.622	0.00E+00	1.10E+02	2.20E+02		
Pu-239	4.2810E-04	6,795.811	13,591.622	0.00E+00	2.91E+00	5.82E+00		
Pu-240	2.4333E-04	6,795.811	13,591.622	0.00E+00	1.65E+00	3.31E+00		
Pu-241	1.6242E-02	6,795.811	13,591.622	0.00E+00	1.10E+02	2.21E+02		
Pu-242	3.6329E-07	6,795.811	13,591.622	0.00E+00	2.47E-03	4.94E-03		
Ra-226	9.0114E-10	6,795.811	13,591.622	0.00E+00	6.12E-06	1.22E-05		
Ra-228	3.1019E-14	6,795.811	13,591.622	0.00E+00	2.11E-10	4.22E-10		
Ru-106	2.1225E-10	6,795.811	13,591.622	0.00E+00	1.44E-06	2.88E-06		
Se-79	1.2930E-05	6,795.811	13,591.622	0.00E+00	8.79E-02	1.76E-01		
Sn-126	1.1571E-05	6,795.811	13,591.622	0.00E+00	7.86E-02	1.57E-01		
Sr-90	1.3472E+00	6,795.811	13,591.622	0.00E+00	9.16E+03	1.83E+04		
Tc-99	4.2239E-04	6,795.811	13,591.622	0.00E+00	2.87E+00	5.74E+00		
Th-229	1.2407E-11	6,795.811	13,591.622	0.00E+00	8.43E-08	1.69E-07		
Th-230	8.3497E-08	6,795.811	13,591.622	0.00E+00	5.67E-04	1.13E-03		
Th-232	3.8371E-14	6,795.811	13,591.622	0.00E+00	2.61E-10	5.22E-10		
Th-232	4.0414E-08	6,795.811	13,591.622	0.00E+00	2.75E-04	5.49E-04		
U-232	1.0948E-07	6,795.811	13,591.622	0.00E+00	7.44E-04	1.49E-03		
U-233	3.6275E-09	6,795.811	13,591.622	0.00E+00	2.47E-05	4.93E-05		
U-234	1.8562E-04	6,795.811	13,591.622	0.00E+00	1.26E+00	2.52E+00		
U-235	-2.7235E-06	6,795.811	0.000	3.50E-02	1.65E-02	3.50E-02		
U-236	1.5493E-05	6,795.811	13,591.622	0.00E+00	1.05E-01	2.11E-01		
U-238	-4.2851E-09	6,795.811	0.000	6.64E-03	6.61E-03	6.64E-03		
Y-90	1.3475E+00	6,795.811	13,591.622	0.00E+00	9.16E+03	1.83E+04		
Other Radionuclides					9.30E+03	1.86E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.14E+02	2.27E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			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.
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U3Si2	U	
	45.07146122	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		6,795.811	
Bounding:		13,591.622	

Checks			Estimated EOL HM/Given EOL HM 1.01
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.60		
Bounding:	1.20		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 882
 Fuel Units & Descr: 20 - ELEMENT
 Heavy Metal Mass: BOL = ; EOL=10.40kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1972
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.69

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	3.4276E-08	16.671	16.671	0.00E+00	5.71E-07	5.71E-07	0.0150	8.698E+11
Am-241	1.1458E-04	16.671	16.671	0.00E+00	1.91E-03	1.91E-03	0.0250	1.807E+11
Am-242m	7.9468E-09	16.671	16.671	0.00E+00	1.32E-07	1.32E-07	0.0375	1.566E+11
Am-243	9.8386E-10	16.671	16.671	0.00E+00	1.64E-08	1.64E-08	0.0575	1.685E+11
C-14	2.2978E-04	16.671	16.671	0.00E+00	3.83E-03	3.83E-03	0.0850	1.018E+11
Cl-36	1.2261E-06	16.671	16.671	0.00E+00	2.04E-05	2.04E-05	0.1250	6.614E+10
Cm-243	1.7271E-10	16.671	16.671	0.00E+00	2.88E-09	2.88E-09	0.2250	8.812E+10
Cm-244	1.3058E-09	16.671	16.671	0.00E+00	2.18E-08	2.18E-08	0.3750	3.825E+10
Co-60	9.8636E-03	16.671	16.671	0.00E+00	1.64E-01	1.64E-01	0.5750	6.369E+11
Cs-134	1.9617E-08	16.671	16.671	0.00E+00	3.27E-07	3.27E-07	0.8500	6.288E+09
Cs-135	3.0316E-05	16.671	16.671	0.00E+00	5.05E-04	5.05E-04	1.2500	1.432E+10
Cs-137	1.0263E+00	16.671	16.671	0.00E+00	1.71E+01	1.71E+01	1.7500	1.620E+08
Eu-154	2.0017E-04	16.671	16.671	0.00E+00	3.34E-03	3.34E-03	2.2500	8.207E+04
Eu-155	8.5957E-05	16.671	16.671	0.00E+00	1.43E-03	1.43E-03	2.7500	1.118E+04
Fe-55	2.2646E-05	16.671	16.671	0.00E+00	3.78E-04	3.78E-04	3.5000	2.892E+00
H-3	1.0835E-03	16.671	16.671	0.00E+00	1.81E-02	1.81E-02	5.0000	1.208E+00
I-129	7.3195E-07	16.671	16.671	0.00E+00	1.22E-05	1.22E-05	7.0000	1.352E-01
Kr-85	1.5661E-02	16.671	16.671	0.00E+00	2.61E-01	2.61E-01	11.0000	1.529E-02
Np-237	1.1494E-06	16.671	16.671	0.00E+00	1.92E-05	1.92E-05		
Pa-231	5.8070E-08	16.671	16.671	0.00E+00	9.68E-07	9.68E-07		
Pb-210	1.2985E-12	16.671	16.671	0.00E+00	2.16E-11	2.16E-11		
Pm-147	2.2196E-05	16.671	16.671	0.00E+00	3.70E-04	3.70E-04		
Pu-238	2.6223E-04	16.671	16.671	0.00E+00	4.37E-03	4.37E-03		
Pu-239	6.6739E-04	16.671	16.671	0.00E+00	1.11E-02	1.11E-02		
Pu-240	8.6705E-05	16.671	16.671	0.00E+00	1.45E-03	1.45E-03		
Pu-241	3.4759E-04	16.671	16.671	0.00E+00	5.79E-03	5.79E-03		
Pu-242	1.9717E-09	16.671	16.671	0.00E+00	3.29E-08	3.29E-08		
Ra-226	3.0000E-12	16.671	16.671	0.00E+00	5.00E-11	5.00E-11		
Ra-228	8.3328E-12	16.671	16.671	0.00E+00	1.39E-10	1.39E-10		
Ru-106	6.1464E-15	16.671	16.671	0.00E+00	1.02E-13	1.02E-13		
Se-79	1.3221E-05	16.671	16.671	0.00E+00	2.20E-04	2.20E-04		
Sn-126	1.1491E-05	16.671	16.671	0.00E+00	1.92E-04	1.92E-04		
Sr-90	9.5541E-01	16.671	16.671	0.00E+00	1.59E+01	1.59E+01		
Tc-99	4.6656E-04	16.671	16.671	0.00E+00	7.78E-03	7.78E-03		
Th-229	1.9085E-11	16.671	16.671	0.00E+00	3.18E-10	3.18E-10		
Th-230	2.1913E-10	16.671	16.671	0.00E+00	3.65E-09	3.65E-09		
Th-232	8.3478E-12	16.671	16.671	0.00E+00	1.39E-10	1.39E-10		
Tl-208	1.8752E-08	16.671	16.671	0.00E+00	3.13E-07	3.13E-07		
U-232	5.0782E-08	16.671	16.671	0.00E+00	8.47E-07	8.47E-07		
U-233	3.2596E-09	16.671	16.671	0.00E+00	5.43E-08	5.43E-08		
U-234	3.9817E-07	16.671	16.671	0.00E+00	6.64E-06	6.64E-06		
U-235	2.7761E-06	16.671	0.000	2.10E-02	2.10E-02	2.10E-02		
U-236	1.6190E-05	16.671	16.671	0.00E+00	2.70E-04	2.70E-04		
U-238	2.8547E-09	16.671	0.000	2.28E-04	2.27E-04	2.28E-04		
Y-90	9.5557E-01	16.671	16.671	0.00E+00	1.59E+01	1.59E+01		
Other Radionuclides					2.03E+01	2.03E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.95E-01	1.95E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	
BOL HM Constituents:	SST	SST	
BOL Enrichment %:	UO2	U	
		60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup set equal to bounding burnup. Bounding burnup taken from SFD and converted to MWd using BOL=10.420kg
	From SFD	Estimated	
Nominal:		16.671	
Bounding:		16.671	

Checks			Estimated EOL HM/Given EOL HM 1.00
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.03		
Bounding:	0.03		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 787
 Fuel Units & Descr: 43 - ELEMENT
 Heavy Metal Mass: BOL = : EOL=239.88kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1972
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 1.34

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.5200E-06	240.132	240.132	0.00E+00	6.05E-04	6.05E-04	0.0150	4.512E+14
Am-241	8.6432E+00	240.132	240.132	0.00E+00	2.08E+03	2.08E+03	0.0250	4.020E+13
Am-242m	1.5728E-02	240.132	240.132	0.00E+00	3.78E+00	3.78E+00	0.0375	3.451E+13
Am-243	1.6288E-02	240.132	240.132	0.00E+00	3.91E+00	3.91E+00	0.0575	6.428E+13
C-14	1.2068E-01	240.132	240.132	0.00E+00	2.90E+01	2.90E+01	0.0850	2.162E+13
Cl-36	2.2849E-03	240.132	240.132	0.00E+00	5.49E-01	5.49E-01	0.1250	1.525E+13
Cm-243	6.0144E-04	240.132	240.132	0.00E+00	1.44E-01	1.44E-01	0.2250	1.864E+13
Cm-244	9.4880E-02	240.132	240.132	0.00E+00	2.28E+01	2.28E+01	0.3750	8.069E+12
Co-60	3.9052E+00	240.132	240.132	0.00E+00	9.38E+02	9.38E+02	0.5750	1.334E+14
Cs-134	2.2139E-06	240.132	240.132	0.00E+00	5.32E-04	5.32E-04	0.8500	2.922E+12
Cs-135	4.3976E-04	240.132	240.132	0.00E+00	1.06E-01	1.06E-01	1.2500	7.161E+13
Cs-137	1.4887E-01	240.132	240.132	0.00E+00	3.57E+03	3.57E+03	1.7500	8.609E+10
Eu-154	3.7342E-01	240.132	240.132	0.00E+00	8.97E+01	8.97E+01	2.2500	3.810E+08
Eu-155	8.4893E-03	240.132	240.132	0.00E+00	2.04E+00	2.04E+00	2.7500	6.457E+08
Fe-55	5.3750E-03	240.132	240.132	0.00E+00	1.29E+00	1.29E+00	3.5000	4.880E+06
H-3	1.0472E-01	240.132	240.132	0.00E+00	2.51E+01	2.51E+01	5.0000	2.059E+06
I-129	1.0618E-05	240.132	240.132	0.00E+00	2.55E-03	2.55E-03	7.0000	2.331E+05
Kr-85	2.2717E-01	240.132	240.132	0.00E+00	5.46E+01	5.46E+01	11.0000	2.654E+04
Np-237	1.6400E-04	240.132	240.132	0.00E+00	3.94E-02	3.94E-02		
Pa-231	2.8688E-06	240.132	240.132	0.00E+00	6.89E-04	6.89E-04		
Pb-210	4.7312E-08	240.132	240.132	0.00E+00	1.14E-05	1.14E-05		
Pm-147	3.2198E-04	240.132	240.132	0.00E+00	7.73E-02	7.73E-02		
Pu-238	-1.1924E+00	240.132	0.000	3.09E+04	3.06E+04	3.09E+04		
Pu-239	-4.8600E-02	240.132	0.000	3.73E+03	3.72E+03	3.73E+03		
Pu-240	-3.0127E-01	240.132	0.000	4.77E+03	4.70E+03	4.77E+03		
Pu-241	-1.2917E+02	240.132	0.000	1.23E+06	1.20E+06	1.23E+06		
Pu-242	-1.1381E-04	240.132	0.000	2.06E+01	2.06E+01	2.06E+01		
Ra-226	1.0760E-07	240.132	240.132	0.00E+00	2.58E-05	2.58E-05		
Ra-228	6.0160E-07	240.132	240.132	0.00E+00	1.44E-04	1.44E-04		
Ru-106	1.3388E-13	240.132	240.132	0.00E+00	3.21E-11	3.21E-11		
Se-79	1.9179E-04	240.132	240.132	0.00E+00	4.61E-02	4.61E-02		
Sn-126	1.6669E-04	240.132	240.132	0.00E+00	4.00E-02	4.00E-02		
Sr-90	1.3859E+01	240.132	240.132	0.00E+00	3.33E+03	3.33E+03		
Tc-99	6.7678E-03	240.132	240.132	0.00E+00	1.63E+00	1.63E+00		
Th-229	2.2592E-06	240.132	240.132	0.00E+00	5.43E-04	5.43E-04		
Th-230	7.5955E-06	240.132	240.132	0.00E+00	1.82E-03	1.82E-03		
Th-232	6.0208E-07	240.132	240.132	0.00E+00	1.45E-04	1.45E-04		
Tl-208	7.5795E-05	240.132	240.132	0.00E+00	1.82E-02	1.82E-02		
U-232	2.0521E-04	240.132	240.132	0.00E+00	4.93E-02	4.93E-02		
U-233	3.6128E-04	240.132	240.132	0.00E+00	8.68E-02	8.68E-02		
U-234	1.2788E-02	240.132	240.132	0.00E+00	3.07E+00	3.07E+00		
U-235	5.7486E-04	240.132	240.132	1.03E-01	2.41E-01	2.41E-01		
U-236	2.3485E-04	240.132	240.132	0.00E+00	5.64E-02	5.64E-02		
U-238	1.1581E-04	240.132	240.132	1.29E-02	4.07E-02	4.07E-02		
Y-90	1.3861E+01	240.132	240.132	0.00E+00	3.33E+03	3.33E+03		
Other Radionuclides					1.23E+04	1.23E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.44E+03	1.45E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: (Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	ZIRC	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 240.132	Estimated: 240.132	Nominal burnup set equal to bounding burnup. Bounding burnup taken from SFD and converted to MWd using BOL=240.132kg
Bounding:		240.132	

Checks		
Nominal:	Burnup Multiplier: 0.03	Estimated Burnup/ Given Burnup: 1.40
Bounding:	0.03	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: SAXTON
 SNF ID #: 883
 Fuel Units & Descr: 25 - ELEMENT
 Heavy Metal Mass: BOL= ; EOL=95.59kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1972
 Estimates as of: 2030

Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.78

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Avg. MeV	
Ac-227	2.5200E-06	95.688	95.688	0.00E+00	2.41E-04	2.41E-04	0.0150	1.798E+14
Am-241	8.6432E+00	95.688	95.688	0.00E+00	8.27E+02	8.27E+02	0.0250	1.602E+13
Am-242m	1.5728E-02	95.688	95.688	0.00E+00	1.50E+00	1.50E+00	0.0375	1.375E+13
Am-243	1.6288E-02	95.688	95.688	0.00E+00	1.56E+00	1.56E+00	0.0575	2.561E+13
C-14	1.2068E-01	95.688	95.688	0.00E+00	1.15E+01	1.15E+01	0.0850	8.615E+12
Cf-252	2.2849E-03	95.688	95.688	0.00E+00	2.19E-01	2.19E-01	0.1250	6.076E+12
Co-60	6.0144E-04	95.688	95.688	0.00E+00	5.76E-02	5.76E-02	0.2250	7.426E+12
Co-60	3.9052E+00	95.688	95.688	0.00E+00	9.08E+00	9.08E+00	0.3750	3.215E+12
Cs-134	2.2139E-06	95.688	95.688	0.00E+00	3.74E+02	3.74E+02	0.8500	1.164E+12
Cs-135	4.3976E-04	95.688	95.688	0.00E+00	2.12E-04	2.12E-04	1.2500	2.854E+13
Cs-137	4.3976E-04	95.688	95.688	0.00E+00	4.21E-02	4.21E-02	1.7500	3.430E+10
Cs-137	1.4887E+01	95.688	95.688	0.00E+00	1.42E+03	1.42E+03	2.2500	1.518E+08
Eu-154	3.7342E-01	95.688	95.688	0.00E+00	3.57E+01	3.57E+01	2.7500	2.573E+08
Eu-155	8.4893E-03	95.688	95.688	0.00E+00	8.12E-01	8.12E-01	3.5000	1.945E+06
Fe-55	5.3750E-03	95.688	95.688	0.00E+00	5.14E-01	5.14E-01	5.0000	8.205E+05
H-3	1.0472E-01	95.688	95.688	0.00E+00	1.00E+01	1.00E+01	7.0000	9.287E+04
I-129	1.0618E-05	95.688	95.688	0.00E+00	1.02E-03	1.02E-03	11.0000	1.058E+04
Kr-85	2.2717E-01	95.688	95.688	0.00E+00	2.17E+01	2.17E+01		
Np-237	1.6400E-04	95.688	95.688	0.00E+00	1.57E-02	1.57E-02		
Pa-231	2.8688E-06	95.688	95.688	0.00E+00	2.75E-04	2.75E-04		
Pb-210	4.7312E-08	95.688	95.688	0.00E+00	4.53E-06	4.53E-06		
Pm-147	3.2198E-04	95.688	95.688	0.00E+00	3.08E-02	3.08E-02		
Pu-238	-1.1924E+00	95.688	0.000	1.23E+04	1.22E+04	1.23E+04		
Pu-239	-4.8600E-02	95.688	0.000	1.49E+03	1.48E+03	1.49E+03		
Pu-240	-3.0127E-01	95.688	0.000	1.90E+03	1.87E+03	1.90E+03		
Pu-241	-1.2917E+02	95.688	0.000	4.89E+05	4.77E+05	4.89E+05		
Pu-242	-1.1381E-04	95.688	0.000	8.22E+00	8.21E+00	8.22E+00		
Ra-226	1.0760E-07	95.688	95.688	0.00E+00	1.03E-05	1.03E-05		
Ra-228	6.0160E-07	95.688	95.688	0.00E+00	5.76E-05	5.76E-05		
Ru-106	1.3388E-13	95.688	95.688	0.00E+00	1.28E-11	1.28E-11		
Se-79	1.9179E-04	95.688	95.688	0.00E+00	1.84E-02	1.84E-02		
Sn-126	1.6669E-04	95.688	95.688	0.00E+00	1.59E-02	1.59E-02		
Sr-90	1.3859E+01	95.688	95.688	0.00E+00	1.33E+03	1.33E+03		
Tc-99	6.7678E-03	95.688	95.688	0.00E+00	6.48E-01	6.48E-01		
Th-229	2.2592E-06	95.688	95.688	0.00E+00	2.16E-04	2.16E-04		
Th-230	7.5955E-06	95.688	95.688	0.00E+00	7.27E-04	7.27E-04		
Th-232	6.0208E-07	95.688	95.688	0.00E+00	5.76E-05	5.76E-05		
Tl-208	7.5795E-05	95.688	95.688	0.00E+00	7.25E-03	7.25E-03		
U-232	2.0521E-04	95.688	95.688	0.00E+00	1.96E-02	1.96E-02		
U-233	3.6128E-04	95.688	95.688	0.00E+00	3.46E-02	3.46E-02		
U-234	1.2788E-02	95.688	95.688	0.00E+00	1.22E+00	1.22E+00		
U-235	5.7486E-04	95.688	95.688	4.12E-02	9.62E-02	9.62E-02		
U-236	2.3485E-04	95.688	95.688	0.00E+00	2.25E-02	2.25E-02		
U-238	1.1581E-04	95.688	95.688	5.12E-03	1.62E-02	1.62E-02		
Y-90	1.3861E+01	95.688	95.688	0.00E+00	1.33E+03	1.33E+03		
Other Radionuclides					4.92E+03	4.92E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.74E+02	5.79E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	SST	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		95.688	Nominal burnup set equal to bounding burnup.
Bounding:		95.688	Bounding burnup taken from SFD and converted to MWd using BOL=95.688kg

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.03		
Bounding:	0.03		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 788
 Fuel Units & Descr: 9 - ELEMENT
 Heavy Metal Mass: BOL= ; EOL=41.48kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1972
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc. 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.31

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.0733E-09	66.483	66.483	0.00E+00	7.14E-08	7.14E-08	0.0150	2.530E+12
Am-241	1.4751E-01	66.483	66.483	0.00E+00	9.81E+00	9.81E+00	0.0250	5.070E+11
Am-242m	2.6809E-04	66.483	66.483	0.00E+00	1.78E-02	1.78E-02	0.0375	4.777E+11
Am-243	6.2484E-04	66.483	66.483	0.00E+00	4.15E-02	4.15E-02	0.0575	5.977E+11
C-14	4.7820E-05	66.483	66.483	0.00E+00	3.18E-03	3.18E-03	0.0850	2.793E+11
Cl-36	8.0297E-07	66.483	66.483	0.00E+00	5.34E-05	5.34E-05	0.1250	1.858E+11
Cm-243	1.7426E-04	66.483	66.483	0.00E+00	1.16E-02	1.16E-02	0.2250	2.385E+11
Cm-244	2.7616E-02	66.483	66.483	0.00E+00	1.84E+00	1.84E+00	0.3750	1.030E+11
Co-60	3.5610E-04	66.483	66.483	0.00E+00	2.37E-02	2.37E-02	0.5750	2.425E+12
Cs-134	2.6260E-07	66.483	66.483	0.00E+00	1.75E-05	1.75E-05	0.8500	2.368E+10
Cs-135	1.4433E-05	66.483	66.483	0.00E+00	9.60E-04	9.60E-04	1.2500	1.507E+10
Cs-137	9.8870E-01	66.483	66.483	0.00E+00	6.57E+01	6.57E+01	1.7500	6.626E+08
Eu-154	6.0320E-03	66.483	66.483	0.00E+00	4.01E-01	4.01E-01	2.2500	1.090E+05
Eu-155	2.1770E-04	66.483	66.483	0.00E+00	1.45E-02	1.45E-02	2.7500	3.838E+05
Fe-55	7.9296E-07	66.483	66.483	0.00E+00	5.27E-05	5.27E-05	3.5000	2.746E+04
H-3	8.9486E-03	66.483	66.483	0.00E+00	5.95E-01	5.95E-01	5.0000	1.173E+04
I-129	9.8288E-07	66.483	66.483	0.00E+00	6.53E-05	6.53E-05	7.0000	1.352E+03
Kr-85	1.0707E-02	66.483	66.483	0.00E+00	7.12E-01	7.12E-01	11.0000	1.552E+02
Np-237	1.1927E-05	66.483	66.483	0.00E+00	7.93E-04	7.93E-04		
Pa-231	1.4703E-09	66.483	66.483	0.00E+00	9.77E-08	9.77E-08		
Pb-210	1.6828E-10	66.483	66.483	0.00E+00	1.12E-08	1.12E-08		
Pm-147	6.9606E-06	66.483	66.483	0.00E+00	4.63E-04	4.63E-04		
Pu-238	6.6263E-02	66.483	66.483	0.00E+00	4.41E+00	4.41E+00		
Pu-239	1.1618E-02	66.483	66.483	0.00E+00	7.72E-01	7.72E-01		
Pu-240	1.5142E-02	66.483	66.483	0.00E+00	1.01E+00	1.01E+00		
Pu-241	4.3766E-01	66.483	66.483	0.00E+00	2.91E+01	2.91E+01		
Pu-242	6.4260E-05	66.483	66.483	0.00E+00	4.27E-03	4.27E-03		
Ra-226	3.8501E-10	66.483	66.483	0.00E+00	2.56E-08	2.56E-08		
Ra-228	5.2955E-12	66.483	66.483	0.00E+00	3.52E-10	3.52E-10		
Ru-106	2.0413E-14	66.483	66.483	0.00E+00	1.36E-12	1.36E-12		
Se-79	1.2376E-05	66.483	66.483	0.00E+00	8.23E-04	8.23E-04		
Sn-126	2.5210E-05	66.483	66.483	0.00E+00	1.68E-03	1.68E-03		
Sr-90	6.4163E-01	66.483	66.483	0.00E+00	4.27E+01	4.27E+01		
Tc-99	3.9357E-04	66.483	66.483	0.00E+00	2.62E-02	2.62E-02		
Th-229	1.5644E-10	66.483	66.483	0.00E+00	1.04E-08	1.04E-08		
Th-230	2.7972E-08	66.483	66.483	0.00E+00	1.86E-06	1.86E-06		
Th-232	5.3036E-12	66.483	66.483	0.00E+00	3.53E-10	3.53E-10		
Ti-208	1.5136E-07	66.483	66.483	0.00E+00	1.01E-05	1.01E-05		
U-232	4.1005E-07	66.483	66.483	0.00E+00	2.73E-05	2.73E-05		
U-233	2.5856E-08	66.483	66.483	0.00E+00	1.72E-06	1.72E-06		
U-234	5.2665E-05	66.483	66.483	0.00E+00	3.50E-03	3.50E-03		
U-235	-1.4487E-06	66.483	0.000	2.87E-03	2.78E-03	2.87E-03		
U-236	7.5888E-06	66.483	66.483	0.00E+00	5.05E-04	5.05E-04		
U-238	-2.6129E-07	66.483	0.000	1.35E-02	1.35E-02	1.35E-02		
Y-90	6.4180E-01	66.483	66.483	0.00E+00	4.27E+01	4.27E+01		
Other Radionuclides					6.34E+01	6.34E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	Nominal burnup set equal to bounding burnup. Bounding burnup taken from SFD and converted to MWd using BOL=41.552kg
Bounding:		66.483	

Checks		
Nominal:	Burnup Multiplier: 0.05	Estimated Burnup/ Given Burnup
Bounding:	0.05	Estimated EOL HM/ Given EOL HM: 1.00

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

²Total burnup for all fuel associated with this worksheet must be 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 (MET MOUNTS)	¹ Fuel decay start date: 1964	Estimated
SNF ID #: 1037	Estimates as of: 2030	Canister usage:
Fuel Units & Descr: 1 - CANISTER OF SCRAP	Template: LWBR (Light Water, Zirc, 60 to 100%, Th and U)	HIC
Heavy Metal Mass: BOL = : EOL = .05kg	² Template Burnup(MWd): 10269.14	1.00
ROD Storage Site: INEEL	Template BOL Heavy Metal Mass (MT): 0.45991251	
	Template Decay Time: 65 years	

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.1130E-04	2.522	2.522	0.00E+00	2.81E-04	2.81E-04	Avg. MeV	
Am-241	2.4968E-04	2.522	2.522	0.00E+00	6.30E-04	6.30E-04	0.0150	1.025E+11
Am-242m	1.2932E-06	2.522	2.522	0.00E+00	3.26E-06	3.26E-06	0.0250	2.101E+10
Am-243	3.1064E-07	2.522	2.522	0.00E+00	7.84E-07	7.84E-07	0.0375	1.797E+10
C-14	9.2091E-05	2.522	2.522	0.00E+00	2.32E-04	2.32E-04	0.0575	1.962E+10
Cl-36	1.8103E-06	2.522	2.522	0.00E+00	4.57E-06	4.57E-06	0.0850	1.290E+10
Cm-243	1.4753E-07	2.522	2.522	0.00E+00	3.72E-07	3.72E-07	0.1250	7.732E+09
Cm-244	4.4872E-06	2.522	2.522	0.00E+00	1.13E-05	1.13E-05	0.2250	1.175E+10
Co-60	1.6866E-05	2.522	2.522	0.00E+00	4.26E-05	4.26E-05	0.3750	4.545E+09
Cs-134	1.0673E-09	2.522	2.522	0.00E+00	2.69E-09	2.69E-09	0.5750	7.057E+10
Cs-135	2.8639E-05	2.522	2.522	0.00E+00	7.22E-05	7.22E-05	0.8500	1.248E+09
Cs-137	7.3872E-01	2.522	2.522	0.00E+00	1.86E+00	1.86E+00	1.2500	3.066E+08
Eu-154	7.6657E-04	2.522	2.522	0.00E+00	1.93E-03	1.93E-03	1.7500	1.115E+08
Eu-155	9.9716E-06	2.522	2.522	0.00E+00	2.52E-05	2.52E-05	2.2500	2.060E+03
Fe-55	7.7368E-10	2.522	2.522	0.00E+00	1.95E-09	1.95E-09	2.7500	9.262E+08
H-3	3.9497E-04	2.522	2.522	0.00E+00	9.96E-04	9.96E-04	3.5000	3.211E+00
I-129	1.5853E-06	2.522	2.522	0.00E+00	4.00E-06	4.00E-06	5.0000	9.838E-01
Kr-85	9.0017E-03	2.522	2.522	0.00E+00	2.27E-02	2.27E-02	7.0000	6.833E-02
Np-237	1.2864E-07	2.522	2.522	0.00E+00	3.24E-07	3.24E-07	11.0000	4.854E-03
Pa-231	1.2007E-04	2.522	2.522	0.00E+00	3.03E-04	3.03E-04		
Pb-210	2.4014E-08	2.522	2.522	0.00E+00	6.06E-08	6.06E-08		
Pm-147	9.4691E-08	2.522	2.522	0.00E+00	2.39E-07	2.39E-07		
Pu-238	3.3537E-04	2.522	2.522	0.00E+00	8.46E-04	8.46E-04		
Pu-239	2.7500E-05	2.522	2.522	0.00E+00	6.94E-05	6.94E-05		
Pu-240	1.6155E-05	2.522	2.522	0.00E+00	4.07E-05	4.07E-05		
Pu-241	3.4867E-04	2.522	2.522	0.00E+00	8.74E-04	8.74E-04		
Pu-242	4.0841E-08	2.522	2.522	0.00E+00	1.03E-07	1.03E-07		
Ra-226	3.7325E-08	2.522	2.522	0.00E+00	9.41E-08	9.41E-08		
Ra-228	4.6382E-06	2.522	2.522	0.00E+00	1.17E-05	1.17E-05		
Ru-106	4.4161E-20	2.522	2.522	0.00E+00	1.11E-19	1.11E-19		
Se-79	3.5407E-05	2.522	2.522	0.00E+00	8.93E-05	8.93E-05		
Sn-126	3.9838E-05	2.522	2.522	0.00E+00	1.00E-04	1.00E-04		
Sr-90	7.3093E-01	2.522	2.522	0.00E+00	1.84E+00	1.84E+00		
Tc-99	3.2525E-04	2.522	2.522	0.00E+00	8.20E-04	8.20E-04		
Th-229	1.0001E-04	2.522	2.522	0.00E+00	2.52E-04	2.52E-04		
Th-230	1.3633E-06	2.522	2.522	0.00E+00	3.44E-06	3.44E-06		
Th-232	9.0328E-08	2.522	0.000	5.03E-06	4.80E-06	5.03E-06		
Tl-208	1.0459E-02	2.522	2.522	0.00E+00	2.64E-02	2.64E-02		
U-232	2.8328E-02	2.522	2.522	0.00E+00	7.15E-02	7.15E-02		
U-233	-3.3244E-03	2.522	0.000	1.69E-02	8.52E-03	1.69E-02		
U-234	8.1769E-04	2.522	2.522	0.00E+00	2.06E-03	2.06E-03		
U-235	5.7813E-08	2.522	2.522	3.46E-09	1.49E-07	1.49E-07		
U-236	1.3273E-07	2.522	2.522	0.00E+00	3.35E-07	3.35E-07		
U-238	-3.1121E-10	2.522	0.000	2.21E-09	1.43E-09	2.21E-09		
Y-90	7.3112E-01	2.522	2.522	0.00E+00	1.84E+00	1.84E+00		
Other Radionuclides					2.28E+00	2.28E+00		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.93E-02	3.96E-02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
BOL HM Constituents:	ZIRC	ZIRC	
BOL Enrichment %:	ThO2-UO2	Th and U	
		60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2.522	Nominal burnup set equal to bounding burnup. Bounding burnup taken from SFD and converted to MWd using BOL=0.048kg
Bounding:		2.522	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	2.37	
Bounding:	2.37	
		Estimated EOL HM/Given EOL HM
		1.00

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

²Total burnup for all fuel associated with this worksheet must be 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 LWBR BLKT I
 SNF ID #: 374
 Fuel Units & Descr: 3 - 443 ROD ARRAY
 Heavy Metal Mass: BOL=3795.70kg ; EOL=3755.20kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1982
 Estimates as of: 2030
 Template: LWBR (Light Water, Zirc. 60 to 100%, Th and U)
²Template Burnup(MWd): 10269.14
 Template BOL Heavy Metal Mass (MT): 0.45991251
 Template Decay Time: 35 years

Estimated
 Canister usage:
 24"x15"
 3.00

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	9.7360E-05	50,103.239	88,060.238	0.00E+00	4.88E+00	8.57E+00	Avg. MeV	
Am-241	2.4345E-04	50,103.239	88,060.238	0.00E+00	1.22E+01	2.14E+01	0.0150	7.263E+15
Am-242m	1.4821E-06	50,103.239	88,060.238	0.00E+00	7.43E-02	1.31E-01	0.0250	1.496E+15
Am-243	3.1152E-07	50,103.239	88,060.238	0.00E+00	1.56E-02	2.74E-02	0.0375	1.279E+15
C-14	9.2432E-05	50,103.239	88,060.238	0.00E+00	4.63E+00	8.14E+00	0.0575	1.398E+15
Cl-36	1.8103E-06	50,103.239	88,060.238	0.00E+00	9.07E-02	1.59E-01	0.0850	8.927E+14
Cm-243	3.0597E-07	50,103.239	88,060.238	0.00E+00	1.53E-02	2.69E-02	0.1250	5.593E+14
Cm-244	1.4149E-05	50,103.239	88,060.238	0.00E+00	7.09E-01	1.25E+00	0.2250	8.005E+14
Co-60	8.7369E-04	50,103.239	88,060.238	0.00E+00	4.38E+01	7.69E+01	0.3750	3.214E+14
Cs-134	2.5601E-05	50,103.239	88,060.238	0.00E+00	1.28E+00	2.25E+00	0.5750	4.908E+15
Cs-135	2.8639E-05	50,103.239	88,060.238	0.00E+00	1.43E+00	2.52E+00	0.8500	8.770E+13
Cs-137	1.4772E+00	50,103.239	88,060.238	0.00E+00	7.40E+04	1.30E+05	1.2500	3.875E+13
Eu-154	8.6025E-03	50,103.239	88,060.238	0.00E+00	4.31E+02	7.58E+02	1.7500	6.044E+12
Eu-155	6.6062E-04	50,103.239	88,060.238	0.00E+00	3.31E+01	5.82E+01	2.2500	1.756E+08
Fe-55	2.3011E-06	50,103.239	88,060.238	0.00E+00	1.15E-01	2.03E-01	2.7500	4.317E+13
H-3	2.1277E-03	50,103.239	88,060.238	0.00E+00	1.07E+02	1.87E+02	3.5000	1.626E+05
I-129	1.5853E-06	50,103.239	88,060.238	0.00E+00	7.94E-02	1.40E-01	5.0000	5.097E+04
Kr-85	6.2625E-02	50,103.239	88,060.238	0.00E+00	3.14E+03	5.51E+03	7.0000	3.727E+03
Np-237	1.2620E-07	50,103.239	88,060.238	0.00E+00	6.32E-03	1.11E-02	11.0000	2.853E+02
Pa-231	1.2017E-04	50,103.239	88,060.238	0.00E+00	6.02E+00	1.06E+01		
Pb-210	1.4247E-08	50,103.239	88,060.238	0.00E+00	7.14E-04	1.25E-03		
Pm-147	2.6224E-04	50,103.239	88,060.238	0.00E+00	1.31E+01	2.31E+01		
Pu-238	4.2477E-04	50,103.239	88,060.238	0.00E+00	2.13E+01	3.74E+01		
Pu-239	2.7519E-05	50,103.239	88,060.238	0.00E+00	1.38E+00	2.42E+00		
Pu-240	1.6184E-05	50,103.239	88,060.238	0.00E+00	8.11E-01	1.43E+00		
Pu-241	1.4695E-03	50,103.239	88,060.238	0.00E+00	7.36E+01	1.29E+02		
Pu-242	4.0831E-08	50,103.239	88,060.238	0.00E+00	2.05E-03	3.60E-03		
Ra-226	2.1423E-08	50,103.239	88,060.238	0.00E+00	1.07E-03	1.89E-03		
Ra-228	4.6236E-06	50,103.239	88,060.238	0.00E+00	2.32E-01	4.07E-01		
Ru-106	4.0208E-11	50,103.239	88,060.238	0.00E+00	2.01E-06	3.54E-06		
Se-79	3.5417E-05	50,103.239	88,060.238	0.00E+00	1.77E+00	3.12E+00		
Sn-126	3.9848E-05	50,103.239	88,060.238	0.00E+00	2.00E+00	3.51E+00		
Sr-90	1.4928E+00	50,103.239	88,060.238	0.00E+00	7.48E+04	1.31E+05		
Tc-99	3.2525E-04	50,103.239	88,060.238	0.00E+00	1.63E+01	2.86E+01		
Th-229	6.4582E-05	50,103.239	88,060.238	0.00E+00	3.24E+00	5.69E+00		
Th-230	1.1432E-06	50,103.239	88,060.238	0.00E+00	5.73E-02	1.01E-01		
Th-232	-9.0328E-08	50,103.239	0.000	4.01E-01	3.96E-01	4.01E-01		
Tl-208	1.3964E-02	50,103.239	88,060.238	0.00E+00	7.00E+02	1.23E+03		
U-232	3.7822E-02	50,103.239	88,060.238	0.00E+00	1.90E+03	3.33E+03		
U-233	-3.3244E-03	50,103.239	0.000	1.35E+03	1.18E+03	1.35E+03		
U-234	8.1769E-04	50,103.239	88,060.238	0.00E+00	4.10E+01	7.20E+01		
U-235	5.7813E-08	50,103.239	88,060.238	2.76E-04	3.17E-03	5.37E-03		
U-236	1.3273E-07	50,103.239	88,060.238	0.00E+00	6.65E-03	1.17E-02		
U-238	-3.1121E-10	50,103.239	0.000	1.76E-04	1.61E-04	1.76E-04		
Y-90	1.4928E+00	50,103.239	88,060.238	0.00E+00	7.48E+04	1.31E+05		
Other Radionuclides					8.36E+04	1.47E+05		

Thermal Power	
Nominal Heat	Bounding
Output (Watts)	Heat Output (Watts)
1.37E+03	2.39E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding:	ZIRC-4	ZIRC
BOL HM Constituents:	ThO ₂ UO ₂ CER	Th and U
BOL Enrichment %:	0.089989331	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:	50,103.239	39,413.097
Bounding:	88,060.238	78,826.195

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

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.59	0.79
Bounding:	1.04	0.90

Estimated EOL HM/Given EOL HM: 1.00

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

²Total burnup for all fuel associated with this worksheet must be 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 LWBR BLKT II
 SNF ID #: 375
 Fuel Units & Desc: 3 - 261 ROD ARRAY
 Heavy Metal Mass: BOL=4373.50kg ; EOL=4331.70kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1982
 Estimates as of: 2030
 Template: LWBR (Light Water, Zirc, 60 to 100%, Th and U)
²Template Burnup(MWd): 10269.14
 Template BOL Heavy Metal Mass (MT): 0.45991251
³Template Decay Time: 35 years

Estimated
 Canister usage:
 24"x15"
 3.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	9.7360E-05	64,290.449	110,212.197	0.00E+00	6.26E+00	1.07E+01	0.0150	9.090E+15
Am-241	2.4345E-04	64,290.449	110,212.197	0.00E+00	1.57E+01	2.68E+01	0.0250	1.872E+15
Am-242m	1.4821E-06	64,290.449	110,212.197	0.00E+00	9.53E-02	1.63E-01	0.0375	1.600E+15
Am-243	3.1152E-07	64,290.449	110,212.197	0.00E+00	2.00E-02	3.43E-02	0.0575	1.749E+15
C-14	9.2432E-05	64,290.449	110,212.197	0.00E+00	5.94E+00	1.02E+01	0.0850	1.117E+15
Cl-36	1.8103E-06	64,290.449	110,212.197	0.00E+00	1.16E-01	2.00E-01	0.1250	7.000E+14
Cm-243	3.0597E-07	64,290.449	110,212.197	0.00E+00	1.97E-02	3.37E-02	0.2250	1.002E+15
Cm-244	1.4149E-05	64,290.449	110,212.197	0.00E+00	9.10E-01	1.56E+00	0.3750	4.023E+14
Co-60	8.7369E-04	64,290.449	110,212.197	0.00E+00	5.62E+01	9.63E+01	0.5750	6.143E+15
Cs-134	2.5601E-05	64,290.449	110,212.197	0.00E+00	1.65E+00	2.82E+00	0.8500	1.098E+14
Cs-135	2.8639E-05	64,290.449	110,212.197	0.00E+00	1.84E+00	3.16E+00	1.2500	4.849E+13
Cs-137	1.4772E+00	64,290.449	110,212.197	0.00E+00	9.50E+04	1.63E+05	1.7500	7.564E+12
Eu-154	8.6025E-03	64,290.449	110,212.197	0.00E+00	5.53E+02	9.48E+02	2.2500	2.198E+08
Eu-155	6.6062E-04	64,290.449	110,212.197	0.00E+00	4.25E+01	7.28E+01	2.7500	5.404E+13
Fe-55	2.3011E-06	64,290.449	110,212.197	0.00E+00	1.48E-01	2.54E-01	3.5000	2.026E+05
H-3	2.1277E-03	64,290.449	110,212.197	0.00E+00	1.37E+02	2.35E+02	5.0000	6.354E+04
I-129	1.5853E-06	64,290.449	110,212.197	0.00E+00	1.02E-01	1.75E-01	7.0000	4.647E+03
Kr-85	6.2625E-02	64,290.449	110,212.197	0.00E+00	4.03E+03	6.90E+03	11.0000	3.560E+02
Np-237	1.2620E-07	64,290.449	110,212.197	0.00E+00	8.11E-03	1.39E-02		
Pa-231	1.2017E-04	64,290.449	110,212.197	0.00E+00	7.73E+00	1.32E+01		
Pb-210	1.4247E-08	64,290.449	110,212.197	0.00E+00	9.16E-04	1.57E-03		
Pm-147	2.6224E-04	64,290.449	110,212.197	0.00E+00	1.69E+01	2.89E+01		
Pu-238	4.2477E-04	64,290.449	110,212.197	0.00E+00	2.73E+01	4.68E+01		
Pu-239	2.7519E-05	64,290.449	110,212.197	0.00E+00	1.77E+00	3.03E+00		
Pu-240	1.6184E-05	64,290.449	110,212.197	0.00E+00	1.04E+00	1.78E+00		
Pu-241	1.4695E-03	64,290.449	110,212.197	0.00E+00	9.45E+01	1.62E+02		
Pu-242	4.0831E-08	64,290.449	110,212.197	0.00E+00	2.63E-03	4.50E-03		
Ra-226	2.1423E-08	64,290.449	110,212.197	0.00E+00	1.38E-03	2.36E-03		
Ra-228	4.6236E-06	64,290.449	110,212.197	0.00E+00	2.97E-01	5.10E-01		
Ru-106	4.0208E-11	64,290.449	110,212.197	0.00E+00	2.58E-06	4.43E-06		
Sr-90	3.5417E-05	64,290.449	110,212.197	0.00E+00	2.28E+00	3.90E+00		
Sn-126	3.9848E-05	64,290.449	110,212.197	0.00E+00	2.58E+00	4.39E+00		
Sr-90	1.4928E+00	64,290.449	110,212.197	0.00E+00	9.60E+04	1.65E+05		
Tc-99	3.2525E-04	64,290.449	110,212.197	0.00E+00	2.09E+01	3.58E+01		
Th-229	6.4582E-05	64,290.449	110,212.197	0.00E+00	4.15E+00	7.12E+00		
Th-230	1.1432E-06	64,290.449	110,212.197	0.00E+00	7.35E-02	1.26E-01		
Th-232	-9.0328E-08	64,290.449	0.000	4.62E-01	4.56E-01	4.62E-01		
Tl-208	1.3964E-02	64,290.449	110,212.197	0.00E+00	8.98E+02	1.54E+03		
U-232	3.7822E-02	64,290.449	110,212.197	0.00E+00	2.43E+03	4.17E+03		
U-233	-3.3244E-03	64,290.449	0.000	1.55E+03	1.34E+03	1.55E+03		
U-234	8.1769E-04	64,290.449	110,212.197	0.00E+00	5.26E+01	9.01E+01		
U-235	5.7813E-08	64,290.449	110,212.197	3.18E-04	4.03E-03	6.69E-03		
U-236	1.3273E-07	64,290.449	110,212.197	0.00E+00	8.53E-03	1.46E-02		
U-238	-3.1121E-10	64,290.449	0.000	2.03E-04	1.83E-04	2.03E-04		
Y-90	1.4928E+00	64,290.449	110,212.197	0.00E+00	9.60E+04	1.65E+05		
Other Radionuclides					1.07E+05	1.84E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.75E+03	2.98E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	ThO ₂ UO ₂ CER	Th and U	
BOL Enrichment %:	0.071220718	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	64,290.449	40,678.112	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:	110,212.197	81,356.224	Bounding burnup taken directly from SFD (converted to MWd).

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.66	0.63
Bounding:	1.13	0.74

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: SHIPPINGPORT LWBR BLKT III ¹Fuel decay start date: 1982
 SNF ID #: 376 Estimates as of: 2030
 Fuel Units & Descr: 6 - 445 ROD ARRAY Template: LWBR (Light Water, Zirc, 60 to 100%, Th and U)
 Heavy Metal Mass: BOL=8776.50kg ; EOL=8700.87kg ²Template Burnup(MWd): 10269.14
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.45991251
Template Decay Time: 35 years

Estimated
Canister usage:
24"x15"
6.00

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	9.7360E-05	129,014.550	221,167.800	0.00E+00	1.26E+01	2.15E+01	Avg. MeV	
Am-241	2.4345E-04	129,014.550	221,167.800	0.00E+00	3.14E+01	5.38E+01	0.0150	1.824E+16
Am-242m	1.4821E-06	129,014.550	221,167.800	0.00E+00	1.91E-01	3.28E-01	0.0250	3.757E+15
Am-243	3.1152E-07	129,014.550	221,167.800	0.00E+00	4.02E-02	6.89E-02	0.0375	3.211E+15
C-14	9.2432E-05	129,014.550	221,167.800	0.00E+00	1.19E+01	2.04E+01	0.0575	3.510E+15
Cl-36	1.8103E-06	129,014.550	221,167.800	0.00E+00	2.34E-01	4.00E-01	0.0850	2.242E+15
Cm-243	3.0597E-07	129,014.550	221,167.800	0.00E+00	3.95E-02	6.77E-02	0.1250	1.405E+15
Cm-244	1.4149E-05	129,014.550	221,167.800	0.00E+00	1.83E+00	3.13E+00	0.2250	2.011E+15
Co-60	8.7369E-04	129,014.550	221,167.800	0.00E+00	1.13E+02	1.93E+02	0.3750	8.073E+14
Cs-134	2.5601E-05	129,014.550	221,167.800	0.00E+00	3.30E+00	5.66E+00	0.5750	1.233E+16
Cs-135	2.8639E-05	129,014.550	221,167.800	0.00E+00	3.69E+00	6.33E+00	0.8500	2.203E+14
Cs-137	1.4772E+00	129,014.550	221,167.800	0.00E+00	1.91E+05	3.27E+05	1.2500	9.731E+13
Eu-154	8.6025E-03	129,014.550	221,167.800	0.00E+00	1.11E+03	1.90E+03	1.7500	1.518E+13
Eu-155	6.6062E-04	129,014.550	221,167.800	0.00E+00	8.52E+01	1.46E+02	2.2500	4.411E+08
Fe-55	2.3011E-06	129,014.550	221,167.800	0.00E+00	2.97E-01	5.09E-01	2.7500	1.084E+14
H-3	2.1277E-03	129,014.550	221,167.800	0.00E+00	2.75E+02	4.71E+02	3.5000	4.067E+05
I-129	1.5853E-06	129,014.550	221,167.800	0.00E+00	2.05E-01	3.51E-01	5.0000	1.275E+05
Kr-85	6.2625E-02	129,014.550	221,167.800	0.00E+00	8.08E+03	1.39E+04	7.0000	9.326E+03
Np-237	1.2620E-07	129,014.550	221,167.800	0.00E+00	1.63E-02	2.79E-02	11.0000	7.144E+02
Pa-231	1.2017E-04	129,014.550	221,167.800	0.00E+00	1.55E+01	2.66E+01		
Pb-210	1.4247E-08	129,014.550	221,167.800	0.00E+00	1.84E-03	3.15E-03		
Pm-147	2.6224E-04	129,014.550	221,167.800	0.00E+00	3.38E+01	5.80E+01		
Pu-238	4.2477E-04	129,014.550	221,167.800	0.00E+00	5.48E+01	9.39E+01		
Pu-239	2.7519E-05	129,014.550	221,167.800	0.00E+00	3.55E+00	6.09E+00		
Pu-240	1.6184E-05	129,014.550	221,167.800	0.00E+00	2.09E+00	3.58E+00		
Pu-241	1.4695E-03	129,014.550	221,167.800	0.00E+00	1.90E+02	3.25E+02		
Pu-242	4.0831E-08	129,014.550	221,167.800	0.00E+00	5.27E-03	9.03E-03		
Ra-226	2.1423E-08	129,014.550	221,167.800	0.00E+00	2.76E-03	4.74E-03		
Ra-228	4.6236E-06	129,014.550	221,167.800	0.00E+00	5.97E-01	1.02E+00		
Ru-106	4.0208E-11	129,014.550	221,167.800	0.00E+00	5.19E-06	8.89E-06		
Se-79	3.5417E-05	129,014.550	221,167.800	0.00E+00	4.57E+00	7.83E+00		
Sn-126	3.9848E-05	129,014.550	221,167.800	0.00E+00	5.14E+00	8.81E+00		
Sr-90	1.4928E+00	129,014.550	221,167.800	0.00E+00	1.93E+05	3.30E+05		
Tc-99	3.2525E-04	129,014.550	221,167.800	0.00E+00	4.20E+01	7.19E+01		
Th-229	6.4582E-05	129,014.550	221,167.800	0.00E+00	8.33E+00	1.43E+01		
Th-230	1.1432E-06	129,014.550	221,167.800	0.00E+00	1.47E-01	2.53E-01		
Th-232	-9.0328E-08	129,014.550	0.000	9.27E-01	9.15E-01	9.27E-01		
Ti-208	1.3964E-02	129,014.550	221,167.800	0.00E+00	1.80E+03	3.09E+03		
U-232	3.7822E-02	129,014.550	221,167.800	0.00E+00	4.88E+03	8.37E+03		
U-233	-3.3244E-03	129,014.550	0.000	3.12E+03	2.69E+03	3.12E+03		
U-234	8.1769E-04	129,014.550	221,167.800	0.00E+00	1.05E+02	1.81E+02		
U-235	5.7813E-08	129,014.550	221,167.800	6.38E-04	8.10E-03	1.34E-02		
U-236	1.3273E-07	129,014.550	221,167.800	0.00E+00	1.71E-02	2.94E-02		
U-238	-3.1121E-10	129,014.550	0.000	4.08E-04	3.68E-04	4.08E-04		
Y-90	1.4928E+00	129,014.550	221,167.800	0.00E+00	1.93E+05	3.30E+05		
Other Radionuclides					2.15E+05	3.69E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.52E+03	5.99E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	ThO2UO2CER	Th and U	
BOL Enrichment %:	0.072866152	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup taken directly from SFD (converted to MWd).
	From SFD	Estimated	
Nominal:	129,014.550	73,600.310	
Bounding:	221,167.800	147,200.620	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.66	0.57	0.99
Bounding:	1.13	0.67	

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

²Total burnup for all fuel associated with this worksheet must be 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 LWBR REFLCT. IV	¹ Fuel decay start date: 1982	Estimated
SNF ID #: 371	Estimates as of: 2030	Canister usage:
Fuel Units & Descr: 9 - 261 ROD ARRAY	Template: LWBR (Light Water, Zirc. 60 to 100%, Th and U)	24"x15"
Heavy Metal Mass: BOL=11491.60kg ; EOL=11491.50kg	² Template Burnup(MWd): 10269.14	9.00
ROD Storage Site: INEEL	Template BOL Heavy Metal Mass (MT): 0.45991251	
	Template Decay Time: 35 years	

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	9.7360E-05	25,281.519	51,712.198	0.00E+00	2.46E+00	5.03E+00	Avg. MeV	
Am-241	2.4345E-04	25,281.519	51,712.198	0.00E+00	6.15E+00	1.26E+01	0.0150	4.275E+15
Am-242m	1.4821E-06	25,281.519	51,712.198	0.00E+00	3.75E-02	7.66E-02	0.0250	8.785E+14
Am-243	3.1152E-07	25,281.519	51,712.198	0.00E+00	7.88E-03	1.61E-02	0.0375	7.510E+14
C-14	9.2432E-05	25,281.519	51,712.198	0.00E+00	2.34E+00	4.78E+00	0.0575	8.207E+14
Cl-36	1.8103E-06	25,281.519	51,712.198	0.00E+00	4.58E-02	9.36E-02	0.0850	5.243E+14
Cm-243	3.0597E-07	25,281.519	51,712.198	0.00E+00	7.74E-03	1.58E-02	0.1250	3.285E+14
Cm-244	1.4149E-05	25,281.519	51,712.198	0.00E+00	3.58E-01	7.32E-01	0.2250	4.701E+14
Co-60	8.7369E-04	25,281.519	51,712.198	0.00E+00	2.21E+01	4.52E+01	0.3750	1.888E+14
Cs-134	2.5601E-05	25,281.519	51,712.198	0.00E+00	6.47E-01	1.32E+00	0.5750	2.882E+15
Cs-135	2.8639E-05	25,281.519	51,712.198	0.00E+00	7.24E-01	1.48E+00	0.8500	5.150E+13
Cs-137	1.4772E+00	25,281.519	51,712.198	0.00E+00	3.73E+04	7.64E+04	1.2500	2.275E+13
Eu-154	8.6025E-03	25,281.519	51,712.198	0.00E+00	2.17E+02	4.45E+02	1.7500	3.549E+12
Eu-155	6.6062E-04	25,281.519	51,712.198	0.00E+00	1.67E+01	3.42E+01	2.2500	1.032E+08
Fe-55	2.3011E-06	25,281.519	51,712.198	0.00E+00	5.82E-02	1.19E-01	2.7500	2.535E+13
H-3	2.1277E-03	25,281.519	51,712.198	0.00E+00	5.38E+01	1.10E+02	3.5000	1.169E+05
I-129	1.5853E-06	25,281.519	51,712.198	0.00E+00	4.01E-02	8.20E-02	5.0000	3.634E+04
Kr-85	6.2625E-02	25,281.519	51,712.198	0.00E+00	1.58E+03	3.24E+03	7.0000	2.605E+03
Np-237	1.2620E-07	25,281.519	51,712.198	0.00E+00	3.19E-03	6.53E-03	11.0000	1.940E+02
Pa-231	1.2017E-04	25,281.519	51,712.198	0.00E+00	3.04E+00	6.21E+00		
Pb-210	1.4247E-08	25,281.519	51,712.198	0.00E+00	3.60E-04	7.37E-04		
Pm-147	2.6224E-04	25,281.519	51,712.198	0.00E+00	6.63E+00	1.36E+01		
Pu-238	4.2477E-04	25,281.519	51,712.198	0.00E+00	1.07E+01	2.20E+01		
Pu-239	2.7519E-05	25,281.519	51,712.198	0.00E+00	6.96E-01	1.42E+00		
Pu-240	1.6184E-05	25,281.519	51,712.198	0.00E+00	4.09E-01	8.37E-01		
Pu-241	1.4695E-03	25,281.519	51,712.198	0.00E+00	3.71E+01	7.60E+01		
Pu-242	4.0831E-08	25,281.519	51,712.198	0.00E+00	1.03E-03	2.11E-03		
Ra-226	2.1423E-08	25,281.519	51,712.198	0.00E+00	5.42E-04	1.11E-03		
Ra-228	4.6236E-06	25,281.519	51,712.198	0.00E+00	1.17E-01	2.39E-01		
Ru-106	4.0208E-11	25,281.519	51,712.198	0.00E+00	1.02E-06	2.08E-06		
Se-79	3.5417E-05	25,281.519	51,712.198	0.00E+00	8.95E-01	1.83E+00		
Sn-126	3.9848E-05	25,281.519	51,712.198	0.00E+00	1.01E+00	2.06E+00		
Sr-90	1.4928E+00	25,281.519	51,712.198	0.00E+00	3.77E+04	7.72E+04		
Tc-99	3.2525E-04	25,281.519	51,712.198	0.00E+00	8.22E+00	1.68E+01		
Th-229	6.4582E-05	25,281.519	51,712.198	0.00E+00	1.63E+00	3.34E+00		
Th-230	1.1432E-06	25,281.519	51,712.198	0.00E+00	2.89E-02	5.91E-02		
Th-232	-9.0328E-08	25,281.519	0.000	1.21E+00	1.21E+00	1.21E+00		
Tl-208	1.3964E-02	25,281.519	51,712.198	0.00E+00	3.53E+02	7.22E+02		
U-232	3.7822E-02	25,281.519	51,712.198	0.00E+00	9.56E+02	1.96E+03		
U-233	-3.3244E-03	25,281.519	0.000	4.08E+03	4.00E+03	4.08E+03		
U-234	8.1769E-04	25,281.519	51,712.198	0.00E+00	2.07E+01	4.23E+01		
U-235	5.7813E-08	25,281.519	51,712.198	8.35E-04	2.30E-03	3.82E-03		
U-236	1.3273E-07	25,281.519	51,712.198	0.00E+00	3.36E-03	6.86E-03		
U-238	-3.1121E-10	25,281.519	0.000	5.34E-04	5.26E-04	5.34E-04		
Y-90	1.4928E+00	25,281.519	51,712.198	0.00E+00	3.77E+04	7.72E+04		
Other Radionuclides					4.22E+04	8.63E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.90E+02	1.50E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
BOL HM Constituents:	ZIRC-4	ZIRC	
BOL Enrichment %:	ThO2UO2CER	Th and U	
		60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:	25,281.519	97.219	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup taken directly from SFD (converted to MWd).
	51,712.198	194.438	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
Bounding:	0.10	0.00	1.00
	0.20	0.00	

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

²Total burnup for all fuel associated with this worksheet must be 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 LWBR REFLCT. V
 SNF ID #: 372
 Fuel Units & Descr: 6 - 166 ROD ARRAY
 Heavy Metal Mass: BOL=5847.10kg ; EOL=5844.70kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1982
 Estimates as of: 2030
 Template: LWBR (Light Water, Zirc, 60 to 100%, Th and U)
²Template Burnup(MWd): 10269.14
 Template BOL Heavy Metal Mass (MT): 0.45991251
 Template Decay Time: 35 years

Estimated
 Canister usage:
 24"x15"
 6.00

II. Estimates

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	9.7360E-05	12,863.620	26,311.951	0.00E+00	1.25E+00	2.56E+00	Avg. MeV	
Am-241	2.4345E-04	12,863.620	26,311.951	0.00E+00	3.13E+00	6.41E+00	0.0150	2.175E+15
Am-242m	1.4821E-06	12,863.620	26,311.951	0.00E+00	1.91E-02	3.90E-02	0.0250	4.470E+14
Am-243	3.1152E-07	12,863.620	26,311.951	0.00E+00	4.01E-03	8.20E-03	0.0375	3.821E+14
C-14	9.2432E-05	12,863.620	26,311.951	0.00E+00	1.19E+00	2.43E+00	0.0575	4.176E+14
Cl-36	1.8103E-06	12,863.620	26,311.951	0.00E+00	2.33E-02	4.76E-02	0.0850	2.668E+14
Cm-243	3.0597E-07	12,863.620	26,311.951	0.00E+00	3.94E-03	8.05E-03	0.1250	1.671E+14
Cm-244	1.4149E-05	12,863.620	26,311.951	0.00E+00	1.82E-01	3.72E-01	0.2250	2.392E+14
Co-60	8.7369E-04	12,863.620	26,311.951	0.00E+00	1.12E+01	2.30E+01	0.3750	9.605E+13
Cs-134	2.5601E-05	12,863.620	26,311.951	0.00E+00	3.29E-01	6.74E-01	0.5750	1.467E+15
Cs-135	2.8639E-05	12,863.620	26,311.951	0.00E+00	3.68E-01	7.54E-01	0.8500	2.620E+13
Cs-137	1.4772E+00	12,863.620	26,311.951	0.00E+00	1.90E+04	3.89E+04	1.2500	1.158E+13
Eu-154	8.6025E-03	12,863.620	26,311.951	0.00E+00	1.11E+02	2.26E+02	1.7500	1.806E+12
Eu-155	6.6062E-04	12,863.620	26,311.951	0.00E+00	8.50E+00	1.74E+01	2.2500	5.250E+07
Fe-55	2.3011E-06	12,863.620	26,311.951	0.00E+00	2.96E-02	6.05E-02	2.7500	1.290E+13
H-3	2.1277E-03	12,863.620	26,311.951	0.00E+00	2.74E+01	5.60E+01	3.5000	5.949E+04
I-129	1.5853E-06	12,863.620	26,311.951	0.00E+00	2.04E-02	4.17E-02	5.0000	1.849E+04
Kr-85	6.2625E-02	12,863.620	26,311.951	0.00E+00	8.06E+02	1.65E+03	7.0000	1.325E+03
Np-237	1.2620E-07	12,863.620	26,311.951	0.00E+00	1.62E-03	3.32E-03	11.0000	9.870E+01
Pa-231	1.2017E-04	12,863.620	26,311.951	0.00E+00	1.55E+00	3.16E+00		
Pb-210	1.4247E-08	12,863.620	26,311.951	0.00E+00	1.83E-04	3.75E-04		
Pm-147	2.6224E-04	12,863.620	26,311.951	0.00E+00	3.37E+00	6.90E+00		
Pu-238	4.2477E-04	12,863.620	26,311.951	0.00E+00	5.46E+00	1.12E+01		
Pu-239	2.7519E-05	12,863.620	26,311.951	0.00E+00	3.54E-01	7.24E-01		
Pu-240	1.6184E-05	12,863.620	26,311.951	0.00E+00	2.08E-01	4.26E-01		
Pu-241	1.4695E-03	12,863.620	26,311.951	0.00E+00	1.89E+01	3.87E+01		
Pu-242	4.0831E-08	12,863.620	26,311.951	0.00E+00	5.25E-04	1.07E-03		
Ra-226	2.1423E-08	12,863.620	26,311.951	0.00E+00	2.76E-04	5.64E-04		
Ra-228	4.6236E-06	12,863.620	26,311.951	0.00E+00	5.95E-02	1.22E-01		
Ru-106	4.0208E-11	12,863.620	26,311.951	0.00E+00	5.17E-07	1.06E-06		
Sa-79	3.5417E-05	12,863.620	26,311.951	0.00E+00	4.56E-01	9.32E-01		
Sn-126	3.9848E-05	12,863.620	26,311.951	0.00E+00	5.13E-01	1.05E+00		
Sr-90	1.4928E+00	12,863.620	26,311.951	0.00E+00	1.92E+04	3.93E+04		
Tc-99	3.2525E-04	12,863.620	26,311.951	0.00E+00	4.18E+00	8.56E+00		
Th-229	6.4582E-05	12,863.620	26,311.951	0.00E+00	8.31E-01	1.70E+00		
Th-230	1.1432E-06	12,863.620	26,311.951	0.00E+00	1.47E-02	3.01E-02		
Th-232	-9.0328E-08	12,863.620	0.000	6.17E-01	6.16E-01	6.17E-01		
Tl-208	1.3964E-02	12,863.620	26,311.951	0.00E+00	1.80E+02	3.67E+02		
U-232	3.7822E-02	12,863.620	26,311.951	0.00E+00	4.87E+02	9.95E+02		
U-233	-3.3244E-03	12,863.620	0.000	2.08E+03	2.03E+03	2.08E+03		
U-234	8.1769E-04	12,863.620	26,311.951	0.00E+00	1.05E+01	2.15E+01		
U-235	5.7813E-08	12,863.620	26,311.951	4.25E-04	1.17E-03	1.95E-03		
U-236	1.3273E-07	12,863.620	26,311.951	0.00E+00	1.71E-03	3.49E-03		
U-238	-3.1121E-10	12,863.620	0.000	2.72E-04	2.68E-04	2.72E-04		
Y-90	1.4928E+00	12,863.620	26,311.951	0.00E+00	1.92E+04	3.93E+04		
Other Radionuclides					2.15E+04	4.39E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.02E+02	7.82E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	ThO2UO2CER	Th and U	
BOL Enrichment %:		60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	12,863.620	2,395.591	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup taken directly from SFD (converted to MWd).
Bounding:	26,311.951	4,671.182	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.10	0.18	1.00
Bounding:	0.20	0.18	

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

²Total burnup for all fuel associated with this worksheet must be 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 LWBR SCRAP
 SNF ID #: 377
 Fuel Units & Descr: 7 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=3143.24kg ; EOL=3122.39kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1982
 Estimates as of: 2030
 Template: LWBR (Light Water, Zirc, 60 to 100%, Th and U)
²Template Burnup(MWd): 10269.14
 Template BOL Heavy Metal Mass (MT): 0.45991251
 Template Decay Time: 35 years

Estimated
 Canister usage:
 HIC
 7.00

Radionuclide	II. Estimates		Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n						Photon Energy Group	Total Photons/sec (bounding)
Ac-227	9.7360E-05	20,285.191	167,848.872	0.00E+00	1.97E+00	1.63E+01	Avg. MeV		
Am-241	2.4345E-04	20,285.191	167,848.872	0.00E+00	4.94E+00	4.09E+01	0.0150	1.384E+16	
Am-242m	1.4821E-06	20,285.191	167,848.872	0.00E+00	3.01E-02	2.49E-01	0.0250	2.851E+15	
Am-243	3.1152E-07	20,285.191	167,848.872	0.00E+00	6.32E-03	5.23E-02	0.0375	2.437E+15	
C-14	9.2432E-05	20,285.191	167,848.872	0.00E+00	1.88E+00	1.55E+01	0.0575	2.664E+15	
Cl-36	1.8103E-06	20,285.191	167,848.872	0.00E+00	3.67E-02	3.04E-01	0.0850	1.702E+15	
Cm-243	3.0597E-07	20,285.191	167,848.872	0.00E+00	6.21E-03	5.14E-02	0.1250	1.066E+15	
Cm-244	1.4149E-05	20,285.191	167,848.872	0.00E+00	2.87E-01	2.37E+00	0.2250	1.526E+15	
Co-60	8.7369E-04	20,285.191	167,848.872	0.00E+00	1.77E+01	1.47E+02	0.3750	6.126E+14	
Cs-134	2.5601E-05	20,285.191	167,848.872	0.00E+00	5.19E-01	4.30E+00	0.5750	9.355E+15	
Cs-135	2.8639E-05	20,285.191	167,848.872	0.00E+00	5.81E-01	4.81E+00	0.8500	1.672E+14	
Cs-137	1.4772E+00	20,285.191	167,848.872	0.00E+00	3.00E+04	2.48E+05	1.2500	7.385E+13	
Eu-154	8.6025E-03	20,285.191	167,848.872	0.00E+00	1.75E+02	1.44E+03	1.7500	1.152E+13	
Eu-155	6.6062E-04	20,285.191	167,848.872	0.00E+00	1.34E+01	1.11E+02	2.2500	3.347E+08	
Fe-55	2.3011E-06	20,285.191	167,848.872	0.00E+00	4.67E-02	3.86E-01	2.7500	8.229E+13	
H-3	2.1277E-03	20,285.191	167,848.872	0.00E+00	4.32E+01	3.57E+02	3.5000	3.005E+05	
I-129	1.5853E-06	20,285.191	167,848.872	0.00E+00	3.22E-02	2.66E-01	5.0000	9.433E+04	
Kr-85	6.2625E-02	20,285.191	167,848.872	0.00E+00	1.27E+03	1.05E+04	7.0000	6.920E+03	
Np-237	1.2620E-07	20,285.191	167,848.872	0.00E+00	2.56E-03	2.12E-02	11.0000	5.321E+02	
Pa-231	1.2017E-04	20,285.191	167,848.872	0.00E+00	2.44E+00	2.02E+01			
Pb-210	1.4247E-08	20,285.191	167,848.872	0.00E+00	2.89E-04	2.39E-03			
Pm-147	2.6224E-04	20,285.191	167,848.872	0.00E+00	5.32E+00	4.40E+01			
Pu-238	4.2477E-04	20,285.191	167,848.872	0.00E+00	8.62E+00	7.13E+01			
Pu-239	2.7519E-05	20,285.191	167,848.872	0.00E+00	5.58E-01	4.62E+00			
Pu-240	1.6184E-05	20,285.191	167,848.872	0.00E+00	3.28E-01	2.72E+00			
Pu-241	1.4695E-03	20,285.191	167,848.872	0.00E+00	2.98E+01	2.47E+02			
Pu-242	4.0831E-08	20,285.191	167,848.872	0.00E+00	8.28E-04	6.85E-03			
Ra-226	2.1423E-08	20,285.191	167,848.872	0.00E+00	4.35E-04	3.60E-03			
Ra-228	4.6236E-06	20,285.191	167,848.872	0.00E+00	9.38E-02	7.76E-01			
Ru-106	4.0208E-11	20,285.191	167,848.872	0.00E+00	8.16E-07	6.75E-06			
Se-79	3.5417E-05	20,285.191	167,848.872	0.00E+00	7.18E-01	5.94E+00			
Sn-126	3.9848E-05	20,285.191	167,848.872	0.00E+00	8.08E-01	6.69E+00			
Sr-90	1.4928E+00	20,285.191	167,848.872	0.00E+00	3.03E+04	2.51E+05			
Tc-99	3.2525E-04	20,285.191	167,848.872	0.00E+00	6.60E+00	5.46E+01			
Th-229	6.4582E-05	20,285.191	167,848.872	0.00E+00	1.31E+00	1.08E+01			
Th-230	1.1432E-06	20,285.191	167,848.872	0.00E+00	2.32E-02	1.92E-01			
Th-232	-9.0328E-08	20,285.191	0.000	3.32E-01	3.30E-01	3.32E-01			
Tl-208	1.3964E-02	20,285.191	167,848.872	0.00E+00	2.83E+02	2.34E+03			
U-232	3.7822E-02	20,285.191	167,848.872	0.00E+00	7.67E+02	6.35E+03			
U-233	-3.3244E-03	20,285.191	0.000	1.12E+03	1.05E+03	1.12E+03			
U-234	8.1769E-04	20,285.191	167,848.872	0.00E+00	1.66E+01	1.37E+02			
U-235	5.7813E-08	20,285.191	167,848.872	2.28E-04	1.40E-03	9.93E-03			
U-236	1.3273E-07	20,285.191	167,848.872	0.00E+00	2.69E-03	2.23E-02			
U-238	-3.1121E-10	20,285.191	0.000	1.46E-04	1.40E-04	1.46E-04			
Y-90	1.4928E+00	20,285.191	167,848.872	0.00E+00	3.03E+04	2.51E+05			
Other Radionuclides					3.38E+04	2.80E+05			

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.71E+02	4.51E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	ThO ₂ UO ₂ CER	Th and U	
BOL Enrichment %:	0.079983883	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		20,285.191	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup taken directly from SFD (converted to t.Wd).
Bounding:	167,848.872	40,570.383	

Checks			
	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.29		1.00
Bounding:	2.39	0.24	

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

²Total burnup for all fuel associated with this worksheet must be 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 LWBR SCRAP (LINER 15718)
 SNF ID #: 379
 Fuel Units & Descr: 1 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL= ; EOL=242.90kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1982
 Estimates as of: 2030
 Template: LWBR (Light Water, Zirc, 60 to 100%, Th and U)
²Template Burnup(MWd): 10269.14
 Template BOL Heavy Metal Mass (MT): 0.45991251
 Template Decay Time: 35 years

Estimated
 Canister usage:
 HIC
 1.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	9.7360E-05	13,723.928	13,723.928	0.00E+00	1.34E+00	1.34E+00	Avg. MeV	
Am-241	2.4345E-04	13,723.928	13,723.928	0.00E+00	3.34E+00	3.34E+00	0.0150	1.132E+15
Am-242m	1.4821E-06	13,723.928	13,723.928	0.00E+00	2.03E-02	2.03E-02	0.0250	2.331E+14
Am-243	3.1152E-07	13,723.928	13,723.928	0.00E+00	4.28E-03	4.28E-03	0.0375	1.993E+14
C-14	9.2432E-05	13,723.928	13,723.928	0.00E+00	1.27E+00	1.27E+00	0.0575	2.178E+14
Cl-36	1.8103E-06	13,723.928	13,723.928	0.00E+00	2.48E-02	2.48E-02	0.0850	1.391E+14
Cm-243	3.0597E-07	13,723.928	13,723.928	0.00E+00	4.20E-03	4.20E-03	0.1250	8.717E+13
Cm-244	1.4149E-05	13,723.928	13,723.928	0.00E+00	1.94E-01	1.94E-01	0.2250	1.248E+14
Co-60	8.7369E-04	13,723.928	13,723.928	0.00E+00	1.20E+01	1.20E+01	0.3750	5.009E+13
Cs-134	2.5601E-05	13,723.928	13,723.928	0.00E+00	3.51E-01	3.51E-01	0.5750	7.849E+14
Cs-135	2.8639E-05	13,723.928	13,723.928	0.00E+00	3.93E-01	3.93E-01	0.8500	1.367E+13
Cs-137	1.4772E+00	13,723.928	13,723.928	0.00E+00	2.03E+04	2.03E+04	1.2500	6.039E+12
Eu-154	8.6025E-03	13,723.928	13,723.928	0.00E+00	1.18E+02	1.18E+02	1.7500	9.419E+11
Eu-155	6.6062E-04	13,723.928	13,723.928	0.00E+00	9.07E+00	9.07E+00	2.2500	2.737E+07
Fe-55	2.3011E-06	13,723.928	13,723.928	0.00E+00	3.16E-02	3.16E-02	2.7500	6.729E+12
H-3	2.1277E-03	13,723.928	13,723.928	0.00E+00	2.92E+01	2.92E+01	3.5000	2.457E+04
I-129	1.5853E-06	13,723.928	13,723.928	0.00E+00	2.18E-02	2.18E-02	5.0000	7.713E+03
Kr-85	6.2625E-02	13,723.928	13,723.928	0.00E+00	8.59E+02	8.59E+02	7.0000	5.658E+02
Np-237	1.2620E-07	13,723.928	13,723.928	0.00E+00	1.73E-03	1.73E-03	11.0000	4.351E-01
Pa-231	1.2017E-04	13,723.928	13,723.928	0.00E+00	1.65E+00	1.65E+00		
Pb-210	1.4247E-08	13,723.928	13,723.928	0.00E+00	1.96E-04	1.96E-04		
Pm-147	2.6224E-04	13,723.928	13,723.928	0.00E+00	3.60E+00	3.60E+00		
Pu-238	4.2477E-04	13,723.928	13,723.928	0.00E+00	5.83E+00	5.83E+00		
Pu-239	2.7519E-05	13,723.928	13,723.928	0.00E+00	3.78E-01	3.78E-01		
Pu-240	1.6184E-05	13,723.928	13,723.928	0.00E+00	2.22E-01	2.22E-01		
Pu-241	1.4695E-03	13,723.928	13,723.928	0.00E+00	2.02E+01	2.02E+01		
Pu-242	4.0831E-08	13,723.928	13,723.928	0.00E+00	5.60E-04	5.60E-04		
Ra-226	2.1423E-08	13,723.928	13,723.928	0.00E+00	2.94E-04	2.94E-04		
Ra-228	4.6236E-06	13,723.928	13,723.928	0.00E+00	6.35E-02	6.35E-02		
Ru-106	4.0208E-11	13,723.928	13,723.928	0.00E+00	5.52E-07	5.52E-07		
Se-79	3.5417E-05	13,723.928	13,723.928	0.00E+00	4.86E-01	4.86E-01		
Sn-126	3.9848E-05	13,723.928	13,723.928	0.00E+00	5.47E-01	5.47E-01		
Sr-90	1.4928E+00	13,723.928	13,723.928	0.00E+00	2.05E+04	2.05E+04		
Tc-99	3.2525E-04	13,723.928	13,723.928	0.00E+00	4.46E+00	4.46E+00		
Th-229	6.4582E-05	13,723.928	13,723.928	0.00E+00	8.86E-01	8.86E-01		
Th-230	1.1432E-06	13,723.928	13,723.928	0.00E+00	1.57E-02	1.57E-02		
Th-232	-9.0328E-08	13,723.928	0.000	2.71E-02	2.59E-02	2.71E-02		
Ti-208	1.3964E-02	13,723.928	13,723.928	0.00E+00	1.92E+02	1.92E+02		
U-232	3.7822E-02	13,723.928	13,723.928	0.00E+00	5.19E+02	5.19E+02		
U-233	-3.3244E-03	13,723.928	0.000	9.13E+01	4.57E+01	9.13E+01		
U-234	8.1769E-04	13,723.928	13,723.928	0.00E+00	1.12E+01	1.12E+01		
U-235	5.7813E-08	13,723.928	13,723.928	1.87E-05	8.12E-04	8.12E-04		
U-236	1.3273E-07	13,723.928	13,723.928	0.00E+00	1.82E-03	1.82E-03		
U-238	-3.1121E-10	13,723.928	0.000	1.19E-05	7.67E-06	1.19E-05		
Y-90	1.4928E+00	13,723.928	13,723.928	0.00E+00	2.05E+04	2.05E+04		
Other Radionuclides					2.29E+04	2.29E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.67E+02	3.68E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	ThO ₂ UO ₂ CER	Th and U	
BOL Enrichment %:		60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		13,723.928	Nominal burnup set equal to bounding burnup. Bounding burnup taken from SFD and converted to MWd using BOL=257.002kg
Bounding:		13,723.928	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	2.39		
Bounding:	2.39		

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

² Total burnup for all fuel associated with this worksheet must be 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 LWBR SEED
 SNF ID #: 380
 Fuel Units & Descr: 12 - 619 ROD HEX ARRAY
 Heavy Metal Mass: BOL=5218.30kg ; EOL=5110.50kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1982
 Estimates as of: 2030
 Template: LWBR (Light Water, Zirc. 60 to 100%, Th and U)
²Template Burnup(MWd): 10269.14
 Template BOL Heavy Metal Mass (MT): 0.45991251
³Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 12.00

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	9.7360E-05	155,505.328	278,657.199	0.00E+00	1.51E+01	2.71E+01		
Am-241	2.4345E-04	155,505.328	278,657.199	0.00E+00	3.79E+01	6.78E+01	0.0150	2.298E+16
Am-242m	1.4821E-06	155,505.328	278,657.199	0.00E+00	2.30E-01	4.13E-01	0.0250	4.734E+15
Am-243	3.1152E-07	155,505.328	278,657.199	0.00E+00	4.84E-02	8.68E-02	0.0375	4.046E+15
C-14	9.2432E-05	155,505.328	278,657.199	0.00E+00	1.44E+01	2.58E+01	0.0575	4.422E+15
Ci-36	1.8103E-06	155,505.328	278,657.199	0.00E+00	2.82E-01	5.04E-01	0.0850	2.825E+15
Co-243	3.0597E-07	155,505.328	278,657.199	0.00E+00	4.76E-02	8.53E-02	0.1250	1.770E+15
Co-244	1.4149E-05	155,505.328	278,657.199	0.00E+00	2.20E+00	3.94E+00	0.2250	2.533E+15
Co-60	8.7369E-04	155,505.328	278,657.199	0.00E+00	1.36E+02	2.43E+02	0.3750	1.017E+15
Cs-134	2.5601E-05	155,505.328	278,657.199	0.00E+00	3.98E+00	7.13E+00	0.5750	1.553E+16
Cs-135	2.8639E-05	155,505.328	278,657.199	0.00E+00	4.45E+00	7.98E+00	0.8500	2.775E+14
Cs-137	1.4772E+00	155,505.328	278,657.199	0.00E+00	2.30E+05	4.12E+05	1.2500	1.226E+14
Eu-154	8.6025E-03	155,505.328	278,657.199	0.00E+00	1.34E+03	2.40E+03	1.7500	1.913E+13
Eu-155	6.6062E-04	155,505.328	278,657.199	0.00E+00	1.03E+02	1.84E+02	2.2500	5.557E+08
Fe-55	2.3011E-06	155,505.328	278,657.199	0.00E+00	3.58E-01	6.41E-01	2.7500	1.366E+14
H-3	2.1277E-03	155,505.328	278,657.199	0.00E+00	3.31E+02	5.93E+02	3.5000	4.989E+05
I-129	1.5853E-06	155,505.328	278,657.199	0.00E+00	2.47E-01	4.42E-01	5.0000	1.566E+05
Kr-85	6.2625E-02	155,505.328	278,657.199	0.00E+00	9.74E+03	1.75E+04	7.0000	1.149E+04
Np-237	1.2620E-07	155,505.328	278,657.199	0.00E+00	1.96E-02	3.52E-02	11.0000	8.834E+02
Pa-231	1.2017E-04	155,505.328	278,657.199	0.00E+00	1.87E+01	3.35E+01		
Pb-210	1.4247E-08	155,505.328	278,657.199	0.00E+00	2.22E-03	3.97E-03		
Pm-147	2.6224E-04	155,505.328	278,657.199	0.00E+00	4.08E+01	7.31E+01		
Pu-238	4.2477E-04	155,505.328	278,657.199	0.00E+00	6.61E+01	1.18E+02		
Pu-239	2.7519E-05	155,505.328	278,657.199	0.00E+00	4.28E+00	7.67E+00		
Pu-240	1.6184E-05	155,505.328	278,657.199	0.00E+00	2.52E+00	4.51E+00		
Pu-241	1.4695E-03	155,505.328	278,657.199	0.00E+00	2.29E+02	4.09E+02		
Pu-242	4.0831E-08	155,505.328	278,657.199	0.00E+00	6.35E-03	1.14E-02		
Ra-226	2.1423E-08	155,505.328	278,657.199	0.00E+00	3.33E-03	5.97E-03		
Ra-228	4.6236E-06	155,505.328	278,657.199	0.00E+00	7.19E-01	1.29E+00		
Ru-106	4.0208E-11	155,505.328	278,657.199	0.00E+00	6.25E-06	1.12E-05		
Se-79	3.5417E-05	155,505.328	278,657.199	0.00E+00	5.51E+00	9.87E+00		
Sn-126	3.9848E-05	155,505.328	278,657.199	0.00E+00	6.20E+00	1.11E+01		
Sr-90	1.4928E+00	155,505.328	278,657.199	0.00E+00	2.32E+05	4.16E+05		
Tc-99	3.2525E-04	155,505.328	278,657.199	0.00E+00	5.06E+01	9.06E+01		
Th-229	6.4582E-05	155,505.328	278,657.199	0.00E+00	1.00E+01	1.80E+01		
Th-230	1.1432E-06	155,505.328	278,657.199	0.00E+00	1.78E-01	3.19E-01		
Th-232	-9.0328E-08	155,505.328	0.000	5.51E-01	5.37E-01	5.51E-01		
Ti-208	1.3964E-02	155,505.328	278,657.199	0.00E+00	2.17E+03	3.89E+03		
U-232	3.7822E-02	155,505.328	278,657.199	0.00E+00	5.88E+03	1.05E+04		
U-233	-3.3244E-03	155,505.328	0.000	1.85E+03	1.34E+03	1.85E+03		
U-234	8.1769E-04	155,505.328	278,657.199	0.00E+00	1.27E+02	2.28E+02		
U-235	5.7813E-08	155,505.328	278,657.199	3.79E-04	9.37E-03	1.65E-02		
U-236	1.3273E-07	155,505.328	278,657.199	0.00E+00	2.06E-02	3.70E-02	4.18E+03	7.48E+03
U-238	-3.1121E-10	155,505.328	0.000	2.42E-04	1.94E-04	2.42E-04		
Y-90	1.4928E+00	155,505.328	278,657.199	0.00E+00	2.32E+05	4.16E+05	Total	Total
Other Radionuclides					2.59E+05	4.65E+05		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	ThO ₂ UO ₂ CER	Th and U	
BOL Enrichment %:	0.070817874	60 to 100	

Burnup Summary (MWd)²

	From SFD	Estimated	Basis for burnup used in estimate: Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup taken directly from SFD (converted to MWd).
Nominal:	155,505.328	104,906.571	
Bounding:	278,657.199	209,813.143	

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	1.33	0.67	0.99
Bounding:	2.39	0.75	

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 191
 Fuel Units & Descr: 36 - 17 FLAT PLATES
 Heavy Metal Mass: BOL=583.92kg : EOL=569.66kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1969
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 36.00

Radionuclide	II. Estimates		x _b	b	y _n	y _b	Gamma Sources	
	m	x _n					Photon Energy Group	Total Photons/sec (bounding)
	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Avg. MeV	
Ac-227	1.0733E-09	13,560.205	27,120.410	0.00E+00	1.46E-05	2.91E-05		
Am-241	1.4751E-01	13,560.205	27,120.410	0.00E+00	2.00E+03	4.00E+03	0.0150	1.032E+15
Am-242m	2.6809E-04	13,560.205	27,120.410	0.00E+00	3.64E+00	7.27E+00	0.0250	2.068E+14
Am-243	6.2484E-04	13,560.205	27,120.410	0.00E+00	8.47E+00	1.69E+01	0.0375	1.949E+14
C-14	4.7820E-05	13,560.205	27,120.410	0.00E+00	6.48E-01	1.30E+00	0.0575	2.438E+14
Cl-36	8.0297E-07	13,560.205	27,120.410	0.00E+00	1.09E-02	2.18E-02	0.0850	1.139E+14
Cm-243	1.7426E-04	13,560.205	27,120.410	0.00E+00	2.36E+00	4.73E+00	0.1250	7.580E+13
Cm-244	2.7616E-02	13,560.205	27,120.410	0.00E+00	3.74E+02	7.49E+02	0.2250	9.727E+13
Co-60	3.5610E-04	13,560.205	27,120.410	0.00E+00	4.83E+00	9.66E+00	0.3750	4.201E+13
Cs-134	2.6260E-07	13,560.205	27,120.410	0.00E+00	3.56E-03	7.12E-03	0.5750	9.893E+14
Cs-135	1.4433E-05	13,560.205	27,120.410	0.00E+00	1.96E-01	3.91E-01	0.8500	9.660E+12
Cs-137	9.8870E-01	13,560.205	27,120.410	0.00E+00	1.34E+04	2.68E+04	1.2500	6.147E+12
Eu-154	6.0320E-03	13,560.205	27,120.410	0.00E+00	8.18E+01	1.64E+02	1.7500	2.703E+11
Eu-155	2.1770E-04	13,560.205	27,120.410	0.00E+00	2.95E+00	5.90E+00	2.2500	4.443E+07
Fe-55	7.9296E-07	13,560.205	27,120.410	0.00E+00	1.08E-02	2.15E-02	2.7500	1.565E+08
H-3	8.9486E-03	13,560.205	27,120.410	0.00E+00	1.21E+02	2.43E+02	3.5000	1.117E+07
I-129	9.8288E-07	13,560.205	27,120.410	0.00E+00	1.33E-02	2.67E-02	5.0000	4.774E+06
Kr-85	1.0707E-02	13,560.205	27,120.410	0.00E+00	1.45E+02	2.90E+02	7.0000	5.500E+05
Np-237	1.1927E-05	13,560.205	27,120.410	0.00E+00	1.62E-01	3.23E-01	11.0000	6.315E+04
Pa-231	1.4703E-09	13,560.205	27,120.410	0.00E+00	1.99E-05	3.99E-05		
Pb-210	1.6828E-10	13,560.205	27,120.410	0.00E+00	2.28E-06	4.56E-06		
Pm-147	6.9606E-06	13,560.205	27,120.410	0.00E+00	9.44E-02	1.89E-01		
Pu-238	6.6263E-02	13,560.205	27,120.410	0.00E+00	8.99E+02	1.80E+03		
Pu-239	1.1618E-02	13,560.205	27,120.410	0.00E+00	1.58E+02	3.15E+02		
Pu-240	1.5142E-02	13,560.205	27,120.410	0.00E+00	2.05E+02	4.11E+02		
Pu-241	4.3766E-01	13,560.205	27,120.410	0.00E+00	5.93E+03	1.19E+04		
Pu-242	6.4260E-05	13,560.205	27,120.410	0.00E+00	8.71E-01	1.74E+00		
Ra-226	3.8501E-10	13,560.205	27,120.410	0.00E+00	5.22E-06	1.04E-05		
Ra-228	5.2955E-12	13,560.205	27,120.410	0.00E+00	7.18E-08	1.44E-07		
Ru-106	2.0413E-14	13,560.205	27,120.410	0.00E+00	2.77E-10	5.54E-10		
Se-79	1.2376E-05	13,560.205	27,120.410	0.00E+00	1.68E-01	3.36E-01		
Sn-126	2.5210E-05	13,560.205	27,120.410	0.00E+00	3.42E-01	6.84E-01		
Sr-90	6.4163E-01	13,560.205	27,120.410	0.00E+00	8.70E+03	1.74E+04		
Tc-99	3.9357E-04	13,560.205	27,120.410	0.00E+00	5.34E+00	1.07E+01		
Th-229	1.5644E-10	13,560.205	27,120.410	0.00E+00	2.12E-06	4.24E-06		
Th-230	2.7972E-08	13,560.205	27,120.410	0.00E+00	3.79E-04	7.59E-04		
Th-232	5.3036E-12	13,560.205	27,120.410	0.00E+00	7.19E-08	1.44E-07		
Tl-208	1.5136E-07	13,560.205	27,120.410	0.00E+00	2.05E-03	4.10E-03		
U-232	4.1005E-07	13,560.205	27,120.410	0.00E+00	5.56E-03	1.11E-02		
U-233	2.5856E-08	13,560.205	27,120.410	0.00E+00	3.51E-04	7.01E-04		
U-234	5.2665E-05	13,560.205	27,120.410	0.00E+00	7.14E-01	1.43E+00		
U-235	-1.4487E-06	13,560.205	0.000	1.24E-02	0.00E+00	1.24E-02		
U-236	7.5888E-06	13,560.205	27,120.410	0.00E+00	1.03E-01	2.06E-01		
U-238	-2.6129E-07	13,560.205	0.000	1.94E-01	1.91E-01	1.94E-01		
Y-90	6.4180E-01	13,560.205	27,120.410	0.00E+00	8.70E+03	1.74E+04		
Other Radionuclides					1.29E+04	2.58E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	
BOL HM Constituents:	ZIRC-2	ZIRC	
BOL Enrichment %:	UO2	U	
	0.98643828	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Nominal:	From SFD	Estimated	
Bounding:	6,481.512	13,560.205	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
Bounding:	0.66	2.09	

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

²Total burnup for all fuel associated with this worksheet must be 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) ¹Fuel decay start date: 1959
 SNF ID #: 189 Estimates as of: 2030
 Fuel Units & Descr: 2 - ROD Template: PWR (Light Water, Zirc, 0 to 5%, U)
 Heavy Metal Mass: BOL=16.89kg ; EOL=16.11kg ²Template Burnup(MWd): 61.92
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00176911
Template Decay Time: 65 years

Estimated
Canister usage:
18"x15"
0.07

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.2581E-09	744.596	1,489.192	0.00E+00	9.37E-07	1.87E-06		
Am-241	1.4761E-01	744.596	1,489.192	0.00E+00	1.10E+02	2.20E+02	0.0150	4.032E+13
Am-242m	2.5032E-04	744.596	1,489.192	0.00E+00	1.86E-01	3.73E-01	0.0250	8.008E+12
Am-243	6.2387E-04	744.596	1,489.192	0.00E+00	4.65E-01	9.29E-01	0.0375	7.486E+12
C-14	4.7739E-05	744.596	1,489.192	0.00E+00	3.55E-02	7.11E-02	0.0575	1.027E+13
Ci-36	8.0297E-07	744.596	1,489.192	0.00E+00	5.98E-04	1.20E-03	0.0850	4.382E+12
Co-243	1.2099E-04	744.596	1,489.192	0.00E+00	9.01E-02	1.80E-01	0.1250	2.858E+12
Co-244	1.5560E-02	744.596	1,489.192	0.00E+00	1.16E+01	2.32E+01	0.2250	3.727E+12
Co-60	4.9580E-05	744.596	1,489.192	0.00E+00	3.69E-02	7.38E-02	0.3750	1.613E+12
Cs-134	1.7022E-09	744.596	1,489.192	0.00E+00	1.27E-06	2.53E-06	0.5750	3.840E+13
Cs-135	1.4433E-05	744.596	1,489.192	0.00E+00	1.07E-02	2.15E-02	0.8500	3.078E+11
Cs-137	6.9929E-01	744.596	1,489.192	0.00E+00	5.21E+02	1.04E+03	1.2500	1.439E+11
Eu-154	1.8023E-03	744.596	1,489.192	0.00E+00	1.34E+00	2.68E+00	1.7500	8.281E+09
Eu-155	2.6793E-05	744.596	1,489.192	0.00E+00	1.99E-02	3.99E-02	2.2500	1.458E+06
Fe-55	1.4580E-08	744.596	1,489.192	0.00E+00	1.09E-05	2.17E-05	2.7500	7.251E+06
H-3	3.8566E-03	744.596	1,489.192	0.00E+00	2.87E+00	5.74E+00	3.5000	3.600E+05
I-129	9.8288E-07	744.596	1,489.192	0.00E+00	7.32E-04	1.46E-03	5.0000	1.537E+05
Kr-85	4.0617E-03	744.596	1,489.192	0.00E+00	3.02E+00	6.05E+00	7.0000	1.769E+04
Np-237	1.2645E-05	744.596	1,489.192	0.00E+00	9.42E-03	1.88E-02	11.0000	2.031E+03
Pa-231	1.6376E-09	744.596	1,489.192	0.00E+00	1.22E-06	2.44E-06		
Pb-210	2.8795E-10	744.596	1,489.192	0.00E+00	2.14E-07	4.29E-07		
Pm-147	1.3264E-07	744.596	1,489.192	0.00E+00	9.88E-05	1.98E-04		
Pu-238	5.8882E-02	744.596	1,489.192	0.00E+00	4.38E+01	8.77E+01		
Pu-239	1.1613E-02	744.596	1,489.192	0.00E+00	8.65E+00	1.73E+01		
Pu-240	1.5142E-02	744.596	1,489.192	0.00E+00	1.13E+01	2.25E+01		
Pu-241	2.1269E-01	744.596	1,489.192	0.00E+00	1.58E+02	3.17E+02		
Pu-242	6.4260E-05	744.596	1,489.192	0.00E+00	4.78E-02	9.57E-02		
Ra-226	5.8689E-10	744.596	1,489.192	0.00E+00	4.37E-07	8.74E-07		
Ra-228	5.3036E-12	744.596	1,489.192	0.00E+00	3.95E-09	7.90E-09		
Ru-106	6.8136E-19	744.596	1,489.192	0.00E+00	5.07E-16	1.01E-15		
Se-79	1.2372E-05	744.596	1,489.192	0.00E+00	9.21E-03	1.84E-02		
Sn-126	2.5194E-05	744.596	1,489.192	0.00E+00	1.88E-02	3.75E-02		
Sr-90	4.4913E-01	744.596	1,489.192	0.00E+00	3.34E+02	6.69E+02		
Tc-99	3.9357E-04	744.596	1,489.192	0.00E+00	2.93E-01	5.86E-01		
Th-229	1.9331E-10	744.596	1,489.192	0.00E+00	1.44E-07	2.88E-07		
Th-230	3.5223E-08	744.596	1,489.192	0.00E+00	2.62E-05	5.25E-05		
Th-232	5.3085E-12	744.596	1,489.192	0.00E+00	3.95E-09	7.91E-09		
Ti-208	1.3102E-07	744.596	1,489.192	0.00E+00	9.76E-05	1.95E-04		
U-232	3.5497E-07	744.596	1,489.192	0.00E+00	2.64E-04	5.29E-04		
U-233	2.6647E-08	744.596	1,489.192	0.00E+00	1.98E-05	3.97E-05		
U-234	5.5023E-05	744.596	1,489.192	0.00E+00	4.10E-02	8.19E-02		
U-235	-1.4485E-06	744.596	0.000	2.60E-04	0.00E+00	2.60E-04		
U-236	7.5969E-06	744.596	1,489.192	0.00E+00	5.66E-03	1.13E-02		
U-238	-2.6129E-07	744.596	0.000	5.64E-03	5.44E-03	5.64E-03		
Y-90	4.4913E-01	744.596	1,489.192	0.00E+00	3.34E+02	6.69E+02		
Other Radionuclides					5.04E+02	1.01E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.09E+01	2.19E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-2	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	0.711001091	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		744.596	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:	304.038	1,489.192	

Checks		
	Burnup Multiplier	Estimated Burnup/Given Burnup
Nominal:	1.26	
Bounding:	2.52	4.90

Estimated EOL HM/Given EOL HM
1.02

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 C2 BLKT
 SNF ID #: 193
 Fuel Units & Descr: 72 - 19 FLAT PLATES
 Heavy Metal Mass: BOL=16236.00kg ; EOL=15780.00kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1969
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc. 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 MCO
 18.00

Radionuclide	II. Estimates			Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n	x _b				Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.0733E-09	433,632.149	867,264.298	0.00E+00	4.65E-04	9.31E-04	Avg. MeV	
Am-241	1.4751E-01	433,632.149	867,264.298	0.00E+00	6.40E+04	1.28E+05	0.0150	3.300E+16
Am-242m	2.6809E-04	433,632.149	867,264.298	0.00E+00	1.16E+02	2.33E+02	0.0250	6.613E+15
Am-243	6.2484E-04	433,632.149	867,264.298	0.00E+00	2.71E+02	5.42E+02	0.0375	6.232E+15
C-14	4.7820E-05	433,632.149	867,264.298	0.00E+00	2.07E+01	4.15E+01	0.0575	7.797E+15
Cl-36	8.0297E-07	433,632.149	867,264.298	0.00E+00	3.48E-01	6.96E-01	0.0850	3.644E+15
Cm-243	1.7426E-04	433,632.149	867,264.298	0.00E+00	7.56E+01	1.51E+02	0.1250	2.424E+15
Cm-244	2.7616E-02	433,632.149	867,264.298	0.00E+00	1.20E+04	2.40E+04	0.2250	3.111E+15
Co-60	3.5610E-04	433,632.149	867,264.298	0.00E+00	1.54E+02	3.09E+02	0.3750	1.343E+15
Cs-134	2.6260E-07	433,632.149	867,264.298	0.00E+00	1.14E-01	2.28E-01	0.5750	3.164E+16
Cs-135	1.4433E-05	433,632.149	867,264.298	0.00E+00	6.26E+00	1.25E+01	0.8500	3.089E+14
Cs-137	9.8870E-01	433,632.149	867,264.298	0.00E+00	4.29E+05	8.57E+05	1.2500	1.966E+14
Eu-154	6.0320E-03	433,632.149	867,264.298	0.00E+00	2.62E+03	5.23E+03	1.7500	8.644E+12
Eu-155	2.1770E-04	433,632.149	867,264.298	0.00E+00	9.44E+01	1.89E+02	2.2500	1.421E+09
Fe-55	7.9296E-07	433,632.149	867,264.298	0.00E+00	3.44E-01	6.88E-01	2.7500	5.006E+09
H-3	8.9486E-03	433,632.149	867,264.298	0.00E+00	3.88E+03	7.76E+03	3.5000	3.573E+08
I-129	9.8288E-07	433,632.149	867,264.298	0.00E+00	4.26E-01	8.52E-01	5.0000	1.527E+08
Kr-85	1.0707E-02	433,632.149	867,264.298	0.00E+00	4.64E+03	9.29E+03	7.0000	1.759E+07
Np-237	1.1927E-05	433,632.149	867,264.298	0.00E+00	5.17E+00	1.03E+01	11.0000	2.019E+06
Pa-231	1.4703E-09	433,632.149	867,264.298	0.00E+00	6.38E-04	1.28E-03		
Pb-210	1.6828E-10	433,632.149	867,264.298	0.00E+00	7.30E-05	1.46E-04		
Pm-147	6.9606E-06	433,632.149	867,264.298	0.00E+00	3.02E+00	6.04E+00		
Pu-238	6.6263E-02	433,632.149	867,264.298	0.00E+00	2.87E+04	5.75E+04		
Pu-239	1.1618E-02	433,632.149	867,264.298	0.00E+00	5.04E+03	1.01E+04		
Pu-240	1.5142E-02	433,632.149	867,264.298	0.00E+00	6.57E+03	1.31E+04		
Pu-241	4.3766E-01	433,632.149	867,264.298	0.00E+00	1.90E+05	3.80E+05		
Pu-242	6.4260E-05	433,632.149	867,264.298	0.00E+00	2.79E+01	5.57E+01		
Ra-226	3.8501E-10	433,632.149	867,264.298	0.00E+00	1.67E-04	3.34E-04		
Ra-228	5.2955E-12	433,632.149	867,264.298	0.00E+00	2.30E-06	4.59E-06		
Ru-106	2.0413E-14	433,632.149	867,264.298	0.00E+00	8.85E-09	1.77E-08		
Se-79	1.2376E-05	433,632.149	867,264.298	0.00E+00	5.37E+00	1.07E+01		
Sn-126	2.5210E-05	433,632.149	867,264.298	0.00E+00	1.09E+01	2.19E+01		
Sr-90	6.4163E-01	433,632.149	867,264.298	0.00E+00	2.78E+05	5.56E+05		
Tc-99	3.9357E-04	433,632.149	867,264.298	0.00E+00	1.71E+02	3.41E+02		
Th-229	1.5644E-10	433,632.149	867,264.298	0.00E+00	6.78E-05	1.36E-04		
Th-230	2.7972E-08	433,632.149	867,264.298	0.00E+00	1.21E-02	2.43E-02		
Th-232	5.3036E-12	433,632.149	867,264.298	0.00E+00	2.30E-06	4.60E-06		
Th-238	1.5136E-07	433,632.149	867,264.298	0.00E+00	6.56E-02	1.31E-01		
U-232	4.1005E-07	433,632.149	867,264.298	0.00E+00	1.78E-01	3.56E-01		
U-233	2.5856E-08	433,632.149	867,264.298	0.00E+00	1.12E-02	2.24E-02		
U-234	5.2665E-05	433,632.149	867,264.298	0.00E+00	2.28E+01	4.57E+01		
U-235	-1.4487E-06	433,632.149	0.000	2.49E-01	0.00E+00	2.49E-01		
U-236	7.5888E-06	433,632.149	867,264.298	0.00E+00	3.29E+00	6.58E+00		
U-238	-2.6129E-07	433,632.149	0.000	5.42E+00	5.30E+00	5.42E+00		
Y-90	6.4180E-01	433,632.149	867,264.298	0.00E+00	2.78E+05	5.57E+05		
Other Radionuclides					4.13E+05	8.26E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.84E+03	1.57E+04
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	0.71	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	263,023.200	433,632.149	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:	399,405.600	867,264.298	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.76	1.65	1.01
Bounding:	1.53	2.17	

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

²Total burnup for all fuel associated with this worksheet must be 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 C2 BLKT ¹Fuel decay start date: 1974
 SNF ID #: 192 Estimates as of: 2030
 Fuel Units & Desc: 17 - 17 FLAT PLATES Template: PWR (Light Water, Zirc. 0 to 5%, U)
 Heavy Metal Mass: BOL=1323.64kg ; EOL=1039.00kg ²Template Burnup(MWd): 61.92
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00176911
³Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 17.00

Radionuclide	m	x _a	x _b	b	y _a	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.0733E-09	270,675,468	541,350,936	0.00E+00	2.91E-04	5.81E-04	Avg. MeV	
Am-241	1.4751E-01	270,675,468	541,350,936	0.00E+00	3.99E+04	7.99E+04	0.0150	2.060E+16
Am-242m	2.6809E-04	270,675,468	541,350,936	0.00E+00	7.26E+01	1.45E+02	0.0250	4.128E+15
Am-243	6.2484E-04	270,675,468	541,350,936	0.00E+00	1.69E+02	3.38E+02	0.0375	3.890E+15
C-14	4.7820E-05	270,675,468	541,350,936	0.00E+00	1.29E+01	2.59E+01	0.0575	4.867E+15
Cl-36	8.0297E-07	270,675,468	541,350,936	0.00E+00	2.17E-01	4.35E-01	0.0850	2.274E+15
Co-243	1.7426E-04	270,675,468	541,350,936	0.00E+00	4.72E+01	9.43E+01	0.1250	1.513E+15
Co-244	2.7616E-02	270,675,468	541,350,936	0.00E+00	7.48E+03	1.50E+04	0.2250	1.942E+15
Co-60	3.5610E-04	270,675,468	541,350,936	0.00E+00	9.64E+01	1.93E+02	0.3750	8.385E+14
Cs-134	2.6260E-07	270,675,468	541,350,936	0.00E+00	7.11E-02	1.42E-01	0.5750	1.975E+16
Cs-135	1.4433E-05	270,675,468	541,350,936	0.00E+00	3.91E+00	7.81E+00	0.8500	1.928E+14
Cs-137	9.8870E-01	270,675,468	541,350,936	0.00E+00	2.68E+05	5.35E+05	1.2500	1.227E+14
Eu-154	6.0320E-03	270,675,468	541,350,936	0.00E+00	1.63E+03	3.27E+03	1.7500	5.396E+12
Eu-155	2.1770E-04	270,675,468	541,350,936	0.00E+00	5.89E+01	1.18E+02	2.2500	8.867E+08
Fe-55	7.9296E-07	270,675,468	541,350,936	0.00E+00	2.15E-01	4.29E-01	2.7500	3.125E+09
H-3	8.9486E-03	270,675,468	541,350,936	0.00E+00	2.42E+03	4.84E+03	3.5000	2.230E+08
I-129	9.8288E-07	270,675,468	541,350,936	0.00E+00	2.66E-01	5.32E-01	5.0000	9.528E+07
Kr-85	1.0707E-02	270,675,468	541,350,936	0.00E+00	2.90E+03	5.80E+03	7.0000	1.098E+07
Np-237	1.1927E-05	270,675,468	541,350,936	0.00E+00	3.23E+00	6.46E+00	11.0000	1.260E+06
Pa-231	1.4703E-09	270,675,468	541,350,936	0.00E+00	3.98E-04	7.96E-04		
Pb-210	1.6828E-10	270,675,468	541,350,936	0.00E+00	4.55E-05	9.11E-05		
Pm-147	6.9606E-06	270,675,468	541,350,936	0.00E+00	1.88E+00	3.77E+00		
Pu-238	6.6263E-02	270,675,468	541,350,936	0.00E+00	1.79E+04	3.59E+04		
Pu-239	1.1618E-02	270,675,468	541,350,936	0.00E+00	3.14E+03	6.29E+03		
Pu-240	1.5142E-02	270,675,468	541,350,936	0.00E+00	4.10E+03	8.20E+03		
Pu-241	4.3766E-01	270,675,468	541,350,936	0.00E+00	1.18E+05	2.37E+05		
Pu-242	6.4260E-05	270,675,468	541,350,936	0.00E+00	1.74E+01	3.48E+01		
Ra-226	3.8501E-10	270,675,468	541,350,936	0.00E+00	1.04E-04	2.08E-04		
Ra-228	5.2955E-12	270,675,468	541,350,936	0.00E+00	1.43E-06	2.87E-06		
Ru-106	2.0413E-14	270,675,468	541,350,936	0.00E+00	5.53E-09	1.11E-08		
Se-79	1.2376E-05	270,675,468	541,350,936	0.00E+00	3.35E+00	6.70E+00		
Sn-126	2.5210E-05	270,675,468	541,350,936	0.00E+00	6.82E+00	1.36E+01		
Sr-90	6.4163E-01	270,675,468	541,350,936	0.00E+00	1.74E+05	3.47E+05		
Tc-99	3.9357E-04	270,675,468	541,350,936	0.00E+00	1.07E+02	2.13E+02		
Th-229	1.5644E-10	270,675,468	541,350,936	0.00E+00	4.23E-05	8.47E-05		
Th-230	2.7972E-08	270,675,468	541,350,936	0.00E+00	7.57E-03	1.51E-02		
Th-232	5.3036E-12	270,675,468	541,350,936	0.00E+00	1.44E-06	2.87E-06		
Tl-208	1.5136E-07	270,675,468	541,350,936	0.00E+00	4.10E-02	8.19E-02		
U-232	4.1005E-07	270,675,468	541,350,936	0.00E+00	1.11E-01	2.22E-01		
U-233	2.5856E-08	270,675,468	541,350,936	0.00E+00	7.00E-03	1.40E-02		
U-234	5.2665E-05	270,675,468	541,350,936	0.00E+00	1.43E+01	2.85E+01		
U-235	-1.4487E-06	270,675,468	0.000	2.03E-02	0.00E+00	2.03E-02		
U-236	7.5888E-06	270,675,468	541,350,936	0.00E+00	2.05E+00	4.11E+00		
U-238	-2.6129E-07	270,675,468	0.000	4.42E-01	3.71E-01	4.42E-01		
Y-90	6.4180E-01	270,675,468	541,350,936	0.00E+00	1.74E+05	3.47E+05		
Other Radionuclides					2.58E+05	5.16E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.90E+03	9.79E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	0.709999887	0 to 5	

Burnup Summary (MWd)²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	18,892.247	270,675,468	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		541,350,936	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	5.84	14.33	1.17
Bounding:	11.69		

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

²Total burnup for all fuel associated with this worksheet must be 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-S4
 SNF ID #: 194
 Fuel Units & Descr: 1 - 17 FLAT PLATES
 Heavy Metal Mass: BOL=3.02kg ; EOL=2.06kg
 ROD Storage Site: INEEL

Fuel decay start date: 1964
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x15"
 1.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4.5940E-08	907.995	1,815.991	0.00E+00	4.17E-05	8.34E-05	Avg. MeV	
Am-241	1.1471E-04	907.995	1,815.991	0.00E+00	1.04E-01	2.08E-01	0.0150	6.628E+13
Am-242m	7.4210E-09	907.995	1,815.991	0.00E+00	6.74E-06	1.35E-05	0.0250	1.377E+13
Am-243	9.8236E-10	907.995	1,815.991	0.00E+00	8.92E-07	1.78E-06	0.0375	1.197E+13
C-14	2.2928E-04	907.995	1,815.991	0.00E+00	2.08E-01	4.16E-01	0.0575	1.284E+13
Cl-36	1.2260E-06	907.995	1,815.991	0.00E+00	1.11E-03	2.23E-03	0.0850	7.757E+12
Cm-243	1.2000E-10	907.995	1,815.991	0.00E+00	1.09E-07	2.18E-07	0.1250	5.029E+12
Cm-244	7.3577E-10	907.995	1,815.991	0.00E+00	6.68E-07	1.34E-06	0.2250	6.685E+12
Co-60	1.3732E-03	907.995	1,815.991	0.00E+00	1.25E+00	2.49E+00	0.3750	2.916E+12
Cs-134	1.2709E-10	907.995	1,815.991	0.00E+00	1.15E-07	2.31E-07	0.5750	4.905E+13
Cs-135	3.0316E-05	907.995	1,815.991	0.00E+00	2.75E-02	5.51E-02	0.8500	4.764E+11
Cs-137	7.2579E-01	907.995	1,815.991	0.00E+00	6.59E+02	1.32E+03	1.2500	3.448E+11
Eu-154	5.9750E-05	907.995	1,815.991	0.00E+00	5.43E-02	1.09E-01	1.7500	1.226E+10
Eu-155	1.0577E-05	907.995	1,815.991	0.00E+00	9.60E-03	1.92E-02	2.2500	2.318E+06
Fa-55	4.1631E-07	907.995	1,815.991	0.00E+00	3.78E-04	7.56E-04	2.7500	1.038E+06
H-3	4.6722E-04	907.995	1,815.991	0.00E+00	4.24E-01	8.48E-01	3.5000	1.048E+02
I-129	7.3195E-07	907.995	1,815.991	0.00E+00	6.65E-04	1.33E-03	5.0000	4.326E+01
Kr-85	5.9418E-03	907.995	1,815.991	0.00E+00	5.40E+00	1.08E+01	7.0000	4.781E+00
Np-237	1.1499E-06	907.995	1,815.991	0.00E+00	1.04E-03	2.09E-03	11.0000	5.368E-01
Pa-231	7.0899E-08	907.995	1,815.991	0.00E+00	6.44E-05	1.29E-04		
Pb-210	2.2363E-12	907.995	1,815.991	0.00E+00	2.03E-09	4.06E-09		
Pm-147	4.2296E-07	907.995	1,815.991	0.00E+00	3.84E-04	7.68E-04		
Pu-238	2.3295E-04	907.995	1,815.991	0.00E+00	2.12E-01	4.23E-01		
Pu-239	6.6722E-04	907.995	1,815.991	0.00E+00	6.06E-01	1.21E+00		
Pu-240	8.6556E-05	907.995	1,815.991	0.00E+00	7.86E-02	1.57E-01		
Pu-241	1.6889E-04	907.995	1,815.991	0.00E+00	1.53E-01	3.07E-01		
Pu-242	1.9717E-09	907.995	1,815.991	0.00E+00	1.79E-06	3.58E-06		
Ra-226	4.5740E-12	907.995	1,815.991	0.00E+00	4.15E-09	8.31E-09		
Ra-228	8.3511E-12	907.995	1,815.991	0.00E+00	7.58E-09	1.52E-08		
Ru-106	2.0516E-19	907.995	1,815.991	0.00E+00	1.86E-16	3.73E-16		
Se-79	1.3220E-05	907.995	1,815.991	0.00E+00	1.20E-02	2.40E-02		
Sn-126	1.1489E-05	907.995	1,815.991	0.00E+00	1.04E-02	2.09E-02		
Sr-90	6.6872E-01	907.995	1,815.991	0.00E+00	6.07E+02	1.21E+03		
Tc-99	4.6639E-04	907.995	1,815.991	0.00E+00	4.23E-01	8.47E-01		
Th-229	2.3727E-11	907.995	1,815.991	0.00E+00	2.15E-08	4.31E-08		
Th-230	2.7354E-10	907.995	1,815.991	0.00E+00	2.48E-07	4.97E-07		
Th-232	8.3594E-12	907.995	1,815.991	0.00E+00	7.59E-09	1.52E-08		
Th-238	1.6228E-08	907.995	1,815.991	0.00E+00	1.47E-05	2.95E-05		
U-232	4.3960E-08	907.995	1,815.991	0.00E+00	3.99E-05	7.98E-05		
U-233	3.3344E-09	907.995	1,815.991	0.00E+00	3.03E-06	6.06E-06		
U-234	4.0749E-07	907.995	1,815.991	0.00E+00	3.70E-04	7.40E-04		
U-235	-2.7761E-06	907.995	0.000	6.08E-03	3.56E-03	6.08E-03		
U-236	1.6190E-05	907.995	1,815.991	0.00E+00	1.47E-02	2.94E-02		
U-238	-2.8547E-09	907.995	0.000	7.12E-05	6.86E-05	7.12E-05		
Y-90	6.6889E-01	907.995	1,815.991	0.00E+00	6.07E+02	1.21E+03		
Other Radionuclides					8.25E+02	1.65E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.39E+00	1.48E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches Pathfinder Template on all but one parameter (cladding, but substituting Stainless Steel is a good conservative assumption).
Fuel Cladding:	ZIRC-2	SST	
BOL HM Constituents:	U-Zr	U	
BOL Enrichment %:	92.9998016	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
		907.995	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,815.991	

Checks			
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
	6.44		
Bounding:	12.87		

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

² Total burnup for all fuel associated with this worksheet must be 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-C2-S1
 SNF ID #: 195
 Fuel Units & Descr: 19 - 19 FLAT PLATES
 Heavy Metal Mass: BOL=343.23kg ; EOL=220.03kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1969
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 19.00

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.4276E-08	116,375.011	232,750.022	0.00E+00	3.99E-03	7.98E-03	Avg. MeV	
Am-241	1.1458E-04	116,375.011	232,750.022	0.00E+00	1.33E+01	2.67E+01	0.0150	1.214E+16
Am-242m	7.9468E-09	116,375.011	232,750.022	0.00E+00	9.25E-04	1.85E-03	0.0250	2.522E+15
Am-243	9.8386E-10	116,375.011	232,750.022	0.00E+00	1.14E-04	2.29E-04	0.0375	2.187E+15
C-14	2.2978E-04	116,375.011	232,750.022	0.00E+00	2.67E+01	5.35E+01	0.0575	2.352E+15
Cl-36	1.2261E-06	116,375.011	232,750.022	0.00E+00	1.43E-01	2.85E-01	0.0850	1.421E+15
Cm-243	1.7271E-10	116,375.011	232,750.022	0.00E+00	2.01E-05	4.02E-05	0.1250	9.216E+14
Cm-244	1.3058E-09	116,375.011	232,750.022	0.00E+00	1.52E-04	3.04E-04	0.2250	1.224E+15
Co-60	9.8636E-03	116,375.011	232,750.022	0.00E+00	1.15E+03	2.30E+03	0.3750	5.340E+14
Cs-134	1.9617E-08	116,375.011	232,750.022	0.00E+00	2.28E-03	4.57E-03	0.5750	8.892E+15
Cs-135	3.0316E-05	116,375.011	232,750.022	0.00E+00	3.53E+00	7.06E+00	0.8500	8.779E+13
Cs-137	1.0263E+00	116,375.011	232,750.022	0.00E+00	1.19E+05	2.39E+05	1.2500	1.999E+14
Eu-154	2.0017E-04	116,375.011	232,750.022	0.00E+00	2.33E+01	4.66E+01	1.7500	2.261E+12
Eu-155	8.5957E-05	116,375.011	232,750.022	0.00E+00	1.00E+01	2.00E+01	2.2500	1.146E+09
Fe-55	2.2646E-05	116,375.011	232,750.022	0.00E+00	2.64E+00	5.27E+00	2.7500	1.560E+08
H-3	1.0835E-03	116,375.011	232,750.022	0.00E+00	1.26E+02	2.52E+02	3.5000	1.361E+04
I-129	7.3195E-07	116,375.011	232,750.022	0.00E+00	8.52E-02	1.70E-01	5.0000	5.619E+03
Kr-85	1.5661E-02	116,375.011	232,750.022	0.00E+00	1.82E+03	3.64E+03	7.0000	6.207E+02
Np-237	1.1494E-06	116,375.011	232,750.022	0.00E+00	1.34E-01	2.68E-01	11.0000	6.967E+01
Pa-231	5.8070E-08	116,375.011	232,750.022	0.00E+00	6.76E-03	1.35E-02		
Pb-210	1.2985E-12	116,375.011	232,750.022	0.00E+00	1.51E-07	3.02E-07		
Pm-147	2.2196E-05	116,375.011	232,750.022	0.00E+00	2.58E+00	5.17E+00		
Pu-238	2.6223E-04	116,375.011	232,750.022	0.00E+00	3.05E+01	6.10E+01		
Pu-239	6.6739E-04	116,375.011	232,750.022	0.00E+00	7.77E+01	1.55E+02		
Pu-240	8.6705E-05	116,375.011	232,750.022	0.00E+00	1.01E+01	2.02E+01		
Pu-241	3.4759E-04	116,375.011	232,750.022	0.00E+00	4.05E+01	8.09E+01		
Pu-242	1.9717E-09	116,375.011	232,750.022	0.00E+00	2.29E-04	4.59E-04		
Ra-226	3.0000E-12	116,375.011	232,750.022	0.00E+00	3.49E-07	6.98E-07		
Ra-228	8.3328E-12	116,375.011	232,750.022	0.00E+00	9.70E-07	1.94E-06		
Ru-106	6.1464E-15	116,375.011	232,750.022	0.00E+00	7.15E-10	1.43E-09		
Se-79	1.3221E-05	116,375.011	232,750.022	0.00E+00	1.54E+00	3.08E+00		
Sn-126	1.1491E-05	116,375.011	232,750.022	0.00E+00	1.34E+00	2.67E+00		
Sr-90	9.5541E-01	116,375.011	232,750.022	0.00E+00	1.11E+05	2.22E+05		
Tc-99	4.6656E-04	116,375.011	232,750.022	0.00E+00	5.43E+01	1.09E+02		
Th-229	1.9085E-11	116,375.011	232,750.022	0.00E+00	2.22E-06	4.44E-06		
Th-230	2.1913E-10	116,375.011	232,750.022	0.00E+00	2.55E-05	5.10E-05		
Th-232	8.3478E-12	116,375.011	232,750.022	0.00E+00	9.71E-07	1.94E-06		
Tl-208	1.8752E-08	116,375.011	232,750.022	0.00E+00	2.18E-03	4.36E-03		
U-232	5.0782E-08	116,375.011	232,750.022	0.00E+00	5.91E-03	1.18E-02		
U-233	3.2596E-09	116,375.011	232,750.022	0.00E+00	3.79E-04	7.59E-04		
U-234	3.9817E-07	116,375.011	232,750.022	0.00E+00	4.63E-02	9.27E-02		
U-235	-2.7761E-06	116,375.011	0.000	6.90E-01	3.67E-01	6.90E-01		
U-236	1.6190E-05	116,375.011	232,750.022	0.00E+00	1.88E+00	3.77E+00		
U-238	-2.8547E-09	116,375.011	0.000	8.07E-03	7.74E-03	8.07E-03		
Y-90	9.5557E-01	116,375.011	232,750.022	0.00E+00	1.11E+05	2.22E+05		
Other Radionuclides					1.42E+05	2.84E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.36E+03	2.72E+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:	ZIRC-2	SST
BOL HM Constituents:	UO2	U
BOL Enrichment %:	93.00008304	60 to 100

Basis for Parameter Differences:
 This Template was used for the following reasons:
 This fuel matches Pathfinder Template on all but one parameter (cladding, but substituting Stainless Steel is a good conservative assumption).

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:		116,375.011
Bounding:		232,750.022

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:	7.27	
Bounding:	14.54	

Estimated EOL HM/ Given EOL HM: 1.01

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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-C2-S2
 SNF ID #: 196
 Fuel Units & Descr: 20 - 19 FLAT PLATES
 Heavy Metal Mass: BOL=419.35kg ; EOL=301.59kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1974
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x115"
 20.00

Radionuclide	m	X _n	X _b	b	Y _n	Y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.4276E-08	111,247.369	222,494.739	0.00E+00	3.81E-03	7.63E-03	Avg. MeV	
Am-241	1.1458E-04	111,247.369	222,494.739	0.00E+00	1.27E+01	2.55E+01	0.0150	1.160E+16
Am-242m	7.9468E-09	111,247.369	222,494.739	0.00E+00	8.84E-04	1.77E-03	0.0250	2.411E+15
Am-243	9.8386E-10	111,247.369	222,494.739	0.00E+00	1.09E-04	2.19E-04	0.0375	2.090E+15
C-14	2.2978E-04	111,247.369	222,494.739	0.00E+00	2.56E+01	5.11E+01	0.0575	2.248E+15
Cl-36	1.2261E-06	111,247.369	222,494.739	0.00E+00	1.36E-01	2.73E-01	0.0850	1.358E+15
Co-60	1.7271E-10	111,247.369	222,494.739	0.00E+00	1.92E-05	3.84E-05	0.1250	8.810E+14
Co-57	1.3058E-09	111,247.369	222,494.739	0.00E+00	1.45E-04	2.91E-04	0.2250	1.170E+15
Cs-134	9.8636E-03	111,247.369	222,494.739	0.00E+00	1.10E+03	2.19E+03	0.3750	5.105E+14
Cs-137	1.9617E-08	111,247.369	222,494.739	0.00E+00	2.18E-03	4.36E-03	0.5750	8.500E+15
Cs-135	3.0316E-05	111,247.369	222,494.739	0.00E+00	3.37E+00	6.75E+00	0.8500	8.392E+13
Cs-137	1.0263E-04	111,247.369	222,494.739	0.00E+00	1.14E+05	2.28E+05	1.2500	1.911E+14
Eu-154	2.0017E-00	111,247.369	222,494.739	0.00E+00	2.23E+01	4.45E+01	1.7500	2.161E+12
Eu-155	8.5957E-05	111,247.369	222,494.739	0.00E+00	9.56E+00	1.91E+01	2.2500	1.095E+09
Fe-55	2.2646E-05	111,247.369	222,494.739	0.00E+00	2.52E+00	5.04E+00	2.7500	1.492E+08
H-3	1.0835E-03	111,247.369	222,494.739	0.00E+00	1.21E+02	2.41E+02	3.5000	1.303E+04
I-129	7.3195E-07	111,247.369	222,494.739	0.00E+00	8.14E-02	1.63E-01	5.0000	5.379E+03
Kr-85	1.5661E-02	111,247.369	222,494.739	0.00E+00	1.74E+03	3.48E+03	7.0000	5.942E+02
Np-237	1.1494E-06	111,247.369	222,494.739	0.00E+00	1.28E-01	2.56E-01	11.0000	6.670E+01
Pa-231	5.8070E-08	111,247.369	222,494.739	0.00E+00	6.46E-03	1.29E-02		
Pb-210	1.2985E-12	111,247.369	222,494.739	0.00E+00	1.44E-07	2.89E-07		
Pm-147	2.2196E-05	111,247.369	222,494.739	0.00E+00	2.47E+00	4.94E+00		
Pu-238	2.6223E-04	111,247.369	222,494.739	0.00E+00	2.92E+01	5.83E+01		
Pu-239	6.6739E-04	111,247.369	222,494.739	0.00E+00	7.42E+01	1.48E+02		
Pu-240	8.6705E-05	111,247.369	222,494.739	0.00E+00	9.65E+00	1.93E+01		
Pu-241	3.4759E-04	111,247.369	222,494.739	0.00E+00	3.87E+01	7.73E+01		
Pu-242	1.9717E-09	111,247.369	222,494.739	0.00E+00	2.19E-04	4.39E-04		
Ra-226	3.0000E-12	111,247.369	222,494.739	0.00E+00	3.34E-07	6.67E-07		
Ra-228	8.3328E-12	111,247.369	222,494.739	0.00E+00	9.27E-07	1.85E-06		
Ru-106	6.1464E-15	111,247.369	222,494.739	0.00E+00	6.84E-10	1.37E-09		
Se-79	1.3221E-05	111,247.369	222,494.739	0.00E+00	1.47E+00	2.94E+00		
Sn-126	1.1491E-05	111,247.369	222,494.739	0.00E+00	1.28E+00	2.56E+00		
Sr-90	9.5541E-01	111,247.369	222,494.739	0.00E+00	1.06E+05	2.13E+05		
Tc-99	4.6658E-04	111,247.369	222,494.739	0.00E+00	5.19E+01	1.04E+02		
Th-229	1.9085E-11	111,247.369	222,494.739	0.00E+00	2.12E-06	4.25E-06		
Th-230	2.1913E-10	111,247.369	222,494.739	0.00E+00	2.44E-05	4.88E-05		
Th-232	8.3478E-12	111,247.369	222,494.739	0.00E+00	9.29E-07	1.86E-06		
Th-208	1.8752E-08	111,247.369	222,494.739	0.00E+00	2.09E-03	4.17E-03		
U-232	5.0782E-08	111,247.369	222,494.739	0.00E+00	5.65E-03	1.13E-02		
U-233	3.2596E-09	111,247.369	222,494.739	0.00E+00	3.63E-04	7.25E-04		
U-234	3.9817E-07	111,247.369	222,494.739	0.00E+00	4.43E-02	8.86E-02		
U-235	-2.7761E-06	111,247.369	0.000	8.43E-01	5.34E-01	8.43E-01		
U-236	1.6190E-05	111,247.369	222,494.739	0.00E+00	1.80E+00	3.60E+00		
U-238	-2.8547E-09	111,247.369	0.000	9.87E-03	9.55E-03	9.87E-03		
Y-90	9.5557E-01	111,247.369	222,494.739	0.00E+00	1.06E+05	2.13E+05		
Other Radionuclides					1.36E+05	2.71E+05		

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			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches Pathfinder Template on all but one parameter (cladding, but substituting Stainless Steel is a good conservative assumption).
BOL HM Constituents:	ZIRC-2	SST	
BOL Enrichment %:	UO2	U	
	93.00000016	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:		111,247.369	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
		222,494.739	

Checks		Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	
Bounding:	5.69	1.01
	11.37	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: SINGLE PASS REACTOR FUEL
 SNF ID #: 197
 Fuel Units & Descr: 139 - TUBE
 Heavy Metal Mass: BOL= ; EOL=407.01kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1971
 Estimates as of: 2030
 Template: N-React (Graphite, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 69600
 Template BOL Heavy Metal Mass (MT): 11.6
 Template Decay Time: 50 years

Estimated
 Canister usage:
 MCO
 0.14

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.7399E-10	407.392	1,234.805	0.00E+00	3.56E-07	1.08E-06		
Am-241	9.9095E-02	407.392	1,234.805	0.00E+00	4.04E+01	1.22E+02	0.0150	4.236E+13
Am-242m	5.4598E-05	407.392	1,234.805	0.00E+00	2.22E-02	6.74E-02	0.0250	8.610E+12
Am-243	4.6221E-05	407.392	1,234.805	0.00E+00	1.88E-02	5.71E-02	0.0375	7.931E+12
C-14	9.1853E-05	407.392	1,234.805	0.00E+00	3.74E-02	1.13E-01	0.0575	9.584E+12
Cl-36	0.0000E+00	407.392	1,234.805	0.00E+00	0.00E+00	0.00E+00	0.0850	4.759E+12
Cm-243	0.0000E+00	407.392	1,234.805	0.00E+00	0.00E+00	0.00E+00	0.1250	3.112E+12
Cm-244	2.5589E-04	407.392	1,234.805	0.00E+00	1.04E-01	3.16E-01	0.2250	4.075E+12
Co-60	8.8563E-06	407.392	1,234.805	0.00E+00	3.61E-03	1.09E-02	0.3750	1.767E+12
Cs-134	9.0661E-08	407.392	1,234.805	0.00E+00	3.69E-05	1.12E-04	0.5750	3.853E+13
Cs-135	1.0066E-05	407.392	1,234.805	0.00E+00	4.10E-03	1.24E-02	0.8500	3.290E+11
Cs-137	8.4454E-01	407.392	1,234.805	0.00E+00	3.44E+02	1.04E+03	1.2500	1.436E+11
Eu-154	1.9842E-03	407.392	1,234.805	0.00E+00	8.08E-01	2.45E+00	1.7500	8.799E+09
Eu-155	3.5690E-05	407.392	1,234.805	0.00E+00	1.45E-02	4.41E-02	2.2500	8.584E+05
Fe-55	5.2802E-08	407.392	1,234.805	0.00E+00	2.15E-05	6.52E-05	2.7500	2.569E+04
H-3	9.0776E-04	407.392	1,234.805	0.00E+00	3.70E-01	1.12E+00	3.5000	2.273E+04
I-129	8.6006E-07	407.392	1,234.805	0.00E+00	3.50E-04	1.06E-03	5.0000	9.576E+03
Kr-85	1.0138E-02	407.392	1,234.805	0.00E+00	4.13E+00	1.25E+01	7.0000	1.083E+03
Np-237	9.0345E-06	407.392	1,234.805	0.00E+00	3.68E-03	1.12E-02	11.0000	1.232E+02
Pa-231	1.9210E-09	407.392	1,234.805	0.00E+00	7.83E-07	2.37E-06		
Pb-210	7.5862E-11	407.392	1,234.805	0.00E+00	3.09E-08	9.37E-08		
Pm-147	1.1372E-05	407.392	1,234.805	0.00E+00	4.63E-03	1.40E-02		
Pu-238	1.7802E-02	407.392	1,234.805	0.00E+00	7.25E+00	2.20E+01		
Pu-239	2.8822E-02	407.392	1,234.805	0.00E+00	1.17E+01	3.56E+01		
Pu-240	2.2759E-02	407.392	1,234.805	0.00E+00	9.27E+00	2.81E+01		
Pu-241	2.9641E-01	407.392	1,234.805	0.00E+00	1.21E+02	3.66E+02		
Pu-242	1.4526E-05	407.392	1,234.805	0.00E+00	5.92E-03	1.79E-02		
Ra-226	2.3132E-10	407.392	1,234.805	0.00E+00	9.42E-08	2.86E-07		
Ra-228	1.9655E-14	407.392	1,234.805	0.00E+00	8.01E-12	2.43E-11		
Ru-106	1.9612E-14	407.392	1,234.805	0.00E+00	7.99E-12	2.42E-11		
Se-79	1.0897E-05	407.392	1,234.805	0.00E+00	4.44E-03	1.35E-02		
Sn-126	0.0000E+00	407.392	1,234.805	0.00E+00	0.00E+00	0.00E+00		
Sr-90	5.9411E-01	407.392	1,234.805	0.00E+00	2.42E+02	7.34E+02		
Tc-99	3.6494E-04	407.392	1,234.805	0.00E+00	1.49E-01	4.51E-01		
Th-229	3.1063E-12	407.392	1,234.805	0.00E+00	1.27E-09	3.84E-09		
Th-230	2.5187E-08	407.392	1,234.805	0.00E+00	1.03E-05	3.11E-05		
Th-232	2.5287E-14	407.392	1,234.805	0.00E+00	1.03E-11	3.12E-11		
Tl-208	6.4885E-15	407.392	1,234.805	0.00E+00	2.64E-12	8.01E-12		
U-232	0.0000E+00	407.392	1,234.805	0.00E+00	0.00E+00	0.00E+00		
U-233	1.5704E-09	407.392	1,234.805	0.00E+00	6.40E-07	1.94E-06		
U-234	6.6293E-05	407.392	1,234.805	0.00E+00	2.70E-02	8.19E-02		
U-235	-1.2930E-06	407.392	0.000	8.34E-03	7.81E-03	8.34E-03		
U-236	1.1961E-05	407.392	1,234.805	0.00E+00	4.87E-03	1.48E-02		
U-238	-3.0619E-07	407.392	0.000	1.36E-01	1.35E-01	1.36E-01		
Y-90	5.9425E-01	407.392	1,234.805	0.00E+00	2.42E+02	7.34E+02		
Other Radionuclides					3.31E+02	1.00E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.54E+00	1.68E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Reactor Moderator:	GRAPHITE	GRAPHITE	This Template was used for the following reasons: This fuel matches on all parameters except cladding and enrichment (unknown)
Fuel Cladding:	ALUM (X-8001)	ZIRC	
BOL HM Constituents:	U METAL	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Nominal:		407.392	Nominal burnup taken from SFD and converted to MWd using BOL=407.392kg Bounding burnup taken from SFD and converted to MWd using BOL=407.392kg
Bounding:		1,234.805	

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.17	
Bounding:	0.51	
		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: SINGLE PASS REACTOR FUEL
 SNF ID #: 198
 Fuel Units & Descr: 835 - TUBE
 Heavy Metal Mass: BOL = 2912.98kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1971
 Estimates as of: 2030
 Template: N-Reactor (Graphite, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 69600
 Template BOL Heavy Metal Mass (MT): 11.6
 Template Decay Time: 50 years

Estimated
 Canister usage:
 MCO
 0.86

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.7399E-10	8,854.686	17,709.372	0.00E+00	7.74E-06	1.55E-05	Avg. MeV	
Am-241	9.9095E-02	8,854.686	17,709.372	0.00E+00	8.77E+02	1.75E+03	0.0150	6.075E+14
Am-242m	5.4598E-05	8,854.686	17,709.372	0.00E+00	4.83E-01	9.67E-01	0.0250	1.235E+14
Am-243	4.6221E-05	8,854.686	17,709.372	0.00E+00	4.09E-01	8.19E-01	0.0375	1.137E+14
C-14	9.1853E-05	8,854.686	17,709.372	0.00E+00	8.13E-01	1.63E+00	0.0575	1.375E+14
Cl-36	0.0000E+00	8,854.686	17,709.372	0.00E+00	0.00E+00	0.00E+00	0.0850	6.825E+13
Cm-243	0.0000E+00	8,854.686	17,709.372	0.00E+00	0.00E+00	0.00E+00	0.1250	4.463E+13
Cm-244	2.5589E-04	8,854.686	17,709.372	0.00E+00	2.27E+00	4.53E+00	0.2250	5.845E+13
Co-60	8.8563E-06	8,854.686	17,709.372	0.00E+00	7.84E-02	1.57E-01	0.3750	2.534E+13
Cs-134	9.0661E-08	8,854.686	17,709.372	0.00E+00	8.03E-04	1.61E-03	0.5750	5.266E+14
Cs-135	1.0066E-05	8,854.686	17,709.372	0.00E+00	8.91E-02	1.78E-01	0.8500	4.719E+12
Cs-137	8.4454E-01	8,854.686	17,709.372	0.00E+00	7.48E+03	1.50E+04	1.2500	2.059E+12
Eu-154	1.9842E-03	8,854.686	17,709.372	0.00E+00	1.76E+01	3.51E+01	1.7500	1.262E+11
Eu-155	3.5690E-05	8,854.686	17,709.372	0.00E+00	3.16E-01	6.32E-01	2.2500	1.230E+07
Fe-55	5.2802E-08	8,854.686	17,709.372	0.00E+00	4.68E-04	9.35E-04	2.7500	3.626E+05
H-3	9.0776E-04	8,854.686	17,709.372	0.00E+00	8.04E+00	1.61E+01	3.5000	3.208E+05
I-129	8.6006E-07	8,854.686	17,709.372	0.00E+00	7.62E-03	1.52E-02	5.0000	1.351E+05
Kr-85	1.0138E-02	8,854.686	17,709.372	0.00E+00	8.98E+01	1.80E+02	7.0000	1.527E+04
Np-237	9.0345E-06	8,854.686	17,709.372	0.00E+00	8.00E-02	1.60E-01	11.0000	1.737E+03
Pa-231	1.9210E-09	8,854.686	17,709.372	0.00E+00	1.70E-05	3.40E-05		
Pb-210	7.5862E-11	8,854.686	17,709.372	0.00E+00	6.72E-07	1.34E-06		
Pm-147	1.1372E-05	8,854.686	17,709.372	0.00E+00	1.01E-01	2.01E-01		
Pu-238	1.7802E-02	8,854.686	17,709.372	0.00E+00	1.58E+02	3.15E+02		
Pu-239	2.8822E-02	8,854.686	17,709.372	0.00E+00	2.55E+02	5.10E+02		
Pu-240	2.2759E-02	8,854.686	17,709.372	0.00E+00	2.02E+02	4.03E+02		
Pu-241	2.9641E-01	8,854.686	17,709.372	0.00E+00	2.62E+03	5.25E+03		
Pu-242	1.4526E-05	8,854.686	17,709.372	0.00E+00	1.29E-01	2.57E-01		
Ra-226	2.3132E-10	8,854.686	17,709.372	0.00E+00	2.05E-06	4.10E-06		
Ra-228	1.9655E-14	8,854.686	17,709.372	0.00E+00	1.74E-10	3.48E-10		
Ru-106	1.9612E-14	8,854.686	17,709.372	0.00E+00	1.74E-10	3.47E-10		
Se-79	1.0897E-05	8,854.686	17,709.372	0.00E+00	9.65E-02	1.93E-01		
Sn-126	0.0000E+00	8,854.686	17,709.372	0.00E+00	0.00E+00	0.00E+00		
Sr-90	5.9411E-01	8,854.686	17,709.372	0.00E+00	5.26E+03	1.05E+04		
Tc-99	3.6494E-04	8,854.686	17,709.372	0.00E+00	3.23E+00	6.46E+00		
Th-229	3.1063E-12	8,854.686	17,709.372	0.00E+00	2.75E-08	5.50E-08		
Th-230	2.5187E-08	8,854.686	17,709.372	0.00E+00	2.23E-04	4.46E-04		
Th-232	2.5287E-14	8,854.686	17,709.372	0.00E+00	2.24E-10	4.48E-10		
Ti-208	6.4885E-15	8,854.686	17,709.372	0.00E+00	5.75E-11	1.15E-10		
U-232	0.0000E+00	8,854.686	17,709.372	0.00E+00	0.00E+00	0.00E+00		
U-233	1.5704E-09	8,854.686	17,709.372	0.00E+00	1.39E-05	2.78E-05		
U-234	6.6293E-05	8,854.686	17,709.372	0.00E+00	5.87E-01	1.17E+00		
U-235	-1.2930E-06	8,854.686	0.000	5.98E-02	4.83E-02	5.98E-02		
U-236	1.1961E-05	8,854.686	17,709.372	0.00E+00	1.06E-01	2.12E-01		
U-238	-3.0619E-07	8,854.686	0.000	9.72E-01	9.69E-01	9.72E-01		
Y-90	5.9425E-01	8,854.686	17,709.372	0.00E+00	5.26E+03	1.05E+04		
Other Radionuclides					7.20E+03	1.44E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.20E+02	2.41E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		Basis for Parameter Differences:	
Reactor Moderator:	From SFD	Used	
	GRAPHITE	GRAPHITE	This Template was used for the following reasons:
Fuel Cladding:	ALUM (X-8001)	ZIRC	This fuel matches on all parameters except cladding and enrichment (unknown)
BOL HM Constituents:	U METAL	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²		Basis for burnup used in estimate:	
Nominal:	From SFD	Estimated	
		8,854.686	Nominal burnup taken from SFD and converted to MWd using BOL=2921.374kg
Bounding:		17,709.372	Bounding burnup assumed to be twice nominal burnup.

Checks		Estimated EOL HM/Given EOL HM	
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
	0.51		1.00
Bounding:	1.01		

¹ Reactor shutdown, core removal, storage, shipping or other data confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be 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 (CANADA) 1Fuel decay start date: 2010
 SNF ID #: 1065 Estimates as of: 2030
 Fuel Units & Descr: 1 - 297 ROD ARRAY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=.88kg ; EOL=.87kg 2Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.25

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.6313E-10	12.528	25.057	0.00E+00	8.31E-09	1.66E-08	0.0150	2.645E+12
Am-241	2.0060E-03	12.528	25.057	0.00E+00	2.51E-02	5.03E-02	0.0250	5.500E+11
Am-242m	4.2429E-07	12.528	25.057	0.00E+00	5.32E-06	1.06E-05	0.0375	4.797E+11
Am-243	1.4899E-06	12.528	25.057	0.00E+00	1.87E-05	3.73E-05	0.0575	5.138E+11
C-14	5.7135E-09	12.528	25.057	0.00E+00	7.16E-08	1.43E-07	0.0850	3.105E+11
Cl-36	1.3124E-32	12.528	25.057	0.00E+00	1.64E-31	3.29E-31	0.1250	2.101E+11
Cm-243	1.6443E-07	12.528	25.057	0.00E+00	2.06E-06	4.12E-06	0.2250	2.679E+11
Cm-244	2.9330E-05	12.528	25.057	0.00E+00	3.67E-04	7.35E-04	0.3750	1.166E+11
Co-60	5.3186E-06	12.528	25.057	0.00E+00	6.66E-05	1.33E-04	0.5750	1.902E+12
Cs-134	3.1563E-03	12.528	25.057	0.00E+00	3.95E-02	7.91E-02	0.8500	3.216E+10
Cs-135	3.4477E-06	12.528	25.057	0.00E+00	4.32E-05	8.64E-05	1.2500	1.837E+10
Cs-137	2.0313E+00	12.528	25.057	0.00E+00	2.54E+01	5.09E+01	1.7500	8.430E+08
Eu-154	2.4513E-02	12.528	25.057	0.00E+00	3.07E-01	6.14E-01	2.2500	7.396E+04
Eu-155	4.8175E-03	12.528	25.057	0.00E+00	6.04E-02	1.21E-01	2.7500	4.180E+11
Fe-55	1.2397E-04	12.528	25.057	0.00E+00	1.55E-03	3.11E-03	3.5000	1.922E+02
H-3	4.5697E-03	12.528	25.057	0.00E+00	5.73E-02	1.15E-01	5.0000	1.091E+01
I-129	7.5300E-07	12.528	25.057	0.00E+00	9.43E-06	1.89E-05	7.0000	1.205E+00
Kr-85	1.0850E-01	12.528	25.057	0.00E+00	1.36E+00	2.72E+00	11.0000	1.351E-01
Np-237	9.5561E-06	12.528	25.057	0.00E+00	1.20E-04	2.39E-04		
Pa-231	2.0359E-09	12.528	25.057	0.00E+00	2.55E-08	5.10E-08		
Pb-210	4.9728E-11	12.528	25.057	0.00E+00	6.23E-10	1.25E-09		
Pm-147	4.8502E-02	12.528	25.057	0.00E+00	6.08E-01	1.22E+00		
Pu-238	1.8254E-02	12.528	25.057	0.00E+00	2.29E-01	4.57E-01		
Pu-239	4.2810E-04	12.528	25.057	0.00E+00	5.36E-03	1.07E-02		
Pu-240	2.4368E-04	12.528	25.057	0.00E+00	3.05E-03	6.11E-03		
Pu-241	3.3415E-02	12.528	25.057	0.00E+00	4.19E-01	8.37E-01		
Pu-242	3.6329E-07	12.528	25.057	0.00E+00	4.55E-06	9.10E-06		
Ra-226	2.2854E-10	12.528	25.057	0.00E+00	2.86E-09	5.73E-09		
Ra-228	1.2426E-14	12.528	25.057	0.00E+00	1.56E-13	3.11E-13		
Ru-106	6.3589E-06	12.528	25.057	0.00E+00	7.97E-05	1.59E-04		
Se-79	1.2933E-05	12.528	25.057	0.00E+00	1.62E-04	3.24E-04		
Sn-126	1.1574E-05	12.528	25.057	0.00E+00	1.45E-04	2.90E-04		
Sr-90	1.9248E+00	12.528	25.057	0.00E+00	2.41E+01	4.82E+01		
Tc-99	4.2239E-04	12.528	25.057	0.00E+00	5.29E-03	1.06E-02		
Th-229	5.0953E-12	12.528	25.057	0.00E+00	6.38E-11	1.28E-10		
Th-230	4.1885E-08	12.528	25.057	0.00E+00	5.25E-07	1.05E-06		
Th-232	1.9270E-14	12.528	25.057	0.00E+00	2.41E-13	4.83E-13		
Tl-208	4.6024E-08	12.528	25.057	0.00E+00	5.77E-07	1.15E-06		
U-232	1.2582E-07	12.528	25.057	0.00E+00	1.58E-06	3.15E-06		
U-233	2.5825E-09	12.528	25.057	0.00E+00	3.24E-08	6.47E-08		
U-234	1.8450E-04	12.528	25.057	0.00E+00	2.31E-03	4.62E-03		
U-235	-2.7235E-06	12.528	0.000	1.78E-03	1.75E-03	1.78E-03		
U-236	1.5493E-05	12.528	25.057	0.00E+00	1.94E-04	3.88E-04		
U-238	-4.2851E-09	12.528	0.000	1.68E-05	1.68E-05	1.68E-05		
Y-90	1.9254E+00	12.528	25.057	0.00E+00	2.41E+01	4.82E+01		
Other Radionuclides					2.42E+01	4.85E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.99E-01	5.97E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	94.28571429	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	12.528	4.735	
Bounding:		25.057	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.05	0.38	
Bounding:	0.09		

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: SLOWPOKE (CANADA) 1Fuel decay start date: 2010
 SNF ID #: 296 Estimates as of: 2030
 Fuel Units & Descr: 1 - 297 ROD ARRAY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=.88kg ; EOL=.87kg 2Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.25

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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	12.528	25.057	0.00E+00	8.31E-09	1.66E-08	Avg. MeV	
Am-241	2.0060E-03	12.528	25.057	0.00E+00	2.51E-02	5.03E-02	0.0150	2.645E+12
Am-242m	4.2429E-07	12.528	25.057	0.00E+00	5.32E-06	1.06E-05	0.0250	5.500E+11
Am-243	1.4899E-06	12.528	25.057	0.00E+00	1.87E-05	3.73E-05	0.0375	4.797E+11
C-14	5.7135E-09	12.528	25.057	0.00E+00	7.16E-08	1.43E-07	0.0575	5.138E+11
Cl-36	1.3124E-32	12.528	25.057	0.00E+00	1.64E-31	3.29E-31	0.0850	3.105E+11
Cm-243	1.6443E-07	12.528	25.057	0.00E+00	2.06E-06	4.12E-06	0.1250	2.101E+11
Cm-244	2.9330E-05	12.528	25.057	0.00E+00	3.67E-04	7.35E-04	0.2250	2.679E+11
Co-60	5.3186E-06	12.528	25.057	0.00E+00	6.66E-05	1.33E-04	0.3750	1.166E+11
Cs-134	3.1563E-03	12.528	25.057	0.00E+00	3.95E-02	7.91E-02	0.5750	1.902E+12
Cs-135	3.4477E-06	12.528	25.057	0.00E+00	4.32E-05	8.64E-05	0.8500	3.216E+10
Cs-137	2.0313E+00	12.528	25.057	0.00E+00	2.54E+01	5.09E+01	1.2500	1.837E+10
Eu-154	2.4513E-02	12.528	25.057	0.00E+00	3.07E-01	6.14E-01	1.7500	8.430E+08
Eu-155	4.8175E-03	12.528	25.057	0.00E+00	6.04E-02	1.21E-01	2.2500	7.396E+04
Fe-55	1.2397E-04	12.528	25.057	0.00E+00	1.55E-03	3.11E-03	2.7500	4.180E+04
H-3	4.5697E-03	12.528	25.057	0.00E+00	5.73E-02	1.15E-01	3.5000	1.922E+02
I-129	7.5300E-07	12.528	25.057	0.00E+00	9.43E-06	1.89E-05	5.0000	1.091E+01
Kr-85	1.0850E-01	12.528	25.057	0.00E+00	1.36E+00	2.72E+00	7.0000	1.205E+00
Np-237	9.5561E-06	12.528	25.057	0.00E+00	1.20E-04	2.39E-04	11.0000	1.351E-01
Pa-231	2.0359E-09	12.528	25.057	0.00E+00	2.55E-08	5.10E-08		
Pb-210	4.9728E-11	12.528	25.057	0.00E+00	6.23E-10	1.25E-09		
Pm-147	4.8502E-02	12.528	25.057	0.00E+00	6.08E-01	1.22E+00		
Pu-238	1.8254E-02	12.528	25.057	0.00E+00	2.29E-01	4.57E-01		
Pu-239	4.2810E-04	12.528	25.057	0.00E+00	5.36E-03	1.07E-02		
Pu-240	2.4368E-04	12.528	25.057	0.00E+00	3.05E-03	6.11E-03		
Pu-241	3.3415E-02	12.528	25.057	0.00E+00	4.19E-01	8.37E-01		
Pu-242	3.6329E-07	12.528	25.057	0.00E+00	4.55E-06	9.10E-06		
Ra-226	2.2854E-10	12.528	25.057	0.00E+00	2.86E-09	5.73E-09		
Ra-228	1.2426E-14	12.528	25.057	0.00E+00	1.56E-13	3.11E-13		
Ru-106	6.3589E-06	12.528	25.057	0.00E+00	7.97E-05	1.59E-04		
Se-79	1.2933E-05	12.528	25.057	0.00E+00	1.62E-04	3.24E-04		
Sn-126	1.1574E-05	12.528	25.057	0.00E+00	1.45E-04	2.90E-04		
Sr-90	1.9248E+00	12.528	25.057	0.00E+00	2.41E+01	4.82E+01		
Tc-99	4.2239E-04	12.528	25.057	0.00E+00	5.29E-03	1.06E-02		
Th-229	5.0953E-12	12.528	25.057	0.00E+00	6.38E-11	1.28E-10		
Th-230	4.1885E-08	12.528	25.057	0.00E+00	5.25E-07	1.05E-06		
Th-232	1.9270E-14	12.528	25.057	0.00E+00	2.41E-13	4.83E-13		
Ti-208	4.6024E-08	12.528	25.057	0.00E+00	5.77E-07	1.15E-06		
U-232	1.2582E-07	12.528	25.057	0.00E+00	1.58E-06	3.15E-06		
U-233	2.5825E-09	12.528	25.057	0.00E+00	3.24E-08	6.47E-08		
U-234	1.8450E-04	12.528	25.057	0.00E+00	2.31E-03	4.62E-03		
U-235	-2.7235E-06	12.528	0.000	1.78E-03	1.75E-03	1.78E-03		
U-236	1.5493E-05	12.528	25.057	0.00E+00	1.94E-04	3.88E-04		
U-238	-4.2851E-09	12.528	0.000	1.68E-05	1.68E-05	1.68E-05		
Y-90	1.9254E+00	12.528	25.057	0.00E+00	2.41E+01	4.82E+01		
Other Radionuclides					2.42E+01	4.85E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.99E-01	5.97E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	94.28571429	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	12.528	4.735	
Bounding:		25.057	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.05	0.38	
Bounding:	0.09		

Estimated EOL HM/Given EOL HM: 0.99

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: SM-1A
 SNF ID #: 201
 Fuel Units & Descr: 93 - ASSEMBLY
 Heavy Metal Mass: BOL=79.78kg ; EOL=65.75kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1971
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 5.81

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	3.4276E-08	13,248.116	26,496.232	0.00E+00	4.54E-04	9.08E-04	0.0150	1.382E+15
Am-241	1.1458E-04	13,248.116	26,496.232	0.00E+00	1.52E+00	3.04E+00	0.0250	2.871E+14
Am-242m	7.9468E-09	13,248.116	26,496.232	0.00E+00	1.05E-04	2.11E-04	0.0375	2.489E+14
Am-243	9.8386E-10	13,248.116	26,496.232	0.00E+00	1.30E-05	2.61E-05	0.0575	2.678E+14
C-14	2.2978E-04	13,248.116	26,496.232	0.00E+00	3.04E+00	6.09E+00	0.0850	1.617E+14
Cl-36	1.2261E-06	13,248.116	26,496.232	0.00E+00	1.62E-02	3.25E-02	0.1250	1.049E+14
Cm-243	1.7271E-10	13,248.116	26,496.232	0.00E+00	2.29E-06	4.58E-06	0.2250	1.394E+14
Cm-244	1.3058E-09	13,248.116	26,496.232	0.00E+00	1.73E-05	3.46E-05	0.3750	6.079E+13
Co-60	9.8636E-03	13,248.116	26,496.232	0.00E+00	1.31E+02	2.61E+02	0.5750	1.012E+15
Cs-134	1.9617E-08	13,248.116	26,496.232	0.00E+00	2.60E-04	5.20E-04	0.8500	9.994E+12
Cs-135	3.0316E-05	13,248.116	26,496.232	0.00E+00	4.02E-01	8.03E-01	1.2500	2.276E+13
Cs-137	1.0263E+00	13,248.116	26,496.232	0.00E+00	1.36E+04	2.72E+04	1.7500	2.574E+11
Eu-154	2.0017E-04	13,248.116	26,496.232	0.00E+00	2.65E+00	5.30E+00	2.2500	1.304E+08
Eu-155	8.5957E-05	13,248.116	26,496.232	0.00E+00	1.14E+00	2.28E+00	2.7500	1.776E+07
Fe-55	2.2646E-05	13,248.116	26,496.232	0.00E+00	3.00E-01	6.00E-01	3.5000	1.588E+03
H-3	1.0835E-03	13,248.116	26,496.232	0.00E+00	1.44E+01	2.87E+01	5.0000	6.430E+02
I-129	7.3195E-07	13,248.116	26,496.232	0.00E+00	9.70E-03	1.94E-02	7.0000	7.104E+01
Kr-85	1.5661E-02	13,248.116	26,496.232	0.00E+00	2.07E+02	4.15E+02	11.0000	7.974E+00
Np-237	1.1494E-06	13,248.116	26,496.232	0.00E+00	1.52E-02	3.05E-02		
Pa-231	5.8070E-08	13,248.116	26,496.232	0.00E+00	7.69E-04	1.54E-03		
Pb-210	1.2985E-12	13,248.116	26,496.232	0.00E+00	1.72E-08	3.44E-08		
Pm-147	2.2196E-05	13,248.116	26,496.232	0.00E+00	2.94E-01	5.88E-01		
Pu-238	2.6223E-04	13,248.116	26,496.232	0.00E+00	3.47E+00	6.95E+00		
Pu-239	6.6739E-04	13,248.116	26,496.232	0.00E+00	8.84E+00	1.77E+01		
Pu-240	8.6705E-05	13,248.116	26,496.232	0.00E+00	1.15E+00	2.30E+00		
Pu-241	3.4759E-04	13,248.116	26,496.232	0.00E+00	4.60E+00	9.21E+00		
Pu-242	1.9717E-09	13,248.116	26,496.232	0.00E+00	2.61E-05	5.22E-05		
Ra-226	3.0000E-12	13,248.116	26,496.232	0.00E+00	3.97E-08	7.95E-08		
Ra-228	8.3328E-12	13,248.116	26,496.232	0.00E+00	1.10E-07	2.21E-07		
Ru-106	6.1464E-15	13,248.116	26,496.232	0.00E+00	8.14E-11	1.63E-10		
Se-79	1.3221E-05	13,248.116	26,496.232	0.00E+00	1.75E-01	3.50E-01		
Sn-126	1.1491E-05	13,248.116	26,496.232	0.00E+00	1.52E-01	3.04E-01		
Sr-90	9.5541E-01	13,248.116	26,496.232	0.00E+00	1.27E+04	2.53E+04		
Tc-99	4.6656E-04	13,248.116	26,496.232	0.00E+00	6.18E+00	1.24E+01		
Th-229	1.9085E-11	13,248.116	26,496.232	0.00E+00	2.53E-07	5.06E-07		
Th-230	2.1913E-10	13,248.116	26,496.232	0.00E+00	2.90E-06	5.81E-06		
Th-232	8.3478E-12	13,248.116	26,496.232	0.00E+00	1.11E-07	2.21E-07		
Tl-208	1.8752E-08	13,248.116	26,496.232	0.00E+00	2.48E-04	4.97E-04		
U-232	5.0782E-08	13,248.116	26,496.232	0.00E+00	6.73E-04	1.35E-03		
U-233	3.2596E-09	13,248.116	26,496.232	0.00E+00	4.32E-05	8.64E-05		
U-234	3.9817E-07	13,248.116	26,496.232	0.00E+00	5.27E-03	1.05E-02		
U-235	-2.7761E-06	13,248.116	0.000	1.60E-01	1.24E-01	1.60E-01		
U-236	1.6190E-05	13,248.116	26,496.232	0.00E+00	2.14E-01	4.29E-01		
U-238	-2.8547E-09	13,248.116	0.000	1.87E-03	1.84E-03	1.87E-03		
Y-90	9.5557E-01	13,248.116	26,496.232	0.00E+00	1.27E+04	2.53E+04		
Other Radionuclides					1.62E+04	3.23E+04		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	SST (347)	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	93.01311673	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	408.769	13,248.116	
Bounding:		26,496.232	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	3.56	32.41	
Bounding:	7.12		

Estimated EOL HM/Given EOL HM: 1.01

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: SNAP
 SNF ID #: 203
 Fuel Units & Descr: 615 - DECLAD ROD
 Heavy Metal Mass: BOL= : EOL=29.77kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1958
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 65 years

Estimated
 Canister usage:
 HIC
 6.15

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Avg. MeV	
Ac-227	1.2442E-08	28,414.841	28,414.841	0.00E+00	3.54E-04	3.54E-04	0.0150	9.715E+14
Am-241	4.0120E-03	28,414.841	28,414.841	0.00E+00	1.14E+02	1.14E+02	0.0250	2.017E+14
Am-242m	1.0749E-06	28,414.841	28,414.841	0.00E+00	3.05E-02	3.05E-02	0.0375	1.760E+14
Am-243	1.4692E-07	28,414.841	28,414.841	0.00E+00	4.17E-03	4.17E-03	0.0575	1.896E+14
C-14	1.2777E-04	28,414.841	28,414.841	0.00E+00	3.63E+00	3.63E+00	0.0850	1.136E+14
Cl-36	2.8120E-06	28,414.841	28,414.841	0.00E+00	7.99E-02	7.99E-02	0.1250	7.365E+13
Cm-243	4.1759E-08	28,414.841	28,414.841	0.00E+00	1.19E-03	1.19E-03	0.2250	9.784E+13
Cm-244	1.7098E-07	28,414.841	28,414.841	0.00E+00	4.86E-03	4.86E-03	0.3750	4.267E+13
Co-60	4.8241E-04	28,414.841	28,414.841	0.00E+00	1.37E+01	1.37E+01	0.5750	7.289E+14
Cs-134	1.5970E-10	28,414.841	28,414.841	0.00E+00	4.54E-06	4.54E-06	0.8500	7.012E-12
Cs-135	3.2195E-05	28,414.841	28,414.841	0.00E+00	9.15E-01	9.15E-01	1.2500	3.401E+12
Cs-137	6.8977E-01	28,414.841	28,414.841	0.00E+00	1.96E+04	1.96E+04	1.7500	1.805E+11
Eu-154	1.2238E-04	28,414.841	28,414.841	0.00E+00	3.48E+00	3.48E+00	2.2500	2.505E+07
Eu-155	6.7158E-06	28,414.841	28,414.841	0.00E+00	1.91E-01	1.91E-01	2.7500	1.034E+07
Fe-55	8.8165E-08	28,414.841	28,414.841	0.00E+00	2.51E-03	2.51E-03	3.5000	3.460E+04
H-3	3.8376E-04	28,414.841	28,414.841	0.00E+00	1.09E+01	1.09E+01	5.0000	1.456E+04
I-129	7.3684E-07	28,414.841	28,414.841	0.00E+00	2.09E-02	2.09E-02	7.0000	1.642E+03
Kr-85	5.2316E-03	28,414.841	28,414.841	0.00E+00	1.49E+02	1.49E+02	11.0000	1.867E+02
Np-237	1.3232E-06	28,414.841	28,414.841	0.00E+00	3.76E-02	3.76E-02		
Pa-231	1.8722E-08	28,414.841	28,414.841	0.00E+00	5.32E-04	5.32E-04		
Pb-210	1.2620E-12	28,414.841	28,414.841	0.00E+00	3.59E-08	3.59E-08		
Pm-147	2.7714E-07	28,414.841	28,414.841	0.00E+00	7.87E-03	7.87E-03		
Pu-238	6.4707E-04	28,414.841	28,414.841	0.00E+00	1.84E+01	1.84E+01		
Pu-239	5.5203E-03	28,414.841	28,414.841	0.00E+00	1.57E+02	1.57E+02		
Pu-240	2.1143E-03	28,414.841	28,414.841	0.00E+00	6.01E+01	6.01E+01		
Pu-241	5.6872E-03	28,414.841	28,414.841	0.00E+00	1.62E+02	1.62E+02		
Pu-242	2.3128E-07	28,414.841	28,414.841	0.00E+00	6.57E-03	6.57E-03		
Ra-226	2.6466E-12	28,414.841	28,414.841	0.00E+00	7.52E-08	7.52E-08		
Ra-228	2.5278E-10	28,414.841	28,414.841	0.00E+00	7.18E-06	7.18E-06		
Ru-106	1.1377E-19	28,414.841	28,414.841	0.00E+00	3.23E-15	3.23E-15		
Se-79	1.3009E-05	28,414.841	28,414.841	0.00E+00	3.70E-01	3.70E-01		
Sn-126	1.2162E-05	28,414.841	28,414.841	0.00E+00	3.46E-01	3.46E-01		
Sr-90	6.2511E-01	28,414.841	28,414.841	0.00E+00	1.78E+04	1.78E+04		
Tc-99	4.4241E-04	28,414.841	28,414.841	0.00E+00	1.26E+01	1.26E+01		
Th-229	9.4105E-10	28,414.841	28,414.841	0.00E+00	2.67E-05	2.67E-05		
Th-230	1.7098E-10	28,414.841	28,414.841	0.00E+00	4.86E-06	4.86E-06		
Th-232	2.5278E-10	28,414.841	28,414.841	0.00E+00	7.18E-06	7.18E-06		
Tl-208	1.0305E-08	28,414.841	28,414.841	0.00E+00	2.93E-04	2.93E-04		
U-232	2.7669E-08	28,414.841	28,414.841	0.00E+00	7.86E-04	7.86E-04		
U-233	1.2239E-07	28,414.841	28,414.841	0.00E+00	3.48E-03	3.48E-03		
U-234	3.1278E-07	28,414.841	28,414.841	0.00E+00	8.89E-03	8.89E-03		
U-235	-2.6179E-06	28,414.841	0.000	2.57E-02	0.00E+00	2.57E-02		
U-236	1.2696E-05	28,414.841	28,414.841	0.00E+00	3.61E-01	3.61E-01		
U-238	-3.6331E-08	28,414.841	0.000	1.60E-02	1.50E-02	1.60E-02		
Y-90	6.2541E-01	28,414.841	28,414.841	0.00E+00	1.78E+04	1.78E+04		
Other Radionuclides					2.01E+04	2.01E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.26E+02	2.26E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative) and enrichment (unknown).
Fuel Cladding:	NONE	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:		10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		28,414.841	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		28,414.841	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	14.00	
Bounding:	14.00	
		Estimated EOL HM/ Given EOL HM
		1.78

¹ Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: SODIUM LOOP SAFETY FAC.
 SNF ID #: 352
 Fuel Units & Descr: 20 - ROD
 Heavy Metal Mass: BOL=4.20kg ; EOL=3.97kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1981
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.42

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.3072E-06	220.482	440.964	0.00E+00	5.09E-04	1.02E-03	0.0150	5.437E+14
Am-241	8.4448E+00	220.482	440.964	0.00E+00	1.86E+03	3.72E+03	0.0250	1.075E+14
Am-242m	1.6848E-02	220.482	440.964	0.00E+00	3.71E+00	7.43E+00	0.0375	9.394E+13
Am-243	1.6320E-02	220.482	440.964	0.00E+00	3.60E+00	7.20E+00	0.0575	1.478E+14
C-14	1.2090E-01	220.482	440.964	0.00E+00	2.67E+01	5.33E+01	0.0850	5.769E+13
Cl-36	2.2849E-03	220.482	440.964	0.00E+00	5.04E-01	1.01E+00	0.1250	4.521E+13
Cm-243	8.6624E-04	220.482	440.964	0.00E+00	1.91E-01	3.82E-01	0.2250	4.988E+13
Cm-244	1.6848E-01	220.482	440.964	0.00E+00	3.71E+01	7.43E+01	0.3750	2.137E+13
Co-60	2.8086E+01	220.482	440.964	0.00E+00	6.19E+03	1.24E+04	0.8500	3.476E+14
Cs-134	3.4148E-04	220.482	440.964	0.00E+00	7.53E-02	1.51E-01	1.2500	9.285E+14
Cs-135	4.3976E-04	220.482	440.964	0.00E+00	9.70E-02	1.94E-01	1.7500	4.108E+11
Cs-137	2.1049E+01	220.482	440.964	0.00E+00	4.64E+03	9.28E+03	2.2500	4.869E+09
Eu-154	1.2500E+00	220.482	440.964	0.00E+00	2.76E+02	5.51E+02	2.7500	1.372E+09
Eu-155	6.8986E-02	220.482	440.964	0.00E+00	1.52E+01	3.04E+01	3.9000	1.160E+06
Fe-55	2.9308E-01	220.482	440.964	0.00E+00	6.46E+01	1.29E+02	5.0000	4.925E+05
H-3	2.4311E-01	220.482	440.964	0.00E+00	5.36E+01	1.07E+02	7.0000	5.636E+04
I-129	1.0618E-05	220.482	440.964	0.00E+00	2.34E-03	4.68E-03	11.0000	6.447E+03
Kr-85	5.9882E-01	220.482	440.964	0.00E+00	1.32E+02	2.64E+02		
Np-237	1.5668E-04	220.482	440.964	0.00E+00	3.45E-02	6.91E-02		
Pa-231	2.8656E-06	220.482	440.964	0.00E+00	6.32E-04	1.26E-03		
Pb-210	2.3918E-08	220.482	440.964	0.00E+00	5.27E-06	1.05E-05		
Pm-147	1.6900E-02	220.482	440.964	0.00E+00	3.73E+00	7.45E+00		
Pu-238	-8.6123E-01	220.482	0.000	5.40E+02	3.50E+02	5.40E+02		
Pu-239	-4.8440E-02	220.482	0.000	6.53E+01	5.46E+01	6.53E+01		
Pu-240	-3.0095E-01	220.482	0.000	8.34E+01	1.70E+01	8.34E+01		
Pu-241	-1.0411E+02	220.482	0.000	2.15E+04	0.00E+00	2.15E+04		
Pu-242	-1.1381E-04	220.482	0.000	3.61E-01	3.36E-01	3.61E-01		
Ra-226	6.4400E-08	220.482	440.964	0.00E+00	1.42E-05	2.84E-05		
Ra-228	5.9952E-07	220.482	440.964	0.00E+00	1.32E-04	2.64E-04		
Ru-106	8.5526E-07	220.482	440.964	0.00E+00	1.89E-04	3.77E-04		
Se-79	1.9181E-04	220.482	440.964	0.00E+00	4.23E-02	8.46E-02		
Sn-126	1.6671E-04	220.482	440.964	0.00E+00	3.68E-02	7.35E-02		
Sr-90	1.9799E+01	220.482	440.964	0.00E+00	4.37E+03	8.73E+03		
Tc-99	6.7678E-03	220.482	440.964	0.00E+00	1.49E+00	2.98E+00		
Th-229	1.7488E-06	220.482	440.964	0.00E+00	3.86E-04	7.71E-04		
Th-230	5.8704E-06	220.482	440.964	0.00E+00	1.29E-03	2.59E-03		
Th-232	6.0208E-07	220.482	440.964	0.00E+00	1.33E-04	2.65E-04		
Ti-208	8.7573E-05	220.482	440.964	0.00E+00	1.93E-02	3.86E-02		
U-232	2.3706E-04	220.482	440.964	0.00E+00	5.23E-02	1.05E-01		
U-233	3.6128E-04	220.482	440.964	0.00E+00	7.97E-02	1.59E-01		
U-234	1.2788E-02	220.482	440.964	0.00E+00	2.82E+00	5.64E+00		
U-235	5.7486E-04	220.482	440.964	1.81E-03	1.29E-01	2.55E-01		
U-236	2.3485E-04	220.482	440.964	0.00E+00	5.18E-02	1.04E-01		
U-238	1.1581E-04	220.482	440.964	2.25E-04	2.58E-02	5.13E-02		
Y-90	1.9804E+01	220.482	440.964	0.00E+00	4.37E+03	8.73E+03		
Other Radionuclides					1.36E+04	2.72E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.31E+02	4.58E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: (Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	SST (316)	SST/Inconel	
BOL HM Constituents:	PuO ₂ -UO ₂	U, Th, & Pu	
BOL Enrichment %:	78.23529412	0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Nominal:	42.000	220.482	
Bounding:		440.964	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	1.57	5.25	
Bounding:	3.14		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: SODIUM LOOP SAFETY FAC.
 SNF ID #: 367
 Fuel Units & Descr: 12 - ROD
 Heavy Metal Mass: BOL= ; EOL=7.33kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1981
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.25

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.3072E-06	74.100	148.199	0.00E+00	1.71E-04	3.42E-04	Avg. MeV	
Am-241	8.4448E+00	74.100	148.199	0.00E+00	6.26E+02	1.25E+03	0.0150	1.889E+14
Am-242m	1.6848E-02	74.100	148.199	0.00E+00	1.25E+00	2.50E+00	0.0250	3.614E+13
Am-243	1.6320E-02	74.100	148.199	0.00E+00	1.21E+00	2.42E+00	0.0375	3.158E+13
C-14	1.2090E-01	74.100	148.199	0.00E+00	8.96E+00	1.79E+01	0.0575	4.967E+13
Cl-36	2.2849E-03	74.100	148.199	0.00E+00	1.69E-01	3.39E-01	0.0850	1.939E+13
Cm-243	8.6624E-04	74.100	148.199	0.00E+00	6.42E-02	1.28E-01	0.1250	1.520E+13
Cm-244	1.6848E-01	74.100	148.199	0.00E+00	1.25E+01	2.50E+01	0.2250	1.680E+13
Co-60	2.8086E+01	74.100	148.199	0.00E+00	2.08E+03	4.16E+03	0.3750	7.184E+12
Cs-134	3.4148E-04	74.100	148.199	0.00E+00	2.53E-02	5.06E-02	0.5750	1.168E+14
Cs-135	4.3976E-04	74.100	148.199	0.00E+00	3.26E-02	6.52E-02	0.8500	4.464E+12
Cs-137	2.1049E+01	74.100	148.199	0.00E+00	1.56E+03	3.12E+03	1.2500	3.121E+14
Eu-154	1.2500E+00	74.100	148.199	0.00E+00	9.26E+01	1.85E+02	1.7500	1.380E+11
Eu-155	6.8986E-02	74.100	148.199	0.00E+00	5.11E+00	1.02E+01	2.2500	1.637E+09
Fe-55	2.9308E-01	74.100	148.199	0.00E+00	2.17E+01	4.34E+01	2.7500	4.613E+08
H-3	2.4311E-01	74.100	148.199	0.00E+00	1.80E+01	3.60E+01	3.5000	5.033E+05
I-129	1.0618E-05	74.100	148.199	0.00E+00	7.87E-04	1.57E-03	5.0000	2.134E+05
Kr-85	5.9882E-01	74.100	148.199	0.00E+00	4.44E+01	8.87E+01	7.0000	2.436E+04
Np-237	1.5668E-04	74.100	148.199	0.00E+00	1.16E-02	2.32E-02	11.0000	2.783E+03
Pa-231	2.8656E-06	74.100	148.199	0.00E+00	2.12E-04	4.25E-04		
Pb-210	2.3918E-08	74.100	148.199	0.00E+00	1.77E-06	3.54E-06		
Pm-147	1.6900E-02	74.100	148.199	0.00E+00	1.25E+00	2.50E+00		
Pu-238	-8.6123E-01	74.100	0.000	9.52E+02	8.88E+02	9.52E+02		
Pu-239	-4.8440E-02	74.100	0.000	1.15E+02	1.12E+02	1.15E+02		
Pu-240	-3.0095E-01	74.100	0.000	1.47E+02	1.25E+02	1.47E+02		
Pu-241	-1.0411E+02	74.100	0.000	3.79E+04	3.02E+04	3.79E+04		
Pu-242	-1.1381E-04	74.100	0.000	6.37E-01	6.28E-01	6.37E-01		
Ra-226	6.4400E-08	74.100	148.199	0.00E+00	4.77E-06	9.54E-06		
Ra-228	5.9952E-07	74.100	148.199	0.00E+00	4.44E-05	8.88E-05		
Ru-106	8.5526E-07	74.100	148.199	0.00E+00	6.34E-05	1.27E-04		
Se-79	1.9181E-04	74.100	148.199	0.00E+00	1.42E-02	2.84E-02		
Sn-126	1.6671E-04	74.100	148.199	0.00E+00	1.24E-02	2.47E-02		
Sr-90	1.9799E+01	74.100	148.199	0.00E+00	1.47E+03	2.93E+03		
Tc-99	6.7678E-03	74.100	148.199	0.00E+00	5.01E-01	1.00E+00		
Th-229	1.7488E-06	74.100	148.199	0.00E+00	1.30E-04	2.59E-04		
Th-230	5.8704E-06	74.100	148.199	0.00E+00	4.35E-04	8.70E-04		
Th-232	6.0208E-07	74.100	148.199	0.00E+00	4.46E-05	8.92E-05		
Th-208	8.7573E-05	74.100	148.199	0.00E+00	6.49E-03	1.30E-02		
U-232	2.3706E-04	74.100	148.199	0.00E+00	1.76E-02	3.51E-02		
U-233	3.6128E-04	74.100	148.199	0.00E+00	2.68E-02	5.35E-02		
U-234	1.2788E-02	74.100	148.199	0.00E+00	9.48E-01	1.90E+00		
U-235	5.7486E-04	74.100	148.199	3.19E-03	4.58E-02	8.84E-02		
U-236	2.3485E-04	74.100	148.199	0.00E+00	1.74E-02	3.48E-02		
U-238	1.1581E-04	74.100	148.199	3.97E-04	8.98E-03	1.76E-02		
Y-90	1.9804E+01	74.100	148.199	0.00E+00	1.47E+03	2.93E+03		
Other Radionuclides					4.57E+03	9.14E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.11E+02	1.87E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: (Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	SST (316)	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 74.100	Estimated: 74.100	Nominal burnup taken from SFD and converted to MWd using BOL=7.410kg Bounding burnup assumed to be twice nominal burnup.
Bounding:		148.199	

Checks		
Nominal:	Burnup Multiplier: 0.30	Estimated Burnup/ Given Burnup: 7.04
Bounding:	0.60	

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: SP-100 FUEL
 SNF ID #: 777
 Fuel Units & Descr: 2 - SCRAP
 Heavy Metal Mass: BOL=2.71kg ; EOL=2.63kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1992
 Estimates as of: 2030
 Template: FERM (Fast, Zirc, 10 to 40%, U)
²Template Burnup(MWd): 58.6725048
 Template BOL Heavy Metal Mass (MT): 0.018774
 Template Decay Time: 35 years

Estimated
 Canister usage:
 HIC
 2.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	9.6110E-08	73.366	146.732	0.00E+00	7.05E-06	1.41E-05	0.0150	9.709E+12
Am-241	6.5601E-07	73.366	146.732	0.00E+00	4.81E-05	9.63E-05	0.0250	2.017E+12
Am-242m	0.0000E+00	73.366	146.732	0.00E+00	0.00E+00	0.00E+00	0.0375	1.774E+12
Am-243	8.3770E-15	73.366	146.732	0.00E+00	6.15E-13	1.23E-12	0.0575	1.879E+12
C-14	2.1714E-05	73.366	146.732	0.00E+00	1.59E-03	3.19E-03	0.0850	1.137E+12
Cl-36	5.5188E-08	73.366	146.732	0.00E+00	4.05E-06	8.10E-06	1.2500	7.362E+11
Cm-243	1.5496E-14	73.366	146.732	0.00E+00	1.14E-12	2.27E-12	0.2250	9.757E+11
Cm-244	5.2375E-16	73.366	146.732	0.00E+00	3.84E-14	7.69E-14	0.3750	4.251E+11
Co-60	2.0947E-03	73.366	146.732	0.00E+00	1.54E-01	3.07E-01	0.5750	7.510E+12
Cs-134	6.2448E-07	73.366	146.732	0.00E+00	4.58E-05	9.16E-05	0.8500	6.936E+10
Cs-135	4.4996E-05	73.366	146.732	0.00E+00	3.30E-03	6.60E-03	1.2500	4.601E+10
Cs-137	1.3775E+00	73.366	146.732	0.00E+00	1.01E+02	2.02E+02	1.7500	1.790E+09
Eu-154	1.8510E-04	73.366	146.732	0.00E+00	1.36E-02	2.72E-02	2.2500	3.157E+05
Eu-155	1.4163E-03	73.366	146.732	0.00E+00	1.04E-01	2.08E-01	2.7500	3.042E+04
Fe-55	1.4179E-05	73.366	146.732	0.00E+00	1.04E-03	2.08E-03	3.5000	2.873E+01
H-3	3.5383E-03	73.366	146.732	0.00E+00	2.60E-01	5.19E-01	5.0000	9.856E+00
I-129	1.1426E-06	73.366	146.732	0.00E+00	8.38E-05	1.68E-04	7.0000	8.517E-01
Kr-85	3.8604E-02	73.366	146.732	0.00E+00	2.83E+00	5.66E+00	11.0000	7.913E-02
Np-237	3.3099E-06	73.366	146.732	0.00E+00	2.43E-04	4.86E-04		
Pa-231	1.8953E-07	73.366	146.732	0.00E+00	1.39E-05	2.78E-05		
Pb-210	8.9531E-12	73.366	146.732	0.00E+00	6.57E-10	1.31E-09		
Pm-147	1.1588E-03	73.366	146.732	0.00E+00	8.50E-02	1.70E-01		
Pu-238	1.7146E-04	73.366	146.732	0.00E+00	1.26E-02	2.52E-02		
Pu-239	1.9464E-02	73.366	146.732	0.00E+00	1.43E+00	2.86E+00		
Pu-240	6.7919E-05	73.366	146.732	0.00E+00	4.98E-03	9.97E-03		
Pu-241	4.1774E-06	73.366	146.732	0.00E+00	3.06E-04	6.13E-04		
Pu-242	4.3751E-13	73.366	146.732	0.00E+00	3.21E-11	6.42E-11		
Ra-226	2.4219E-11	73.366	146.732	0.00E+00	1.78E-09	3.55E-09		
Ra-228	2.3572E-11	73.366	146.732	0.00E+00	1.73E-09	3.46E-09		
Ru-106	3.0951E-10	73.366	146.732	0.00E+00	2.27E-08	4.54E-08		
Se-79	1.6488E-05	73.366	146.732	0.00E+00	1.21E-03	2.42E-03		
Sn-126	3.7564E-05	73.366	146.732	0.00E+00	2.76E-03	5.51E-03		
Sr-90	1.2052E+00	73.366	146.732	0.00E+00	8.84E+01	1.77E+02		
Tc-99	4.4825E-04	73.366	146.732	0.00E+00	3.29E-02	6.58E-02		
Th-229	4.6478E-11	73.366	146.732	0.00E+00	3.41E-09	6.82E-09		
Th-230	2.2259E-09	73.366	146.732	0.00E+00	1.63E-07	3.27E-07		
Th-232	2.3691E-11	73.366	146.732	0.00E+00	1.74E-09	3.48E-09		
Ti-208	5.8256E-09	73.366	146.732	0.00E+00	4.27E-07	8.55E-07		
U-232	1.5759E-08	73.366	146.732	0.00E+00	1.16E-06	2.31E-06		
U-233	1.0110E-08	73.366	146.732	0.00E+00	7.42E-07	1.48E-06		
U-234	4.9001E-06	73.366	146.732	0.00E+00	3.59E-04	7.19E-04		
U-235	-2.3191E-06	73.366	0.000	1.05E-03	8.84E-04	1.05E-03		
U-236	1.2633E-05	73.366	146.732	0.00E+00	9.27E-04	1.85E-03		
U-238	-9.5407E-08	73.366	0.000	7.47E-04	7.40E-04	7.47E-04		
Y-90	1.2053E+00	73.366	146.732	0.00E+00	8.84E+01	1.77E+02		
Other Radionuclides					1.00E+02	2.01E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.13E+00	2.26E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This template is a good approximation since it is a FAST, Uranium fuel
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	FAST	FAST	
BOL HM Constituents:	UNKNOWN	ZIRC	
BOL Enrichment %:	UO2	U	
	18.00000074	10 to 40	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		73.366	
Bounding:		146.732	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	8.66		
Bounding:	17.32		
			1.01

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: SPEC (ORME) 1Fuel decay start date: 1958
 SNF ID #: 208 Estimates as of: 2030
 Fuel Units & Descr: 1 - FLAT PLATES IN CAN Template: HFBR (Heavy Water, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=2.39kg ; EOL=2.39kg 2Template Burnup(MWd): 15
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00034251
Template Decay Time: 65 years

Estimated
 Canister usage:
 HIC
 1.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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	5.3460E-09	45.432	90.864	0.00E+00	2.43E-07	4.86E-07	Avg. MeV	
Am-241	2.9433E-02	45.432	90.864	0.00E+00	1.34E+00	2.67E+00	0.0150	3.162E+12
Am-242m	7.2600E-06	45.432	90.864	0.00E+00	3.30E-04	6.60E-04	0.0250	6.537E+11
Am-243	6.3740E-06	45.432	90.864	0.00E+00	2.90E-04	5.79E-04	0.0375	5.728E+11
C-14	2.9460E-08	45.432	90.864	0.00E+00	1.34E-06	2.68E-06	0.0575	6.440E+11
Cl-36	5.9507E-35	45.432	90.864	0.00E+00	2.70E-33	5.41E-33	0.0850	3.667E+11
Cm-243	7.3933E-07	45.432	90.864	0.00E+00	3.36E-05	6.72E-05	0.1250	2.383E+11
Cm-244	1.9660E-05	45.432	90.864	0.00E+00	8.93E-04	1.79E-03	0.2250	3.158E+11
Co-60	4.3927E-08	45.432	90.864	0.00E+00	2.00E-06	3.99E-06	0.3750	1.375E+11
Cs-134	5.7507E-10	45.432	90.864	0.00E+00	2.61E-08	5.23E-08	0.5750	2.415E+12
Cs-135	4.8607E-06	45.432	90.864	0.00E+00	2.21E-04	4.42E-04	0.8500	2.317E+10
Cs-137	7.1533E-01	45.432	90.864	0.00E+00	3.25E+01	6.50E+01	1.2500	8.345E+09
Eu-154	5.5553E-04	45.432	90.864	0.00E+00	2.52E-02	5.05E-02	1.7500	6.042E+08
Eu-155	7.5800E-06	45.432	90.864	0.00E+00	3.44E-04	6.89E-04	2.2500	6.387E+04
Fe-55	8.7333E-09	45.432	90.864	0.00E+00	3.97E-07	7.94E-07	2.7500	1.629E+04
H-3	3.7313E-04	45.432	90.864	0.00E+00	1.70E-02	3.39E-02	3.5000	3.379E+02
I-129	7.1600E-07	45.432	90.864	0.00E+00	3.25E-05	6.51E-05	5.0000	1.413E+02
Kr-85	5.5793E-03	45.432	90.864	0.00E+00	2.53E-01	5.07E-01	7.0000	1.583E+01
Np-237	4.2207E-06	45.432	90.864	0.00E+00	1.92E-04	3.84E-04	11.0000	1.793E+00
Pa-231	8.3333E-09	45.432	90.864	0.00E+00	3.79E-07	7.57E-07		
Pb-210	2.4613E-12	45.432	90.864	0.00E+00	1.12E-10	2.24E-10		
Pm-147	3.1780E-07	45.432	90.864	0.00E+00	1.44E-05	2.89E-05		
Pu-238	3.8753E-03	45.432	90.864	0.00E+00	1.76E-01	3.52E-01		
Pu-239	1.0300E-02	45.432	90.864	0.00E+00	4.68E-01	9.36E-01		
Pu-240	5.3920E-03	45.432	90.864	0.00E+00	2.45E-01	4.90E-01		
Pu-241	4.3067E-02	45.432	90.864	0.00E+00	1.96E+00	3.91E+00		
Pu-242	3.0713E-06	45.432	90.864	0.00E+00	1.40E-04	2.79E-04		
Ra-226	5.8127E-12	45.432	90.864	0.00E+00	2.64E-10	5.28E-10		
Ra-228	4.5447E-14	45.432	90.864	0.00E+00	2.06E-12	4.13E-12		
Ru-106	3.0860E-19	45.432	90.864	0.00E+00	1.40E-17	2.80E-17		
Se-79	1.2533E-05	45.432	90.864	0.00E+00	5.69E-04	1.14E-03		
Sn-126	1.1393E-05	45.432	90.864	0.00E+00	5.18E-04	1.04E-03		
Sr-90	6.3033E-01	45.432	90.864	0.00E+00	2.86E+01	5.73E+01		
Tc-99	4.3527E-04	45.432	90.864	0.00E+00	1.98E-02	3.96E-02		
Th-229	5.2893E-12	45.432	90.864	0.00E+00	2.40E-10	4.81E-10		
Th-230	4.6820E-10	45.432	90.864	0.00E+00	2.13E-08	4.25E-08		
Th-232	5.1647E-14	45.432	90.864	0.00E+00	2.35E-12	4.69E-12		
Tl-208	4.9873E-09	45.432	90.864	0.00E+00	2.27E-07	4.53E-07		
U-232	1.3513E-08	45.432	90.864	0.00E+00	6.14E-07	1.23E-06		
U-233	1.3927E-09	45.432	90.864	0.00E+00	6.33E-08	1.27E-07		
U-234	1.1380E-06	45.432	90.864	0.00E+00	5.17E-05	1.03E-04		
U-235	-2.5335E-06	45.432	0.000	2.66E-04	1.51E-04	2.66E-04		
U-236	1.3007E-05	45.432	90.864	0.00E+00	5.91E-04	1.18E-03		
U-238	-1.4207E-08	45.432	0.000	7.62E-04	7.61E-04	7.62E-04		
Y-90	6.3053E-01	45.432	90.864	0.00E+00	2.86E+01	5.73E+01		
Other Radionuclides					3.09E+01	6.19E+01		

Thermal Power	
Nominal Heat (Watts)	Bounding Heat Output (Watts)
4.22E+01	8.44E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
	ORGANIC	HEAVY WATER	This Template was used for the following reasons:
Fuel Cladding:	ALUM (1100)	ALUM	This fuel matches on cladding and BOL heavy metal, heavy water is a conservative assumption for moderator, and it is fairly close on enrichment.
BOL HM Constituents:	U-Mo	U	
BOL Enrichment %:	5.146443515	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		45.432	Nominal burnup assumed to be 2% of BOL heavy metal mass.
Bounding:		90.864	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.43		0.98
Bounding:	0.87		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 209
 Fuel Units & Descr: 3 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL= : EOL=9.74kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1966
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 HIC
 1.00

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.0733E-09	9,262.374	9,262.374	0.00E+00	9.94E-06	9.94E-06	0.0150	3.524E+14
Am-241	1.4751E-01	9,262.374	9,262.374	0.00E+00	1.37E+03	1.37E+03	0.0250	7.063E+13
Am-242m	2.6809E-04	9,262.374	9,262.374	0.00E+00	2.48E+00	2.48E+00	0.0375	6.656E+13
Am-243	6.2484E-04	9,262.374	9,262.374	0.00E+00	5.79E+00	5.79E+00	0.0575	8.327E+13
C-14	4.7820E-05	9,262.374	9,262.374	0.00E+00	4.43E-01	4.43E-01	0.0850	3.891E+13
Cl-36	8.0297E-07	9,262.374	9,262.374	0.00E+00	7.44E-03	7.44E-03	0.1250	2.589E+13
Cm-243	1.7426E-04	9,262.374	9,262.374	0.00E+00	1.61E+00	1.61E+00	0.2250	3.322E+13
Cm-244	2.7616E-02	9,262.374	9,262.374	0.00E+00	2.56E+02	2.56E+02	0.3750	1.435E+13
Co-60	3.5610E-04	9,262.374	9,262.374	0.00E+00	3.30E+00	3.30E+00	0.5750	3.379E+14
Cs-134	2.6260E-07	9,262.374	9,262.374	0.00E+00	2.43E-03	2.43E-03	0.8500	3.299E+12
Cs-135	1.4433E-05	9,262.374	9,262.374	0.00E+00	1.34E-01	1.34E-01	1.2500	2.099E+12
Cs-137	9.8870E-01	9,262.374	9,262.374	0.00E+00	9.16E+03	9.16E+03	1.7500	9.232E+10
Eu-154	6.0320E-03	9,262.374	9,262.374	0.00E+00	5.59E+01	5.59E+01	2.2500	1.517E+07
Eu-155	2.1770E-04	9,262.374	9,262.374	0.00E+00	2.02E+00	2.02E+00	2.7500	5.346E+07
Fe-55	7.9296E-07	9,262.374	9,262.374	0.00E+00	7.34E-03	7.34E-03	3.5000	3.815E+06
H-3	8.9486E-03	9,262.374	9,262.374	0.00E+00	8.29E+01	8.29E+01	5.0000	1.630E+06
I-129	9.8288E-07	9,262.374	9,262.374	0.00E+00	9.10E-03	9.10E-03	7.0000	1.878E+05
Kr-85	1.0707E-02	9,262.374	9,262.374	0.00E+00	9.92E+01	9.92E+01	11.0000	2.157E+04
Np-237	1.1927E-05	9,262.374	9,262.374	0.00E+00	1.10E-01	1.10E-01		
Pa-231	1.4703E-09	9,262.374	9,262.374	0.00E+00	1.36E-05	1.36E-05		
Pb-210	1.6828E-10	9,262.374	9,262.374	0.00E+00	1.56E-06	1.56E-06		
Pm-147	6.9606E-06	9,262.374	9,262.374	0.00E+00	6.45E-02	6.45E-02		
Pu-238	6.6263E-02	9,262.374	9,262.374	0.00E+00	6.14E+02	6.14E+02		
Pu-239	1.1618E-02	9,262.374	9,262.374	0.00E+00	1.08E+02	1.08E+02		
Pu-240	1.5142E-02	9,262.374	9,262.374	0.00E+00	1.40E+02	1.40E+02		
Pu-241	4.3766E-01	9,262.374	9,262.374	0.00E+00	4.05E+03	4.05E+03		
Pu-242	6.4260E-05	9,262.374	9,262.374	0.00E+00	5.95E-01	5.95E-01		
Ra-226	3.8501E-10	9,262.374	9,262.374	0.00E+00	3.57E-06	3.57E-06		
Ra-228	5.2955E-12	9,262.374	9,262.374	0.00E+00	4.90E-08	4.90E-08		
Ru-106	2.0413E-14	9,262.374	9,262.374	0.00E+00	1.89E-10	1.89E-10		
Se-79	1.2376E-05	9,262.374	9,262.374	0.00E+00	1.15E-01	1.15E-01		
Sn-126	2.5210E-05	9,262.374	9,262.374	0.00E+00	2.34E-01	2.34E-01		
Sr-90	6.4163E-01	9,262.374	9,262.374	0.00E+00	5.94E+03	5.94E+03		
Tc-99	3.9357E-04	9,262.374	9,262.374	0.00E+00	3.65E+00	3.65E+00		
Th-229	1.5644E-10	9,262.374	9,262.374	0.00E+00	1.45E-06	1.45E-06		
Th-230	2.7972E-08	9,262.374	9,262.374	0.00E+00	2.59E-04	2.59E-04		
Th-232	5.3036E-12	9,262.374	9,262.374	0.00E+00	4.91E-08	4.91E-08		
Tl-208	1.5136E-07	9,262.374	9,262.374	0.00E+00	1.40E-03	1.40E-03		
U-232	4.1005E-07	9,262.374	9,262.374	0.00E+00	3.80E-03	3.80E-03		
U-233	2.5856E-08	9,262.374	9,262.374	0.00E+00	2.39E-04	2.39E-04		
U-234	5.2665E-05	9,262.374	9,262.374	0.00E+00	4.88E-01	4.88E-01		
U-235	1.4487E-06	9,262.374	0.000	1.35E-03	0.00E+00	1.35E-03		
U-236	7.5888E-06	9,262.374	9,262.374	0.00E+00	7.03E-02	7.03E-02		
U-238	2.6129E-07	9,262.374	0.000	6.33E-03	3.91E-03	6.33E-03		
Y-90	6.4180E-01	9,262.374	9,262.374	0.00E+00	5.94E+03	5.94E+03		
Other Radionuclides					8.83E+03	8.83E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (unknown).
Fuel Cladding:	ZIRC-2	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:		0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		9,262.374	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		9,262.374	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	13.58		
Bounding:	13.58		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: SPSS (SPERT)
 SNF ID #: 213
 Fuel Units & Descr: 1 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=59kg ; EOL=59kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1959
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.08

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	4.5940E-08	1.889	3.779	0.00E+00	8.68E-08	1.74E-07	0.0150	1.379E+11
Am-241	1.1471E-04	1.889	3.779	0.00E+00	2.17E-04	4.33E-04	0.0250	2.866E+10
Am-242m	7.4210E-09	1.889	3.779	0.00E+00	1.40E-08	2.80E-08	0.0375	2.490E+10
Am-243	9.8236E-10	1.889	3.779	0.00E+00	1.86E-09	3.71E-09	0.0575	2.672E+10
C-14	2.2928E-04	1.889	3.779	0.00E+00	4.33E-04	8.66E-04	0.0850	1.614E+10
Cl-36	1.2260E-06	1.889	3.779	0.00E+00	2.32E-06	4.63E-06	0.1250	1.047E+10
Cm-243	1.2000E-10	1.889	3.779	0.00E+00	2.27E-10	4.53E-10	0.2250	1.393E+10
Cm-244	7.3577E-10	1.889	3.779	0.00E+00	1.39E-09	2.78E-09	0.3750	6.067E+09
Co-60	1.3732E-03	1.889	3.779	0.00E+00	2.59E-03	5.19E-03	0.5750	1.021E+11
Cs-134	1.2709E-10	1.889	3.779	0.00E+00	2.40E-10	4.80E-10	0.8500	9.912E+08
Cs-135	3.0316E-05	1.889	3.779	0.00E+00	5.73E-05	1.15E-04	1.2500	7.174E+08
Cs-137	7.2579E-01	1.889	3.779	0.00E+00	1.37E+00	2.74E+00	1.7500	2.551E+07
Eu-154	5.9750E-05	1.889	3.779	0.00E+00	1.13E-04	2.26E-04	2.2500	4.823E+03
Eu-155	1.0577E-05	1.889	3.779	0.00E+00	2.00E-05	4.00E-05	2.7500	2.160E+03
Fe-55	4.1631E-07	1.889	3.779	0.00E+00	7.87E-07	1.57E-06	3.5000	3.302E+01
H-3	4.6722E-04	1.889	3.779	0.00E+00	8.83E-04	1.77E-03	5.0000	1.372E-01
I-129	7.3195E-07	1.889	3.779	0.00E+00	1.38E-06	2.77E-06	7.0000	1.527E-02
Kr-85	5.9418E-03	1.889	3.779	0.00E+00	1.12E-02	2.25E-02	11.0000	1.721E-03
Np-237	1.1499E-06	1.889	3.779	0.00E+00	2.17E-06	4.35E-06		
Pa-231	7.0899E-08	1.889	3.779	0.00E+00	1.34E-07	2.68E-07		
Pb-210	2.2363E-12	1.889	3.779	0.00E+00	4.22E-12	8.45E-12		
Pm-147	4.2296E-07	1.889	3.779	0.00E+00	7.99E-07	1.60E-06		
Pu-238	2.3295E-04	1.889	3.779	0.00E+00	4.40E-04	8.80E-04		
Pu-239	6.6722E-04	1.889	3.779	0.00E+00	1.26E-03	2.52E-03		
Pu-240	8.6556E-05	1.889	3.779	0.00E+00	1.64E-04	3.27E-04		
Pu-241	1.6889E-04	1.889	3.779	0.00E+00	3.19E-04	6.38E-04		
Pu-242	1.9717E-09	1.889	3.779	0.00E+00	3.73E-09	7.45E-09		
Ra-226	4.5740E-12	1.889	3.779	0.00E+00	8.64E-12	1.73E-11		
Ra-228	8.3511E-12	1.889	3.779	0.00E+00	1.58E-11	3.16E-11		
Ru-106	2.0516E-19	1.889	3.779	0.00E+00	3.88E-19	7.75E-19		
Se-79	1.3220E-05	1.889	3.779	0.00E+00	2.50E-05	5.00E-05		
Sn-126	1.1489E-05	1.889	3.779	0.00E+00	2.17E-05	4.34E-05		
Sr-90	6.6872E-01	1.889	3.779	0.00E+00	1.26E+00	2.53E+00		
Tc-99	4.6639E-04	1.889	3.779	0.00E+00	8.81E-04	1.76E-03		
Th-229	2.3727E-11	1.889	3.779	0.00E+00	4.48E-11	8.97E-11		
Th-230	2.7354E-10	1.889	3.779	0.00E+00	5.17E-10	1.03E-09		
Th-232	8.3594E-12	1.889	3.779	0.00E+00	1.58E-11	3.16E-11		
Ti-208	1.6228E-08	1.889	3.779	0.00E+00	3.07E-08	6.13E-08		
U-232	4.3960E-08	1.889	3.779	0.00E+00	8.31E-08	1.66E-07		
U-233	3.3344E-09	1.889	3.779	0.00E+00	6.30E-09	1.26E-08		
U-234	4.0749E-07	1.889	3.779	0.00E+00	7.70E-07	1.54E-06		
U-235	-2.7761E-06	1.889	0.000	1.19E-03	1.18E-03	1.19E-03		
U-236	1.6190E-05	1.889	3.779	0.00E+00	3.06E-05	6.12E-05		
U-238	-2.8547E-09	1.889	0.000	1.38E-05	1.38E-05	1.38E-05		
Y-90	6.6889E-01	1.889	3.779	0.00E+00	1.26E+00	2.53E+00		
Other Radionuclides					1.72E+00	3.43E+00		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	SST (304L)	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	93.05084746	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1.889	
Bounding:		3.779	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.07		
Bounding:	0.14		

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: THOR (TAIWAN) ¹Fuel decay start date: 1997
 SNF ID #: 629 Estimates as of: 2030
 Fuel Units & Descr: 35 - MTR TYPE Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=5.06kg ; EOL=4.10kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 1.46

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)		Avg. MeV
Ac-227	3.8271E-09	918.724	1,837.448	0.00E+00	3.52E-06	7.03E-06		0.0150
Am-241	4.4195E-03	918.724	1,837.448	0.00E+00	4.06E+00	8.12E+00		1.661E+14
Am-242m	1.8195E-06	918.724	1,837.448	0.00E+00	1.67E-03	3.34E-03		0.0250
Am-243	2.3278E-07	918.724	1,837.448	0.00E+00	2.14E-04	4.28E-04		0.0375
C-14	4.3203E-05	918.724	1,837.448	0.00E+00	3.97E-02	7.94E-02		0.0575
Cl-36	4.3023E-08	918.724	1,837.448	0.00E+00	3.95E-05	7.91E-05		0.0850
Cm-243	1.6872E-07	918.724	1,837.448	0.00E+00	1.55E-04	3.10E-04		0.1250
Cm-244	1.4660E-06	918.724	1,837.448	0.00E+00	1.35E-03	2.69E-03		0.2250
Co-60	2.2376E-03	918.724	1,837.448	0.00E+00	2.06E+00	4.11E+00		0.3750
Cs-134	1.2525E-04	918.724	1,837.448	0.00E+00	1.15E-01	2.30E-01		0.5750
Cs-135	3.1549E-05	918.724	1,837.448	0.00E+00	2.90E-02	5.80E-02		0.8500
Cs-137	1.7368E+00	918.724	1,837.448	0.00E+00	1.60E+03	3.19E+03		1.2500
Eu-154	2.6947E-01	918.724	1,837.448	0.00E+00	2.48E+02	4.95E+02		1.7500
Eu-155	2.6857E-02	918.724	1,837.448	0.00E+00	2.47E+01	4.93E+01		2.2500
Fe-55	4.2105E-05	918.724	1,837.448	0.00E+00	3.87E-02	7.74E-02		2.7500
H-3	3.5173E-03	918.724	1,837.448	0.00E+00	3.23E+00	6.46E+00		3.5000
I-129	7.3805E-07	918.724	1,837.448	0.00E+00	6.78E-04	1.36E-03		5.0000
Kr-85	6.9263E-02	918.724	1,837.448	0.00E+00	6.36E+01	1.27E+02		7.0000
Np-237	1.4752E-06	918.724	1,837.448	0.00E+00	1.36E-03	2.71E-03		11.0000
Pa-231	8.3970E-09	918.724	1,837.448	0.00E+00	7.71E-06	1.54E-05		
Pb-210	1.4995E-13	918.724	1,837.448	0.00E+00	1.38E-10	2.76E-10		
Pm-147	1.0567E-02	918.724	1,837.448	0.00E+00	9.71E+00	1.94E+01		
Pu-238	1.1543E-03	918.724	1,837.448	0.00E+00	1.06E+00	2.12E+00		
Pu-239	5.6917E-03	918.724	1,837.448	0.00E+00	5.23E+00	1.05E+01		
Pu-240	2.2602E-03	918.724	1,837.448	0.00E+00	2.08E+00	4.15E+00		
Pu-241	4.8045E-02	918.724	1,837.448	0.00E+00	4.41E+01	8.83E+01		
Pu-242	3.0602E-07	918.724	1,837.448	0.00E+00	2.81E-04	5.62E-04		
Ra-226	5.1293E-13	918.724	1,837.448	0.00E+00	4.71E-10	9.42E-10		
Ra-228	2.3323E-03	918.724	1,837.448	0.00E+00	2.14E-07	4.29E-07		
Ru-106	1.0075E-07	918.724	1,837.448	0.00E+00	9.26E-05	1.85E-04		
Se-79	1.2935E-05	918.724	1,837.448	0.00E+00	1.19E-02	2.38E-02		
Sn-126	1.2238E-05	918.724	1,837.448	0.00E+00	1.12E-02	2.25E-02		
Sr-90	1.6165E+00	918.724	1,837.448	0.00E+00	1.49E+03	2.97E+03		
Tc-99	4.4120E-04	918.724	1,837.448	0.00E+00	4.05E-01	8.11E-01		
Th-229	4.5684E-10	918.724	1,837.448	0.00E+00	4.20E-07	8.39E-07		
Th-230	6.8271E-11	918.724	1,837.448	0.00E+00	6.27E-08	1.25E-07		
Th-232	2.3744E-10	918.724	1,837.448	0.00E+00	2.18E-07	4.36E-07		
Tl-208	1.7368E-08	918.724	1,837.448	0.00E+00	1.60E-05	3.19E-05		
U-232	4.6797E-08	918.724	1,837.448	0.00E+00	4.30E-05	8.60E-05		
U-233	1.3146E-07	918.724	1,837.448	0.00E+00	1.21E-04	2.42E-04		
U-234	2.5729E-07	918.724	1,837.448	0.00E+00	2.36E-04	4.73E-04		
U-235	-2.6159E-06	918.724	0.000	1.02E-02	7.79E-03	1.02E-02		
U-236	1.2719E-05	918.724	1,837.448	0.00E+00	1.17E-02	2.34E-02		
U-238	-3.8857E-08	918.724	0.000	1.16E-04	8.06E-05	1.16E-04		
Y-90	1.6165E+00	918.724	1,837.448	0.00E+00	1.49E+03	2.97E+03		
Other Radionuclides					1.73E+03	3.46E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.05E+01	4.09E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U-ALX	U	
	93.16330608	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		918.724	
Bounding:		1,837.448	

Checks			Estimated EOL HM/Given EOL HM 1.01
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	4.91		
Bounding:	9.83		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TMI-2
 SNF ID #: 228
 Fuel Units & Descr: 1 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=.03kg ; EOL=.03kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1979
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc. 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.06

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	1.0733E-09	0.190	0.380	0.00E+00	2.04E-10	4.08E-10	Avg. MeV	
Am-241	1.4751E-01	0.190	0.380	0.00E+00	2.81E-02	5.61E-02	0.0150	1.447E+10
Am-242m	2.6809E-04	0.190	0.380	0.00E+00	5.10E-05	1.02E-04	0.0250	2.901E+09
Am-243	6.2484E-04	0.190	0.380	0.00E+00	1.19E-04	2.38E-04	0.0375	2.733E+09
C-14	4.7820E-05	0.190	0.380	0.00E+00	9.09E-06	1.82E-05	0.0575	3.420E+09
Cl-36	8.0297E-07	0.190	0.380	0.00E+00	1.53E-07	3.05E-07	0.0850	1.598E+09
Cm-243	1.7426E-04	0.190	0.380	0.00E+00	3.31E-05	6.63E-05	0.1250	1.063E+09
Cm-244	2.7616E-02	0.190	0.380	0.00E+00	5.25E-03	1.05E-02	0.2250	1.364E+09
Co-60	3.5610E-04	0.190	0.380	0.00E+00	6.77E-05	1.35E-04	0.3750	5.892E+08
Cs-134	2.6260E-07	0.190	0.380	0.00E+00	4.99E-08	9.99E-08	0.5750	1.388E+10
Cs-135	1.4433E-05	0.190	0.380	0.00E+00	2.75E-06	5.49E-06	0.8500	1.355E+08
Cs-137	9.8870E-01	0.190	0.380	0.00E+00	1.88E-01	3.76E-01	1.2500	8.622E+07
Eu-154	6.0320E-03	0.190	0.380	0.00E+00	1.15E-03	2.29E-03	1.7500	3.791E+06
Eu-155	2.1770E-04	0.190	0.380	0.00E+00	4.14E-05	8.28E-05	2.2500	6.232E+02
Fe-55	7.9296E-07	0.190	0.380	0.00E+00	1.51E-07	3.02E-07	2.7500	2.196E+03
H-3	8.9486E-03	0.190	0.380	0.00E+00	1.70E-03	3.40E-03	3.5000	1.567E+02
I-129	9.8288E-07	0.190	0.380	0.00E+00	1.87E-07	3.74E-07	5.0000	6.697E+01
Kr-85	1.0707E-02	0.190	0.380	0.00E+00	2.04E-03	4.07E-03	7.0000	7.716E+00
Np-237	1.1927E-05	0.190	0.380	0.00E+00	2.27E-06	4.54E-06	11.0000	8.859E-01
Pa-231	1.4703E-09	0.190	0.380	0.00E+00	2.80E-10	5.59E-10		
Pb-210	1.6828E-10	0.190	0.380	0.00E+00	3.20E-11	6.40E-11		
Pm-147	6.9606E-06	0.190	0.380	0.00E+00	1.32E-06	2.65E-06		
Pu-238	6.6263E-02	0.190	0.380	0.00E+00	1.26E-02	2.52E-02		
Pu-239	1.1618E-02	0.190	0.380	0.00E+00	2.21E-03	4.42E-03		
Pu-240	1.5142E-02	0.190	0.380	0.00E+00	2.88E-03	5.76E-03		
Pu-241	4.3766E-01	0.190	0.380	0.00E+00	8.32E-02	1.66E-01		
Pu-242	6.4260E-05	0.190	0.380	0.00E+00	1.22E-05	2.44E-05		
Ra-226	3.8501E-10	0.190	0.380	0.00E+00	7.32E-11	1.46E-10		
Ra-228	5.2955E-12	0.190	0.380	0.00E+00	1.01E-12	2.01E-12		
Ru-106	2.0413E-14	0.190	0.380	0.00E+00	3.88E-15	7.76E-15		
Se-79	1.2376E-05	0.190	0.380	0.00E+00	2.35E-06	4.71E-06		
Sn-126	2.5210E-05	0.190	0.380	0.00E+00	4.79E-06	9.59E-06		
Sr-90	6.4163E-01	0.190	0.380	0.00E+00	1.22E-01	2.44E-01		
Tc-99	3.9357E-04	0.190	0.380	0.00E+00	7.49E-05	1.50E-04		
Th-229	1.5644E-10	0.190	0.380	0.00E+00	2.98E-11	5.95E-11		
Th-230	2.7972E-08	0.190	0.380	0.00E+00	5.32E-09	1.06E-08		
Th-232	5.3036E-12	0.190	0.380	0.00E+00	1.01E-12	2.02E-12		
Tl-208	1.5138E-07	0.190	0.380	0.00E+00	2.88E-08	5.76E-08		
U-232	4.1005E-07	0.190	0.380	0.00E+00	7.80E-08	1.56E-07		
U-233	2.5856E-08	0.190	0.380	0.00E+00	4.92E-09	9.84E-09		
U-234	5.2665E-05	0.190	0.380	0.00E+00	1.00E-05	2.00E-05		
U-235	-1.4487E-06	0.190	0.000	2.50E-06	2.22E-06	2.50E-06		
U-236	7.5888E-06	0.190	0.380	0.00E+00	1.44E-06	2.89E-06		
U-238	-2.6129E-07	0.190	0.000	1.04E-05	1.04E-05	1.04E-05		
Y-90	6.4180E-01	0.190	0.380	0.00E+00	1.22E-01	2.44E-01		
Other Radionuclides					1.81E-01	3.62E-01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.44E-03	6.88E-03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding:	ZIRC-4	ZIRC
BOL HM Constituents:	UO2	U
BOL Enrichment %:	3.588289669	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:		0.190
Bounding:		0.380

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

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.17	
Bounding:	0.34	

Estimated EOL HM/ Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TMI-2 CORE DEBRIS
 SNF ID #: 914
 Fuel Units & Descr: 341 - DEBRIS
 Heavy Metal Mass: BOL=82038.39kg ; EOL=81749.23kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1979
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 341.00

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.0733E-09	274,985.090	549,970.181	0.00E+00	2.95E-04	5.90E-04	Avg. MeV	
Am-241	1.4751E-01	274,985.090	549,970.181	0.00E+00	4.06E+04	8.11E+04	0.0150	2.093E+16
Am-242m	2.6809E-04	274,985.090	549,970.181	0.00E+00	7.37E+01	1.47E+02	0.0250	4.194E+15
Am-243	6.2484E-04	274,985.090	549,970.181	0.00E+00	1.72E+02	3.44E+02	0.0375	3.952E+15
C-14	4.7820E-05	274,985.090	549,970.181	0.00E+00	1.31E+01	2.63E+01	0.0575	4.945E+15
Cl-36	8.0297E-07	274,985.090	549,970.181	0.00E+00	2.21E-01	4.42E-01	0.0850	2.311E+15
Cm-243	1.7426E-04	274,985.090	549,970.181	0.00E+00	4.79E+01	9.58E+01	0.1250	1.537E+15
Cm-244	2.7616E-02	274,985.090	549,970.181	0.00E+00	7.59E+03	1.52E+04	0.2250	1.973E+15
Co-60	3.5610E-04	274,985.090	549,970.181	0.00E+00	9.79E+01	1.96E+02	0.3750	8.519E+14
Cs-134	2.6260E-07	274,985.090	549,970.181	0.00E+00	7.22E-02	1.44E-01	0.5750	2.006E+14
Cs-135	1.4433E-05	274,985.090	549,970.181	0.00E+00	3.97E+00	7.94E+00	0.8500	1.959E+14
Cs-137	9.8870E-01	274,985.090	549,970.181	0.00E+00	2.72E+05	5.44E+05	1.2500	1.247E+14
Eu-154	6.0320E-03	274,985.090	549,970.181	0.00E+00	1.66E+03	3.32E+03	1.7500	5.482E+12
Eu-155	2.1770E-04	274,985.090	549,970.181	0.00E+00	5.99E+01	1.20E+02	2.2500	9.011E+08
Fe-55	7.9296E-07	274,985.090	549,970.181	0.00E+00	2.18E-01	4.36E-01	2.7500	3.175E+09
H-3	8.9486E-03	274,985.090	549,970.181	0.00E+00	2.46E+03	4.92E+03	3.5000	2.267E+08
I-129	9.8288E-07	274,985.090	549,970.181	0.00E+00	2.70E-01	5.41E-01	5.0000	9.686E+07
Kr-85	1.0707E-02	274,985.090	549,970.181	0.00E+00	2.94E+03	5.89E+03	7.0000	1.116E+07
Np-237	1.1927E-05	274,985.090	549,970.181	0.00E+00	3.28E+00	6.56E+00	11.0000	1.281E+06
Pa-231	1.4703E-09	274,985.090	549,970.181	0.00E+00	4.04E-04	8.09E-04		
Pb-210	1.6828E-10	274,985.090	549,970.181	0.00E+00	4.63E-05	9.25E-05		
Pm-147	6.9606E-06	274,985.090	549,970.181	0.00E+00	1.91E+00	3.83E+00		
Pu-238	6.6263E-02	274,985.090	549,970.181	0.00E+00	1.82E+04	3.64E+04		
Pu-239	1.1618E-01	274,985.090	549,970.181	0.00E+00	3.19E+03	6.39E+03		
Pu-240	1.5142E-02	274,985.090	549,970.181	0.00E+00	4.16E+03	8.33E+03		
Pu-241	4.3766E-01	274,985.090	549,970.181	0.00E+00	1.20E+05	2.41E+05		
Pu-242	6.4260E-05	274,985.090	549,970.181	0.00E+00	1.77E+01	3.53E+01		
Ra-226	3.8501E-10	274,985.090	549,970.181	0.00E+00	1.06E-04	2.12E-04		
Ra-228	5.2955E-12	274,985.090	549,970.181	0.00E+00	1.46E-06	2.91E-06		
Ru-106	2.0413E-14	274,985.090	549,970.181	0.00E+00	5.61E-09	1.12E-08		
Se-79	1.2376E-05	274,985.090	549,970.181	0.00E+00	3.40E+00	6.81E+00		
Sn-126	2.5210E-05	274,985.090	549,970.181	0.00E+00	6.93E+00	1.39E+01		
Sr-90	6.4163E-01	274,985.090	549,970.181	0.00E+00	1.76E+05	3.53E+05		
Tc-99	3.9357E-04	274,985.090	549,970.181	0.00E+00	1.08E+02	2.16E+02		
Th-229	1.5644E-10	274,985.090	549,970.181	0.00E+00	4.30E-05	8.60E-05		
Th-230	2.7972E-08	274,985.090	549,970.181	0.00E+00	7.69E-03	1.54E-02		
Th-232	5.3036E-12	274,985.090	549,970.181	0.00E+00	1.46E-06	2.92E-06		
Ti-208	1.5136E-07	274,985.090	549,970.181	0.00E+00	4.16E-02	8.32E-02		
U-232	4.1005E-07	274,985.090	549,970.181	0.00E+00	1.13E-01	2.26E-01		
U-233	2.5856E-08	274,985.090	549,970.181	0.00E+00	7.11E-03	1.42E-02		
U-234	5.2665E-05	274,985.090	549,970.181	0.00E+00	1.45E+01	2.90E+01		
U-235	-1.4487E-06	274,985.090	0.000	4.50E+00	4.10E+00	4.50E+00		
U-236	7.5888E-06	274,985.090	549,970.181	0.00E+00	2.09E+00	4.17E+00		
U-238	-2.6129E-07	274,985.090	0.000	2.69E+01	2.68E+01	2.69E+01		
Y-90	6.4180E-01	274,985.090	549,970.181	0.00E+00	1.76E+05	3.53E+05		
Other Radionuclides					2.62E+05	5.24E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.97E+03	9.95E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		Basis for Parameter Differences:
From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER
Fuel Cladding:	ZIRC-4	ZIRC
BOL HM Constituents:	UO2	U
BOL Enrichment %:	2.539514873	0 to 5

Burnup Summary (MWd) ²		Basis for burnup used in estimate:
From SFD	Estimated	
Nominal:	260,471,900	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:	489,359,019	Bounding burnup assumed to be twice nominal burnup.

Checks		Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	
	0.10	1.06
Bounding:	0.19	1.12

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TMI-2 CORE DEBRIS (D-153 & 388)
 SNF ID #: 229
 Fuel Units & Descr: 2 - DEBRIS
 Heavy Metal Mass: BOL=19.08kg ; EOL=19.01kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1979
 Estimate as of: 2030
 Template: PWR (Light Water, Zirc. 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x15"
 2.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.0733E-09	66.567	133.133	0.00E+00	7.14E-08	1.43E-07	Avg. MeV	
Am-241	1.4751E-01	66.567	133.133	0.00E+00	9.82E+00	1.96E+01	0.0150	5.066E+12
Am-242m	2.6809E-04	66.567	133.133	0.00E+00	1.78E-02	3.57E-02	0.0250	1.015E+12
Am-243	6.2484E-04	66.567	133.133	0.00E+00	4.16E-02	8.32E-02	0.0375	9.567E+11
C-14	4.7820E-05	66.567	133.133	0.00E+00	3.18E-03	6.37E-03	0.0575	1.197E+12
Cl-36	8.0297E-07	66.567	133.133	0.00E+00	5.35E-05	1.07E-04	0.0850	5.593E+11
Cm-243	1.7426E-04	66.567	133.133	0.00E+00	1.16E-02	2.32E-02	0.1250	3.721E+11
Cm-244	2.7616E-02	66.567	133.133	0.00E+00	1.84E+00	3.68E+00	0.2250	4.775E+11
Co-60	3.5610E-04	66.567	133.133	0.00E+00	2.37E-02	4.74E-02	0.3750	2.062E+11
Cs-134	2.6260E-07	66.567	133.133	0.00E+00	1.75E-05	3.50E-05	0.5750	4.857E+12
Cs-135	1.4433E-05	66.567	133.133	0.00E+00	9.61E-04	1.92E-03	0.8500	4.742E+10
Cs-137	9.8870E-01	66.567	133.133	0.00E+00	6.58E+01	1.32E+02	1.2500	3.018E+10
Eu-154	6.0320E-03	66.567	133.133	0.00E+00	4.02E-01	8.03E-01	1.7500	1.327E+09
Eu-155	2.1770E-04	66.567	133.133	0.00E+00	1.45E-02	2.90E-02	2.2500	2.181E+05
Fe-55	7.9296E-07	66.567	133.133	0.00E+00	5.28E-05	1.06E-04	2.7500	7.685E+05
H-3	8.9486E-03	66.567	133.133	0.00E+00	5.96E-01	1.19E+00	3.5000	5.487E+04
I-129	9.8288E-07	66.567	133.133	0.00E+00	6.54E-05	1.31E-04	5.0000	2.345E+04
Kr-85	1.0707E-02	66.567	133.133	0.00E+00	7.13E-01	1.43E+00	7.0000	2.701E+03
Np-237	1.1927E-05	66.567	133.133	0.00E+00	7.94E-04	1.59E-03	11.0000	3.102E+02
Pa-231	1.4703E-09	66.567	133.133	0.00E+00	9.79E-08	1.96E-07		
Pb-210	1.6828E-10	66.567	133.133	0.00E+00	1.12E-08	2.24E-08		
Pm-147	6.9606E-06	66.567	133.133	0.00E+00	4.63E-04	9.27E-04		
Pu-238	6.6263E-02	66.567	133.133	0.00E+00	4.41E+00	8.82E+00		
Pu-239	1.1618E-02	66.567	133.133	0.00E+00	7.73E-01	1.55E+00		
Pu-240	1.5142E-02	66.567	133.133	0.00E+00	1.01E+00	2.02E+00		
Pu-241	4.3766E-01	66.567	133.133	0.00E+00	2.91E+01	5.83E+01		
Pu-242	6.4260E-05	66.567	133.133	0.00E+00	4.28E-03	8.56E-03		
Ra-226	3.8501E-10	66.567	133.133	0.00E+00	2.56E-08	5.13E-08		
Ra-228	5.2955E-12	66.567	133.133	0.00E+00	3.53E-10	7.05E-10		
Ru-106	2.0413E-14	66.567	133.133	0.00E+00	1.36E-12	2.72E-12		
Se-79	1.2376E-05	66.567	133.133	0.00E+00	8.24E-04	1.65E-03		
Sn-126	2.5210E-05	66.567	133.133	0.00E+00	1.68E-03	3.36E-03		
Sr-90	6.4163E-01	66.567	133.133	0.00E+00	4.27E+01	8.54E+01		
Tc-99	3.9357E-04	66.567	133.133	0.00E+00	2.62E-02	5.24E-02		
Th-229	1.5644E-10	66.567	133.133	0.00E+00	1.04E-08	2.08E-08		
Th-230	2.7972E-08	66.567	133.133	0.00E+00	1.86E-06	3.72E-06		
Th-232	5.3036E-12	66.567	133.133	0.00E+00	3.53E-10	7.06E-10		
Tl-208	1.5136E-07	66.567	133.133	0.00E+00	1.01E-05	2.02E-05		
U-232	4.1005E-07	66.567	133.133	0.00E+00	2.73E-05	5.46E-05		
U-233	2.5856E-08	66.567	133.133	0.00E+00	1.72E-06	3.44E-06		
U-234	5.2665E-05	66.567	133.133	0.00E+00	3.51E-03	7.01E-03		
U-235	-1.4487E-06	66.567	0.000	1.29E-03	1.19E-03	1.29E-03		
U-236	7.5888E-06	66.567	133.133	0.00E+00	5.05E-04	1.01E-03		
U-238	-2.6129E-07	66.567	0.000	6.21E-03	6.19E-03	6.21E-03		
Y-90	6.4180E-01	66.567	133.133	0.00E+00	4.27E+01	8.54E+01		
Other Radionuclides					6.34E+01	1.27E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.20E+00	2.41E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	3.125	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	60.579	66.567	
Bounding:	113.812	133.133	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.10	1.10	
Bounding:	0.20	1.17	

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TORY-IIA
 SNF ID #: 230
 Fuel Units & Descr: 146 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=48.65kg ; EOL=48.65kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1962
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 65 years

Estimated
 Canister usage:
 HIC
 3.65

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.9216E-09	896.182	1,792.363	0.00E+00	1.72E-06	3.44E-06	Avg. MeV	
Am-241	1.0419E-02	896.182	1,792.363	0.00E+00	9.34E+00	1.87E+01	0.0150	6.524E+13
Am-242m	1.1154E-06	896.182	1,792.363	0.00E+00	1.00E-03	2.00E-03	0.0250	1.331E+13
Am-243	3.6944E-05	896.182	1,792.363	0.00E+00	3.31E-02	6.62E-02	0.0375	1.162E+13
C-14	2.6324E-08	896.182	1,792.363	0.00E+00	2.36E-05	4.72E-05	0.0575	1.266E+13
Cl-36	4.4435E-31	896.182	1,792.363	0.00E+00	3.98E-28	7.96E-28	0.0850	7.492E+12
Cm-243	1.9101E-06	896.182	1,792.363	0.00E+00	1.71E-03	3.42E-03	0.1250	4.890E+12
Cm-244	8.3232E-04	896.182	1,792.363	0.00E+00	7.46E-01	1.49E+00	0.2250	6.460E+12
Co-60	1.3135E-07	896.182	1,792.363	0.00E+00	1.18E-04	2.35E-04	0.3750	2.813E+12
Cs-134	2.8943E-09	896.182	1,792.363	0.00E+00	2.59E-06	5.19E-06	0.5750	4.804E+13
Cs-135	4.2564E-06	896.182	1,792.363	0.00E+00	3.81E-03	7.63E-03	0.8500	4.993E+11
Cs-137	7.2053E-01	896.182	1,792.363	0.00E+00	6.46E+02	1.29E+03	1.2500	1.989E+11
Eu-154	1.3852E-03	896.182	1,792.363	0.00E+00	1.24E+00	2.48E+00	1.7500	1.320E+10
Eu-155	2.6634E-05	896.182	1,792.363	0.00E+00	2.39E-02	4.77E-02	2.2500	1.347E+06
Fe-55	8.4265E-09	896.182	1,792.363	0.00E+00	7.55E-06	1.51E-05	2.7500	2.069E+06
H-3	3.7066E-04	896.182	1,792.363	0.00E+00	3.32E-01	6.64E-01	3.5000	2.792E+04
I-129	6.6403E-07	896.182	1,792.363	0.00E+00	5.95E-04	1.19E-03	5.0000	1.177E+04
Kr-85	5.9010E-03	896.182	1,792.363	0.00E+00	5.29E+00	1.06E+01	7.0000	1.336E+03
Np-237	3.1713E-05	896.182	1,792.363	0.00E+00	2.84E-02	5.68E-02	11.0000	1.521E+02
Pa-231	2.9878E-09	896.182	1,792.363	0.00E+00	2.68E-06	5.36E-06		
Pb-210	3.0772E-10	896.182	1,792.363	0.00E+00	2.76E-07	5.52E-07		
Pm-147	1.6883E-07	896.182	1,792.363	0.00E+00	1.51E-04	3.03E-04		
Pu-238	1.0765E-01	896.182	1,792.363	0.00E+00	9.65E+01	1.93E+02		
Pu-239	6.9441E-04	896.182	1,792.363	0.00E+00	6.22E-01	1.24E+00		
Pu-240	3.8341E-04	896.182	1,792.363	0.00E+00	3.44E-01	6.87E-01		
Pu-241	1.5419E-02	896.182	1,792.363	0.00E+00	1.38E+01	2.76E+01		
Pu-242	3.0911E-06	896.182	1,792.363	0.00E+00	2.77E-03	5.54E-03		
Ra-226	6.4642E-10	896.182	1,792.363	0.00E+00	5.79E-07	1.16E-06		
Ra-228	5.8019E-14	896.182	1,792.363	0.00E+00	5.20E-11	1.04E-10		
Ru-106	2.7278E-19	896.182	1,792.363	0.00E+00	2.44E-16	4.89E-16		
Se-79	1.2333E-05	896.182	1,792.363	0.00E+00	1.11E-02	2.21E-02		
Sn-126	1.0188E-05	896.182	1,792.363	0.00E+00	9.13E-03	1.83E-02		
Sr-90	6.5371E-01	896.182	1,792.363	0.00E+00	5.86E+02	1.17E+03		
Tc-99	3.8050E-04	896.182	1,792.363	0.00E+00	3.41E-01	6.82E-01		
Th-229	4.4113E-11	896.182	1,792.363	0.00E+00	3.95E-08	7.91E-08		
Th-230	4.1233E-08	896.182	1,792.363	0.00E+00	3.70E-05	7.39E-05		
Th-232	6.5978E-14	896.182	1,792.363	0.00E+00	5.91E-11	1.18E-10		
Ti-208	3.2382E-08	896.182	1,792.363	0.00E+00	2.90E-05	5.80E-05		
U-232	8.7728E-08	896.182	1,792.363	0.00E+00	7.86E-05	1.57E-04		
U-233	1.1367E-08	896.182	1,792.363	0.00E+00	1.02E-05	2.04E-05		
U-234	7.0717E-05	896.182	1,792.363	0.00E+00	6.34E-02	1.27E-01		
U-235	-2.8661E-06	896.182	0.000	9.80E-02	9.54E-02	9.80E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.6701E-05	896.182	1,792.363	0.00E+00	1.50E-02	2.99E-02	1.06E+01	2.13E+01
U-238	-9.4194E-09	896.182	0.000	1.12E-03	1.11E-03	1.12E-03	Total	Total
Y-90	6.5371E-01	896.182	1,792.363	0.00E+00	5.86E+02	1.17E+03		
Other Radionuclides					6.23E+02	1.25E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	BERYLLIUM	HEAVY WATER	This Template was used for the following reasons: This fuel matches on all parameters except cladding (none) and moderator (Heavy Water is conservative)
Fuel Cladding:	NONE	ALUM	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	93.17486044	40 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		896.182	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,792.363	

Checks		
	Burnup Multiplier	Estimated Burnup/Given Burnup
Nominal:	0.04	
Bounding:	0.08	
		Estimated EOL HM/Given EOL HM
		0.98

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TORY-IIIC
 SNF ID #: 231
 Fuel Units & Descr: 655 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=59.08kg ; EOL=59.08kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1964
 Estimates as of: 2030
 Template: HFBR (Heavy Water, Alum., 40 to 100%, U)
²Template Burnup(MWd): 164.6
 Template BOL Heavy Metal Mass (MT): 0.000377
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 13.10

Radionuclide	II. Estimates		Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n						Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.9216E-09	1,088.394	2,176.787	0.00E+00	2.09E-06	4.18E-06	Avg. MeV		
Am-241	1.0419E-02	1,088.394	2,176.787	0.00E+00	1.13E+01	2.27E+01	0.0150	7.923E+13	
Am-242m	1.1154E-06	1,088.394	2,176.787	0.00E+00	1.21E-03	2.43E-03	0.0250	1.617E+13	
Am-243	3.6944E-05	1,088.394	2,176.787	0.00E+00	4.02E-02	8.04E-02	0.0375	1.411E+13	
C-14	2.6324E-08	1,088.394	2,176.787	0.00E+00	2.87E-05	5.73E-05	0.0575	1.537E+13	
Cl-36	4.4435E-31	1,088.394	2,176.787	0.00E+00	4.84E-28	9.67E-28	0.0850	9.099E+12	
Cm-243	1.9101E-06	1,088.394	2,176.787	0.00E+00	2.08E-03	4.16E-03	0.1250	5.939E+12	
Cm-244	8.3232E-04	1,088.394	2,176.787	0.00E+00	9.06E-01	1.81E+00	0.2250	7.845E+12	
Co-60	1.3135E-07	1,088.394	2,176.787	0.00E+00	1.43E-04	2.86E-04	0.3750	3.417E+12	
Cs-134	2.8943E-09	1,088.394	2,176.787	0.00E+00	3.15E-06	6.30E-06	0.5750	5.835E+13	
Cs-135	4.2564E-06	1,088.394	2,176.787	0.00E+00	4.63E-03	9.27E-03	0.8500	6.064E+11	
Cs-137	7.2053E-01	1,088.394	2,176.787	0.00E+00	7.84E+02	1.57E+03	1.2500	2.416E+11	
Eu-154	1.3852E-03	1,088.394	2,176.787	0.00E+00	1.51E+00	3.02E+00	1.7500	1.804E+10	
Eu-155	2.6634E-05	1,088.394	2,176.787	0.00E+00	2.90E-02	5.80E-02	2.2500	1.636E+06	
Fe-55	8.4265E-09	1,088.394	2,176.787	0.00E+00	9.17E-06	1.83E-05	2.7500	2.513E+06	
H-3	3.7066E-04	1,088.394	2,176.787	0.00E+00	4.03E-01	8.07E-01	3.5000	3.390E+04	
I-129	6.6403E-07	1,088.394	2,176.787	0.00E+00	7.23E-04	1.45E-03	5.0000	1.429E+04	
Kr-85	5.9010E-03	1,088.394	2,176.787	0.00E+00	6.42E+00	1.28E+01	7.0000	1.623E+03	
Np-237	3.1713E-05	1,088.394	2,176.787	0.00E+00	3.45E-02	6.90E-02	11.0000	1.848E+02	
Pa-231	2.9878E-09	1,088.394	2,176.787	0.00E+00	3.25E-06	6.50E-06			
Pb-210	3.0772E-10	1,088.394	2,176.787	0.00E+00	3.35E-07	6.70E-07			
Pm-147	1.6883E-07	1,088.394	2,176.787	0.00E+00	1.84E-04	3.68E-04			
Pu-238	1.0765E-01	1,088.394	2,176.787	0.00E+00	1.17E+02	2.34E+02			
Pu-239	6.9441E-04	1,088.394	2,176.787	0.00E+00	7.56E-01	1.51E+00			
Pu-240	3.8341E-04	1,088.394	2,176.787	0.00E+00	4.17E-01	8.35E-01			
Pu-241	1.5419E-02	1,088.394	2,176.787	0.00E+00	1.68E+01	3.36E+01			
Pu-242	3.0911E-06	1,088.394	2,176.787	0.00E+00	3.36E-03	6.73E-03			
Ra-226	6.4642E-10	1,088.394	2,176.787	0.00E+00	7.04E-07	1.41E-06			
Ra-228	5.8019E-14	1,088.394	2,176.787	0.00E+00	6.31E-11	1.26E-10			
Ru-106	2.7278E-19	1,088.394	2,176.787	0.00E+00	2.97E-16	5.94E-16			
Se-79	1.2333E-05	1,088.394	2,176.787	0.00E+00	1.34E-02	2.68E-02			
Sn-126	1.0188E-05	1,088.394	2,176.787	0.00E+00	1.11E-02	2.22E-02			
Sr-90	6.5371E-01	1,088.394	2,176.787	0.00E+00	7.11E+02	1.42E+03			
Tc-99	3.8050E-04	1,088.394	2,176.787	0.00E+00	4.14E-01	8.28E-01			
Th-229	4.4113E-11	1,088.394	2,176.787	0.00E+00	4.80E-08	9.60E-08			
Th-230	4.1233E-08	1,088.394	2,176.787	0.00E+00	4.49E-05	8.98E-05			
Th-232	6.5978E-14	1,088.394	2,176.787	0.00E+00	7.18E-11	1.44E-10			
Tl-208	3.2382E-08	1,088.394	2,176.787	0.00E+00	3.52E-05	7.05E-05			
U-232	8.7728E-08	1,088.394	2,176.787	0.00E+00	9.55E-05	1.91E-04			
U-233	1.1367E-08	1,088.394	2,176.787	0.00E+00	1.24E-05	2.47E-05			
U-234	7.0717E-05	1,088.394	2,176.787	0.00E+00	7.70E-02	1.54E-01			
U-235	-2.8661E-06	1,088.394	0.000	1.19E-01	1.16E-01	1.19E-01			
U-236	1.6701E-05	1,088.394	2,176.787	0.00E+00	1.82E-02	3.64E-02			
U-238	-9.4194E-09	1,088.394	0.000	1.36E-03	1.35E-03	1.36E-03			
Y-90	6.5371E-01	1,088.394	2,176.787	0.00E+00	7.11E+02	1.42E+03			
Other Radionuclides					7.57E+02	1.51E+03			
								Thermal Power	
								Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
								1.29E+01	2.58E+01
								Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except cladding (none) and moderator (Heavy Water is conservative)
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	BERYLLIUM	HEAVY WATER	
BOL HM Constituents:	NONE	ALUM	
BOL Enrichment %:	UO2	U	
	93.14703925	40 to 100	

Burnup Summary (MWd) ²			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.
	From SFD	Estimated	
Nominal:		1,088.394	
Bounding:		2,176.787	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.04		0.98
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: TREAT DRIVER
 SNF ID #: 232
 Fuel Units & Descr: 391 - ASSEMBLY
 Heavy Metal Mass: BOL=15.64kg ; EOL=15.25kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: N-Reactor (Graphite, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 69600
 Template BOL Heavy Metal Mass (MT): 11.6
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x15"
 14.48

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	4.2184E-10	412.488	824.976	0.00E+00	1.74E-07	3.48E-07		
Am-241	9.6379E-02	412.488	824.976	0.00E+00	3.98E+01	7.95E+01	0.0150	4.008E+13
Am-242m	5.8463E-05	412.488	824.976	0.00E+00	2.41E-02	4.82E-02	0.0250	8.193E+12
Am-243	4.6279E-05	412.488	824.976	0.00E+00	1.91E-02	3.82E-02	0.0375	7.579E+12
C-14	9.2026E-05	412.488	824.976	0.00E+00	3.80E-02	7.59E-02	0.0575	8.649E+12
Ci-36	0.0000E+00	412.488	824.976	0.00E+00	0.00E+00	0.00E+00	0.0850	4.549E+12
Cm-243	0.0000E+00	412.488	824.976	0.00E+00	0.00E+00	0.00E+00	0.1250	3.021E+12
Cm-244	4.5445E-04	412.488	824.976	0.00E+00	1.87E-01	3.75E-01	0.2250	3.903E+12
Co-60	6.3707E-05	412.488	824.976	0.00E+00	2.63E-02	5.26E-02	0.3750	1.689E+12
Cs-134	1.4042E-05	412.488	824.976	0.00E+00	5.79E-03	1.16E-02	0.5750	3.643E+13
Cs-135	1.0066E-05	412.488	824.976	0.00E+00	4.15E-03	8.30E-03	0.8500	3.701E+11
Cs-137	1.1945E+00	412.488	824.976	0.00E+00	4.93E+02	9.85E+02	1.2500	2.019E+11
Eu-154	6.6451E-03	412.488	824.976	0.00E+00	2.74E+00	5.48E+00	1.7500	1.024E+10
Eu-155	2.9052E-04	412.488	824.976	0.00E+00	1.20E-01	2.40E-01	2.2500	8.269E+05
Fe-55	2.8807E-06	412.488	824.976	0.00E+00	1.19E-03	2.38E-03	2.7500	1.931E+04
H-3	2.1063E-03	412.488	824.976	0.00E+00	8.69E-01	1.74E+00	3.5000	1.707E+04
I-129	8.6006E-07	412.488	824.976	0.00E+00	3.55E-04	7.10E-04	5.0000	7.203E+03
Kr-85	2.6739E-02	412.488	824.976	0.00E+00	1.10E+01	2.21E+01	7.0000	8.163E+02
Np-237	8.5589E-06	412.488	824.976	0.00E+00	3.53E-03	7.06E-03	11.0000	9.298E+01
Pa-231	1.2500E-09	412.488	824.976	0.00E+00	5.16E-07	1.03E-06		
Pb-210	2.3017E-11	412.488	824.976	0.00E+00	9.49E-09	1.90E-08		
Pm-147	5.9856E-04	412.488	824.976	0.00E+00	2.47E-01	4.94E-01		
Pu-238	2.0029E-02	412.488	824.976	0.00E+00	8.26E+00	1.65E+01		
Pu-239	2.8636E-02	412.488	824.976	0.00E+00	1.19E+01	2.38E+01		
Pu-240	2.2802E-02	412.488	824.976	0.00E+00	9.41E+00	1.88E+01		
Pu-241	6.1020E-01	412.488	824.976	0.00E+00	2.52E+02	5.03E+02		
Pu-242	1.4526E-05	412.488	824.976	0.00E+00	5.99E-03	1.20E-02		
Ra-226	9.7701E-11	412.488	824.976	0.00E+00	4.03E-08	8.06E-08		
Ra-228	1.1068E-14	412.488	824.976	0.00E+00	4.57E-12	9.13E-12		
Ru-106	5.9224E-10	412.488	824.976	0.00E+00	2.44E-07	4.89E-07		
Se-79	1.0899E-05	412.488	824.976	0.00E+00	4.50E-03	8.99E-03		
Sn-126	0.0000E+00	412.488	824.976	0.00E+00	0.00E+00	0.00E+00		
Sr-90	8.4899E-01	412.488	824.976	0.00E+00	3.50E+02	7.00E+02		
Tc-99	3.6494E-04	412.488	824.976	0.00E+00	1.51E-01	3.01E-01		
Th-229	1.2928E-12	412.488	824.976	0.00E+00	5.33E-10	1.07E-09		
Th-230	1.6293E-08	412.488	824.976	0.00E+00	6.72E-06	1.34E-05		
Th-232	1.6451E-14	412.488	824.976	0.00E+00	6.79E-12	1.36E-11		
Ti-208	3.4382E-15	412.488	824.976	0.00E+00	1.42E-12	2.84E-12		
U-232	0.0000E+00	412.488	824.976	0.00E+00	0.00E+00	0.00E+00		
U-233	9.9425E-10	412.488	824.976	0.00E+00	4.10E-07	8.20E-07		
U-234	6.5575E-05	412.488	824.976	0.00E+00	2.70E-02	5.41E-02		
U-235	-1.2944E-06	412.488	0.000	3.13E-02	3.07E-02	3.13E-02		
U-236	1.1951E-05	412.488	824.976	0.00E+00	4.93E-03	9.86E-03		
U-238	-3.0619E-07	412.488	0.000	3.94E-04	2.68E-04	3.94E-04		
Y-90	8.4928E-01	412.488	824.976	0.00E+00	3.50E+02	7.01E+02		
Other Radionuclides					4.73E+02	9.46E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.04E+00	1.41E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary

	From SFD	Used	Basis for Parameter Differences:
Reactor Moderator:	GRAPHITE	GRAPHITE	This Template was used for the following reasons:
Fuel Cladding:	ZIRC-3	ZIRC	This fuel matches on all parameters except enrichment.
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	92.5	0 to 5	

Burnup Summary (MWd)²

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal:	30.185	412.488	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		824.976	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	4.40	13.67	1.01
Bounding:	8.79		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

 Fuel Name: TRIGA FFCR (AFRR)
 SNF ID #: 969
 Fuel Units & Descr: 3 - ELEMENT
 Heavy Metal Mass: BOL= ; EOL=26kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2019
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 10 years

 Estimated
 Canister usage:
 18"x10"
 0.04

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.3731E-09	9.201	18.402	0.00E+00	1.26E-08	2.53E-08	Avg. MeV	
Am-241	2.3865E-03	9.201	18.402	0.00E+00	2.20E-02	4.39E-02	0.0150	2.377E+12
Am-242m	1.3812E-06	9.201	18.402	0.00E+00	1.27E-05	2.54E-05	0.0250	5.036E+11
Am-243	1.4767E-07	9.201	18.402	0.00E+00	1.36E-06	2.72E-06	0.0375	4.302E+11
C-14	1.2863E-04	9.201	18.402	0.00E+00	1.18E-03	2.37E-03	0.0575	4.585E+11
Cl-36	2.8120E-06	9.201	18.402	0.00E+00	2.59E-05	5.17E-05	0.0850	2.782E+11
Cm-243	1.5895E-07	9.201	18.402	0.00E+00	1.46E-06	2.92E-06	0.1250	1.828E+11
Cm-244	1.4008E-06	9.201	18.402	0.00E+00	1.29E-05	2.58E-05	0.2250	2.372E+11
Co-60	6.6541E-01	9.201	18.402	0.00E+00	6.12E+00	1.22E+01	0.3750	1.090E+11
Cs-134	1.6887E-02	9.201	18.402	0.00E+00	1.55E-01	3.11E-01	0.5750	1.707E+12
Cs-135	3.2195E-05	9.201	18.402	0.00E+00	2.96E-04	5.92E-04	0.8500	3.048E+10
Cs-137	2.4556E+00	9.201	18.402	0.00E+00	2.26E+01	4.52E+01	1.2500	9.164E+11
Eu-154	1.0268E-02	9.201	18.402	0.00E+00	9.45E-02	1.89E-01	1.7500	5.516E+08
Eu-155	1.4570E-02	9.201	18.402	0.00E+00	1.34E-01	2.68E-01	2.2500	2.880E+07
Fe-55	2.0361E-01	9.201	18.402	0.00E+00	1.87E+00	3.75E+00	2.7500	4.768E+05
H-3	8.3940E-03	9.201	18.402	0.00E+00	7.72E-02	1.54E-01	3.5000	5.652E+04
I-129	7.3684E-07	9.201	18.402	0.00E+00	6.78E-06	1.36E-05	5.0000	9.789E+00
Kr-85	1.8286E-01	9.201	18.402	0.00E+00	1.68E+00	3.36E+00	7.0000	1.105E+00
Np-237	1.2462E-06	9.201	18.402	0.00E+00	1.15E-05	2.29E-05	11.0000	1.258E-01
Pa-231	4.9143E-09	9.201	18.402	0.00E+00	4.52E-08	9.04E-08		
Pb-210	1.7173E-14	9.201	18.402	0.00E+00	1.58E-13	3.16E-13		
Pm-147	5.6165E-01	9.201	18.402	0.00E+00	5.17E+00	1.03E+01		
Pu-238	9.9820E-04	9.201	18.402	0.00E+00	9.18E-03	1.84E-02		
Pu-239	5.5293E-03	9.201	18.402	0.00E+00	5.09E-02	1.02E-01		
Pu-240	2.1263E-03	9.201	18.402	0.00E+00	1.96E-02	3.91E-02		
Pu-241	8.0165E-02	9.201	18.402	0.00E+00	7.38E-01	1.48E+00		
Pu-242	2.3128E-07	9.201	18.402	0.00E+00	2.13E-06	4.26E-06		
Ra-226	9.9774E-14	9.201	18.402	0.00E+00	9.18E-13	1.84E-12		
Ra-228	2.1729E-10	9.201	18.402	0.00E+00	2.00E-09	4.00E-09		
Ru-106	2.9519E-03	9.201	18.402	0.00E+00	2.72E-02	5.43E-02		
Se-79	1.3017E-05	9.201	18.402	0.00E+00	1.20E-04	2.40E-04		
Sn-126	1.2167E-05	9.201	18.402	0.00E+00	1.12E-04	2.24E-04		
Sr-90	2.3128E+00	9.201	18.402	0.00E+00	2.13E+01	4.26E+01		
Tc-99	4.4241E-04	9.201	18.402	0.00E+00	4.07E-03	8.14E-03		
Th-229	1.9459E-10	9.201	18.402	0.00E+00	1.79E-09	3.58E-09		
Th-230	2.5564E-11	9.201	18.402	0.00E+00	2.35E-10	4.70E-10		
Th-232	2.5278E-10	9.201	18.402	0.00E+00	2.33E-09	4.65E-09		
Ti-208	1.6947E-08	9.201	18.402	0.00E+00	1.56E-07	3.12E-07		
U-232	4.6812E-08	9.201	18.402	0.00E+00	4.31E-07	8.61E-07		
U-233	1.2206E-07	9.201	18.402	0.00E+00	1.12E-06	2.25E-06		
U-234	1.7323E-07	9.201	18.402	0.00E+00	1.59E-06	3.19E-06		
U-235	-2.6194E-06	9.201	0.000	1.17E-04	9.25E-05	1.17E-04	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	9.201	18.402	0.00E+00	1.17E-04	2.34E-04	3.60E-01	7.21E-01
U-238	-3.6331E-08	9.201	0.000	7.25E-05	7.22E-05	7.25E-05	Total	Total
Y-90	2.3128E+00	9.201	18.402	0.00E+00	2.13E+01	4.26E+01		
Other Radionuclides					2.26E+01	4.51E+01		

Thermal Power

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons: This fuel matches on all parameters except enrichment! (unknown)
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:		10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		9.201	Nominal burnup taken from SFD and converted to MWd using BOL=270kg
Bounding:		18.402	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.00		1.00
Bounding:	2.00		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (UC-IRVINE)
 SNF ID #: 1052
 Fuel Units & Descr: 1 - ELEMENT
 Heavy Metal Mass: BOL=.18kg ; EOL=.18kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.01

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	1.786	3.573	0.00E+00	1.52E-09	3.04E-09	Avg. MeV	
Am-241	1.8331E-03	1.786	3.573	0.00E+00	3.27E-03	6.55E-03	0.0150	5.775E+11
Am-242m	1.4129E-06	1.786	3.573	0.00E+00	2.52E-06	5.05E-06	0.0250	1.271E+11
Am-243	1.4774E-07	1.786	3.573	0.00E+00	2.64E-07	5.28E-07	0.0375	1.082E+11
C-14	1.2871E-04	1.786	3.573	0.00E+00	2.30E-04	4.60E-04	0.0575	1.111E+11
Cl-36	2.8120E-06	1.786	3.573	0.00E+00	5.02E-06	1.00E-05	0.0850	6.881E+10
Cm-243	1.7940E-07	1.786	3.573	0.00E+00	3.20E-07	6.41E-07	0.1250	4.997E+10
Cm-244	1.6962E-06	1.786	3.573	0.00E+00	3.03E-06	6.06E-06	0.2250	5.837E+10
Co-60	1.2839E+00	1.786	3.573	0.00E+00	2.29E+00	4.59E+00	0.3750	2.962E+10
Cs-134	9.0541E-02	1.786	3.573	0.00E+00	1.62E-01	3.23E-01	0.5750	3.938E+11
Cs-135	3.2195E-05	1.786	3.573	0.00E+00	5.75E-05	1.15E-04	0.8500	1.690E+10
Cs-137	2.7564E+00	1.786	3.573	0.00E+00	4.92E+00	9.85E+00	1.2500	3.432E+11
Eu-154	1.5368E-02	1.786	3.573	0.00E+00	2.75E-02	5.49E-02	1.7500	2.288E+08
Eu-155	2.9293E-02	1.786	3.573	0.00E+00	5.23E-02	1.05E-01	2.2500	3.688E+08
Fe-55	7.7158E-01	1.786	3.573	0.00E+00	1.38E+00	2.76E+00	2.7500	2.926E+06
H-3	1.1111E-02	1.786	3.573	0.00E+00	1.98E-02	3.97E-02	3.5000	3.407E+05
I-129	7.3684E-07	1.786	3.573	0.00E+00	1.32E-06	2.63E-06	5.0000	1.986E+00
Kr-85	2.5263E-01	1.786	3.573	0.00E+00	4.51E-01	9.03E-01	7.0000	2.250E-01
Np-237	1.2427E-06	1.786	3.573	0.00E+00	2.22E-06	4.44E-06	11.0000	2.564E-02
Pa-231	3.8511E-09	1.786	3.573	0.00E+00	6.88E-09	1.38E-08		
Pb-210	7.3880E-15	1.786	3.573	0.00E+00	1.32E-14	2.64E-14		
Pm-147	2.1023E+00	1.786	3.573	0.00E+00	3.76E+00	7.51E+00		
Pu-238	1.0383E-03	1.786	3.573	0.00E+00	1.85E-03	3.71E-03		
Pu-239	5.5293E-03	1.786	3.573	0.00E+00	9.88E-03	1.98E-02		
Pu-240	2.1278E-03	1.786	3.573	0.00E+00	3.80E-03	7.60E-03		
Pu-241	1.0195E-01	1.786	3.573	0.00E+00	1.82E-01	3.64E-01		
Pu-242	2.3128E-07	1.786	3.573	0.00E+00	4.13E-07	8.26E-07		
Ra-226	5.2782E-14	1.786	3.573	0.00E+00	9.43E-14	1.89E-13		
Ra-228	1.9338E-10	1.786	3.573	0.00E+00	3.45E-10	6.91E-10		
Ru-106	9.1684E-02	1.786	3.573	0.00E+00	1.64E-01	3.28E-01		
Se-79	1.3018E-05	1.786	3.573	0.00E+00	2.33E-05	4.65E-05		
Sn-126	1.2167E-05	1.786	3.573	0.00E+00	2.17E-05	4.35E-05		
Sr-90	2.6045E+00	1.786	3.573	0.00E+00	4.65E+00	9.31E+00		
Tc-99	4.4241E-04	1.786	3.573	0.00E+00	7.90E-04	1.58E-03		
Th-229	1.3713E-10	1.786	3.573	0.00E+00	2.45E-10	4.90E-10		
Th-230	1.8090E-11	1.786	3.573	0.00E+00	3.23E-11	6.46E-11		
Th-232	2.5278E-10	1.786	3.573	0.00E+00	4.52E-10	9.03E-10		
Tl-208	1.6947E-08	1.786	3.573	0.00E+00	3.03E-08	6.06E-08		
U-232	4.8737E-08	1.786	3.573	0.00E+00	8.71E-08	1.74E-07		
U-233	1.2203E-07	1.786	3.573	0.00E+00	2.18E-07	4.36E-07		
U-234	1.5925E-07	1.786	3.573	0.00E+00	2.84E-07	5.69E-07		
U-235	-2.6194E-06	1.786	0.000	7.92E-05	7.45E-05	7.92E-05		
U-236	1.2693E-05	1.786	3.573	0.00E+00	2.27E-05	4.54E-05		
U-238	-3.6331E-08	1.786	0.000	4.93E-05	4.92E-05	4.93E-05		
Y-90	2.6060E+00	1.786	3.573	0.00E+00	4.66E+00	9.31E+00		
Other Radionuclides					6.44E+00	1.29E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.04E+01	2.08E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.99996708	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	1.786		
Bounding:		3.573	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.29	0.00	
Bounding:	0.57		

Estimated EOL HM/Given EOL HM: 0.99

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (UC-IRVINE) ¹Fuel decay start date: 2035
 SNF ID #: 1050 Estimates as of: 2030
 Fuel Units & Descr: 2 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=,38kg ; EOL=,38kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.02

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	3.735	7.469	0.00E+00	3.18E-09	6.36E-09	Avg. MeV	
Am-241	1.8331E-03	3.735	7.469	0.00E+00	6.85E-03	1.37E-02	0.0150	1.207E+12
Am-242m	1.4129E-06	3.735	7.469	0.00E+00	5.28E-06	1.06E-05	0.0250	2.656E+11
Am-243	1.4774E-07	3.735	7.469	0.00E+00	5.52E-07	1.10E-06	0.0375	2.262E+11
C-14	1.2871E-04	3.735	7.469	0.00E+00	4.81E-04	9.61E-04	0.0575	3.322E+11
Cl-36	2.8120E-06	3.735	7.469	0.00E+00	1.05E-05	2.10E-05	0.0850	1.438E+11
Cm-243	1.7940E-07	3.735	7.469	0.00E+00	6.70E-07	1.34E-06	0.1250	1.045E+11
Cm-244	1.6962E-06	3.735	7.469	0.00E+00	6.33E-06	1.27E-05	0.2250	1.220E+11
Co-60	1.2839E+00	3.735	7.469	0.00E+00	4.79E+00	9.59E+00	0.3750	6.192E+10
Cs-134	9.0541E-02	3.735	7.469	0.00E+00	3.38E-01	6.76E-01	0.5750	8.233E+11
Cs-135	3.2195E-05	3.735	7.469	0.00E+00	1.20E-04	2.40E-04	0.8500	3.533E+10
Cs-137	2.7564E+00	3.735	7.469	0.00E+00	1.03E+01	2.06E+01	1.2500	7.175E+11
Eu-154	1.5368E-02	3.735	7.469	0.00E+00	5.74E-02	1.15E-01	1.7500	4.784E+08
Eu-155	2.9293E-02	3.735	7.469	0.00E+00	1.09E-01	2.19E-01	2.2500	7.710E+08
Fe-55	7.7158E-01	3.735	7.469	0.00E+00	2.88E+00	5.76E+00	2.7500	6.118E+06
H-3	1.1111E-02	3.735	7.469	0.00E+00	4.15E-02	8.30E-02	3.5000	7.122E+05
I-129	7.3684E-07	3.735	7.469	0.00E+00	2.75E-06	5.50E-06	5.0000	4.152E+00
Kr-85	2.5263E-01	3.735	7.469	0.00E+00	9.43E-01	1.89E+00	7.0000	4.704E-01
Np-237	1.2427E-06	3.735	7.469	0.00E+00	4.64E-06	9.28E-06	11.0000	5.361E-02
Pa-231	3.8511E-09	3.735	7.469	0.00E+00	1.44E-08	2.88E-08		
Pb-210	7.3880E-15	3.735	7.469	0.00E+00	2.76E-14	5.52E-14		
Pm-147	2.1023E+00	3.735	7.469	0.00E+00	7.85E+00	1.57E+01		
Pu-238	1.0383E-03	3.735	7.469	0.00E+00	3.88E-03	7.76E-03		
Pu-239	5.5293E-03	3.735	7.469	0.00E+00	2.07E-02	4.13E-02		
Pu-240	2.1278E-03	3.735	7.469	0.00E+00	7.95E-03	1.59E-02		
Pu-241	1.0195E-01	3.735	7.469	0.00E+00	3.81E-01	7.62E-01		
Pu-242	2.3128E-07	3.735	7.469	0.00E+00	8.64E-07	1.73E-06		
Ra-226	5.2782E-14	3.735	7.469	0.00E+00	1.97E-13	3.94E-13		
Ra-228	1.9338E-10	3.735	7.469	0.00E+00	7.22E-10	1.44E-09		
Ru-106	9.1684E-02	3.735	7.469	0.00E+00	3.42E-01	6.85E-01		
Se-79	1.3018E-05	3.735	7.469	0.00E+00	4.86E-05	9.72E-05		
Sn-126	1.2167E-05	3.735	7.469	0.00E+00	4.54E-05	9.09E-05		
Sr-90	2.6045E+00	3.735	7.469	0.00E+00	9.73E+00	1.95E+01		
Tc-99	4.4241E-04	3.735	7.469	0.00E+00	1.65E-03	3.30E-03		
Th-229	1.3713E-10	3.735	7.469	0.00E+00	5.12E-10	1.02E-09		
Th-230	1.8090E-11	3.735	7.469	0.00E+00	6.76E-11	1.35E-10		
Th-232	2.5278E-10	3.735	7.469	0.00E+00	9.44E-10	1.89E-09		
Tl-208	1.6947E-08	3.735	7.469	0.00E+00	6.33E-08	1.27E-07		
U-232	4.8737E-08	3.735	7.469	0.00E+00	1.82E-07	3.64E-07		
U-233	1.2203E-07	3.735	7.469	0.00E+00	4.56E-07	9.11E-07		
U-234	1.5925E-07	3.735	7.469	0.00E+00	5.95E-07	1.19E-06		
U-235	-2.6194E-06	3.735	0.000	1.66E-04	1.56E-04	1.66E-04		
U-236	1.2693E-05	3.735	7.469	0.00E+00	4.74E-05	9.48E-05		
U-238	-3.6331E-08	3.735	0.000	1.03E-04	1.03E-04	1.03E-04		
Y-90	2.6060E+00	3.735	7.469	0.00E+00	9.73E+00	1.95E+01		
Other Radionuclides					1.35E+01	2.69E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.17E-01	4.35E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

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

Burnup Summary (MWd) ²		Basis for burnup used in estimate:
Nominal:	Estimated	
3.735	2.864	Nominal burnup taken directly from SFD (converted to MWd).
	7.469	Bounding burnup assumed to be twice nominal burnup.

Checks		Estimated EOL HM/Given EOL HM
Nominal:	Estimated Burnup/ Given Burnup	
0.29	0.77	1.00
Bounding:	0.57	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (HANFORD) 1 Fuel decay start date: 1989
 SNF ID #: 316 Estimates as of: 2030
 Fuel Units & Descr: 33 - ELEMENT Template: TRIGA-SS (LW/U-ZrX, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=6.34kg : EOL=6.32kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: HANFORD Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.30

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.7038E-09	30.875	61.751	0.00E+00	2.07E-07	4.14E-07	0.0150	4.310E+12
Am-241	3.9068E-03	30.875	61.751	0.00E+00	1.21E-01	2.41E-01	0.0250	8.956E+11
Am-242m	1.2325E-06	30.875	61.751	0.00E+00	3.81E-05	7.61E-05	0.0375	7.781E+11
Am-243	1.4732E-07	30.875	61.751	0.00E+00	4.55E-06	9.10E-06	0.0575	8.383E+11
C-14	1.2824E-04	30.875	61.751	0.00E+00	3.96E-03	7.92E-03	0.0850	5.044E+11
Cl-36	2.8120E-06	30.875	61.751	0.00E+00	8.68E-05	1.74E-04	0.1250	3.283E+11
Cm-243	8.6556E-08	30.875	61.751	0.00E+00	2.67E-06	5.34E-06	0.2250	4.345E+11
Cm-244	5.3835E-07	30.875	61.751	0.00E+00	1.66E-05	3.32E-05	0.3750	1.895E+11
Co-60	2.4887E-02	30.875	61.751	0.00E+00	7.68E-01	1.54E+00	0.5750	3.169E+12
Cs-134	3.8030E-06	30.875	61.751	0.00E+00	1.17E-04	2.35E-04	0.8500	3.243E+10
Cs-135	3.2195E-05	30.875	61.751	0.00E+00	9.94E-04	1.99E-03	1.2500	1.259E+11
Cs-137	1.3788E+00	30.875	61.751	0.00E+00	4.26E+01	8.51E+01	1.7500	8.420E+08
Eu-154	1.3711E-03	30.875	61.751	0.00E+00	4.23E-02	8.47E-02	2.2500	6.898E+05
Eu-155	4.4361E-04	30.875	61.751	0.00E+00	1.37E-02	2.74E-02	2.7500	3.171E+04
Fe-55	2.6075E-04	30.875	61.751	0.00E+00	8.05E-03	1.61E-02	3.5000	8.494E+01
H-3	2.0647E-03	30.875	61.751	0.00E+00	6.37E-02	1.27E-01	5.0000	3.583E+01
I-129	7.3684E-07	30.875	61.751	0.00E+00	2.28E-05	4.55E-05	7.0000	4.050E+00
Kr-85	3.6346E-02	30.875	61.751	0.00E+00	1.12E+00	2.24E+00	11.0000	4.610E-01
Np-237	1.2844E-06	30.875	61.751	0.00E+00	3.97E-05	7.93E-05		
Pa-231	1.2352E-08	30.875	61.751	0.00E+00	3.81E-07	7.63E-07		
Pb-210	3.5338E-13	30.875	61.751	0.00E+00	1.09E-11	2.18E-11		
Pm-147	7.6346E-04	30.875	61.751	0.00E+00	2.36E-02	4.71E-02		
Pu-238	8.1970E-04	30.875	61.751	0.00E+00	2.53E-02	5.06E-02		
Pu-239	5.5248E-03	30.875	61.751	0.00E+00	1.71E-01	3.41E-01		
Pu-240	2.1203E-03	30.875	61.751	0.00E+00	6.55E-02	1.31E-01		
Pu-241	2.4075E-02	30.875	61.751	0.00E+00	7.43E-01	1.49E+00		
Pu-242	2.3128E-07	30.875	61.751	0.00E+00	7.14E-06	1.43E-05		
Ra-226	9.6481E-13	30.875	61.751	0.00E+00	2.98E-11	5.96E-11		
Ra-228	2.5188E-10	30.875	61.751	0.00E+00	7.78E-09	1.56E-08		
Ru-106	1.0214E-10	30.875	61.751	0.00E+00	3.15E-09	6.31E-09		
Se-79	1.3014E-05	30.875	61.751	0.00E+00	4.02E-04	8.04E-04		
Sn-126	1.2164E-05	30.875	61.751	0.00E+00	3.76E-04	7.51E-04		
Sr-90	1.2762E+00	30.875	61.751	0.00E+00	3.94E+01	7.88E+01		
Tc-99	4.4241E-04	30.875	61.751	0.00E+00	1.37E-02	2.73E-02		
Th-229	5.9684E-10	30.875	61.751	0.00E+00	1.84E-08	3.69E-08		
Th-230	9.3880E-11	30.875	61.751	0.00E+00	2.90E-09	5.80E-09		
Th-232	2.5278E-10	30.875	61.751	0.00E+00	7.80E-09	1.56E-08		
Ti-208	1.3723E-08	30.875	61.751	0.00E+00	4.24E-07	8.47E-07		
U-232	3.6932E-08	30.875	61.751	0.00E+00	1.14E-06	2.28E-06		
U-233	1.2224E-07	30.875	61.751	0.00E+00	3.77E-06	7.55E-06		
U-234	2.5714E-07	30.875	61.751	0.00E+00	7.94E-06	1.59E-05		
U-235	-2.6194E-06	30.875	0.000	2.72E-03	2.64E-03	2.72E-03		
U-236	1.2695E-05	30.875	61.751	0.00E+00	3.92E-04	7.84E-04		
U-238	-3.6331E-08	30.875	0.000	1.71E-03	1.70E-03	1.71E-03		
Y-90	1.2765E+00	30.875	61.751	0.00E+00	3.94E+01	7.88E+01		
Other Radionuclides					4.25E+01	8.49E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.97E-01	9.93E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.89583333	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	30.875	18.901	
Bounding:		61.751	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.14	0.61	
Bounding:	0.29		

Estimated EOL HM/Given EOL HM: 1.00

¹ Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA (DEMOUNTABLE) (U OF AZ) ¹Fuel decay start date: 2035
 SNF ID #: 971 Estimates as of: 2030
 Fuel Units & Descr: 1 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=,20kg ; EOL=,18kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.01

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	8.5173E-10	13.460	26.920	0.00E+00	1.15E-08	2.29E-08		
Am-241	1.8331E-03	13.460	26.920	0.00E+00	2.47E-02	4.93E-02	0.0150	4.351E+12
Am-242m	1.4129E-06	13.460	26.920	0.00E+00	1.90E-05	3.80E-05	0.0250	9.574E+11
Am-243	1.4774E-07	13.460	26.920	0.00E+00	1.99E-06	3.98E-06	0.0375	8.153E+11
C-14	1.2871E-04	13.460	26.920	0.00E+00	1.73E-03	3.46E-03	0.0575	8.368E+11
Cf-36	2.8120E-06	13.460	26.920	0.00E+00	3.78E-05	7.57E-05	0.0850	5.184E+11
Cm-243	1.7940E-07	13.460	26.920	0.00E+00	2.41E-06	4.83E-06	0.1250	3.765E+11
Cm-244	1.6962E-06	13.460	26.920	0.00E+00	2.28E-05	4.57E-05	0.2250	4.398E+11
Co-60	1.2839E+00	13.460	26.920	0.00E+00	1.73E+01	3.46E+01	0.3750	2.232E+11
Cs-134	9.0541E-02	13.460	26.920	0.00E+00	1.22E+00	2.44E+00	0.5750	2.967E+12
Cs-135	3.2195E-05	13.460	26.920	0.00E+00	4.33E-04	8.67E-04	0.8500	1.273E+11
Cs-137	2.7564E+00	13.460	26.920	0.00E+00	3.71E+01	7.42E+01	1.2500	2.586E+12
Eu-154	1.5368E-02	13.460	26.920	0.00E+00	2.07E-01	4.14E-01	1.7500	1.724E+09
Eu-155	2.9293E-02	13.460	26.920	0.00E+00	3.94E-01	7.89E-01	2.2500	2.779E+09
Fe-55	7.7158E-01	13.460	26.920	0.00E+00	1.04E+01	2.08E+01	2.7500	2.205E+07
H-3	1.1111E-02	13.460	26.920	0.00E+00	1.50E-01	2.99E-01	3.5000	2.567E+06
I-129	7.3684E-07	13.460	26.920	0.00E+00	9.92E-06	1.98E-05	5.0000	1.423E+01
Kr-85	2.5263E-01	13.460	26.920	0.00E+00	3.40E+00	6.80E+00	7.0000	1.610E+00
Np-237	1.2427E-06	13.460	26.920	0.00E+00	1.67E-05	3.35E-05	11.0000	1.835E-01
Pa-231	3.8511E-09	13.460	26.920	0.00E+00	5.18E-08	1.04E-07		
Pb-210	7.3880E-15	13.460	26.920	0.00E+00	9.94E-14	1.99E-13		
Pm-147	2.1023E+00	13.460	26.920	0.00E+00	2.83E+01	5.66E+01		
Pu-238	1.0383E-03	13.460	26.920	0.00E+00	1.40E-02	2.80E-02		
Pu-239	5.5293E-03	13.460	26.920	0.00E+00	7.44E-02	1.49E-01		
Pu-240	2.1278E-03	13.460	26.920	0.00E+00	2.86E-02	5.73E-02		
Pu-241	1.0195E-01	13.460	26.920	0.00E+00	1.37E+00	2.74E+00		
Pu-242	2.3128E-07	13.460	26.920	0.00E+00	3.11E-06	6.23E-06		
Ra-226	5.2782E-14	13.460	26.920	0.00E+00	7.10E-13	1.42E-12		
Ra-228	1.9338E-10	13.460	26.920	0.00E+00	2.60E-09	5.21E-09		
Ru-106	9.1684E-02	13.460	26.920	0.00E+00	1.23E+00	2.47E+00		
Se-79	1.3018E-05	13.460	26.920	0.00E+00	1.75E-04	3.50E-04		
Sn-126	1.2167E-05	13.460	26.920	0.00E+00	1.64E-04	3.28E-04		
Sr-90	2.6045E+00	13.460	26.920	0.00E+00	3.51E+01	7.01E+01		
Tc-99	4.4241E-04	13.460	26.920	0.00E+00	5.95E-03	1.19E-02		
Th-229	1.3713E-10	13.460	26.920	0.00E+00	1.85E-09	3.69E-09		
Th-230	1.8090E-11	13.460	26.920	0.00E+00	2.43E-10	4.87E-10		
Th-232	2.5278E-10	13.460	26.920	0.00E+00	3.40E-09	6.80E-09		
TI-208	1.6947E-08	13.460	26.920	0.00E+00	2.28E-07	4.56E-07		
U-232	4.8737E-08	13.460	26.920	0.00E+00	6.56E-07	1.31E-06		
U-233	1.2203E-07	13.460	26.920	0.00E+00	1.64E-06	3.29E-06		
U-234	1.5925E-07	13.460	26.920	0.00E+00	2.14E-06	4.29E-06		
U-235	-2.6194E-06	13.460	0.000	8.21E-05	4.69E-05	8.21E-05		
U-236	1.2693E-05	13.460	26.920	0.00E+00	1.71E-04	3.42E-04		
U-238	-3.6331E-08	13.460	0.000	5.28E-05	5.23E-05	5.28E-05		
Y-90	2.6060E+00	13.460	26.920	0.00E+00	3.51E+01	7.02E+01		
Other Radionuclides					4.85E+01	9.71E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.83E-01	1.57E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.48717949	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	2.851	13.460	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		26.920	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	2.02	4.72	
Bounding:	4.05		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA 20/30 (GA) 1 Fuel decay start date: 2035
 SNF ID #: 995 Estimates as of: 2030
 Fuel Units & Descr: 22 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=17.00kg ; EOL=16.68kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 years

Estimated
Canister usage:
18"x10"
0.20

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	308.720	617.440	0.00E+00	2.63E-07	5.26E-07	0.0150	9.979E+13
Am-241	1.8331E-03	308.720	617.440	0.00E+00	5.66E-01	1.13E+00	0.0250	2.196E+13
Am-242m	1.4129E-06	308.720	617.440	0.00E+00	4.36E-04	8.72E-04	0.0375	1.870E+13
Am-243	1.4774E-07	308.720	617.440	0.00E+00	4.56E-05	9.12E-05	0.0575	1.919E+13
C-14	1.2871E-04	308.720	617.440	0.00E+00	3.97E-02	7.95E-02	0.0850	1.189E+13
Cl-36	2.8120E-06	308.720	617.440	0.00E+00	8.68E-04	1.74E-03	0.1250	8.635E+12
Co-243	1.7940E-07	308.720	617.440	0.00E+00	5.54E-05	1.11E-04	0.2250	1.009E+13
Co-244	1.6962E-06	308.720	617.440	0.00E+00	5.24E-04	1.05E-03	0.3750	5.119E+12
Co-60	1.2839E+00	308.720	617.440	0.00E+00	3.96E+02	7.93E+02	0.5750	6.805E+13
Cs-134	9.0541E-02	308.720	617.440	0.00E+00	2.80E+01	5.59E+01	0.8500	2.920E+12
Cs-135	3.2195E-05	308.720	617.440	0.00E+00	9.94E-03	1.99E-02	1.2500	5.932E+13
Cs-137	2.7564E+00	308.720	617.440	0.00E+00	8.51E+02	1.70E+03	1.7500	3.954E+10
Eu-154	1.5368E-02	308.720	617.440	0.00E+00	4.74E+00	9.49E+00	2.2500	6.374E+10
Eu-155	2.9293E-02	308.720	617.440	0.00E+00	9.04E+00	1.81E+01	2.7500	5.057E+08
Fe-55	7.7158E-01	308.720	617.440	0.00E+00	2.38E+02	4.76E+02	3.5000	5.887E+07
H-3	1.1111E-02	308.720	617.440	0.00E+00	3.43E+00	6.86E+00	5.0000	3.345E+02
I-129	7.3684E-07	308.720	617.440	0.00E+00	2.27E-04	4.55E-04	7.0000	3.787E+01
Kr-85	2.5263E-01	308.720	617.440	0.00E+00	7.80E+01	1.56E+02	11.0000	4.316E+00
Np-237	1.2427E-06	308.720	617.440	0.00E+00	3.84E-04	7.67E-04		
Pa-231	3.8511E-09	308.720	617.440	0.00E+00	1.19E-06	2.38E-06		
Pb-210	7.3880E-15	308.720	617.440	0.00E+00	2.28E-12	4.56E-12		
Pm-147	2.1023E+00	308.720	617.440	0.00E+00	6.49E+02	1.30E+03		
Pu-238	1.0383E-03	308.720	617.440	0.00E+00	3.21E-01	6.41E-01		
Pu-239	5.5293E-03	308.720	617.440	0.00E+00	1.71E+00	3.41E+00		
Pu-240	2.1278E-03	308.720	617.440	0.00E+00	6.57E-01	1.31E+00		
Pu-241	1.0195E-01	308.720	617.440	0.00E+00	3.15E+01	6.30E+01		
Pu-242	2.3128E-07	308.720	617.440	0.00E+00	7.14E-05	1.43E-04		
Ra-226	5.2782E-14	308.720	617.440	0.00E+00	1.63E-11	3.26E-11		
Ra-228	1.9338E-10	308.720	617.440	0.00E+00	5.97E-08	1.19E-07		
Ru-106	9.1684E-02	308.720	617.440	0.00E+00	2.83E+01	5.66E+01		
Se-79	1.3018E-05	308.720	617.440	0.00E+00	4.02E-03	8.04E-03		
Sn-126	1.2167E-05	308.720	617.440	0.00E+00	3.76E-03	7.51E-03		
Sr-90	2.6045E+00	308.720	617.440	0.00E+00	8.04E+02	1.61E+03		
Tc-99	4.4241E-04	308.720	617.440	0.00E+00	1.37E-01	2.73E-01		
Th-229	1.3713E-10	308.720	617.440	0.00E+00	4.23E-08	8.47E-08		
Th-230	1.8090E-11	308.720	617.440	0.00E+00	5.58E-09	1.12E-08		
Th-232	2.5278E-10	308.720	617.440	0.00E+00	7.80E-08	1.56E-07		
Ti-208	1.6947E-08	308.720	617.440	0.00E+00	5.23E-06	1.05E-05		
U-232	4.8737E-08	308.720	617.440	0.00E+00	1.50E-05	3.01E-05		
U-233	1.2203E-07	308.720	617.440	0.00E+00	3.77E-05	7.53E-05		
U-234	1.5925E-07	308.720	617.440	0.00E+00	4.92E-05	9.83E-05		
U-235	-2.6194E-06	308.720	0.000	6.29E-03	5.48E-03	6.29E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	308.720	617.440	0.00E+00	3.92E-03	7.84E-03	1.80E+01	3.59E+01
U-238	-3.6331E-08	308.720	0.000	4.74E-03	4.73E-03	4.74E-03	Total	Total
Y-90	2.6060E+00	308.720	617.440	0.00E+00	8.05E+02	1.61E+03		
Other Radionuclides					1.11E+03	2.23E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	17.1174446	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		308.720	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		617.440	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.53	
Bounding:	1.06	
		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: TRIGA ACPR (SLOVENIA) ¹Fuel decay start date: 1999
 SNF ID #: 932 Estimates as of: 2030
 Fuel Units & Descr: 1 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=.28kg ; EOL=.28kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.01

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	4.1459E-09	5.262	10.524	0.00E+00	2.18E-08	4.36E-08	Avg. MeV	
Am-241	3.5850E-03	5.262	10.524	0.00E+00	1.89E-02	3.77E-02	0.0150	9.341E+11
Am-242m	1.2899E-06	5.262	10.524	0.00E+00	6.79E-06	1.36E-05	0.0250	1.942E+11
Am-243	1.4747E-07	5.262	10.524	0.00E+00	7.76E-07	1.55E-06	0.0375	1.685E+11
C-14	1.2839E-04	5.262	10.524	0.00E+00	6.76E-04	1.35E-03	0.0575	1.814E+11
Cl-36	2.8120E-06	5.262	10.524	0.00E+00	1.48E-05	2.96E-05	0.0850	1.094E+11
Cm-243	1.1038E-07	5.262	10.524	0.00E+00	5.81E-07	1.16E-06	0.1250	7.135E+10
Cm-244	7.8917E-07	5.262	10.524	0.00E+00	4.15E-06	8.30E-06	0.2250	9.406E+10
Co-60	9.2647E-02	5.262	10.524	0.00E+00	4.87E-01	9.75E-01	0.3750	4.107E+10
Cs-134	1.0940E-04	5.262	10.524	0.00E+00	5.76E-04	1.15E-03	0.5750	6.810E+10
Cs-135	3.2195E-05	5.262	10.524	0.00E+00	1.69E-04	3.39E-04	0.8500	7.311E+09
Cs-137	1.7368E+00	5.262	10.524	0.00E+00	9.14E+00	1.83E+01	1.2500	7.507E+10
Eu-154	3.0677E-03	5.262	10.524	0.00E+00	1.61E-02	3.23E-02	1.7500	1.903E+08
Eu-155	1.7925E-03	5.262	10.524	0.00E+00	9.43E-03	1.89E-02	2.2500	4.013E+05
Fe-55	3.7444E-03	5.262	10.524	0.00E+00	1.97E-02	3.94E-02	2.7500	6.785E+03
H-3	3.6180E-03	5.262	10.524	0.00E+00	1.90E-02	3.81E-02	3.5000	1.444E+01
I-129	7.3684E-07	5.262	10.524	0.00E+00	3.88E-06	7.75E-06	5.0000	5.629E+00
Kr-85	6.9368E-02	5.262	10.524	0.00E+00	3.65E-01	7.30E-01	7.0000	6.356E-01
Np-237	1.2662E-06	5.262	10.524	0.00E+00	6.66E-06	1.33E-05	11.0000	7.231E-02
Pa-231	9.1654E-09	5.262	10.524	0.00E+00	4.82E-08	9.65E-08		
Pb-210	1.3728E-13	5.262	10.524	0.00E+00	7.22E-13	1.44E-12		
Pm-147	1.0702E-02	5.262	10.524	0.00E+00	5.63E-02	1.13E-01		
Pu-238	8.8692E-04	5.262	10.524	0.00E+00	4.67E-03	9.33E-03		
Pu-239	5.5263E-03	5.262	10.524	0.00E+00	2.91E-02	5.82E-02		
Pu-240	2.1233E-03	5.262	10.524	0.00E+00	1.12E-02	2.23E-02		
Pu-241	3.8962E-02	5.262	10.524	0.00E+00	2.05E-01	4.10E-01		
Pu-242	2.3128E-07	5.262	10.524	0.00E+00	1.22E-06	2.43E-06		
Ra-226	4.6752E-13	5.262	10.524	0.00E+00	2.46E-12	4.92E-12		
Ra-228	2.4827E-10	5.262	10.524	0.00E+00	1.31E-09	2.61E-09		
Ru-106	9.8526E-08	5.262	10.524	0.00E+00	5.18E-07	1.04E-06		
Se-79	1.3015E-05	5.262	10.524	0.00E+00	6.85E-05	1.37E-04		
Sn-126	1.2165E-05	5.262	10.524	0.00E+00	6.40E-05	1.28E-04		
Sr-90	1.6195E+00	5.262	10.524	0.00E+00	8.52E+00	1.70E+01		
Tc-99	4.4241E-04	5.262	10.524	0.00E+00	2.33E-03	4.66E-03		
Th-229	4.2451E-10	5.262	10.524	0.00E+00	2.23E-09	4.47E-09		
Th-230	6.1398E-11	5.262	10.524	0.00E+00	3.23E-10	6.46E-10		
Th-232	2.5278E-10	5.262	10.524	0.00E+00	1.33E-09	2.66E-09		
Ti-208	1.5098E-08	5.262	10.524	0.00E+00	7.94E-08	1.59E-07		
U-232	4.0662E-08	5.262	10.524	0.00E+00	2.14E-07	4.28E-07		
U-233	1.2217E-07	5.262	10.524	0.00E+00	6.43E-07	1.29E-06		
U-234	2.2391E-07	5.262	10.524	0.00E+00	1.18E-06	2.36E-06		
U-235	2.6194E-06	5.262	0.000	1.18E-04	1.05E-04	1.18E-04		
U-236	1.2695E-05	5.262	10.524	0.00E+00	6.68E-05	1.34E-04		
U-238	-3.6331E-08	5.262	0.000	7.42E-05	7.40E-05	7.42E-05	1.12E-01	2.23E-01
Y-90	1.6195E+00	5.262	10.524	0.00E+00	8.52E+00	1.70E+01	Total	Total
Other Radionuclides					9.05E+00	1.81E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.88316824	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		5.262	Nominal burnup assumed to be 2% of BOL heavy metal mass.
Bounding:		10.524	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.56		0.98
Bounding:	1.12		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA ACPR (JAPAN)
 SNF ID #: 480
 Fuel Units & Descr: 182 - ELEMENT
 Heavy Metal Mass: BOL=48.36kg ; EOL=48.23kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 1.64

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.6436E-09	455.865	911.730	0.00E+00	1.21E-06	2.41E-06	Avg. MeV	
Am-241	3.1429E-03	455.865	911.730	0.00E+00	1.43E+00	2.87E+00	0.0150	9.137E+13
Am-242m	1.3195E-06	455.865	911.730	0.00E+00	6.02E-04	1.20E-03	0.0250	1.902E+13
Am-243	1.4753E-07	455.865	911.730	0.00E+00	6.73E-05	1.35E-04	0.0375	1.648E+13
C-14	1.2847E-04	455.865	911.730	0.00E+00	5.86E-02	1.17E-01	0.0575	1.773E+13
Cl-36	2.8120E-06	455.865	911.730	0.00E+00	1.28E-03	2.56E-03	0.0850	1.070E+13
Cm-243	1.2465E-07	455.865	911.730	0.00E+00	5.68E-05	1.14E-04	0.1250	6.994E+12
Cm-244	9.5564E-07	455.865	911.730	0.00E+00	4.36E-04	8.71E-04	0.2250	9.188E+12
Co-60	1.7880E-01	455.865	911.730	0.00E+00	8.15E+01	1.63E+02	0.3750	4.027E+12
Cs-134	5.8692E-04	455.865	911.730	0.00E+00	2.68E-01	5.35E-01	0.5750	6.623E+13
Cs-135	3.2195E-05	455.865	911.730	0.00E+00	1.47E-02	2.94E-02	0.8500	7.465E+11
Cs-137	1.9489E+00	455.865	911.730	0.00E+00	8.88E+02	1.78E+03	1.2500	1.237E+13
Eu-154	4.5895E-03	455.865	911.730	0.00E+00	2.09E+00	4.18E+00	1.7500	1.919E+10
Eu-155	3.6045E-03	455.865	911.730	0.00E+00	1.64E+00	3.29E+00	2.2500	6.606E+07
Fe-55	1.4185E-02	455.865	911.730	0.00E+00	6.47E+00	1.29E+01	2.7500	7.280E+05
H-3	4.7895E-03	455.865	911.730	0.00E+00	2.18E+00	4.37E+00	3.5000	4.096E+03
I-129	7.3684E-07	455.865	911.730	0.00E+00	3.36E-04	6.72E-04	5.0000	5.037E+02
Kr-85	9.5820E-02	455.865	911.730	0.00E+00	4.37E+01	8.74E+01	7.0000	5.695E+01
Np-237	1.2552E-06	455.865	911.730	0.00E+00	5.72E-04	1.14E-03	11.0000	6.483E+00
Pa-231	7.0406E-09	455.865	911.730	0.00E+00	3.21E-06	6.42E-06		
Pb-210	5.8000E-14	455.865	911.730	0.00E+00	2.64E-11	5.29E-11		
Pm-147	4.0075E-02	455.865	911.730	0.00E+00	1.83E+01	3.65E+01		
Pu-238	9.2256E-04	455.865	911.730	0.00E+00	4.21E-01	8.41E-01		
Pu-239	5.5278E-03	455.865	911.730	0.00E+00	2.52E+00	5.04E+00		
Pu-240	2.1248E-03	455.865	911.730	0.00E+00	9.69E-01	1.94E+00		
Pu-241	4.9549E-02	455.865	911.730	0.00E+00	2.26E+01	4.52E+01		
Pu-242	2.3128E-07	455.865	911.730	0.00E+00	1.05E-04	2.11E-04		
Ra-226	2.4526E-13	455.865	911.730	0.00E+00	1.12E-10	2.24E-10		
Ra-228	2.4015E-10	455.865	911.730	0.00E+00	1.09E-07	2.19E-07		
Ru-106	3.0602E-06	455.865	911.730	0.00E+00	1.40E-03	2.79E-03		
Se-79	1.3015E-05	455.865	911.730	0.00E+00	5.93E-03	1.19E-02		
Sn-126	1.2165E-05	455.865	911.730	0.00E+00	5.55E-03	1.11E-02		
Sr-90	1.8226E+00	455.865	911.730	0.00E+00	8.31E+02	1.66E+03		
Tc-99	4.4241E-04	455.865	911.730	0.00E+00	2.02E-01	4.03E-01		
Th-229	3.0962E-10	455.865	911.730	0.00E+00	1.41E-07	2.82E-07		
Th-230	4.2346E-11	455.865	911.730	0.00E+00	1.93E-08	3.86E-08		
Th-232	2.5278E-10	455.865	911.730	0.00E+00	1.15E-07	2.30E-07		
Th-208	1.5820E-08	455.865	911.730	0.00E+00	7.21E-06	1.44E-05		
U-232	4.2647E-08	455.865	911.730	0.00E+00	1.94E-05	3.89E-05		
U-233	1.2211E-07	455.865	911.730	0.00E+00	5.57E-05	1.11E-04		
U-234	1.9955E-07	455.865	911.730	0.00E+00	9.10E-05	1.82E-04		
U-235	-2.6194E-06	455.865	0.000	2.08E-02	1.97E-02	2.08E-02		
U-236	1.2693E-05	455.865	911.730	0.00E+00	5.79E-03	1.16E-02		
U-238	-3.6331E-08	455.865	0.000	1.30E-02	1.30E-02	1.30E-02		
Y-90	1.8241E+00	455.865	911.730	0.00E+00	8.32E+02	1.66E+03		
Other Radionuclides					8.78E+02	1.76E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.14E+01	2.28E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.95031243	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nomina:	455.865	121.617	
Bounding:		911.730	

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

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nomina:	0.28	0.27	0.99
Bounding:	0.55		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA ACPR (ROMANIA) ¹Fuel decay start date: 1999
SNF ID #: 1077 Estimates as of: 2030
Fuel Units & Descr: 75 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
Heavy Metal Mass: BOL=14.70kg ; EOL=14.45kg ²Template Burnup(MWd): 6.65
ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.68

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4.1459E-09	243.425	486.850	0.00E+00	1.01E-06	2.02E-06	Avg. MeV	
Am-241	3.5850E-03	243.425	486.850	0.00E+00	8.73E-01	1.75E+00	0.0150	4.321E+13
Am-242m	1.2899E-06	243.425	486.850	0.00E+00	3.14E-04	6.28E-04	0.0250	8.984E+12
Am-243	1.4747E-07	243.425	486.850	0.00E+00	3.59E-05	7.18E-05	0.0375	7.795E+12
C-14	1.2839E-04	243.425	486.850	0.00E+00	3.13E-02	6.25E-02	0.0575	8.394E+12
Cl-36	2.8120E-06	243.425	486.850	0.00E+00	6.85E-04	1.37E-03	0.0850	5.060E+12
Cm-243	1.1038E-07	243.425	486.850	0.00E+00	2.69E-05	5.37E-05	0.1250	3.301E+12
Cm-244	7.8917E-07	243.425	486.850	0.00E+00	1.92E-04	3.84E-04	0.2250	4.351E+12
Co-60	9.2647E-02	243.425	486.850	0.00E+00	2.26E+01	4.51E+01	0.3750	1.900E+12
Cs-134	1.0940E-04	243.425	486.850	0.00E+00	2.66E-02	5.33E-02	0.5750	3.150E+13
Cs-135	3.2195E-05	243.425	486.850	0.00E+00	7.84E-03	1.57E-02	0.8500	3.382E+11
Cs-137	1.7368E+00	243.425	486.850	0.00E+00	4.23E+02	8.46E+02	1.2500	3.473E+12
Eu-154	3.0677E-03	243.425	486.850	0.00E+00	7.47E-01	1.49E+00	1.7500	8.806E+09
Eu-155	1.7925E-03	243.425	486.850	0.00E+00	4.36E-01	8.73E-01	2.2500	1.856E+07
Fe-55	3.7444E-03	243.425	486.850	0.00E+00	9.11E-01	1.82E+00	2.7500	3.139E+05
H-3	3.6180E-03	243.425	486.850	0.00E+00	8.81E-01	1.76E+00	3.5000	6.708E+02
I-129	7.3684E-07	243.425	486.850	0.00E+00	1.79E-04	3.59E-04	5.0000	2.616E+02
Kr-85	6.9368E-02	243.425	486.850	0.00E+00	1.69E+01	3.38E+01	7.0000	2.955E+01
Np-237	1.2662E-06	243.425	486.850	0.00E+00	3.08E-04	6.16E-04	11.0000	3.361E+00
Pa-231	9.1654E-09	243.425	486.850	0.00E+00	2.23E-06	4.46E-06		
Pb-210	1.3728E-13	243.425	486.850	0.00E+00	3.34E-11	6.68E-11		
Pm-147	1.0702E-02	243.425	486.850	0.00E+00	2.61E+00	5.21E+00		
Pu-238	8.8692E-04	243.425	486.850	0.00E+00	2.16E-01	4.32E-01		
Pu-239	5.5263E-03	243.425	486.850	0.00E+00	1.35E+00	2.69E+00		
Pu-240	2.1233E-03	243.425	486.850	0.00E+00	5.17E-01	1.03E+00		
Pu-241	3.8962E-02	243.425	486.850	0.00E+00	9.48E+00	1.90E+01		
Pu-242	2.3128E-07	243.425	486.850	0.00E+00	5.63E-05	1.13E-04		
Ra-226	4.6752E-13	243.425	486.850	0.00E+00	1.14E-10	2.28E-10		
Ra-228	2.4827E-10	243.425	486.850	0.00E+00	6.04E-08	1.21E-07		
Ru-106	9.8526E-08	243.425	486.850	0.00E+00	2.40E-05	4.80E-05		
Se-79	1.3015E-05	243.425	486.850	0.00E+00	3.17E-03	6.34E-03		
Sn-126	1.2165E-05	243.425	486.850	0.00E+00	2.96E-03	5.92E-03		
Sr-90	1.6195E+00	243.425	486.850	0.00E+00	3.94E+02	7.88E+02		
Tc-99	4.4241E-04	243.425	486.850	0.00E+00	1.08E-01	2.15E-01		
Th-229	4.2451E-10	243.425	486.850	0.00E+00	1.03E-07	2.07E-07		
Th-230	6.1398E-11	243.425	486.850	0.00E+00	1.49E-08	2.99E-08		
Th-232	2.5278E-10	243.425	486.850	0.00E+00	6.15E-08	1.23E-07		
Tl-208	1.5098E-08	243.425	486.850	0.00E+00	3.68E-06	7.35E-06		
U-232	4.0662E-08	243.425	486.850	0.00E+00	9.90E-06	1.98E-05		
U-233	1.2217E-07	243.425	486.850	0.00E+00	2.97E-05	5.95E-05		
U-234	2.2391E-07	243.425	486.850	0.00E+00	5.45E-05	1.09E-04		
U-235	-2.6194E-06	243.425	0.000	6.32E-03	5.68E-03	6.32E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2695E-05	243.425	486.850	0.00E+00	3.09E-03	6.18E-03	5.17E+00	1.03E+01
U-238	-3.6331E-08	243.425	0.000	3.96E-03	3.95E-03	3.96E-03	Total	Total
Y-90	1.6195E+00	243.425	486.850	0.00E+00	3.94E+02	7.88E+02		
Other Radionuclides					4.19E+02	8.38E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		Basis for Parameter Differences:	
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.89795918	10 to 20	

Burnup Summary (MWd) ²		Basis for burnup used in estimate:	
	From SFD	Estimated	
Nominal:		243.425	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		486.850	Bounding burnup assumed to be twice nominal burnup.

Checks		Estimated EOL HM/Given EOL HM	
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.49		1.00
Bounding:	0.97		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA ACPR PENN. STATE UNIV. ¹Fuel decay start date: 2035
 SNF ID #: 1002 Estimates as of: 2030
 Fuel Units & Descr: 46 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=12.78kg ; EOL=12.01kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.41

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	737.721	1,475.441	0.00E+00	6.28E-07	1.26E-06	Avg. MeV	
Am-241	1.8331E-03	737.721	1,475.441	0.00E+00	1.35E+00	2.70E+00	0.0150	2.385E+14
Am-242m	1.4129E-06	737.721	1,475.441	0.00E+00	1.04E-03	2.08E-03	0.0250	5.247E+13
Am-243	1.4774E-07	737.721	1,475.441	0.00E+00	1.09E-04	2.18E-04	0.0375	4.469E+13
C-14	1.2871E-04	737.721	1,475.441	0.00E+00	9.49E-02	1.90E-01	0.0575	4.587E+13
Cl-36	2.8120E-06	737.721	1,475.441	0.00E+00	2.07E-03	4.15E-03	0.0850	2.841E+13
Cm-243	1.7940E-07	737.721	1,475.441	0.00E+00	1.32E-04	2.65E-04	0.1250	2.063E+13
Cm-244	1.6962E-06	737.721	1,475.441	0.00E+00	1.25E-03	2.50E-03	0.2250	2.410E+13
Co-60	1.2839E+00	737.721	1,475.441	0.00E+00	9.47E+02	1.89E+03	0.3750	1.223E+13
Cs-134	9.0541E-02	737.721	1,475.441	0.00E+00	6.68E+01	1.34E+02	0.5750	1.626E+14
Cs-135	3.2195E-05	737.721	1,475.441	0.00E+00	2.38E-02	4.75E-02	0.8500	6.979E+12
Cs-137	2.7564E+00	737.721	1,475.441	0.00E+00	2.03E+03	4.07E+03	1.2500	1.417E+14
Eu-154	1.5368E-02	737.721	1,475.441	0.00E+00	1.13E+01	2.27E+01	1.7500	9.449E+10
Eu-155	2.9293E-02	737.721	1,475.441	0.00E+00	2.16E+01	4.32E+01	2.2500	1.523E+11
Fe-55	7.7158E-01	737.721	1,475.441	0.00E+00	5.69E+02	1.14E+03	2.7500	1.208E+09
H-3	1.1111E-02	737.721	1,475.441	0.00E+00	8.20E+00	1.64E+01	3.5000	1.407E+08
I-129	7.3684E-07	737.721	1,475.441	0.00E+00	5.44E-04	1.09E-03	5.0000	7.811E+02
Kr-85	2.5263E-01	737.721	1,475.441	0.00E+00	1.86E+02	3.73E+02	7.0000	8.841E+01
Np-237	1.2427E-06	737.721	1,475.441	0.00E+00	9.17E-04	1.83E-03	11.0000	1.007E+01
Pa-231	3.8511E-09	737.721	1,475.441	0.00E+00	2.84E-06	5.68E-06		
Pb-210	7.3880E-15	737.721	1,475.441	0.00E+00	5.45E-12	1.09E-11		
Pm-147	2.1023E+00	737.721	1,475.441	0.00E+00	1.55E+03	3.10E+03		
Pu-238	1.0383E-03	737.721	1,475.441	0.00E+00	7.66E-01	1.53E+00		
Pu-239	5.5293E-03	737.721	1,475.441	0.00E+00	4.08E+00	8.16E+00		
Pu-240	2.1278E-03	737.721	1,475.441	0.00E+00	1.57E+00	3.14E+00		
Pu-241	1.0195E-01	737.721	1,475.441	0.00E+00	7.52E+01	1.50E+02		
Pu-242	2.3128E-07	737.721	1,475.441	0.00E+00	1.71E-04	3.41E-04		
Ra-226	5.2782E-14	737.721	1,475.441	0.00E+00	3.89E-11	7.79E-11		
Ra-228	1.9338E-10	737.721	1,475.441	0.00E+00	1.43E-07	2.85E-07		
Ru-106	9.1684E-02	737.721	1,475.441	0.00E+00	6.76E+01	1.35E+02		
Se-79	1.3018E-05	737.721	1,475.441	0.00E+00	9.60E-03	1.92E-02		
Sn-126	1.2167E-05	737.721	1,475.441	0.00E+00	8.98E-03	1.80E-02		
Sr-90	2.6045E+00	737.721	1,475.441	0.00E+00	1.92E+03	3.84E+03		
Tc-99	4.4241E-04	737.721	1,475.441	0.00E+00	3.26E-01	6.53E-01		
Th-229	1.3713E-10	737.721	1,475.441	0.00E+00	1.01E-07	2.02E-07		
Th-230	1.8090E-11	737.721	1,475.441	0.00E+00	1.33E-08	2.67E-08		
Th-232	2.5278E-10	737.721	1,475.441	0.00E+00	1.86E-07	3.73E-07		
Tl-208	1.6947E-08	737.721	1,475.441	0.00E+00	1.25E-05	2.50E-05		
U-232	4.8737E-08	737.721	1,475.441	0.00E+00	3.60E-05	7.19E-05		
U-233	1.2203E-07	737.721	1,475.441	0.00E+00	9.00E-05	1.80E-04		
U-234	1.5925E-07	737.721	1,475.441	0.00E+00	1.17E-04	2.35E-04		
U-235	-2.6194E-06	737.721	0.000	5.47E-03	3.54E-03	5.47E-03		
U-236	1.2693E-05	737.721	1,475.441	0.00E+00	9.36E-03	1.87E-02		
U-238	-3.6331E-08	737.721	0.000	3.44E-03	3.42E-03	3.44E-03		
Y-90	2.6060E+00	737.721	1,475.441	0.00E+00	1.92E+03	3.85E+03		
Other Radionuclides					2.66E+03	5.32E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.29E+01	8.59E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.79999842	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	240.931	737.721	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,475.441	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	1.69	3.06	
Bounding:	3.39		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR
 SNF ID #: 448
 Fuel Units & Descr: 4 - ELEMENT
 Heavy Metal Mass: BOL=.63kg ; EOL=.63kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.05

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	15.350	30.700	0.00E+00	1.31E-08	2.61E-08	0.0150	4.962E+12
Am-241	1.8331E-03	15.350	30.700	0.00E+00	2.81E-02	5.63E-02	0.0250	1.092E+12
Am-242m	1.4129E-06	15.350	30.700	0.00E+00	2.17E-05	4.34E-05	0.0375	9.298E+11
Am-243	1.4774E-07	15.350	30.700	0.00E+00	2.27E-06	4.54E-06	0.0575	9.543E+11
C-14	1.2871E-04	15.350	30.700	0.00E+00	1.98E-03	3.96E-03	0.0850	5.912E+11
Cl-36	2.8120E-06	15.350	30.700	0.00E+00	4.32E-05	8.63E-05	0.1250	4.293E+11
Cm-243	1.7940E-07	15.350	30.700	0.00E+00	2.75E-06	5.51E-06	0.2250	5.016E+11
Cm-244	1.6962E-06	15.350	30.700	0.00E+00	2.60E-05	5.21E-05	0.3750	2.545E+11
Co-60	1.2839E+00	15.350	30.700	0.00E+00	1.97E+01	3.94E+01	0.5750	3.384E+12
Cs-134	9.0541E-02	15.350	30.700	0.00E+00	1.39E+00	2.78E+00	0.8500	1.452E+11
Cs-135	3.2195E-05	15.350	30.700	0.00E+00	4.94E-04	9.88E-04	1.2500	2.949E+12
Cs-137	2.7564E+00	15.350	30.700	0.00E+00	4.23E+01	8.46E+01	1.7500	1.966E+09
Eu-154	1.5368E-02	15.350	30.700	0.00E+00	2.36E-01	4.72E-01	2.2500	3.169E+09
Eu-155	2.9293E-02	15.350	30.700	0.00E+00	4.50E-01	8.99E-01	2.7500	2.515E+07
Fe-55	7.7158E-01	15.350	30.700	0.00E+00	1.18E+01	2.37E+01	3.5000	2.927E+06
H-3	1.1111E-02	15.350	30.700	0.00E+00	1.71E-01	3.41E-01	5.0000	1.648E+01
I-129	7.3684E-07	15.350	30.700	0.00E+00	1.13E-05	2.26E-05	7.0000	1.866E+00
Kr-85	2.5263E-01	15.350	30.700	0.00E+00	3.88E+00	7.76E+00	11.0000	2.126E-01
Np-237	1.2427E-06	15.350	30.700	0.00E+00	1.91E-05	3.82E-05		
Pa-231	3.8511E-09	15.350	30.700	0.00E+00	5.91E-08	1.18E-07		
Pb-210	7.3880E-15	15.350	30.700	0.00E+00	1.13E-13	2.27E-13		
Pm-147	2.1023E+00	15.350	30.700	0.00E+00	3.23E+01	6.45E+01		
Pu-238	1.0383E-03	15.350	30.700	0.00E+00	1.59E-02	3.19E-02		
Pu-239	5.5293E-03	15.350	30.700	0.00E+00	8.49E-02	1.70E-01		
Pu-240	2.1278E-03	15.350	30.700	0.00E+00	3.27E-02	6.53E-02		
Pu-241	1.0195E-01	15.350	30.700	0.00E+00	1.57E+00	3.13E+00		
Pu-242	2.3128E-07	15.350	30.700	0.00E+00	3.55E-06	7.10E-06		
Ra-226	5.2782E-14	15.350	30.700	0.00E+00	8.10E-13	1.62E-12		
Ra-228	1.9338E-10	15.350	30.700	0.00E+00	2.97E-09	5.94E-09		
Ru-106	9.1684E-02	15.350	30.700	0.00E+00	1.41E+00	2.81E+00		
Se-79	1.3018E-05	15.350	30.700	0.00E+00	2.00E-04	4.00E-04		
Sn-126	1.2167E-05	15.350	30.700	0.00E+00	1.87E-04	3.74E-04		
Sr-90	2.6045E+00	15.350	30.700	0.00E+00	4.00E+01	8.00E+01		
Tc-99	4.4241E-04	15.350	30.700	0.00E+00	6.79E-03	1.36E-02		
Th-229	1.3713E-10	15.350	30.700	0.00E+00	2.10E-09	4.21E-09		
Th-230	1.8090E-11	15.350	30.700	0.00E+00	2.78E-10	5.55E-10		
Th-232	2.5278E-10	15.350	30.700	0.00E+00	3.88E-09	7.76E-09		
Ti-208	1.6947E-08	15.350	30.700	0.00E+00	2.60E-07	5.20E-07		
U-232	4.8737E-08	15.350	30.700	0.00E+00	7.48E-07	1.50E-06		
U-233	1.2203E-07	15.350	30.700	0.00E+00	1.87E-06	3.75E-06		
U-234	1.5925E-07	15.350	30.700	0.00E+00	2.44E-06	4.89E-06		
U-235	-2.6194E-06	15.350	0.000	2.71E-04	2.31E-04	2.71E-04		
U-236	1.2693E-05	15.350	30.700	0.00E+00	1.95E-04	3.90E-04		
U-238	-3.6331E-08	15.350	0.000	1.70E-04	1.69E-04	1.70E-04		
Y-90	2.6060E+00	15.350	30.700	0.00E+00	4.00E+01	8.00E+01		
Other Radionuclides					5.53E+01	1.11E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.93E-01	1.79E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.93650794	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	15.350	2.673	
Bounding:		30.700	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.71	0.17	
Bounding:	1.43		

Estimated EOL HM/Given EOL HM: 0.98

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (DORF) 1 Fuel decay start date: 1989
 SNF ID #: 315 Estimates as of: 2030
 Fuel Units & Descr: 2 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=38kg ; EOL=38kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: HANFORD Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 35 years

Estimated
Canister usage:
18"x10"
0.03

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.7038E-09	3.742	7.485	0.00E+00	2.51E-08	5.02E-08	0.0150	5.225E+11
Am-241	3.9068E-03	3.742	7.485	0.00E+00	1.46E-02	2.92E-02	0.0250	1.086E+11
Am-242m	1.2325E-06	3.742	7.485	0.00E+00	4.61E-06	9.23E-06	0.0375	9.431E+10
Am-243	1.4732E-07	3.742	7.485	0.00E+00	5.51E-07	1.10E-06	0.0575	1.016E+11
C-14	1.2824E-04	3.742	7.485	0.00E+00	4.80E-04	9.60E-04	0.0850	6.114E+10
Ci-36	2.8120E-06	3.742	7.485	0.00E+00	1.05E-05	2.10E-05	0.1250	3.979E+10
Cm-243	8.6556E-08	3.742	7.485	0.00E+00	3.24E-07	6.48E-07	0.2250	5.267E+10
Cm-244	5.3835E-07	3.742	7.485	0.00E+00	2.01E-06	4.03E-06	0.3750	2.297E+10
Co-60	2.4887E-02	3.742	7.485	0.00E+00	9.31E-02	1.86E-01	0.5750	3.842E+11
Cs-134	3.8030E-06	3.742	7.485	0.00E+00	1.42E-05	2.85E-05	0.8500	3.931E+09
Cs-135	3.2195E-05	3.742	7.485	0.00E+00	1.20E-04	2.41E-04	1.2500	1.526E+10
Cs-137	1.3788E+00	3.742	7.485	0.00E+00	5.16E+00	1.03E+01	1.7500	1.021E+08
Eu-154	1.3711E-03	3.742	7.485	0.00E+00	5.13E-03	1.03E-02	2.2500	8.362E+04
Eu-155	4.4361E-04	3.742	7.485	0.00E+00	1.66E-03	3.32E-03	2.7500	3.844E+03
Fe-55	2.6075E-04	3.742	7.485	0.00E+00	9.76E-04	1.95E-03	3.5000	9.740E+00
H-3	2.0647E-03	3.742	7.485	0.00E+00	7.73E-03	1.55E-02	5.0000	4.104E+00
I-129	7.3684E-07	3.742	7.485	0.00E+00	2.76E-06	5.52E-06	7.0000	4.635E-01
Kr-85	3.6346E-02	3.742	7.485	0.00E+00	1.36E-01	2.72E-01	11.0000	5.272E-02
Np-237	1.2844E-06	3.742	7.485	0.00E+00	4.81E-06	9.61E-06		
Pa-231	1.2352E-08	3.742	7.485	0.00E+00	4.62E-08	9.25E-08		
Pb-210	3.5338E-13	3.742	7.485	0.00E+00	1.32E-12	2.65E-12		
Pm-147	7.6346E-04	3.742	7.485	0.00E+00	2.86E-03	5.71E-03		
Pu-238	8.1970E-04	3.742	7.485	0.00E+00	3.07E-03	6.14E-03		
Pu-239	5.5248E-03	3.742	7.485	0.00E+00	2.07E-02	4.14E-02		
Pu-240	2.1203E-03	3.742	7.485	0.00E+00	7.94E-03	1.59E-02		
Pu-241	2.4075E-02	3.742	7.485	0.00E+00	9.01E-02	1.80E-01		
Pu-242	2.3128E-07	3.742	7.485	0.00E+00	8.66E-07	1.73E-06		
Ra-226	9.6481E-13	3.742	7.485	0.00E+00	3.61E-12	7.22E-12		
Ra-228	2.5188E-10	3.742	7.485	0.00E+00	9.43E-10	1.89E-09		
Ru-106	1.0214E-10	3.742	7.485	0.00E+00	3.82E-10	7.64E-10		
Se-79	1.3014E-05	3.742	7.485	0.00E+00	4.87E-05	9.74E-05		
Sn-126	1.2164E-05	3.742	7.485	0.00E+00	4.55E-05	9.10E-05		
Sr-90	1.2762E+00	3.742	7.485	0.00E+00	4.78E+00	9.55E+00		
Tc-99	4.4241E-04	3.742	7.485	0.00E+00	1.66E-03	3.31E-03		
Th-229	5.9684E-10	3.742	7.485	0.00E+00	2.23E-09	4.47E-09		
Th-230	9.3880E-11	3.742	7.485	0.00E+00	3.51E-10	7.03E-10		
Th-232	2.5278E-10	3.742	7.485	0.00E+00	9.46E-10	1.89E-09		
Ti-208	1.3723E-08	3.742	7.485	0.00E+00	5.14E-08	1.03E-07		
U-232	3.6932E-08	3.742	7.485	0.00E+00	1.38E-07	2.76E-07		
U-233	1.2224E-07	3.742	7.485	0.00E+00	4.57E-07	9.15E-07		
U-234	2.5714E-07	3.742	7.485	0.00E+00	9.62E-07	1.92E-06		
U-235	-2.6194E-06	3.742	0.000	1.64E-04	1.54E-04	1.64E-04		
U-236	1.2695E-05	3.742	7.485	0.00E+00	4.75E-05	9.50E-05		
U-238	-3.6331E-08	3.742	0.000	1.04E-04	1.03E-04	1.04E-04		
Y-90	1.2765E+00	3.742	7.485	0.00E+00	4.78E+00	9.55E+00		
Other Radionuclides					5.15E+00	1.03E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.02E-02	1.20E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx	U	
BOL Enrichment %:	19.7916667	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	3.742	1.146	
Bounding:		7.485	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.29	0.31	
Bounding:	0.57		

0.99

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (ENGLAND)
 SNF ID #: 987
 Fuel Units & Descr: 4 - ELEMENT
 Heavy Metal Mass: BOL=64kg ; EOL=.62kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.04

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.6436E-09	18.747	37.495	0.00E+00	4.96E-08	9.91E-08	Avg. MeV	
Am-241	3.1429E-03	18.747	37.495	0.00E+00	5.89E-02	1.18E-01	0.0150	3.757E+12
Am-242m	1.3195E-06	18.747	37.495	0.00E+00	2.47E-05	4.95E-05	0.0250	7.822E+11
Am-243	1.4753E-07	18.747	37.495	0.00E+00	2.77E-06	5.53E-06	0.0375	6.776E+11
C-14	1.2847E-04	18.747	37.495	0.00E+00	2.41E-03	4.82E-03	0.0575	7.290E+11
Cl-36	2.8120E-06	18.747	37.495	0.00E+00	5.27E-05	1.05E-04	0.0850	4.401E+11
Cm-243	1.2465E-07	18.747	37.495	0.00E+00	2.34E-06	4.67E-06	0.1250	2.876E+11
Cm-244	9.5564E-07	18.747	37.495	0.00E+00	1.79E-05	3.58E-05	0.2250	3.779E+11
Co-60	1.7880E-01	18.747	37.495	0.00E+00	3.35E+00	6.70E+00	0.3750	1.656E+11
Cs-134	5.8692E-04	18.747	37.495	0.00E+00	1.10E-02	2.20E-02	0.5750	2.724E+12
Cs-135	3.2195E-05	18.747	37.495	0.00E+00	6.04E-04	1.21E-03	0.8500	3.070E+10
Cs-137	1.9489E+00	18.747	37.495	0.00E+00	3.65E+01	7.31E+01	1.2500	5.088E+11
Eu-154	4.5895E-03	18.747	37.495	0.00E+00	8.60E-02	1.72E-01	1.7500	7.890E+08
Eu-155	3.6045E-03	18.747	37.495	0.00E+00	6.76E-02	1.35E-01	2.2500	2.717E+06
Fe-55	1.4185E-02	18.747	37.495	0.00E+00	2.66E-01	5.32E-01	2.7500	2.994E+04
H-3	4.7895E-03	18.747	37.495	0.00E+00	8.98E-02	1.80E-01	3.5000	1.665E+02
I-129	7.3684E-07	18.747	37.495	0.00E+00	1.38E-05	2.76E-05	5.0000	1.987E+01
Kr-85	9.5820E-02	18.747	37.495	0.00E+00	1.80E+00	3.59E+00	7.0000	2.245E+00
Np-237	1.2552E-06	18.747	37.495	0.00E+00	2.35E-05	4.71E-05	11.0000	2.555E-01
Pa-231	7.0406E-09	18.747	37.495	0.00E+00	1.32E-07	2.64E-07		
Pb-210	5.8000E-14	18.747	37.495	0.00E+00	1.09E-12	2.17E-12		
Pm-147	4.0075E-02	18.747	37.495	0.00E+00	7.51E-01	1.50E+00		
Pu-238	9.2256E-04	18.747	37.495	0.00E+00	1.73E-02	3.46E-02		
Pu-239	5.5278E-03	18.747	37.495	0.00E+00	1.04E-01	2.07E-01		
Pu-240	2.1248E-03	18.747	37.495	0.00E+00	3.98E-02	7.97E-02		
Pu-241	4.9549E-02	18.747	37.495	0.00E+00	9.29E-01	1.86E+00		
Pu-242	2.3128E-07	18.747	37.495	0.00E+00	4.34E-06	8.67E-06		
Ra-226	2.4526E-13	18.747	37.495	0.00E+00	4.60E-12	9.20E-12		
Ra-228	2.4015E-10	18.747	37.495	0.00E+00	4.50E-09	9.00E-09		
Ru-106	3.0602E-06	18.747	37.495	0.00E+00	5.74E-05	1.15E-04		
Se-79	1.3015E-05	18.747	37.495	0.00E+00	2.44E-04	4.88E-04		
Sn-126	1.2165E-05	18.747	37.495	0.00E+00	2.28E-04	4.56E-04		
Sr-90	1.8226E+00	18.747	37.495	0.00E+00	3.42E+01	6.83E+01		
Tc-99	4.4241E-04	18.747	37.495	0.00E+00	8.29E-03	1.66E-02		
Th-229	3.0962E-10	18.747	37.495	0.00E+00	5.80E-09	1.16E-08		
Th-230	4.2346E-11	18.747	37.495	0.00E+00	7.94E-10	1.59E-09		
Th-232	2.5278E-10	18.747	37.495	0.00E+00	4.74E-09	9.48E-09		
Tl-208	1.5820E-08	18.747	37.495	0.00E+00	2.97E-07	5.93E-07		
U-232	4.2647E-08	18.747	37.495	0.00E+00	8.00E-07	1.60E-06		
U-233	1.2211E-07	18.747	37.495	0.00E+00	2.29E-06	4.58E-06		
U-234	1.9955E-07	18.747	37.495	0.00E+00	3.74E-06	7.48E-06		
U-235	2.6194E-06	18.747	0.000	2.77E-04	2.28E-04	2.77E-04		
U-236	1.2693E-05	18.747	37.495	0.00E+00	2.38E-04	4.76E-04		
U-238	-3.6331E-08	18.747	0.000	1.72E-04	1.72E-04	1.72E-04		
Y-90	1.8241E+00	18.747	37.495	0.00E+00	3.42E+01	6.84E+01		
Other Radionuclides					3.61E+01	7.22E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.69E-01	9.38E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.96879875	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	18.747	16.801	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		37.495	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.86	0.90	1.00
Bounding:	1.71		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (GA) 1Fuel decay start date: 2035
 SNF ID #: 1003 Estimates as of: 2030
 Fuel Units & Descr: 10 - ELEMENT Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=1.60kg ; EOL=1.54kg 2Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 years

Estimated
Canister usage:
18"x10"
0.14

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	60.140	120.281	0.00E+00	5.12E-08	1.02E-07		
Am-241	1.8331E-03	60.140	120.281	0.00E+00	1.10E-01	2.20E-01	0.0150	1.944E+13
Am-242m	1.4129E-06	60.140	120.281	0.00E+00	8.50E-05	1.70E-04	0.0250	4.278E+12
Am-243	1.4774E-07	60.140	120.281	0.00E+00	8.89E-06	1.78E-05	0.0375	3.643E+12
C-14	1.2871E-04	60.140	120.281	0.00E+00	7.74E-03	1.55E-02	0.0575	3.739E+12
Cl-36	2.8120E-06	60.140	120.281	0.00E+00	1.69E-04	3.38E-04	0.0850	2.316E+12
Cm-243	1.7940E-07	60.140	120.281	0.00E+00	1.08E-05	2.16E-05	0.1250	1.682E+12
Cm-244	1.6962E-06	60.140	120.281	0.00E+00	1.02E-04	2.04E-04	0.2250	1.965E+12
Co-60	1.2839E+00	60.140	120.281	0.00E+00	7.72E+01	1.54E+02	0.3750	9.972E+11
Cs-134	9.0541E-02	60.140	120.281	0.00E+00	5.45E+00	1.09E+01	0.5750	1.326E+13
Cs-135	3.2195E-05	60.140	120.281	0.00E+00	1.94E-03	3.87E-03	0.8500	5.689E+11
Cs-137	2.7564E+00	60.140	120.281	0.00E+00	1.66E+02	3.32E+02	1.2500	1.155E+13
Eu-154	1.5368E-02	60.140	120.281	0.00E+00	9.24E-01	1.85E+00	1.7500	7.703E+09
Eu-155	2.9293E-02	60.140	120.281	0.00E+00	1.76E+00	3.52E+00	2.2500	1.242E+10
Fe-55	7.7158E-01	60.140	120.281	0.00E+00	4.64E+01	9.28E+01	2.7500	9.852E+07
H-3	1.1111E-02	60.140	120.281	0.00E+00	6.68E-01	1.34E+00	3.5000	1.147E+07
I-129	7.3684E-07	60.140	120.281	0.00E+00	4.43E-05	8.86E-05	5.0000	6.403E+01
Kr-85	2.5263E-01	60.140	120.281	0.00E+00	1.52E+01	3.04E+01	7.0000	7.249E+00
Np-237	1.2427E-06	60.140	120.281	0.00E+00	7.47E-05	1.49E-04	11.0000	8.258E-01
Pa-231	3.8511E-09	60.140	120.281	0.00E+00	2.32E-07	4.63E-07		
Pb-210	7.3880E-15	60.140	120.281	0.00E+00	4.44E-13	8.89E-13		
Pm-147	2.1023E+00	60.140	120.281	0.00E+00	1.26E+02	2.53E+02		
Pu-238	1.0383E-03	60.140	120.281	0.00E+00	6.24E-02	1.25E-01		
Pu-239	5.5293E-03	60.140	120.281	0.00E+00	3.33E-01	6.65E-01		
Pu-240	2.1278E-03	60.140	120.281	0.00E+00	1.28E-01	2.56E-01		
Pu-241	1.0195E-01	60.140	120.281	0.00E+00	6.13E+00	1.23E+01		
Pu-242	2.3128E-07	60.140	120.281	0.00E+00	1.39E-05	2.78E-05		
Ra-226	5.2782E-14	60.140	120.281	0.00E+00	3.17E-12	6.35E-12		
Ra-228	1.9338E-10	60.140	120.281	0.00E+00	1.16E-08	2.33E-08		
Ru-106	9.1684E-02	60.140	120.281	0.00E+00	5.51E+00	1.10E+01		
Se-79	1.3018E-05	60.140	120.281	0.00E+00	7.83E-04	1.57E-03		
Sn-126	1.2167E-05	60.140	120.281	0.00E+00	7.32E-04	1.46E-03		
Sr-90	2.6045E+00	60.140	120.281	0.00E+00	1.57E+02	3.13E+02		
Tc-99	4.4241E-04	60.140	120.281	0.00E+00	2.66E-02	5.32E-02		
Th-229	1.3713E-10	60.140	120.281	0.00E+00	8.25E-09	1.65E-08		
Th-230	1.8090E-11	60.140	120.281	0.00E+00	1.09E-09	2.18E-09		
Th-232	2.5278E-10	60.140	120.281	0.00E+00	1.52E-08	3.04E-08		
Tl-208	1.6947E-08	60.140	120.281	0.00E+00	1.02E-06	2.04E-06		
U-232	4.8737E-08	60.140	120.281	0.00E+00	2.93E-06	5.86E-06		
U-233	1.2203E-07	60.140	120.281	0.00E+00	7.34E-06	1.47E-05		
U-234	1.5925E-07	60.140	120.281	0.00E+00	9.58E-06	1.92E-05		
U-235	-2.6194E-06	60.140	0.000	6.68E-04	5.10E-04	6.68E-04	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	60.140	120.281	0.00E+00	7.63E-04	1.53E-03	3.50E+00	7.00E+00
U-238	-3.6331E-08	60.140	0.000	4.35E-04	4.33E-04	4.35E-04	Total	Total
Y-90	2.6060E+00	60.140	120.281	0.00E+00	1.57E+02	3.13E+02		
Other Radionuclides					2.17E+02	4.34E+02		

Thermal Power

Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.50E+00	7.00E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.26433915	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	54.714	60.140	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		120.281	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.10	1.10	1.00
Bounding:	2.20		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (HEIDELBERG) ¹Fuel decay start date: 2010
 SNF ID #: 1045 Estimates as of: 2030
 Fuel Units & Descr: 5 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=80kg ; EOL=79kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.05

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.6436E-09	15.613	31.226	0.00E+00	4.13E-08	8.25E-08		
Am-241	3.1429E-03	15.613	31.226	0.00E+00	4.91E-02	9.81E-02	0.0150	3.129E+12
Am-242m	1.3195E-06	15.613	31.226	0.00E+00	2.06E-05	4.12E-05	0.0250	6.514E+11
Am-243	1.4753E-07	15.613	31.226	0.00E+00	2.30E-06	4.61E-06	0.0375	5.643E+11
C-14	1.2847E-04	15.613	31.226	0.00E+00	2.01E-03	4.01E-03	0.0575	6.071E+11
Cl-36	2.8120E-06	15.613	31.226	0.00E+00	4.39E-05	8.78E-05	0.0850	3.665E+11
Cm-243	1.2465E-07	15.613	31.226	0.00E+00	1.95E-06	3.89E-06	0.1250	2.395E+11
Cm-244	9.5564E-07	15.613	31.226	0.00E+00	1.49E-05	2.98E-05	0.2250	3.147E+11
Co-60	1.7880E-01	15.613	31.226	0.00E+00	2.79E+00	5.58E+00	0.3750	1.379E+11
Cs-134	5.8692E-04	15.613	31.226	0.00E+00	9.16E-03	1.83E-02	0.5750	2.268E+12
Cs-135	3.2195E-05	15.613	31.226	0.00E+00	5.03E-04	1.01E-03	0.8500	2.557E+10
Cs-137	1.9489E+00	15.613	31.226	0.00E+00	3.04E+01	6.09E+01	1.2500	4.237E+11
Eu-154	4.5895E-03	15.613	31.226	0.00E+00	7.17E-02	1.43E-01	1.7500	6.571E+08
Eu-155	3.6045E-03	15.613	31.226	0.00E+00	5.63E-02	1.13E-01	2.2500	2.263E+06
Fe-55	1.4185E-02	15.613	31.226	0.00E+00	2.21E-01	4.43E-01	2.7500	2.493E+04
H-3	4.7895E-03	15.613	31.226	0.00E+00	7.48E-02	1.50E-01	3.5000	1.390E+02
I-129	7.3684E-07	15.613	31.226	0.00E+00	1.15E-05	2.30E-05	5.0000	1.672E+01
Kr-85	9.5820E-02	15.613	31.226	0.00E+00	1.50E+00	2.99E+00	7.0000	1.889E+00
Np-237	1.2552E-06	15.613	31.226	0.00E+00	1.96E-05	3.92E-05	11.0000	2.150E-01
Pa-231	7.0406E-09	15.613	31.226	0.00E+00	1.10E-07	2.20E-07		
Pb-210	5.8000E-14	15.613	31.226	0.00E+00	9.06E-13	1.81E-12		
Pm-147	4.0075E-02	15.613	31.226	0.00E+00	6.26E-01	1.25E+00		
Pu-238	9.2256E-04	15.613	31.226	0.00E+00	1.44E-02	2.88E-02		
Pu-239	5.5278E-03	15.613	31.226	0.00E+00	8.63E-02	1.73E-01		
Pu-240	2.1248E-03	15.613	31.226	0.00E+00	3.32E-02	6.63E-02		
Pu-241	4.9549E-02	15.613	31.226	0.00E+00	7.74E-01	1.55E+00		
Pu-242	2.3128E-07	15.613	31.226	0.00E+00	3.61E-06	7.22E-06		
Ra-226	2.4526E-13	15.613	31.226	0.00E+00	3.83E-12	7.66E-12		
Ra-228	2.4015E-10	15.613	31.226	0.00E+00	3.75E-09	7.50E-09		
Ru-106	3.0602E-06	15.613	31.226	0.00E+00	4.78E-05	9.56E-05		
Se-79	1.3015E-05	15.613	31.226	0.00E+00	2.03E-04	4.06E-04		
Sn-126	1.2165E-05	15.613	31.226	0.00E+00	1.90E-04	3.80E-04		
Sr-90	1.8226E+00	15.613	31.226	0.00E+00	2.85E+01	5.69E+01		
Tc-99	4.4241E-04	15.613	31.226	0.00E+00	6.91E-03	1.38E-02		
Th-229	3.0962E-10	15.613	31.226	0.00E+00	4.83E-09	9.67E-09		
Th-230	4.2346E-11	15.613	31.226	0.00E+00	6.61E-10	1.32E-09		
Th-232	2.5278E-10	15.613	31.226	0.00E+00	3.95E-09	7.89E-09		
Tl-208	1.5820E-08	15.613	31.226	0.00E+00	2.47E-07	4.94E-07		
U-232	4.2647E-08	15.613	31.226	0.00E+00	6.66E-07	1.33E-06		
U-233	1.2211E-07	15.613	31.226	0.00E+00	1.91E-06	3.81E-06		
U-234	1.9955E-07	15.613	31.226	0.00E+00	3.12E-06	6.23E-06		
U-235	-2.6194E-06	15.613	0.000	3.44E-04	3.03E-04	3.44E-04		
U-236	1.2693E-05	15.613	31.226	0.00E+00	1.98E-04	3.96E-04		
U-238	-3.6331E-08	15.613	0.000	2.16E-04	2.15E-04	2.16E-04		
Y-90	1.8241E+00	15.613	31.226	0.00E+00	2.85E+01	5.70E+01		
Other Radionuclides					3.01E+01	6.01E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.91E-01	7.81E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.85018727	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	15.613	10.023	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		31.226	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.57	0.64	0.99
Bounding:	1.14		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (ITALY) 1 Fuel decay start date: 1959
 SNF ID #: 730 Estimates as of: 2030
 Fuel Units & Descr: 3 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL= 48kg ; EOL= 46kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.04

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.2442E-08	24.342	48.685	0.00E+00	3.03E-07	6.06E-07	Avg. MeV	
Am-241	4.0120E-03	24.342	48.685	0.00E+00	9.77E-02	1.95E-01	0.0150	1.665E+12
Am-242m	1.0749E-06	24.342	48.685	0.00E+00	2.62E-05	5.23E-05	0.0250	3.456E+11
Am-243	1.4692E-07	24.342	48.685	0.00E+00	3.58E-06	7.15E-06	0.0375	3.015E+11
C-14	1.2777E-04	24.342	48.685	0.00E+00	3.11E-03	6.22E-03	0.0575	3.248E+11
Cl-36	2.8120E-06	24.342	48.685	0.00E+00	6.85E-05	1.37E-04	0.0850	1.946E+11
Cm-243	4.1759E-08	24.342	48.685	0.00E+00	1.02E-06	2.03E-06	0.1250	1.262E+11
Cm-244	1.7098E-07	24.342	48.685	0.00E+00	4.16E-06	8.32E-06	0.2250	1.676E+11
Co-60	4.8241E-04	24.342	48.685	0.00E+00	1.17E-02	2.35E-02	0.3750	7.311E+10
Cs-134	1.5970E-10	24.342	48.685	0.00E+00	3.89E-09	7.77E-09	0.5750	1.249E+12
Cs-135	3.2195E-05	24.342	48.685	0.00E+00	7.84E-04	1.57E-03	0.8500	1.201E+10
Cs-137	6.8977E-01	24.342	48.685	0.00E+00	1.68E+01	3.36E+01	1.2500	5.827E+09
Eu-154	1.2238E-04	24.342	48.685	0.00E+00	2.98E-03	5.96E-03	1.7500	3.092E+08
Eu-155	6.7158E-06	24.342	48.685	0.00E+00	1.63E-04	3.27E-04	2.2500	4.291E+04
Fe-55	8.8165E-08	24.342	48.685	0.00E+00	2.15E-06	4.29E-06	2.7500	1.771E+04
H-3	3.8376E-04	24.342	48.685	0.00E+00	9.34E-03	1.87E-02	3.5000	5.983E+01
I-129	7.3684E-07	24.342	48.685	0.00E+00	1.79E-05	3.59E-05	5.0000	2.518E+01
Kr-85	5.2316E-03	24.342	48.685	0.00E+00	1.27E-01	2.55E-01	7.0000	2.841E+00
Np-237	1.3232E-06	24.342	48.685	0.00E+00	3.22E-05	6.44E-05	11.0000	3.230E-01
Pa-231	1.8722E-08	24.342	48.685	0.00E+00	4.56E-07	9.11E-07		
Pb-210	1.2620E-12	24.342	48.685	0.00E+00	3.07E-11	6.14E-11		
Pm-147	2.7714E-07	24.342	48.685	0.00E+00	6.75E-06	1.35E-05		
Pu-238	6.4707E-04	24.342	48.685	0.00E+00	1.58E-02	3.15E-02		
Pu-239	5.5203E-03	24.342	48.685	0.00E+00	1.34E-01	2.69E-01		
Pu-240	2.1143E-03	24.342	48.685	0.00E+00	5.15E-02	1.03E-01		
Pu-241	5.6872E-03	24.342	48.685	0.00E+00	1.38E-01	2.77E-01		
Pu-242	2.3128E-07	24.342	48.685	0.00E+00	5.63E-06	1.13E-05		
Ra-226	2.6466E-12	24.342	48.685	0.00E+00	6.44E-11	1.29E-10		
Ra-228	2.5278E-10	24.342	48.685	0.00E+00	6.15E-09	1.23E-08		
Ru-106	1.1377E-19	24.342	48.685	0.00E+00	2.77E-18	5.54E-18		
Se-79	1.3009E-05	24.342	48.685	0.00E+00	3.17E-04	6.33E-04		
Sn-126	1.2162E-05	24.342	48.685	0.00E+00	2.96E-04	5.92E-04		
Sr-90	6.2511E-01	24.342	48.685	0.00E+00	1.52E+01	3.04E+01		
Tc-99	4.4241E-04	24.342	48.685	0.00E+00	1.08E-02	2.15E-02		
Th-229	9.4105E-10	24.342	48.685	0.00E+00	2.29E-08	4.58E-08		
Th-230	1.7098E-10	24.342	48.685	0.00E+00	4.16E-09	8.32E-09		
Th-232	2.5278E-10	24.342	48.685	0.00E+00	6.15E-09	1.23E-08		
Tl-208	1.0305E-08	24.342	48.685	0.00E+00	2.51E-07	5.02E-07		
U-232	2.7669E-08	24.342	48.685	0.00E+00	6.74E-07	1.35E-06		
U-233	1.2239E-07	24.342	48.685	0.00E+00	2.98E-06	5.96E-06		
U-234	3.1278E-07	24.342	48.685	0.00E+00	7.61E-06	1.52E-05		
U-235	-2.6179E-06	24.342	0.000	2.10E-04	1.46E-04	2.10E-04	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2696E-05	24.342	48.685	0.00E+00	3.09E-04	6.18E-04	1.93E-01	3.87E-01
U-238	-3.6331E-08	24.342	0.000	1.30E-04	1.29E-04	1.30E-04	Total	Total
Y-90	6.2541E-01	24.342	48.685	0.00E+00	1.52E+01	3.04E+01		
Other Radionuclides					1.73E+01	3.45E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		Basis for Parameter Differences:
From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE / LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304) / SST	
BOL HM Constituents:	U-ZrHx / U	
BOL Enrichment %:	20.04130579 / 10 to 20	

Burnup Summary (MWd) ²		Basis for burnup used in estimate:
From SFD	Estimated	
Nominal:	16.506 / 24.342	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:	48.685	

Checks		Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier / Estimated Burnup/Given Burnup	
Bounding:	1.48 / 1.47	1.00
	2.95	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (MNRC) ¹Fuel decay start date: 2035
 SNF ID #: 703 Estimates as of: 2030
 Fuel Units & Descr: 5 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=80kg ; EOL=.76kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.07

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	39.139	78.278	0.00E+00	3.33E-08	6.67E-08	Avg. MeV	
Am-241	1.8331E-03	39.139	78.278	0.00E+00	7.17E-02	1.43E-01	0.0150	1.265E+13
Am-242m	1.4129E-06	39.139	78.278	0.00E+00	5.53E-05	1.11E-04	0.0250	2.784E+12
Am-243	1.4774E-07	39.139	78.278	0.00E+00	5.78E-06	1.16E-05	0.0375	2.371E+12
C-14	1.2871E-04	39.139	78.278	0.00E+00	5.04E-03	1.01E-02	0.0675	2.433E+12
Cl-36	2.8120E-06	39.139	78.278	0.00E+00	1.10E-04	2.20E-04	0.0850	1.508E+12
Cm-243	1.7940E-07	39.139	78.278	0.00E+00	7.02E-06	1.40E-05	0.1250	1.095E+12
Cm-244	1.6962E-06	39.139	78.278	0.00E+00	6.64E-05	1.33E-04	0.2250	1.279E+12
Co-60	1.2839E+00	39.139	78.278	0.00E+00	5.03E+01	1.01E+02	0.3750	6.490E+11
Cs-134	9.0541E-02	39.139	78.278	0.00E+00	3.54E+00	7.09E+00	0.5750	8.628E+12
Cs-135	3.2195E-05	39.139	78.278	0.00E+00	1.26E-03	2.52E-03	0.8500	3.703E+11
Cs-137	2.7564E+00	39.139	78.278	0.00E+00	1.08E+02	2.16E+02	1.2500	7.520E+12
Eu-154	1.5368E-02	39.139	78.278	0.00E+00	6.02E-01	1.20E+00	1.7500	5.013E+09
Eu-155	2.9293E-02	39.139	78.278	0.00E+00	1.15E+00	2.29E+00	2.2500	8.080E+09
Fe-55	7.7158E-01	39.139	78.278	0.00E+00	3.02E+01	6.04E+01	2.7500	6.411E+07
H-3	1.1111E-02	39.139	78.278	0.00E+00	4.35E-01	8.70E-01	3.5000	7.464E+06
I-129	7.3684E-07	39.139	78.278	0.00E+00	2.88E-05	5.77E-05	5.0000	4.152E+01
Kr-85	2.5263E-01	39.139	78.278	0.00E+00	9.89E+00	1.98E+01	7.0000	4.700E+00
Np-237	1.2427E-06	39.139	78.278	0.00E+00	4.86E-05	9.73E-05	11.0000	5.354E-01
Pa-231	3.8511E-09	39.139	78.278	0.00E+00	1.51E-07	3.01E-07		
Pb-210	7.3880E-15	39.139	78.278	0.00E+00	2.89E-13	5.78E-13		
Pm-147	2.1023E+00	39.139	78.278	0.00E+00	8.23E+01	1.65E+02		
Pu-238	1.0383E-03	39.139	78.278	0.00E+00	4.06E-02	8.13E-02		
Pu-239	5.5293E-03	39.139	78.278	0.00E+00	2.16E-01	4.33E-01		
Pu-240	2.1278E-03	39.139	78.278	0.00E+00	8.33E-02	1.67E-01		
Pu-241	1.0195E-01	39.139	78.278	0.00E+00	3.99E+00	7.98E+00		
Pu-242	2.3128E-07	39.139	78.278	0.00E+00	9.05E-06	1.81E-05		
Ra-226	5.2782E-14	39.139	78.278	0.00E+00	2.07E-12	4.13E-12		
Ra-228	1.9338E-10	39.139	78.278	0.00E+00	7.57E-09	1.51E-08		
Ru-106	9.1684E-02	39.139	78.278	0.00E+00	3.59E+00	7.18E+00		
Se-79	1.3018E-05	39.139	78.278	0.00E+00	5.10E-04	1.02E-03		
Sn-126	1.2167E-05	39.139	78.278	0.00E+00	4.76E-04	9.52E-04		
Sr-90	2.6045E+00	39.139	78.278	0.00E+00	1.02E+02	2.04E+02		
Tc-99	4.4241E-04	39.139	78.278	0.00E+00	1.73E-02	3.46E-02		
Th-229	1.3713E-10	39.139	78.278	0.00E+00	5.37E-09	1.07E-08		
Th-230	1.8090E-11	39.139	78.278	0.00E+00	7.08E-10	1.42E-09		
Th-232	2.5278E-10	39.139	78.278	0.00E+00	9.89E-09	1.98E-08		
Tl-208	1.6947E-08	39.139	78.278	0.00E+00	6.63E-07	1.33E-06		
U-232	4.8737E-08	39.139	78.278	0.00E+00	1.91E-06	3.82E-06		
U-233	1.2203E-07	39.139	78.278	0.00E+00	4.78E-06	9.55E-06		
U-234	1.5925E-07	39.139	78.278	0.00E+00	6.23E-06	1.25E-05		
U-235	-2.6194E-06	39.139	0.000	3.35E-04	2.32E-04	3.35E-04	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	39.139	78.278	0.00E+00	4.97E-04	9.94E-04	2.28E+00	4.56E+00
U-238	-3.6331E-08	39.139	0.000	2.17E-04	2.16E-04	2.17E-04	Total	Total
Y-90	2.6060E+00	39.139	78.278	0.00E+00	1.02E+02	2.04E+02		
Other Radionuclides					1.41E+02	2.82E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		Basis for Parameter Differences:	
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.34235977	10 to 20	

Burnup Summary (MWd) ²		Basis for burnup used in estimate:	
	From SFD	Estimated	
Nominal:	27.340	39.139	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		78.278	Bounding burnup assumed to be twice nominal burnup.

Checks		Estimated EOL HM/Given EOL HM	
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.43	1.43	1.00
Bounding:	2.86		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (MNRC) 1 Fuel decay start date: 2035
 SNF ID #: 737 Estimates as of: 2030
 Fuel Units & Descr: 6 - ELEMENT Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=2.46kg ; EOL=2.46kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.08

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	47.013	232.332	0.00E+00	4.00E-08	1.98E-07	0.0150	3.755E+13
Am-241	1.8331E-03	47.013	232.332	0.00E+00	8.62E-02	4.26E-01	0.0250	8.263E+12
Am-242m	1.4129E-06	47.013	232.332	0.00E+00	6.64E-05	3.28E-04	0.0375	7.037E+12
Am-243	1.4774E-07	47.013	232.332	0.00E+00	6.95E-06	3.43E-05	0.0575	7.222E+12
C-14	1.2871E-04	47.013	232.332	0.00E+00	6.05E-03	2.99E-02	0.0850	4.474E+12
Cl-36	2.8120E-06	47.013	232.332	0.00E+00	1.32E-04	6.53E-04	0.1250	3.249E+12
Cm-243	1.7940E-07	47.013	232.332	0.00E+00	8.43E-06	4.17E-05	0.2250	3.796E+12
Cm-244	1.6962E-06	47.013	232.332	0.00E+00	7.97E-05	3.94E-04	0.3750	1.926E+12
Co-60	1.2839E+00	47.013	232.332	0.00E+00	6.04E+01	2.98E+02	0.5750	2.561E+13
Cs-134	9.0541E-02	47.013	232.332	0.00E+00	4.26E+00	2.10E+01	0.8500	1.099E+12
Cs-135	3.2195E-05	47.013	232.332	0.00E+00	1.51E-03	7.48E-03	1.2500	2.232E+13
Cs-137	2.7564E+00	47.013	232.332	0.00E+00	1.30E+02	6.40E+02	1.7500	1.488E+10
Eu-154	1.5368E-02	47.013	232.332	0.00E+00	7.23E-01	3.57E+00	2.2500	2.398E+10
Eu-155	2.9293E-02	47.013	232.332	0.00E+00	1.38E+00	6.81E+00	2.7500	1.903E+08
Fe-55	7.7158E-01	47.013	232.332	0.00E+00	3.63E+01	1.79E+02	3.5000	2.215E+07
H-3	1.1111E-02	47.013	232.332	0.00E+00	5.22E-01	2.58E+00	5.0000	1.239E+02
I-129	7.3684E-07	47.013	232.332	0.00E+00	3.46E-05	1.71E-04	7.0000	1.395E+01
Kr-85	2.5263E-01	47.013	232.332	0.00E+00	1.19E+01	5.87E+01	11.0000	1.590E+00
Np-237	1.2427E-06	47.013	232.332	0.00E+00	5.84E-05	2.89E-04		
Pa-231	3.8511E-09	47.013	232.332	0.00E+00	1.81E-07	8.95E-07		
Pb-210	7.3880E-15	47.013	232.332	0.00E+00	3.47E-13	1.72E-12		
Pm-147	2.1023E+00	47.013	232.332	0.00E+00	9.88E+01	4.88E+02		
Pu-238	1.0383E-03	47.013	232.332	0.00E+00	4.88E-02	2.41E-01		
Pu-239	5.5293E-03	47.013	232.332	0.00E+00	2.60E-01	1.28E+00		
Pu-240	2.1278E-03	47.013	232.332	0.00E+00	1.00E-01	4.94E-01		
Pu-241	1.0195E-01	47.013	232.332	0.00E+00	4.79E+00	2.37E+01		
Pu-242	2.3128E-07	47.013	232.332	0.00E+00	1.09E-05	5.37E-05		
Ra-226	5.2782E-14	47.013	232.332	0.00E+00	2.48E-12	1.23E-11		
Ra-228	1.9338E-10	47.013	232.332	0.00E+00	9.09E-09	4.49E-08		
Ru-106	9.1684E-02	47.013	232.332	0.00E+00	4.31E+00	2.13E+01		
Se-79	1.3018E-05	47.013	232.332	0.00E+00	6.12E-04	3.02E-03		
Sn-126	1.2167E-05	47.013	232.332	0.00E+00	5.72E-04	2.83E-03		
Sr-90	2.6045E+00	47.013	232.332	0.00E+00	1.22E+02	6.05E+02		
Tc-99	4.4241E-04	47.013	232.332	0.00E+00	2.08E-02	1.03E-01		
Th-229	1.3713E-10	47.013	232.332	0.00E+00	6.45E-09	3.19E-08		
Th-230	1.8090E-11	47.013	232.332	0.00E+00	8.50E-10	4.20E-09		
Th-232	2.5278E-10	47.013	232.332	0.00E+00	1.19E-08	5.87E-08		
Tl-208	1.6947E-08	47.013	232.332	0.00E+00	7.97E-07	3.94E-06		
U-232	4.8737E-08	47.013	232.332	0.00E+00	2.29E-06	1.13E-05		
U-233	1.2203E-07	47.013	232.332	0.00E+00	5.74E-06	2.84E-05		
U-234	1.5925E-07	47.013	232.332	0.00E+00	7.49E-06	3.70E-05		
U-235	-2.6194E-06	47.013	0.000	1.05E-03	9.29E-04	1.05E-03		
U-236	1.2693E-05	47.013	232.332	0.00E+00	5.97E-04	2.95E-03		
U-238	-3.6331E-08	47.013	0.000	6.64E-04	6.62E-04	6.64E-04		
Y-90	2.6060E+00	47.013	232.332	0.00E+00	1.23E+02	6.05E+02		
Other Radionuclides					1.69E+02	8.38E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.74E+00	1.35E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.76779631	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		47.013	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup taken directly from SFD (converted to MWd).
Bounding:	232.332	94.025	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.56		
Bounding:	2.77	0.40	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (MNRC) ¹Fuel decay start date: 2035
 SNF ID #: 1055 Estimates as of: 2030
 Fuel Units & Descr: 1 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=.67kg ; EOL=.67kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.01

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	8.5173E-10	12.881	63.594	0.00E+00	1.10E-08	5.42E-08	Avg. MeV	
Am-241	1.8331E-03	12.881	63.594	0.00E+00	2.36E-02	1.17E-01	0.0150	1.028E+13
Am-242m	1.4129E-06	12.881	63.594	0.00E+00	1.82E-05	8.99E-05	0.0250	2.262E+12
Am-243	1.4774E-07	12.881	63.594	0.00E+00	1.90E-06	9.40E-06	0.0375	1.926E+12
C-14	1.2871E-04	12.881	63.594	0.00E+00	1.66E-03	8.18E-03	0.0575	1.977E+12
Cl-36	2.8120E-06	12.881	63.594	0.00E+00	3.62E-05	1.79E-04	0.0850	1.225E+12
Cm-243	1.7940E-07	12.881	63.594	0.00E+00	2.31E-06	1.14E-05	0.1250	8.893E+11
Cm-244	1.6962E-06	12.881	63.594	0.00E+00	2.19E-05	1.08E-04	0.2250	1.039E+12
Co-60	1.2839E+00	12.881	63.594	0.00E+00	1.65E+01	8.16E+01	0.3750	5.272E+11
Cs-134	9.0541E-02	12.881	63.594	0.00E+00	1.17E+00	5.76E+00	0.5750	7.009E+12
Cs-135	3.2195E-05	12.881	63.594	0.00E+00	4.15E-04	2.05E-03	0.8500	3.008E+11
Cs-137	2.7564E+00	12.881	63.594	0.00E+00	3.55E+01	1.75E+02	1.2500	6.109E+12
Eu-154	1.5368E-02	12.881	63.594	0.00E+00	1.98E-01	9.77E-01	1.7500	4.073E+09
Eu-155	2.9293E-02	12.881	63.594	0.00E+00	3.77E-01	1.86E+00	2.2500	6.565E+09
Fe-55	7.7158E-01	12.881	63.594	0.00E+00	9.94E+00	4.91E+01	2.7500	5.209E+07
H-3	1.1111E-02	12.881	63.594	0.00E+00	1.43E-01	7.07E-01	3.5000	6.064E+06
I-129	7.3684E-07	12.881	63.594	0.00E+00	9.49E-06	4.69E-05	5.0000	3.374E+01
Kr-85	2.5263E-01	12.881	63.594	0.00E+00	3.25E+00	1.61E+01	7.0000	3.820E+00
Np-237	1.2427E-06	12.881	63.594	0.00E+00	1.60E-05	7.90E-05	11.0000	4.352E-01
Pa-231	3.8511E-09	12.881	63.594	0.00E+00	4.96E-08	2.45E-07		
Pb-210	7.3880E-15	12.881	63.594	0.00E+00	9.52E-14	4.70E-13		
Pm-147	2.1023E+00	12.881	63.594	0.00E+00	2.71E+01	1.34E+02		
Pu-238	1.0383E-03	12.881	63.594	0.00E+00	1.34E-02	6.60E-02		
Pu-239	5.5293E-03	12.881	63.594	0.00E+00	7.12E-02	3.52E-01		
Pu-240	2.1278E-03	12.881	63.594	0.00E+00	2.74E-02	1.35E-01		
Pu-241	1.0195E-01	12.881	63.594	0.00E+00	1.31E+00	6.48E+00		
Pu-242	2.3128E-07	12.881	63.594	0.00E+00	2.98E-06	1.47E-05		
Ra-226	5.2782E-14	12.881	63.594	0.00E+00	6.80E-13	3.36E-12		
Ra-228	1.9338E-10	12.881	63.594	0.00E+00	2.49E-09	1.23E-08		
Ru-106	9.1684E-02	12.881	63.594	0.00E+00	1.18E+00	5.83E+00		
Se-79	1.3018E-05	12.881	63.594	0.00E+00	1.68E-04	8.28E-04		
Sn-126	1.2167E-05	12.881	63.594	0.00E+00	1.57E-04	7.74E-04		
Sr-90	2.6045E+00	12.881	63.594	0.00E+00	3.35E+01	1.66E+02		
Tc-99	4.4241E-04	12.881	63.594	0.00E+00	5.70E-03	2.81E-02		
Th-229	1.3713E-10	12.881	63.594	0.00E+00	1.77E-09	8.72E-09		
Th-230	1.8090E-11	12.881	63.594	0.00E+00	2.33E-10	1.15E-09		
Th-232	2.5278E-10	12.881	63.594	0.00E+00	3.26E-09	1.61E-08		
Tl-208	1.6947E-08	12.881	63.594	0.00E+00	2.18E-07	1.08E-06		
U-232	4.8737E-08	12.881	63.594	0.00E+00	6.28E-07	3.10E-06		
U-233	1.2203E-07	12.881	63.594	0.00E+00	1.57E-06	7.76E-06		
U-234	1.5925E-07	12.881	63.594	0.00E+00	2.05E-06	1.01E-05		
U-235	-2.6194E-06	12.881	0.000	2.88E-04	2.54E-04	2.88E-04	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	12.881	63.594	0.00E+00	1.64E-04	8.07E-04	7.50E-01	3.70E+00
U-238	-3.6331E-08	12.881	0.000	1.82E-04	1.82E-04	1.82E-04	Total	Total
Y-90	2.6060E+00	12.881	63.594	0.00E+00	3.36E+01	1.66E+02		
Other Radionuclides					4.64E+01	2.29E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.74748006	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		12.881	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup taken directly from SFD (converted to MWd).
Bounding:	63.594	25.763	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.56	
Bounding:	2.76	0.41

Estimated EOL HM/Given EOL HM 0.98

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (OSU) ¹Fuel decay start date: 2025
 SNF ID #: 1041 Estimates as of: 2030
 Fuel Units & Descr: 2 - ELEMENT Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
 Heavy Metal Mass: BOL=.39kg ; EOL=.37kg ²Template Burnup(MWd): 66.52
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000196
Template Decay Time: 5 years

Estimated
Canister usage:
18"x10"
0.02

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.8488E-10	20.909	41.818	0.00E+00	5.96E-09	1.19E-08	Avg. MeV	
Am-241	7.5767E-03	20.909	41.818	0.00E+00	1.58E-01	3.17E-01	0.0150	6.747E+12
Am-242m	2.4459E-05	20.909	41.818	0.00E+00	5.11E-04	1.02E-03	0.0250	1.481E+12
Am-243	3.0983E-05	20.909	41.818	0.00E+00	6.48E-04	1.30E-03	0.0375	1.310E+12
C-14	1.2590E-04	20.909	41.818	0.00E+00	2.63E-03	5.27E-03	0.0575	1.307E+12
Cl-36	2.6624E-06	20.909	41.818	0.00E+00	5.57E-05	1.11E-04	0.0850	8.134E+11
Cm-243	3.8244E-05	20.909	41.818	0.00E+00	8.00E-04	1.60E-03	0.1250	6.531E+11
Cm-244	4.1010E-03	20.909	41.818	0.00E+00	8.57E-02	1.71E-01	0.2250	6.913E+11
Co-60	1.2410E+00	20.909	41.818	0.00E+00	2.59E+01	5.19E+01	0.3750	3.449E+11
Cs-134	6.5454E-01	20.909	41.818	0.00E+00	1.37E+01	2.74E+01	0.5750	5.709E+12
Cs-135	1.9753E-05	20.909	41.818	0.00E+00	4.13E-04	8.26E-04	0.8500	1.047E+12
Cs-137	2.7375E+00	20.909	41.818	0.00E+00	5.72E+01	1.14E+02	1.2500	4.023E+12
Eu-154	1.2324E-01	20.909	41.818	0.00E+00	2.58E+00	5.15E+00	1.7500	5.381E+09
Eu-155	5.3037E-02	20.909	41.818	0.00E+00	1.11E+00	2.22E+00	2.2500	4.218E+09
Fe-55	7.9555E-01	20.909	41.818	0.00E+00	1.66E+01	3.33E+01	2.7500	3.823E+07
H-3	1.0531E-02	20.909	41.818	0.00E+00	2.20E-01	4.40E-01	3.5000	4.501E-06
I-129	7.1287E-07	20.909	41.818	0.00E+00	1.49E-05	2.98E-05	5.0000	1.078E+03
Kr-85	2.4955E-01	20.909	41.818	0.00E+00	5.22E+00	1.04E+01	7.0000	1.241E+02
Np-237	1.2121E-05	20.909	41.818	0.00E+00	2.53E-04	5.07E-04	11.0000	1.424E+01
Pa-231	1.1230E-09	20.909	41.818	0.00E+00	2.35E-08	4.70E-08		
Pb-210	6.1636E-14	20.909	41.818	0.00E+00	1.29E-12	2.58E-12		
Pm-147	1.1302E+00	20.909	41.818	0.00E+00	2.36E+01	4.73E+01		
Pu-238	5.4826E-02	20.909	41.818	0.00E+00	1.15E+00	2.29E+00		
Pu-239	1.4056E-03	20.909	41.818	0.00E+00	2.94E-02	5.88E-02		
Pu-240	1.1536E-03	20.909	41.818	0.00E+00	2.41E-02	4.82E-02		
Pu-241	4.2995E-01	20.909	41.818	0.00E+00	8.99E+00	1.80E+01		
Pu-242	4.9910E-06	20.909	41.818	0.00E+00	1.04E-04	2.09E-04		
Ra-226	2.4008E-13	20.909	41.818	0.00E+00	5.02E-12	1.00E-11		
Ra-228	1.8220E-11	20.909	41.818	0.00E+00	3.81E-10	7.62E-10		
Ru-106	1.0343E-01	20.909	41.818	0.00E+00	2.16E+00	4.33E+00		
Se-79	1.2832E-05	20.909	41.818	0.00E+00	2.68E-04	5.37E-04		
Sn-126	1.2090E-05	20.909	41.818	0.00E+00	2.53E-04	5.06E-04		
Sr-90	2.5646E+00	20.909	41.818	0.00E+00	5.36E+01	1.07E+02		
Tc-99	4.0319E-04	20.909	41.818	0.00E+00	8.43E-03	1.69E-02		
Th-229	7.7375E-11	20.909	41.818	0.00E+00	1.62E-09	3.24E-09		
Th-230	1.2211E-10	20.909	41.818	0.00E+00	2.55E-09	5.11E-09		
Th-232	2.3842E-11	20.909	41.818	0.00E+00	4.99E-10	9.97E-10		
Tl-208	1.4313E-07	20.909	41.818	0.00E+00	2.99E-06	5.99E-06		
U-232	4.1927E-07	20.909	41.818	0.00E+00	8.77E-06	1.75E-05		
U-233	6.8491E-08	20.909	41.818	0.00E+00	1.43E-06	2.86E-06		
U-234	2.0189E-06	20.909	41.818	0.00E+00	4.22E-05	8.44E-05		
U-235	-2.6572E-06	20.909	0.000	5.92E-04	5.37E-04	5.92E-04	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.3575E-05	20.909	41.818	0.00E+00	2.84E-04	5.68E-04	1.37E+00	2.74E+00
U-238	-2.2698E-08	20.909	0.000	3.97E-05	3.92E-05	3.97E-05	Total	Total
Y-90	2.5646E+00	20.909	41.818	0.00E+00	5.36E+01	1.07E+02		
Other Radionuclides					7.45E+01	1.49E+02		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX-Er	U	
BOL Enrichment %:	69.89795918	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	5.731	20.909	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		41.818	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.16	3.65	1.00
Bounding:	0.31		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (OSU)
 SNF ID #: 1039
 Fuel Units & Descr: 3 - ELEMENT
 Heavy Metal Mass: BOL=48kg ; EOL=47kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2025
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.04

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	7.732	15.465	0.00E+00	6.59E-09	1.32E-08	0.0150	2.499E+12
Am-241	1.8331E-03	7.732	15.465	0.00E+00	1.42E-02	2.83E-02	0.0250	5.500E+11
Am-242m	1.4129E-06	7.732	15.465	0.00E+00	1.09E-05	2.19E-05	0.0375	4.684E+11
Am-243	1.4774E-07	7.732	15.465	0.00E+00	1.14E-06	2.28E-06	0.0575	4.807E+11
C-14	1.2871E-04	7.732	15.465	0.00E+00	9.95E-04	1.99E-03	0.0850	2.978E+11
Cl-36	2.8120E-06	7.732	15.465	0.00E+00	2.17E-05	4.35E-05	0.1250	2.163E+11
Cm-243	1.7940E-07	7.732	15.465	0.00E+00	1.39E-06	2.77E-06	0.2250	2.527E+11
Cm-244	1.6962E-06	7.732	15.465	0.00E+00	1.31E-05	2.62E-05	0.3750	1.282E+11
Co-60	1.2839E+00	7.732	15.465	0.00E+00	9.93E+00	1.99E+01	0.5750	1.705E+12
Cs-134	9.0541E-02	7.732	15.465	0.00E+00	7.00E-01	1.40E+00	0.8500	7.315E+10
Cs-135	3.2195E-05	7.732	15.465	0.00E+00	2.49E-04	4.98E-04	1.2500	1.486E+12
Cs-137	2.7564E+00	7.732	15.465	0.00E+00	2.13E+01	4.26E+01	1.7500	9.904E+08
Eu-154	1.5368E-02	7.732	15.465	0.00E+00	1.19E-01	2.38E-01	2.2500	1.596E+09
Eu-155	2.9293E-02	7.732	15.465	0.00E+00	2.27E-01	4.53E-01	2.7500	1.267E+07
Fe-55	7.7158E-01	7.732	15.465	0.00E+00	5.97E+00	1.19E+01	3.5000	1.475E+06
H-3	1.1111E-02	7.732	15.465	0.00E+00	8.59E-02	1.72E-01	5.0000	8.402E+00
I-129	7.3684E-07	7.732	15.465	0.00E+00	5.70E-06	1.14E-05	7.0000	9.515E-01
Kr-85	2.5263E-01	7.732	15.465	0.00E+00	1.95E+00	3.91E+00	11.0000	1.084E-01
Np-237	1.2427E-06	7.732	15.465	0.00E+00	9.61E-06	1.92E-05		
Pa-231	3.8511E-09	7.732	15.465	0.00E+00	2.98E-08	5.96E-08		
Pb-210	7.3880E-15	7.732	15.465	0.00E+00	5.71E-14	1.14E-13		
Pm-147	2.1023E+00	7.732	15.465	0.00E+00	1.63E+01	3.25E+01		
Pu-238	1.0383E-03	7.732	15.465	0.00E+00	8.03E-03	1.61E-02		
Pu-239	5.5293E-03	7.732	15.465	0.00E+00	4.28E-02	8.55E-02		
Pu-240	2.1278E-03	7.732	15.465	0.00E+00	1.65E-02	3.29E-02		
Pu-241	1.0195E-01	7.732	15.465	0.00E+00	7.88E-01	1.58E+00		
Pu-242	2.3128E-07	7.732	15.465	0.00E+00	1.79E-06	3.58E-06		
Ra-226	5.2782E-14	7.732	15.465	0.00E+00	4.08E-13	8.16E-13		
Ra-228	1.9338E-10	7.732	15.465	0.00E+00	1.50E-09	2.99E-09		
Ru-106	9.1684E-02	7.732	15.465	0.00E+00	7.09E-01	1.42E+00		
Se-79	1.3018E-05	7.732	15.465	0.00E+00	1.01E-04	2.01E-04		
Sn-126	1.2167E-05	7.732	15.465	0.00E+00	9.41E-05	1.88E-04		
Sr-90	2.6045E+00	7.732	15.465	0.00E+00	2.01E+01	4.03E+01		
Tc-99	4.4241E-04	7.732	15.465	0.00E+00	3.42E-03	6.84E-03		
Th-229	1.3713E-10	7.732	15.465	0.00E+00	1.06E-09	2.12E-09		
Th-230	1.8090E-11	7.732	15.465	0.00E+00	1.40E-10	2.80E-10		
Th-232	2.5278E-10	7.732	15.465	0.00E+00	1.95E-09	3.91E-09		
Tl-208	1.6947E-08	7.732	15.465	0.00E+00	1.31E-07	2.62E-07		
U-232	4.8737E-08	7.732	15.465	0.00E+00	3.77E-07	7.54E-07		
U-233	1.2203E-07	7.732	15.465	0.00E+00	9.44E-07	1.89E-06		
U-234	1.5925E-07	7.732	15.465	0.00E+00	1.23E-06	2.46E-06		
U-235	-2.6194E-06	7.732	0.000	2.06E-04	1.86E-04	2.06E-04		
U-236	1.2693E-05	7.732	15.465	0.00E+00	9.81E-05	1.96E-04		
U-238	-3.6331E-08	7.732	0.000	1.29E-04	1.29E-04	1.29E-04		
Y-90	2.6060E+00	7.732	15.465	0.00E+00	2.02E+01	4.03E+01		
Other Radionuclides					2.79E+01	5.58E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.9	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	4.678	7.732	
Bounding:		15.465	

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:	0.47	1.65
Bounding:	0.94	

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (PENN. STATE UNIV.) ¹Fuel decay start date: 2035
 SNF ID #: 815 Estimates as of: 2030
 Fuel Units & Descr: 7 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=1.38kg : EOL=1.32kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.09

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	8.5173E-10	60.140	120.281	0.00E+00	5.12E-08	1.02E-07	Avg. MeV	
Am-241	1.8331E-03	60.140	120.281	0.00E+00	1.10E-01	2.20E-01	0.0150	1.944E+13
Am-242m	1.4129E-06	60.140	120.281	0.00E+00	8.50E-05	1.70E-04	0.0250	4.278E+12
Am-243	1.4774E-07	60.140	120.281	0.00E+00	8.89E-06	1.78E-05	0.0375	3.643E+12
C-14	1.2871E-04	60.140	120.281	0.00E+00	7.74E-03	1.55E-02	0.0575	3.739E+12
Cl-36	2.8120E-06	60.140	120.281	0.00E+00	1.69E-04	3.38E-04	0.0850	2.316E+12
Cm-243	1.7940E-07	60.140	120.281	0.00E+00	1.08E-05	2.16E-05	0.1250	1.682E+12
Cm-244	1.6962E-06	60.140	120.281	0.00E+00	1.02E-04	2.04E-04	0.2250	1.965E+12
Co-60	1.2839E+00	60.140	120.281	0.00E+00	7.72E+01	1.54E+02	0.3750	9.972E+11
Cs-134	9.0541E-02	60.140	120.281	0.00E+00	5.45E+00	1.09E+01	0.5750	1.326E+13
Cs-135	3.2195E-05	60.140	120.281	0.00E+00	1.94E-03	3.87E-03	0.8500	5.689E+11
Cs-137	2.7564E+00	60.140	120.281	0.00E+00	1.66E+02	3.32E+02	1.2500	1.155E+13
Eu-154	1.5368E-02	60.140	120.281	0.00E+00	9.24E-01	1.85E+00	1.7500	7.703E+09
Eu-155	2.9293E-02	60.140	120.281	0.00E+00	1.76E+00	3.52E+00	2.2500	1.242E+10
Fe-55	7.7158E-01	60.140	120.281	0.00E+00	4.64E+01	9.28E+01	2.7500	9.852E+07
H-3	1.1111E-02	60.140	120.281	0.00E+00	6.68E-01	1.34E+00	3.5000	1.147E+07
I-129	7.3684E-07	60.140	120.281	0.00E+00	4.43E-05	8.86E-05	5.0000	6.388E+01
Kr-85	2.5263E-01	60.140	120.281	0.00E+00	1.52E+01	3.04E+01	7.0000	7.232E+00
Np-237	1.2427E-06	60.140	120.281	0.00E+00	7.47E-05	1.49E-04	11.0000	8.239E-01
Pa-231	3.8511E-09	60.140	120.281	0.00E+00	2.32E-07	4.63E-07		
Pb-210	7.3880E-15	60.140	120.281	0.00E+00	4.44E-13	8.89E-13		
Pm-147	2.1023E+00	60.140	120.281	0.00E+00	1.26E+02	2.53E+02		
Pu-238	1.0383E-03	60.140	120.281	0.00E+00	6.24E-02	1.25E-01		
Pu-239	5.5293E-03	60.140	120.281	0.00E+00	3.33E-01	6.65E-01		
Pu-240	2.1278E-03	60.140	120.281	0.00E+00	1.28E-01	2.56E-01		
Pu-241	1.0195E-01	60.140	120.281	0.00E+00	6.13E+00	1.23E+01		
Pu-242	2.3128E-07	60.140	120.281	0.00E+00	1.39E-05	2.78E-05		
Ra-226	5.2782E-14	60.140	120.281	0.00E+00	3.17E-12	6.35E-12		
Ra-228	1.9338E-10	60.140	120.281	0.00E+00	1.16E-08	2.33E-08		
Ru-106	9.1684E-02	60.140	120.281	0.00E+00	5.51E+00	1.10E+01		
Se-79	1.3018E-05	60.140	120.281	0.00E+00	7.83E-04	1.57E-03		
Sn-126	1.2167E-05	60.140	120.281	0.00E+00	7.32E-04	1.46E-03		
Sr-90	2.6045E+00	60.140	120.281	0.00E+00	1.57E+02	3.13E+02		
Tc-99	4.4241E-04	60.140	120.281	0.00E+00	2.66E-02	5.32E-02		
Th-229	1.3713E-10	60.140	120.281	0.00E+00	8.25E-09	1.65E-08		
Th-230	1.8090E-11	60.140	120.281	0.00E+00	1.09E-09	2.18E-09		
Th-232	2.5278E-10	60.140	120.281	0.00E+00	1.52E-08	3.04E-08		
Ti-208	1.6947E-08	60.140	120.281	0.00E+00	1.02E-06	2.04E-06		
U-232	4.8737E-08	60.140	120.281	0.00E+00	2.93E-06	5.86E-06		
U-233	1.2203E-07	60.140	120.281	0.00E+00	7.34E-06	1.47E-05		
U-234	1.5925E-07	60.140	120.281	0.00E+00	9.58E-06	1.92E-05		
U-235	-2.6194E-06	60.140	0.000	5.90E-04	4.32E-04	5.90E-04		
U-236	1.2693E-05	60.140	120.281	0.00E+00	7.63E-04	1.53E-03		
U-238	-3.6331E-08	60.140	0.000	3.72E-04	3.70E-04	3.72E-04		
Y-90	2.6060E+00	60.140	120.281	0.00E+00	1.57E+02	3.13E+02		
Other Radionuclides					2.17E+02	4.34E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.50E+00	7.00E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.79695431	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	40.319	60.140	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		120.281	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	1.28	1.49	1.00
Bounding:	2.56		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (SLOVENIA) ¹Fuel decay start date: 1959
 SNF ID #: 941 Estimates as of: 2030
 Fuel Units & Descr: 3 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=47kg ; EOL=46kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.04

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.2442E-08	16.138	32.276	0.00E+00	2.01E-07	4.02E-07	Avg. MeV	
Am-241	4.0120E-03	16.138	32.276	0.00E+00	6.47E-02	1.29E-01	0.0150	1.104E+12
Am-242m	1.0749E-06	16.138	32.276	0.00E+00	1.73E-05	3.47E-05	0.0250	2.291E+11
Am-243	1.4692E-07	16.138	32.276	0.00E+00	2.37E-06	4.74E-06	0.0375	1.999E+11
C-14	1.2777E-04	16.138	32.276	0.00E+00	2.06E-03	4.12E-03	0.0575	2.153E+11
Cf-252	2.8120E-06	16.138	32.276	0.00E+00	4.54E-05	9.08E-05	0.0850	1.290E+11
Cm-243	4.1759E-08	16.138	32.276	0.00E+00	6.74E-07	1.35E-06	0.1250	8.366E+10
Cm-244	1.7098E-07	16.138	32.276	0.00E+00	2.76E-06	5.52E-06	0.2250	1.111E+11
Co-60	4.8241E-04	16.138	32.276	0.00E+00	7.79E-03	1.56E-02	0.3750	4.847E+10
Cs-134	1.5970E-10	16.138	32.276	0.00E+00	2.58E-09	5.15E-09	0.5750	8.280E+11
Cs-135	3.2195E-05	16.138	32.276	0.00E+00	5.20E-04	1.04E-03	0.8500	7.964E+09
Cs-137	6.8977E-01	16.138	32.276	0.00E+00	1.11E+01	2.23E+01	1.2500	3.863E+09
Eu-154	1.2238E-04	16.138	32.276	0.00E+00	1.97E-03	3.95E-03	1.7500	2.050E+08
Eu-155	6.7158E-06	16.138	32.276	0.00E+00	1.08E-04	2.17E-04	2.2500	2.845E+04
Fe-55	8.8165E-08	16.138	32.276	0.00E+00	1.42E-06	2.85E-06	2.7500	1.174E+04
H-3	3.8378E-04	16.138	32.276	0.00E+00	6.19E-03	1.24E-02	3.5000	3.988E+01
I-129	7.3684E-07	16.138	32.276	0.00E+00	1.19E-05	2.38E-05	5.0000	1.679E+01
Kr-85	5.2316E-03	16.138	32.276	0.00E+00	8.44E-02	1.69E-01	7.0000	1.895E+00
Np-237	1.3232E-06	16.138	32.276	0.00E+00	2.14E-05	4.27E-05	11.0000	2.154E+01
Pa-231	1.8722E-08	16.138	32.276	0.00E+00	3.02E-07	6.04E-07		
Pb-210	1.2620E-12	16.138	32.276	0.00E+00	2.04E-11	4.07E-11		
Pm-147	2.7714E-07	16.138	32.276	0.00E+00	4.47E-06	8.95E-06		
Pu-238	6.4707E-04	16.138	32.276	0.00E+00	1.04E-02	2.09E-02		
Pu-239	5.5203E-03	16.138	32.276	0.00E+00	8.91E-02	1.78E-01		
Pu-240	2.1143E-03	16.138	32.276	0.00E+00	3.41E-02	6.82E-02		
Pu-241	5.6872E-03	16.138	32.276	0.00E+00	9.18E-02	1.84E-01		
Pu-242	2.3128E-07	16.138	32.276	0.00E+00	3.73E-06	7.46E-06		
Ra-226	2.6466E-12	16.138	32.276	0.00E+00	4.27E-11	8.54E-11		
Ra-228	2.5278E-10	16.138	32.276	0.00E+00	4.08E-09	8.16E-09		
Ru-106	1.1377E-19	16.138	32.276	0.00E+00	1.84E-18	3.67E-18		
Se-79	1.3009E-05	16.138	32.276	0.00E+00	2.10E-04	4.20E-04		
Sn-126	1.2162E-05	16.138	32.276	0.00E+00	1.96E-04	3.93E-04		
Sr-90	6.2511E-01	16.138	32.276	0.00E+00	1.01E+01	2.02E+01		
Tc-99	4.4241E-04	16.138	32.276	0.00E+00	7.14E-03	1.43E-02		
Th-229	9.4105E-10	16.138	32.276	0.00E+00	1.52E-08	3.04E-08		
Th-230	1.7098E-10	16.138	32.276	0.00E+00	2.76E-09	5.52E-09		
Th-232	2.5278E-10	16.138	32.276	0.00E+00	4.08E-09	8.16E-09		
Tl-208	1.0305E-08	16.138	32.276	0.00E+00	1.66E-07	3.33E-07		
U-232	2.7669E-08	16.138	32.276	0.00E+00	4.47E-07	8.93E-07		
U-233	1.2239E-07	16.138	32.276	0.00E+00	1.98E-06	3.95E-06		
U-234	3.1278E-07	16.138	32.276	0.00E+00	5.05E-06	1.01E-05		
U-235	-2.6179E-06	16.138	0.000	2.03E-04	1.61E-04	2.03E-04		
U-236	1.2696E-05	16.138	32.276	0.00E+00	2.05E-04	4.10E-04		
U-238	-3.6331E-08	16.138	0.000	1.27E-04	1.27E-04	1.27E-04		
Y-90	6.2541E-01	16.138	32.276	0.00E+00	1.01E+01	2.02E+01		
Other Radionuclides					1.14E+01	2.29E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.28E-01	2.56E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.87312476	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	16.138	15.465	
Bounding:		32.276	

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

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	1.00	0.96	1.00
Bounding:	2.00		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (SO. KOREA) 1 Fuel decay start date: 1996
 SNF ID #: 734 Estimates as of: 2030
 Fuel Units & Descr: 3 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=48kg ; EOL=47kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 25 years

Estimated
Canister usage:
18"x10"
0.04

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	4.1459E-09	11.695	23.390	0.00E+00	4.85E-08	9.70E-08	0.0150	2.076E+12
Am-241	3.5850E-03	11.695	23.390	0.00E+00	4.19E-02	8.39E-02	0.0250	4.316E+11
Am-242m	1.2899E-06	11.695	23.390	0.00E+00	1.51E-05	3.02E-05	0.0375	3.745E+11
Am-243	1.4747E-07	11.695	23.390	0.00E+00	1.72E-06	3.45E-06	0.0575	4.035E+11
C-14	1.2839E-04	11.695	23.390	0.00E+00	1.50E-03	3.00E-03	0.0850	2.431E+11
Cl-36	2.8120E-06	11.695	23.390	0.00E+00	3.29E-05	6.58E-05	0.1250	1.586E+11
Cm-243	1.1038E-07	11.695	23.390	0.00E+00	1.29E-06	2.58E-06	0.2250	2.091E+11
Cm-244	7.8917E-07	11.695	23.390	0.00E+00	9.23E-06	1.85E-05	0.3750	9.129E+10
Co-60	9.2647E-02	11.695	23.390	0.00E+00	1.08E+00	2.17E+00	0.5750	1.514E+12
Cs-134	1.0940E-04	11.695	23.390	0.00E+00	1.28E-03	2.56E-03	0.8500	1.625E+10
Cs-135	3.2195E-05	11.695	23.390	0.00E+00	3.77E-04	7.53E-04	1.2500	1.669E+11
Cs-137	1.7368E+00	11.695	23.390	0.00E+00	2.03E+01	4.06E+01	1.7500	4.231E+08
Eu-154	3.0677E-03	11.695	23.390	0.00E+00	3.59E-02	7.18E-02	2.2500	8.919E+05
Eu-155	1.7925E-03	11.695	23.390	0.00E+00	2.10E-02	4.19E-02	2.7500	1.508E+04
Fe-55	3.7444E-03	11.695	23.390	0.00E+00	4.38E-02	8.76E-02	3.5000	3.190E+01
H-3	3.6180E-03	11.695	23.390	0.00E+00	4.23E-02	8.46E-02	5.0000	1.243E+01
I-129	7.3684E-07	11.695	23.390	0.00E+00	8.62E-06	1.72E-05	7.0000	1.403E+00
Kr-85	6.9368E-02	11.695	23.390	0.00E+00	8.11E-01	1.62E+00	11.0000	1.596E-01
Np-237	1.2662E-06	11.695	23.390	0.00E+00	1.48E-05	2.96E-05		
Pa-231	9.1654E-09	11.695	23.390	0.00E+00	1.07E-07	2.14E-07		
Pb-210	1.3728E-13	11.695	23.390	0.00E+00	1.61E-12	3.21E-12		
Pm-147	1.0702E-02	11.695	23.390	0.00E+00	1.25E-01	2.50E-01		
Pu-238	8.8692E-04	11.695	23.390	0.00E+00	1.04E-02	2.07E-02		
Pu-239	5.5263E-03	11.695	23.390	0.00E+00	6.46E-02	1.29E-01		
Pu-240	2.1233E-03	11.695	23.390	0.00E+00	2.48E-02	4.97E-02		
Pu-241	3.8962E-02	11.695	23.390	0.00E+00	4.56E-01	9.11E-01		
Pu-242	2.3128E-07	11.695	23.390	0.00E+00	2.70E-06	5.41E-06		
Ra-226	4.6752E-13	11.695	23.390	0.00E+00	5.47E-12	1.09E-11		
Ra-228	2.4827E-10	11.695	23.390	0.00E+00	2.90E-09	5.81E-09		
Ru-106	9.8526E-08	11.695	23.390	0.00E+00	1.15E-06	2.30E-06		
Se-79	1.3015E-05	11.695	23.390	0.00E+00	1.52E-04	3.04E-04		
Sn-126	1.2165E-05	11.695	23.390	0.00E+00	1.42E-04	2.85E-04		
Sr-90	1.6195E+00	11.695	23.390	0.00E+00	1.89E+01	3.79E+01		
Tc-99	4.4241E-04	11.695	23.390	0.00E+00	5.17E-03	1.03E-02		
Th-229	4.2451E-10	11.695	23.390	0.00E+00	4.96E-09	9.93E-09		
Th-230	6.1398E-11	11.695	23.390	0.00E+00	7.18E-10	1.44E-09		
Th-232	2.5278E-10	11.695	23.390	0.00E+00	2.96E-09	5.91E-09		
Tl-208	1.5098E-08	11.695	23.390	0.00E+00	1.77E-07	3.53E-07		
U-232	4.0662E-08	11.695	23.390	0.00E+00	4.76E-07	9.51E-07		
U-233	1.2217E-07	11.695	23.390	0.00E+00	1.43E-06	2.86E-06		
U-234	2.2391E-07	11.695	23.390	0.00E+00	2.62E-06	5.24E-06		
U-235	-2.6194E-06	11.695	0.000	2.07E-04	1.77E-04	2.07E-04		
U-236	1.2695E-05	11.695	23.390	0.00E+00	1.48E-04	2.97E-04		
U-238	-3.6331E-08	11.695	0.000	1.29E-04	1.29E-04	1.29E-04		
Y-90	1.6195E+00	11.695	23.390	0.00E+00	1.89E+01	3.79E+01		
Other Radionuclides					2.01E+01	4.02E+01		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	11.695	7.446	
Bounding:		23.390	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.71	0.64	
Bounding:	1.43		

0.99

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (U OF AZ) 1Fuel decay start date: 2035
 SNF ID #: 974 Estimates as of: 2030
 Fuel Units & Descr: 2 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=32kg ; EOL=32kg 2Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.03

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	0.955	1.909	0.00E+00	8.13E-10	1.63E-09		
Am-241	1.8331E-03	0.955	1.909	0.00E+00	1.75E-03	3.50E-03	0.0150	3.086E+11
Am-242m	1.4129E-06	0.955	1.909	0.00E+00	1.35E-06	2.70E-06	0.0250	6.790E+10
Am-243	1.4774E-07	0.955	1.909	0.00E+00	1.41E-07	2.82E-07	0.0375	5.782E+10
C-14	1.2871E-04	0.955	1.909	0.00E+00	1.23E-04	2.46E-04	0.0575	5.935E+10
Cl-36	2.8120E-06	0.955	1.909	0.00E+00	2.68E-06	5.37E-06	0.0850	3.677E+10
Cm-243	1.7940E-07	0.955	1.909	0.00E+00	1.71E-07	3.43E-07	0.1250	2.670E+10
Cm-244	1.6962E-06	0.955	1.909	0.00E+00	1.62E-06	3.24E-06	0.2250	3.119E+10
Co-60	1.2839E+00	0.955	1.909	0.00E+00	1.23E+00	2.45E+00	0.3750	1.583E+10
Cs-134	9.0541E-02	0.955	1.909	0.00E+00	8.64E-02	1.73E-01	0.5750	2.104E+11
Cs-135	3.2195E-05	0.955	1.909	0.00E+00	3.07E-05	6.15E-05	0.8500	9.031E+09
Cs-137	2.7564E+00	0.955	1.909	0.00E+00	2.63E+00	5.26E+00	1.2500	1.834E+11
Eu-154	1.5368E-02	0.955	1.909	0.00E+00	1.47E-02	2.93E-02	1.7500	1.223E+08
Eu-155	2.9293E-02	0.955	1.909	0.00E+00	2.80E-02	5.59E-02	2.2500	1.971E+08
Fe-55	7.7158E-01	0.955	1.909	0.00E+00	7.37E-01	1.47E+00	2.7500	1.564E+06
H-3	1.1111E-02	0.955	1.909	0.00E+00	1.06E-02	2.12E-02	3.5000	1.820E+05
I-129	7.3684E-07	0.955	1.909	0.00E+00	7.03E-07	1.41E-06	5.0000	1.200E+00
Kr-85	2.5263E-01	0.955	1.909	0.00E+00	2.41E-01	4.82E-01	7.0000	1.362E-01
Np-237	1.2427E-06	0.955	1.909	0.00E+00	1.19E-06	2.37E-06	11.0000	1.553E-02
Pa-231	3.8511E-09	0.955	1.909	0.00E+00	3.68E-09	7.35E-09		
Pb-210	7.3880E-15	0.955	1.909	0.00E+00	7.05E-15	1.41E-14		
Pm-147	2.1023E+00	0.955	1.909	0.00E+00	2.01E+00	4.01E+00		
Pu-238	1.0383E-03	0.955	1.909	0.00E+00	9.91E-04	1.98E-03		
Pu-239	5.5293E-03	0.955	1.909	0.00E+00	5.28E-03	1.06E-02		
Pu-240	2.1278E-03	0.955	1.909	0.00E+00	2.03E-03	4.06E-03		
Pu-241	1.0195E-01	0.955	1.909	0.00E+00	9.73E-02	1.95E-01		
Pu-242	2.3128E-07	0.955	1.909	0.00E+00	2.21E-07	4.42E-07		
Ra-226	5.2782E-14	0.955	1.909	0.00E+00	5.04E-14	1.01E-13		
Ra-228	1.9338E-10	0.955	1.909	0.00E+00	1.85E-10	3.69E-10		
Ru-106	9.1684E-02	0.955	1.909	0.00E+00	8.75E-02	1.75E-01		
Se-79	1.3018E-05	0.955	1.909	0.00E+00	1.24E-05	2.49E-05		
Sn-126	1.2167E-05	0.955	1.909	0.00E+00	1.16E-05	2.32E-05		
Sr-90	2.6045E+00	0.955	1.909	0.00E+00	2.49E+00	4.97E+00		
Tc-99	4.4241E-04	0.955	1.909	0.00E+00	4.22E-04	8.45E-04		
Th-229	1.3713E-10	0.955	1.909	0.00E+00	1.31E-10	2.62E-10		
Th-230	1.8090E-11	0.955	1.909	0.00E+00	1.73E-11	3.45E-11		
Th-232	2.5278E-10	0.955	1.909	0.00E+00	2.41E-10	4.83E-10		
Tl-208	1.6947E-08	0.955	1.909	0.00E+00	1.62E-08	3.24E-08		
U-232	4.8737E-08	0.955	1.909	0.00E+00	4.65E-08	9.30E-08		
U-233	1.2203E-07	0.955	1.909	0.00E+00	1.16E-07	2.33E-07		
U-234	1.5925E-07	0.955	1.909	0.00E+00	1.52E-07	3.04E-07		
U-235	-2.6194E-06	0.955	0.000	1.37E-04	1.35E-04	1.37E-04		
U-236	1.2693E-05	0.955	1.909	0.00E+00	1.21E-05	2.42E-05		
U-238	-3.6331E-08	0.955	0.000	8.62E-05	8.61E-05	8.62E-05		
Y-90	2.6060E+00	0.955	1.909	0.00E+00	2.49E+00	4.98E+00		
Other Radionuclides					3.44E+00	6.88E+00		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.875	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	0.780	0.955	
Bounding:		1.909	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.09	1.22	
Bounding:	0.17		

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (U OF TX AUSTIN)
 SNF ID #: 825
 Fuel Units & Descr: 3 - ELEMENT
 Heavy Metal Mass: BOL=48kg ; EOL=.48kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.04

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	2.339	4.678	0.00E+00	1.99E-09	3.98E-09	0.0150	7.561E+11
Am-241	1.8331E-03	2.339	4.678	0.00E+00	4.29E-03	8.58E-03	0.0250	1.664E+11
Am-242m	1.4129E-06	2.339	4.678	0.00E+00	3.30E-06	6.61E-06	0.0375	1.417E+11
Am-243	1.4774E-07	2.339	4.678	0.00E+00	3.46E-07	6.91E-07	0.0575	1.454E+11
C-14	1.2871E-04	2.339	4.678	0.00E+00	3.01E-04	6.02E-04	0.0850	9.009E+10
Ci-36	2.8120E-06	2.339	4.678	0.00E+00	6.58E-06	1.32E-05	0.1250	6.542E+10
Cm-243	1.7940E-07	2.339	4.678	0.00E+00	4.20E-07	8.39E-07	0.2250	7.643E+10
Cm-244	1.6962E-06	2.339	4.678	0.00E+00	3.97E-06	7.94E-06	0.3750	3.878E+10
Co-60	1.2839E+00	2.339	4.678	0.00E+00	3.00E+00	6.01E+00	0.5750	5.156E+11
Cs-134	9.0541E-02	2.339	4.678	0.00E+00	2.12E-01	4.24E-01	0.8500	2.213E+11
Cs-135	3.2195E-05	2.339	4.678	0.00E+00	7.53E-05	1.51E-04	1.2500	4.494E+11
Cs-137	2.7564E+00	2.339	4.678	0.00E+00	6.45E+00	1.29E+01	1.7500	2.996E+08
Eu-154	1.5368E-02	2.339	4.678	0.00E+00	3.59E-02	7.19E-02	2.2500	4.829E+08
Eu-155	2.9293E-02	2.339	4.678	0.00E+00	6.85E-02	1.37E-01	2.7500	3.832E+06
Fe-55	7.7158E-01	2.339	4.678	0.00E+00	1.80E+00	3.61E+00	3.5000	4.461E+05
H-3	1.1111E-02	2.339	4.678	0.00E+00	2.60E-02	5.20E-02	5.0000	2.750E+00
I-129	7.3684E-07	2.339	4.678	0.00E+00	1.72E-06	3.45E-06	7.0000	3.119E-01
Kr-85	2.5263E-01	2.339	4.678	0.00E+00	5.91E-01	1.18E+00	11.0000	3.556E-02
Np-237	1.2427E-06	2.339	4.678	0.00E+00	2.91E-06	5.81E-06		
Pa-231	3.8511E-09	2.339	4.678	0.00E+00	9.01E-09	1.80E-08		
Pb-210	7.3880E-15	2.339	4.678	0.00E+00	1.73E-14	3.46E-14		
Pm-147	2.1023E+00	2.339	4.678	0.00E+00	4.92E+00	9.83E+00		
Pu-238	1.0383E-03	2.339	4.678	0.00E+00	2.43E-03	4.86E-03		
Pu-239	5.5293E-03	2.339	4.678	0.00E+00	1.29E-02	2.59E-02		
Pu-240	2.1278E-03	2.339	4.678	0.00E+00	4.98E-03	9.95E-03		
Pu-241	1.0195E-01	2.339	4.678	0.00E+00	2.38E-01	4.77E-01		
Pu-242	2.3128E-07	2.339	4.678	0.00E+00	5.41E-07	1.08E-06		
Ra-226	5.2782E-14	2.339	4.678	0.00E+00	1.23E-13	2.47E-13		
Ra-228	1.9338E-10	2.339	4.678	0.00E+00	4.52E-10	9.05E-10		
Ru-106	9.1684E-02	2.339	4.678	0.00E+00	2.14E-01	4.29E-01		
Se-79	1.3018E-05	2.339	4.678	0.00E+00	3.04E-05	6.09E-05		
Sn-126	1.2167E-05	2.339	4.678	0.00E+00	2.85E-05	5.69E-05		
Sr-90	2.6045E+00	2.339	4.678	0.00E+00	6.09E+00	1.22E+01		
Tc-99	4.4241E-04	2.339	4.678	0.00E+00	1.03E-03	2.07E-03		
Th-229	1.3713E-10	2.339	4.678	0.00E+00	3.21E-10	6.41E-10		
Th-230	1.8090E-11	2.339	4.678	0.00E+00	4.23E-11	8.46E-11		
Th-232	2.5278E-10	2.339	4.678	0.00E+00	5.91E-10	1.18E-09		
Th-208	1.6947E-08	2.339	4.678	0.00E+00	3.96E-08	7.93E-08		
U-232	4.8737E-08	2.339	4.678	0.00E+00	1.14E-07	2.28E-07		
U-233	1.2203E-07	2.339	4.678	0.00E+00	2.85E-07	5.71E-07		
U-234	1.5925E-07	2.339	4.678	0.00E+00	3.72E-07	7.45E-07		
U-235	-2.6194E-06	2.339	0.000	2.05E-04	1.99E-04	2.05E-04		
U-236	1.2693E-05	2.339	4.678	0.00E+00	2.97E-05	5.94E-05		
U-238	-3.6331E-08	2.339	0.000	1.29E-04	1.29E-04	1.29E-04		
Y-90	2.6060E+00	2.339	4.678	0.00E+00	6.10E+00	1.22E+01		
Other Radionuclides					8.43E+00	1.69E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.36E-01	2.72E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.7916875	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	2.339		Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		4.678	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.14	0.00	1.00
Bounding:	0.29		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FFCR (ZAIRE) ¹Fuel decay start date: 2010
 SNF ID #: 735 Estimates as of: 2030
 Fuel Units & Descr: 4 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=.64kg ; EOL=.64kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.04

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.6436E-09	6.218	12.436	0.00E+00	1.64E-08	3.29E-08		
Am-241	3.1429E-03	6.218	12.436	0.00E+00	1.95E-02	3.91E-02	0.0150	1.246E+12
Am-242m	1.3195E-06	6.218	12.436	0.00E+00	8.20E-06	1.64E-05	0.0250	2.594E+11
Am-243	1.4753E-07	6.218	12.436	0.00E+00	9.17E-07	1.83E-06	0.0375	2.247E+11
C-14	1.2847E-04	6.218	12.436	0.00E+00	7.99E-04	1.60E-03	0.0575	2.418E+11
Cl-36	2.8120E-06	6.218	12.436	0.00E+00	1.75E-05	3.50E-05	0.0850	1.460E+11
Cm-243	1.2465E-07	6.218	12.436	0.00E+00	7.75E-07	1.55E-06	0.1250	9.539E+10
Cm-244	9.5564E-07	6.218	12.436	0.00E+00	5.94E-06	1.19E-05	0.2250	1.253E+11
Co-60	1.7880E-01	6.218	12.436	0.00E+00	1.11E+00	2.22E+00	0.3750	5.499E+10
Cs-134	5.8692E-04	6.218	12.436	0.00E+00	3.65E-03	7.30E-03	0.5750	9.034E+11
Cs-135	3.2195E-05	6.218	12.436	0.00E+00	2.00E-04	4.00E-04	0.8500	1.018E+10
Cs-137	1.9489E+00	6.218	12.436	0.00E+00	1.21E+01	2.42E+01	1.2500	1.687E+11
Eu-154	4.5895E-03	6.218	12.436	0.00E+00	2.85E-02	5.71E-02	1.7500	2.617E+08
Eu-155	3.6045E-03	6.218	12.436	0.00E+00	2.24E-02	4.48E-02	2.2500	9.011E+05
Fe-55	1.4185E-02	6.218	12.436	0.00E+00	8.82E-02	1.76E-01	2.7500	9.929E+03
H-3	4.7895E-03	6.218	12.436	0.00E+00	2.98E-02	5.96E-02	3.5000	5.583E+01
I-129	7.3684E-07	6.218	12.436	0.00E+00	4.58E-06	9.16E-06	5.0000	6.856E+00
Kr-85	9.5820E-02	6.218	12.436	0.00E+00	5.96E-01	1.19E+00	7.0000	7.752E-01
Np-237	1.2552E-06	6.218	12.436	0.00E+00	7.80E-06	1.56E-05	11.0000	8.824E-02
Pa-231	7.0406E-09	6.218	12.436	0.00E+00	4.38E-08	8.76E-08		
Pb-210	5.8000E-14	6.218	12.436	0.00E+00	3.61E-13	7.21E-13		
Pm-147	4.0075E-02	6.218	12.436	0.00E+00	2.49E-01	4.98E-01		
Pu-238	9.2256E-04	6.218	12.436	0.00E+00	5.74E-03	1.15E-02		
Pu-239	5.5278E-03	6.218	12.436	0.00E+00	3.44E-02	6.87E-02		
Pu-240	2.1248E-03	6.218	12.436	0.00E+00	1.32E-02	2.64E-02		
Pu-241	4.9549E-02	6.218	12.436	0.00E+00	3.08E-01	6.16E-01		
Pu-242	2.3128E-07	6.218	12.436	0.00E+00	1.44E-06	2.88E-06		
Ra-226	2.4526E-13	6.218	12.436	0.00E+00	1.53E-12	3.05E-12		
Ra-228	2.4015E-10	6.218	12.436	0.00E+00	1.49E-09	2.99E-09		
Ru-106	3.0602E-06	6.218	12.436	0.00E+00	1.90E-05	3.81E-05		
Se-79	1.3015E-05	6.218	12.436	0.00E+00	8.09E-05	1.62E-04		
Sn-126	1.2165E-05	6.218	12.436	0.00E+00	7.56E-05	1.51E-04		
Sr-90	1.8226E+00	6.218	12.436	0.00E+00	1.13E+01	2.27E+01		
Tc-99	4.4241E-04	6.218	12.436	0.00E+00	2.75E-03	5.50E-03		
Th-229	3.0962E-10	6.218	12.436	0.00E+00	1.93E-09	3.85E-09		
Th-230	4.2346E-11	6.218	12.436	0.00E+00	2.63E-10	5.27E-10		
Th-232	2.5278E-10	6.218	12.436	0.00E+00	1.57E-09	3.14E-09		
Tl-208	1.5820E-08	6.218	12.436	0.00E+00	9.84E-08	1.97E-07		
U-232	4.2647E-08	6.218	12.436	0.00E+00	2.65E-07	5.30E-07		
U-233	1.2211E-07	6.218	12.436	0.00E+00	7.59E-07	1.52E-06		
U-234	1.9955E-07	6.218	12.436	0.00E+00	1.24E-06	2.48E-06		
U-235	-2.6194E-06	6.218	0.000	2.76E-04	2.59E-04	2.76E-04	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	6.218	12.436	0.00E+00	7.89E-05	1.58E-04	1.56E-01	3.11E-01
U-238	-3.6331E-08	6.218	0.000	1.72E-04	1.71E-04	1.72E-04	Total	Total
Y-90	1.8241E+00	6.218	12.436	0.00E+00	1.13E+01	2.27E+01		
Other Radionuclides					1.20E+01	2.39E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00000041	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	6.218		Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		12.436	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.29	0.00	0.99
Bounding:	0.57		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP
 SNF ID #: 242
 Fuel Units & Descr: 92 - ELEMENT
 Heavy Metal Mass: BOL=18.03kg ; EOL=15.53kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.83

II. Estimates							Gamma Sources	
	m	x _a	x _b	b	y _a	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.8488E-10	2,378.332	4,756.663	0.00E+00	6.78E-07	1.36E-06	Avg. MeV	
Am-241	7.5767E-03	2,378.332	4,756.663	0.00E+00	1.80E+01	3.60E+01	0.0150	7.675E+14
Am-242m	2.4459E-05	2,378.332	4,756.663	0.00E+00	5.82E-02	1.16E-01	0.0250	1.684E+14
Am-243	3.0983E-05	2,378.332	4,756.663	0.00E+00	7.37E-02	1.47E-01	0.0375	1.490E+14
C-14	1.2590E-04	2,378.332	4,756.663	0.00E+00	2.99E-01	5.99E-01	0.0575	1.487E+14
Cl-36	2.6624E-06	2,378.332	4,756.663	0.00E+00	6.33E-03	1.27E-02	0.0850	9.252E+13
Co-243	3.8244E-05	2,378.332	4,756.663	0.00E+00	9.10E-02	1.82E-01	0.1250	7.429E+13
Co-244	4.1010E-03	2,378.332	4,756.663	0.00E+00	9.75E+00	1.95E+01	0.2250	7.863E+13
Co-60	1.2410E+00	2,378.332	4,756.663	0.00E+00	2.95E+03	5.90E+03	0.3750	3.923E+13
Cs-134	6.5454E-01	2,378.332	4,756.663	0.00E+00	1.56E+03	3.11E+03	0.5750	6.499E+14
Cs-135	1.9753E-05	2,378.332	4,756.663	0.00E+00	4.70E-02	9.40E-02	0.8500	1.191E+14
Cs-137	2.7375E+00	2,378.332	4,756.663	0.00E+00	6.51E+03	1.30E+04	1.2500	4.575E+14
Eu-154	1.2324E-01	2,378.332	4,756.663	0.00E+00	2.93E+02	5.86E+02	1.7500	6.120E+11
Eu-155	5.3037E-02	2,378.332	4,756.663	0.00E+00	1.26E+02	2.52E+02	2.2500	4.797E+11
Fe-55	7.9555E-01	2,378.332	4,756.663	0.00E+00	1.89E+03	3.78E+03	2.7500	4.349E+09
H-3	1.0531E-02	2,378.332	4,756.663	0.00E+00	2.50E+01	5.01E+01	3.5000	5.119E+08
I-129	7.1287E-07	2,378.332	4,756.663	0.00E+00	1.70E-03	3.39E-03	5.0000	1.226E+05
Kr-85	2.4955E-01	2,378.332	4,756.663	0.00E+00	5.94E+02	1.19E+03	7.0000	1.411E+04
Np-237	1.2121E-05	2,378.332	4,756.663	0.00E+00	2.88E-02	5.77E-02	11.0000	1.619E+03
Pa-231	1.1230E-09	2,378.332	4,756.663	0.00E+00	2.67E-06	5.34E-06		
Pb-210	6.1636E-14	2,378.332	4,756.663	0.00E+00	1.47E-10	2.93E-10		
Pm-147	1.1302E+00	2,378.332	4,756.663	0.00E+00	2.69E+03	5.38E+03		
Pu-238	5.4826E-02	2,378.332	4,756.663	0.00E+00	1.30E+02	2.61E+02		
Pu-239	1.4056E-03	2,378.332	4,756.663	0.00E+00	3.34E+00	6.69E+00		
Pu-240	1.1536E-03	2,378.332	4,756.663	0.00E+00	2.74E+00	5.49E+00		
Pu-241	4.2995E-01	2,378.332	4,756.663	0.00E+00	1.02E+03	2.05E+03		
Pu-242	4.9910E-06	2,378.332	4,756.663	0.00E+00	1.19E-02	2.37E-02		
Ra-226	2.4008E-13	2,378.332	4,756.663	0.00E+00	5.71E-10	1.14E-09		
Ra-228	1.8220E-11	2,378.332	4,756.663	0.00E+00	4.33E-08	8.67E-08		
Ru-106	1.0343E-01	2,378.332	4,756.663	0.00E+00	2.46E+02	4.92E+02		
Se-79	1.2832E-05	2,378.332	4,756.663	0.00E+00	3.05E-02	6.10E-02		
Sn-126	1.2090E-05	2,378.332	4,756.663	0.00E+00	2.88E-02	5.75E-02		
Sr-90	2.5646E+00	2,378.332	4,756.663	0.00E+00	6.10E+03	1.22E+04		
Tc-99	4.0319E-04	2,378.332	4,756.663	0.00E+00	9.59E-01	1.92E+00		
Th-229	7.7375E-11	2,378.332	4,756.663	0.00E+00	1.84E-07	3.68E-07		
Th-230	1.2211E-10	2,378.332	4,756.663	0.00E+00	2.90E-07	5.81E-07		
Th-232	2.3842E-11	2,378.332	4,756.663	0.00E+00	5.67E-08	1.13E-07		
Tl-208	1.4313E-07	2,378.332	4,756.663	0.00E+00	3.40E-04	6.81E-04		
U-232	4.1927E-07	2,378.332	4,756.663	0.00E+00	9.97E-04	1.99E-03		
U-233	6.8491E-08	2,378.332	4,756.663	0.00E+00	1.63E-04	3.26E-04		
U-234	2.0189E-06	2,378.332	4,756.663	0.00E+00	4.80E-03	9.60E-03		
U-235	-2.6572E-06	2,378.332	0.000	2.72E-02	2.09E-02	2.72E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.3575E-05	2,378.332	4,756.663	0.00E+00	3.23E-02	6.46E-02	1.56E+02	3.12E+02
U-238	-2.2698E-08	2,378.332	0.000	1.82E-03	1.77E-03	1.82E-03	Total	Total
Y-90	2.5646E+00	2,378.332	4,756.663	0.00E+00	6.10E+03	1.22E+04		
Other Radionuclides					8.47E+03	1.69E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrH-Er	U	
BOL Enrichment %:	69.89795918	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	509.963	2,378.332	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		4,756.663	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.39	4.66	1.00
Bounding:	0.78		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP
 SNF ID #: 241
 Fuel Units & Descr: 96 - ELEMENT
 Heavy Metal Mass: BOL=16.82kg ; EOL=14.63kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.86

II. Estimates

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.8488E-10	2,080.280	4,160.559	0.00E+00	5.93E-07	1.19E-06	Avg. MeV	
Am-241	7.5767E-03	2,080.280	4,160.559	0.00E+00	1.58E+01	3.15E+01	0.0150	6.713E+14
Am-242m	2.4459E-05	2,080.280	4,160.559	0.00E+00	5.09E-02	1.02E-01	0.0250	1.473E+14
Am-243	3.0983E-05	2,080.280	4,160.559	0.00E+00	6.45E-02	1.29E-01	0.0375	1.303E+14
C-14	1.2590E-04	2,080.280	4,160.559	0.00E+00	2.62E-01	5.24E-01	0.0575	1.301E+14
Cl-36	2.6624E-06	2,080.280	4,160.559	0.00E+00	5.54E-03	1.11E-02	0.0850	8.093E+13
Cm-243	3.8244E-05	2,080.280	4,160.559	0.00E+00	7.96E-02	1.59E-01	0.1250	6.498E+13
Cm-244	4.1010E-03	2,080.280	4,160.559	0.00E+00	8.53E-00	1.71E+01	0.2250	6.877E+13
Co-60	1.2410E+00	2,080.280	4,160.559	0.00E+00	2.58E+03	5.16E+03	0.3750	3.432E+13
Cs-134	6.5454E-01	2,080.280	4,160.559	0.00E+00	1.36E+03	2.72E+03	0.5750	5.680E+14
Cs-135	1.9753E-05	2,080.280	4,160.559	0.00E+00	4.11E-02	8.22E-02	0.8500	1.042E+14
Cs-137	2.7375E+00	2,080.280	4,160.559	0.00E+00	5.69E+03	1.14E+04	1.2500	4.002E+14
Eu-154	1.2324E-01	2,080.280	4,160.559	0.00E+00	2.56E+02	5.13E+02	1.7500	5.353E+11
Eu-155	5.3037E-02	2,080.280	4,160.559	0.00E+00	1.10E+02	2.21E+02	2.2500	4.196E+11
Fe-55	7.9555E-01	2,080.280	4,160.559	0.00E+00	1.65E+03	3.31E+03	2.7500	3.804E+09
H-3	1.0531E-02	2,080.280	4,160.559	0.00E+00	2.19E+01	4.38E+01	3.5000	4.478E+08
I-129	7.1287E-07	2,080.280	4,160.559	0.00E+00	1.48E-03	2.97E-03	5.0000	1.072E+05
Kr-85	2.4955E-01	2,080.280	4,160.559	0.00E+00	5.19E+02	1.04E+03	7.0000	1.234E+04
Np-237	1.2121E-05	2,080.280	4,160.559	0.00E+00	2.52E-02	5.04E-02	11.0000	1.416E+03
Pa-231	1.1230E-09	2,080.280	4,160.559	0.00E+00	2.34E-06	4.67E-06		
Pb-210	6.1636E-14	2,080.280	4,160.559	0.00E+00	1.28E-10	2.56E-10		
Pm-147	1.1302E+00	2,080.280	4,160.559	0.00E+00	2.35E+03	4.70E+03		
Pu-238	5.4826E-02	2,080.280	4,160.559	0.00E+00	1.14E+02	2.28E+02		
Pu-239	1.4056E-03	2,080.280	4,160.559	0.00E+00	2.92E+00	5.85E+00		
Pu-240	1.1536E-03	2,080.280	4,160.559	0.00E+00	2.40E+00	4.80E+00		
Pu-241	4.2995E-01	2,080.280	4,160.559	0.00E+00	8.94E+02	1.79E+03		
Pu-242	4.9910E-06	2,080.280	4,160.559	0.00E+00	1.04E-02	2.08E-02		
Ra-226	2.4008E-13	2,080.280	4,160.559	0.00E+00	4.99E-10	9.99E-10		
Ra-228	1.8220E-11	2,080.280	4,160.559	0.00E+00	3.79E-08	7.58E-08		
Ru-106	1.0343E-01	2,080.280	4,160.559	0.00E+00	2.15E+02	4.30E+02		
Se-79	1.2832E-05	2,080.280	4,160.559	0.00E+00	2.67E-02	5.34E-02		
Sn-126	1.2090E-05	2,080.280	4,160.559	0.00E+00	2.51E-02	5.03E-02		
Sr-90	2.5646E+00	2,080.280	4,160.559	0.00E+00	5.34E+03	1.07E+04		
Tc-99	4.0319E-04	2,080.280	4,160.559	0.00E+00	8.39E-01	1.68E+00		
Th-229	7.7375E-11	2,080.280	4,160.559	0.00E+00	1.61E-07	3.22E-07		
Th-230	1.2211E-10	2,080.280	4,160.559	0.00E+00	2.54E-07	5.08E-07		
Th-232	2.3842E-11	2,080.280	4,160.559	0.00E+00	4.96E-08	9.92E-08		
Tl-208	1.4313E-07	2,080.280	4,160.559	0.00E+00	2.98E-04	5.96E-04		
U-232	4.1927E-07	2,080.280	4,160.559	0.00E+00	8.72E-04	1.74E-03		
U-233	6.8491E-08	2,080.280	4,160.559	0.00E+00	1.42E-04	2.85E-04		
U-234	2.0189E-06	2,080.280	4,160.559	0.00E+00	4.20E-03	8.40E-03		
U-235	-2.6572E-06	2,080.280	0.000	2.54E-02	1.99E-02	2.54E-02		
U-236	1.3575E-05	2,080.280	4,160.559	0.00E+00	2.82E-02	5.65E-02		
U-238	-2.2698E-08	2,080.280	0.000	1.70E-03	1.65E-03	1.70E-03		
Y-90	2.5646E+00	2,080.280	4,160.559	0.00E+00	5.34E+03	1.07E+04		
Other Radionuclides					7.41E+03	1.48E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.36E+02	2.73E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX-Er	U	
BOL Enrichment %:	70.00179205	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	792.756	2,080.280	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		4,160.559	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.36	2.62	1.00
Bounding:	0.73		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP
 SNF ID #: 240
 Fuel Units & Descr: 87 - ELEMENT
 Heavy Metal Mass: BOL=17.05kg ; EOL=15.63kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2025
 Estimates as of: 2030
 Template: TRIGA-FLIP (LW/U-Zr, SST, 60 to 100%, U)
²Template Burnup(MWd): 66.52
 Template BOL Heavy Metal Mass (MT): 0.000196
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.78

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.8488E-10	1,356.060	2,712.119	0.00E+00	3.86E-07	7.73E-07	Avg. MeV	
Am-241	7.5767E-03	1,356.060	2,712.119	0.00E+00	1.03E+01	2.05E+01	0.0150	4.376E+14
Am-242m	2.4459E-05	1,356.060	2,712.119	0.00E+00	3.32E-02	6.63E-02	0.0250	9.603E+13
Am-243	3.0983E-05	1,356.060	2,712.119	0.00E+00	4.20E-02	8.40E-02	0.0375	8.495E+13
C-14	1.2590E-04	1,356.060	2,712.119	0.00E+00	1.71E-01	3.41E-01	0.0575	8.478E+13
Cl-36	2.6624E-06	1,356.060	2,712.119	0.00E+00	3.61E-03	7.22E-03	0.0850	5.275E+13
Cm-243	3.8244E-05	1,356.060	2,712.119	0.00E+00	5.19E-02	1.04E-01	0.1250	4.236E+13
Cm-244	4.1010E-03	1,356.060	2,712.119	0.00E+00	5.56E+00	1.11E+01	0.2250	4.483E+13
Co-60	1.2410E+00	1,356.060	2,712.119	0.00E+00	1.68E+03	3.37E+03	0.3750	2.237E+13
Cs-134	6.5454E-01	1,356.060	2,712.119	0.00E+00	8.88E+02	1.78E+03	0.5750	3.702E+14
Cs-135	1.9753E-05	1,356.060	2,712.119	0.00E+00	2.68E-02	5.36E-02	0.8500	6.791E+13
Cs-137	2.7375E+00	1,356.060	2,712.119	0.00E+00	3.71E+03	7.42E+03	1.2500	2.609E+14
Eu-154	1.2324E-01	1,356.060	2,712.119	0.00E+00	1.67E+02	3.34E+02	1.7500	3.490E+11
Eu-155	5.3037E-02	1,356.060	2,712.119	0.00E+00	7.19E+01	1.44E+02	2.2500	2.735E+11
Fe-55	7.9555E-01	1,356.060	2,712.119	0.00E+00	1.08E+03	2.16E+03	2.7500	2.480E+09
H-3	1.0531E-02	1,356.060	2,712.119	0.00E+00	1.43E+01	2.86E+01	3.5000	2.919E+08
I-129	7.1287E-07	1,356.060	2,712.119	0.00E+00	9.67E-04	1.93E-03	5.0000	6.991E+04
Kr-85	2.4955E-01	1,356.060	2,712.119	0.00E+00	3.38E+02	6.77E+02	7.0000	8.046E+03
Np-237	1.2121E-05	1,356.060	2,712.119	0.00E+00	1.64E-02	3.29E-02	11.0000	9.233E+02
Pa-231	1.1230E-09	1,356.060	2,712.119	0.00E+00	1.52E-06	3.05E-06		
Pb-210	6.1636E-14	1,356.060	2,712.119	0.00E+00	8.36E-11	1.67E-10		
Pm-147	1.1302E+00	1,356.060	2,712.119	0.00E+00	1.53E+03	3.07E+03		
Pu-238	5.4826E-02	1,356.060	2,712.119	0.00E+00	7.43E+01	1.49E+02		
Pu-239	1.4056E-03	1,356.060	2,712.119	0.00E+00	1.91E+00	3.81E+00		
Pu-240	1.1536E-03	1,356.060	2,712.119	0.00E+00	1.56E+00	3.13E+00		
Pu-241	4.2995E-01	1,356.060	2,712.119	0.00E+00	5.83E+02	1.17E+03		
Pu-242	4.9910E-06	1,356.060	2,712.119	0.00E+00	6.77E-03	1.35E-02		
Ra-226	2.4008E-13	1,356.060	2,712.119	0.00E+00	3.26E-10	6.51E-10		
Ra-228	1.8220E-11	1,356.060	2,712.119	0.00E+00	2.47E-08	4.94E-08		
Ru-106	1.0343E-01	1,356.060	2,712.119	0.00E+00	1.40E+02	2.81E+02		
Se-79	1.2832E-05	1,356.060	2,712.119	0.00E+00	1.74E-02	3.48E-02		
Sn-126	1.2090E-05	1,356.060	2,712.119	0.00E+00	1.64E-02	3.28E-02		
Sr-90	2.5646E+00	1,356.060	2,712.119	0.00E+00	3.48E+03	6.96E+03		
Tc-99	4.0319E-04	1,356.060	2,712.119	0.00E+00	5.47E-01	1.09E+00		
Th-229	7.7375E-11	1,356.060	2,712.119	0.00E+00	1.05E-07	2.10E-07		
Th-230	1.2211E-10	1,356.060	2,712.119	0.00E+00	1.66E-07	3.31E-07		
Th-232	2.3842E-11	1,356.060	2,712.119	0.00E+00	3.23E-08	6.47E-08		
Th-232	1.4313E-07	1,356.060	2,712.119	0.00E+00	1.94E-04	3.88E-04		
U-232	4.1927E-07	1,356.060	2,712.119	0.00E+00	5.69E-04	1.14E-03		
U-233	6.8491E-08	1,356.060	2,712.119	0.00E+00	9.29E-05	1.86E-04		
U-234	2.0189E-06	1,356.060	2,712.119	0.00E+00	2.74E-03	5.48E-03		
U-235	2.6572E-06	1,356.060	0.000	2.58E-02	2.22E-02	2.58E-02		
U-236	1.3575E-05	1,356.060	2,712.119	0.00E+00	1.84E-02	3.68E-02		
U-238	2.2698E-08	1,356.060	0.000	1.73E-03	1.69E-03	1.73E-03		
Y-90	2.5646E+00	1,356.060	2,712.119	0.00E+00	3.48E+03	6.96E+03		
Other Radionuclides					4.83E+03	9.66E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.89E+01	1.78E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	69.89795918	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	482.248	1,356.060	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		2,712.119	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.23	2.81	1.00
Bounding:	0.47		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP
 SNF ID #: 243
 Fuel Units & Descr: 78 - ELEMENT
 Heavy Metal Mass: BOL=15.29kg ; EOL=13.29kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.70

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.8488E-10	1,897.799	3,795.598	0.00E+00	5.41E-07	1.08E-06		
Am-241	7.5767E-03	1,897.799	3,795.598	0.00E+00	1.44E+01	2.88E+01	0.0150	6.124E+14
Am-242m	2.4459E-05	1,897.799	3,795.598	0.00E+00	4.64E-02	9.28E-02	0.0250	1.344E+14
Am-243	3.0983E-05	1,897.799	3,795.598	0.00E+00	5.88E-02	1.18E-01	0.0375	1.189E+14
C-14	1.2590E-04	1,897.799	3,795.598	0.00E+00	2.39E-01	4.78E-01	0.0575	1.186E+14
Cl-36	2.6624E-06	1,897.799	3,795.598	0.00E+00	5.05E-03	1.01E-02	0.0850	7.383E+13
Cm-243	3.8244E-05	1,897.799	3,795.598	0.00E+00	7.26E-02	1.45E-01	0.1250	5.928E+13
Cm-244	4.1010E-03	1,897.799	3,795.598	0.00E+00	7.78E+00	1.56E+01	0.2250	6.274E+13
Co-60	1.2410E+00	1,897.799	3,795.598	0.00E+00	2.36E+03	4.71E+03	0.3750	3.131E+13
Cs-134	6.5454E-01	1,897.799	3,795.598	0.00E+00	1.24E+03	2.48E+03	0.5750	5.181E+14
Cs-135	1.9753E-05	1,897.799	3,795.598	0.00E+00	3.75E-02	7.50E-02	0.8500	9.504E+13
Cs-137	2.7375E+00	1,897.799	3,795.598	0.00E+00	5.20E+03	1.04E+04	1.2500	3.651E+14
Eu-154	1.2324E-01	1,897.799	3,795.598	0.00E+00	2.34E+02	4.68E+02	1.7500	4.884E+11
Eu-155	5.3037E-02	1,897.799	3,795.598	0.00E+00	1.01E+02	2.01E+02	2.2500	3.828E+11
Fe-55	7.9555E-01	1,897.799	3,795.598	0.00E+00	1.51E+03	3.02E+03	2.7500	3.470E+09
H-3	1.0531E-02	1,897.799	3,795.598	0.00E+00	2.00E+01	4.00E+01	3.5000	4.085E+08
I-129	7.1287E-07	1,897.799	3,795.598	0.00E+00	1.35E-03	2.71E-03	5.0000	9.784E+04
Kr-85	2.4955E-01	1,897.799	3,795.598	0.00E+00	4.74E+02	9.47E+02	7.0000	1.126E+04
Np-237	1.2121E-05	1,897.799	3,795.598	0.00E+00	2.30E-02	4.60E-02	11.0000	1.292E+03
Pa-231	1.1230E-09	1,897.799	3,795.598	0.00E+00	2.13E-06	4.26E-06		
Pb-210	6.1636E-14	1,897.799	3,795.598	0.00E+00	1.17E-10	2.34E-10		
Pm-147	1.1302E+00	1,897.799	3,795.598	0.00E+00	2.14E+03	4.29E+03		
Pu-238	5.4826E-02	1,897.799	3,795.598	0.00E+00	1.04E+02	2.08E+02		
Pu-239	1.4056E-03	1,897.799	3,795.598	0.00E+00	2.67E+00	5.34E+00		
Pu-240	1.1536E-03	1,897.799	3,795.598	0.00E+00	2.19E+00	4.38E+00		
Pu-241	4.2995E-01	1,897.799	3,795.598	0.00E+00	8.16E+02	1.63E+03		
Pu-242	4.9910E-06	1,897.799	3,795.598	0.00E+00	9.47E-03	1.89E-02		
Ra-226	2.4008E-13	1,897.799	3,795.598	0.00E+00	4.56E-10	9.11E-10		
Ra-228	1.8220E-11	1,897.799	3,795.598	0.00E+00	3.46E-08	6.92E-08		
Ru-106	1.0343E-01	1,897.799	3,795.598	0.00E+00	1.96E+02	3.93E+02		
Se-79	1.2832E-05	1,897.799	3,795.598	0.00E+00	2.44E-02	4.87E-02		
Sn-126	1.2090E-05	1,897.799	3,795.598	0.00E+00	2.29E-02	4.59E-02		
Sr-90	2.5646E+00	1,897.799	3,795.598	0.00E+00	4.87E+03	9.73E+03		
Tc-99	4.0319E-04	1,897.799	3,795.598	0.00E+00	7.65E-01	1.53E+00		
Th-229	7.7375E-11	1,897.799	3,795.598	0.00E+00	1.47E-07	2.94E-07		
Th-230	1.2211E-10	1,897.799	3,795.598	0.00E+00	2.32E-07	4.63E-07		
Th-232	2.3842E-11	1,897.799	3,795.598	0.00E+00	4.52E-08	9.05E-08		
Tl-208	1.4313E-07	1,897.799	3,795.598	0.00E+00	2.72E-04	5.43E-04		
U-232	4.1927E-07	1,897.799	3,795.598	0.00E+00	7.96E-04	1.59E-03		
U-233	6.8491E-08	1,897.799	3,795.598	0.00E+00	1.30E-04	2.60E-04		
U-234	2.0189E-06	1,897.799	3,795.598	0.00E+00	3.83E-03	7.66E-03		
U-235	-2.6572E-06	1,897.799	0.000	2.31E-02	1.81E-02	2.31E-02		
U-236	1.3575E-05	1,897.799	3,795.598	0.00E+00	2.58E-02	5.15E-02		
U-238	-2.2698E-08	1,897.799	0.000	1.54E-03	1.50E-03	1.54E-03	1.24E+02	2.49E+02
Y-90	2.5646E+00	1,897.799	3,795.598	0.00E+00	4.87E+03	9.73E+03	Total	Total
Other Radionuclides					6.76E+03	1.35E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	70	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	432.360	1,897.799	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		3,795.598	Bounding burnup assumed to be twice nominal burnup.

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

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP
 SNF ID #: 239
 Fuel Units & Desc.: 7 - ELEMENT
 Heavy Metal Mass: BOL=1.37kg ; EOL=1.18kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1976
 Estimates as of: 2030
 Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
²Template Burnup(MWd): 66.52
 Template BOL Heavy Metal Mass (MT): 0.000196
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.06

Radionuclide	II. Estimates		x _n	x _b	b	y _n	y _b	Gamma Sources	
	m							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV		
Ac-227	2.0776E-09	180.295	360.589	0.00E+00	3.75E-07	7.49E-07	0.0150	1.746E+13	
Am-241	1.6777E-02	180.295	360.589	0.00E+00	3.02E+00	6.05E+00	0.0250	3.606E+12	
Am-242m	1.9919E-05	180.295	360.589	0.00E+00	3.59E-03	7.18E-03	0.0375	3.150E+12	
Am-243	3.0848E-05	180.295	360.589	0.00E+00	5.56E-03	1.11E-02	0.0575	3.442E+12	
C-14	1.2521E-04	180.295	360.589	0.00E+00	2.26E-02	4.51E-02	0.0850	2.028E+12	
Cl-36	2.6624E-06	180.295	360.589	0.00E+00	4.80E-04	9.60E-04	0.1250	1.332E+12	
Cm-243	1.2813E-05	180.295	360.589	0.00E+00	2.31E-03	4.62E-03	0.2250	1.750E+12	
Cm-244	7.3361E-04	180.295	360.589	0.00E+00	1.32E-01	2.65E-01	0.3750	7.616E+11	
Co-60	3.3494E-03	180.295	360.589	0.00E+00	6.04E-01	1.21E+00	0.5750	1.299E+13	
Cs-134	1.7799E-07	180.295	360.589	0.00E+00	3.21E-05	6.42E-05	0.8500	1.445E+11	
Cs-135	1.9738E-05	180.295	360.589	0.00E+00	3.56E-03	7.12E-03	1.2500	1.534E+11	
Cs-137	9.6843E-01	180.295	360.589	0.00E+00	1.75E+02	3.49E+02	1.7500	3.874E+09	
Eu-154	3.2877E-03	180.295	360.589	0.00E+00	5.93E-01	1.19E+00	2.2500	8.321E+05	
Eu-155	9.8812E-05	180.295	360.589	0.00E+00	1.78E-02	3.56E-02	2.7500	1.403E+06	
Fe-55	4.9444E-06	180.295	360.589	0.00E+00	8.91E-04	1.78E-03	3.5000	4.506E+03	
H-3	8.4381E-04	180.295	360.589	0.00E+00	1.52E-01	3.04E-01	5.0000	1.911E+03	
I-129	7.1287E-07	180.295	360.589	0.00E+00	1.29E-04	2.57E-04	7.0000	2.183E+02	
Kr-85	1.3624E-02	180.295	360.589	0.00E+00	2.46E+00	4.91E+00	11.0000	2.495E+01	
Np-237	1.2375E-05	180.295	360.589	0.00E+00	2.23E-03	4.46E-03			
Pa-231	3.2066E-09	180.295	360.589	0.00E+00	5.78E-07	1.16E-06			
Pb-210	1.0925E-11	180.295	360.589	0.00E+00	1.97E-09	3.94E-09			
Pm-147	7.8187E-06	180.295	360.589	0.00E+00	1.41E-03	2.82E-03			
Pu-238	3.8440E-02	180.295	360.589	0.00E+00	6.93E+00	1.39E+01			
Pu-239	1.4038E-03	180.295	360.589	0.00E+00	2.53E-01	5.06E-01			
Pu-240	1.1560E-03	180.295	360.589	0.00E+00	2.08E-01	4.17E-01			
Pu-241	4.9354E-02	180.295	360.589	0.00E+00	8.90E+00	1.78E+01			
Pu-242	4.9910E-06	180.295	360.589	0.00E+00	9.00E-04	1.80E-03			
Ra-226	2.9330E-11	180.295	360.589	0.00E+00	5.29E-09	1.06E-08			
Ra-228	2.3857E-11	180.295	360.589	0.00E+00	4.30E-09	8.60E-09			
Ru-106	3.8455E-15	180.295	360.589	0.00E+00	6.93E-13	1.39E-12			
Se-79	1.2826E-05	180.295	360.589	0.00E+00	2.31E-03	4.62E-03			
Sn-126	1.2087E-05	180.295	360.589	0.00E+00	2.18E-03	4.36E-03			
Sr-90	8.7913E-01	180.295	360.589	0.00E+00	1.59E+02	3.17E+02			
Tc-99	4.0304E-04	180.295	360.589	0.00E+00	7.27E-02	1.45E-01			
Th-229	4.3912E-10	180.295	360.589	0.00E+00	7.92E-08	1.58E-07			
Th-230	2.8879E-09	180.295	360.589	0.00E+00	5.21E-07	1.04E-06			
Th-232	2.3888E-11	180.295	360.589	0.00E+00	4.31E-09	8.61E-09			
Tl-208	1.1027E-07	180.295	360.589	0.00E+00	1.99E-05	3.98E-05			
U-232	2.9871E-07	180.295	360.589	0.00E+00	5.39E-05	1.08E-04			
U-233	7.1407E-08	180.295	360.589	0.00E+00	1.29E-05	2.57E-05			
U-234	8.6801E-06	180.295	360.589	0.00E+00	1.56E-03	3.13E-03			
U-235	-2.6572E-06	180.295	0.000	2.07E-03	1.59E-03	2.07E-03			
U-236	1.3576E-05	180.295	360.589	0.00E+00	2.45E-03	4.90E-03			
U-238	-2.2698E-08	180.295	0.000	1.39E-04	1.35E-04	1.39E-04			
Y-90	8.7928E-01	180.295	360.589	0.00E+00	1.59E+02	3.17E+02			
Other Radionuclides					1.74E+02	3.49E+02			

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.28E+00	4.55E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	69.89795918	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	38.802	180.295	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		360.589	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.39	4.65	1.00
Bounding:	0.77		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP
 SNF ID #: 354
 Fuel Units & Descr: 6 - ELEMENT
 Heavy Metal Mass: BOL=1.07kg ; EOL=.98kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: TRIGA-FLIP (LW/U-Zr, SST, 60 to 100%, U)
²Template Burnup(MWd): 66.52
 Template BOL Heavy Metal Mass (MT): 0.000196
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.05

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.5469E-09	84.968	169.935	0.00E+00	1.31E-07	2.63E-07	0.0150	1.175E+13
Am-241	1.6326E-02	84.968	169.935	0.00E+00	1.39E+00	2.77E+00	0.0250	2.431E+12
Am-242m	2.1332E-05	84.968	169.935	0.00E+00	1.81E-03	3.63E-03	0.0375	2.128E+12
Am-243	3.0893E-05	84.968	169.935	0.00E+00	2.62E-03	5.25E-03	0.0575	2.305E+12
C-14	1.2544E-04	84.968	169.935	0.00E+00	1.07E-02	2.13E-02	0.0850	1.368E+12
Cl-36	2.6624E-06	84.968	169.935	0.00E+00	2.26E-04	4.52E-04	0.1250	9.140E+11
Cm-243	1.8446E-05	84.968	169.935	0.00E+00	1.57E-03	3.13E-03	0.2250	1.182E+12
Cm-244	1.3020E-03	84.968	169.935	0.00E+00	1.11E-01	2.21E-01	0.3750	5.135E+11
Co-60	2.4053E-02	84.968	169.935	0.00E+00	2.04E+00	4.09E+00	0.5750	8.664E+11
Cs-134	2.7480E-05	84.968	169.935	0.00E+00	2.33E-03	4.67E-03	0.8500	1.163E+11
Cs-135	1.9738E-05	84.968	169.935	0.00E+00	1.68E-03	3.35E-03	1.2500	3.665E+11
Cs-137	1.3692E+00	84.968	169.935	0.00E+00	1.16E+02	2.33E+02	1.7500	3.235E+09
Eu-154	1.1001E-02	84.968	169.935	0.00E+00	9.35E-01	1.87E+00	2.2500	1.845E+06
Eu-155	8.0292E-04	84.968	169.935	0.00E+00	6.82E-02	1.36E-01	2.7500	7.688E+05
Fe-55	2.6894E-04	84.968	169.935	0.00E+00	2.29E-02	4.57E-02	3.5000	3.506E+03
H-3	1.9573E-03	84.968	169.935	0.00E+00	1.66E-01	3.33E-01	5.0000	1.491E+03
I-129	7.1287E-07	84.968	169.935	0.00E+00	6.06E-05	1.21E-04	7.0000	1.709E+02
Kr-85	3.5914E-02	84.968	169.935	0.00E+00	3.05E+00	6.10E+00	11.0000	1.957E+01
Np-237	1.2294E-05	84.968	169.935	0.00E+00	1.04E-03	2.09E-03		
Pa-231	2.6383E-09	84.968	169.935	0.00E+00	2.24E-07	4.48E-07		
Pb-210	4.4648E-12	84.968	169.935	0.00E+00	3.79E-10	7.59E-10		
Pm-147	4.1025E-04	84.968	169.935	0.00E+00	3.49E-02	6.97E-02		
Pu-238	4.3265E-02	84.968	169.935	0.00E+00	3.68E+00	7.35E+00		
Pu-239	1.4044E-03	84.968	169.935	0.00E+00	1.19E-01	2.39E-01		
Pu-240	1.1563E-03	84.968	169.935	0.00E+00	9.83E-02	1.97E-01		
Pu-241	1.0156E-01	84.968	169.935	0.00E+00	8.63E+00	1.73E+01		
Pu-242	4.9910E-06	84.968	169.935	0.00E+00	4.24E-04	8.48E-04		
Ra-226	1.4301E-11	84.968	169.935	0.00E+00	1.22E-09	2.43E-09		
Ra-228	2.3767E-11	84.968	169.935	0.00E+00	2.02E-09	4.04E-09		
Ru-106	1.1521E-10	84.968	169.935	0.00E+00	9.79E-09	1.96E-08		
Se-79	1.2828E-05	84.968	169.935	0.00E+00	1.09E-03	2.18E-03		
Sn-126	1.2088E-05	84.968	169.935	0.00E+00	1.03E-03	2.05E-03		
Sr-90	1.2560E+00	84.968	169.935	0.00E+00	1.07E+02	2.13E+02		
Tc-99	4.0319E-04	84.968	169.935	0.00E+00	3.43E-02	6.85E-02		
Th-229	3.3915E-10	84.968	169.935	0.00E+00	2.88E-08	5.76E-08		
Th-230	1.8175E-09	84.968	169.935	0.00E+00	1.54E-07	3.09E-07		
Th-232	2.3873E-11	84.968	169.935	0.00E+00	2.03E-09	4.06E-09		
Ti-208	1.2736E-07	84.968	169.935	0.00E+00	1.08E-05	2.16E-05		
U-232	3.4501E-07	84.968	169.935	0.00E+00	2.93E-05	5.86E-05		
U-233	7.0610E-08	84.968	169.935	0.00E+00	6.00E-06	1.20E-05		
U-234	7.1407E-06	84.968	169.935	0.00E+00	6.07E-04	1.21E-03		
U-235	-2.6572E-06	84.968	0.000	1.62E-03	1.39E-03	1.62E-03		
U-236	1.3576E-05	84.968	169.935	0.00E+00	1.15E-03	2.31E-03		
U-238	-2.2698E-08	84.968	0.000	1.07E-04	1.05E-04	1.07E-04		
Y-90	1.2563E+00	84.968	169.935	0.00E+00	1.07E+02	2.13E+02		
Other Radionuclides					1.15E+02	2.30E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.50E+00	3.00E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	70.2247191	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	77.667	84.968	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:	43.788	169.935	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.23	1.09	
Bounding:	0.47	3.88	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP (AUSTRIA)
 SNF ID #: 492
 Fuel Units & Descr: 10 - ELEMENT
 Heavy Metal Mass: BOL=1.96kg ; EOL=1.95kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: TRIGA-FLIP (LW/U-Zr, SST, 60 to 100%, U)
²Template Burnup(MWd): 66.52
 Template BOL Heavy Metal Mass (MT): 0.000196
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.09

Radionuclide	II. Estimates		Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n						Photon Energy Group	Total Photons/sec (bounding)
Ac-227	7.1933E-10	47.512	95.025	95.025	0.00E+00	3.42E-08	6.84E-08	Avg. MeV	
Am-241	1.3109E-02	47.512	95.025	95.025	0.00E+00	6.23E-01	1.25E+00	0.0150	9.433E+12
Am-242m	2.2835E-05	47.512	95.025	95.025	0.00E+00	1.08E-03	2.17E-03	0.0250	1.956E+12
Am-243	3.0938E-05	47.512	95.025	95.025	0.00E+00	1.47E-03	2.94E-03	0.0375	1.724E+12
C-14	1.2566E-04	47.512	95.025	95.025	0.00E+00	5.97E-03	1.19E-02	0.0575	1.840E+12
Cl-36	2.6624E-06	47.512	95.025	95.025	0.00E+00	1.26E-04	2.53E-04	0.0850	1.103E+12
Cm-243	2.6563E-05	47.512	95.025	95.025	0.00E+00	1.26E-03	2.52E-03	0.1250	7.652E+11
Cm-244	2.3106E-03	47.512	95.025	95.025	0.00E+00	1.10E-01	2.20E-01	0.2250	9.521E+11
Co-60	1.7273E-01	47.512	95.025	95.025	0.00E+00	8.21E+00	1.64E+01	0.3750	4.140E+11
Cs-134	4.2408E-03	47.512	95.025	95.025	0.00E+00	2.01E-01	4.03E-01	0.5750	6.881E+12
Cs-135	1.9753E-05	47.512	95.025	95.025	0.00E+00	9.39E-04	1.88E-03	0.8500	1.413E+11
Cs-137	1.9363E+00	47.512	95.025	95.025	0.00E+00	9.20E+01	1.84E+02	1.2500	1.306E+12
Eu-154	3.6816E-02	47.512	95.025	95.025	0.00E+00	1.75E+00	3.50E+00	1.7500	3.757E+09
Eu-155	6.5259E-03	47.512	95.025	95.025	0.00E+00	3.10E-01	6.20E-01	2.2500	6.664E+06
Fe-55	1.4627E-02	47.512	95.025	95.025	0.00E+00	6.95E-01	1.39E+00	2.7500	5.115E+05
H-3	4.5400E-03	47.512	95.025	95.025	0.00E+00	2.16E-01	4.31E-01	3.5000	3.665E+03
I-129	7.1287E-07	47.512	95.025	95.025	0.00E+00	3.39E-05	6.77E-05	5.0000	1.417E+03
Kr-85	9.4663E-02	47.512	95.025	95.025	0.00E+00	4.50E+00	9.00E+00	7.0000	1.628E+02
Np-237	1.2172E-05	47.512	95.025	95.025	0.00E+00	5.78E-04	1.16E-03	11.0000	1.867E+01
Pa-231	1.6912E-09	47.512	95.025	95.025	0.00E+00	8.04E-08	1.61E-07		
Pb-210	4.4242E-13	47.512	95.025	95.025	0.00E+00	2.10E-11	4.20E-11		
Pm-147	2.1527E-02	47.512	95.025	95.025	0.00E+00	1.02E+00	2.05E+00		
Pu-238	4.8707E-02	47.512	95.025	95.025	0.00E+00	2.31E+00	4.63E+00		
Pu-239	1.4050E-03	47.512	95.025	95.025	0.00E+00	6.68E-02	1.34E-01		
Pu-240	1.1559E-03	47.512	95.025	95.025	0.00E+00	5.49E-02	1.10E-01		
Pu-241	2.0896E-01	47.512	95.025	95.025	0.00E+00	9.93E+00	1.99E+01		
Pu-242	4.9910E-06	47.512	95.025	95.025	0.00E+00	2.37E-04	4.74E-04		
Ra-226	2.2279E-12	47.512	95.025	95.025	0.00E+00	1.06E-10	2.12E-10		
Ra-228	2.2655E-11	47.512	95.025	95.025	0.00E+00	1.08E-09	2.15E-09		
Ru-106	3.4516E-06	47.512	95.025	95.025	0.00E+00	1.64E-04	3.28E-04		
Se-79	1.2829E-05	47.512	95.025	95.025	0.00E+00	6.10E-04	1.22E-03		
Sn-126	1.2088E-05	47.512	95.025	95.025	0.00E+00	5.74E-04	1.15E-03		
Sr-90	1.7949E+00	47.512	95.025	95.025	0.00E+00	8.53E+01	1.71E+02		
Tc-99	4.0319E-04	47.512	95.025	95.025	0.00E+00	1.92E-02	3.83E-02		
Th-229	1.7468E-10	47.512	95.025	95.025	0.00E+00	8.30E-09	1.66E-08		
Th-230	5.3984E-10	47.512	95.025	95.025	0.00E+00	2.56E-08	5.13E-08		
Th-232	2.3857E-11	47.512	95.025	95.025	0.00E+00	1.13E-09	2.27E-09		
Tl-208	1.4546E-07	47.512	95.025	95.025	0.00E+00	6.91E-06	1.38E-05		
U-232	3.9687E-07	47.512	95.025	95.025	0.00E+00	1.89E-05	3.77E-05		
U-233	6.9272E-08	47.512	95.025	95.025	0.00E+00	3.29E-06	6.58E-06		
U-234	4.1311E-06	47.512	95.025	95.025	0.00E+00	1.96E-04	3.93E-04		
U-235	-2.6572E-06	47.512	0.000	2.96E-03	2.83E-03	2.96E-03			
U-236	1.3576E-05	47.512	95.025	95.025	0.00E+00	6.45E-04	1.29E-03		
U-238	-2.2698E-08	47.512	0.000	1.98E-04	1.97E-04	1.98E-04			
Y-90	1.7949E+00	47.512	95.025	95.025	0.00E+00	8.53E+01	1.71E+02		
Other Radionuclides						9.02E+01	1.80E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.27E+00	2.55E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX-Er	U	
BOL Enrichment %:	69.89795918	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	47.512	9.504	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:		95.025	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.07	0.20	0.98
Bounding:	0.14		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP (BANGLADESH)
 SNF ID #: 470
 Fuel Units & Descr: 100 - ELEMENT
 Heavy Metal Mass: BOL=50.40kg ; EOL=46.06kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.90

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.6436E-09	4,142.996	8,285.991	0.00E+00	1.10E-05	2.19E-05	0.0150	8.304E+14
Am-241	3.1429E-03	4,142.996	8,285.991	0.00E+00	1.30E+01	2.60E+01	0.0250	1.729E+14
Am-242m	1.3195E-06	4,142.996	8,285.991	0.00E+00	5.47E-03	1.09E-02	0.0375	1.497E+14
Am-243	1.4753E-07	4,142.996	8,285.991	0.00E+00	6.11E-04	1.22E-03	0.0575	1.611E+14
C-14	1.2847E-04	4,142.996	8,285.991	0.00E+00	5.32E-01	1.06E+00	0.0850	9.725E+13
Cl-36	2.8120E-06	4,142.996	8,285.991	0.00E+00	1.17E-02	2.33E-02	0.1250	6.356E+13
Cm-243	1.2465E-07	4,142.996	8,285.991	0.00E+00	5.16E-04	1.03E-03	0.2250	8.350E+13
Cm-244	9.5564E-07	4,142.996	8,285.991	0.00E+00	3.96E-03	7.92E-03	0.3750	3.660E+13
Co-60	1.7880E-01	4,142.996	8,285.991	0.00E+00	7.41E+02	1.48E+03	0.5750	6.019E+14
Cs-134	5.8692E-04	4,142.996	8,285.991	0.00E+00	2.43E+00	4.86E+00	0.8500	6.784E+14
Cs-135	3.2195E-05	4,142.996	8,285.991	0.00E+00	1.33E-01	2.67E-01	1.2500	1.124E+14
Cs-137	1.9489E+00	4,142.996	8,285.991	0.00E+00	8.07E+03	1.61E+04	1.7500	1.744E+11
Eu-154	4.5895E-03	4,142.996	8,285.991	0.00E+00	1.90E+01	3.80E+01	2.2500	6.004E+08
Eu-155	3.6045E-03	4,142.996	8,285.991	0.00E+00	1.49E+01	2.99E+01	2.7500	6.615E+06
Fe-55	1.4185E-02	4,142.996	8,285.991	0.00E+00	5.88E+01	1.18E+02	3.5000	3.666E+04
H-3	4.7895E-03	4,142.996	8,285.991	0.00E+00	1.98E+01	3.97E+01	5.0000	4.335E+03
I-129	7.3684E-07	4,142.996	8,285.991	0.00E+00	3.05E-03	6.11E-03	7.0000	4.897E+02
Kr-85	9.5820E-02	4,142.996	8,285.991	0.00E+00	3.97E+02	7.94E+02	11.0000	5.571E+01
Np-237	1.2552E-06	4,142.996	8,285.991	0.00E+00	5.20E-03	1.04E-02		
Pa-231	7.0406E-09	4,142.996	8,285.991	0.00E+00	2.92E-05	5.83E-05		
Pb-210	5.8000E-14	4,142.996	8,285.991	0.00E+00	2.40E-10	4.81E-10		
Pm-147	4.0075E-02	4,142.996	8,285.991	0.00E+00	1.66E+02	3.32E+02		
Pu-238	9.2256E-04	4,142.996	8,285.991	0.00E+00	3.82E+00	7.64E+00		
Pu-239	5.5278E-03	4,142.996	8,285.991	0.00E+00	2.29E+01	4.58E+01		
Pu-240	2.1248E-03	4,142.996	8,285.991	0.00E+00	8.80E+00	1.76E+01		
Pu-241	4.9549E-02	4,142.996	8,285.991	0.00E+00	2.05E+02	4.11E+02		
Pu-242	2.3128E-07	4,142.996	8,285.991	0.00E+00	9.58E-04	1.92E-03		
Ra-226	2.4526E-13	4,142.996	8,285.991	0.00E+00	1.02E-09	2.03E-09		
Ra-228	2.4015E-10	4,142.996	8,285.991	0.00E+00	9.95E-07	1.99E-06		
Ru-106	3.0602E-06	4,142.996	8,285.991	0.00E+00	1.27E-02	2.54E-02		
Se-79	1.3015E-05	4,142.996	8,285.991	0.00E+00	5.39E-02	1.08E-01		
Sn-126	1.2165E-05	4,142.996	8,285.991	0.00E+00	5.04E-02	1.01E-01		
Sr-90	1.8226E+00	4,142.996	8,285.991	0.00E+00	7.55E+03	1.51E+04		
Tc-99	4.4241E-04	4,142.996	8,285.991	0.00E+00	1.83E+00	3.67E+00		
Th-229	3.0962E-10	4,142.996	8,285.991	0.00E+00	1.28E-06	2.57E-06		
Th-230	4.2346E-11	4,142.996	8,285.991	0.00E+00	1.75E-07	3.51E-07		
Th-232	2.5278E-10	4,142.996	8,285.991	0.00E+00	1.05E-06	2.09E-06		
Th-208	1.5820E-08	4,142.996	8,285.991	0.00E+00	6.55E-05	1.31E-04		
U-232	4.2647E-08	4,142.996	8,285.991	0.00E+00	1.77E-04	3.53E-04		
U-233	1.2211E-07	4,142.996	8,285.991	0.00E+00	5.06E-04	1.01E-03		
U-234	1.9955E-07	4,142.996	8,285.991	0.00E+00	8.27E-04	1.65E-03		
U-235	-2.6194E-06	4,142.996	0.000	2.18E-02	1.10E-02	2.18E-02		
U-236	1.2693E-05	4,142.996	8,285.991	0.00E+00	5.26E-02	1.05E-01		
U-238	-3.6331E-08	4,142.996	0.000	1.35E-02	1.34E-02	1.35E-02		
Y-90	1.8241E+00	4,142.996	8,285.991	0.00E+00	7.56E+03	1.51E+04		
Other Radionuclides					7.98E+03	1.60E+04		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	20.03968254	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	475.121	4,142.996	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		8,285.991	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	2.41	8.72	1.00
Bounding:	4.82		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP (DAMAGED) (SO. KOREA)
 SNF ID #: 819
 Fuel Units & Descr: 4 - ELEMENT
 Heavy Metal Mass: BOL= 58kg ; EOL= 56kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1996
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.04

II. Estimates							Gamma Sources	
	m	x _a	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	4.1459E-09	25.583	51.167	0.00E+00	1.06E-07	2.12E-07	0.0150	4.542E+12
Am-241	3.5850E-03	25.583	51.167	0.00E+00	9.17E-02	1.83E-01	0.0250	9.442E+11
Am-242m	1.2899E-06	25.583	51.167	0.00E+00	3.30E-05	6.60E-05	0.0375	8.192E+11
Am-243	1.4747E-07	25.583	51.167	0.00E+00	3.77E-06	7.55E-06	0.0575	8.822E+11
C-14	1.2839E-04	25.583	51.167	0.00E+00	3.28E-03	6.57E-03	0.0850	5.317E+11
Cl-36	2.8120E-06	25.583	51.167	0.00E+00	7.19E-05	1.44E-04	0.1250	3.469E+11
Cm-243	1.1038E-07	25.583	51.167	0.00E+00	2.82E-06	5.65E-06	0.2250	4.573E+11
Cm-244	7.8917E-07	25.583	51.167	0.00E+00	2.02E-05	4.04E-05	0.3750	1.997E+11
Co-60	9.2647E-02	25.583	51.167	0.00E+00	2.37E+00	4.74E+00	0.5750	3.311E+12
Cs-134	1.0940E-04	25.583	51.167	0.00E+00	2.80E-03	5.60E-03	0.8500	3.555E+10
Cs-135	3.2195E-05	25.583	51.167	0.00E+00	8.24E-04	1.65E-03	1.2500	3.650E+10
Cs-137	1.7368E+00	25.583	51.167	0.00E+00	4.44E+01	8.89E+01	1.7500	9.255E+08
Eu-154	3.0677E-03	25.583	51.167	0.00E+00	7.85E-02	1.57E-01	2.2500	1.951E+06
Eu-155	1.7925E-03	25.583	51.167	0.00E+00	4.59E-02	9.17E-02	2.7500	3.299E+04
Fe-55	3.7444E-03	25.583	51.167	0.00E+00	9.58E-02	1.92E-01	3.5000	6.884E+01
H-3	3.6180E-03	25.583	51.167	0.00E+00	9.26E-02	1.85E-01	5.0000	2.678E+01
I-129	7.3684E-07	25.583	51.167	0.00E+00	1.89E-05	3.77E-05	7.0000	3.023E+00
Kr-85	6.9368E-02	25.583	51.167	0.00E+00	1.77E+00	3.55E+00	11.0000	3.438E-01
Np-237	1.2662E-06	25.583	51.167	0.00E+00	3.24E-05	6.48E-05		
Pa-231	9.1654E-09	25.583	51.167	0.00E+00	2.34E-07	4.69E-07		
Pb-210	1.3728E-13	25.583	51.167	0.00E+00	3.51E-12	7.02E-12		
Pm-147	1.0702E-02	25.583	51.167	0.00E+00	2.74E-01	5.48E-01		
Pu-238	8.8692E-04	25.583	51.167	0.00E+00	2.27E-02	4.54E-02		
Pu-239	5.5263E-03	25.583	51.167	0.00E+00	1.41E-01	2.83E-01		
Pu-240	2.1233E-03	25.583	51.167	0.00E+00	5.43E-02	1.09E-01		
Pu-241	3.8962E-02	25.583	51.167	0.00E+00	9.97E-01	1.99E+00		
Pu-242	2.3128E-07	25.583	51.167	0.00E+00	5.92E-06	1.18E-05		
Ra-226	4.6752E-13	25.583	51.167	0.00E+00	1.20E-11	2.39E-11		
Ra-228	2.4827E-10	25.583	51.167	0.00E+00	6.35E-09	1.27E-08		
Ru-106	9.8526E-08	25.583	51.167	0.00E+00	2.52E-06	5.04E-06		
Se-79	1.3015E-05	25.583	51.167	0.00E+00	3.33E-04	6.66E-04		
Sn-126	1.2165E-05	25.583	51.167	0.00E+00	3.11E-04	6.22E-04		
Sr-90	1.6195E+00	25.583	51.167	0.00E+00	4.14E+01	8.29E+01		
Tc-99	4.4241E-04	25.583	51.167	0.00E+00	1.13E-02	2.26E-02		
Th-229	4.2451E-10	25.583	51.167	0.00E+00	1.09E-08	2.17E-08		
Th-230	6.1398E-11	25.583	51.167	0.00E+00	1.57E-09	3.14E-09		
Th-232	2.5278E-10	25.583	51.167	0.00E+00	6.47E-09	1.29E-08		
Ti-208	1.5098E-08	25.583	51.167	0.00E+00	3.86E-07	7.73E-07		
U-232	4.0662E-08	25.583	51.167	0.00E+00	1.04E-06	2.08E-06		
U-233	1.2217E-07	25.583	51.167	0.00E+00	3.13E-06	6.25E-06		
U-234	2.2391E-07	25.583	51.167	0.00E+00	5.73E-06	1.15E-05		
U-235	-2.6194E-06	25.583	0.000	5.81E-04	5.14E-04	5.81E-04		
U-236	1.2695E-05	25.583	51.167	0.00E+00	3.25E-04	6.50E-04		
U-238	-3.6331E-08	25.583	0.000	1.06E-04	1.05E-04	1.06E-04		
Y-90	1.6195E+00	25.583	51.167	0.00E+00	4.14E+01	8.29E+01		
Other Radionuclides					4.40E+01	8.80E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.43E+01	1.09E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LW AND U ZIRC HYDRIDE	Used: LW AND U ZIRC HYDRIDE	This Template was used for the following reasons:
Fuel Cladding:	SST (304)	SST	This fuel matches on all parameters except enrichment.
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	46.09053498	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 14.210	Estimated: 25.583	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		51.167	Bounding burnup assumed to be twice nominal burnup.

Checks		
Nominal:	Burnup Multiplier: 1.29	Estimated Burnup/ Given Burnup: 1.80
Bounding:	2.57	
		Estimated EOL HM/ Given EOL HM: 1.00

¹ Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP (GA)
 SNF ID #: 729
 Fuel Units & Descr: 111 - ELEMENT
 Heavy Metal Mass: BOL=21.53kg ; EOL=16.35kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 1.00

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.8488E-10	4,926.693	9,853.386	0.00E+00	1.40E-06	2.81E-06	0.0150	1.590E+15
Am-241	7.5767E-03	4,926.693	9,853.386	0.00E+00	3.73E+01	7.47E+01	0.0250	3.489E+14
Am-242m	2.4459E-05	4,926.693	9,853.386	0.00E+00	1.21E-01	2.41E-01	0.0375	3.086E+14
Am-243	3.0983E-05	4,926.693	9,853.386	0.00E+00	1.53E-01	3.05E-01	0.0575	3.080E+14
C-14	1.2590E-04	4,926.693	9,853.386	0.00E+00	6.20E-01	1.24E+00	0.0850	1.917E+14
Cl-36	2.6624E-06	4,926.693	9,853.386	0.00E+00	1.31E-02	2.62E-02	0.1250	1.539E+14
Cm-243	3.8244E-05	4,926.693	9,853.386	0.00E+00	1.88E-01	3.77E-01	0.2250	1.629E+14
Cm-244	4.1010E-03	4,926.693	9,853.386	0.00E+00	2.02E+01	4.04E+01	0.3750	8.127E+13
Co-60	1.2410E+00	4,926.693	9,853.386	0.00E+00	6.11E+03	1.22E+04	0.5750	1.345E+15
Cs-134	6.5454E-01	4,926.693	9,853.386	0.00E+00	3.22E+03	6.45E+03	0.8500	2.467E+14
Cs-135	1.9753E-05	4,926.693	9,853.386	0.00E+00	9.73E-02	1.95E-01	1.2500	9.478E+14
Cs-137	2.7375E+00	4,926.693	9,853.386	0.00E+00	1.35E+04	2.70E+04	1.7500	1.268E+12
Eu-154	1.2324E-01	4,926.693	9,853.386	0.00E+00	6.07E+02	1.21E+03	2.2500	9.938E+11
Eu-155	5.3037E-02	4,926.693	9,853.386	0.00E+00	2.61E+02	5.23E+02	2.7500	9.008E+09
Fe-55	7.9555E-01	4,926.693	9,853.386	0.00E+00	3.92E+03	7.84E+03	3.5000	1.060E+09
H-3	1.0531E-02	4,926.693	9,853.386	0.00E+00	5.19E+01	1.04E+02	5.0000	2.540E+05
I-129	7.1287E-07	4,926.693	9,853.386	0.00E+00	3.51E-03	7.02E-03	7.0000	2.923E+04
Kr-85	2.4955E-01	4,926.693	9,853.386	0.00E+00	1.23E+03	2.46E+03	11.0000	3.354E+03
Np-237	1.2121E-05	4,926.693	9,853.386	0.00E+00	5.97E-02	1.19E-01		
Pa-231	1.1230E-09	4,926.693	9,853.386	0.00E+00	5.53E-06	1.11E-05		
Pb-210	6.1636E-14	4,926.693	9,853.386	0.00E+00	3.04E-10	6.07E-10		
Pm-147	1.1302E+00	4,926.693	9,853.386	0.00E+00	5.57E+03	1.11E+04		
Pu-238	5.4826E-02	4,926.693	9,853.386	0.00E+00	2.70E+02	5.40E+02		
Pu-239	1.4056E-03	4,926.693	9,853.386	0.00E+00	6.92E+00	1.38E+01		
Pu-240	1.1536E-03	4,926.693	9,853.386	0.00E+00	5.68E+00	1.14E+01		
Pu-241	4.2995E-01	4,926.693	9,853.386	0.00E+00	2.12E+03	4.24E+03		
Pu-242	4.9910E-06	4,926.693	9,853.386	0.00E+00	2.46E-02	4.92E-02		
Ra-226	2.4008E-13	4,926.693	9,853.386	0.00E+00	1.18E-09	2.37E-09		
Ra-228	1.8220E-11	4,926.693	9,853.386	0.00E+00	8.98E-08	1.80E-07		
Ru-106	1.0343E-01	4,926.693	9,853.386	0.00E+00	5.10E+02	1.02E+03		
Se-79	1.2832E-05	4,926.693	9,853.386	0.00E+00	6.32E-02	1.26E-01		
Sn-126	1.2090E-05	4,926.693	9,853.386	0.00E+00	5.96E-02	1.19E-01		
Sr-90	2.5646E+00	4,926.693	9,853.386	0.00E+00	1.26E+04	2.53E+04		
Tc-99	4.0319E-04	4,926.693	9,853.386	0.00E+00	1.99E+00	3.97E+00		
Th-229	7.7375E-11	4,926.693	9,853.386	0.00E+00	3.81E-07	7.62E-07		
Th-230	1.2211E-10	4,926.693	9,853.386	0.00E+00	6.02E-07	1.20E-06		
Th-232	2.3842E-11	4,926.693	9,853.386	0.00E+00	1.17E-07	2.35E-07		
Tl-208	1.4313E-07	4,926.693	9,853.386	0.00E+00	7.05E-04	1.41E-03		
U-232	4.1927E-07	4,926.693	9,853.386	0.00E+00	2.07E-03	4.13E-03		
U-233	6.8491E-08	4,926.693	9,853.386	0.00E+00	3.37E-04	6.75E-04		
U-234	2.0189E-06	4,926.693	9,853.386	0.00E+00	9.95E-03	1.99E-02		
U-235	-2.6572E-06	4,926.693	0.000	3.26E-02	1.95E-02	3.26E-02		
U-236	1.3575E-05	4,926.693	9,853.386	0.00E+00	6.69E-02	1.34E-01		
U-238	-2.2698E-08	4,926.693	0.000	2.17E-03	2.06E-03	2.17E-03		
Y-90	2.5646E+00	4,926.693	9,853.386	0.00E+00	1.26E+04	2.53E+04		
Other Radionuclides					1.75E+04	3.51E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.23E+02	6.46E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	70.03211513	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	4,697.965	4,926.693	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		9,853.386	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.67	1.05	1.00
Bounding:	1.35		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP (MALAYSIA) 1 Fuel decay start date: 2010
 SNF ID #: 497 Estimates as of: 2030
 Fuel Units & Descr: 94 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=47.38kg ; EOL=46.53kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 20 years

Estimated
Canister usage:
18"x10"
0.85

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.6436E-09	807.598	1,615.196	0.00E+00	2.13E-06	4.27E-06	0.0150	1.619E+14
Am-241	3.1429E-03	807.598	1,615.196	0.00E+00	2.54E+00	5.08E+00	0.0250	3.369E+13
Am-242m	1.3195E-06	807.598	1,615.196	0.00E+00	1.07E-03	2.13E-03	0.0375	2.919E+13
Am-243	1.4753E-07	807.598	1,615.196	0.00E+00	1.19E-04	2.38E-04	0.0575	3.140E+13
C-14	1.2847E-04	807.598	1,615.196	0.00E+00	4.04E-01	2.07E-01	0.0850	1.896E+13
Cf-252	2.8120E-06	807.598	1,615.196	0.00E+00	2.27E-03	4.54E-03	0.1250	1.239E+13
Cm-243	1.2465E-07	807.598	1,615.196	0.00E+00	1.01E-04	2.01E-04	0.2250	1.628E+13
Cm-244	9.5564E-07	807.598	1,615.196	0.00E+00	7.72E-04	1.54E-03	0.3750	7.194E+12
Co-60	1.7880E-01	807.598	1,615.196	0.00E+00	1.44E+02	2.89E+02	0.5750	1.173E+14
Cs-134	5.8692E-04	807.598	1,615.196	0.00E+00	4.74E-01	9.48E-01	0.8500	1.323E+12
Cs-135	3.2195E-05	807.598	1,615.196	0.00E+00	2.60E-02	5.20E-02	1.2500	2.192E+13
Cs-137	1.9489E+00	807.598	1,615.196	0.00E+00	1.57E+03	3.15E+03	1.7500	3.399E+10
Eu-154	4.5895E-03	807.598	1,615.196	0.00E+00	3.71E+00	7.41E+00	2.2500	1.170E+08
Eu-155	3.6045E-03	807.598	1,615.196	0.00E+00	2.91E+00	5.82E+00	2.7500	1.290E+06
Fe-55	1.4185E-02	807.598	1,615.196	0.00E+00	1.15E+01	2.29E+01	3.5000	7.200E+03
H-3	4.7895E-03	807.598	1,615.196	0.00E+00	3.87E+00	7.74E+00	5.0000	8.684E+02
I-129	7.3684E-07	807.598	1,615.196	0.00E+00	5.95E-04	1.19E-03	7.0000	9.814E+01
Kr-85	9.5820E-02	807.598	1,615.196	0.00E+00	7.74E+01	1.55E+02	11.0000	1.117E+01
Np-237	1.2552E-06	807.598	1,615.196	0.00E+00	1.01E-03	2.03E-03		
Pa-231	7.0406E-09	807.598	1,615.196	0.00E+00	5.69E-06	1.14E-05		
Pb-210	5.8000E-14	807.598	1,615.196	0.00E+00	4.68E-11	9.37E-11		
Pm-147	4.0075E-02	807.598	1,615.196	0.00E+00	3.24E+01	6.47E+01		
Pu-238	9.2256E-04	807.598	1,615.196	0.00E+00	7.45E-01	1.49E+00		
Pu-239	5.5278E-03	807.598	1,615.196	0.00E+00	4.46E+00	8.93E+00		
Pu-240	2.1248E-03	807.598	1,615.196	0.00E+00	1.72E+00	3.43E+00		
Pu-241	4.9549E-02	807.598	1,615.196	0.00E+00	4.00E+01	8.00E+01		
Pu-242	2.3128E-07	807.598	1,615.196	0.00E+00	1.87E-04	3.74E-04		
Ra-226	2.4526E-13	807.598	1,615.196	0.00E+00	1.98E-10	3.96E-10		
Ra-228	2.4015E-10	807.598	1,615.196	0.00E+00	1.94E-07	3.88E-07		
Ru-106	3.0602E-06	807.598	1,615.196	0.00E+00	2.47E-03	4.94E-03		
Se-79	1.3015E-05	807.598	1,615.196	0.00E+00	1.05E-02	2.10E-02		
Sn-126	1.2165E-05	807.598	1,615.196	0.00E+00	9.82E-03	1.96E-02		
Sr-90	1.8226E+00	807.598	1,615.196	0.00E+00	1.47E+03	2.94E+03		
Tc-99	4.4241E-04	807.598	1,615.196	0.00E+00	3.57E-01	7.15E-01		
Th-229	3.0962E-10	807.598	1,615.196	0.00E+00	2.50E-07	5.00E-07		
Th-230	4.2346E-11	807.598	1,615.196	0.00E+00	3.42E-08	6.84E-08		
Th-232	2.5278E-10	807.598	1,615.196	0.00E+00	2.04E-07	4.08E-07		
Th-208	1.5820E-08	807.598	1,615.196	0.00E+00	1.28E-05	2.56E-05		
U-232	4.2647E-08	807.598	1,615.196	0.00E+00	3.44E-05	6.89E-05		
U-233	1.2211E-07	807.598	1,615.196	0.00E+00	9.86E-05	1.97E-04		
U-234	1.9955E-07	807.598	1,615.196	0.00E+00	1.61E-04	3.22E-04		
U-235	2.6194E-06	807.598	0.000	2.05E-02	1.84E-02	2.05E-02		
U-236	1.2693E-05	807.598	1,615.196	0.00E+00	1.03E-02	2.05E-02		
U-238	-3.6331E-08	807.598	0.000	1.27E-02	1.27E-02	1.27E-02		
Y-90	1.8241E+00	807.598	1,615.196	0.00E+00	1.47E+03	2.95E+03		
Other Radionuclides					1.56E+03	3.11E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.02E+01	4.04E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	20.03968254	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	446.614	807.598	
Bounding:		1,615.196	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.50	1.81	
Bounding:	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: TRIGA FLIP (MEXICO)
 SNF ID #: 493
 Fuel Units & Descr: 35 - ELEMENT
 Heavy Metal Mass: BOL=6.86kg ; EOL=6.83kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
²Template Burnup(MWd): 66.52
 Template BOL Heavy Metal Mass (MT): 0.000196
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.32

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	7.1933E-10	64.669	129.338	0.00E+00	4.65E-08	9.30E-08	0.0150	1.284E+13
Am-241	1.3109E-02	64.669	129.338	0.00E+00	8.48E-01	1.70E+00	0.0250	2.662E+12
Am-242m	2.2835E-05	64.669	129.338	0.00E+00	1.48E-03	2.95E-03	0.0375	2.347E+12
Am-243	3.0938E-05	64.669	129.338	0.00E+00	2.00E-03	4.00E-03	0.0575	2.505E+12
C-14	1.2566E-04	64.669	129.338	0.00E+00	8.13E-03	1.63E-02	0.0850	1.501E+12
Cf-252	2.6624E-06	64.669	129.338	0.00E+00	1.72E-04	3.44E-04	0.1250	1.041E+12
Cm-243	2.6563E-05	64.669	129.338	0.00E+00	1.72E-03	3.44E-03	0.2250	1.296E+12
Cm-244	2.3106E-03	64.669	129.338	0.00E+00	1.49E-01	2.99E-01	0.3750	5.635E+11
Co-60	1.7273E-01	64.669	129.338	0.00E+00	1.12E+01	2.23E+01	0.5750	9.365E+12
Cs-134	4.2408E-03	64.669	129.338	0.00E+00	2.74E-01	5.49E-01	0.8500	1.923E+11
Cs-135	1.9753E-05	64.669	129.338	0.00E+00	1.28E-03	2.55E-03	1.2500	1.777E+12
Cs-137	1.9363E+00	64.669	129.338	0.00E+00	1.25E+02	2.50E+02	1.7500	5.114E+09
Eu-154	3.6816E-02	64.669	129.338	0.00E+00	2.38E+00	4.76E+00	2.2500	9.071E+06
Eu-155	6.5259E-03	64.669	129.338	0.00E+00	4.22E-01	8.44E-01	2.7500	6.963E+05
Fe-55	1.4627E-02	64.669	129.338	0.00E+00	9.46E-01	1.89E+00	3.5000	4.991E+03
H-3	4.5400E-03	64.669	129.338	0.00E+00	2.94E-01	5.87E-01	5.0000	1.930E+03
I-129	7.1287E-07	64.669	129.338	0.00E+00	4.61E-05	9.22E-05	7.0000	2.217E+02
Kr-85	9.4663E-02	64.669	129.338	0.00E+00	6.12E+00	1.22E+01	11.0000	2.542E+01
Np-237	1.2172E-05	64.669	129.338	0.00E+00	7.87E-04	1.57E-03		
Pa-231	1.6912E-09	64.669	129.338	0.00E+00	1.09E-07	2.19E-07		
Pb-210	4.4242E-13	64.669	129.338	0.00E+00	2.86E-11	5.72E-11		
Pm-147	2.1527E-02	64.669	129.338	0.00E+00	1.39E+00	2.78E+00		
Pu-238	4.8707E-02	64.669	129.338	0.00E+00	3.15E+00	6.30E+00		
Pu-239	1.4050E-03	64.669	129.338	0.00E+00	9.09E-02	1.82E-01		
Pu-240	1.1559E-03	64.669	129.338	0.00E+00	7.48E-02	1.50E-01		
Pu-241	2.0896E-01	64.669	129.338	0.00E+00	1.35E+01	2.70E+01		
Pu-242	4.9910E-06	64.669	129.338	0.00E+00	3.23E-04	6.46E-04		
Ra-226	2.2279E-12	64.669	129.338	0.00E+00	1.44E-10	2.88E-10		
Ra-228	2.2655E-11	64.669	129.338	0.00E+00	1.47E-09	2.93E-09		
Ru-106	3.4516E-06	64.669	129.338	0.00E+00	2.23E-04	4.46E-04		
Se-79	1.2829E-05	64.669	129.338	0.00E+00	8.30E-04	1.66E-03		
Sn-126	1.2088E-05	64.669	129.338	0.00E+00	7.82E-04	1.56E-03		
Sr-90	1.7949E+00	64.669	129.338	0.00E+00	1.16E+02	2.32E+02		
Tc-99	4.0319E-04	64.669	129.338	0.00E+00	2.61E-02	5.21E-02		
Th-229	1.7468E-10	64.669	129.338	0.00E+00	1.13E-08	2.26E-08		
Th-230	5.3984E-10	64.669	129.338	0.00E+00	3.49E-08	6.98E-08		
Th-232	2.3857E-11	64.669	129.338	0.00E+00	1.54E-09	3.09E-09		
Ti-208	1.4546E-07	64.669	129.338	0.00E+00	9.41E-06	1.88E-05		
U-232	3.9687E-07	64.669	129.338	0.00E+00	2.57E-05	5.13E-05		
U-233	6.9272E-08	64.669	129.338	0.00E+00	4.48E-06	8.96E-06		
U-234	4.1311E-06	64.669	129.338	0.00E+00	2.67E-04	5.34E-04		
U-235	-2.6572E-06	64.669	0.000	1.04E-02	1.02E-02	1.04E-02		
U-236	1.3576E-05	64.669	129.338	0.00E+00	8.78E-04	1.76E-03		
U-238	-2.2698E-08	64.669	0.000	6.94E-04	6.93E-04	6.94E-04		
Y-90	1.7949E+00	64.669	129.338	0.00E+00	1.16E+02	2.32E+02		
Other Radionuclides					1.23E+02	2.46E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.74E+00	3.47E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrH-Er	U	
BOL Enrichment %:	69.89795918	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	64.669	33.265	
Bounding:		129.338	

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:	0.03	0.51
Bounding:	0.06	

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP (PHILIPPINES)
 SNF ID #: 499
 Fuel Units & Decar: 128 - ELEMENT
 Heavy Metal Mass: BOL=105.47kg ; EOL=105.34kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 1.15

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.6436E-09	994.285	1,988.569	0.00E+00	2.63E-06	5.26E-06	Avg. MeV	
Am-241	3.1429E-03	994.285	1,988.569	0.00E+00	3.12E+00	6.25E+00	0.0150	1.993E+14
Am-242m	1.3195E-06	994.285	1,988.569	0.00E+00	1.31E-03	2.62E-03	0.0250	4.148E+13
Am-243	1.4753E-07	994.285	1,988.569	0.00E+00	1.47E-04	2.93E-04	0.0375	3.594E+13
C-14	1.2847E-04	994.285	1,988.569	0.00E+00	1.28E-01	2.55E-01	0.0575	3.866E+13
Cl-36	2.8120E-06	994.285	1,988.569	0.00E+00	2.80E-03	5.59E-03	0.0850	2.334E+13
Cm-243	1.2465E-07	994.285	1,988.569	0.00E+00	1.24E-04	2.48E-04	0.1250	1.525E+13
Cm-244	9.5564E-07	994.285	1,988.569	0.00E+00	9.50E-04	1.90E-03	0.2250	2.004E+13
Co-60	1.7880E-01	994.285	1,988.569	0.00E+00	1.78E+02	3.56E+02	0.3750	8.783E+12
Cs-134	5.8692E-04	994.285	1,988.569	0.00E+00	5.84E-01	1.17E+00	0.5750	1.445E+14
Cs-135	3.2195E-05	994.285	1,988.569	0.00E+00	3.20E-02	6.40E-02	0.8500	1.628E+12
Cs-137	1.9489E+00	994.285	1,988.569	0.00E+00	1.94E+03	3.88E+03	1.2500	2.698E+13
Eu-154	4.5895E-03	994.285	1,988.569	0.00E+00	4.56E+00	9.13E+00	1.7500	4.185E+10
Eu-155	3.6045E-03	994.285	1,988.569	0.00E+00	3.58E+00	7.17E+00	2.2500	1.441E+08
Fe-55	1.4185E-02	994.285	1,988.569	0.00E+00	1.41E+01	2.82E+01	2.7500	1.588E+06
H-3	4.7895E-03	994.285	1,988.569	0.00E+00	4.76E+00	9.52E+00	3.5000	8.933E+03
I-129	7.3684E-07	994.285	1,988.569	0.00E+00	7.33E-04	1.47E-03	5.0000	1.098E+03
Kr-85	9.5820E-02	994.285	1,988.569	0.00E+00	9.53E+01	1.91E+02	7.0000	1.242E+02
Np-237	1.2552E-06	994.285	1,988.569	0.00E+00	1.25E-03	2.50E-03	11.0000	1.414E+01
Pa-231	7.0406E-09	994.285	1,988.569	0.00E+00	7.00E-06	1.40E-05		
Pb-210	5.8000E-14	994.285	1,988.569	0.00E+00	5.77E-11	1.15E-10		
Pm-147	4.0075E-02	994.285	1,988.569	0.00E+00	3.98E+01	7.97E+01		
Pu-238	9.2256E-04	994.285	1,988.569	0.00E+00	9.17E-01	1.83E+00		
Pu-239	5.5278E-03	994.285	1,988.569	0.00E+00	5.50E+00	1.10E+01		
Pu-240	2.1248E-03	994.285	1,988.569	0.00E+00	2.11E+00	4.23E+00		
Pu-241	4.9549E-02	994.285	1,988.569	0.00E+00	4.93E+01	9.85E+01		
Pu-242	2.3128E-07	994.285	1,988.569	0.00E+00	2.30E-04	4.60E-04		
Ra-226	2.4526E-13	994.285	1,988.569	0.00E+00	2.44E-10	4.88E-10		
Ra-228	2.4015E-10	994.285	1,988.569	0.00E+00	2.39E-07	4.78E-07		
Ru-106	3.0602E-06	994.285	1,988.569	0.00E+00	3.04E-03	6.09E-03		
Se-79	1.3015E-05	994.285	1,988.569	0.00E+00	1.29E-02	2.59E-02		
Sn-126	1.2165E-05	994.285	1,988.569	0.00E+00	1.21E-02	2.42E-02		
Sr-90	1.8226E+00	994.285	1,988.569	0.00E+00	1.81E+03	3.62E+03		
Tc-99	4.4241E-04	994.285	1,988.569	0.00E+00	4.40E-01	8.80E-01		
Th-229	3.0962E-10	994.285	1,988.569	0.00E+00	3.08E-07	6.16E-07		
Th-230	4.2346E-11	994.285	1,988.569	0.00E+00	4.21E-08	8.42E-08		
Th-232	2.5278E-10	994.285	1,988.569	0.00E+00	2.51E-07	5.03E-07		
Th-208	1.5820E-08	994.285	1,988.569	0.00E+00	1.57E-05	3.15E-05		
U-232	4.2647E-08	994.285	1,988.569	0.00E+00	4.24E-05	8.48E-05		
U-233	1.2211E-07	994.285	1,988.569	0.00E+00	1.21E-04	2.43E-04		
U-234	1.9955E-07	994.285	1,988.569	0.00E+00	1.98E-04	3.97E-04		
U-235	-2.6194E-06	994.285	0.000	4.56E-02	4.30E-02	4.56E-02		
U-236	1.2693E-05	994.285	1,988.569	0.00E+00	1.26E-02	2.52E-02		
U-238	-3.6331E-08	994.285	0.000	2.84E-02	2.83E-02	2.84E-02		
Y-90	1.8241E+00	994.285	1,988.569	0.00E+00	1.81E+03	3.63E+03		
Other Radionuclides					1.91E+03	3.83E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.49E+01	4.98E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	20.02427184	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	994.285	122.190	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		1,988.569	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.28	0.12	0.99
Bounding:	0.55		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP (SLOVENIA)
 SNF ID #: 495
 Fuel Units & Descr: 26 - ELEMENT
 Heavy Metal Mass: BOL=4.99kg ; EOL=4.69kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1999
 Estimates as of: 2030
 Template: TRIGA-FLIP (LW/U-Zr, SST, 60 to 100%, U)
²Template Burnup(MWd): 66.52
 Template BOL Heavy Metal Mass (MT): 0.000196
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.23

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.0386E-09	281.705	563.409	0.00E+00	2.93E-07	5.85E-07	Avg. MeV	
Am-241	1.4973E-02	281.705	563.409	0.00E+00	4.22E+00	8.44E+00	0.0150	4.952E+13
Am-242m	2.2324E-05	281.705	563.409	0.00E+00	6.29E-03	1.26E-02	0.0250	1.025E+13
Am-243	3.0923E-05	281.705	563.409	0.00E+00	8.71E-03	1.74E-02	0.0375	9.012E+12
C-14	1.2559E-04	281.705	563.409	0.00E+00	3.54E-02	7.08E-02	0.0575	9.682E+12
Ci-36	2.6624E-06	281.705	563.409	0.00E+00	7.50E-04	1.50E-03	0.0850	5.780E+12
Cm-243	2.3527E-05	281.705	563.409	0.00E+00	6.63E-03	1.33E-02	0.1250	3.946E+12
Cm-244	1.9092E-03	281.705	563.409	0.00E+00	5.38E-01	1.08E+00	0.2250	4.993E+12
Co-60	8.9552E-02	281.705	563.409	0.00E+00	2.52E+01	5.05E+01	0.3750	2.167E+12
Cs-134	7.9074E-04	281.705	563.409	0.00E+00	2.23E-01	4.46E-01	0.5750	3.623E+13
Cs-135	1.9753E-05	281.705	563.409	0.00E+00	5.56E-03	1.11E-02	0.8500	6.088E+11
Cs-137	1.7243E+00	281.705	563.409	0.00E+00	4.86E+02	9.71E+02	1.2500	4.121E+12
Eu-154	2.4609E-02	281.705	563.409	0.00E+00	6.93E+00	1.39E+01	1.7500	1.712E+10
Eu-155	3.2456E-03	281.705	563.409	0.00E+00	9.14E-01	1.83E+00	2.2500	2.081E+07
Fe-55	3.8605E-03	281.705	563.409	0.00E+00	1.09E+00	2.18E+00	2.7500	2.846E+06
H-3	3.4305E-03	281.705	563.409	0.00E+00	9.66E-01	1.93E+00	3.5000	1.656E+04
I-129	7.1287E-07	281.705	563.409	0.00E+00	2.01E-04	4.02E-04	5.0000	7.027E+03
Kr-85	6.8536E-02	281.705	563.409	0.00E+00	1.93E+01	3.86E+01	7.0000	8.069E+02
Np-237	1.2219E-05	281.705	563.409	0.00E+00	3.44E-03	6.88E-03	11.0000	9.247E+01
Pa-231	2.0701E-09	281.705	563.409	0.00E+00	5.83E-07	1.17E-06		
Pb-210	1.3279E-12	281.705	563.409	0.00E+00	3.74E-10	7.48E-10		
Pm-147	5.7517E-03	281.705	563.409	0.00E+00	1.62E+00	3.24E+00		
Pu-238	4.6828E-02	281.705	563.409	0.00E+00	1.32E+01	2.64E+01		
Pu-239	1.4048E-03	281.705	563.409	0.00E+00	3.96E-01	7.91E-01		
Pu-240	1.1563E-03	281.705	563.409	0.00E+00	3.26E-01	6.51E-01		
Pu-241	1.6431E-01	281.705	563.409	0.00E+00	4.63E+01	9.26E+01		
Pu-242	4.9910E-06	281.705	563.409	0.00E+00	1.41E-03	2.81E-03		
Ra-226	5.4390E-12	281.705	563.409	0.00E+00	1.53E-09	3.06E-09		
Ra-228	2.3437E-11	281.705	563.409	0.00E+00	6.60E-09	1.32E-08		
Ru-106	1.1115E-07	281.705	563.409	0.00E+00	3.13E-05	6.26E-05		
Se-79	1.2829E-05	281.705	563.409	0.00E+00	3.61E-03	7.23E-03		
Sn-126	1.2088E-05	281.705	563.409	0.00E+00	3.41E-03	6.81E-03		
Sr-90	1.5935E+00	281.705	563.409	0.00E+00	4.49E+02	8.98E+02		
Tc-99	4.0319E-04	281.705	563.409	0.00E+00	1.14E-01	2.27E-01		
Th-229	2.4023E-10	281.705	563.409	0.00E+00	6.77E-08	1.35E-07		
Th-230	9.6948E-10	281.705	563.409	0.00E+00	2.73E-07	5.46E-07		
Th-232	2.3857E-11	281.705	563.409	0.00E+00	6.72E-09	1.34E-08		
Ti-208	1.3982E-07	281.705	563.409	0.00E+00	3.94E-05	7.88E-05		
U-232	3.7943E-07	281.705	563.409	0.00E+00	1.07E-04	2.14E-04		
U-233	6.9814E-08	281.705	563.409	0.00E+00	1.97E-05	3.93E-05		
U-234	5.4059E-06	281.705	563.409	0.00E+00	1.52E-03	3.05E-03		
U-235	-2.6572E-06	281.705	0.000	7.54E-03	6.79E-03	7.54E-03		
U-236	1.3576E-05	281.705	563.409	0.00E+00	3.82E-03	7.65E-03		
U-238	-2.2698E-08	281.705	0.000	5.03E-04	4.97E-04	5.03E-04		
Y-90	1.5935E+00	281.705	563.409	0.00E+00	4.49E+02	8.98E+02		
Other Radionuclides					4.77E+02	9.54E+02		
							Thermal Power	
							Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
							6.46E+00	1.29E+01
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-Zr/HX-Er	U	
BOL Enrichment %:	69.96306689	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	94.021	281.705	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		563.409	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.17	3.00	1.00
Bounding:	0.33		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP (SO. KOREA)
 SNF ID #: 494
 Fuel Units & Descr: 114 - ELEMENT
 Heavy Metal Mass: BOL=21.66kg ; EOL=19.11kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1996
 Estimates as of: 2030
 Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
²Template Burnup(MWd): 66.52
 Template BOL Heavy Metal Mass (MT): 0.000196
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 1.03

Radionuclide	II. Estimates			Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n	x _b				Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.0386E-09	2,426.993	4,853.986	0.00E+00	2.52E-06	5.04E-06	Avg. MeV	
Am-241	1.4973E-02	2,426.993	4,853.986	0.00E+00	3.63E+01	7.27E+01	0.0150	4.267E+14
Am-242m	2.2324E-05	2,426.993	4,853.986	0.00E+00	5.42E-02	1.08E-01	0.0250	8.834E+13
Am-243	3.0923E-05	2,426.993	4,853.986	0.00E+00	7.50E-02	1.50E-01	0.0375	7.764E+13
C-14	1.2559E-04	2,426.993	4,853.986	0.00E+00	3.05E-01	6.10E-01	0.0575	8.341E+13
Cl-36	2.6624E-06	2,426.993	4,853.986	0.00E+00	6.46E-03	1.29E-02	0.0850	4.979E+13
Cm-243	2.3527E-05	2,426.993	4,853.986	0.00E+00	5.71E-02	1.14E-01	0.1250	3.400E+13
Cm-244	1.9092E-03	2,426.993	4,853.986	0.00E+00	4.63E+00	9.27E+00	0.2250	4.302E+13
Co-60	8.9552E-02	2,426.993	4,853.986	0.00E+00	2.17E+02	4.35E+02	0.3750	1.867E+13
Cs-134	7.9074E-04	2,426.993	4,853.986	0.00E+00	1.92E+00	3.84E+00	0.5750	3.121E+14
Cs-135	1.9753E-05	2,426.993	4,853.986	0.00E+00	4.79E-02	9.59E-02	0.8500	5.245E+12
Cs-137	1.7243E+00	2,426.993	4,853.986	0.00E+00	4.18E+03	8.37E+03	1.2500	3.551E+13
Eu-154	2.4609E-02	2,426.993	4,853.986	0.00E+00	5.97E+01	1.19E+02	1.7500	1.475E+11
Eu-155	3.2456E-03	2,426.993	4,853.986	0.00E+00	7.88E+00	1.58E+01	2.2500	1.793E+08
Fe-55	3.8605E-03	2,426.993	4,853.986	0.00E+00	9.37E+00	1.87E+01	2.7500	2.452E+07
H-3	3.4305E-03	2,426.993	4,853.986	0.00E+00	8.33E+00	1.67E+01	3.5000	1.427E+05
I-129	7.1287E-07	2,426.993	4,853.986	0.00E+00	1.73E-03	3.46E-03	5.0000	6.054E+04
Kr-85	6.8536E-02	2,426.993	4,853.986	0.00E+00	1.66E+02	3.33E+02	7.0000	6.951E+03
Np-237	1.2219E-05	2,426.993	4,853.986	0.00E+00	2.97E-02	5.93E-02	11.0000	7.966E+02
Pa-231	2.0701E-09	2,426.993	4,853.986	0.00E+00	5.02E-06	1.00E-05		
Pb-210	1.3279E-12	2,426.993	4,853.986	0.00E+00	3.22E-09	6.45E-09		
Pm-147	5.7517E-03	2,426.993	4,853.986	0.00E+00	1.40E+01	2.79E+01		
Pu-238	4.6828E-02	2,426.993	4,853.986	0.00E+00	1.14E+02	2.27E+02		
Pu-239	1.4048E-03	2,426.993	4,853.986	0.00E+00	3.41E+00	6.82E+00		
Pu-240	1.1563E-03	2,426.993	4,853.986	0.00E+00	2.81E+00	5.61E+00		
Pu-241	1.6431E-01	2,426.993	4,853.986	0.00E+00	3.99E+02	7.98E+02		
Pu-242	4.9910E-06	2,426.993	4,853.986	0.00E+00	1.21E-02	2.42E-02		
Ra-226	5.4390E-12	2,426.993	4,853.986	0.00E+00	1.32E-08	2.64E-08		
Ra-228	2.3437E-11	2,426.993	4,853.986	0.00E+00	5.69E-08	1.14E-07		
Ru-106	1.1115E-07	2,426.993	4,853.986	0.00E+00	2.70E-04	5.40E-04		
Se-79	1.2829E-05	2,426.993	4,853.986	0.00E+00	3.11E-02	6.23E-02		
Sn-126	1.2088E-05	2,426.993	4,853.986	0.00E+00	2.93E-02	5.87E-02		
Sr-90	1.5935E+00	2,426.993	4,853.986	0.00E+00	3.87E+03	7.73E+03		
Tc-99	4.0319E-04	2,426.993	4,853.986	0.00E+00	9.79E-01	1.96E+00		
Th-229	2.4023E-10	2,426.993	4,853.986	0.00E+00	5.83E-07	1.17E-06		
Th-230	9.6948E-10	2,426.993	4,853.986	0.00E+00	2.35E-06	4.71E-06		
Th-232	2.3857E-11	2,426.993	4,853.986	0.00E+00	5.79E-08	1.16E-07		
Tl-208	1.3982E-07	2,426.993	4,853.986	0.00E+00	3.39E-04	6.79E-04		
U-232	3.7943E-07	2,426.993	4,853.986	0.00E+00	9.21E-04	1.84E-03		
U-233	6.9814E-08	2,426.993	4,853.986	0.00E+00	1.69E-04	3.39E-04		
U-234	5.4059E-06	2,426.993	4,853.986	0.00E+00	1.31E-02	2.62E-02		
U-235	-2.6572E-06	2,426.993	0.000	3.28E-02	2.63E-02	3.28E-02		
U-236	1.3576E-05	2,426.993	4,853.986	0.00E+00	3.29E-02	6.59E-02		
U-238	-2.2698E-08	2,426.993	0.000	2.18E-03	2.13E-03	2.18E-03		
Y-90	1.5935E+00	2,426.993	4,853.986	0.00E+00	3.87E+03	7.73E+03		
Other Radionuclides					4.11E+03	8.22E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.57E+01	1.11E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	70	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	816.755	2,426.993	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		4,853.986	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.33	2.97	1.00
Bounding:	0.66		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP (TAIWAN)
 SNF ID #: 498
 Fuel Units & Descr: 144 - ELEMENT
 Heavy Metal Mass: BOL=118.66kg ; EOL=118.51kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 1.30

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.6436E-09	1,118.570	2,237.140	0.00E+00	2.96E-06	5.91E-06		
Am-241	3.1429E-03	1,118.570	2,237.140	0.00E+00	3.52E+00	7.03E+00	0.0150	2.242E+14
Am-242m	1.3195E-06	1,118.570	2,237.140	0.00E+00	1.48E-03	2.95E-03	0.0250	4.667E+13
Am-243	1.4753E-07	1,118.570	2,237.140	0.00E+00	1.65E-04	3.30E-04	0.0375	4.043E+13
C-14	1.2847E-04	1,118.570	2,237.140	0.00E+00	1.44E-01	2.87E-01	0.0575	4.349E+13
Cl-36	2.8120E-06	1,118.570	2,237.140	0.00E+00	3.15E-03	6.29E-03	0.0850	2.626E+13
Cm-243	1.2465E-07	1,118.570	2,237.140	0.00E+00	1.39E-04	2.79E-04	0.1250	1.716E+13
Cm-244	9.5564E-07	1,118.570	2,237.140	0.00E+00	1.07E-03	2.14E-03	0.2250	2.255E+13
Co-60	1.7880E-01	1,118.570	2,237.140	0.00E+00	2.00E+02	4.00E+02	0.3750	9.881E+12
Cs-134	5.8692E-04	1,118.570	2,237.140	0.00E+00	6.57E-01	1.31E+00	0.5750	1.625E+14
Cs-135	3.2195E-05	1,118.570	2,237.140	0.00E+00	3.60E-02	7.20E-02	0.8500	1.832E+12
Cs-137	1.9489E+00	1,118.570	2,237.140	0.00E+00	2.18E+03	4.36E+03	1.2500	3.035E+13
Eu-154	4.5895E-03	1,118.570	2,237.140	0.00E+00	5.13E+00	1.03E+01	1.7500	4.708E+10
Eu-155	3.6045E-03	1,118.570	2,237.140	0.00E+00	4.03E+00	8.06E+00	2.2500	1.621E+08
Fe-55	1.4185E-02	1,118.570	2,237.140	0.00E+00	1.59E+01	3.17E+01	2.7500	1.786E+06
H-3	4.7895E-03	1,118.570	2,237.140	0.00E+00	5.36E+00	1.07E+01	3.5000	1.005E+04
I-129	7.3684E-07	1,118.570	2,237.140	0.00E+00	8.24E-04	1.65E-03	5.0000	1.236E+03
Kr-85	9.5820E-02	1,118.570	2,237.140	0.00E+00	1.07E+02	2.14E+02	7.0000	1.397E+02
Np-237	1.2552E-06	1,118.570	2,237.140	0.00E+00	1.40E-03	2.81E-03	11.0000	1.591E+01
Pa-231	7.0406E-09	1,118.570	2,237.140	0.00E+00	7.88E-06	1.58E-05		
Pb-210	5.8000E-14	1,118.570	2,237.140	0.00E+00	6.49E-11	1.30E-10		
Pm-147	4.0075E-02	1,118.570	2,237.140	0.00E+00	4.48E+01	8.97E+01		
Pu-238	9.2256E-04	1,118.570	2,237.140	0.00E+00	1.03E+00	2.06E+00		
Pu-239	5.5278E-03	1,118.570	2,237.140	0.00E+00	6.18E+00	1.24E+01		
Pu-240	2.1248E-03	1,118.570	2,237.140	0.00E+00	2.38E+00	4.75E+00		
Pu-241	4.9549E-02	1,118.570	2,237.140	0.00E+00	5.54E+01	1.11E+02		
Pu-242	2.3128E-07	1,118.570	2,237.140	0.00E+00	2.59E-04	5.17E-04		
Ra-226	2.4526E-13	1,118.570	2,237.140	0.00E+00	2.74E-10	5.49E-10		
Ra-228	2.4015E-10	1,118.570	2,237.140	0.00E+00	2.69E-07	5.37E-07		
Ru-106	3.0602E-06	1,118.570	2,237.140	0.00E+00	3.42E-03	6.85E-03		
Se-79	1.3015E-05	1,118.570	2,237.140	0.00E+00	1.46E-02	2.91E-02		
Sn-126	1.2165E-05	1,118.570	2,237.140	0.00E+00	1.36E-02	2.72E-02		
Sr-90	1.8226E+00	1,118.570	2,237.140	0.00E+00	2.04E+03	4.08E+03		
Tc-99	4.4241E-04	1,118.570	2,237.140	0.00E+00	4.95E-01	9.90E-01		
Th-229	3.0962E-10	1,118.570	2,237.140	0.00E+00	3.46E-07	6.93E-07		
Th-230	4.2346E-11	1,118.570	2,237.140	0.00E+00	4.74E-08	9.47E-08		
Th-232	2.5278E-10	1,118.570	2,237.140	0.00E+00	2.83E-07	5.66E-07		
Ti-208	1.5820E-08	1,118.570	2,237.140	0.00E+00	1.77E-05	3.54E-05		
U-232	4.2647E-08	1,118.570	2,237.140	0.00E+00	4.77E-05	9.54E-05		
U-233	1.2211E-07	1,118.570	2,237.140	0.00E+00	1.37E-04	2.73E-04		
U-234	1.9955E-07	1,118.570	2,237.140	0.00E+00	2.23E-04	4.46E-04		
U-235	-2.6194E-06	1,118.570	0.000	5.13E-02	4.84E-02	5.13E-02		
U-236	1.2693E-05	1,118.570	2,237.140	0.00E+00	1.42E-02	2.84E-02		
U-238	-3.6331E-08	1,118.570	0.000	3.19E-02	3.19E-02	3.19E-02		
Y-90	1.8241E+00	1,118.570	2,237.140	0.00E+00	2.04E+03	4.08E+03		
Other Radionuclides					2.15E+03	4.31E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.80E+01	5.60E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	20.02427184	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	1,118.570	137.463	
Bounding:		2,237.140	

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

Checks				
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM	
Nominal:	0.28	0.12		
Bounding:	0.55			0.99

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP (THAILAND) ¹Fuel decay start date: 2010
 SNF ID #: 496 Estimates as of: 2030
 Fuel Units & Descr: 36 - ELEMENT Template: TRIGA-SS (LW/U-ZrX, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=18.14kg ; EOL=15.65kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.32

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.6436E-09	2,381.554	4,763.109	0.00E+00	6.30E-06	1.26E-05	Avg. MeV	
Am-241	3.1429E-03	2,381.554	4,763.109	0.00E+00	7.48E+00	1.50E+01	0.0150	4.773E+14
Am-242m	1.3195E-06	2,381.554	4,763.109	0.00E+00	3.14E-03	6.29E-03	0.0250	9.936E+13
Am-243	1.4753E-07	2,381.554	4,763.109	0.00E+00	3.51E-04	7.03E-04	0.0375	8.608E+13
C-14	1.2847E-04	2,381.554	4,763.109	0.00E+00	3.06E-01	6.12E-01	0.0575	9.260E+13
Cl-36	2.8120E-06	2,381.554	4,763.109	0.00E+00	6.70E-03	1.34E-02	0.0850	5.590E+13
Cm-243	1.2465E-07	2,381.554	4,763.109	0.00E+00	2.97E-04	5.94E-04	0.1250	3.654E+13
Cm-244	9.5564E-07	2,381.554	4,763.109	0.00E+00	2.28E-03	4.55E-03	0.2250	4.800E+13
Co-60	1.7880E-01	2,381.554	4,763.109	0.00E+00	4.26E+02	8.52E+02	0.3750	2.104E+13
Cs-134	5.8692E-04	2,381.554	4,763.109	0.00E+00	1.40E+00	2.80E+00	0.5750	3.460E+14
Cs-135	3.2195E-05	2,381.554	4,763.109	0.00E+00	7.67E-02	1.53E-01	0.8500	3.900E+12
Cs-137	1.9489E+00	2,381.554	4,763.109	0.00E+00	4.64E+03	9.28E+03	1.2500	6.463E+13
Eu-154	4.5895E-03	2,381.554	4,763.109	0.00E+00	1.09E+01	2.19E+01	1.7500	1.002E+11
Eu-155	3.6045E-07	2,381.554	4,763.109	0.00E+00	8.58E+00	1.72E+01	2.2500	3.451E+08
Fe-55	1.4185E-02	2,381.554	4,763.109	0.00E+00	3.38E+01	6.76E+01	2.7500	3.803E+06
H-3	4.7895E-03	2,381.554	4,763.109	0.00E+00	1.14E+01	2.28E+01	3.5000	2.106E+04
I-129	7.3684E-07	2,381.554	4,763.109	0.00E+00	1.75E-03	3.51E-03	5.0000	2.485E+03
Kr-85	9.5820E-02	2,381.554	4,763.109	0.00E+00	2.28E+02	4.56E+02	7.0000	2.807E+02
Np-237	1.2552E-06	2,381.554	4,763.109	0.00E+00	2.99E-03	5.98E-03	11.0000	3.194E+01
Pa-231	7.0406E-09	2,381.554	4,763.109	0.00E+00	1.68E-05	3.35E-05		
Pb-210	5.8000E-14	2,381.554	4,763.109	0.00E+00	1.38E-10	2.76E-10		
Pm-147	4.0075E-02	2,381.554	4,763.109	0.00E+00	9.54E+01	1.91E+02		
Pu-238	9.2256E-04	2,381.554	4,763.109	0.00E+00	2.20E+00	4.39E+00		
Pu-239	5.5278E-03	2,381.554	4,763.109	0.00E+00	1.32E+01	2.63E+01		
Pu-240	2.1248E-03	2,381.554	4,763.109	0.00E+00	5.06E+00	1.01E+01		
Pu-241	4.9549E-02	2,381.554	4,763.109	0.00E+00	1.18E+02	2.36E+02		
Pu-242	2.3128E-07	2,381.554	4,763.109	0.00E+00	5.51E-04	1.10E-03		
Ra-226	2.4526E-13	2,381.554	4,763.109	0.00E+00	5.84E-10	1.17E-09		
Ra-228	2.4015E-10	2,381.554	4,763.109	0.00E+00	5.72E-07	1.14E-06		
Ru-106	3.0602E-06	2,381.554	4,763.109	0.00E+00	7.29E-03	1.46E-02		
Se-79	1.3015E-05	2,381.554	4,763.109	0.00E+00	3.10E-02	6.20E-02		
Sn-126	1.2165E-05	2,381.554	4,763.109	0.00E+00	2.90E-02	5.79E-02		
Sr-90	1.8226E+00	2,381.554	4,763.109	0.00E+00	4.34E+03	8.68E+03		
Tc-99	4.4241E-04	2,381.554	4,763.109	0.00E+00	1.05E+00	2.11E+00		
Th-229	3.0962E-10	2,381.554	4,763.109	0.00E+00	7.37E-07	1.47E-06		
Th-230	4.2346E-11	2,381.554	4,763.109	0.00E+00	1.01E-07	2.02E-07		
Th-232	2.5278E-10	2,381.554	4,763.109	0.00E+00	6.02E-07	1.20E-06		
Tl-208	1.5820E-08	2,381.554	4,763.109	0.00E+00	3.77E-05	7.54E-05		
U-232	4.2647E-08	2,381.554	4,763.109	0.00E+00	1.02E-04	2.03E-04		
U-233	1.2211E-07	2,381.554	4,763.109	0.00E+00	2.91E-04	5.82E-04		
U-234	1.9955E-07	2,381.554	4,763.109	0.00E+00	4.75E-04	9.50E-04		
U-235	-2.6194E-06	2,381.554	0.000	7.86E-03	1.62E-03	7.86E-03		
U-236	1.2693E-05	2,381.554	4,763.109	0.00E+00	3.02E-02	6.05E-02		
U-238	-3.6331E-08	2,381.554	0.000	4.88E-03	4.79E-03	4.88E-03		
Y-90	1.8241E+00	2,381.554	4,763.109	0.00E+00	4.34E+03	8.69E+03		
Other Radionuclides					4.59E+03	9.17E+03		
							Thermal Power	
							Nominal Heat	Bounding Heat Output
							Output (Watts)	Heat Output (Watts)
							5.96E+01	1.19E+02
							Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX-Er	U	
BOL Enrichment %:	20.03968254	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	855.199	2,381.554	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		4,763.109	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	3.85	2.78	1.00
Bounding:	7.70		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP (DAMAGED) (TEXAS A&M)
 SNF ID #: 844
 Fuel Units & Descr: 5 - ELEMENT
 Heavy Metal Mass: BOL=.88kg ; EOL=.81kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.05

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.8488E-10	63.678	127.356	0.00E+00	1.81E-08	3.63E-08	0.0150	2.055E+13
Am-241	7.5767E-03	63.678	127.356	0.00E+00	4.82E-01	9.65E-01	0.0250	4.509E+12
Am-242m	2.4459E-05	63.678	127.356	0.00E+00	1.56E-03	3.11E-03	0.0375	3.989E+12
Am-243	3.0983E-05	63.678	127.356	0.00E+00	1.97E-03	3.95E-03	0.0575	3.981E+12
C-14	1.2590E-04	63.678	127.356	0.00E+00	8.02E-03	1.60E-02	0.0850	2.477E+12
Ci-36	2.6624E-06	63.678	127.356	0.00E+00	1.70E-04	3.39E-04	0.1250	1.989E+12
Cm-243	3.8244E-05	63.678	127.356	0.00E+00	2.44E-03	4.87E-03	0.2250	2.105E+12
Cm-244	4.1010E-03	63.678	127.356	0.00E+00	2.61E-01	5.22E-01	0.3750	1.050E+12
Co-60	1.2410E+00	63.678	127.356	0.00E+00	7.90E+01	1.58E+02	0.5750	1.739E+13
Cs-134	6.5454E-01	63.678	127.356	0.00E+00	4.17E+01	8.34E+01	0.8500	3.189E+12
Cs-135	1.9753E-05	63.678	127.356	0.00E+00	1.26E-03	2.52E-03	1.2500	1.225E+13
Cs-137	2.7375E+00	63.678	127.356	0.00E+00	1.74E+02	3.49E+02	1.7500	1.639E+10
Eu-154	1.2324E-01	63.678	127.356	0.00E+00	7.85E+00	1.57E+01	2.2500	1.284E+10
Eu-155	5.3037E-02	63.678	127.356	0.00E+00	3.38E+00	6.75E+00	2.7500	1.164E+08
Fe-55	7.9555E-01	63.678	127.356	0.00E+00	5.07E+01	1.01E+02	3.5000	1.371E+07
H-3	1.0531E-02	63.678	127.356	0.00E+00	6.71E-01	1.34E+00	5.0000	3.283E+03
I-129	7.1287E-07	63.678	127.356	0.00E+00	4.54E-05	9.08E-05	7.0000	3.778E+02
Kr-85	2.4955E-01	63.678	127.356	0.00E+00	1.59E+01	3.18E+01	11.0000	4.336E+01
Np-237	1.2121E-05	63.678	127.356	0.00E+00	7.72E-04	1.54E-03		
Pa-231	1.1230E-09	63.678	127.356	0.00E+00	7.15E-08	1.43E-07		
Pb-210	6.1636E-14	63.678	127.356	0.00E+00	3.92E-12	7.85E-12		
Pm-147	1.1302E+00	63.678	127.356	0.00E+00	7.20E+01	1.44E+02		
Pu-238	5.4826E-02	63.678	127.356	0.00E+00	3.49E+00	6.98E+00		
Pu-239	1.4056E-03	63.678	127.356	0.00E+00	8.95E-02	1.79E-01		
Pu-240	1.1536E-03	63.678	127.356	0.00E+00	7.35E-02	1.47E-01		
Pu-241	4.2995E-01	63.678	127.356	0.00E+00	2.74E+01	5.48E+01		
Pu-242	4.9910E-06	63.678	127.356	0.00E+00	3.18E-04	6.36E-04		
Ra-226	2.4008E-13	63.678	127.356	0.00E+00	1.53E-11	3.06E-11		
Ra-228	1.8220E-11	63.678	127.356	0.00E+00	1.16E-09	2.32E-09		
Ru-106	1.0343E-01	63.678	127.356	0.00E+00	6.59E+00	1.32E+01		
Se-79	1.2832E-05	63.678	127.356	0.00E+00	8.17E-04	1.63E-03		
Sn-126	1.2090E-05	63.678	127.356	0.00E+00	7.70E-04	1.54E-03		
Sr-90	2.5646E+00	63.678	127.356	0.00E+00	1.63E+02	3.27E+02		
Tc-99	4.0319E-04	63.678	127.356	0.00E+00	2.57E-02	5.13E-02		
Th-229	7.7375E-11	63.678	127.356	0.00E+00	4.93E-09	9.85E-09		
Th-230	1.2211E-10	63.678	127.356	0.00E+00	7.78E-09	1.56E-08		
Th-232	2.3842E-11	63.678	127.356	0.00E+00	1.52E-09	3.04E-09		
Th-208	1.4313E-07	63.678	127.356	0.00E+00	9.11E-06	1.82E-05		
U-232	4.1927E-07	63.678	127.356	0.00E+00	2.67E-05	5.34E-05		
U-233	6.8491E-08	63.678	127.356	0.00E+00	4.36E-06	8.72E-06		
U-234	2.0189E-06	63.678	127.356	0.00E+00	1.29E-04	2.57E-04		
U-235	-2.6572E-06	63.678	0.000	1.33E-03	1.16E-03	1.33E-03		
U-236	1.3575E-05	63.678	127.356	0.00E+00	8.64E-04	1.73E-03		
U-238	-2.2698E-08	63.678	0.000	8.87E-05	8.73E-05	8.87E-05		
Y-90	2.5646E+00	63.678	127.356	0.00E+00	1.63E+02	3.27E+02		
Other Radionuclides					2.27E+02	4.54E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.18E+00	8.35E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	69.96587031	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	24.859	63.678	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		127.356	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.21	2.56	1.00
Bounding:	0.43		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP ANL-W (NRAD)
 SNF ID #: 884
 Fuel Units & Descr: 61 - ELEMENT
 Heavy Metal Mass: BOL=10.86kg ; EOL=10.60kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
²Template Burnup(MWd): 66.52
 Template BOL Heavy Metal Mass (MT): 0.000196
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.55

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.5469E-09	263.209	486.995	0.00E+00	4.07E-07	7.53E-07	0.0150	3.368E+13
Am-241	1.6326E-02	263.209	486.995	0.00E+00	4.30E+00	7.95E+00	0.0250	6.966E+12
Am-242m	2.1332E-05	263.209	486.995	0.00E+00	5.61E-03	1.04E-02	0.0375	6.098E+12
Am-243	3.0893E-05	263.209	486.995	0.00E+00	8.13E-03	1.50E-02	0.0575	6.605E+12
C-14	1.2544E-04	263.209	486.995	0.00E+00	3.30E-02	6.11E-02	0.0850	3.922E+12
Cl-36	2.6624E-06	263.209	486.995	0.00E+00	7.01E-04	1.30E-03	0.1250	2.619E+12
Cm-243	1.8446E-05	263.209	486.995	0.00E+00	4.86E-03	8.98E-03	0.2250	3.388E+12
Cm-244	1.3020E-03	263.209	486.995	0.00E+00	3.43E-01	6.34E-01	0.3750	1.472E+12
Co-60	2.4053E-02	263.209	486.995	0.00E+00	6.33E+00	1.17E+01	0.5750	2.483E+13
Cs-134	2.7480E-05	263.209	486.995	0.00E+00	7.23E-03	1.34E-02	0.8500	3.333E+11
Cs-135	1.9738E-05	263.209	486.995	0.00E+00	5.20E-03	9.61E-03	1.2500	1.050E+12
Cs-137	1.3692E+00	263.209	486.995	0.00E+00	3.60E+02	6.67E+02	1.7500	9.271E+09
Eu-154	1.1001E-02	263.209	486.995	0.00E+00	2.90E+00	5.36E+00	2.2500	5.288E+06
Eu-155	8.0292E-04	263.209	486.995	0.00E+00	2.11E-01	3.91E-01	2.7500	2.203E+06
Fe-55	2.6894E-04	263.209	486.995	0.00E+00	7.08E-02	1.31E-01	3.5000	1.005E+04
H-3	1.9573E-03	263.209	486.995	0.00E+00	5.15E-01	9.53E-01	5.0000	4.276E+03
I-129	7.1287E-07	263.209	486.995	0.00E+00	1.88E-04	3.47E-04	7.0000	4.901E+02
Kr-85	3.5914E-02	263.209	486.995	0.00E+00	9.45E+00	1.75E+01	11.0000	5.612E+01
Np-237	1.2294E-05	263.209	486.995	0.00E+00	3.24E-03	5.99E-03		
Pa-231	2.6383E-09	263.209	486.995	0.00E+00	6.94E-07	1.28E-06		
Pb-210	4.4648E-12	263.209	486.995	0.00E+00	1.18E-09	2.17E-09		
Pm-147	4.1025E-04	263.209	486.995	0.00E+00	1.08E-01	2.00E-01		
Pu-238	4.3265E-02	263.209	486.995	0.00E+00	1.14E+01	2.11E+01		
Pu-239	1.4044E-03	263.209	486.995	0.00E+00	3.70E-01	6.84E-01		
Pu-240	1.1563E-03	263.209	486.995	0.00E+00	3.04E-01	5.63E-01		
Pu-241	1.0156E-01	263.209	486.995	0.00E+00	2.67E+01	4.95E+01		
Pu-242	4.9910E-06	263.209	486.995	0.00E+00	1.31E-03	2.43E-03		
Ra-226	1.4301E-11	263.209	486.995	0.00E+00	3.76E-09	6.96E-09		
Ra-228	2.3767E-11	263.209	486.995	0.00E+00	6.26E-09	1.16E-08		
Ru-106	1.1521E-10	263.209	486.995	0.00E+00	3.03E-08	5.61E-08		
Se-79	1.2828E-05	263.209	486.995	0.00E+00	3.38E-03	6.25E-03		
Sn-126	1.2088E-05	263.209	486.995	0.00E+00	3.18E-03	5.89E-03		
Sr-90	1.2560E+00	263.209	486.995	0.00E+00	3.31E+02	6.12E+02		
Tc-99	4.0319E-04	263.209	486.995	0.00E+00	1.06E-01	1.96E-01		
Th-229	3.3915E-10	263.209	486.995	0.00E+00	8.93E-08	1.65E-07		
Th-230	1.8175E-09	263.209	486.995	0.00E+00	4.78E-07	8.85E-07		
Th-232	2.3873E-11	263.209	486.995	0.00E+00	6.28E-09	1.16E-08		
Tl-208	1.2736E-07	263.209	486.995	0.00E+00	3.35E-05	6.20E-05		
U-232	3.4501E-07	263.209	486.995	0.00E+00	9.08E-05	1.68E-04		
U-233	7.0610E-08	263.209	486.995	0.00E+00	1.86E-05	3.44E-05		
U-234	7.1407E-06	263.209	486.995	0.00E+00	1.88E-03	3.48E-03		
U-235	-2.6572E-06	263.209	0.000	1.65E-02	1.58E-02	1.65E-02		
U-236	1.3576E-05	263.209	486.995	0.00E+00	3.57E-03	6.61E-03		
U-238	-2.2698E-08	263.209	0.000	1.09E-03	1.08E-03	1.09E-03		
Y-90	1.2563E+00	263.209	486.995	0.00E+00	3.31E+02	6.12E+02		
Other Radionuclides					3.56E+02	6.59E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.65E+00	8.61E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	70.2247191	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	263.209	243.498	
Bounding:	445.178	486.995	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.07	0.93	
Bounding:	0.13	1.09	

Estimated EOL HM/Given EOL HM: 1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP FFCR (GA)
 SNF ID #: 996
 Fuel Units & Descr: 6 - ELEMENT
 Heavy Metal Mass: BOL=.96kg ; EOL=.61kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.08

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.8488E-10	339.870	679.741	0.00E+00	9.68E-08	1.94E-07	Avg. MeV	
Am-241	7.5767E-03	339.870	679.741	0.00E+00	2.58E+00	5.15E+00	0.0150	1.097E+14
Am-242m	2.4459E-05	339.870	679.741	0.00E+00	8.31E-03	1.66E-02	0.0250	2.407E+13
Am-243	3.0983E-05	339.870	679.741	0.00E+00	1.05E-02	2.11E-02	0.0375	2.129E+13
C-14	1.2590E-04	339.870	679.741	0.00E+00	4.28E-02	8.56E-02	0.0575	2.125E+13
Cf-36	2.6624E-06	339.870	679.741	0.00E+00	9.05E-04	1.81E-03	0.0850	1.322E+13
Cm-243	3.8244E-05	339.870	679.741	0.00E+00	1.30E-02	2.60E-02	0.1250	1.062E+13
Cm-244	4.1010E-03	339.870	679.741	0.00E+00	1.39E+00	2.79E+00	0.2250	1.124E+13
Co-60	1.2410E+00	339.870	679.741	0.00E+00	4.22E+02	8.44E+02	0.3750	5.606E+12
Cs-134	6.5454E-01	339.870	679.741	0.00E+00	2.22E+02	4.45E+02	0.5750	9.279E+13
Cs-135	1.9753E-05	339.870	679.741	0.00E+00	6.71E-03	1.34E-02	0.8500	1.702E+13
Cs-137	2.7375E+00	339.870	679.741	0.00E+00	9.30E+02	1.86E+03	1.2500	6.538E+13
Eu-154	1.2324E-01	339.870	679.741	0.00E+00	4.19E+01	8.38E+01	1.7500	8.746E+10
Eu-155	5.3037E-02	339.870	679.741	0.00E+00	1.80E+01	3.61E+01	2.2500	6.856E+10
Fe-55	7.9555E-01	339.870	679.741	0.00E+00	2.70E+02	5.41E+02	2.7500	6.215E+08
H-3	1.0531E-02	339.870	679.741	0.00E+00	3.58E+00	7.16E+00	3.5000	7.316E+07
I-129	7.1287E-07	339.870	679.741	0.00E+00	2.42E-04	4.85E-04	5.0000	1.752E+04
Kr-85	2.4955E-01	339.870	679.741	0.00E+00	8.48E+01	1.70E+02	7.0000	2.016E+03
Np-237	1.2121E-05	339.870	679.741	0.00E+00	4.12E-03	8.24E-03	11.0000	2.314E+02
Pa-231	1.1230E-09	339.870	679.741	0.00E+00	3.82E-07	7.63E-07		
Pb-210	6.1636E-14	339.870	679.741	0.00E+00	2.09E-11	4.19E-11		
Pm-147	1.1302E+00	339.870	679.741	0.00E+00	3.84E+02	7.68E+02		
Pu-238	5.4826E-02	339.870	679.741	0.00E+00	1.86E+01	3.73E+01		
Pu-239	1.4056E-03	339.870	679.741	0.00E+00	4.78E-01	9.55E-01		
Pu-240	1.1536E-03	339.870	679.741	0.00E+00	3.92E-01	7.84E-01		
Pu-241	4.2995E-01	339.870	679.741	0.00E+00	1.46E+02	2.92E+02		
Pu-242	4.9910E-06	339.870	679.741	0.00E+00	1.70E-03	3.39E-03		
Ra-226	2.4008E-13	339.870	679.741	0.00E+00	8.16E-11	1.63E-10		
Ra-228	1.8220E-11	339.870	679.741	0.00E+00	6.19E-09	1.24E-08		
Ru-106	1.0343E-01	339.870	679.741	0.00E+00	3.52E+01	7.03E+01		
Se-79	1.2832E-05	339.870	679.741	0.00E+00	4.36E-03	8.72E-03		
Sn-126	1.2090E-05	339.870	679.741	0.00E+00	4.11E-03	8.22E-03		
Sr-90	2.5646E+00	339.870	679.741	0.00E+00	8.72E+02	1.74E+03		
Tc-99	4.0319E-04	339.870	679.741	0.00E+00	1.37E-01	2.74E-01		
Th-229	7.7375E-11	339.870	679.741	0.00E+00	2.63E-08	5.26E-08		
Th-230	1.2211E-10	339.870	679.741	0.00E+00	4.15E-08	8.30E-08		
Th-232	2.3842E-11	339.870	679.741	0.00E+00	8.10E-09	1.62E-08		
Tl-208	1.4313E-07	339.870	679.741	0.00E+00	4.86E-05	9.73E-05		
U-232	4.1927E-07	339.870	679.741	0.00E+00	1.42E-04	2.85E-04		
U-233	6.8491E-08	339.870	679.741	0.00E+00	2.33E-05	4.66E-05		
U-234	2.0189E-06	339.870	679.741	0.00E+00	6.86E-04	1.37E-03		
U-235	-2.6572E-06	339.870	0.000	1.46E-03	5.57E-04	1.46E-03		
U-236	1.3575E-05	339.870	679.741	0.00E+00	4.61E-03	9.23E-03		
U-238	-2.2698E-08	339.870	0.000	9.71E-05	8.94E-05	9.71E-05		
Y-90	2.5646E+00	339.870	679.741	0.00E+00	8.72E+02	1.74E+03		
Other Radionuclides					1.21E+03	2.42E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.23E+01	4.46E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	70.05184872	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	327.422	339.870	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		679.741	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	1.04	1.04	1.00
Bounding:	2.08		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP FFCR (OSU) 1 Fuel decay start date: 2025
 SNF ID #: 702 Estimates as of: 2030
 Fuel Units & Descr: 4 - ELEMENT Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
 Heavy Metal Mass: BOL=.64kg ; EOL=.62kg 2 Template Burnup(MWd): 66.52
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000196
Template Decay Time: 5 years

Estimated
Canister usage:
18"x10"
0.05

II. Estimates								Gamma Sources	
	m	x _n	x _b	b	y _n	y _b		Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)			
Ac-227	2.8488E-10	21.670	43.339	0.00E+00	6.17E-09	1.23E-08		Avg. Mev	
Am-241	7.5767E-03	21.670	43.339	0.00E+00	1.64E-01	3.28E-01	0.0150		6.993E+12
Am-242m	2.4459E-05	21.670	43.339	0.00E+00	5.30E-04	1.06E-03	0.0250		1.534E+12
Am-243	3.0983E-05	21.670	43.339	0.00E+00	6.71E-04	1.34E-03	0.0375		1.357E+12
C-14	1.2590E-04	21.670	43.339	0.00E+00	2.73E-03	5.46E-03	0.0575		1.355E+12
Cl-36	2.6624E-06	21.670	43.339	0.00E+00	5.77E-05	1.15E-04	0.0850		8.430E+11
Cm-243	3.8244E-05	21.670	43.339	0.00E+00	8.29E-04	1.66E-03	0.1250		6.768E+11
Cm-244	4.1010E-03	21.670	43.339	0.00E+00	8.89E-02	1.78E-01	0.2250		7.164E+11
Co-60	1.2410E+00	21.670	43.339	0.00E+00	2.69E+01	5.38E+01	0.3750		3.575E+11
Cs-134	6.5454E-01	21.670	43.339	0.00E+00	1.42E+01	2.84E+01	0.5750		5.916E+12
Cs-135	1.9753E-05	21.670	43.339	0.00E+00	4.28E-04	8.56E-04	0.8500		1.085E+12
Cs-137	2.7375E+00	21.670	43.339	0.00E+00	5.93E+01	1.19E+02	1.2500		4.169E+12
Eu-154	1.2324E-01	21.670	43.339	0.00E+00	2.67E+00	5.34E+00	1.7500		5.576E+09
Eu-155	5.3037E-02	21.670	43.339	0.00E+00	1.15E+00	2.30E+00	2.2500		4.371E+09
Fe-55	7.9555E-01	21.670	43.339	0.00E+00	1.72E+01	3.45E+01	2.7500		3.962E+07
H-3	1.0531E-02	21.670	43.339	0.00E+00	2.28E-01	4.56E-01	3.5000		4.664E+06
I-129	7.1287E-07	21.670	43.339	0.00E+00	1.54E-05	3.09E-05	5.0000		1.117E+03
Kr-85	2.4955E-01	21.670	43.339	0.00E+00	5.41E+00	1.08E+01	7.0000		1.288E+02
Np-237	1.2121E-05	21.670	43.339	0.00E+00	2.63E-04	5.25E-04	11.0000		1.475E+01
Pa-231	1.1230E-09	21.670	43.339	0.00E+00	2.43E-08	4.87E-08			
Pb-210	6.1636E-14	21.670	43.339	0.00E+00	1.34E-12	2.67E-12			
Pm-147	1.1302E+00	21.670	43.339	0.00E+00	2.45E+01	4.90E+01			
Pu-238	5.4826E-02	21.670	43.339	0.00E+00	1.19E+00	2.38E+00			
Pu-239	1.4056E-03	21.670	43.339	0.00E+00	3.05E-02	6.09E-02			
Pu-240	1.1536E-03	21.670	43.339	0.00E+00	2.50E-02	5.00E-02			
Pu-241	4.2995E-01	21.670	43.339	0.00E+00	9.32E+00	1.86E+01			
Pu-242	4.9910E-06	21.670	43.339	0.00E+00	1.08E-04	2.16E-04			
Ra-226	2.4008E-13	21.670	43.339	0.00E+00	5.20E-12	1.04E-11			
Ra-228	1.8220E-11	21.670	43.339	0.00E+00	3.95E-10	7.90E-10			
Ru-106	1.0343E-01	21.670	43.339	0.00E+00	2.24E+00	4.48E+00			
Se-79	1.2832E-05	21.670	43.339	0.00E+00	2.78E-04	5.56E-04			
Sn-126	1.2090E-05	21.670	43.339	0.00E+00	2.62E-04	5.24E-04			
Sr-90	2.5646E+00	21.670	43.339	0.00E+00	5.56E+01	1.11E+02			
Tc-99	4.0319E-04	21.670	43.339	0.00E+00	8.74E-03	1.75E-02			
Th-229	7.7375E-11	21.670	43.339	0.00E+00	1.68E-09	3.35E-09			
Th-230	1.2211E-10	21.670	43.339	0.00E+00	2.65E-09	5.29E-09			
Th-232	2.3842E-11	21.670	43.339	0.00E+00	5.17E-10	1.03E-09			
Th-208	1.4313E-07	21.670	43.339	0.00E+00	3.10E-06	6.20E-06			
U-232	4.1927E-07	21.670	43.339	0.00E+00	9.09E-06	1.82E-05			
U-233	6.8491E-08	21.670	43.339	0.00E+00	1.48E-06	2.97E-06			
U-234	2.0189E-06	21.670	43.339	0.00E+00	4.37E-05	8.75E-05			
U-235	-2.6572E-06	21.670	0.000	9.67E-04	9.09E-04	9.67E-04			
U-236	1.3575E-05	21.670	43.339	0.00E+00	2.94E-04	5.88E-04			
U-238	-2.2698E-08	21.670	0.000	6.47E-05	6.43E-05	6.47E-05			
Y-90	2.5646E+00	21.670	43.339	0.00E+00	5.56E+01	1.11E+02			
Other Radionuclides					7.72E+01	1.54E+02			

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.42E+00	2.84E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	69.9	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	6.033	21.670	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		43.339	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.10	3.59	1.00
Bounding:	0.20		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP FFCR (SO. KOREA)
 SNF ID #: 733
 Fuel Units & Descr: 4 - ELEMENT
 Heavy Metal Mass: BOL=,64kg ; EOL=.56kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1997
 Estimates as of: 2030
 Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
²Template Burnup(MWd): 66.52
 Template BOL Heavy Metal Mass (MT): 0.000196
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18" x10"
 0.05

II. Estimates

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Avg. MeV	
Ac-227	1.0386E-09	73.372	146.745	0.00E+00	7.62E-08	1.52E-07		
Am-241	1.4973E-02	73.372	146.745	0.00E+00	1.10E+00	2.20E+00	0.0150	1.290E+13
Am-242m	2.2324E-05	73.372	146.745	0.00E+00	1.64E-03	3.28E-03	0.0250	2.671E+12
Am-243	3.0923E-05	73.372	146.745	0.00E+00	2.27E-03	4.54E-03	0.0375	2.347E+12
C-14	1.2559E-04	73.372	146.745	0.00E+00	9.21E-03	1.84E-02	0.0575	2.522E+12
Cl-36	2.6624E-06	73.372	146.745	0.00E+00	1.95E-04	3.91E-04	0.0850	1.505E+12
Cm-243	2.3527E-05	73.372	146.745	0.00E+00	1.73E-03	3.45E-03	0.1250	1.028E+12
Cm-244	1.9092E-03	73.372	146.745	0.00E+00	1.40E-01	2.80E-01	0.2250	1.300E+12
Co-60	8.9552E-02	73.372	146.745	0.00E+00	6.57E+00	1.31E+01	0.3750	5.644E+11
Cs-134	7.9074E-04	73.372	146.745	0.00E+00	5.80E-02	1.16E-01	0.5750	9.436E+12
Cs-135	1.9753E-05	73.372	146.745	0.00E+00	1.45E-03	2.90E-03	0.8500	1.586E+11
Cs-137	1.7243E+00	73.372	146.745	0.00E+00	1.27E+02	2.53E+02	1.2500	1.073E+12
Eu-154	2.4609E-02	73.372	146.745	0.00E+00	1.81E+00	3.61E+00	1.7500	4.458E+09
Eu-155	3.2456E-03	73.372	146.745	0.00E+00	2.38E-01	4.76E-01	2.2500	5.421E+06
Fe-55	3.8605E-03	73.372	146.745	0.00E+00	2.83E-01	5.67E-01	2.7500	7.413E+05
H-3	3.4305E-03	73.372	146.745	0.00E+00	2.52E-01	5.03E-01	3.5000	4.313E+03
I-129	7.1287E-07	73.372	146.745	0.00E+00	5.23E-05	1.05E-04	5.0000	1.830E+03
Kr-85	6.8536E-02	73.372	146.745	0.00E+00	5.03E+00	1.01E+01	7.0000	2.101E+02
Np-237	1.2219E-05	73.372	146.745	0.00E+00	8.97E-04	1.79E-03	11.0000	2.408E+01
Pa-231	2.0701E-09	73.372	146.745	0.00E+00	1.52E-07	3.04E-07		
Pb-210	1.3279E-12	73.372	146.745	0.00E+00	9.74E-11	1.95E-10		
Pm-147	5.7517E-03	73.372	146.745	0.00E+00	4.22E-01	8.44E-01		
Pu-238	4.6828E-02	73.372	146.745	0.00E+00	3.44E+00	6.87E+00		
Pu-239	1.4048E-03	73.372	146.745	0.00E+00	1.03E-01	2.06E-01		
Pu-240	1.1563E-03	73.372	146.745	0.00E+00	8.48E-02	1.70E-01		
Pu-241	1.6431E-01	73.372	146.745	0.00E+00	1.21E+01	2.41E+01		
Pu-242	4.9910E-06	73.372	146.745	0.00E+00	3.66E-04	7.32E-04		
Ra-226	5.4390E-12	73.372	146.745	0.00E+00	3.99E-10	7.98E-10		
Ra-228	2.3437E-11	73.372	146.745	0.00E+00	1.72E-09	3.44E-09		
Ru-106	1.1115E-07	73.372	146.745	0.00E+00	8.16E-06	1.63E-05		
Se-79	1.2829E-05	73.372	146.745	0.00E+00	9.41E-04	1.88E-03		
Sn-126	1.2088E-05	73.372	146.745	0.00E+00	8.87E-04	1.77E-03		
Sr-90	1.5935E+00	73.372	146.745	0.00E+00	1.17E+02	2.34E+02		
Tc-99	4.0319E-04	73.372	146.745	0.00E+00	2.96E-02	5.92E-02		
Th-229	2.4023E-10	73.372	146.745	0.00E+00	1.76E-08	3.53E-08		
Th-230	9.6948E-10	73.372	146.745	0.00E+00	7.11E-08	1.42E-07		
Th-232	2.3857E-11	73.372	146.745	0.00E+00	1.75E-09	3.50E-09		
Tl-208	1.3982E-07	73.372	146.745	0.00E+00	1.03E-05	2.05E-05		
U-232	3.7943E-07	73.372	146.745	0.00E+00	2.78E-05	5.57E-05		
U-233	6.9814E-08	73.372	146.745	0.00E+00	5.12E-06	1.02E-05		
U-234	5.4059E-06	73.372	146.745	0.00E+00	3.97E-04	7.93E-04		
U-235	-2.6572E-06	73.372	0.000	9.65E-04	7.70E-04	9.65E-04		
U-236	1.3576E-05	73.372	146.745	0.00E+00	9.96E-04	1.99E-03	1.68E+00	3.37E+00
U-238	-2.2698E-08	73.372	0.000	6.44E-05	6.27E-05	6.44E-05	Total	Total
Y-90	1.5935E+00	73.372	146.745	0.00E+00	1.17E+02	2.34E+02		
Other Radionuclides					1.24E+02	2.49E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.68E+00	3.37E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX-Er	U	
BOL Enrichment %:	69.98432602	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	30.071	73.372	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		146.745	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.34	2.44	
Bounding:	0.68		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA FLIP UNIV OF WISCONSIN
 SNF ID #: 1035
 Fuel Units & Descr: 9 - ELEMENT
 Heavy Metal Mass: BOL=1.57kg ; EOL=1.57kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.08

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.8488E-10	59.322	118.644	0.00E+00	1.69E-08	3.38E-08		
Am-241	7.5767E-03	59.322	118.644	0.00E+00	4.49E-01	8.99E-01	0.0150	1.914E+13
Am-242m	2.4459E-05	59.322	118.644	0.00E+00	1.45E-03	2.90E-03	0.0250	4.201E+12
Am-243	3.0983E-05	59.322	118.644	0.00E+00	1.84E-03	3.68E-03	0.0375	3.716E+12
C-14	1.2590E-04	59.322	118.644	0.00E+00	7.47E-03	1.49E-02	0.0575	3.709E+12
Cl-36	2.6624E-06	59.322	118.644	0.00E+00	1.58E-04	3.16E-04	0.0850	2.308E+12
Cr-243	3.8244E-05	59.322	118.644	0.00E+00	2.27E-03	4.54E-03	0.1250	1.853E+12
Cr-244	4.1010E-03	59.322	118.644	0.00E+00	2.43E-01	4.87E-01	0.2250	1.961E+12
Co-60	1.2410E+00	59.322	118.644	0.00E+00	7.36E+01	1.47E+02	0.3750	9.786E+11
Cs-134	6.5454E-01	59.322	118.644	0.00E+00	3.88E+01	7.77E+01	0.5750	1.620E+13
Cs-135	1.9753E-05	59.322	118.644	0.00E+00	1.17E-03	2.34E-03	0.8500	2.971E+12
Cs-137	2.7375E+00	59.322	118.644	0.00E+00	1.62E+02	3.25E+02	1.2500	1.141E+13
Eu-154	1.2324E-01	59.322	118.644	0.00E+00	7.31E+00	1.46E+01	1.7500	1.527E+10
Eu-155	5.3037E-02	59.322	118.644	0.00E+00	3.15E+00	6.29E+00	2.2500	1.197E+10
Fe-55	7.9555E-01	59.322	118.644	0.00E+00	4.72E+01	9.44E+01	2.7500	1.085E+08
H-3	1.0531E-02	59.322	118.644	0.00E+00	6.25E-01	1.25E+00	3.5000	1.277E+07
I-129	7.1287E-07	59.322	118.644	0.00E+00	4.23E-05	8.46E-05	5.0000	3.059E+03
Kr-85	2.4955E-01	59.322	118.644	0.00E+00	1.48E+01	2.96E+01	7.0000	3.520E+02
Np-237	1.2121E-05	59.322	118.644	0.00E+00	7.19E-04	1.44E-03	11.0000	4.039E+01
Pa-231	1.1230E-09	59.322	118.644	0.00E+00	6.66E-08	1.33E-07		
Pb-210	6.1636E-14	59.322	118.644	0.00E+00	3.66E-12	7.31E-12		
Pm-147	1.1302E+00	59.322	118.644	0.00E+00	6.70E+01	1.34E+02		
Pu-238	5.4826E-02	59.322	118.644	0.00E+00	3.25E+00	6.50E+00		
Pu-239	1.4056E-03	59.322	118.644	0.00E+00	8.34E-02	1.67E-01		
Pu-240	1.1536E-03	59.322	118.644	0.00E+00	6.84E-02	1.37E-01		
Pu-241	4.2995E-01	59.322	118.644	0.00E+00	2.55E+01	5.10E+01		
Pu-242	4.9910E-06	59.322	118.644	0.00E+00	2.96E-04	5.92E-04		
Ra-226	2.4008E-13	59.322	118.644	0.00E+00	1.42E-11	2.85E-11		
Ra-228	1.8220E-11	59.322	118.644	0.00E+00	1.08E-09	2.16E-09		
Ru-106	1.0343E-01	59.322	118.644	0.00E+00	6.14E+00	1.23E+01		
Se-79	1.2832E-05	59.322	118.644	0.00E+00	7.61E-04	1.52E-03		
Sn-126	1.2090E-05	59.322	118.644	0.00E+00	7.17E-04	1.43E-03		
Sr-90	2.5646E+00	59.322	118.644	0.00E+00	1.52E+02	3.04E+02		
Tc-99	4.0319E-04	59.322	118.644	0.00E+00	2.39E-02	4.78E-02		
Th-229	7.7375E-11	59.322	118.644	0.00E+00	4.59E-09	9.18E-09		
Th-230	1.2211E-10	59.322	118.644	0.00E+00	7.24E-09	1.45E-08		
Th-232	2.3842E-11	59.322	118.644	0.00E+00	1.41E-09	2.83E-09		
Ti-208	1.4313E-07	59.322	118.644	0.00E+00	8.49E-06	1.70E-05		
U-232	4.1927E-07	59.322	118.644	0.00E+00	2.49E-05	4.97E-05		
U-233	6.8491E-08	59.322	118.644	0.00E+00	4.06E-06	8.13E-06		
U-234	2.0189E-06	59.322	118.644	0.00E+00	1.20E-04	2.40E-04		
U-235	-2.6572E-06	59.322	0.000	2.38E-03	2.22E-03	2.38E-03		
U-236	1.3575E-05	59.322	118.644	0.00E+00	8.05E-04	1.61E-03		
U-238	-2.2698E-08	59.322	0.000	1.59E-04	1.58E-04	1.59E-04		
Y-90	2.5646E+00	59.322	118.644	0.00E+00	1.52E+02	3.04E+02		
Other Radionuclides					2.11E+02	4.23E+02		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX-Er	U	
BOL Enrichment %:	69.93004832	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
	59.322		
Bounding:		118.644	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
	0.11	0.00	
Bounding:	0.22		0.96

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA HIGH POWER (GA) ¹Fuel decay start date: 1970
 SNF ID #: 998 Estimates as of: 2030
 Fuel Units & Descr: 4 - ELEMENT Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
 Heavy Metal Mass: BOL= .12kg ; EOL= .12kg ²Template Burnup(MWd): 66.52
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000196
Template Decay Time: 50 years

Estimated
Canister usage:
18"x10"
0.05

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0776E-09	2.220	4.440	0.00E+00	4.61E-09	9.23E-09	0.0150	2.150E+11
Am-241	1.6777E-02	2.220	4.440	0.00E+00	3.72E-02	7.45E-02	0.0250	4.441E+10
Am-242m	1.9919E-05	2.220	4.440	0.00E+00	4.42E-05	8.84E-05	0.0375	3.879E+10
Am-243	3.0848E-05	2.220	4.440	0.00E+00	6.85E-05	1.37E-04	0.0575	4.239E+10
C-14	1.2521E-04	2.220	4.440	0.00E+00	2.78E-04	5.56E-04	0.0850	2.498E+10
Cl-36	2.6624E-06	2.220	4.440	0.00E+00	5.91E-06	1.18E-05	0.1250	1.640E+10
Cm-243	1.2813E-05	2.220	4.440	0.00E+00	2.84E-05	5.69E-05	0.2250	2.155E+10
Cm-244	7.3361E-04	2.220	4.440	0.00E+00	1.63E-03	3.26E-03	0.3750	9.379E+09
Co-60	3.3494E-03	2.220	4.440	0.00E+00	7.44E-03	1.49E-02	0.5750	1.600E+11
Cs-134	1.7799E-07	2.220	4.440	0.00E+00	3.95E-07	7.90E-07	0.8500	1.779E+09
Cs-135	1.9738E-05	2.220	4.440	0.00E+00	4.38E-05	8.76E-05	1.2500	1.889E+09
Cs-137	9.6843E-01	2.220	4.440	0.00E+00	2.15E+00	4.30E+00	1.7500	4.771E+04
Eu-154	3.2877E-03	2.220	4.440	0.00E+00	7.30E-03	1.46E-02	2.2500	1.025E+07
Eu-155	9.8812E-05	2.220	4.440	0.00E+00	2.19E-04	4.39E-04	2.7500	1.727E+04
Fe-55	4.9444E-06	2.220	4.440	0.00E+00	1.10E-05	2.20E-05	3.5000	5.550E+01
H-3	8.4381E-04	2.220	4.440	0.00E+00	1.87E-03	3.75E-03	5.0000	2.353E+01
I-129	7.1287E-07	2.220	4.440	0.00E+00	1.58E-06	3.17E-06	7.0000	2.688E+00
Kr-85	1.3624E-02	2.220	4.440	0.00E+00	3.02E-02	6.05E-02	11.0000	3.073E-01
Np-237	1.2375E-05	2.220	4.440	0.00E+00	2.75E-05	5.50E-05		
Pu-231	3.2066E-09	2.220	4.440	0.00E+00	7.12E-09	1.42E-08		
Pu-238	1.0925E-11	2.220	4.440	0.00E+00	2.43E-11	4.85E-11		
Pu-239	7.8187E-06	2.220	4.440	0.00E+00	1.74E-05	3.47E-05		
Pu-240	3.8440E-02	2.220	4.440	0.00E+00	8.53E-02	1.71E-01		
Pu-241	1.4038E-03	2.220	4.440	0.00E+00	3.12E-03	6.23E-03		
Pu-242	1.1560E-03	2.220	4.440	0.00E+00	2.57E-03	5.13E-03		
Pu-243	4.9354E-02	2.220	4.440	0.00E+00	1.10E-01	2.19E-01		
Pu-244	4.9910E-06	2.220	4.440	0.00E+00	1.11E-05	2.22E-05		
Ra-226	2.9330E-11	2.220	4.440	0.00E+00	6.51E-11	1.30E-10		
Ra-228	2.3857E-11	2.220	4.440	0.00E+00	5.30E-11	1.06E-10		
Ru-106	3.8455E-15	2.220	4.440	0.00E+00	8.54E-15	1.71E-14		
Sr-90	1.2826E-05	2.220	4.440	0.00E+00	2.85E-05	5.70E-05		
Sn-126	1.2087E-05	2.220	4.440	0.00E+00	2.68E-05	5.37E-05		
Tc-99	8.7913E-01	2.220	4.440	0.00E+00	1.95E+00	3.90E+00		
Th-229	4.0304E-04	2.220	4.440	0.00E+00	8.95E-04	1.79E-03		
Th-230	4.3912E-10	2.220	4.440	0.00E+00	9.75E-10	1.95E-09		
Th-232	2.8879E-09	2.220	4.440	0.00E+00	6.41E-09	1.28E-08		
Th-234	2.3888E-11	2.220	4.440	0.00E+00	5.30E-11	1.06E-10		
Ti-208	1.1027E-07	2.220	4.440	0.00E+00	2.45E-07	4.90E-07		
U-232	2.9871E-07	2.220	4.440	0.00E+00	6.63E-07	1.33E-06		
U-233	7.1407E-08	2.220	4.440	0.00E+00	1.59E-07	3.17E-07		
U-234	8.6801E-06	2.220	4.440	0.00E+00	1.93E-05	3.85E-05		
U-235	-2.6572E-06	2.220	0.000	2.35E-04	2.29E-04	2.35E-04		
U-236	1.3576E-05	2.220	4.440	0.00E+00	3.01E-05	6.03E-05		
U-238	-2.2698E-08	2.220	0.000	2.69E-06	2.64E-06	2.69E-06		
Y-90	8.7928E-01	2.220	4.440	0.00E+00	1.95E+00	3.90E+00		
Other Radionuclides					2.15E+00	4.30E+00		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.80E-02	5.61E-02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative).
Fuel Cladding:	INCOLOY 800	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	93.15162424	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
2.220		2.220	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
4.440		4.440	

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup
0.06	0.06	
0.11	0.11	
		Estimated EOL HM/ Given EOL HM
		0.98

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA HIGH POWER (ROMANIA)
 SNF ID #: 930
 Fuel Units & Descr: 267 - ELEMENT
 Heavy Metal Mass: BOL=11.83kg ; EOL=5.58kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1999
 Estimates as of: 2030
 Template: TRIGA-FLIP (LW/U-Zrx, SST, 60 to 100%, U)
²Template Burnup(MWd): 66.52
 Template BOL Heavy Metal Mass (MT): 0.000196
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 2.41

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.0386E-09	5,938.035	11,241.665	0.00E+00	6.17E-06	1.17E-05	0.0150	9.881E+14
Am-241	1.4973E-02	5,938.035	11,241.665	0.00E+00	8.89E+01	1.68E+02	0.0250	2.046E+14
Am-242m	2.2324E-05	5,938.035	11,241.665	0.00E+00	1.33E-01	2.51E-01	0.0375	1.798E+14
Am-243	3.0923E-05	5,938.035	11,241.665	0.00E+00	1.84E-01	3.48E-01	0.0575	1.932E+14
C-14	1.2559E-04	5,938.035	11,241.665	0.00E+00	7.46E-01	1.41E+00	0.0850	1.153E+14
Cl-36	2.6624E-06	5,938.035	11,241.665	0.00E+00	1.58E-02	2.99E-02	0.1250	7.874E+13
Cm-243	2.3527E-05	5,938.035	11,241.665	0.00E+00	1.40E-01	2.64E-01	0.2250	9.962E+13
Cm-244	1.9092E-03	5,938.035	11,241.665	0.00E+00	1.13E+01	2.15E+01	0.3750	4.324E+13
Co-60	8.9552E-02	5,938.035	11,241.665	0.00E+00	5.32E+02	1.01E+03	0.5750	7.229E+14
Cs-134	7.9074E-04	5,938.035	11,241.665	0.00E+00	4.70E+00	8.89E+00	0.8500	1.215E+13
Cs-135	1.9753E-05	5,938.035	11,241.665	0.00E+00	1.17E-01	2.22E-01	1.2500	8.223E+13
Cs-137	1.7243E+00	5,938.035	11,241.665	0.00E+00	1.02E+04	1.94E+04	1.7500	3.415E+11
Eu-154	2.4609E-02	5,938.035	11,241.665	0.00E+00	1.46E+02	2.77E+02	2.2500	4.153E+08
Eu-155	3.2456E-03	5,938.035	11,241.665	0.00E+00	1.93E+01	3.65E+01	2.7500	5.679E+07
Fe-55	3.8605E-03	5,938.035	11,241.665	0.00E+00	2.29E+01	4.34E+01	3.5000	3.304E+05
H-3	3.4305E-03	5,938.035	11,241.665	0.00E+00	2.04E+01	3.86E+01	5.0000	1.402E+05
I-129	7.1287E-07	5,938.035	11,241.665	0.00E+00	4.23E-03	8.01E-03	7.0000	1.610E+04
Kr-85	6.8536E-02	5,938.035	11,241.665	0.00E+00	4.07E+02	7.70E+02	11.0000	1.845E+03
Np-237	1.2219E-05	5,938.035	11,241.665	0.00E+00	7.26E-02	1.37E-01		
Pa-231	2.0701E-09	5,938.035	11,241.665	0.00E+00	1.23E-05	2.33E-05		
Pb-210	1.3279E-12	5,938.035	11,241.665	0.00E+00	7.88E-09	1.49E-08		
Pm-147	5.7517E-03	5,938.035	11,241.665	0.00E+00	3.42E+01	6.47E+01		
Pu-238	4.6828E-02	5,938.035	11,241.665	0.00E+00	2.78E+02	5.26E+02		
Pu-239	1.4048E-03	5,938.035	11,241.665	0.00E+00	8.34E+00	1.58E+01		
Pu-240	1.1563E-03	5,938.035	11,241.665	0.00E+00	6.87E+00	1.30E+01		
Pu-241	1.6431E-01	5,938.035	11,241.665	0.00E+00	9.76E+02	1.85E+03		
Pu-242	4.9910E-06	5,938.035	11,241.665	0.00E+00	2.96E-02	5.61E-02		
Ra-226	5.4390E-12	5,938.035	11,241.665	0.00E+00	3.23E-08	6.11E-08		
Ra-228	2.3437E-11	5,938.035	11,241.665	0.00E+00	1.39E-07	2.63E-07		
Ru-106	1.1115E-07	5,938.035	11,241.665	0.00E+00	6.60E-04	1.25E-03		
Se-79	1.2829E-05	5,938.035	11,241.665	0.00E+00	7.62E-02	1.44E-01		
Sn-126	1.2088E-05	5,938.035	11,241.665	0.00E+00	7.18E-02	1.36E-01		
Sr-90	1.5935E+00	5,938.035	11,241.665	0.00E+00	9.46E+03	1.79E+04		
Tc-99	4.0319E-04	5,938.035	11,241.665	0.00E+00	2.39E+00	4.53E+00		
Th-229	2.4023E-10	5,938.035	11,241.665	0.00E+00	1.43E-06	2.70E-06		
Th-230	9.6948E-10	5,938.035	11,241.665	0.00E+00	5.76E-06	1.09E-05		
Th-232	2.3857E-11	5,938.035	11,241.665	0.00E+00	1.42E-07	2.68E-07		
Tl-208	1.3982E-07	5,938.035	11,241.665	0.00E+00	8.30E-04	1.57E-03		
U-232	3.7943E-07	5,938.035	11,241.665	0.00E+00	2.25E-03	4.27E-03		
U-233	6.9814E-08	5,938.035	11,241.665	0.00E+00	4.15E-04	7.85E-04		
U-234	5.4059E-06	5,938.035	11,241.665	0.00E+00	3.21E-02	6.08E-02		
U-235	2.6572E-06	5,938.035	0.000	2.38E-02	8.03E-03	2.38E-02		
U-236	1.3576E-05	5,938.035	11,241.665	0.00E+00	8.06E-02	1.53E-01		
U-238	2.2698E-08	5,938.035	0.000	2.72E-04	1.38E-04	2.72E-04		
Y-90	1.5935E+00	5,938.035	11,241.665	0.00E+00	9.46E+03	1.79E+04		
Other Radionuclides					1.01E+04	1.90E+04		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
From SFD	Used		
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative).
Fuel Cladding:	INCOLOY 800	SST	
BOL HM Constituents:	U-ZrHx-Er	U	
BOL Enrichment %:	93.14636964	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
From SFD	Estimated		
Nominal:		5,938.035	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		11,241.665	Bounding burnup calculated assuming all BOL heavy metal burned.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	1.48		1.00
Bounding:	2.80		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA HIGH POWER (ROMANIA)
 SNF ID #: 302
 Fuel Units & Descr: 611 - ELEMENT
 Heavy Metal Mass: BOL=27.07kg : EOL=13.99kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 5.50

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.0776E-09	12,427.124	24,854.249	0.00E+00	2.58E-05	5.16E-05	Avg. MeV	
Am-241	1.6777E-02	12,427.124	24,854.249	0.00E+00	2.08E+02	4.17E+02	0.0150	1.203E+15
Am-242m	1.9919E-05	12,427.124	24,854.249	0.00E+00	2.48E-01	4.95E-01	0.0250	2.486E+14
Am-243	3.0848E-05	12,427.124	24,854.249	0.00E+00	3.83E-01	7.67E-01	0.0375	2.171E+14
C-14	1.2521E-04	12,427.124	24,854.249	0.00E+00	1.56E+00	3.11E+00	0.0575	2.373E+14
Cl-36	2.6624E-06	12,427.124	24,854.249	0.00E+00	3.31E-02	6.62E-02	0.0850	1.398E+14
Cm-243	1.2813E-05	12,427.124	24,854.249	0.00E+00	1.59E-01	3.18E-01	0.1250	9.178E+13
Cm-244	7.3361E-04	12,427.124	24,854.249	0.00E+00	9.12E+00	1.82E+01	1.2050	1.206E+14
Co-60	3.3494E-03	12,427.124	24,854.249	0.00E+00	4.16E+01	8.32E+01	0.3750	5.249E+13
Cs-134	1.7799E-07	12,427.124	24,854.249	0.00E+00	2.21E-03	4.42E-03	0.5750	8.955E+14
Cs-135	1.9738E-05	12,427.124	24,854.249	0.00E+00	2.45E-01	4.91E-01	0.8500	9.957E+12
Cs-137	9.6843E-01	12,427.124	24,854.249	0.00E+00	1.20E+04	2.41E+04	1.2500	1.057E+13
Eu-154	3.2877E-03	12,427.124	24,854.249	0.00E+00	4.09E+01	8.17E+01	1.7500	2.670E+11
Eu-155	9.8812E-05	12,427.124	24,854.249	0.00E+00	1.23E+00	2.46E+00	2.2500	5.736E+07
Fe-55	4.9444E-06	12,427.124	24,854.249	0.00E+00	6.14E-02	1.23E-01	2.7500	9.667E+07
H-3	8.4381E-04	12,427.124	24,854.249	0.00E+00	1.05E+01	2.10E+01	3.5000	3.105E+05
I-129	7.1287E-07	12,427.124	24,854.249	0.00E+00	8.86E-03	1.77E-02	5.0000	1.317E+05
Kr-85	1.3624E-02	12,427.124	24,854.249	0.00E+00	1.69E+02	3.39E+02	7.0000	1.504E+04
Np-237	1.2375E-05	12,427.124	24,854.249	0.00E+00	1.54E-01	3.08E-01	11.0000	1.719E+03
Pa-231	3.2066E-09	12,427.124	24,854.249	0.00E+00	3.98E-05	7.97E-05		
Pb-210	1.0925E-11	12,427.124	24,854.249	0.00E+00	1.36E-07	2.72E-07		
Pm-147	7.8187E-06	12,427.124	24,854.249	0.00E+00	9.72E-02	1.94E-01		
Pu-238	3.8440E-02	12,427.124	24,854.249	0.00E+00	4.78E+02	9.55E+02		
Pu-239	1.4038E-03	12,427.124	24,854.249	0.00E+00	1.74E+01	3.49E+01		
Pu-240	1.1560E-03	12,427.124	24,854.249	0.00E+00	1.44E+01	2.87E+01		
Pu-241	4.9354E-02	12,427.124	24,854.249	0.00E+00	6.13E+02	1.23E+03		
Pu-242	4.9910E-06	12,427.124	24,854.249	0.00E+00	6.20E-02	1.24E-01		
Ra-226	2.9330E-11	12,427.124	24,854.249	0.00E+00	3.64E-07	7.29E-07		
Ra-228	2.3857E-11	12,427.124	24,854.249	0.00E+00	2.96E-07	5.93E-07		
Ru-106	3.8455E-15	12,427.124	24,854.249	0.00E+00	4.78E-11	9.56E-11		
Se-79	1.2826E-05	12,427.124	24,854.249	0.00E+00	1.59E-01	3.19E-01		
Sn-126	1.2087E-05	12,427.124	24,854.249	0.00E+00	1.50E-01	3.00E-01		
Sr-90	8.7913E-01	12,427.124	24,854.249	0.00E+00	1.09E+04	2.19E+04		
Tc-99	4.0304E-04	12,427.124	24,854.249	0.00E+00	5.01E+00	1.00E+01		
Th-229	4.3912E-10	12,427.124	24,854.249	0.00E+00	5.46E-06	1.09E-05		
Th-230	2.8879E-09	12,427.124	24,854.249	0.00E+00	3.59E-05	7.18E-05		
Th-232	2.3888E-11	12,427.124	24,854.249	0.00E+00	2.97E-07	5.94E-07		
Th-238	1.1027E-07	12,427.124	24,854.249	0.00E+00	1.37E-03	2.74E-03		
U-232	2.9871E-07	12,427.124	24,854.249	0.00E+00	3.71E-03	7.42E-03		
U-233	7.1407E-08	12,427.124	24,854.249	0.00E+00	8.87E-04	1.77E-03		
U-234	8.6801E-06	12,427.124	24,854.249	0.00E+00	1.08E-01	2.16E-01		
U-235	-2.6572E-06	12,427.124	0.000	5.45E-02	2.15E-02	5.45E-02		
U-236	1.3576E-05	12,427.124	24,854.249	0.00E+00	1.69E-01	3.37E-01		
U-238	-2.2698E-08	12,427.124	0.000	6.24E-04	3.42E-04	6.24E-04		
Y-90	8.7928E-01	12,427.124	24,854.249	0.00E+00	1.09E+04	2.19E+04		
Other Radionuclides					1.20E+04	2.40E+04		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons: This fuel matches on all parameters except cladding (SST is conservative).
Fuel Cladding:	INCOLOY 800	SST	
BOL HM Constituents:	U-ZHX-Er	U	
BOL Enrichment %:	93.14035234	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		12,427.124	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		24,854.249	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	1.35		
Bounding:	2.71		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 250
 Fuel Units & Descr: 95 - ELEMENT
 Heavy Metal Mass: BOL=18.53kg ; EOL=18.01kg
 ROD Storage Sits: INEEL

¹Fuel decay start date: 2019
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 10 years

Estimated
 Canister usage:
 18"x10"
 0.86

Radionuclide	m		x _n		x _b		b		y _n		y _b		Gamma Sources	
	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)	Avg. MeV					
Ac-227	1.3731E-09	489.714	979.427	0.00E+00	6.72E-07	1.34E-06								
Am-241	2.3865E-03	489.714	979.427	0.00E+00	1.17E+00	2.34E+00	0.0150	1.265E+14						
Am-242m	1.3812E-06	489.714	979.427	0.00E+00	6.76E-04	1.35E-03	0.0250	2.681E+13						
Am-243	1.4767E-07	489.714	979.427	0.00E+00	7.23E-05	1.45E-04	0.0375	2.290E+13						
C-14	1.2863E-04	489.714	979.427	0.00E+00	6.30E-02	1.26E-01	0.0575	2.440E+13						
Cl-36	2.8120E-06	489.714	979.427	0.00E+00	1.38E-03	2.75E-03	0.0850	1.480E+13						
Cm-243	1.5895E-07	489.714	979.427	0.00E+00	7.78E-05	1.56E-04	0.1250	9.732E+12						
Cm-244	1.4008E-06	489.714	979.427	0.00E+00	6.66E-04	1.37E-03	0.2250	1.263E+13						
Co-60	6.6541E-01	489.714	979.427	0.00E+00	3.26E+02	6.52E+02	0.3750	5.799E+12						
Cs-134	1.6887E-02	489.714	979.427	0.00E+00	8.27E+00	1.65E+01	0.5750	9.086E+13						
Cs-135	3.2195E-05	489.714	979.427	0.00E+00	1.58E-02	3.15E-02	0.8500	1.622E+12						
Cs-137	2.4556E+00	489.714	979.427	0.00E+00	1.20E+03	2.41E+03	1.2500	4.877E+13						
Eu-154	1.0268E-02	489.714	979.427	0.00E+00	5.03E+00	1.01E+01	1.7500	2.936E+10						
Eu-155	1.4570E-02	489.714	979.427	0.00E+00	7.14E+00	1.43E+01	2.2500	1.533E+09						
Fe-55	2.0361E-01	489.714	979.427	0.00E+00	9.97E+01	1.99E+02	2.7500	2.588E+07						
H-3	8.3940E-03	489.714	979.427	0.00E+00	4.11E+00	8.22E+00	3.5000	3.008E+06						
I-129	7.3684E-07	489.714	979.427	0.00E+00	3.61E-04	7.22E-04	5.0000	5.225E+02						
Kr-85	1.8286E-01	489.714	979.427	0.00E+00	8.95E+01	1.79E+02	7.0000	5.911E+01						
Np-237	1.2462E-06	489.714	979.427	0.00E+00	6.10E-04	1.22E-03	11.0000	6.731E+00						
Pa-231	4.9143E-09	489.714	979.427	0.00E+00	2.41E-06	4.81E-06								
Pb-210	1.7173E-14	489.714	979.427	0.00E+00	8.41E-12	1.68E-11								
Pm-147	5.6165E-01	489.714	979.427	0.00E+00	2.75E+02	5.50E+02								
Pu-238	9.9820E-04	489.714	979.427	0.00E+00	4.89E-01	9.78E-01								
Pu-239	5.5293E-03	489.714	979.427	0.00E+00	2.71E+00	5.42E+00								
Pu-240	2.1263E-03	489.714	979.427	0.00E+00	1.04E+00	2.08E+00								
Pu-241	8.0165E-02	489.714	979.427	0.00E+00	3.93E+01	7.85E+01								
Pu-242	2.3128E-07	489.714	979.427	0.00E+00	1.13E-04	2.27E-04								
Ra-226	9.9774E-14	489.714	979.427	0.00E+00	4.89E-11	9.77E-11								
Ra-228	2.1729E-10	489.714	979.427	0.00E+00	1.06E-07	2.13E-07								
Ru-106	2.9519E-03	489.714	979.427	0.00E+00	1.45E+00	2.89E+00								
Se-79	1.3017E-05	489.714	979.427	0.00E+00	6.37E-03	1.27E-02								
Sn-126	1.2167E-05	489.714	979.427	0.00E+00	5.96E-03	1.19E-02								
Sr-90	2.3128E+00	489.714	979.427	0.00E+00	1.13E+03	2.27E+03								
Tc-99	4.4241E-04	489.714	979.427	0.00E+00	2.17E-01	4.33E-01								
Th-229	1.9459E-10	489.714	979.427	0.00E+00	9.53E-08	1.91E-07								
Th-230	2.5564E-11	489.714	979.427	0.00E+00	1.25E-08	2.50E-08								
Th-232	2.5278E-10	489.714	979.427	0.00E+00	1.24E-07	2.48E-07								
Tl-208	1.6947E-08	489.714	979.427	0.00E+00	8.30E-06	1.66E-05								
U-232	4.6812E-08	489.714	979.427	0.00E+00	2.29E-05	4.58E-05								
U-233	1.2206E-07	489.714	979.427	0.00E+00	5.98E-05	1.20E-04								
U-234	1.7323E-07	489.714	979.427	0.00E+00	8.48E-05	1.70E-04								
U-235	-2.6194E-06	489.714	0.000	8.01E-03	6.72E-03	8.01E-03								
U-236	1.2693E-05	489.714	979.427	0.00E+00	6.22E-03	1.24E-02								
U-238	-3.6331E-08	489.714	0.000	4.98E-03	4.96E-03	4.98E-03								
Y-90	2.3128E+00	489.714	979.427	0.00E+00	1.13E+03	2.27E+03								
Other Radionuclides					1.20E+03	2.40E+03								

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	90.272	489.714	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		979.427	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.78	5.42	1.00
Bounding:	1.55		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 268
 Fuel Units & Descr: 137 - ELEMENT
 Heavy Metal Mass: BOL=26.72kg ; EOL=23.48kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 1.23

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	3,086.436	6,172.873	0.00E+00	2.63E-06	5.26E-06	Avg. MeV	
Am-241	1.8331E-03	3,086.436	6,172.873	0.00E+00	5.66E+00	1.13E+01	0.0150	9.977E+14
Am-242m	1.4129E-06	3,086.436	6,172.873	0.00E+00	4.36E-03	8.72E-03	0.0250	2.195E+14
Am-243	1.4774E-07	3,086.436	6,172.873	0.00E+00	4.56E-04	9.12E-04	0.0375	1.870E+14
C-14	1.2871E-04	3,086.436	6,172.873	0.00E+00	3.97E-01	7.94E-01	0.0575	1.919E+14
Cl-36	2.8120E-06	3,086.436	6,172.873	0.00E+00	8.68E-03	1.74E-02	0.0850	1.189E+14
Cm-243	1.7940E-07	3,086.436	6,172.873	0.00E+00	5.54E-04	1.11E-03	0.1250	8.633E+13
Cm-244	1.6962E-06	3,086.436	6,172.873	0.00E+00	5.24E-03	1.05E-02	0.2250	1.008E+14
Co-60	1.2839E+00	3,086.436	6,172.873	0.00E+00	3.96E+03	7.93E+03	0.3750	5.118E+13
Cs-134	9.0541E-02	3,086.436	6,172.873	0.00E+00	2.79E+02	5.59E+02	0.5750	6.804E+14
Cs-135	3.2195E-05	3,086.436	6,172.873	0.00E+00	9.94E-02	1.99E-01	0.8500	2.920E+13
Cs-137	2.7564E+00	3,086.436	6,172.873	0.00E+00	8.51E+03	1.70E+04	1.2500	5.930E+14
Eu-154	1.5368E-02	3,086.436	6,172.873	0.00E+00	4.74E+01	9.49E+01	1.7500	3.953E+11
Eu-155	2.9293E-02	3,086.436	6,172.873	0.00E+00	9.04E+01	1.81E+02	2.2500	6.372E+11
Fe-55	7.7158E-01	3,086.436	6,172.873	0.00E+00	2.38E+03	4.76E+03	2.7500	5.056E+09
H-3	1.1111E-02	3,086.436	6,172.873	0.00E+00	3.43E+01	6.86E+01	3.5000	5.886E+08
I-129	7.3684E-07	3,086.436	6,172.873	0.00E+00	2.27E-03	4.55E-03	5.0000	3.251E+03
Kr-85	2.5263E-01	3,086.436	6,172.873	0.00E+00	7.80E+02	1.56E+03	7.0000	3.680E+02
Np-237	1.2427E-06	3,086.436	6,172.873	0.00E+00	3.84E-03	7.67E-03	11.0000	4.192E+01
Pa-231	3.8511E-09	3,086.436	6,172.873	0.00E+00	1.19E-05	2.38E-05		
Pb-210	7.3880E-15	3,086.436	6,172.873	0.00E+00	2.28E-11	4.56E-11		
Pm-147	2.1023E+00	3,086.436	6,172.873	0.00E+00	6.49E+03	1.30E+04		
Pu-238	1.0383E-03	3,086.436	6,172.873	0.00E+00	3.20E+00	6.41E+00		
Pu-239	5.5293E-03	3,086.436	6,172.873	0.00E+00	1.71E+01	3.41E+01		
Pu-240	2.1278E-03	3,086.436	6,172.873	0.00E+00	6.57E+00	1.31E+01		
Pu-241	1.0195E-01	3,086.436	6,172.873	0.00E+00	3.15E+02	6.29E+02		
Pu-242	2.3128E-07	3,086.436	6,172.873	0.00E+00	7.14E-04	1.43E-03		
Ra-226	5.2782E-14	3,086.436	6,172.873	0.00E+00	1.63E-10	3.26E-10		
Ra-228	1.9338E-10	3,086.436	6,172.873	0.00E+00	5.97E-07	1.19E-06		
Ru-106	9.1684E-02	3,086.436	6,172.873	0.00E+00	2.83E+02	5.66E+02		
Se-79	1.3018E-05	3,086.436	6,172.873	0.00E+00	4.02E-02	8.04E-02		
Sn-126	1.2167E-05	3,086.436	6,172.873	0.00E+00	3.76E-02	7.51E-02		
Sr-90	2.6045E+00	3,086.436	6,172.873	0.00E+00	8.04E+03	1.61E+04		
Tc-99	4.4241E-04	3,086.436	6,172.873	0.00E+00	1.37E+00	2.73E+00		
Th-229	1.3713E-10	3,086.436	6,172.873	0.00E+00	4.23E-07	8.46E-07		
Th-230	1.8090E-11	3,086.436	6,172.873	0.00E+00	5.58E-08	1.12E-07		
Th-232	2.5278E-10	3,086.436	6,172.873	0.00E+00	7.80E-07	1.56E-06		
Tl-208	1.6947E-08	3,086.436	6,172.873	0.00E+00	5.23E-05	1.05E-04		
U-232	4.8737E-08	3,086.436	6,172.873	0.00E+00	1.50E-04	3.01E-04		
U-233	1.2203E-07	3,086.436	6,172.873	0.00E+00	3.77E-04	7.53E-04		
U-234	1.5925E-07	3,086.436	6,172.873	0.00E+00	4.92E-04	9.83E-04		
U-235	-2.6194E-06	3,086.436	0.000	1.14E-02	3.35E-03	1.14E-02		
U-236	1.2693E-05	3,086.436	6,172.873	0.00E+00	3.92E-02	7.84E-02		
U-238	-3.6331E-08	3,086.436	0.000	7.20E-03	7.09E-03	7.20E-03		
Y-90	2.6060E+00	3,086.436	6,172.873	0.00E+00	8.04E+03	1.61E+04		
Other Radionuclides					1.11E+04	2.23E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.80E+02	3.59E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZHX	U	
BOL Enrichment %:	19.8	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		3,086.436	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		6,172.873	Bounding burnup assumed to be twice nominal burnup.

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	3.39	
Bounding:	6.78	
		Estimated EOL HM/ Given EOL HM
		1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD 1 Fuel decay start date: 2035
 SNF ID #: 262 Estimates as of: 2030
 Fuel Units & Desc: 128 - ELEMENT Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=24.96kg ; EOL=22.18kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 1.15

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	2,651.517	5,303.034	0.00E+00	2.26E-06	4.52E-06	0.0150	8.571E+14
Am-241	1.8331E-03	2,651.517	5,303.034	0.00E+00	4.86E+00	9.72E+00	0.0250	1.886E+14
Am-242m	1.4129E-06	2,651.517	5,303.034	0.00E+00	3.75E-03	7.49E-03	0.0375	1.606E+14
Am-243	1.4774E-07	2,651.517	5,303.034	0.00E+00	3.92E-04	7.83E-04	0.0575	1.649E+14
C-14	1.2871E-04	2,651.517	5,303.034	0.00E+00	3.41E-01	6.83E-01	0.0850	1.021E+14
Ci-36	2.8120E-06	2,651.517	5,303.034	0.00E+00	7.46E-03	1.49E-02	0.1250	7.416E+13
Cm-243	1.7940E-07	2,651.517	5,303.034	0.00E+00	4.76E-04	9.51E-04	0.2250	8.664E+13
Cm-244	1.6962E-06	2,651.517	5,303.034	0.00E+00	4.50E-03	9.00E-03	0.3750	4.396E+13
Co-60	1.2839E+00	2,651.517	5,303.034	0.00E+00	3.40E+03	6.81E+03	0.5750	5.845E+14
Cs-134	9.0541E-02	2,651.517	5,303.034	0.00E+00	2.40E+02	4.80E+02	0.8500	2.508E+13
Cs-135	3.2195E-05	2,651.517	5,303.034	0.00E+00	8.54E-02	1.71E-01	1.2500	5.094E+14
Cs-137	2.7564E+00	2,651.517	5,303.034	0.00E+00	7.31E+03	1.46E+04	1.7500	3.396E+11
Eu-154	1.5368E-02	2,651.517	5,303.034	0.00E+00	4.07E+01	8.15E+01	2.2500	5.474E+11
Eu-155	2.9293E-02	2,651.517	5,303.034	0.00E+00	7.77E+01	1.55E+02	2.7500	4.344E+09
Fe-55	7.7158E-01	2,651.517	5,303.034	0.00E+00	2.05E+03	4.09E+03	3.5000	5.057E+08
H-3	1.1111E-02	2,651.517	5,303.034	0.00E+00	2.95E+01	5.89E+01	5.0000	2.794E+03
I-129	7.3684E-07	2,651.517	5,303.034	0.00E+00	1.95E-03	3.91E-03	7.0000	3.163E+02
Kr-85	2.5263E-01	2,651.517	5,303.034	0.00E+00	6.70E+02	1.34E+03	11.0000	3.603E+01
Np-237	1.2427E-06	2,651.517	5,303.034	0.00E+00	3.30E-03	6.59E-03		
Pa-231	3.8511E-09	2,651.517	5,303.034	0.00E+00	1.02E-05	2.04E-05		
Pb-210	7.3880E-15	2,651.517	5,303.034	0.00E+00	1.96E-11	3.92E-11		
Pm-147	2.1023E+00	2,651.517	5,303.034	0.00E+00	5.57E+03	1.11E+04		
Pu-238	1.0383E-03	2,651.517	5,303.034	0.00E+00	2.75E+00	5.51E+00		
Pu-239	5.5293E-03	2,651.517	5,303.034	0.00E+00	1.47E+01	2.93E+01		
Pu-240	2.1278E-03	2,651.517	5,303.034	0.00E+00	5.64E+00	1.13E+01		
Pu-241	1.0195E-01	2,651.517	5,303.034	0.00E+00	2.70E+02	5.41E+02		
Pu-242	2.3128E-07	2,651.517	5,303.034	0.00E+00	6.13E-04	1.23E-03		
Ra-226	5.2782E-14	2,651.517	5,303.034	0.00E+00	1.40E-10	2.80E-10		
Ra-228	1.9338E-10	2,651.517	5,303.034	0.00E+00	5.13E-07	1.03E-06		
Ru-106	9.1684E-02	2,651.517	5,303.034	0.00E+00	2.43E+02	4.86E+02		
Se-79	1.3018E-05	2,651.517	5,303.034	0.00E+00	3.45E-02	6.90E-02		
Sn-126	1.2167E-05	2,651.517	5,303.034	0.00E+00	3.23E-02	6.45E-02		
Sr-90	2.6045E+00	2,651.517	5,303.034	0.00E+00	6.91E+03	1.38E+04		
Tc-99	4.4241E-04	2,651.517	5,303.034	0.00E+00	1.17E+00	2.35E+00		
Th-229	1.3713E-10	2,651.517	5,303.034	0.00E+00	3.64E-07	7.27E-07		
Th-230	1.8090E-11	2,651.517	5,303.034	0.00E+00	4.80E-08	9.59E-08		
Th-232	2.5278E-10	2,651.517	5,303.034	0.00E+00	6.70E-07	1.34E-06		
Th-208	1.6947E-08	2,651.517	5,303.034	0.00E+00	4.49E-05	8.99E-05		
U-232	4.8737E-08	2,651.517	5,303.034	0.00E+00	1.29E-04	2.58E-04		
U-233	1.2203E-07	2,651.517	5,303.034	0.00E+00	3.24E-04	6.47E-04		
U-234	1.5925E-07	2,651.517	5,303.034	0.00E+00	4.22E-04	8.44E-04		
U-235	-2.6194E-06	2,651.517	0.000	1.08E-02	3.84E-03	1.08E-02		
U-236	1.2693E-05	2,651.517	5,303.034	0.00E+00	3.37E-02	6.73E-02		
U-238	-3.6331E-08	2,651.517	0.000	6.71E-03	6.61E-03	6.71E-03		
Y-90	2.6060E+00	2,651.517	5,303.034	0.00E+00	6.91E+03	1.38E+04		
Other Radionuclides					9.56E+03	1.91E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.54E+02	3.09E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,651.517	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		5,303.034	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	3.12		1.00
Bounding:	6.23		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 238
 Fuel Units & Descr: 71 - ELEMENT
 Heavy Metal Mass: BOL=13.38kg ; EOL=9.32kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.64

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	8.0632E-10	3,869.714	7,739.428	0.00E+00	3.12E-06	6.24E-06	Avg. MeV	
Am-241	2.2586E-03	3,869.714	7,739.428	0.00E+00	8.74E+00	1.75E+01	0.0150	1.310E+15
Am-242m	1.9925E-06	3,869.714	7,739.428	0.00E+00	7.71E-03	1.54E-02	0.0250	2.843E+14
Am-243	2.3323E-07	3,869.714	7,739.428	0.00E+00	9.03E-04	1.81E-03	0.0375	3.541E+14
C-14	4.3308E-05	3,869.714	7,739.428	0.00E+00	1.68E-01	3.35E-01	0.0675	2.715E+14
Cl-36	4.3023E-08	3,869.714	7,739.428	0.00E+00	1.66E-04	3.33E-04	0.0850	1.900E+14
Cr-243	2.7429E-07	3,869.714	7,739.428	0.00E+00	1.06E-03	2.12E-03	0.1250	2.842E+14
Cr-244	3.1504E-06	3,869.714	7,739.428	0.00E+00	1.22E-02	2.44E-02	0.2250	1.586E+14
Co-60	3.1008E-02	3,869.714	7,739.428	0.00E+00	1.20E+02	2.40E+02	0.3750	7.060E+13
Cs-134	1.0367E-01	3,869.714	7,739.428	0.00E+00	4.01E+02	8.02E+02	0.5750	8.952E+14
Cs-135	3.1549E-05	3,869.714	7,739.428	0.00E+00	1.22E-01	2.44E-01	0.8500	2.203E+14
Cs-137	2.7564E+00	3,869.714	7,739.428	0.00E+00	1.07E+04	2.13E+04	1.2500	2.284E+14
Eu-154	1.3490E+00	3,869.714	7,739.428	0.00E+00	5.22E+03	1.04E+04	1.7500	6.537E+12
Eu-155	4.3880E-01	3,869.714	7,739.428	0.00E+00	1.70E+03	3.40E+03	2.2500	7.947E+11
Fe-55	8.6782E-03	3,869.714	7,739.428	0.00E+00	3.36E+01	6.72E+01	2.7500	6.454E+09
H-3	1.0805E-02	3,869.714	7,739.428	0.00E+00	4.18E+01	8.36E+01	3.5000	7.546E+08
I-129	7.3805E-07	3,869.714	7,739.428	0.00E+00	2.86E-03	5.71E-03	5.0000	4.423E+03
Kr-85	2.5218E-01	3,869.714	7,739.428	0.00E+00	9.76E+02	1.95E+03	7.0000	5.005E+02
Np-237	1.4463E-06	3,869.714	7,739.428	0.00E+00	5.60E-03	1.12E-02	11.0000	5.700E+01
Pa-231	3.5970E-09	3,869.714	7,739.428	0.00E+00	1.39E-05	2.78E-05		
Pb-210	8.2511E-15	3,869.714	7,739.428	0.00E+00	3.19E-11	6.39E-11		
Pm-147	2.0767E+00	3,869.714	7,739.428	0.00E+00	8.04E+03	1.61E+04		
Pu-238	1.3514E-03	3,869.714	7,739.428	0.00E+00	5.23E+00	1.05E+01		
Pu-239	5.6947E-03	3,869.714	7,739.428	0.00E+00	2.20E+01	4.41E+01		
Pu-240	2.2647E-03	3,869.714	7,739.428	0.00E+00	8.76E+00	1.75E+01		
Pu-241	1.2574E-01	3,869.714	7,739.428	0.00E+00	4.87E+02	9.73E+02		
Pu-242	3.0602E-07	3,869.714	7,739.428	0.00E+00	1.18E-03	2.37E-03		
Ra-226	5.7353E-14	3,869.714	7,739.428	0.00E+00	2.22E-10	4.44E-10		
Ra-228	1.8150E-10	3,869.714	7,739.428	0.00E+00	7.02E-07	1.40E-06		
Ru-106	9.3744E-02	3,869.714	7,739.428	0.00E+00	3.63E+02	7.26E+02		
Se-79	1.2938E-05	3,869.714	7,739.428	0.00E+00	5.01E-02	1.00E-01		
Sn-126	1.2239E-05	3,869.714	7,739.428	0.00E+00	4.74E-02	9.47E-02		
Sr-90	2.6000E+00	3,869.714	7,739.428	0.00E+00	1.01E+04	2.01E+04		
Tc-99	4.4120E-04	3,869.714	7,739.428	0.00E+00	1.71E+00	3.41E+00		
Th-229	1.4749E-10	3,869.714	7,739.428	0.00E+00	5.71E-07	1.14E-06		
Th-230	1.9549E-11	3,869.714	7,739.428	0.00E+00	7.56E-08	1.51E-07		
Th-232	2.3744E-10	3,869.714	7,739.428	0.00E+00	9.19E-07	1.84E-06		
Th-208	1.9459E-08	3,869.714	7,739.428	0.00E+00	7.53E-05	1.51E-04		
U-232	5.6015E-08	3,869.714	7,739.428	0.00E+00	2.17E-04	4.34E-04		
U-233	1.3132E-07	3,869.714	7,739.428	0.00E+00	5.08E-04	1.02E-03		
U-234	1.7323E-07	3,869.714	7,739.428	0.00E+00	6.70E-04	1.34E-03		
U-235	-2.6159E-06	3,869.714	0.000	5.67E-03	0.00E+00	5.67E-03		
U-236	1.2717E-05	3,869.714	7,739.428	0.00E+00	4.92E-02	9.84E-02		
U-238	-3.8857E-08	3,869.714	0.000	3.61E-03	3.46E-03	3.61E-03		
Y-90	2.6015E+00	3,869.714	7,739.428	0.00E+00	1.01E+04	2.01E+04		
Other Radionuclides					1.47E+04	2.94E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.94E+02	3.89E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.62614987	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	494.298	3,869.714	
Bounding:		7,739.428	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	7.83	7.83	
Bounding:	15.66		

Estimated EOL HM/Given EOL HM: 1.23

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 261
 Fuel Units & Desc: 92 - ELEMENT
 Heavy Metal Mass: BOL=17.94kg ; EOL=16.10kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.83

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	1,756.477	3,512.955	0.00E+00	1.50E-06	2.99E-06	0.0150	5.678E+14
Am-241	1.8331E-03	1,756.477	3,512.955	0.00E+00	3.22E+00	6.44E+00	0.0250	1.249E+14
Am-242m	1.4129E-06	1,756.477	3,512.955	0.00E+00	2.48E-03	4.96E-03	0.0375	1.064E+14
Am-243	1.4774E-07	1,756.477	3,512.955	0.00E+00	2.60E-04	5.19E-04	0.0575	1.092E+14
C-14	1.2871E-04	1,756.477	3,512.955	0.00E+00	2.26E-01	4.52E-01	0.0850	6.765E+13
Cl-36	2.8120E-06	1,756.477	3,512.955	0.00E+00	4.94E-03	9.88E-03	0.1250	4.913E+13
Cm-243	1.7940E-07	1,756.477	3,512.955	0.00E+00	3.15E-04	6.30E-04	0.2250	5.739E+13
Cm-244	1.6962E-06	1,756.477	3,512.955	0.00E+00	2.98E-03	5.96E-03	0.3750	2.912E+13
Co-60	1.2839E+00	1,756.477	3,512.955	0.00E+00	2.26E+03	4.51E+03	0.5750	3.872E+14
Cs-134	9.0541E-02	1,756.477	3,512.955	0.00E+00	1.59E+02	3.18E+02	0.8500	1.662E+13
Cs-135	3.2195E-05	1,756.477	3,512.955	0.00E+00	5.66E-02	1.13E-01	1.2500	3.375E+14
Cs-137	2.7564E+00	1,756.477	3,512.955	0.00E+00	4.84E+03	9.68E+03	1.7500	2.250E+11
Eu-154	1.5368E-02	1,756.477	3,512.955	0.00E+00	2.70E+01	5.40E+01	2.2500	3.626E+11
Eu-155	2.9293E-02	1,756.477	3,512.955	0.00E+00	5.15E+01	1.03E+02	2.7500	2.877E+09
Fe-55	7.7158E-01	1,756.477	3,512.955	0.00E+00	1.36E+03	2.71E+03	3.5000	3.350E+08
H-3	1.1111E-02	1,756.477	3,512.955	0.00E+00	1.95E+01	3.90E+01	5.0000	1.852E+03
I-129	7.3684E-07	1,756.477	3,512.955	0.00E+00	1.29E-03	2.59E-03	7.0000	2.096E+02
Kr-85	2.5263E-01	1,756.477	3,512.955	0.00E+00	4.44E+02	8.87E+02	11.0000	2.388E+01
Np-237	1.2427E-06	1,756.477	3,512.955	0.00E+00	2.18E-03	4.37E-03		
Pa-231	3.8511E-09	1,756.477	3,512.955	0.00E+00	6.76E-06	1.35E-05		
Pb-210	7.3880E-15	1,756.477	3,512.955	0.00E+00	1.30E-11	2.60E-11		
Pm-147	2.1023E+00	1,756.477	3,512.955	0.00E+00	3.69E+03	7.39E+03		
Pu-238	1.0383E-03	1,756.477	3,512.955	0.00E+00	1.82E+00	3.65E+00		
Pu-239	5.5293E-03	1,756.477	3,512.955	0.00E+00	9.71E+00	1.94E+01		
Pu-240	2.1278E-03	1,756.477	3,512.955	0.00E+00	3.74E+00	7.47E+00		
Pu-241	1.0195E-01	1,756.477	3,512.955	0.00E+00	1.79E+02	3.58E+02		
Pu-242	2.3128E-07	1,756.477	3,512.955	0.00E+00	4.06E-04	8.12E-04		
Ra-226	5.2782E-14	1,756.477	3,512.955	0.00E+00	9.27E-11	1.85E-10		
Ra-228	1.9338E-10	1,756.477	3,512.955	0.00E+00	3.40E-07	6.79E-07		
Ru-106	9.1684E-02	1,756.477	3,512.955	0.00E+00	1.61E+02	3.22E+02		
Se-79	1.3018E-05	1,756.477	3,512.955	0.00E+00	2.29E-02	4.57E-02		
Sn-126	1.2167E-05	1,756.477	3,512.955	0.00E+00	2.14E-02	4.27E-02		
Sr-90	2.6045E+00	1,756.477	3,512.955	0.00E+00	4.57E+03	9.15E+03		
Tc-99	4.4241E-04	1,756.477	3,512.955	0.00E+00	7.77E-01	1.55E+00		
Th-229	1.3713E-10	1,756.477	3,512.955	0.00E+00	2.41E-07	4.82E-07		
Th-230	1.8090E-11	1,756.477	3,512.955	0.00E+00	3.18E-08	6.36E-08		
Th-232	2.5278E-10	1,756.477	3,512.955	0.00E+00	4.44E-07	8.88E-07		
Tl-208	1.6947E-08	1,756.477	3,512.955	0.00E+00	2.98E-05	5.95E-05		
U-232	4.8737E-08	1,756.477	3,512.955	0.00E+00	8.56E-05	1.71E-04		
U-233	1.2203E-07	1,756.477	3,512.955	0.00E+00	2.14E-04	4.29E-04		
U-234	1.5925E-07	1,756.477	3,512.955	0.00E+00	2.80E-04	5.59E-04		
U-235	-2.6194E-06	1,756.477	0.000	7.55E-03	2.95E-03	7.55E-03		
U-236	1.2693E-05	1,756.477	3,512.955	0.00E+00	2.23E-02	4.46E-02		
U-238	-3.6331E-08	1,756.477	0.000	4.85E-03	4.79E-03	4.85E-03		
Y-90	2.6060E+00	1,756.477	3,512.955	0.00E+00	4.58E+03	9.15E+03		
Other Radionuclides					6.33E+03	1.27E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST 304	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.48717949	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,756.477	
Bounding:		3,512.955	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	2.87		
Bounding:	5.74		

1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 254
 Fuel Units & Descr: 102 - ELEMENT
 Heavy Metal Mass: BOL=19.11kg : EOL=19.07kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.92

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	372.490	744.980	0.00E+00	3.17E-07	6.35E-07	0.0150	1.204E+14
Am-241	1.8331E-03	372.490	744.980	0.00E+00	6.83E-01	1.37E+00	0.0250	2.649E+13
Am-242m	1.4129E-06	372.490	744.980	0.00E+00	5.26E-04	1.05E-03	0.0375	2.256E+13
Am-243	1.4774E-07	372.490	744.980	0.00E+00	5.50E-05	1.10E-04	0.0575	2.316E+13
C-14	1.2871E-04	372.490	744.980	0.00E+00	4.79E-02	9.59E-02	0.0850	1.435E+13
Cl-36	2.8120E-06	372.490	744.980	0.00E+00	1.05E-03	2.09E-03	0.1250	1.042E+13
Cm-243	1.7940E-07	372.490	744.980	0.00E+00	6.68E-05	1.34E-04	0.2250	1.217E+13
Cm-244	1.6962E-06	372.490	744.980	0.00E+00	6.32E-04	1.26E-03	0.3750	6.176E+12
Co-60	1.2839E+00	372.490	744.980	0.00E+00	4.78E+02	9.56E+02	0.5750	8.211E+13
Cs-134	9.0541E-02	372.490	744.980	0.00E+00	3.37E+01	6.75E+01	0.8500	3.524E+12
Cs-135	3.2195E-05	372.490	744.980	0.00E+00	1.20E-02	2.40E-02	1.2500	7.157E+13
Cs-137	2.7564E+00	372.490	744.980	0.00E+00	1.03E+03	2.05E+03	1.7500	4.771E+10
Eu-154	1.5368E-02	372.490	744.980	0.00E+00	5.72E+00	1.14E+01	2.2500	7.690E+10
Eu-155	2.9293E-02	372.490	744.980	0.00E+00	1.09E+01	2.18E+01	2.7500	6.102E+08
Fe-55	7.7158E-01	372.490	744.980	0.00E+00	2.87E+02	5.75E+02	3.5000	7.104E+07
H-3	1.1111E-02	372.490	744.980	0.00E+00	4.14E+00	8.28E+00	5.0000	4.023E+02
I-129	7.3684E-07	372.490	744.980	0.00E+00	2.74E-04	5.49E-04	7.0000	4.556E+01
Kr-85	2.5263E-01	372.490	744.980	0.00E+00	9.41E+01	1.88E+02	11.0000	5.191E+00
Np-237	1.2427E-06	372.490	744.980	0.00E+00	4.63E-04	9.26E-04		
Pa-231	3.8511E-09	372.490	744.980	0.00E+00	1.43E-06	2.87E-06		
Pb-210	7.3880E-15	372.490	744.980	0.00E+00	2.75E-12	5.50E-12		
Pm-147	2.1023E+00	372.490	744.980	0.00E+00	7.83E+02	1.57E+03		
Pu-238	1.0383E-03	372.490	744.980	0.00E+00	3.87E-01	7.74E-01		
Pu-239	5.5293E-03	372.490	744.980	0.00E+00	2.06E+00	4.12E+00		
Pu-240	2.1278E-03	372.490	744.980	0.00E+00	7.93E-01	1.59E+00		
Pu-241	1.0195E-01	372.490	744.980	0.00E+00	3.80E+01	7.60E+01		
Pu-242	2.3128E-07	372.490	744.980	0.00E+00	8.61E-05	1.72E-04		
Ra-226	5.2782E-14	372.490	744.980	0.00E+00	1.97E-11	3.93E-11		
Ra-228	1.9338E-10	372.490	744.980	0.00E+00	7.20E-08	1.44E-07		
Ru-106	9.1684E-02	372.490	744.980	0.00E+00	3.42E+01	6.83E+01		
Se-79	1.3018E-05	372.490	744.980	0.00E+00	4.85E-03	9.70E-03		
Sn-126	1.2167E-05	372.490	744.980	0.00E+00	4.53E-03	9.06E-03		
Sr-90	2.6045E+00	372.490	744.980	0.00E+00	9.70E+02	1.94E+03		
Tc-99	4.4241E-04	372.490	744.980	0.00E+00	1.65E-01	3.30E-01		
Th-229	1.3713E-10	372.490	744.980	0.00E+00	5.11E-08	1.02E-07		
Th-230	1.8090E-11	372.490	744.980	0.00E+00	6.74E-09	1.35E-08		
Th-232	2.5278E-10	372.490	744.980	0.00E+00	9.42E-08	1.88E-07		
Tl-208	1.6947E-08	372.490	744.980	0.00E+00	6.31E-06	1.26E-05		
U-232	4.8737E-08	372.490	744.980	0.00E+00	1.82E-05	3.63E-05		
U-233	1.2203E-07	372.490	744.980	0.00E+00	4.55E-05	9.09E-05		
U-234	1.5925E-07	372.490	744.980	0.00E+00	5.93E-05	1.19E-04		
U-235	2.6194E-06	372.490	0.000	8.05E-03	7.08E-03	8.05E-03		
U-236	1.2693E-05	372.490	744.980	0.00E+00	4.73E-03	9.46E-03		
U-238	-3.6331E-08	372.490	0.000	5.17E-03	5.16E-03	5.17E-03		
Y-90	2.6060E+00	372.490	744.980	0.00E+00	9.71E+02	1.94E+03		
Other Radionuclides					1.34E+03	2.69E+03		

Thermal Power		
Nominal Heat	Bounding Heat	
Output (Watts)	Output (Watts)	
2.17E+01	4.34E+01	
Total	Total	

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.48980681	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	372.490	38.948	
Bounding:		744.980	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.57	0.10	
Bounding:	1.14		

0.98

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 260
 Fuel Units & Descr: 93 - ELEMENT
 Heavy Metal Mass: BOL=17.21kg ; EOL=16.35kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.84

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	8.5173E-10	816.762	1,633.524	0.00E+00	6.96E-07	1.39E-06	0.0150	2.640E+14
Am-241	1.8331E-03	816.762	1,633.524	0.00E+00	1.50E+00	2.99E+00	0.0250	5.809E+13
Am-242m	1.4129E-06	816.762	1,633.524	0.00E+00	1.15E-03	2.31E-03	0.0375	4.947E+13
Am-243	1.4774E-07	816.762	1,633.524	0.00E+00	1.21E-04	2.41E-04	0.0575	5.078E+13
C-14	1.2871E-04	816.762	1,633.524	0.00E+00	1.05E-01	2.10E-01	0.0850	3.146E+13
Ct-36	2.8120E-06	816.762	1,633.524	0.00E+00	2.30E-03	4.59E-03	0.1250	5.078E+13
Cm-243	1.7940E-07	816.762	1,633.524	0.00E+00	1.47E-04	2.93E-04	0.2250	2.669E+13
Cm-244	1.6962E-06	816.762	1,633.524	0.00E+00	1.39E-03	2.77E-03	0.3750	1.354E+13
Co-60	1.2839E+00	816.762	1,633.524	0.00E+00	1.05E+03	2.10E+03	0.5750	1.800E+14
Cs-134	9.0541E-02	816.762	1,633.524	0.00E+00	7.40E+01	1.48E+02	0.8500	7.727E+12
Cs-135	3.2195E-05	816.762	1,633.524	0.00E+00	2.63E-02	5.26E-02	1.2500	1.569E+14
Cs-137	2.7564E+00	816.762	1,633.524	0.00E+00	2.25E+03	4.50E+03	1.7500	1.046E+11
Eu-154	1.5368E-02	816.762	1,633.524	0.00E+00	1.26E+01	2.51E+01	2.2500	1.686E+11
Eu-155	2.9293E-02	816.762	1,633.524	0.00E+00	2.39E+01	4.79E+01	2.7500	1.338E+09
Fe-55	7.7158E-01	816.762	1,633.524	0.00E+00	6.30E+02	1.26E+03	3.5000	1.558E+08
H-3	1.1111E-02	816.762	1,633.524	0.00E+00	9.08E+00	1.82E+01	5.0000	8.667E+02
I-129	7.3684E-07	816.762	1,633.524	0.00E+00	6.02E-04	1.20E-03	7.0000	9.811E+01
Kr-85	2.5263E-01	816.762	1,633.524	0.00E+00	2.06E+02	4.13E+02	11.0000	1.118E+01
Np-237	1.2427E-06	816.762	1,633.524	0.00E+00	1.01E-03	2.03E-03		
Pa-231	3.8511E-09	816.762	1,633.524	0.00E+00	3.15E-06	6.29E-06		
Pb-210	7.3880E-15	816.762	1,633.524	0.00E+00	6.03E-12	1.21E-11		
Pm-147	2.1023E+00	816.762	1,633.524	0.00E+00	1.72E+03	3.43E+03		
Pu-238	1.0383E-03	816.762	1,633.524	0.00E+00	8.48E-01	1.70E+00		
Pu-239	5.5293E-03	816.762	1,633.524	0.00E+00	4.52E+00	9.03E+00		
Pu-240	2.1278E-03	816.762	1,633.524	0.00E+00	1.74E+00	3.48E+00		
Pu-241	1.0195E-01	816.762	1,633.524	0.00E+00	8.33E+01	1.67E+02		
Pu-242	2.3128E-07	816.762	1,633.524	0.00E+00	1.89E-04	3.78E-04		
Ra-226	5.2782E-14	816.762	1,633.524	0.00E+00	4.31E-11	8.62E-11		
Ra-228	1.9338E-10	816.762	1,633.524	0.00E+00	1.58E-07	3.16E-07		
Ru-106	9.1684E-02	816.762	1,633.524	0.00E+00	7.49E+01	1.50E+02		
Se-79	1.3018E-05	816.762	1,633.524	0.00E+00	1.06E-02	2.13E-02		
Sn-126	1.2167E-05	816.762	1,633.524	0.00E+00	9.94E-03	1.99E-02		
Sr-90	2.6045E+00	816.762	1,633.524	0.00E+00	2.13E+03	4.25E+03		
Tc-99	4.4241E-04	816.762	1,633.524	0.00E+00	3.61E-01	7.23E-01		
Th-229	1.3713E-10	816.762	1,633.524	0.00E+00	1.12E-07	2.24E-07		
Th-230	1.8090E-11	816.762	1,633.524	0.00E+00	1.48E-08	2.96E-08		
Th-232	2.5278E-10	816.762	1,633.524	0.00E+00	2.06E-07	4.13E-07		
Tl-208	1.6947E-08	816.762	1,633.524	0.00E+00	1.38E-05	2.77E-05		
U-232	4.8737E-08	816.762	1,633.524	0.00E+00	3.98E-05	7.96E-05		
U-233	1.2203E-07	816.762	1,633.524	0.00E+00	9.97E-05	1.99E-04		
U-234	1.5925E-07	816.762	1,633.524	0.00E+00	1.30E-04	2.60E-04		
U-235	-2.6194E-06	816.762	0.000	7.34E-03	5.20E-03	7.34E-03		
U-236	1.2693E-05	816.762	1,633.524	0.00E+00	1.04E-02	2.07E-02		
U-238	-3.6331E-08	816.762	0.000	4.64E-03	4.61E-03	4.64E-03		
Y-90	2.6060E+00	816.762	1,633.524	0.00E+00	2.13E+03	4.26E+03		
Other Radionuclides					2.94E+03	5.89E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.75E+01	9.51E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.72972973	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		816.762	
Bounding:		1,633.524	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.39		
Bounding:	2.78		

Estimated EOL HM/Given EOL HM: 1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 246
 Fuel Units & Descr: 115 - ELEMENT
 Heavy Metal Mass: BOL=21.90kg ; EOL=21.59kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2002
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 1.04

II. Estimates

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	4.1459E-09	296.406	592.811	0.00E+00	1.23E-06	2.46E-06		
Am-241	3.5850E-03	296.406	592.811	0.00E+00	1.06E+00	2.13E+00	0.0150	5.262E+13
Am-242m	1.2899E-06	296.406	592.811	0.00E+00	3.82E-04	7.65E-04	0.0250	1.094E+13
Am-243	1.4747E-07	296.406	592.811	0.00E+00	4.37E-05	8.74E-05	0.0375	9.491E+12
C-14	1.2839E-04	296.406	592.811	0.00E+00	3.81E-02	7.61E-02	0.0575	1.022E+13
Cl-36	2.8120E-06	296.406	592.811	0.00E+00	8.34E-04	1.67E-03	0.0850	6.161E+12
Cm-243	1.1038E-07	296.406	592.811	0.00E+00	3.27E-05	6.54E-05	0.1250	4.019E+12
Cm-244	7.8917E-07	296.406	592.811	0.00E+00	2.34E-04	4.68E-04	0.2250	5.299E+12
Co-60	9.2647E-02	296.406	592.811	0.00E+00	2.75E+01	5.49E+01	0.3750	2.314E+12
Cs-134	1.0940E-04	296.406	592.811	0.00E+00	3.24E-02	6.49E-02	0.5750	3.836E+13
Cs-135	3.2195E-05	296.406	592.811	0.00E+00	9.54E-03	1.91E-02	0.8500	4.118E+11
Cs-137	1.7368E+00	296.406	592.811	0.00E+00	5.15E+02	1.03E+03	1.2500	4.229E+12
Eu-154	3.0677E-03	296.406	592.811	0.00E+00	9.09E-01	1.82E+00	1.7500	1.072E+10
Eu-155	1.7925E-03	296.406	592.811	0.00E+00	5.31E-01	1.06E+00	2.2500	2.261E+07
Fe-55	3.7444E-03	296.406	592.811	0.00E+00	1.11E+00	2.22E+00	2.7500	3.822E+05
H-3	3.6180E-03	296.406	592.811	0.00E+00	1.07E+00	2.14E+00	3.5000	8.225E+02
I-129	7.3684E-07	296.406	592.811	0.00E+00	2.18E-04	4.37E-04	5.0000	3.210E+02
Kr-85	6.9368E-02	296.406	592.811	0.00E+00	2.06E+01	4.11E+01	7.0000	3.626E+01
Np-237	1.2662E-06	296.406	592.811	0.00E+00	3.75E-04	7.51E-04	11.0000	4.125E+00
Pa-231	9.1654E-09	296.406	592.811	0.00E+00	2.72E-06	5.43E-06		
Pb-210	1.3728E-13	296.406	592.811	0.00E+00	4.07E-11	8.14E-11		
Pm-147	1.0702E-02	296.406	592.811	0.00E+00	3.17E+00	6.34E+00		
Pu-238	8.8692E-04	296.406	592.811	0.00E+00	2.63E-01	5.26E-01		
Pu-239	5.5263E-03	296.406	592.811	0.00E+00	1.64E+00	3.28E+00		
Pu-240	2.1233E-03	296.406	592.811	0.00E+00	6.29E-01	1.26E+00		
Pu-241	3.8962E-02	296.406	592.811	0.00E+00	1.15E+01	2.31E+01		
Pu-242	2.3128E-07	296.406	592.811	0.00E+00	6.86E-05	1.37E-04		
Ra-226	4.6752E-13	296.406	592.811	0.00E+00	1.39E-10	2.77E-10		
Ra-228	2.4827E-10	296.406	592.811	0.00E+00	7.36E-08	1.47E-07		
Ru-106	9.8526E-08	296.406	592.811	0.00E+00	2.92E-05	5.84E-05		
Se-79	1.3015E-05	296.406	592.811	0.00E+00	3.86E-03	7.72E-03		
Sn-126	1.2165E-05	296.406	592.811	0.00E+00	3.61E-03	7.21E-03		
Sr-90	1.6195E+00	296.406	592.811	0.00E+00	4.80E+02	9.60E+02		
Tc-99	4.4241E-04	296.406	592.811	0.00E+00	1.31E-01	2.62E-01		
Th-229	4.2451E-10	296.406	592.811	0.00E+00	1.26E-07	2.52E-07		
Th-230	6.1398E-11	296.406	592.811	0.00E+00	1.82E-08	3.64E-08		
Th-232	2.5278E-10	296.406	592.811	0.00E+00	7.49E-08	1.50E-07		
Tl-208	1.5098E-08	296.406	592.811	0.00E+00	4.48E-06	8.95E-06		
U-232	4.0662E-08	296.406	592.811	0.00E+00	1.21E-05	2.41E-05		
U-233	1.2217E-07	296.406	592.811	0.00E+00	3.62E-05	7.24E-05		
U-234	2.2391E-07	296.406	592.811	0.00E+00	6.64E-05	1.33E-04		
U-235	-2.6194E-06	296.406	0.000	9.45E-03	8.67E-03	9.45E-03		
U-236	1.2695E-05	296.406	592.811	0.00E+00	3.76E-03	7.53E-03		
U-238	-3.6331E-08	296.406	0.000	5.89E-03	5.88E-03	5.89E-03		
Y-90	1.6195E+00	296.406	592.811	0.00E+00	4.80E+02	9.60E+02		
Other Radionuclides					5.10E+02	1.02E+03		

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	Basis for Parameter Differences:
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx	U	
BOL Enrichment %:	19.97312804	10 to 20	

Burnup Summary (MWd)²

	From SFD	Estimated	Basis for burnup used in estimate:
Nominal:	0.328	296.406	
Bounding:	0.022	592.811	Bounding burnup assumed to be twice nominal burnup.

Checks

	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.40	902.46	1.00
Bounding:	0.79	27,073.95	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 253
 Fuel Units & Desc.: 163 - ELEMENT
 Heavy Metal Mass: BOL=31.79kg ; EOL=30.48kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 1.47

II. Estimates	m	x _a	x _b	b	y _a	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	1,244.808	2,489.616	0.00E+00	1.06E-06	2.12E-06		
Am-241	1.8331E-03	1,244.808	2,489.616	0.00E+00	2.28E+00	4.56E+00	0.0150	4.024E+14
Am-242m	1.4129E-06	1,244.808	2,489.616	0.00E+00	1.76E-03	3.52E-03	0.0250	8.854E+13
Am-243	1.4774E-07	1,244.808	2,489.616	0.00E+00	1.84E-04	3.68E-04	0.0375	7.540E+13
C-14	1.2871E-04	1,244.808	2,489.616	0.00E+00	1.60E-01	3.20E-01	0.0575	7.739E+13
Cl-36	2.8120E-06	1,244.808	2,489.616	0.00E+00	3.50E-03	7.00E-03	0.0850	4.795E+13
Co-243	1.7940E-07	1,244.808	2,489.616	0.00E+00	2.23E-04	4.47E-04	0.1250	3.482E+13
Co-244	1.6962E-06	1,244.808	2,489.616	0.00E+00	2.11E-03	4.22E-03	0.2250	4.067E+13
Co-60	1.2839E+00	1,244.808	2,489.616	0.00E+00	1.60E+03	3.20E+03	0.3750	2.064E+13
Cs-134	9.0541E-02	1,244.808	2,489.616	0.00E+00	1.13E+02	2.25E+02	0.5750	2.744E+14
Cs-135	3.2195E-05	1,244.808	2,489.616	0.00E+00	4.01E-02	8.02E-02	0.8500	1.178E+13
Cs-137	2.7564E+00	1,244.808	2,489.616	0.00E+00	3.43E+03	6.86E+03	1.2500	2.392E+14
Eu-154	1.5368E-02	1,244.808	2,489.616	0.00E+00	1.91E+01	3.83E+01	1.7500	1.594E+11
Eu-155	2.9293E-02	1,244.808	2,489.616	0.00E+00	3.65E+01	7.29E+01	2.2500	2.570E+11
Fe-55	7.7158E-01	1,244.808	2,489.616	0.00E+00	9.60E+02	1.92E+03	2.7500	2.039E+09
H-3	1.1111E-02	1,244.808	2,489.616	0.00E+00	1.38E+01	2.77E+01	3.5000	2.374E+08
I-129	7.3684E-07	1,244.808	2,489.616	0.00E+00	9.17E-04	1.83E-03	5.0000	1.324E+03
Kr-85	2.5263E-01	1,244.808	2,489.616	0.00E+00	3.14E+02	6.29E+02	7.0000	1.499E+02
Np-237	1.2427E-06	1,244.808	2,489.616	0.00E+00	1.55E-03	3.09E-03	11.0000	1.708E+01
Pa-231	3.8511E-09	1,244.808	2,489.616	0.00E+00	4.79E-06	9.59E-06		
Pb-210	7.3880E-15	1,244.808	2,489.616	0.00E+00	9.20E-12	1.84E-11		
Pm-147	2.1023E+00	1,244.808	2,489.616	0.00E+00	2.62E+03	5.23E+03		
Pu-238	1.0383E-03	1,244.808	2,489.616	0.00E+00	1.29E+00	2.59E+00		
Pu-239	5.5293E-03	1,244.808	2,489.616	0.00E+00	6.88E+00	1.38E+01		
Pu-240	2.1278E-03	1,244.808	2,489.616	0.00E+00	2.65E+00	5.30E+00		
Pu-241	1.0195E-01	1,244.808	2,489.616	0.00E+00	1.27E+02	2.54E+02		
Pu-242	2.3128E-07	1,244.808	2,489.616	0.00E+00	2.88E-04	5.76E-04		
Ra-226	5.2782E-14	1,244.808	2,489.616	0.00E+00	6.57E-11	1.31E-10		
Ra-228	1.9338E-10	1,244.808	2,489.616	0.00E+00	2.41E-07	4.81E-07		
Ru-106	9.1684E-02	1,244.808	2,489.616	0.00E+00	1.14E+02	2.28E+02		
Se-79	1.3018E-05	1,244.808	2,489.616	0.00E+00	1.62E-02	3.24E-02		
Sn-126	1.2167E-05	1,244.808	2,489.616	0.00E+00	1.51E-02	3.03E-02		
Sr-90	2.6045E+00	1,244.808	2,489.616	0.00E+00	3.24E+03	6.48E+03		
Tc-99	4.4241E-04	1,244.808	2,489.616	0.00E+00	5.51E-01	1.10E+00		
Th-229	1.3713E-10	1,244.808	2,489.616	0.00E+00	1.71E-07	3.41E-07		
Th-230	1.8090E-11	1,244.808	2,489.616	0.00E+00	2.25E-08	4.50E-08		
Th-232	2.5278E-10	1,244.808	2,489.616	0.00E+00	3.15E-07	6.29E-07		
Ti-208	1.6947E-08	1,244.808	2,489.616	0.00E+00	2.11E-05	4.22E-05		
U-232	4.8737E-08	1,244.808	2,489.616	0.00E+00	6.07E-05	1.21E-04		
U-233	1.2203E-07	1,244.808	2,489.616	0.00E+00	1.52E-04	3.04E-04		
U-234	1.5925E-07	1,244.808	2,489.616	0.00E+00	1.98E-04	3.96E-04		
U-235	-2.6194E-06	1,244.808	0.000	1.37E-02	1.05E-02	1.37E-02		
U-236	1.2693E-05	1,244.808	2,489.616	0.00E+00	1.58E-02	3.16E-02		
U-238	-3.6331E-08	1,244.808	0.000	8.55E-03	8.50E-03	8.55E-03		
Y-90	2.6060E+00	1,244.808	2,489.616	0.00E+00	3.24E+03	6.49E+03		
Other Radionuclides					4.49E+03	8.98E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.24E+01	1.45E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	774.442	1,244.808	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		2,489.616	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	1.15	1.61
Bounding:	2.30	
		Estimated EOL HM/ Given EOL HM
		1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 251
 Fuel Units & Descr: 77 - ELEMENT
 Heavy Metal Mass: BOL=15.02kg ; EOL=14.63kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.69

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	367.524	735.048	0.00E+00	3.13E-07	6.26E-07	Avg. MeV	
Am-241	1.8331E-03	367.524	735.048	0.00E+00	6.74E-01	1.35E+00	0.0150	1.188E+14
Am-242m	1.4129E-06	367.524	735.048	0.00E+00	5.19E-04	1.04E-03	0.0250	2.614E+13
Am-243	1.4774E-07	367.524	735.048	0.00E+00	5.43E-05	1.09E-04	0.0375	2.226E+13
C-14	1.2871E-04	367.524	735.048	0.00E+00	4.73E-02	9.46E-02	0.0575	2.285E+13
Cf-252	2.8120E-06	367.524	735.048	0.00E+00	1.03E-03	2.07E-03	0.0850	1.416E+13
Cm-243	1.7940E-07	367.524	735.048	0.00E+00	6.59E-05	1.32E-04	0.1250	1.028E+13
Cm-244	1.6962E-06	367.524	735.048	0.00E+00	6.23E-04	1.25E-03	0.2250	1.201E+13
Co-60	1.2839E+00	367.524	735.048	0.00E+00	4.72E+02	9.44E+02	0.3750	6.094E+12
Cs-134	9.0541E-02	367.524	735.048	0.00E+00	3.33E+01	6.66E+01	0.5750	8.102E+13
Cs-135	3.2195E-05	367.524	735.048	0.00E+00	1.18E-02	2.37E-02	0.8500	3.477E+12
Cs-137	2.7564E+00	367.524	735.048	0.00E+00	1.01E+03	2.03E+03	1.2500	7.061E+13
Eu-154	1.5368E-02	367.524	735.048	0.00E+00	5.65E+00	1.13E+01	1.7500	4.708E+10
Eu-155	2.9293E-02	367.524	735.048	0.00E+00	1.08E+01	2.15E+01	2.2500	7.588E+10
Fe-55	7.7158E-01	367.524	735.048	0.00E+00	2.84E+02	5.67E+02	2.7500	6.021E+08
H-3	1.1111E-02	367.524	735.048	0.00E+00	4.08E+00	8.17E+00	3.5000	7.009E+07
I-129	7.3684E-07	367.524	735.048	0.00E+00	2.71E-04	5.42E-04	5.0000	3.945E+02
Kr-85	2.5263E-01	367.524	735.048	0.00E+00	9.28E+01	1.86E+02	7.0000	4.466E+01
Np-237	1.2427E-06	367.524	735.048	0.00E+00	4.57E-04	9.13E-04	11.0000	5.089E+00
Pa-231	3.8511E-09	367.524	735.048	0.00E+00	1.42E-06	2.83E-06		
Pb-210	7.3880E-15	367.524	735.048	0.00E+00	2.72E-12	5.43E-12		
Pm-147	2.1023E+00	367.524	735.048	0.00E+00	7.73E+02	1.55E+03		
Pu-238	1.0383E-03	367.524	735.048	0.00E+00	3.82E-01	7.63E-01		
Pu-239	5.5293E-03	367.524	735.048	0.00E+00	2.03E+00	4.06E+00		
Pu-240	2.1278E-03	367.524	735.048	0.00E+00	7.82E-01	1.56E+00		
Pu-241	1.0195E-01	367.524	735.048	0.00E+00	3.75E+01	7.49E+01		
Pu-242	2.3128E-07	367.524	735.048	0.00E+00	8.50E-05	1.70E-04		
Ra-226	5.2782E-14	367.524	735.048	0.00E+00	1.94E-11	3.88E-11		
Ra-228	1.9338E-10	367.524	735.048	0.00E+00	7.11E-08	1.42E-07		
Ru-106	9.1684E-02	367.524	735.048	0.00E+00	3.37E+01	6.74E+01		
Se-79	1.3018E-05	367.524	735.048	0.00E+00	4.78E-03	9.57E-03		
Sn-126	1.2167E-05	367.524	735.048	0.00E+00	4.47E-03	8.94E-03		
Sr-90	2.6045E+00	367.524	735.048	0.00E+00	9.57E+02	1.91E+03		
Tc-99	4.4241E-04	367.524	735.048	0.00E+00	1.63E-01	3.25E-01		
Th-229	1.3713E-10	367.524	735.048	0.00E+00	5.04E-08	1.01E-07		
Th-230	1.8090E-11	367.524	735.048	0.00E+00	6.65E-09	1.33E-08		
Th-232	2.5278E-10	367.524	735.048	0.00E+00	9.29E-08	1.86E-07		
Tl-208	1.6947E-08	367.524	735.048	0.00E+00	6.23E-06	1.25E-05		
U-232	4.8737E-08	367.524	735.048	0.00E+00	1.79E-05	3.58E-05		
U-233	1.2203E-07	367.524	735.048	0.00E+00	4.48E-05	8.97E-05		
U-234	1.5925E-07	367.524	735.048	0.00E+00	5.85E-05	1.17E-04		
U-235	-2.6194E-06	367.524	0.000	6.49E-03	5.53E-03	6.49E-03		
U-236	1.2693E-05	367.524	735.048	0.00E+00	4.67E-03	9.33E-03		
U-238	-3.6331E-08	367.524	0.000	4.04E-03	4.02E-03	4.04E-03		
Y-90	2.6060E+00	367.524	735.048	0.00E+00	9.58E+02	1.92E+03		
Other Radionuclides					1.33E+03	2.65E+03		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	SST (304)	SST
BOL HM Constituents:	U-ZrHX	U
BOL Enrichment %:	20	10 to 20

Basis for Parameter Differences:

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:	219.504	367.524
Bounding:		735.048

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:	0.72	1.67
Bounding:	1.44	

Estimated EOL HM/Given EOL HM: 1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 265
 Fuel Units & Descr: 156 - ELEMENT
 Heavy Metal Mass: BOL=30.12kg ; EOL=29.76kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 1.41

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	342.513	685.026	0.00E+00	2.92E-07	5.83E-07		
Am-241	1.8331E-03	342.513	685.026	0.00E+00	6.28E-01	1.26E+00	0.0150	1.107E+14
Am-242m	1.4129E-06	342.513	685.026	0.00E+00	4.84E-04	9.68E-04	0.0250	2.436E+13
Am-243	1.4774E-07	342.513	685.026	0.00E+00	5.06E-05	1.01E-04	0.0375	2.075E+13
C-14	1.2871E-04	342.513	685.026	0.00E+00	4.41E-02	8.82E-02	0.0575	2.129E+13
Ci-36	2.8120E-06	342.513	685.026	0.00E+00	9.63E-04	1.93E-03	0.0850	1.319E+13
Cm-243	1.7940E-07	342.513	685.026	0.00E+00	6.14E-05	1.23E-04	0.1250	9.580E+12
Cm-244	1.6962E-06	342.513	685.026	0.00E+00	5.81E-04	1.16E-03	0.2250	1.119E+13
Co-60	1.2839E+00	342.513	685.026	0.00E+00	4.40E+02	8.80E+02	0.3750	5.679E+12
Cs-134	9.0541E-02	342.513	685.026	0.00E+00	3.10E+01	6.20E+01	0.5750	7.550E+13
Cs-135	3.2195E-05	342.513	685.026	0.00E+00	1.10E-02	2.21E-02	0.8500	3.240E+12
Cs-137	2.7564E+00	342.513	685.026	0.00E+00	9.44E+02	1.89E+03	1.2500	6.581E+13
Eu-154	1.5368E-02	342.513	685.026	0.00E+00	5.26E+00	1.05E+01	1.7500	4.387E+10
Eu-155	2.9293E-02	342.513	685.026	0.00E+00	1.00E+01	2.01E+01	2.2500	7.071E+10
Fe-55	7.7158E-01	342.513	685.026	0.00E+00	2.64E+02	5.29E+02	2.7500	5.611E+08
H-3	1.1111E-02	342.513	685.026	0.00E+00	3.81E+00	7.61E+00	3.5000	6.532E+07
I-129	7.3684E-07	342.513	685.026	0.00E+00	2.52E-04	5.05E-04	5.0000	3.777E+02
Kr-85	2.5263E-01	342.513	685.026	0.00E+00	8.65E+01	1.73E+02	7.0000	4.278E+01
Np-237	1.2427E-06	342.513	685.026	0.00E+00	4.26E-04	8.51E-04	11.0000	4.876E+00
Pa-231	3.8511E-09	342.513	685.026	0.00E+00	1.32E-06	2.64E-06		
Pb-210	7.3880E-15	342.513	685.026	0.00E+00	2.53E-12	5.06E-12		
Pm-147	2.1023E+00	342.513	685.026	0.00E+00	7.20E+02	1.44E+03		
Pu-238	1.0383E-03	342.513	685.026	0.00E+00	3.56E-01	7.11E-01		
Pu-239	5.5293E-03	342.513	685.026	0.00E+00	1.89E+00	3.79E+00		
Pu-240	2.1278E-03	342.513	685.026	0.00E+00	7.29E-01	1.46E+00		
Pu-241	1.0195E-01	342.513	685.026	0.00E+00	3.49E+01	6.98E+01		
Pu-242	2.3128E-07	342.513	685.026	0.00E+00	7.92E-05	1.58E-04		
Ra-226	5.2782E-14	342.513	685.026	0.00E+00	1.81E-11	3.62E-11		
Ra-228	1.9338E-10	342.513	685.026	0.00E+00	6.62E-08	1.32E-07		
Ru-106	9.1684E-02	342.513	685.026	0.00E+00	3.14E+01	6.28E+01		
Se-79	1.3018E-05	342.513	685.026	0.00E+00	4.46E-03	8.92E-03		
Sn-126	1.2167E-05	342.513	685.026	0.00E+00	4.17E-03	8.33E-03		
Sr-90	2.6045E+00	342.513	685.026	0.00E+00	8.92E+02	1.78E+03		
Tc-99	4.4241E-04	342.513	685.026	0.00E+00	1.52E-01	3.03E-01		
Th-229	1.3713E-10	342.513	685.026	0.00E+00	4.70E-08	9.39E-08		
Th-230	1.8090E-11	342.513	685.026	0.00E+00	6.20E-09	1.24E-08		
Th-232	2.5278E-10	342.513	685.026	0.00E+00	8.66E-08	1.73E-07		
Ti-208	1.6947E-08	342.513	685.026	0.00E+00	5.80E-06	1.16E-05		
U-232	4.8737E-08	342.513	685.026	0.00E+00	1.67E-05	3.34E-05		
U-233	1.2203E-07	342.513	685.026	0.00E+00	4.18E-05	8.36E-05		
U-234	1.5925E-07	342.513	685.026	0.00E+00	5.45E-05	1.09E-04		
U-235	-2.6194E-06	342.513	0.000	1.29E-02	1.20E-02	1.29E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	342.513	685.026	0.00E+00	4.35E-03	8.70E-03	1.99E+01	3.99E+01
U-238	-3.6331E-08	342.513	0.000	8.12E-03	8.11E-03	8.12E-03	Total	Total
Y-90	2.6060E+00	342.513	685.026	0.00E+00	8.93E+02	1.79E+03		
Other Radionuclides					1.23E+03	2.47E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.78958118	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		342.513	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		685.026	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.33		
Bounding:	0.67		1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD ¹Fuel decay start date: 2035
SNF ID #: 237 **Estimates as of:** 2030
Fuel Units & Descr: 203 - ELEMENT **Template:** TRIGA-SS (LW/U-ZrX, SST, 10 to 20%, U)
Heavy Metal Mass: BOL=39.99kg ; EOL=37.58kg ²Template Burnup(MWd): 6.65
ROD Storage Site: INEEL **Template BOL Heavy Metal Mass (MT):** 0.000195
Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
1.83

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	2,306.045	4,612.090	0.00E+00	1.96E-06	3.93E-06		
Am-241	1.8331E-03	2,306.045	4,612.090	0.00E+00	4.23E+00	8.45E+00	0.0150	7.454E+14
Am-242m	1.4129E-06	2,306.045	4,612.090	0.00E+00	3.26E-03	6.52E-03	0.0250	1.640E+14
Am-243	1.4774E-07	2,306.045	4,612.090	0.00E+00	3.41E-04	6.81E-04	0.0375	1.397E+14
C-14	1.2871E-04	2,306.045	4,612.090	0.00E+00	2.97E-01	5.94E-01	0.0575	1.434E+14
Cl-36	2.8120E-06	2,306.045	4,612.090	0.00E+00	6.48E-03	1.30E-02	0.0850	8.882E+13
Cm-243	1.7940E-07	2,306.045	4,612.090	0.00E+00	4.14E-04	8.27E-04	0.1250	6.450E+13
Cm-244	1.6962E-06	2,306.045	4,612.090	0.00E+00	3.91E-03	7.82E-03	0.2250	7.535E+13
Co-60	1.2839E+00	2,306.045	4,612.090	0.00E+00	2.96E+03	5.92E+03	0.3750	3.824E+13
Cs-134	9.0541E-02	2,306.045	4,612.090	0.00E+00	2.09E+02	4.18E+02	0.5750	5.083E+14
Cs-135	3.2195E-05	2,306.045	4,612.090	0.00E+00	7.42E-02	1.48E-01	0.8500	2.182E+13
Cs-137	2.7564E+00	2,306.045	4,612.090	0.00E+00	6.36E+03	1.27E+04	1.2500	4.431E+14
Eu-154	1.5368E-02	2,306.045	4,612.090	0.00E+00	3.54E+01	7.09E+01	1.7500	2.954E+11
Eu-155	2.9293E-02	2,306.045	4,612.090	0.00E+00	6.76E+01	1.35E+02	2.2500	4.761E+11
Fe-55	7.7158E-01	2,306.045	4,612.090	0.00E+00	1.78E+03	3.56E+03	2.7500	3.778E+09
H-3	1.1111E-02	2,306.045	4,612.090	0.00E+00	2.56E+01	5.12E+01	3.5000	4.398E+08
I-129	7.3684E-07	2,306.045	4,612.090	0.00E+00	1.70E-03	3.40E-03	5.0000	2.442E+03
Kr-85	2.5263E-01	2,306.045	4,612.090	0.00E+00	5.83E+02	1.17E+03	7.0000	2.764E+02
Np-237	1.2427E-06	2,306.045	4,612.090	0.00E+00	2.87E-03	5.73E-03	11.0000	3.149E+01
Pa-231	3.8511E-09	2,306.045	4,612.090	0.00E+00	8.88E-06	1.78E-05		
Pb-210	7.3880E-15	2,306.045	4,612.090	0.00E+00	1.70E-11	3.41E-11		
Pm-147	2.1023E+00	2,306.045	4,612.090	0.00E+00	4.85E+03	9.70E+03		
Pu-238	1.0383E-03	2,306.045	4,612.090	0.00E+00	2.39E+00	4.79E+00		
Pu-239	5.5293E-03	2,306.045	4,612.090	0.00E+00	1.28E+01	2.55E+01		
Pu-240	2.1278E-03	2,306.045	4,612.090	0.00E+00	4.91E+00	9.81E+00		
Pu-241	1.0195E-01	2,306.045	4,612.090	0.00E+00	2.35E+02	4.70E+02		
Pu-242	2.3128E-07	2,306.045	4,612.090	0.00E+00	5.33E-04	1.07E-03		
Ra-226	5.2782E-14	2,306.045	4,612.090	0.00E+00	1.22E-10	2.43E-10		
Ra-228	1.9338E-10	2,306.045	4,612.090	0.00E+00	4.46E-07	8.92E-07		
Ru-106	9.1684E-02	2,306.045	4,612.090	0.00E+00	2.11E+02	4.23E+02		
Se-79	1.3018E-05	2,306.045	4,612.090	0.00E+00	3.00E-02	6.00E-02		
Sn-126	1.2167E-05	2,306.045	4,612.090	0.00E+00	2.81E-02	5.61E-02		
Sr-90	2.6045E+00	2,306.045	4,612.090	0.00E+00	6.01E+03	1.20E+04		
Tc-99	4.4241E-04	2,306.045	4,612.090	0.00E+00	1.02E+00	2.04E+00		
Th-229	1.3713E-10	2,306.045	4,612.090	0.00E+00	3.16E-07	6.32E-07		
Th-230	1.8090E-11	2,306.045	4,612.090	0.00E+00	4.17E-08	8.34E-08		
Th-232	2.5278E-10	2,306.045	4,612.090	0.00E+00	5.83E-07	1.17E-06		
Tl-208	1.6947E-08	2,306.045	4,612.090	0.00E+00	3.91E-05	7.82E-05		
U-232	4.8737E-08	2,306.045	4,612.090	0.00E+00	1.12E-04	2.25E-04		
U-233	1.2203E-07	2,306.045	4,612.090	0.00E+00	2.81E-04	5.63E-04		
U-234	1.5925E-07	2,306.045	4,612.090	0.00E+00	3.67E-04	7.34E-04		
U-235	-2.6194E-06	2,306.045	0.000	1.71E-02	1.11E-02	1.71E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	2,306.045	4,612.090	0.00E+00	2.93E-02	5.85E-02	1.34E+02	2.68E+02
U-238	-3.6331E-08	2,306.045	0.000	1.08E-02	1.07E-02	1.08E-02	Total	Total
Y-90	2.6060E+00	2,306.045	4,612.090	0.00E+00	6.01E+03	1.20E+04		
Other Radionuclides					8.31E+03	1.66E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.79695431	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,306.045	
Bounding:		4,612.090	

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:	1.69	
Bounding:	3.38	
		Estimated EOL HM/ Given EOL HM
		1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 264
 Fuel Units & Descr: 104 - ELEMENT
 Heavy Metal Mass: BOL=19.93kg : EOL=19.77kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 203E
 Estimates as of: 203C
 Template: TRIGA-SS (LW/U-Zr/X, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.6E
 Template BOL Heavy Metal Mass (MT): 0.00019E
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.94

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	148.919	297.837	0.00E+00	1.27E-07	2.54E-07		
Am-241	1.8331E-03	148.919	297.837	0.00E+00	2.73E-01	5.46E-01	0.0150	4.814E+13
Am-242m	1.4129E-06	148.919	297.837	0.00E+00	2.10E-04	4.21E-04	0.0250	1.059E+13
Am-243	1.4774E-07	148.919	297.837	0.00E+00	2.20E-05	4.40E-05	0.0375	9.020E+12
C-14	1.2871E-04	148.919	297.837	0.00E+00	1.92E-02	3.83E-02	0.0575	9.259E+12
Cl-36	2.8120E-06	148.919	297.837	0.00E+00	4.19E-04	8.38E-04	0.0850	5.736E+12
Cm-243	1.7940E-07	148.919	297.837	0.00E+00	2.67E-05	5.34E-05	0.1250	4.165E+12
Cm-244	1.6962E-06	148.919	297.837	0.00E+00	2.53E-04	5.05E-04	0.2250	4.866E+12
Co-60	1.2839E+00	148.919	297.837	0.00E+00	1.91E+02	3.82E+02	0.3750	2.469E+12
Cs-134	9.0541E-02	148.919	297.837	0.00E+00	1.35E+01	2.70E+01	0.5750	3.283E+13
Cs-135	3.2195E-05	148.919	297.837	0.00E+00	4.79E-03	9.59E-03	0.8500	1.409E+12
Cs-137	2.7564E+00	148.919	297.837	0.00E+00	4.10E+02	8.21E+02	1.2500	2.861E+13
Eu-154	1.5368E-02	148.919	297.837	0.00E+00	2.29E+00	4.58E+00	1.7500	1.907E+10
Eu-155	2.9293E-02	148.919	297.837	0.00E+00	4.36E+00	8.72E+00	2.2500	3.074E+10
Fe-55	7.7158E-01	148.919	297.837	0.00E+00	1.15E+02	2.30E+02	2.7500	2.439E+08
H-3	1.1111E-02	148.919	297.837	0.00E+00	1.65E+00	3.31E+00	3.5000	2.840E+07
I-129	7.3684E-07	148.919	297.837	0.00E+00	1.10E-04	2.19E-04	5.0000	1.684E+02
Kr-85	2.5263E-01	148.919	297.837	0.00E+00	3.76E+01	7.52E+01	7.0000	1.909E+01
Np-237	1.2427E-06	148.919	297.837	0.00E+00	1.85E-04	3.70E-04	11.0000	2.176E+00
Pa-231	3.8511E-09	148.919	297.837	0.00E+00	5.74E-07	1.15E-06		
Pb-210	7.3880E-15	148.919	297.837	0.00E+00	1.10E-12	2.20E-12		
Pm-147	2.1023E+00	148.919	297.837	0.00E+00	3.13E+02	6.26E+02		
Pu-238	1.0383E-03	148.919	297.837	0.00E+00	1.55E-01	3.09E-01		
Pu-239	5.5293E-03	148.919	297.837	0.00E+00	8.23E-01	1.65E+00		
Pu-240	2.1278E-03	148.919	297.837	0.00E+00	3.17E-01	6.34E-01		
Pu-241	1.0195E-01	148.919	297.837	0.00E+00	1.52E+01	3.04E+01		
Pu-242	2.3128E-07	148.919	297.837	0.00E+00	3.44E-05	6.89E-05		
Ra-226	5.2782E-14	148.919	297.837	0.00E+00	7.86E-12	1.57E-11		
Ra-228	1.9338E-10	148.919	297.837	0.00E+00	2.88E-08	5.76E-08		
Ru-106	9.1684E-02	148.919	297.837	0.00E+00	1.37E+01	2.73E+01		
Se-79	1.3018E-05	148.919	297.837	0.00E+00	1.94E-03	3.88E-03		
Sn-126	1.2167E-05	148.919	297.837	0.00E+00	1.81E-03	3.62E-03		
Sr-90	2.6045E+00	148.919	297.837	0.00E+00	3.88E+02	7.76E+02		
Tc-99	4.4241E-04	148.919	297.837	0.00E+00	6.59E-02	1.32E-01		
Th-229	1.3713E-10	148.919	297.837	0.00E+00	2.04E-08	4.08E-08		
Th-230	1.8090E-11	148.919	297.837	0.00E+00	2.69E-09	5.39E-09		
Th-232	2.5278E-10	148.919	297.837	0.00E+00	3.76E-08	7.53E-08		
Tl-208	1.6947E-08	148.919	297.837	0.00E+00	2.52E-06	5.05E-06		
U-232	4.8737E-08	148.919	297.837	0.00E+00	7.26E-06	1.45E-05		
U-233	1.2203E-07	148.919	297.837	0.00E+00	1.82E-05	3.63E-05		
U-234	1.5925E-07	148.919	297.837	0.00E+00	2.37E-05	4.74E-05		
U-235	-2.6194E-06	148.919	0.000	8.61E-03	8.22E-03	8.61E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	148.919	297.837	0.00E+00	1.89E-03	3.78E-03	8.67E+00	1.73E+01
U-238	-3.6331E-08	148.919	0.000	5.36E-03	5.35E-03	5.36E-03	Total	Total
Y-90	2.6060E+00	148.919	297.837	0.00E+00	3.88E+02	7.76E+02		
Other Radionuclides					5.37E+02	1.07E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.0002088	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		148.919	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		297.837	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.22		1.00
Bounding:	0.44		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 256
 Fuel Units & Descr: 58 - ELEMENT
 Heavy Metal Mass: BOL=10.93kg ; EOL=10.89kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2026
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.52

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.0632E-10	53.248	106.496	0.00E+00	4.29E-08	8.59E-08	Avg. MeV	
Am-241	2.2586E-03	53.248	106.496	0.00E+00	1.20E-01	2.41E-01	0.0150	1.802E+13
Am-242m	1.9925E-06	53.248	106.496	0.00E+00	1.06E-04	2.12E-04	0.0250	3.912E+12
Am-243	2.3323E-07	53.248	106.496	0.00E+00	1.24E-05	2.48E-05	0.0375	4.873E+12
C-14	4.3308E-05	53.248	106.496	0.00E+00	2.31E-03	4.61E-03	0.0575	3.736E+12
Cl-36	4.3023E-08	53.248	106.496	0.00E+00	2.29E-06	4.58E-06	0.0850	2.615E+12
Cm-243	2.7429E-07	53.248	106.496	0.00E+00	1.46E-05	2.92E-05	0.1250	3.911E+12
Cm-244	3.1504E-06	53.248	106.496	0.00E+00	1.68E-04	3.36E-04	0.2250	2.183E+12
Co-60	3.1008E-02	53.248	106.496	0.00E+00	1.65E+00	3.30E+00	0.3750	9.715E+11
Cs-134	1.0367E-01	53.248	106.496	0.00E+00	5.52E+00	1.10E+01	0.5750	1.232E+13
Cs-135	3.1549E-05	53.248	106.496	0.00E+00	1.68E-03	3.36E-03	0.8500	3.032E+12
Cs-137	2.7564E+00	53.248	106.496	0.00E+00	1.47E+02	2.94E+02	1.2500	3.143E+12
Eu-154	1.3490E+00	53.248	106.496	0.00E+00	7.18E+01	1.44E+02	1.7500	8.995E+10
Eu-155	4.3880E-01	53.248	106.496	0.00E+00	2.34E+01	4.67E+01	2.2500	1.093E+10
Fe-55	8.6782E-03	53.248	106.496	0.00E+00	4.62E-01	9.24E-01	2.7500	8.880E+07
H-3	1.0805E-02	53.248	106.496	0.00E+00	5.75E-01	1.15E+00	3.5000	1.038E+07
I-129	7.3805E-07	53.248	106.496	0.00E+00	3.93E-05	7.86E-05	5.0000	6.754E+01
Kr-85	2.5218E-01	53.248	106.496	0.00E+00	1.34E+01	2.69E+01	7.0000	7.657E+00
Np-237	1.4463E-06	53.248	106.496	0.00E+00	7.70E-05	1.54E-04	11.0000	8.729E-01
Pa-231	3.5970E-09	53.248	106.496	0.00E+00	1.92E-07	3.83E-07		
Pb-210	8.2511E-15	53.248	106.496	0.00E+00	4.39E-13	8.79E-13		
Pm-147	2.0767E+00	53.248	106.496	0.00E+00	1.11E+02	2.21E+02		
Pu-238	1.3514E-03	53.248	106.496	0.00E+00	7.20E-02	1.44E-01		
Pu-239	5.6947E-03	53.248	106.496	0.00E+00	3.03E-01	6.06E-01		
Pu-240	2.2647E-03	53.248	106.496	0.00E+00	1.21E-01	2.41E-01		
Pu-241	1.2574E-01	53.248	106.496	0.00E+00	6.70E+00	1.34E+01		
Pu-242	3.0602E-07	53.248	106.496	0.00E+00	1.63E-05	3.26E-05		
Ra-226	5.7353E-14	53.248	106.496	0.00E+00	3.05E-12	6.11E-12		
Ra-228	1.8150E-10	53.248	106.496	0.00E+00	9.66E-09	1.93E-08		
Ru-106	9.3744E-02	53.248	106.496	0.00E+00	4.99E+00	9.98E+00		
Se-79	1.2938E-05	53.248	106.496	0.00E+00	6.89E-04	1.38E-03		
Sn-126	1.2239E-05	53.248	106.496	0.00E+00	6.52E-04	1.30E-03		
Sr-90	2.6000E+00	53.248	106.496	0.00E+00	1.38E+02	2.77E+02		
Tc-99	4.4120E-04	53.248	106.496	0.00E+00	2.35E-02	4.70E-02		
Th-229	1.4749E-10	53.248	106.496	0.00E+00	7.85E-09	1.57E-08		
Th-230	1.9549E-11	53.248	106.496	0.00E+00	1.04E-09	2.08E-09		
Th-232	2.3744E-10	53.248	106.496	0.00E+00	1.26E-08	2.53E-08		
Tl-208	1.9459E-08	53.248	106.496	0.00E+00	1.04E-06	2.07E-06		
U-232	5.6015E-08	53.248	106.496	0.00E+00	2.98E-06	5.97E-06		
U-233	1.3132E-07	53.248	106.496	0.00E+00	6.99E-06	1.40E-05		
U-234	1.7323E-07	53.248	106.496	0.00E+00	9.22E-06	1.84E-05		
U-235	-2.6159E-06	53.248	0.000	4.70E-03	4.56E-03	4.70E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2717E-05	53.248	106.496	0.00E+00	6.77E-04	1.35E-03	2.68E+00	5.35E+00
U-238	-3.8857E-08	53.248	0.000	2.94E-03	2.94E-03	2.94E-03	Total	Total
Y-90	2.6015E+00	53.248	106.496	0.00E+00	1.39E+02	2.77E+02		
Other Radionuclides					2.02E+02	4.05E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.89205598	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	53.248	38.753	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		106.496	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.13	0.73	1.00
Bounding:	0.26		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 258
 Fuel Units & Descr: 85 - ELEMENT
 Heavy Metal Mass: BOL=14.88kg ; EOL=14.34kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-ZrX, SST, 10 to 20%, U)
²Template Burnup(MWD): 6.63
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.77

II. Estimates							Gamma Sources	
	m	x _a	x _b	b	y _a	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	8.5173E-10	511.192	1,022.384	0.00E+00	4.35E-07	8.71E-07	Avg. MeV	
Am-241	1.8331E-03	511.192	1,022.384	0.00E+00	9.37E-01	1.87E+00	0.0150	1.652E+14
Am-242m	1.4129E-06	511.192	1,022.384	0.00E+00	7.22E-04	1.44E-03	0.0250	3.636E+13
Am-243	1.4774E-07	511.192	1,022.384	0.00E+00	7.55E-05	1.51E-04	0.0375	3.096E+13
C-14	1.2871E-04	511.192	1,022.384	0.00E+00	6.58E-02	1.32E-01	0.0575	3.178E+13
Cl-36	2.8120E-06	511.192	1,022.384	0.00E+00	1.44E-03	2.87E-03	0.0850	1.969E+13
Cr-243	1.7940E-07	511.192	1,022.384	0.00E+00	9.17E-05	1.83E-04	0.1250	1.430E+13
Cr-244	1.6962E-06	511.192	1,022.384	0.00E+00	8.67E-04	1.73E-03	0.2250	1.670E+13
Co-60	1.2839E+00	511.192	1,022.384	0.00E+00	6.56E+02	1.31E+03	0.3750	8.476E+12
Cs-134	9.0541E-02	511.192	1,022.384	0.00E+00	4.63E+01	9.26E+01	0.5750	1.127E+14
Cs-135	3.2195E-05	511.192	1,022.384	0.00E+00	1.65E-02	3.29E-02	0.8500	4.836E+12
Cs-137	2.7564E+00	511.192	1,022.384	0.00E+00	1.41E+03	2.82E+03	1.2500	9.822E+13
Eu-154	1.5368E-02	511.192	1,022.384	0.00E+00	7.86E+00	1.57E+01	1.7500	6.548E+10
Eu-155	2.9293E-02	511.192	1,022.384	0.00E+00	1.50E+01	2.99E+01	2.2500	1.055E+11
Fe-55	7.7158E-01	511.192	1,022.384	0.00E+00	3.94E+02	7.89E+02	2.7500	8.374E+08
H-3	1.1111E-02	511.192	1,022.384	0.00E+00	5.68E+00	1.14E+01	3.5000	9.749E+07
I-129	7.3684E-07	511.192	1,022.384	0.00E+00	3.77E-04	7.53E-04	5.0000	5.450E+02
Kr-85	2.5263E-01	511.192	1,022.384	0.00E+00	1.29E+02	2.58E+02	7.0000	6.169E+01
Np-237	1.2427E-06	511.192	1,022.384	0.00E+00	6.35E-04	1.27E-03	11.0000	7.029E+00
Pa-231	3.8511E-09	511.192	1,022.384	0.00E+00	1.97E-06	3.94E-06		
Pb-210	7.3880E-15	511.192	1,022.384	0.00E+00	3.78E-12	7.55E-12		
Pm-147	2.1023E+00	511.192	1,022.384	0.00E+00	1.07E+03	2.15E+03		
Pu-238	1.0383E-03	511.192	1,022.384	0.00E+00	5.31E-01	1.06E+00		
Pu-239	5.5293E-03	511.192	1,022.384	0.00E+00	2.83E+00	5.65E+00		
Pu-240	2.1278E-03	511.192	1,022.384	0.00E+00	1.09E+00	2.18E+00		
Pu-241	1.0195E-01	511.192	1,022.384	0.00E+00	5.21E+01	1.04E+02		
Pu-242	2.3128E-07	511.192	1,022.384	0.00E+00	1.18E-04	2.36E-04		
Ra-226	5.2782E-14	511.192	1,022.384	0.00E+00	2.70E-11	5.40E-11		
Ra-228	1.9338E-10	511.192	1,022.384	0.00E+00	9.89E-08	1.98E-07		
Ru-106	9.1684E-02	511.192	1,022.384	0.00E+00	4.69E+01	9.37E+01		
Se-79	1.3018E-05	511.192	1,022.384	0.00E+00	6.65E-03	1.33E-02		
Sn-126	1.2167E-05	511.192	1,022.384	0.00E+00	6.22E-03	1.24E-02		
Sr-90	2.6045E+00	511.192	1,022.384	0.00E+00	1.33E+03	2.66E+03		
Tc-99	4.4241E-04	511.192	1,022.384	0.00E+00	2.26E-01	4.52E-01		
Th-229	1.3713E-10	511.192	1,022.384	0.00E+00	7.01E-08	1.40E-07		
Th-230	1.8090E-11	511.192	1,022.384	0.00E+00	9.25E-09	1.85E-08		
Th-232	2.5278E-10	511.192	1,022.384	0.00E+00	1.29E-07	2.58E-07		
Th-208	1.6947E-08	511.192	1,022.384	0.00E+00	8.66E-06	1.73E-05		
U-232	4.8737E-08	511.192	1,022.384	0.00E+00	2.49E-05	4.98E-05		
U-233	1.2203E-07	511.192	1,022.384	0.00E+00	6.24E-05	1.25E-04		
U-234	1.5925E-07	511.192	1,022.384	0.00E+00	8.14E-05	1.63E-04		
U-235	-2.6194E-06	511.192	0.000	6.43E-03	5.09E-03	6.43E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	511.192	1,022.384	0.00E+00	6.49E-03	1.30E-02	2.98E+01	5.95E+01
U-238	-3.6331E-08	511.192	0.000	4.00E-03	3.98E-03	4.00E-03	Total	Total
Y-90	2.6060E+00	511.192	1,022.384	0.00E+00	1.33E+03	2.66E+03		
Other Radionuclides					1.84E+03	3.69E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		511.192	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		1,022.384	Bounding burnup assumed to be twice nominal burnup.

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	1.01	
Bounding:	2.02	
		Estimated EOL HM/ Given EOL HM
		1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 447
 Fuel Units & Descr: 58 - ELEMENT
 Heavy Metal Mass: BOL=11.31kg ; EOL=11.27kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.52

Radionuclide	m		x _n		x _b		b		y _n		y _b		Gamma Sources	
	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)	Avg. MeV				
Ac-227	8.0632E-10	220.455	220.455	440.909	0.00E+00	1.78E-07	3.56E-07							
Am-241	2.2586E-03	220.455	220.455	440.909	0.00E+00	4.98E-01	9.96E-01							
Am-242m	1.9925E-06	220.455	220.455	440.909	0.00E+00	4.39E-04	8.79E-04							
Am-243	2.3323E-07	220.455	220.455	440.909	0.00E+00	5.14E-05	1.03E-04							
C-14	4.3308E-05	220.455	220.455	440.909	0.00E+00	9.55E-03	1.91E-02							
Cl-36	4.3023E-08	220.455	220.455	440.909	0.00E+00	9.48E-06	1.90E-05							
Cm-243	2.7429E-07	220.455	220.455	440.909	0.00E+00	6.05E-05	1.21E-04							
Cm-244	3.1504E-06	220.455	220.455	440.909	0.00E+00	6.95E-04	1.39E-03							
Co-60	3.1008E-02	220.455	220.455	440.909	0.00E+00	6.84E+00	1.37E+01							
Cs-134	1.0367E-01	220.455	220.455	440.909	0.00E+00	2.29E+01	4.57E+01							
Cs-135	3.1549E-05	220.455	220.455	440.909	0.00E+00	6.96E-03	1.39E-02							
Cs-137	2.7564E+00	220.455	220.455	440.909	0.00E+00	6.08E+02	1.22E+03							
Eu-154	1.3490E+00	220.455	220.455	440.909	0.00E+00	2.97E+02	5.95E+02							
Eu-155	4.3880E-01	220.455	220.455	440.909	0.00E+00	9.67E+01	1.93E+02							
Fe-55	8.6782E-03	220.455	220.455	440.909	0.00E+00	1.91E+00	3.83E+00							
H-3	1.0805E-02	220.455	220.455	440.909	0.00E+00	2.38E+00	4.76E+00							
I-129	7.3805E-07	220.455	220.455	440.909	0.00E+00	1.63E-04	3.25E-04							
Kr-85	2.5218E-01	220.455	220.455	440.909	0.00E+00	5.56E+01	1.11E+02							
Np-237	1.4463E-06	220.455	220.455	440.909	0.00E+00	3.19E-04	6.38E-04							
Pa-231	3.5970E-09	220.455	220.455	440.909	0.00E+00	7.93E-07	1.59E-06							
Pb-210	8.2511E-15	220.455	220.455	440.909	0.00E+00	1.82E-12	3.64E-12							
Pm-147	2.0767E+00	220.455	220.455	440.909	0.00E+00	4.58E+02	9.16E+02							
Pu-238	1.3514E-03	220.455	220.455	440.909	0.00E+00	2.98E-01	5.96E-01							
Pu-239	5.6947E-03	220.455	220.455	440.909	0.00E+00	1.26E+00	2.51E+00							
Pu-240	2.2647E-03	220.455	220.455	440.909	0.00E+00	4.99E-01	9.99E-01							
Pu-241	1.2574E-01	220.455	220.455	440.909	0.00E+00	2.77E+01	5.54E+01							
Pu-242	3.0602E-07	220.455	220.455	440.909	0.00E+00	6.75E-05	1.35E-04							
Ra-226	5.7353E-14	220.455	220.455	440.909	0.00E+00	1.26E-11	2.53E-11							
Ra-228	1.8150E-10	220.455	220.455	440.909	0.00E+00	4.00E-08	8.00E-08							
Ru-106	9.3744E-02	220.455	220.455	440.909	0.00E+00	2.07E+01	4.13E+01							
Se-79	1.2938E-05	220.455	220.455	440.909	0.00E+00	2.85E-03	5.70E-03							
Sn-126	1.2239E-05	220.455	220.455	440.909	0.00E+00	2.70E-03	5.40E-03							
Sr-90	2.6000E+00	220.455	220.455	440.909	0.00E+00	5.73E+02	1.15E+03							
Tc-99	4.4120E-04	220.455	220.455	440.909	0.00E+00	9.73E-02	1.95E-01							
Th-229	1.4749E-10	220.455	220.455	440.909	0.00E+00	3.25E-08	6.50E-08							
Th-230	1.9549E-11	220.455	220.455	440.909	0.00E+00	4.31E-09	8.62E-09							
Th-232	2.3744E-10	220.455	220.455	440.909	0.00E+00	5.23E-08	1.05E-07							
Tl-208	1.9459E-08	220.455	220.455	440.909	0.00E+00	4.29E-06	8.58E-06							
U-232	5.6015E-08	220.455	220.455	440.909	0.00E+00	1.23E-05	2.47E-05							
U-233	1.3132E-07	220.455	220.455	440.909	0.00E+00	2.90E-05	5.79E-05							
U-234	1.7323E-07	220.455	220.455	440.909	0.00E+00	3.82E-05	7.64E-05							
U-235	-2.6159E-06	220.455	220.455	0.000	4.89E-03	4.31E-03	4.89E-03							
U-236	1.2717E-05	220.455	220.455	440.909	0.00E+00	2.80E-03	5.61E-03							
U-238	-3.8857E-08	220.455	220.455	0.000	3.04E-03	3.03E-03	3.04E-03							
Y-90	2.6015E+00	220.455	220.455	440.909	0.00E+00	5.74E+02	1.15E+03							
Other Radionuclides						8.38E+02	1.68E+03							

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	220.455	38.753	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:		440.909	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.53	0.18	0.98
Bounding:	1.06		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 314
 Fuel Units & Desc: 66 - ELEMENT
 Heavy Metal Mass: BOL=12.34kg ; EOL=12.20kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1987
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.6;
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.59

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.1504E-09	420.998	841.996	0.00E+00	2.59E-06	5.18E-06		
Am-241	4.8165E-03	420.998	841.996	0.00E+00	2.03E+00	4.06E+00	0.0150	5.939E+13
Am-242m	1.7383E-06	420.998	841.996	0.00E+00	7.32E-04	1.46E-03	0.0250	1.229E+13
Am-243	2.3263E-07	420.998	841.996	0.00E+00	9.79E-05	1.96E-04	0.0375	1.160E+13
C-14	4.3158E-05	420.998	841.996	0.00E+00	1.82E-02	3.63E-02	0.0575	1.169E+13
Cl-36	4.3023E-08	420.998	841.996	0.00E+00	1.81E-05	3.62E-05	0.0850	6.974E+12
Cm-243	1.3229E-07	420.998	841.996	0.00E+00	5.57E-05	1.11E-04	0.1250	6.024E+12
Cm-244	1.0000E-06	420.998	841.996	0.00E+00	4.21E-04	8.42E-04	0.2250	6.231E+12
Co-60	6.0120E-04	420.998	841.996	0.00E+00	2.53E-01	5.06E-01	0.3750	2.644E+12
Cs-134	4.3534E-06	420.998	841.996	0.00E+00	1.83E-03	3.67E-03	0.5750	4.356E+13
Cs-135	3.1549E-05	420.998	841.996	0.00E+00	1.33E-02	2.66E-02	0.8500	2.223E+12
Cs-137	1.3788E+00	420.998	841.996	0.00E+00	5.80E+02	1.16E+03	1.2500	2.181E+12
Eu-154	1.2041E-01	420.998	841.996	0.00E+00	5.07E+01	1.01E+02	1.7500	7.018E+10
Eu-155	6.6451E-03	420.998	841.996	0.00E+00	2.80E+00	5.60E+00	2.2500	1.384E+06
Fe-55	2.9338E-06	420.998	841.996	0.00E+00	1.24E-03	2.47E-03	2.7500	4.682E+05
H-3	2.0075E-03	420.998	841.996	0.00E+00	8.45E-01	1.69E+00	3.5000	1.133E+03
I-129	7.3805E-07	420.998	841.996	0.00E+00	3.11E-04	6.21E-04	5.0000	4.764E+02
Kr-85	3.6301E-02	420.998	841.996	0.00E+00	1.53E+01	3.06E+01	7.0000	5.372E+01
Np-237	1.4977E-06	420.998	841.996	0.00E+00	6.31E-04	1.26E-03	11.0000	6.105E+00
Pa-231	1.1275E-08	420.998	841.996	0.00E+00	4.75E-06	9.49E-06		
Pb-210	3.8932E-13	420.998	841.996	0.00E+00	1.64E-10	3.28E-10		
Pm-147	7.5383E-04	420.998	841.996	0.00E+00	3.17E-01	6.35E-01		
Pu-238	1.0668E-03	420.998	841.996	0.00E+00	4.49E-01	8.98E-01		
Pu-239	5.6902E-03	420.998	841.996	0.00E+00	2.40E+00	4.79E+00		
Pu-240	2.2571E-03	420.998	841.996	0.00E+00	9.50E-01	1.90E+00		
Pu-241	2.9699E-02	420.998	841.996	0.00E+00	1.25E+01	2.50E+01		
Pu-242	3.0602E-07	420.998	841.996	0.00E+00	1.29E-04	2.58E-04		
Ra-226	1.0704E-12	420.998	841.996	0.00E+00	4.51E-10	9.01E-10		
Ra-228	2.3654E-10	420.998	841.996	0.00E+00	9.96E-08	1.99E-07		
Ru-106	1.0444E-10	420.998	841.996	0.00E+00	4.40E-08	8.79E-08		
Se-79	1.2934E-05	420.998	841.996	0.00E+00	5.45E-03	1.09E-02		
Sn-126	1.2236E-05	420.998	841.996	0.00E+00	5.15E-03	1.03E-02		
Sr-90	1.2740E+00	420.998	841.996	0.00E+00	5.36E+02	1.07E+03		
Tc-99	4.4120E-04	420.998	841.996	0.00E+00	1.86E-01	3.71E-01		
Th-229	6.4226E-10	420.998	841.996	0.00E+00	2.70E-07	5.41E-07		
Th-230	1.0594E-10	420.998	841.996	0.00E+00	4.46E-08	8.92E-08		
Th-232	2.3744E-10	420.998	841.996	0.00E+00	1.00E-07	2.00E-07		
Th-208	1.5774E-08	420.998	841.996	0.00E+00	6.64E-06	1.33E-05		
U-232	4.2511E-08	420.998	841.996	0.00E+00	1.79E-05	3.58E-05		
U-233	1.3155E-07	420.998	841.996	0.00E+00	5.54E-05	1.11E-04		
U-234	3.0030E-07	420.998	841.996	0.00E+00	1.26E-04	2.53E-04		
U-235	-2.6144E-06	420.998	0.000	5.28E-03	4.18E-03	5.28E-03		
U-236	1.2720E-05	420.998	841.996	0.00E+00	5.36E-03	1.07E-02		
U-238	-3.8857E-08	420.998	0.000	3.33E-03	3.31E-03	3.33E-03		
Y-90	1.2744E+00	420.998	841.996	0.00E+00	5.37E+02	1.07E+03		
Other Radionuclides					6.41E+02	1.28E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.08E+00	1.42E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.78609626	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	420.998	132.296	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		841.996	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.92	0.31	0.98
Bounding:	1.85		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 235
 Fuel Units & Descr: 65 - ELEMENT
 Heavy Metal Mass: BOL=12.03kg ; EOL=11.94kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1973
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.59

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.6842E-09	80.657	161.314	0.00E+00	7.00E-07	1.40E-06	0.0150	7.910E+12
Am-241	4.9459E-03	80.657	161.314	0.00E+00	3.99E-01	7.98E-01	0.0250	1.640E+12
Am-242m	1.6241E-06	80.657	161.314	0.00E+00	1.31E-04	2.62E-04	0.0375	1.480E+12
Am-243	2.3233E-07	80.657	161.314	0.00E+00	1.87E-05	3.75E-05	0.0575	1.549E+12
C-14	4.3083E-05	80.657	161.314	0.00E+00	3.47E-03	6.95E-03	0.0850	9.239E+11
Cl-36	4.3023E-08	80.657	161.314	0.00E+00	3.47E-06	6.94E-06	0.1250	6.855E+11
Cm-243	9.1880E-08	80.657	161.314	0.00E+00	7.41E-06	1.48E-05	0.2250	8.109E+11
Cm-244	5.6346E-07	80.657	161.314	0.00E+00	4.54E-05	9.09E-05	0.3750	3.498E+11
Co-60	8.3699E-05	80.657	161.314	0.00E+00	6.75E-03	1.35E-02	0.5750	5.873E+12
Cs-134	2.8211E-08	80.657	161.314	0.00E+00	2.28E-06	4.55E-06	0.8500	1.599E+11
Cs-135	3.1549E-05	80.657	161.314	0.00E+00	2.54E-03	5.09E-03	1.2500	1.352E+11
Cs-137	9.7519E-01	80.657	161.314	0.00E+00	7.87E+01	1.57E+02	1.7500	4.848E+09
Eu-154	3.5970E-02	80.657	161.314	0.00E+00	2.90E+00	5.80E+00	2.2500	1.645E+05
Eu-155	8.1774E-04	80.657	161.314	0.00E+00	6.60E-02	1.32E-01	2.7500	7.769E+04
Fe-55	5.3940E-08	80.657	161.314	0.00E+00	4.35E-06	8.70E-06	3.5000	2.293E+02
H-3	8.6571E-04	80.657	161.314	0.00E+00	6.98E-02	1.40E-01	5.0000	9.658E+01
I-129	7.3805E-07	80.657	161.314	0.00E+00	5.95E-05	1.19E-04	7.0000	1.090E+01
Kr-85	1.3771E-02	80.657	161.314	0.00E+00	1.11E+00	2.22E+00	11.0000	1.240E+00
Np-237	1.5218E-06	80.657	161.314	0.00E+00	1.23E-04	2.45E-04		
Pa-231	1.4152E-08	80.657	161.314	0.00E+00	1.14E-06	2.28E-06		
Pb-210	7.9774E-13	80.657	161.314	0.00E+00	6.43E-11	1.29E-10		
Pm-147	1.4362E-05	80.657	161.314	0.00E+00	1.16E-03	2.32E-03		
Pu-238	9.4782E-04	80.657	161.314	0.00E+00	7.64E-02	1.53E-01		
Pu-239	5.6872E-03	80.657	161.314	0.00E+00	4.59E-01	9.17E-01		
Pu-240	2.2541E-03	80.657	161.314	0.00E+00	1.82E-01	3.64E-01		
Pu-241	1.4433E-02	80.657	161.314	0.00E+00	1.16E+00	2.33E+00		
Pu-242	3.0602E-07	80.657	161.314	0.00E+00	2.47E-05	4.94E-05		
Ra-226	1.8857E-12	80.657	161.314	0.00E+00	1.52E-10	3.04E-10		
Ra-228	2.3729E-10	80.657	161.314	0.00E+00	1.91E-08	3.83E-08		
Ru-106	3.4857E-15	80.657	161.314	0.00E+00	2.81E-13	5.62E-13		
Se-79	1.2931E-05	80.657	161.314	0.00E+00	1.04E-03	2.09E-03		
Sn-126	1.2235E-05	80.657	161.314	0.00E+00	9.87E-04	1.97E-03		
Sr-90	8.9173E-01	80.657	161.314	0.00E+00	7.19E+01	1.44E+02		
Tc-99	4.4120E-04	80.657	161.314	0.00E+00	3.56E-02	7.12E-02		
Th-229	8.2752E-10	80.657	161.314	0.00E+00	6.67E-08	1.33E-07		
Th-230	1.4908E-10	80.657	161.314	0.00E+00	1.20E-08	2.40E-08		
Th-232	2.3744E-10	80.657	161.314	0.00E+00	1.92E-08	3.83E-08		
Tl-208	1.3668E-08	80.657	161.314	0.00E+00	1.10E-06	2.20E-06		
U-232	3.6797E-08	80.657	161.314	0.00E+00	2.97E-06	5.94E-06		
U-233	1.3164E-07	80.657	161.314	0.00E+00	1.06E-05	2.12E-05		
U-234	3.3865E-07	80.657	161.314	0.00E+00	2.73E-05	5.46E-05		
U-235	-2.6144E-06	80.657	0.000	5.20E-03	4.99E-03	5.20E-03		
U-236	1.2722E-05	80.657	161.314	0.00E+00	1.03E-03	2.05E-03		
U-238	-3.8857E-08	80.657	0.000	3.23E-03	3.23E-03	3.23E-03		
Y-90	8.9203E-01	80.657	161.314	0.00E+00	7.19E+01	1.44E+02		
Other Radionuclides					9.01E+01	1.80E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.27E-01	1.85E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	58.598	80.657	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		161.314	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.18	1.38	1.00
Bounding:	0.36		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 244
 Fuel Units & Descr: 114 - ELEMENT
 Heavy Metal Mass: BOL=22.23kg ; EOL=19.69kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1982
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 1.03

Radionuclide	II. Estimates			Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n	x _b				Photon Energy Group	Total Photons/sec (bounding)
	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²				Avg. MeV	
Ac-227	6.7038E-09	2,426.803	4,853.605	0.00E+00	1.63E-05	3.25E-05	0.0150	3.388E+14
Am-241	3.9068E-03	2,426.803	4,853.605	0.00E+00	9.48E+00	1.90E+01	0.0250	7.039E+13
Am-242m	1.2325E-06	2,426.803	4,853.605	0.00E+00	2.99E-03	5.98E-03	0.0375	6.116E+13
Am-243	1.4732E-07	2,426.803	4,853.605	0.00E+00	3.58E-04	7.15E-04	0.0575	6.589E+13
C-14	1.2824E-04	2,426.803	4,853.605	0.00E+00	3.11E-01	6.22E-01	0.0850	3.965E+13
Cl-36	2.8120E-06	2,426.803	4,853.605	0.00E+00	6.82E-03	1.36E-02	0.1250	2.580E+13
Cr-243	8.6566E-08	2,426.803	4,853.605	0.00E+00	2.10E-04	4.20E-04	0.2250	3.415E+13
Cr-244	5.3835E-07	2,426.803	4,853.605	0.00E+00	1.31E-03	2.61E-03	0.3750	1.489E+13
Co-60	2.4887E-02	2,426.803	4,853.605	0.00E+00	6.04E+01	1.21E+02	0.5750	2.491E+14
Cs-134	3.8030E-06	2,426.803	4,853.605	0.00E+00	9.23E-03	1.85E-02	3.5000	5.987E+03
Cs-135	3.2195E-05	2,426.803	4,853.605	0.00E+00	7.81E-02	1.56E-01	5.0000	2.520E+03
Cs-137	1.3788E+00	2,426.803	4,853.605	0.00E+00	3.35E+03	6.69E+03	7.0000	2.843E+02
Eu-154	1.3711E-03	2,426.803	4,853.605	0.00E+00	3.33E+00	6.65E+00	11.0000	3.232E+01
Eu-155	4.4361E-04	2,426.803	4,853.605	0.00E+00	1.08E+00	2.15E+00		
Fe-55	2.6075E-04	2,426.803	4,853.605	0.00E+00	6.33E-01	1.27E+00		
H-3	2.0647E-03	2,426.803	4,853.605	0.00E+00	5.01E+00	1.00E+01		
I-129	7.3684E-07	2,426.803	4,853.605	0.00E+00	1.79E-03	3.58E-03		
Kr-85	3.6346E-02	2,426.803	4,853.605	0.00E+00	8.82E+01	1.76E+02		
Np-237	1.2844E-06	2,426.803	4,853.605	0.00E+00	3.12E-03	6.23E-03		
Pa-231	1.2352E-08	2,426.803	4,853.605	0.00E+00	3.00E-05	6.00E-05		
Pb-210	3.5338E-13	2,426.803	4,853.605	0.00E+00	8.58E-10	1.72E-09		
Pm-147	7.6346E-04	2,426.803	4,853.605	0.00E+00	1.85E+00	3.71E+00		
Pu-238	8.1970E-04	2,426.803	4,853.605	0.00E+00	1.99E+00	3.98E+00		
Pu-239	5.5248E-03	2,426.803	4,853.605	0.00E+00	1.34E+01	2.68E+01		
Pu-240	2.1203E-03	2,426.803	4,853.605	0.00E+00	5.15E+00	1.03E+01		
Pu-241	2.4075E-02	2,426.803	4,853.605	0.00E+00	5.84E+01	1.17E+02		
Pu-242	2.3128E-07	2,426.803	4,853.605	0.00E+00	5.61E-04	1.12E-03		
Ra-226	9.6481E-13	2,426.803	4,853.605	0.00E+00	2.34E-09	4.68E-09		
Ra-228	2.5188E-10	2,426.803	4,853.605	0.00E+00	6.11E-07	1.22E-06		
Ru-106	1.0214E-10	2,426.803	4,853.605	0.00E+00	2.48E-07	4.96E-07		
Se-79	1.3014E-05	2,426.803	4,853.605	0.00E+00	3.16E-02	6.32E-02		
Sn-126	1.2164E-05	2,426.803	4,853.605	0.00E+00	2.95E-02	5.90E-02		
Sr-90	1.2762E+00	2,426.803	4,853.605	0.00E+00	3.10E+03	6.19E+03		
Tc-99	4.4241E-04	2,426.803	4,853.605	0.00E+00	1.07E+00	2.15E+00		
Th-229	5.9684E-10	2,426.803	4,853.605	0.00E+00	1.45E-06	2.90E-06		
Th-230	9.3880E-11	2,426.803	4,853.605	0.00E+00	2.28E-07	4.56E-07		
Th-232	2.5278E-10	2,426.803	4,853.605	0.00E+00	6.13E-07	1.23E-06		
Tl-208	1.3723E-08	2,426.803	4,853.605	0.00E+00	3.33E-05	6.66E-05		
U-232	3.6932E-08	2,426.803	4,853.605	0.00E+00	8.96E-05	1.79E-04		
U-233	1.2224E-07	2,426.803	4,853.605	0.00E+00	2.97E-04	5.93E-04		
U-234	2.5714E-07	2,426.803	4,853.605	0.00E+00	6.24E-04	1.25E-03		
U-235	-2.6194E-06	2,426.803	0.000	9.61E-03	3.25E-03	9.61E-03		
U-236	1.2695E-05	2,426.803	4,853.605	0.00E+00	3.08E-02	6.16E-02		
U-238	-3.6331E-08	2,426.803	0.000	5.98E-03	5.89E-03	5.98E-03		
Y-90	1.2765E+00	2,426.803	4,853.605	0.00E+00	3.10E+03	6.20E+03		
Other Radionuclides					3.34E+03	6.67E+03		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	758.288	2,426.803	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		4,853.605	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	3.20	3.20	1.00
Bounding:	6.40		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 370
 Fuel Units & Descr: 40 - ELEMENT
 Heavy Metal Mass: BOL=7.12kg ; EOL=6.86kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18" x 10"
 0.36

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	6.7038E-09	248.198	496.396	0.00E+00	1.66E-06	3.33E-06	Avg. MeV	
Am-241	3.9068E-03	248.198	496.396	0.00E+00	9.70E-01	1.94E+00	0.0150	3.465E+13
Am-242m	1.2325E-06	248.198	496.396	0.00E+00	3.06E-04	6.12E-04	0.0250	7.200E+12
Am-243	1.4732E-07	248.198	496.396	0.00E+00	3.66E-05	7.31E-05	0.0375	6.255E+12
C-14	1.2824E-04	248.198	496.396	0.00E+00	3.18E-02	6.37E-02	0.0575	6.739E+12
Cl-36	2.8120E-06	248.198	496.396	0.00E+00	6.98E-04	1.40E-03	0.0850	4.055E+12
Cm-243	8.6556E-08	248.198	496.396	0.00E+00	2.15E-05	4.30E-05	0.1250	2.639E+12
Cm-244	5.3835E-07	248.198	496.396	0.00E+00	1.34E-04	2.67E-04	0.2250	3.493E+12
Co-60	2.4887E-02	248.198	496.396	0.00E+00	6.18E+00	1.24E+01	0.3750	1.523E+12
Cs-134	3.8030E-06	248.198	496.396	0.00E+00	9.44E-04	1.89E-03	0.5750	2.548E+13
Cs-135	3.2195E-05	248.198	496.396	0.00E+00	7.99E-03	1.60E-02	0.8500	2.607E+11
Cs-137	1.3788E+00	248.198	496.396	0.00E+00	3.42E+02	6.84E+02	1.2500	1.012E+12
Eu-154	1.3711E-03	248.198	496.396	0.00E+00	3.40E-01	6.81E-01	1.7500	6.769E+09
Eu-155	4.4361E-04	248.198	496.396	0.00E+00	1.10E-01	2.20E-01	2.2500	5.545E+06
Fe-55	2.6075E-04	248.198	496.396	0.00E+00	6.47E-02	1.29E-01	2.7500	2.549E+05
H-3	2.0647E-03	248.198	496.396	0.00E+00	5.12E-01	1.02E+00	3.5000	6.193E+02
I-129	7.3684E-07	248.198	496.396	0.00E+00	1.83E-04	3.66E-04	5.0000	2.607E+02
Kr-85	3.6346E-02	248.198	496.396	0.00E+00	9.02E+00	1.80E+01	7.0000	2.942E+01
Np-237	1.2844E-06	248.198	496.396	0.00E+00	3.19E-04	6.38E-04	11.0000	3.345E+00
Pa-231	1.2352E-08	248.198	496.396	0.00E+00	3.07E-06	6.13E-06		
Pb-210	3.5338E-13	248.198	496.396	0.00E+00	8.77E-11	1.75E-10		
Pm-147	7.6346E-04	248.198	496.396	0.00E+00	1.89E-01	3.79E-01		
Pu-238	8.1970E-04	248.198	496.396	0.00E+00	2.03E-01	4.07E-01		
Pu-239	5.5248E-03	248.198	496.396	0.00E+00	1.37E+00	2.74E+00		
Pu-240	2.1203E-03	248.198	496.396	0.00E+00	5.26E-01	1.05E+00		
Pu-241	2.4075E-02	248.198	496.396	0.00E+00	5.98E+00	1.20E+01		
Pu-242	2.3128E-07	248.198	496.396	0.00E+00	5.74E-05	1.15E-04		
Ra-226	9.6481E-13	248.198	496.396	0.00E+00	2.39E-10	4.79E-10		
Ra-228	2.5188E-10	248.198	496.396	0.00E+00	6.25E-08	1.25E-07		
Ru-106	1.0214E-10	248.198	496.396	0.00E+00	2.53E-08	5.07E-08		
Se-79	1.3014E-05	248.198	496.396	0.00E+00	3.23E-03	6.46E-03		
Sn-126	1.2164E-05	248.198	496.396	0.00E+00	3.02E-03	6.04E-03		
Sr-90	1.2762E+00	248.198	496.396	0.00E+00	3.17E+02	6.34E+02		
Tc-99	4.4241E-04	248.198	496.396	0.00E+00	1.10E-01	2.20E-01		
Th-229	5.9684E-10	248.198	496.396	0.00E+00	1.48E-07	2.96E-07		
Th-230	9.3880E-11	248.198	496.396	0.00E+00	2.33E-08	4.66E-08		
Th-232	2.5278E-10	248.198	496.396	0.00E+00	6.27E-08	1.25E-07		
Th-238	1.3723E-08	248.198	496.396	0.00E+00	3.41E-06	6.81E-06		
U-232	3.6932E-08	248.198	496.396	0.00E+00	9.17E-06	1.83E-05		
U-233	1.2224E-07	248.198	496.396	0.00E+00	3.03E-05	6.07E-05		
U-234	2.5714E-07	248.198	496.396	0.00E+00	6.38E-05	1.28E-04		
U-235	-2.6194E-06	248.198	0.000	3.03E-03	2.38E-03	3.03E-03		
U-236	1.2695E-05	248.198	496.396	0.00E+00	3.15E-03	6.30E-03		
U-238	-3.6331E-08	248.198	0.000	1.92E-03	1.91E-03	1.92E-03		
Y-90	1.2765E+00	248.198	496.396	0.00E+00	3.17E+02	6.34E+02		
Other Radionuclides					3.41E+02	6.83E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.99E+00	7.98E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.66292135	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	173.479	248.198	
Bounding:	291.920	496.396	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.02	1.43	
Bounding:	2.04	1.70	

1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 353
 Fuel Units & Descr: 2 - ELEMENT
 Heavy Metal Mass: BOL=36kg ; EOL=.34kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1984
 Estimates as of: 2010
 Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.02

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.7038E-09	12.410	24.820	0.00E+00	8.32E-08	1.66E-07	0.0150	1.732E+12
Am-241	3.9068E-03	12.410	24.820	0.00E+00	4.85E-02	9.70E-02	0.0250	3.600E+11
Am-242m	1.2325E-06	12.410	24.820	0.00E+00	1.53E-05	3.06E-05	0.0375	3.127E+11
Am-243	1.4732E-07	12.410	24.820	0.00E+00	1.83E-06	3.66E-06	0.0575	3.370E+11
C-14	1.2824E-04	12.410	24.820	0.00E+00	1.59E-03	3.18E-03	0.0850	2.027E+11
Cl-36	2.8120E-06	12.410	24.820	0.00E+00	3.49E-05	6.98E-05	0.1250	1.319E+11
Cm-243	8.6556E-08	12.410	24.820	0.00E+00	1.07E-06	2.15E-06	0.2250	1.746E+11
Cm-244	5.3835E-07	12.410	24.820	0.00E+00	6.68E-06	1.34E-05	0.3750	7.616E+10
Co-60	2.4887E-02	12.410	24.820	0.00E+00	3.09E-01	6.18E-01	0.5750	1.274E+12
Cs-134	3.8030E-06	12.410	24.820	0.00E+00	4.72E-05	9.44E-05	0.8500	1.304E+10
Cs-135	3.2195E-05	12.410	24.820	0.00E+00	4.00E-04	7.99E-04	1.2500	5.059E+10
Cs-137	1.3788E+00	12.410	24.820	0.00E+00	1.71E+01	3.42E+01	1.7500	3.384E+08
Eu-154	1.3711E-03	12.410	24.820	0.00E+00	1.70E-02	3.40E-02	2.2500	2.773E+05
Eu-155	4.4361E-04	12.410	24.820	0.00E+00	5.51E-03	1.10E-02	2.7500	1.274E+04
Fe-55	2.6075E-04	12.410	24.820	0.00E+00	3.24E-03	6.47E-03	3.5000	3.097E+01
H-3	2.0647E-03	12.410	24.820	0.00E+00	2.56E-02	5.12E-02	5.0000	1.304E+01
I-129	7.3684E-07	12.410	24.820	0.00E+00	9.14E-06	1.83E-05	7.0000	1.471E+00
Kr-85	3.6346E-02	12.410	24.820	0.00E+00	4.51E-01	9.02E-01	11.0000	1.673E-01
Np-237	1.2844E-06	12.410	24.820	0.00E+00	1.59E-05	3.19E-05		
Pa-231	1.2352E-08	12.410	24.820	0.00E+00	1.53E-07	3.07E-07		
Pb-210	3.5338E-13	12.410	24.820	0.00E+00	4.39E-12	8.77E-12		
Pm-147	7.6346E-04	12.410	24.820	0.00E+00	9.47E-03	1.89E-02		
Pu-238	8.1970E-04	12.410	24.820	0.00E+00	1.02E-02	2.03E-02		
Pu-239	5.5248E-03	12.410	24.820	0.00E+00	6.86E-02	1.37E-01		
Pu-240	2.1203E-03	12.410	24.820	0.00E+00	2.63E-02	5.26E-02		
Pu-241	2.4075E-02	12.410	24.820	0.00E+00	2.99E-01	5.98E-01		
Pu-242	2.3128E-07	12.410	24.820	0.00E+00	2.87E-06	5.74E-06		
Ra-226	9.6481E-13	12.410	24.820	0.00E+00	1.20E-11	2.39E-11		
Ra-228	2.5188E-10	12.410	24.820	0.00E+00	3.13E-09	6.25E-09		
Ru-106	1.0214E-10	12.410	24.820	0.00E+00	1.27E-09	2.53E-09		
Se-79	1.3014E-05	12.410	24.820	0.00E+00	1.61E-04	3.23E-04		
Sn-126	1.2164E-05	12.410	24.820	0.00E+00	1.51E-04	3.02E-04		
Sr-90	1.2762E+00	12.410	24.820	0.00E+00	1.58E+01	3.17E+01		
Tc-99	4.4241E-04	12.410	24.820	0.00E+00	5.49E-03	1.10E-02		
Th-229	5.9684E-10	12.410	24.820	0.00E+00	7.41E-09	1.48E-08		
Th-230	9.3880E-11	12.410	24.820	0.00E+00	1.17E-09	2.33E-09		
Th-232	2.5278E-10	12.410	24.820	0.00E+00	3.14E-09	6.27E-09		
Tl-208	1.3723E-08	12.410	24.820	0.00E+00	1.70E-07	3.41E-07		
U-232	3.6932E-08	12.410	24.820	0.00E+00	4.58E-07	9.17E-07		
U-233	1.2224E-07	12.410	24.820	0.00E+00	1.52E-06	3.03E-06		
U-234	2.5714E-07	12.410	24.820	0.00E+00	3.19E-06	6.38E-06		
U-235	-2.6194E-06	12.410	0.000	1.51E-04	1.19E-04	1.51E-04		
U-236	1.2695E-05	12.410	24.820	0.00E+00	1.58E-04	3.15E-04		
U-238	-3.6331E-08	12.410	0.000	9.61E-05	9.57E-05	9.61E-05		
Y-90	1.2765E+00	12.410	24.820	0.00E+00	1.58E+01	3.17E+01		
Other Radionuclides					1.71E+01	3.41E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.00E-01	3.99E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.66292135	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	12.144	12.410	
Bounding:	14.596	24.820	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.02	1.02	
Bounding:	2.04	1.70	

Estimated EOL HM/Given EOL HM: 1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 233
 Fuel Units & Descr: 90 - ELEMENT
 Heavy Metal Mass: BOL=17.55kg ; EOL=17.19kg
 ROD Storage Site: HANFORD

¹Fuel decay start date: 1989
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.81

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.7038E-09	343.659	687.317	0.00E+00	2.30E-06	4.61E-06		
Am-241	3.9068E-03	343.659	687.317	0.00E+00	1.34E+00	2.69E+00	0.0150	4.798E+13
Am-242m	1.2325E-06	343.659	687.317	0.00E+00	4.24E-04	8.47E-04	0.0250	9.969E+12
Am-243	1.4732E-07	343.659	687.317	0.00E+00	5.06E-05	1.01E-04	0.0375	8.660E+12
C-14	1.2824E-04	343.659	687.317	0.00E+00	4.41E-02	8.81E-02	0.0575	9.331E+12
Cl-36	2.8120E-06	343.659	687.317	0.00E+00	9.66E-04	1.93E-03	0.0850	5.615E+12
Cm-243	8.6556E-08	343.659	687.317	0.00E+00	2.97E-05	5.95E-05	0.1250	3.654E+12
Cm-244	5.3835E-07	343.659	687.317	0.00E+00	1.85E-04	3.70E-04	0.2250	4.836E+12
Co-60	2.4887E-02	343.659	687.317	0.00E+00	8.55E+00	1.71E+01	0.3750	2.109E+12
Cs-134	3.8030E-06	343.659	687.317	0.00E+00	1.31E-03	2.61E-03	0.5750	3.528E+13
Cs-135	3.2195E-05	343.659	687.317	0.00E+00	1.11E-02	2.21E-02	0.8500	3.610E+11
Cs-137	1.3788E+00	343.659	687.317	0.00E+00	4.74E+02	9.48E+02	1.2500	1.401E+12
Eu-154	1.3711E-03	343.659	687.317	0.00E+00	4.71E-01	9.42E-01	1.7500	9.372E+09
Eu-155	4.4361E-04	343.659	687.317	0.00E+00	1.52E-01	3.05E-01	2.2500	7.678E+06
Fe-55	2.6075E-04	343.659	687.317	0.00E+00	8.96E-02	1.79E-01	2.7500	3.529E+05
H-3	2.0647E-03	343.659	687.317	0.00E+00	7.10E-01	1.42E+00	3.5000	8.686E+02
I-129	7.3684E-07	343.659	687.317	0.00E+00	2.53E-04	5.06E-04	5.0000	3.658E+02
Kr-85	3.6346E-02	343.659	687.317	0.00E+00	1.25E+01	2.50E+01	7.0000	4.128E+01
Np-237	1.2844E-06	343.659	687.317	0.00E+00	4.41E-04	8.83E-04	11.0000	4.695E+00
Pa-231	1.2352E-08	343.659	687.317	0.00E+00	4.24E-06	8.49E-06		
Pb-210	3.5338E-13	343.659	687.317	0.00E+00	1.21E-10	2.43E-10		
Pm-147	7.6346E-04	343.659	687.317	0.00E+00	2.62E-01	5.25E-01		
Pu-238	8.1970E-04	343.659	687.317	0.00E+00	2.82E-01	5.63E-01		
Pu-239	5.5248E-03	343.659	687.317	0.00E+00	1.90E+00	3.80E+00		
Pu-240	2.1203E-03	343.659	687.317	0.00E+00	7.29E-01	1.46E+00		
Pu-241	2.4075E-02	343.659	687.317	0.00E+00	8.27E+00	1.65E+01		
Pu-242	2.3128E-07	343.659	687.317	0.00E+00	7.95E-05	1.59E-04		
Ra-226	9.6481E-13	343.659	687.317	0.00E+00	3.32E-10	6.63E-10		
Ra-228	2.5188E-10	343.659	687.317	0.00E+00	8.66E-08	1.73E-07		
Ru-106	1.0214E-10	343.659	687.317	0.00E+00	3.51E-08	7.02E-08		
Se-79	1.3014E-05	343.659	687.317	0.00E+00	4.47E-03	8.94E-03		
Sn-126	1.2164E-05	343.659	687.317	0.00E+00	4.18E-03	8.36E-03		
Sr-90	1.2762E+00	343.659	687.317	0.00E+00	4.39E+02	8.77E+02		
Tc-99	4.4241E-04	343.659	687.317	0.00E+00	1.52E-01	3.04E-01		
Th-229	5.9684E-10	343.659	687.317	0.00E+00	2.05E-07	4.10E-07		
Th-230	9.3880E-11	343.659	687.317	0.00E+00	3.23E-08	6.45E-08		
Th-232	2.5278E-10	343.659	687.317	0.00E+00	8.69E-08	1.74E-07		
Ti-208	1.3723E-08	343.659	687.317	0.00E+00	4.72E-06	9.43E-06		
U-232	3.6932E-08	343.659	687.317	0.00E+00	1.27E-05	2.54E-05		
U-233	1.2224E-07	343.659	687.317	0.00E+00	4.20E-05	8.40E-05		
U-234	2.5714E-07	343.659	687.317	0.00E+00	8.84E-05	1.77E-04		
U-235	-2.6194E-06	343.659	0.000	7.59E-03	6.68E-03	7.59E-03		
U-236	1.2695E-05	343.659	687.317	0.00E+00	4.36E-03	8.73E-03		
U-238	-3.6331E-08	343.659	0.000	4.72E-03	4.71E-03	4.72E-03		
Y-90	1.2765E+00	343.659	687.317	0.00E+00	4.39E+02	8.77E+02		
Other Radionuclides					4.73E+02	9.45E+02		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00000115	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	256.563	343.659	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		687.317	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.57	1.34	1.00
Bounding:	1.15		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 267
 Fuel Units & Descr: ELEMENT
 Heavy Metal Mass: BOL=42.22kg ; EOL=41.29kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 20:5
 Estimates as of: 20:0
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 2.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	8.0632E-10	889.993	1,779.986	0.00E+00	7.18E-07	1.44E-06	Avg. MeV	
Am-241	2.2586E-03	889.993	1,779.986	0.00E+00	2.01E+00	4.02E+00	0.0150	3.012E+14
Am-242m	1.9925E-06	889.993	1,779.986	0.00E+00	1.77E-03	3.55E-03	0.0250	6.539E+13
Am-243	2.3323E-07	889.993	1,779.986	0.00E+00	2.08E-04	4.15E-04	0.0375	8.145E+13
C-14	4.3308E-05	889.993	1,779.986	0.00E+00	3.85E-02	7.71E-02	0.0575	6.244E+13
Cl-36	4.3023E-08	889.993	1,779.986	0.00E+00	3.83E-05	7.66E-05	0.0850	4.370E+13
Cm-243	2.7429E-07	889.993	1,779.986	0.00E+00	2.44E-04	4.88E-04	0.1250	6.537E+13
Cm-244	3.1504E-06	889.993	1,779.986	0.00E+00	2.80E-03	5.61E-03	0.2250	3.649E+13
Co-60	3.1008E-02	889.993	1,779.986	0.00E+00	2.76E+01	5.52E+01	0.3750	1.624E+13
Cs-134	1.0367E-01	889.993	1,779.986	0.00E+00	9.23E+01	1.85E+02	0.5750	2.059E+14
Cs-135	3.1549E-05	889.993	1,779.986	0.00E+00	2.81E-02	5.62E-02	0.8500	5.067E+13
Cs-137	2.7564E+00	889.993	1,779.986	0.00E+00	2.45E+03	4.91E+03	1.2500	5.253E+13
Eu-154	1.3490E+00	889.993	1,779.986	0.00E+00	1.20E+03	2.40E+03	1.7500	1.503E+12
Eu-155	4.3880E-01	889.993	1,779.986	0.00E+00	3.91E+02	7.81E+02	2.2500	1.828E+11
Fe-55	8.6782E-03	889.993	1,779.986	0.00E+00	7.72E+00	1.54E+01	2.7500	1.484E+09
H-3	1.0805E-02	889.993	1,779.986	0.00E+00	9.62E+00	1.92E+01	3.5000	1.735E+08
I-129	7.3805E-07	889.993	1,779.986	0.00E+00	6.57E-04	1.31E-03	5.0000	1.042E+03
Kr-85	2.5218E-01	889.993	1,779.986	0.00E+00	2.24E+02	4.49E+02	7.0000	1.179E+02
Np-237	1.4463E-06	889.993	1,779.986	0.00E+00	1.29E-03	2.57E-03	11.0000	1.343E+01
Pa-231	3.5970E-09	889.993	1,779.986	0.00E+00	3.20E-06	6.40E-06		
Pb-210	8.2511E-15	889.993	1,779.986	0.00E+00	7.34E-12	1.47E-11		
Pm-147	2.0767E+00	889.993	1,779.986	0.00E+00	1.85E+03	3.70E+03		
Pu-238	1.3514E-03	889.993	1,779.986	0.00E+00	1.20E+00	2.41E+00		
Pu-239	5.6947E-03	889.993	1,779.986	0.00E+00	5.07E+00	1.01E+01		
Pu-240	2.2647E-03	889.993	1,779.986	0.00E+00	2.02E+00	4.03E+00		
Pu-241	1.2574E-01	889.993	1,779.986	0.00E+00	1.12E+02	2.24E+02		
Pu-242	3.0602E-07	889.993	1,779.986	0.00E+00	2.72E-04	5.45E-04		
Ra-226	5.7353E-14	889.993	1,779.986	0.00E+00	5.10E-11	1.02E-10		
Ra-228	1.8150E-10	889.993	1,779.986	0.00E+00	1.62E-07	3.23E-07		
Ru-106	9.3744E-02	889.993	1,779.986	0.00E+00	8.34E+01	1.67E+02		
Se-79	1.2938E-05	889.993	1,779.986	0.00E+00	1.15E-02	2.30E-02		
Sn-126	1.2239E-05	889.993	1,779.986	0.00E+00	1.09E-02	2.18E-02		
Sr-90	2.6000E+00	889.993	1,779.986	0.00E+00	2.31E+03	4.63E+03		
Tc-99	4.4120E-04	889.993	1,779.986	0.00E+00	3.93E-01	7.85E-01		
Th-229	1.4749E-10	889.993	1,779.986	0.00E+00	1.31E-07	2.63E-07		
Th-230	1.9549E-11	889.993	1,779.986	0.00E+00	1.74E-08	3.48E-08		
Th-232	2.3744E-10	889.993	1,779.986	0.00E+00	2.11E-07	4.23E-07		
Th-234	1.9459E-08	889.993	1,779.986	0.00E+00	1.73E-05	3.46E-05		
U-232	5.6015E-08	889.993	1,779.986	0.00E+00	4.99E-05	9.97E-05		
U-233	1.3132E-07	889.993	1,779.986	0.00E+00	1.17E-04	2.34E-04		
U-234	1.7323E-07	889.993	1,779.986	0.00E+00	1.54E-04	3.08E-04		
U-235	-2.6159E-06	889.993	0.000	1.82E-02	1.58E-02	1.82E-02		
U-236	1.2717E-05	889.993	1,779.986	0.00E+00	1.13E-02	2.26E-02		
U-238	-3.8857E-08	889.993	0.000	1.14E-02	1.13E-02	1.14E-02		
Y-90	2.6015E+00	889.993	1,779.986	0.00E+00	2.32E+03	4.63E+03		
Other Radionuclides					3.38E+03	6.77E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.47E+01	8.94E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.89809973	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	102.859	889.993	
Bounding:		1,779.986	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.57	8.65	
Bounding:	1.14		

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD
 SNF ID #: 252
 Fuel Units & Descr: 50 - ELEMENT
 Heavy Metal Mass: BOL=9.37kg ; EOL=9.07kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.45

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	286.382	572.764	0.00E+00	2.44E-07	4.88E-07	Avg. MeV	
Am-241	1.8331E-03	286.382	572.764	0.00E+00	5.25E-01	1.05E+00	0.0150	9.257E+13
Am-242m	1.4129E-06	286.382	572.764	0.00E+00	4.05E-04	8.09E-04	0.0250	2.037E+13
Am-243	1.4774E-07	286.382	572.764	0.00E+00	4.23E-05	8.46E-05	0.0375	1.735E+13
C-14	1.2871E-04	286.382	572.764	0.00E+00	3.69E-02	7.37E-02	0.0575	1.781E+13
Ci-36	2.8120E-06	286.382	572.764	0.00E+00	8.05E-04	1.61E-03	0.0850	1.103E+13
Cm-243	1.7940E-07	286.382	572.764	0.00E+00	5.14E-05	1.03E-04	0.1250	8.010E+12
Cm-244	1.6962E-06	286.382	572.764	0.00E+00	4.86E-04	9.72E-04	0.2250	9.357E+12
Co-60	1.2839E+00	286.382	572.764	0.00E+00	3.68E+02	7.35E+02	0.3750	4.749E+12
Cs-134	9.0541E-02	286.382	572.764	0.00E+00	2.59E+01	5.19E+01	0.5750	6.313E+13
Cs-135	3.2195E-05	286.382	572.764	0.00E+00	9.22E-03	1.84E-02	0.8500	2.709E+12
Cs-137	2.7564E+00	286.382	572.764	0.00E+00	7.89E+02	1.58E+03	1.2500	5.502E+13
Eu-154	1.5368E-02	286.382	572.764	0.00E+00	4.40E+00	8.80E+00	1.7500	3.668E+10
Eu-155	2.9293E-02	286.382	572.764	0.00E+00	8.39E+00	1.68E+01	2.2500	5.912E+10
Fe-55	7.7158E-01	286.382	572.764	0.00E+00	2.21E+02	4.42E+02	2.7500	4.691E+08
H-3	1.1111E-02	286.382	572.764	0.00E+00	3.18E+00	6.36E+00	3.5000	5.461E+07
I-129	7.3684E-07	286.382	572.764	0.00E+00	2.11E-04	4.22E-04	5.0000	3.060E+02
Kr-85	2.5263E-01	286.382	572.764	0.00E+00	7.23E+01	1.45E+02	7.0000	3.464E+01
Np-237	1.2427E-06	286.382	572.764	0.00E+00	3.56E-04	7.12E-04	11.0000	3.947E+00
Pa-231	3.8511E-09	286.382	572.764	0.00E+00	1.10E-06	2.21E-06		
Pb-210	7.3880E-15	286.382	572.764	0.00E+00	2.12E-12	4.23E-12		
Pm-147	2.1023E+00	286.382	572.764	0.00E+00	6.02E+02	1.20E+03		
Pu-238	1.0383E-03	286.382	572.764	0.00E+00	2.97E-01	5.95E-01		
Pu-239	5.5293E-03	286.382	572.764	0.00E+00	1.58E+00	3.17E+00		
Pu-240	2.1278E-03	286.382	572.764	0.00E+00	6.09E-01	1.22E+00		
Pu-241	1.0195E-01	286.382	572.764	0.00E+00	2.92E+01	5.84E+01		
Pu-242	2.3128E-07	286.382	572.764	0.00E+00	6.62E-05	1.32E-04		
Ra-226	5.2782E-14	286.382	572.764	0.00E+00	1.51E-11	3.02E-11		
Ra-228	1.9338E-10	286.382	572.764	0.00E+00	5.54E-08	1.11E-07		
Ru-106	9.1684E-02	286.382	572.764	0.00E+00	2.63E+01	5.25E+01		
Se-79	1.3018E-05	286.382	572.764	0.00E+00	3.73E-03	7.46E-03		
Sn-126	1.2167E-05	286.382	572.764	0.00E+00	3.48E-03	6.97E-03		
Sr-90	2.6045E+00	286.382	572.764	0.00E+00	7.46E+02	1.49E+03		
Tc-99	4.4241E-04	286.382	572.764	0.00E+00	1.27E-01	2.53E-01		
Th-229	1.3713E-10	286.382	572.764	0.00E+00	3.93E-08	7.85E-08		
Th-230	1.8090E-11	286.382	572.764	0.00E+00	5.18E-09	1.04E-08		
Th-232	2.5278E-10	286.382	572.764	0.00E+00	7.24E-08	1.45E-07		
Ti-208	1.6947E-08	286.382	572.764	0.00E+00	4.85E-06	9.71E-06		
U-232	4.8737E-08	286.382	572.764	0.00E+00	1.40E-05	2.79E-05		
U-233	1.2203E-07	286.382	572.764	0.00E+00	3.49E-05	6.99E-05		
U-234	1.5925E-07	286.382	572.764	0.00E+00	4.56E-05	9.12E-05		
U-235	-2.6194E-06	286.382	0.000	3.95E-03	3.20E-03	3.95E-03		
U-236	1.2693E-05	286.382	572.764	0.00E+00	3.64E-03	7.27E-03		
U-238	-3.6331E-08	286.382	0.000	2.54E-03	2.53E-03	2.54E-03		
Y-90	2.6060E+00	286.382	572.764	0.00E+00	7.46E+02	1.49E+03		
Other Radionuclides					1.03E+03	2.06E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.67E+01	3.33E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.49184744	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	273.960	286.382	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		572.764	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.90	1.05	1.00
Bounding:	1.79		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ACPR) 1Fuel decay start date: 2035
 SNF ID #: 895 Estimates as of: 2030
 Fuel Units & Descr: 182 - ELEMENT Template: TRIGA-SS (LW/U-235, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=48.36kg ; EOL=48.36kg 2Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000155
Template Decay Time: 5 year's

Estimated
Canister usage:
18"x10"
1.64

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	8.5173E-10	923.247	1,846.493	0.00E+00	7.86E-07	1.57E-06	Avg. MeV	
Am-241	1.8331E-03	923.247	1,846.493	0.00E+00	1.69E+00	3.38E+00	0.0150	2.984E+14
Am-242m	1.4129E-06	923.247	1,846.493	0.00E+00	1.30E-03	2.61E-03	0.0250	6.567E+13
Am-243	1.4774E-07	923.247	1,846.493	0.00E+00	1.36E-04	2.73E-04	0.0375	5.592E+13
C-14	1.2871E-04	923.247	1,846.493	0.00E+00	1.19E-01	2.38E-01	0.0575	5.740E+13
Cl-36	2.8120E-06	923.247	1,846.493	0.00E+00	2.60E-03	5.19E-03	0.0850	3.556E+13
Cm-243	1.7940E-07	923.247	1,846.493	0.00E+00	1.66E-04	3.31E-04	0.1250	2.582E+13
Cm-244	1.6962E-06	923.247	1,846.493	0.00E+00	1.57E-03	3.13E-03	0.2250	3.017E+13
Co-60	1.2839E+00	923.247	1,846.493	0.00E+00	1.19E+03	2.37E+03	0.3750	1.531E+13
Cs-134	9.0541E-02	923.247	1,846.493	0.00E+00	8.36E+01	1.67E+02	0.5750	2.035E+14
Cs-135	3.2195E-05	923.247	1,846.493	0.00E+00	2.97E-02	5.94E-02	0.8500	8.734E+12
Cs-137	2.7564E+00	923.247	1,846.493	0.00E+00	2.54E+03	5.09E+03	1.2500	1.774E+14
Eu-154	1.5368E-02	923.247	1,846.493	0.00E+00	1.42E+01	2.84E+01	1.7500	1.183E+11
Eu-155	2.9293E-02	923.247	1,846.493	0.00E+00	2.70E+01	5.41E+01	2.2500	1.906E+11
Fe-55	7.7158E-01	923.247	1,846.493	0.00E+00	7.12E+02	1.42E+03	2.7500	1.512E+09
H-3	1.1111E-02	923.247	1,846.493	0.00E+00	1.03E+01	2.05E+01	3.5000	1.761E+08
I-129	7.3684E-07	923.247	1,846.493	0.00E+00	6.80E-04	1.36E-03	5.0000	9.976E+02
Kr-85	2.5263E-01	923.247	1,846.493	0.00E+00	2.33E+02	4.66E+02	7.0000	1.130E+02
Np-237	1.2427E-06	923.247	1,846.493	0.00E+00	1.15E-03	2.29E-03	11.0000	1.287E+01
Pa-231	3.8511E-09	923.247	1,846.493	0.00E+00	3.56E-06	7.11E-06		
Pb-210	7.3880E-15	923.247	1,846.493	0.00E+00	6.82E-12	1.36E-11		
Pm-147	2.1023E+00	923.247	1,846.493	0.00E+00	1.94E+03	3.88E+03		
Pu-238	1.0383E-03	923.247	1,846.493	0.00E+00	9.59E-01	1.92E+00		
Pu-239	5.5293E-03	923.247	1,846.493	0.00E+00	5.10E+00	1.02E+01		
Pu-240	2.1278E-03	923.247	1,846.493	0.00E+00	1.96E+00	3.93E+00		
Pu-241	1.0195E-01	923.247	1,846.493	0.00E+00	9.41E+01	1.88E+02		
Pu-242	2.3128E-07	923.247	1,846.493	0.00E+00	2.14E-04	4.27E-04		
Ra-226	5.2782E-14	923.247	1,846.493	0.00E+00	4.87E-11	9.75E-11		
Ra-228	1.9338E-10	923.247	1,846.493	0.00E+00	1.79E-07	3.57E-07		
Ru-106	9.1684E-02	923.247	1,846.493	0.00E+00	8.46E+01	1.69E+02		
Se-79	1.3018E-05	923.247	1,846.493	0.00E+00	1.20E-02	2.40E-02		
Sn-126	1.2167E-05	923.247	1,846.493	0.00E+00	1.12E-02	2.25E-02		
Sr-90	2.6045E+00	923.247	1,846.493	0.00E+00	2.40E+03	4.81E+03		
Tc-99	4.4241E-04	923.247	1,846.493	0.00E+00	4.08E-01	8.17E-01		
Th-229	1.3713E-10	923.247	1,846.493	0.00E+00	1.27E-07	2.53E-07		
Th-230	1.8090E-11	923.247	1,846.493	0.00E+00	1.67E-08	3.34E-08		
Th-232	2.5278E-10	923.247	1,846.493	0.00E+00	2.33E-07	4.67E-07		
Ti-208	1.6947E-08	923.247	1,846.493	0.00E+00	1.56E-05	3.13E-05		
U-232	4.8737E-08	923.247	1,846.493	0.00E+00	4.50E-05	9.00E-05		
U-233	1.2203E-07	923.247	1,846.493	0.00E+00	1.13E-04	2.25E-04		
U-234	1.5925E-07	923.247	1,846.493	0.00E+00	1.47E-04	2.94E-04		
U-235	2.6194E-06	923.247	0.000	2.08E-02	1.84E-02	2.08E-02		
U-236	1.2693E-05	923.247	1,846.493	0.00E+00	1.17E-02	2.34E-02		
U-238	-3.6331E-08	923.247	0.000	1.30E-02	1.30E-02	1.30E-02	5.37E+01	1.07E+02
Y-90	2.6060E+00	923.247	1,846.493	0.00E+00	2.41E+03	4.81E+03	Total	Total
Other Radionuclides					3.33E+03	6.66E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.37E+01	1.07E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.95031243	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		923.247	Nominal burnup assumed to be 2% of BOL heavy metal mass.
Bounding:	200.006	1,846.493	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.56		0.98
Bounding:	1.12	9.23	

¹ Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ARRR) ¹Fuel decay start date: 2035
 SNF ID #: 780 Estimates as of: 2030
 Fuel Units & Descr: 15 - ELEMENT Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=10.28kg ; EOL=8.18kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.14

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	2,000.380	4,000.759	0.00E+00	1.70E-06	3.41E-06	0.0150	6.466E+14
Am-241	1.8331E-03	2,000.380	4,000.759	0.00E+00	3.67E+00	7.33E+00	0.0250	1.423E+14
Am-242m	1.4129E-06	2,000.380	4,000.759	0.00E+00	2.83E-03	5.65E-03	0.0375	1.212E+14
Am-243	1.4774E-07	2,000.380	4,000.759	0.00E+00	2.96E-04	5.91E-04	0.0575	1.244E+14
C-14	1.2871E-04	2,000.380	4,000.759	0.00E+00	2.57E-01	5.15E-01	0.0850	7.705E+13
Cl-36	2.8120E-06	2,000.380	4,000.759	0.00E+00	5.63E-03	1.13E-02	0.1250	5.595E+13
Cm-243	1.7940E-07	2,000.380	4,000.759	0.00E+00	3.59E-04	7.18E-04	0.2250	6.536E+13
Cm-244	1.6962E-06	2,000.380	4,000.759	0.00E+00	3.39E-03	6.79E-03	0.3750	3.317E+13
Co-60	1.2639E+00	2,000.380	4,000.759	0.00E+00	2.57E+03	5.14E+03	0.5750	4.410E+14
Cs-134	9.0541E-02	2,000.380	4,000.759	0.00E+00	1.81E+02	3.62E+02	0.8500	1.892E+13
Cs-135	3.2195E-05	2,000.380	4,000.759	0.00E+00	6.44E-02	1.29E-01	1.2500	3.843E+14
Cs-137	2.7564E+00	2,000.380	4,000.759	0.00E+00	5.51E+03	1.10E+04	1.7500	2.562E+11
Eu-154	1.5368E-02	2,000.380	4,000.759	0.00E+00	3.07E+01	6.15E+01	2.2500	4.130E+11
Eu-155	2.9293E-02	2,000.380	4,000.759	0.00E+00	5.86E+01	1.17E+02	2.7500	3.277E+09
Fe-55	7.7158E-01	2,000.380	4,000.759	0.00E+00	1.54E+03	3.09E+03	3.5000	3.815E+08
H-3	1.1111E-02	2,000.380	4,000.759	0.00E+00	2.22E+01	4.45E+01	5.0000	2.103E+03
I-129	7.3684E-07	2,000.380	4,000.759	0.00E+00	1.47E-03	2.95E-03	7.0000	2.380E+02
Kr-85	2.5263E-01	2,000.380	4,000.759	0.00E+00	5.05E+02	1.01E+03	11.0000	2.711E+01
Np-237	1.2427E-06	2,000.380	4,000.759	0.00E+00	2.49E-03	4.97E-03		
Pa-231	3.8511E-09	2,000.380	4,000.759	0.00E+00	7.70E-06	1.54E-05		
Pb-210	7.3880E-15	2,000.380	4,000.759	0.00E+00	1.48E-11	2.96E-11		
Pm-147	2.1023E+00	2,000.380	4,000.759	0.00E+00	4.21E+03	8.41E+03		
Pu-238	1.0383E-03	2,000.380	4,000.759	0.00E+00	2.08E+00	4.15E+00		
Pu-239	5.5293E-03	2,000.380	4,000.759	0.00E+00	1.11E+01	2.21E+01		
Pu-240	2.1278E-03	2,000.380	4,000.759	0.00E+00	4.26E+00	8.51E+00		
Pu-241	1.0195E-01	2,000.380	4,000.759	0.00E+00	2.04E+02	4.08E+02		
Pu-242	2.3128E-07	2,000.380	4,000.759	0.00E+00	4.63E-04	9.25E-04		
Ra-226	5.2782E-14	2,000.380	4,000.759	0.00E+00	1.06E-10	2.11E-10		
Ra-228	1.9338E-10	2,000.380	4,000.759	0.00E+00	3.87E-07	7.74E-07		
Ru-106	9.1684E-02	2,000.380	4,000.759	0.00E+00	1.83E+02	3.67E+02		
Se-79	1.3018E-05	2,000.380	4,000.759	0.00E+00	2.60E-02	5.21E-02		
Sn-126	1.2167E-05	2,000.380	4,000.759	0.00E+00	2.43E-02	4.87E-02		
Sr-90	2.6045E+00	2,000.380	4,000.759	0.00E+00	5.21E+03	1.04E+04		
Tc-99	4.4241E-04	2,000.380	4,000.759	0.00E+00	8.85E-01	1.77E+00		
Th-229	1.3713E-10	2,000.380	4,000.759	0.00E+00	2.74E-07	5.49E-07		
Th-230	1.8090E-11	2,000.380	4,000.759	0.00E+00	3.62E-08	7.24E-08		
Th-232	2.5278E-10	2,000.380	4,000.759	0.00E+00	5.06E-07	1.01E-06		
Tl-208	1.6947E-08	2,000.380	4,000.759	0.00E+00	3.39E-05	6.78E-05		
U-232	4.8737E-08	2,000.380	4,000.759	0.00E+00	9.75E-05	1.95E-04		
U-233	1.2203E-07	2,000.380	4,000.759	0.00E+00	2.44E-04	4.88E-04		
U-234	1.5925E-07	2,000.380	4,000.759	0.00E+00	3.19E-04	6.37E-04		
U-235	-2.6194E-06	2,000.380	0.000	4.36E-03	0.00E+00	4.36E-03		
U-236	1.2693E-05	2,000.380	4,000.759	0.00E+00	2.54E-02	5.08E-02		
U-238	-3.6331E-08	2,000.380	0.000	2.77E-03	2.70E-03	2.77E-03		
Y-90	2.6060E+00	2,000.380	4,000.759	0.00E+00	5.21E+03	1.04E+04		
Other Radionuclides					7.21E+03	1.44E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.16E+02	2.33E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.64963504	10 to 20	

Burnup Summary (MWd)²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	581.164	2,000.380	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		4,000.759	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Bumup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	5.71	3.44	1.06
Bounding:	11.42		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (AUSTRIA) 1 Fuel decay start date: 2010
 SNF ID #: 469 Estimates as of: 2030
 Fuel Units & Descr: 30 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=5.85kg ; EOL=5.64kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00019:5
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.27

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.6436E-09	197.604	395.207	0.00E+00	5.22E-07	1.04E-06	Avg. MeV	
Am-241	3.1429E-03	197.604	395.207	0.00E+00	6.21E-01	1.24E+00	0.0150	3.960E+13
Am-242m	1.3195E-06	197.604	395.207	0.00E+00	2.61E-04	5.21E-04	0.0250	8.244E+12
Am-243	1.4753E-07	197.604	395.207	0.00E+00	2.92E-05	5.83E-05	0.0375	7.142E+12
C-14	1.2847E-04	197.604	395.207	0.00E+00	2.54E-02	5.08E-02	0.0575	7.684E+12
Cl-36	2.8120E-06	197.604	395.207	0.00E+00	5.56E-04	1.11E-03	0.0850	4.638E+12
Cm-243	1.2465E-07	197.604	395.207	0.00E+00	2.46E-05	4.93E-05	0.1250	3.031E+12
Cm-244	9.5564E-07	197.604	395.207	0.00E+00	1.89E-04	3.78E-04	0.2250	3.983E+12
Co-60	1.7880E-01	197.604	395.207	0.00E+00	3.53E+01	7.07E+01	0.3750	1.746E+12
Cs-134	5.8692E-04	197.604	395.207	0.00E+00	1.16E-01	2.32E-01	0.5750	2.871E+13
Cs-135	3.2195E-05	197.604	395.207	0.00E+00	6.36E-03	1.27E-02	0.8500	3.236E+11
Cs-137	1.9489E+00	197.604	395.207	0.00E+00	3.85E+02	7.70E+02	1.2500	5.362E+12
Eu-154	4.5895E-03	197.604	395.207	0.00E+00	9.07E-01	1.81E+00	1.7500	8.316E+09
Eu-155	3.6045E-03	197.604	395.207	0.00E+00	7.12E-01	1.42E+00	2.2500	2.864E+07
Fe-55	1.4185E-02	197.604	395.207	0.00E+00	2.80E+00	5.61E+00	2.7500	3.155E+05
H-3	4.7895E-03	197.604	395.207	0.00E+00	9.46E-01	1.89E+00	3.5000	1.753E+03
I-129	7.3684E-07	197.604	395.207	0.00E+00	1.46E-04	2.91E-04	5.0000	2.089E+02
Kr-85	9.5820E-02	197.604	395.207	0.00E+00	1.89E+01	3.79E+01	7.0000	2.360E+01
Np-237	1.2552E-06	197.604	395.207	0.00E+00	2.48E-04	4.96E-04	11.0000	2.686E+00
Pa-231	7.0406E-09	197.604	395.207	0.00E+00	1.39E-06	2.78E-06		
Pb-210	5.8000E-14	197.604	395.207	0.00E+00	1.15E-11	2.29E-11		
Pm-147	4.0075E-02	197.604	395.207	0.00E+00	7.92E+00	1.58E+01		
Pu-238	9.2256E-04	197.604	395.207	0.00E+00	1.82E-01	3.65E-01		
Pu-239	5.5278E-03	197.604	395.207	0.00E+00	1.09E+00	2.18E+00		
Pu-240	2.1248E-03	197.604	395.207	0.00E+00	4.20E-01	8.40E-01		
Pu-241	4.9549E-02	197.604	395.207	0.00E+00	9.79E+00	1.96E+01		
Pu-242	2.3128E-07	197.604	395.207	0.00E+00	4.57E-05	9.14E-05		
Ra-226	2.4526E-13	197.604	395.207	0.00E+00	4.85E-11	9.69E-11		
Ra-228	2.4015E-10	197.604	395.207	0.00E+00	4.75E-08	9.49E-08		
Ru-106	3.0602E-06	197.604	395.207	0.00E+00	6.05E-04	1.21E-03		
Se-79	1.3015E-05	197.604	395.207	0.00E+00	2.57E-03	5.14E-03		
Sn-126	1.2165E-05	197.604	395.207	0.00E+00	2.40E-03	4.81E-03		
Sr-90	1.8226E+00	197.604	395.207	0.00E+00	3.60E+02	7.20E+02		
Tc-99	4.4241E-04	197.604	395.207	0.00E+00	8.74E-02	1.75E-01		
Th-229	3.0962E-10	197.604	395.207	0.00E+00	6.12E-08	1.22E-07		
Th-230	4.2346E-11	197.604	395.207	0.00E+00	8.37E-09	1.67E-08		
Th-232	2.5278E-10	197.604	395.207	0.00E+00	5.00E-08	9.99E-08		
Tl-208	1.5820E-08	197.604	395.207	0.00E+00	3.13E-06	6.25E-06		
U-232	4.2647E-08	197.604	395.207	0.00E+00	8.43E-06	1.69E-05		
U-233	1.2211E-07	197.604	395.207	0.00E+00	2.41E-05	4.83E-05		
U-234	1.9955E-07	197.604	395.207	0.00E+00	3.94E-05	7.89E-05		
U-235	-2.6194E-06	197.604	0.000	2.53E-03	2.01E-03	2.53E-03		
U-236	1.2693E-05	197.604	395.207	0.00E+00	2.51E-03	5.02E-03		
U-238	-3.6331E-08	197.604	0.000	1.57E-03	1.57E-03	1.57E-03		
Y-90	1.8241E+00	197.604	395.207	0.00E+00	3.60E+02	7.21E+02		
Other Radionuclides					3.81E+02	7.61E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.94E+00	9.89E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00000041	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	57.014	197.604	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		395.207	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.99	3.47	1.00
Bounding:	1.98		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (AUSTRIA) 1 Fuel decay start date: 2010
 SNF ID #: 462 Estimates as of: 2030
 Fuel Units & Descr: 66 - ELEMENT Template: TRIGA-Al (LW/U-Zr, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=11.88kg ; EOL=11.81kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00018
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.59

II. Estimates	m	x _a	x _b	b	y _a	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.4556E-09	62.998	125.996	0.00E+00	1.55E-07	3.09E-07	Avg. MeV	
Am-241	3.8752E-03	62.998	125.996	0.00E+00	2.44E-01	4.88E-01	0.0150	1.293E+13
Am-242m	1.8617E-06	62.998	125.996	0.00E+00	1.17E-04	2.35E-04	0.0250	2.670E+12
Am-243	2.3293E-07	62.998	125.996	0.00E+00	1.47E-05	2.93E-05	0.0375	2.795E+12
C-14	4.3233E-05	62.998	125.996	0.00E+00	2.72E-03	5.45E-03	0.0575	2.583E+12
Cf-36	4.3023E-08	62.998	125.996	0.00E+00	2.71E-06	5.42E-06	0.0850	1.573E+12
Cm-243	1.9053E-07	62.998	125.996	0.00E+00	1.20E-05	2.40E-05	0.1250	1.765E+12
Cm-244	1.7744E-06	62.998	125.996	0.00E+00	1.12E-04	2.24E-04	0.2250	1.425E+12
Co-60	4.3188E-03	62.998	125.996	0.00E+00	2.72E-01	5.44E-01	0.3750	5.856E+11
Cs-134	6.7188E-04	62.998	125.996	0.00E+00	4.23E-02	8.47E-02	0.5750	9.330E+11
Cs-135	3.1549E-05	62.998	125.996	0.00E+00	1.99E-03	3.98E-03	0.8500	9.925E+11
Cs-137	1.9489E+00	62.998	125.996	0.00E+00	1.23E+02	2.46E+02	1.2500	1.069E+12
Eu-154	4.0301E-01	62.998	125.996	0.00E+00	2.54E+01	5.08E+01	1.7500	3.203E+10
Eu-155	5.4000E-02	62.998	125.996	0.00E+00	3.40E+00	6.80E+00	2.2500	5.079E+05
Fe-55	1.5955E-04	62.998	125.996	0.00E+00	1.01E-02	2.01E-02	2.7500	8.452E+04
H-3	4.6571E-03	62.998	125.996	0.00E+00	2.93E-01	5.87E-01	3.5000	5.954E+02
I-129	7.3805E-07	62.998	125.996	0.00E+00	4.65E-05	9.30E-05	5.0000	7.819E+01
Kr-85	9.5684E-02	62.998	125.996	0.00E+00	6.03E+00	1.21E+01	7.0000	8.842E+00
Np-237	1.4618E-06	62.998	125.996	0.00E+00	9.21E-05	1.84E-04	11.0000	1.007E+00
Pa-231	6.4782E-09	62.998	125.996	0.00E+00	4.08E-07	8.16E-07		
Pb-210	6.3158E-14	62.998	125.996	0.00E+00	3.98E-12	7.96E-12		
Pm-147	3.9564E-02	62.998	125.996	0.00E+00	2.49E+00	4.98E+00		
Pu-238	1.2008E-03	62.998	125.996	0.00E+00	7.56E-02	1.51E-01		
Pu-239	5.6917E-03	62.998	125.996	0.00E+00	3.59E-01	7.17E-01		
Pu-240	2.2617E-03	62.998	125.996	0.00E+00	1.42E-01	2.85E-01		
Pu-241	6.1113E-02	62.998	125.996	0.00E+00	3.85E+00	7.70E+00		
Pu-242	3.0602E-07	62.998	125.996	0.00E+00	1.93E-05	3.86E-05		
Ra-226	2.6707E-13	62.998	125.996	0.00E+00	1.68E-11	3.36E-11		
Ra-228	2.2556E-10	62.998	125.996	0.00E+00	1.42E-08	2.84E-08		
Ru-106	3.1293E-06	62.998	125.996	0.00E+00	1.97E-04	3.94E-04		
Se-79	1.2935E-05	62.998	125.996	0.00E+00	8.15E-04	1.63E-03		
Sn-126	1.2238E-05	62.998	125.996	0.00E+00	7.71E-04	1.54E-03		
Sr-90	1.8195E+00	62.998	125.996	0.00E+00	1.15E+02	2.29E+02		
Tc-99	4.4120E-04	62.998	125.996	0.00E+00	2.78E-02	5.56E-02		
Th-229	3.3308E-10	62.998	125.996	0.00E+00	2.10E-08	4.20E-08		
Th-230	4.6526E-11	62.998	125.996	0.00E+00	2.93E-09	5.86E-09		
Th-232	2.3744E-10	62.998	125.996	0.00E+00	1.50E-08	2.99E-08		
Tl-208	1.8195E-08	62.998	125.996	0.00E+00	1.15E-06	2.29E-06		
U-232	4.9098E-08	62.998	125.996	0.00E+00	3.09E-06	6.19E-06		
U-233	1.3140E-07	62.998	125.996	0.00E+00	8.28E-06	1.66E-05		
U-234	2.2571E-07	62.998	125.996	0.00E+00	1.42E-05	2.84E-05		
U-235	-2.6159E-06	62.998	0.000	5.13E-03	4.97E-03	5.13E-03		
U-236	1.2719E-05	62.998	125.996	0.00E+00	8.01E-04	1.60E-03		
U-238	-3.8857E-08	62.998	0.000	3.19E-03	3.19E-03	3.19E-03		
Y-90	1.8211E+00	62.998	125.996	0.00E+00	1.15E+02	2.29E+02		
Other Radionuclides					1.32E+02	2.64E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.64E+00	3.27E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	57.891	62.998	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		125.996	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.14	1.09	1.00
Bounding:	0.29		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (BRAZIL) 1 Fuel decay start date: 2006
 SNF ID #: 1063 Estimates as of: 2030
 Fuel Units & Descr: 9 - ELEMENT Template: TRIGA-SS (LW/U-ZrX, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=1.76kg ; EOL=1.74kg 2 Template Burnup(MWd): 6.66
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
3 Template Decay Time: 20 years

Estimated
Canister usage:
18"x10"
0.08

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.6436E-09	17.104	34.208	0.00E+00	4.52E-08	9.04E-08	0.0150	3.428E+12
Am-241	3.1429E-03	17.104	34.208	0.00E+00	5.38E-02	1.08E-01	0.0250	7.136E+11
Am-242m	1.3195E-06	17.104	34.208	0.00E+00	2.26E-05	4.51E-05	0.0375	6.182E+11
Am-243	1.4753E-07	17.104	34.208	0.00E+00	2.52E-06	5.05E-06	0.0575	6.651E+11
C-14	1.2847E-04	17.104	34.208	0.00E+00	2.20E-03	4.39E-03	0.0850	4.015E+11
Cl-36	2.8120E-06	17.104	34.208	0.00E+00	4.81E-05	9.62E-05	0.1250	2.624E+11
Cm-243	1.2465E-07	17.104	34.208	0.00E+00	2.13E-06	4.26E-06	0.2250	3.448E+11
Cm-244	9.5564E-07	17.104	34.208	0.00E+00	1.63E-05	3.27E-05	0.3750	1.511E+11
Co-60	1.7880E-01	17.104	34.208	0.00E+00	3.06E+00	6.12E+00	0.5750	2.485E+12
Cs-134	5.8692E-04	17.104	34.208	0.00E+00	1.00E-02	2.01E-02	0.8500	2.801E+10
Cs-135	3.2195E-05	17.104	34.208	0.00E+00	5.51E-04	1.10E-03	1.2500	4.642E+10
Cs-137	1.9489E+00	17.104	34.208	0.00E+00	3.33E+01	6.67E+01	1.7500	7.198E+08
Eu-154	4.5895E-03	17.104	34.208	0.00E+00	7.85E-02	1.57E-01	2.2500	2.479E+06
Eu-155	3.6045E-03	17.104	34.208	0.00E+00	6.17E-02	1.23E-01	2.7500	2.731E+04
Fe-55	1.4185E-02	17.104	34.208	0.00E+00	2.43E-01	4.85E-01	3.5000	1.536E+02
H-3	4.7895E-03	17.104	34.208	0.00E+00	8.19E-02	1.64E-01	5.0000	1.886E+01
I-129	7.3684E-07	17.104	34.208	0.00E+00	1.26E-05	2.52E-05	7.0000	2.132E+00
Kr-85	9.5820E-02	17.104	34.208	0.00E+00	1.64E+00	3.28E+00	11.0000	2.427E+01
Np-237	1.2552E-06	17.104	34.208	0.00E+00	2.15E-05	4.29E-05		
Pa-231	7.0406E-09	17.104	34.208	0.00E+00	1.20E-07	2.41E-07		
Pb-210	5.8000E-14	17.104	34.208	0.00E+00	9.92E-13	1.98E-12		
Pm-147	4.0075E-02	17.104	34.208	0.00E+00	6.85E-01	1.37E+00		
Pu-238	9.2256E-04	17.104	34.208	0.00E+00	1.58E-02	3.16E-02		
Pu-239	5.5278E-03	17.104	34.208	0.00E+00	9.45E-02	1.89E-01		
Pu-240	2.1248E-03	17.104	34.208	0.00E+00	3.63E-02	7.27E-02		
Pu-241	4.9549E-02	17.104	34.208	0.00E+00	8.47E-01	1.69E+00		
Pu-242	2.3128E-07	17.104	34.208	0.00E+00	3.96E-06	7.91E-06		
Ra-226	2.4526E-13	17.104	34.208	0.00E+00	4.20E-12	8.39E-12		
Ra-228	2.4015E-10	17.104	34.208	0.00E+00	4.11E-09	8.22E-09		
Ru-106	3.0602E-06	17.104	34.208	0.00E+00	5.23E-05	1.05E-04		
Se-79	1.3015E-05	17.104	34.208	0.00E+00	2.23E-04	4.45E-04		
Sn-126	1.2165E-05	17.104	34.208	0.00E+00	2.08E-04	4.16E-04		
Sr-90	1.8226E+00	17.104	34.208	0.00E+00	3.12E+01	6.23E+01		
Tc-99	4.4241E-04	17.104	34.208	0.00E+00	7.57E-03	1.51E-02		
Th-229	3.0962E-10	17.104	34.208	0.00E+00	5.30E-09	1.06E-08		
Th-230	4.2346E-11	17.104	34.208	0.00E+00	7.24E-10	1.45E-09		
Th-232	2.5278E-10	17.104	34.208	0.00E+00	4.32E-09	8.65E-09		
Th-208	1.5820E-08	17.104	34.208	0.00E+00	2.71E-07	5.41E-07		
U-232	4.2647E-08	17.104	34.208	0.00E+00	7.29E-07	1.46E-06		
U-233	1.2211E-07	17.104	34.208	0.00E+00	2.09E-06	4.18E-06		
U-234	1.9955E-07	17.104	34.208	0.00E+00	3.41E-06	6.83E-06		
U-235	-2.6194E-06	17.104	0.000	7.59E-04	7.14E-04	7.59E-04	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	17.104	34.208	0.00E+00	2.17E-04	4.34E-04	4.28E-01	8.56E-01
U-238	-3.6331E-08	17.104	0.000	4.72E-04	4.71E-04	4.72E-04	Total	Total
Y-90	1.8241E+00	17.104	34.208	0.00E+00	3.12E+01	6.24E+01		
Other Radionuclides					3.29E+01	6.59E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	17.104	13.746	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		34.208	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.29	0.80	1.00
Bounding:	0.57		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (BRAZIL)	¹ Fuel decay start date: 2006
SNF ID #: 471	Estimates as of: 2030
Fuel Units & Descr: 59 - ELEMENT	Template: TRIGA-Al (LW/U-Zr, Alum., 10 to 20%, U)
Heavy Metal Mass: BOL=11.09 kg; EOL=10.58kg	² Template Burnup(MWd): 6.65
ROD Storage Site: INEEL	Template BOL Heavy Metal Mass (MT): 0.00018
	Template Decay Time: 20 years

Estimated
Canister usage:
18"x10"
0.53

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.4556E-09	478.691	957.382	0.00E+00	1.18E-06	2.35E-06	Avg. MeV	
Am-241	3.8752E-03	478.691	957.382	0.00E+00	1.86E+00	3.71E+00	0.0150	9.825E+13
Am-242m	1.8617E-06	478.691	957.382	0.00E+00	8.91E-04	1.78E-03	0.0250	2.029E+13
Am-243	2.3293E-07	478.691	957.382	0.00E+00	1.12E-04	2.23E-04	0.0375	2.124E+13
C-14	4.3233E-05	478.691	957.382	0.00E+00	2.07E-02	4.14E-02	0.0575	1.963E+13
Cl-36	4.3023E-08	478.691	957.382	0.00E+00	2.06E-05	4.12E-05	0.0850	1.195E+13
Cm-243	1.9053E-07	478.691	957.382	0.00E+00	9.12E-05	1.82E-04	0.1250	1.341E+13
Cm-244	1.7744E-06	478.691	957.382	0.00E+00	8.49E-04	1.70E-03	0.2250	1.083E+13
Co-60	4.3188E-03	478.691	957.382	0.00E+00	2.07E+00	4.13E+00	0.3750	4.450E+12
Cs-134	6.7188E-04	478.691	957.382	0.00E+00	3.22E-01	6.43E-01	0.5750	7.089E+13
Cs-135	3.1549E-05	478.691	957.382	0.00E+00	1.51E-02	3.02E-02	0.8500	7.542E+12
Cs-137	1.9489E+00	478.691	957.382	0.00E+00	9.33E+02	1.87E+03	1.2500	8.125E+12
Eu-154	4.0301E-01	478.691	957.382	0.00E+00	1.93E+02	3.86E+02	1.7500	2.434E+11
Eu-155	5.4000E-02	478.691	957.382	0.00E+00	2.58E+01	5.17E+01	2.2500	3.859E+06
Fe-55	1.5955E-04	478.691	957.382	0.00E+00	7.64E-02	1.53E-01	2.7500	6.421E+05
H-3	4.6571E-03	478.691	957.382	0.00E+00	2.23E+00	4.46E+00	3.5000	4.409E+03
I-129	7.3805E-07	478.691	957.382	0.00E+00	3.53E-04	7.07E-04	5.0000	5.449E+02
Kr-85	9.5684E-02	478.691	957.382	0.00E+00	4.58E+01	9.16E+01	7.0000	6.152E+01
Np-237	1.4618E-06	478.691	957.382	0.00E+00	7.00E-04	1.40E-03	11.0000	6.998E+00
Pa-231	6.4782E-09	478.691	957.382	0.00E+00	3.10E-06	6.20E-06		
Pb-210	6.3158E-14	478.691	957.382	0.00E+00	3.02E-11	6.05E-11		
Pm-147	3.9564E-02	478.691	957.382	0.00E+00	1.89E+01	3.79E+01		
Pu-238	1.2008E-03	478.691	957.382	0.00E+00	5.75E-01	1.15E+00		
Pu-239	5.6917E-03	478.691	957.382	0.00E+00	2.72E+00	5.45E+00		
Pu-240	2.2617E-03	478.691	957.382	0.00E+00	1.08E+00	2.17E+00		
Pu-241	6.1113E-02	478.691	957.382	0.00E+00	2.93E+01	5.85E+01		
Pu-242	3.0602E-07	478.691	957.382	0.00E+00	1.46E-04	2.93E-04		
Ra-226	2.6707E-13	478.691	957.382	0.00E+00	1.28E-10	2.56E-10		
Ra-228	2.2556E-10	478.691	957.382	0.00E+00	1.08E-07	2.16E-07		
Ru-106	3.1293E-06	478.691	957.382	0.00E+00	1.50E-03	3.00E-03		
Se-79	1.2935E-05	478.691	957.382	0.00E+00	6.19E-03	1.24E-02		
Sn-126	1.2238E-05	478.691	957.382	0.00E+00	5.86E-03	1.17E-02		
Sr-90	1.8195E+00	478.691	957.382	0.00E+00	8.71E+02	1.74E+03		
Tc-99	4.4120E-04	478.691	957.382	0.00E+00	2.11E-01	4.22E-01		
Th-229	3.3308E-10	478.691	957.382	0.00E+00	1.59E-07	3.19E-07		
Th-230	4.6526E-11	478.691	957.382	0.00E+00	2.23E-08	4.45E-08		
Th-232	2.3744E-10	478.691	957.382	0.00E+00	1.14E-07	2.27E-07		
Th-208	1.8195E-08	478.691	957.382	0.00E+00	8.71E-06	1.74E-05		
U-232	4.9098E-08	478.691	957.382	0.00E+00	2.35E-05	4.70E-05		
U-233	1.3140E-07	478.691	957.382	0.00E+00	6.29E-05	1.26E-04		
U-234	2.2571E-07	478.691	957.382	0.00E+00	1.08E-04	2.16E-04		
U-235	-2.6159E-06	478.691	0.000	4.75E-03	3.49E-03	4.75E-03		
U-236	1.2719E-05	478.691	957.382	0.00E+00	6.09E-03	1.22E-02		
U-238	-3.8857E-08	478.691	0.000	2.99E-03	2.97E-03	2.99E-03		
Y-90	1.8211E+00	478.691	957.382	0.00E+00	8.72E+02	1.74E+03		
Other Radionuclides					1.00E+03	2.00E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.24E+01	2.49E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		Basis for Parameter Differences:
From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	ALUM	ALUM
BOL HM Constituents:	U-ZrHX	U
BOL Enrichment %:	19.81043128	10 to 20

Burnup Summary (MWd) ²		Basis for burnup used in estimate:
From SFD	Estimated	
Nominal:	108.045	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:	957.382	Bounding burnup assumed to be twice nominal burnup.

Checks		Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	
	1.17	1.00
Bounding:	2.34	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (CORNELL) 1 Fuel decay start date: 1976
 SNF ID #: 1047 Estimates as of: 2030
 Fuel Units & Desc.: 7 - ELEMENT Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=1.26kg ; EOL=1.26kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000113
Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.06

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.6842E-09	0.001	0.001	0.00E+00	1.10E-11	1.10E-11	Avg. MeV	
Am-241	4.9459E-03	0.001	0.001	0.00E+00	6.24E-06	6.24E-06	0.0150	7.528E+07
Am-242m	1.6241E-06	0.001	0.001	0.00E+00	2.05E-09	2.05E-09	0.0250	1.283E+07
Am-243	2.3233E-07	0.001	0.001	0.00E+00	2.93E-10	2.93E-10	0.0375	1.160E+07
C-14	4.3083E-05	0.001	0.001	0.00E+00	5.44E-08	5.44E-08	0.0575	1.213E+07
Cl-36	4.3023E-08	0.001	0.001	0.00E+00	5.43E-11	5.43E-11	0.0850	8.788E+06
Cm-243	9.1880E-08	0.001	0.001	0.00E+00	1.16E-10	1.16E-10	0.1250	8.442E+06
Cm-244	5.6346E-07	0.001	0.001	0.00E+00	7.11E-10	7.11E-10	0.2250	1.724E+07
Co-60	8.3699E-05	0.001	0.001	0.00E+00	1.06E-07	1.06E-07	0.3750	2.764E+06
Cs-134	2.8211E-08	0.001	0.001	0.00E+00	3.56E-11	3.56E-11	0.5750	4.595E+06
Cs-135	3.1549E-05	0.001	0.001	0.00E+00	3.98E-08	3.98E-08	0.8500	1.252E+06
Cs-137	9.7519E-01	0.001	0.001	0.00E+00	1.23E-03	1.23E-03	1.2500	1.058E+06
Eu-154	3.5970E-02	0.001	0.001	0.00E+00	4.54E-05	4.54E-05	1.7500	3.794E+04
Eu-155	8.1774E-04	0.001	0.001	0.00E+00	1.03E-06	1.03E-06	2.2500	4.811E+00
Fe-55	5.3940E-08	0.001	0.001	0.00E+00	6.81E-11	6.81E-11	2.7500	2.655E+00
H-3	8.6571E-04	0.001	0.001	0.00E+00	1.09E-06	1.09E-06	3.5000	1.832E+00
I-129	7.3805E-07	0.001	0.001	0.00E+00	9.31E-10	9.31E-10	5.0000	7.870E-01
Kr-85	1.3771E-02	0.001	0.001	0.00E+00	1.74E-05	1.74E-05	7.0000	9.061E-02
Np-237	1.5218E-06	0.001	0.001	0.00E+00	1.92E-09	1.92E-09	11.0000	1.042E-02
Pa-231	1.4152E-08	0.001	0.001	0.00E+00	1.79E-11	1.79E-11		
Pb-210	7.9774E-13	0.001	0.001	0.00E+00	1.01E-15	1.01E-15		
Pm-147	1.4362E-05	0.001	0.001	0.00E+00	1.81E-08	1.81E-08		
Pu-238	9.4782E-04	0.001	0.001	0.00E+00	1.20E-06	1.20E-06		
Pu-239	5.6872E-03	0.001	0.001	0.00E+00	7.18E-06	7.18E-06		
Pu-240	2.2541E-03	0.001	0.001	0.00E+00	2.84E-06	2.84E-06		
Pu-241	1.4433E-02	0.001	0.001	0.00E+00	1.82E-05	1.82E-05		
Pu-242	3.0602E-07	0.001	0.001	0.00E+00	3.86E-10	3.86E-10		
Ra-226	1.8857E-12	0.001	0.001	0.00E+00	2.38E-15	2.38E-15		
Ra-228	2.3729E-10	0.001	0.001	0.00E+00	2.99E-13	2.99E-13		
Ru-106	3.4857E-15	0.001	0.001	0.00E+00	4.40E-18	4.40E-18		
Se-79	1.2931E-05	0.001	0.001	0.00E+00	1.63E-08	1.63E-08		
Sn-126	1.2235E-05	0.001	0.001	0.00E+00	1.54E-08	1.54E-08		
Sr-90	8.9173E-01	0.001	0.001	0.00E+00	1.13E-03	1.13E-03		
Tc-99	4.4120E-04	0.001	0.001	0.00E+00	5.57E-07	5.57E-07		
Th-229	8.2752E-10	0.001	0.001	0.00E+00	1.04E-12	1.04E-12		
Th-230	1.4908E-10	0.001	0.001	0.00E+00	1.88E-13	1.88E-13		
Th-232	2.3744E-10	0.001	0.001	0.00E+00	3.00E-13	3.00E-13		
Ti-208	1.3668E-08	0.001	0.001	0.00E+00	1.72E-11	1.72E-11		
U-232	3.6797E-08	0.001	0.001	0.00E+00	4.64E-11	4.64E-11		
U-233	1.3164E-07	0.001	0.001	0.00E+00	1.66E-10	1.66E-10		
U-234	3.3865E-07	0.001	0.001	0.00E+00	4.27E-10	4.27E-10		
U-235	-2.6144E-06	0.001	0.000	5.40E-04	5.40E-04	5.40E-04		
U-236	1.2722E-05	0.001	0.001	0.00E+00	1.61E-08	1.61E-08		
U-238	-3.8857E-08	0.001	0.000	3.40E-04	3.40E-04	3.40E-04		
Y-90	8.9203E-01	0.001	0.001	0.00E+00	1.13E-03	1.13E-03		
Other Radionuclides					1.41E-03	1.41E-03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.73E-05	3.73E-05
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.81136943	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	0.001		Nominal burnup taken directly from SFD (converted to MWd).
Bounding:	0.001		Bounding burnup taken directly from SFD (converted to MWd).

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.00	0.00	1.00
Bounding:	0.00	0.00	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (DOW)
 SNF ID #: 970
 Fuel Units & Descr: 1 - ELEMENT
 Heavy Metal Mass: BOL=.18kg ; EOL=.18kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.01

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.0632E-10	1.909	3.818	0.00E+00	1.54E-09	3.08E-09	Avg. MeV	
Am-241	2.2586E-03	1.909	3.818	0.00E+00	4.31E-03	8.62E-03	0.0150	6.460E+11
Am-242m	1.9925E-06	1.909	3.818	0.00E+00	3.80E-06	7.61E-06	0.0250	1.403E+11
Am-243	2.3323E-07	1.909	3.818	0.00E+00	4.45E-07	8.91E-07	0.0375	1.747E+11
C-14	4.3308E-05	1.909	3.818	0.00E+00	8.27E-05	1.65E-04	0.0575	1.339E+11
Cl-36	4.3023E-08	1.909	3.818	0.00E+00	8.21E-08	1.64E-07	0.0850	9.375E+10
Cm-243	2.7429E-07	1.909	3.818	0.00E+00	5.24E-07	1.05E-06	0.1250	1.402E+11
Cm-244	3.1504E-06	1.909	3.818	0.00E+00	6.01E-06	1.20E-05	0.2250	7.827E+10
Co-60	3.1008E-02	1.909	3.818	0.00E+00	5.92E-02	1.18E-01	0.3750	3.483E+10
Cs-134	1.0367E-01	1.909	3.818	0.00E+00	1.98E-01	3.96E-01	0.5750	4.416E+11
Cs-135	3.1549E-05	1.909	3.818	0.00E+00	6.02E-05	1.20E-04	0.8500	1.087E+11
Cs-137	2.7564E+00	1.909	3.818	0.00E+00	5.26E+00	1.05E+01	1.2500	1.127E+11
Eu-154	1.3490E+00	1.909	3.818	0.00E+00	2.58E+00	5.15E+00	1.7500	3.225E+09
Eu-155	4.3880E-01	1.909	3.818	0.00E+00	8.38E-01	1.68E+00	2.2500	3.920E+08
Fe-55	8.6782E-03	1.909	3.818	0.00E+00	1.66E-02	3.31E-02	2.7500	3.184E+06
H-3	1.0805E-02	1.909	3.818	0.00E+00	2.06E-02	4.13E-02	3.5000	3.722E+05
I-129	7.3805E-07	1.909	3.818	0.00E+00	1.41E-06	2.82E-06	5.0000	2.290E+00
Kr-85	2.5218E-01	1.909	3.818	0.00E+00	4.81E-01	9.63E-01	7.0000	2.594E-01
Np-237	1.4463E-06	1.909	3.818	0.00E+00	2.76E-06	5.52E-06	11.0000	2.955E-02
Pa-231	3.5970E-09	1.909	3.818	0.00E+00	6.87E-09	1.37E-08		
Pb-210	8.2511E-15	1.909	3.818	0.00E+00	1.58E-14	3.15E-14		
Pm-147	2.0767E+00	1.909	3.818	0.00E+00	3.96E+00	7.93E+00		
Pu-238	1.3514E-03	1.909	3.818	0.00E+00	2.58E-03	5.16E-03		
Pu-239	5.6947E-03	1.909	3.818	0.00E+00	1.09E-02	2.17E-02		
Pu-240	2.2647E-03	1.909	3.818	0.00E+00	4.32E-03	8.65E-03		
Pu-241	1.2574E-01	1.909	3.818	0.00E+00	2.40E-01	4.80E-01		
Pu-242	3.0602E-07	1.909	3.818	0.00E+00	5.84E-07	1.17E-06		
Ra-226	5.7353E-14	1.909	3.818	0.00E+00	1.09E-13	2.19E-13		
Ra-228	1.8150E-10	1.909	3.818	0.00E+00	3.46E-10	6.93E-10		
Ru-106	9.3744E-02	1.909	3.818	0.00E+00	1.79E-01	3.58E-01		
Se-79	1.2938E-05	1.909	3.818	0.00E+00	2.47E-05	4.94E-05		
Sn-126	1.2239E-05	1.909	3.818	0.00E+00	2.34E-05	4.67E-05		
Sr-90	2.6000E+00	1.909	3.818	0.00E+00	4.96E+00	9.93E+00		
Tc-99	4.4120E-04	1.909	3.818	0.00E+00	8.42E-04	1.68E-03		
Th-229	1.4749E-10	1.909	3.818	0.00E+00	2.82E-10	5.63E-10		
Th-230	1.9549E-11	1.909	3.818	0.00E+00	3.73E-11	7.46E-11		
Th-232	2.3744E-10	1.909	3.818	0.00E+00	4.53E-10	9.07E-10		
Tl-208	1.9459E-08	1.909	3.818	0.00E+00	3.71E-08	7.43E-08		
U-232	5.6015E-08	1.909	3.818	0.00E+00	1.07E-07	2.14E-07		
U-233	1.3132E-07	1.909	3.818	0.00E+00	2.51E-07	5.01E-07		
U-234	1.7323E-07	1.909	3.818	0.00E+00	3.31E-07	6.61E-07		
U-235	-2.6159E-06	1.909	0.000	7.67E-05	7.17E-05	7.67E-05		
U-236	1.2717E-05	1.909	3.818	0.00E+00	2.43E-05	4.86E-05		
U-238	-3.8857E-08	1.909	0.000	4.86E-05	4.85E-05	4.86E-05		
Y-90	2.6015E+00	1.909	3.818	0.00E+00	4.97E+00	9.93E+00		
Other Radionuclides					7.26E+00	1.45E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.59E-02	1.92E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.72222222	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	1.754	1.909	
Bounding:		3.818	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.29	1.09	
Bounding:	0.57		

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ENGLAND)
 SNF ID #: 485
 Fuel Units & Descr: 84 - ELEMENT
 Heavy Metal Mass: BOL=16.19kg ; EOL=15.83kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.76

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Avg. MeV	
Ac-227	2.6436E-09	394.391	788.783	0.00E+00	1.04E-06	2.09E-06	0.0150	7.905E+13
Am-241	3.1429E-03	394.391	788.783	0.00E+00	1.24E+00	2.48E+00	0.0250	1.645E+13
Am-242m	1.3195E-06	394.391	788.783	0.00E+00	5.20E-04	1.04E-03	0.0375	1.426E+13
Am-243	1.4753E-07	394.391	788.783	0.00E+00	5.82E-05	1.16E-04	0.0575	1.534E+13
C-14	1.2847E-04	394.391	788.783	0.00E+00	5.07E-02	1.01E-01	0.0850	9.258E+12
Cl-36	2.8120E-06	394.391	788.783	0.00E+00	1.11E-03	2.22E-03	0.1250	6.050E+12
Cm-243	1.2465E-07	394.391	788.783	0.00E+00	4.92E-05	9.83E-05	0.2250	7.949E+12
Cm-244	9.5564E-07	394.391	788.783	0.00E+00	3.77E-04	7.54E-04	0.3750	3.484E+12
Co-60	1.7880E-01	394.391	788.783	0.00E+00	7.05E+01	1.41E+02	0.5750	5.730E+13
Cs-134	5.8692E-04	394.391	788.783	0.00E+00	2.31E-01	4.63E-01	0.8500	6.458E+11
Cs-135	3.2195E-05	394.391	788.783	0.00E+00	1.27E-02	2.54E-02	1.2500	1.070E+13
Cs-137	1.9489E+00	394.391	788.783	0.00E+00	7.69E+02	1.54E+03	1.7500	1.660E+10
Eu-154	4.5895E-03	394.391	788.783	0.00E+00	1.81E+00	3.62E+00	2.2500	5.716E+07
Eu-155	3.6045E-03	394.391	788.783	0.00E+00	1.42E+00	2.84E+00	2.7500	6.298E+05
Fe-55	1.4185E-02	394.391	788.783	0.00E+00	5.59E+00	1.12E+01	3.5000	3.506E+03
H-3	4.7895E-03	394.391	788.783	0.00E+00	1.89E+00	3.78E+00	5.0000	4.198E+02
I-129	7.3684E-07	394.391	788.783	0.00E+00	2.91E-04	5.81E-04	7.0000	4.743E+01
Kr-85	9.5820E-02	394.391	788.783	0.00E+00	3.78E+01	7.56E+01	11.0000	5.398E+00
Np-237	1.2552E-06	394.391	788.783	0.00E+00	4.95E-04	9.90E-04		
Pa-231	7.0406E-09	394.391	788.783	0.00E+00	2.78E-06	5.55E-06		
Pb-210	5.8000E-14	394.391	788.783	0.00E+00	2.29E-11	4.57E-11		
Pm-147	4.0075E-02	394.391	788.783	0.00E+00	1.58E+01	3.16E+01		
Pu-238	9.2256E-04	394.391	788.783	0.00E+00	3.64E-01	7.28E-01		
Pu-239	5.5278E-03	394.391	788.783	0.00E+00	2.18E+00	4.36E+00		
Pu-240	2.1248E-03	394.391	788.783	0.00E+00	8.38E-01	1.68E+00		
Pu-241	4.9549E-02	394.391	788.783	0.00E+00	1.95E+01	3.91E+01		
Pu-242	2.3128E-07	394.391	788.783	0.00E+00	9.12E-05	1.82E-04		
Ra-226	2.4526E-13	394.391	788.783	0.00E+00	9.67E-11	1.93E-10		
Ra-228	2.4015E-10	394.391	788.783	0.00E+00	9.47E-08	1.89E-07		
Ru-106	3.0602E-06	394.391	788.783	0.00E+00	1.21E-03	2.41E-03		
Se-79	1.3015E-05	394.391	788.783	0.00E+00	5.13E-03	1.03E-02		
Sn-126	1.2165E-05	394.391	788.783	0.00E+00	4.80E-03	9.60E-03		
Sr-90	1.8226E+00	394.391	788.783	0.00E+00	7.19E+02	1.44E+03		
Tc-99	4.4241E-04	394.391	788.783	0.00E+00	1.74E-01	3.49E-01		
Th-229	3.0962E-10	394.391	788.783	0.00E+00	1.22E-07	2.44E-07		
Th-230	4.2346E-11	394.391	788.783	0.00E+00	1.67E-08	3.34E-08		
Th-232	2.5278E-10	394.391	788.783	0.00E+00	9.97E-08	1.99E-07		
Tl-208	1.5820E-08	394.391	788.783	0.00E+00	6.24E-06	1.25E-05		
U-232	4.2647E-08	394.391	788.783	0.00E+00	1.68E-05	3.36E-05		
U-233	1.2211E-07	394.391	788.783	0.00E+00	4.82E-05	9.63E-05		
U-234	1.9955E-07	394.391	788.783	0.00E+00	7.87E-05	1.57E-04		
U-235	-2.6194E-06	394.391	0.000	6.93E-03	5.90E-03	6.93E-03		
U-236	1.2693E-05	394.391	788.783	0.00E+00	5.01E-03	1.00E-02		
U-238	-3.6331E-08	394.391	0.000	4.36E-03	4.35E-03	4.36E-03		
Y-90	1.8241E+00	394.391	788.783	0.00E+00	7.19E+02	1.44E+03		
Other Radionuclides					7.59E+02	1.52E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.87E+00	1.97E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.80853811	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	394.391	344.804	
Bounding:		788.783	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.71	0.87	
Bounding:	1.43		

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (FINLAND)
 SNF ID #: 463
 Fuel Units & Descr: 69 - ELEMENT
 Heavy Metal Mass: BOL=12.42kg ; EOL=12.34kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.62

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.4556E-09	72.448	144.896	0.00E+00	1.78E-07	3.56E-07	0.0150	1.487E+13
Am-241	3.8752E-03	72.448	144.896	0.00E+00	2.81E-01	5.61E-01	0.0250	3.070E+12
Am-242m	1.8617E-06	72.448	144.896	0.00E+00	1.35E-04	2.70E-04	0.0375	3.214E+12
Am-243	2.3293E-07	72.448	144.896	0.00E+00	1.69E-05	3.38E-05	0.0575	2.971E+12
C-14	4.3233E-05	72.448	144.896	0.00E+00	3.13E-03	6.26E-03	0.0850	1.809E+12
Cl-36	4.3023E-08	72.448	144.896	0.00E+00	3.12E-06	6.23E-06	0.1250	2.030E+12
Cm-243	1.9053E-07	72.448	144.896	0.00E+00	1.38E-05	2.76E-05	0.2250	1.639E+12
Cm-244	1.7744E-06	72.448	144.896	0.00E+00	1.29E-04	2.57E-04	0.3750	6.734E+11
Co-60	4.3188E-03	72.448	144.896	0.00E+00	3.13E-01	6.26E-01	0.5750	1.073E+13
Cs-134	6.7188E-04	72.448	144.896	0.00E+00	4.87E-02	9.74E-02	0.8500	1.141E+12
Cs-135	3.1549E-05	72.448	144.896	0.00E+00	2.29E-03	4.57E-03	1.2500	1.230E+12
Cs-137	1.9489E+00	72.448	144.896	0.00E+00	1.41E+02	2.82E+02	1.7500	3.684E+10
Eu-154	4.0301E-01	72.448	144.896	0.00E+00	2.92E+01	5.84E+01	2.2500	5.841E+05
Eu-155	5.4000E-02	72.448	144.896	0.00E+00	3.91E+00	7.82E+00	2.7500	9.719E+04
Fe-55	1.5955E-04	72.448	144.896	0.00E+00	1.16E-02	2.31E-02	3.5000	6.829E+02
H-3	4.6571E-03	72.448	144.896	0.00E+00	3.37E-01	6.75E-01	5.0000	8.914E+01
I-129	7.3805E-07	72.448	144.896	0.00E+00	5.35E-05	1.07E-04	7.0000	1.008E+01
Kr-85	9.5684E-02	72.448	144.896	0.00E+00	6.93E+00	1.39E+01	11.0000	1.147E+00
Np-237	1.4618E-06	72.448	144.896	0.00E+00	1.06E-04	2.12E-04		
Pa-231	6.4782E-09	72.448	144.896	0.00E+00	4.69E-07	9.39E-07		
Pb-210	6.3158E-14	72.448	144.896	0.00E+00	4.58E-12	9.15E-12		
Pm-147	3.9564E-02	72.448	144.896	0.00E+00	2.87E+00	5.73E+00		
Pu-238	1.2008E-03	72.448	144.896	0.00E+00	8.70E-02	1.74E-01		
Pu-239	5.6917E-03	72.448	144.896	0.00E+00	4.12E-01	8.25E-01		
Pu-240	2.2617E-03	72.448	144.896	0.00E+00	1.64E-01	3.28E-01		
Pu-241	6.1113E-02	72.448	144.896	0.00E+00	4.43E+00	8.85E+00		
Pu-242	3.0602E-07	72.448	144.896	0.00E+00	2.22E-05	4.43E-05		
Ra-226	2.6707E-13	72.448	144.896	0.00E+00	1.93E-11	3.87E-11		
Ra-228	2.2556E-10	72.448	144.896	0.00E+00	1.63E-08	3.27E-08		
Ru-106	3.1293E-06	72.448	144.896	0.00E+00	2.27E-04	4.53E-04		
Se-79	1.2935E-05	72.448	144.896	0.00E+00	9.37E-04	1.87E-03		
Sn-126	1.2238E-05	72.448	144.896	0.00E+00	8.87E-04	1.77E-03		
Sr-90	1.8195E+00	72.448	144.896	0.00E+00	1.32E+02	2.64E+02		
Tc-99	4.4120E-04	72.448	144.896	0.00E+00	3.20E-02	6.39E-02		
Th-229	3.3308E-10	72.448	144.896	0.00E+00	2.41E-08	4.83E-08		
Th-230	4.6526E-11	72.448	144.896	0.00E+00	3.37E-09	6.74E-09		
Th-232	2.3744E-10	72.448	144.896	0.00E+00	1.72E-08	3.44E-08		
Tl-208	1.8195E-08	72.448	144.896	0.00E+00	1.32E-06	2.64E-06		
U-232	4.9098E-08	72.448	144.896	0.00E+00	3.56E-06	7.11E-06		
U-233	1.3140E-07	72.448	144.896	0.00E+00	9.52E-06	1.90E-05		
U-234	2.2571E-07	72.448	144.896	0.00E+00	1.64E-05	3.27E-05		
U-235	-2.6159E-06	72.448	0.000	5.37E-03	5.18E-03	5.37E-03		
U-236	1.2719E-05	72.448	144.896	0.00E+00	9.21E-04	1.84E-03		
U-238	-3.8857E-08	72.448	0.000	3.34E-03	3.34E-03	3.34E-03		
Y-90	1.8211E+00	72.448	144.896	0.00E+00	1.32E+02	2.64E+02		
Other Radionuclides					1.52E+02	3.03E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.88E+00	3.76E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	60.523	72.448	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		144.896	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.16	1.20	1.00
Bounding:	0.32		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (FINLAND) Fuel decay start date: 2010
 SNF ID #: 472 Estimates as of: 2030
 Fuel Units & Descr: 102 - ELEMENT Template: TRIGA-SS (LW/U-;rx, SST, 10 to 20%, U)
 Heavy Metal Mas: BOL=19.89kg ; EOL=19.69kg Template Burnup(MWd): 6.65
 ROD Storage Sits: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 20 years

Estimated
Canister usage:
18"x10"
0.92

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.6436E-09	194.740	389.480	0.00E+00	5.15E-07	1.03E-06	0.0150	3.903E+13
Am-241	3.1429E-03	194.740	389.480	0.00E+00	6.12E-01	1.22E+00	0.0250	8.125E+12
Am-242m	1.3195E-06	194.740	389.480	0.00E+00	2.57E-04	5.14E-04	0.0375	7.039E+12
Am-243	1.4753E-07	194.740	389.480	0.00E+00	2.87E-05	5.75E-05	0.0575	7.572E+12
C-14	1.2847E-04	194.740	389.480	0.00E+00	2.50E-02	5.00E-02	0.0850	4.571E+12
Cl-36	2.8120E-06	194.740	389.480	0.00E+00	5.48E-04	1.10E-03	0.1250	2.988E+12
Cm-243	1.2465E-07	194.740	389.480	0.00E+00	2.43E-05	4.85E-05	0.2250	3.925E+12
Cm-244	9.5564E-07	194.740	389.480	0.00E+00	1.86E-04	3.72E-04	0.3750	1.720E+12
Co-60	1.7880E-01	194.740	389.480	0.00E+00	3.48E+01	6.96E+01	0.5750	2.829E+13
Cs-134	5.8692E-04	194.740	389.480	0.00E+00	1.14E-01	2.29E-01	0.8500	3.189E+11
Cs-135	3.2195E-05	194.740	389.480	0.00E+00	6.27E-03	1.25E-02	1.2500	5.285E+12
Cs-137	1.9489E+00	194.740	389.480	0.00E+00	3.80E+02	7.59E+02	1.7500	8.196E+09
Eu-154	4.5895E-03	194.740	389.480	0.00E+00	8.94E-01	1.79E+00	2.2500	2.822E+07
Eu-155	3.6045E-03	194.740	389.480	0.00E+00	7.02E-01	1.40E+00	2.7500	3.110E+05
Fe-55	1.4185E-02	194.740	389.480	0.00E+00	2.76E+00	5.52E+00	3.5000	1.748E+03
H-3	4.7895E-03	194.740	389.480	0.00E+00	9.33E-01	1.87E+00	5.0000	2.147E+02
I-129	7.3684E-07	194.740	389.480	0.00E+00	1.43E-04	2.87E-04	7.0000	2.427E+01
Kr-85	9.5820E-02	194.740	389.480	0.00E+00	1.87E+01	3.73E+01	11.0000	2.763E+00
Np-237	1.2552E-06	194.740	389.480	0.00E+00	2.44E-04	4.89E-04		
Pa-231	7.0406E-09	194.740	389.480	0.00E+00	1.37E-06	2.74E-06		
Pb-210	5.8000E-14	194.740	389.480	0.00E+00	1.13E-11	2.26E-11		
Pm-147	4.0075E-02	194.740	389.480	0.00E+00	7.80E+00	1.56E+01		
Pu-238	9.2256E-04	194.740	389.480	0.00E+00	1.80E-01	3.59E-01		
Pu-239	5.5278E-03	194.740	389.480	0.00E+00	1.08E+00	2.15E+00		
Pu-240	2.1248E-03	194.740	389.480	0.00E+00	4.14E-01	8.28E-01		
Pu-241	4.9549E-02	194.740	389.480	0.00E+00	9.65E+00	1.93E+01		
Pu-242	2.3128E-07	194.740	389.480	0.00E+00	4.50E-05	9.01E-05		
Ra-226	2.4526E-13	194.740	389.480	0.00E+00	4.78E-11	9.55E-11		
Ra-228	2.4015E-10	194.740	389.480	0.00E+00	4.68E-08	9.35E-08		
Ru-106	3.0602E-06	194.740	389.480	0.00E+00	5.96E-04	1.19E-03		
Se-79	1.3015E-05	194.740	389.480	0.00E+00	2.53E-03	5.07E-03		
Sn-126	1.2165E-05	194.740	389.480	0.00E+00	2.37E-03	4.74E-03		
Sr-90	1.8226E+00	194.740	389.480	0.00E+00	3.55E+02	7.10E+02		
Tc-99	4.4241E-04	194.740	389.480	0.00E+00	8.62E-02	1.72E-01		
Th-229	3.0962E-10	194.740	389.480	0.00E+00	6.03E-08	1.21E-07		
Th-230	4.2346E-11	194.740	389.480	0.00E+00	8.25E-09	1.65E-08		
Th-232	2.5278E-10	194.740	389.480	0.00E+00	4.92E-08	9.85E-08		
Tl-208	1.5820E-08	194.740	389.480	0.00E+00	3.08E-06	6.16E-06		
U-232	4.2647E-08	194.740	389.480	0.00E+00	8.30E-06	1.66E-05		
U-233	1.2211E-07	194.740	389.480	0.00E+00	2.38E-05	4.76E-05		
U-234	1.9955E-07	194.740	389.480	0.00E+00	3.89E-05	7.77E-05		
U-235	-2.6194E-06	194.740	0.000	8.60E-03	8.09E-03	8.60E-03		
U-236	1.2693E-05	194.740	389.480	0.00E+00	2.47E-03	4.94E-03		
U-238	-3.6331E-08	194.740	0.000	5.35E-03	5.34E-03	5.35E-03		
Y-90	1.8241E+00	194.740	389.480	0.00E+00	3.55E+02	7.10E+02		
Other Radionuclides					3.75E+02	7.50E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.87E+00	9.74E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00000041	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	193.848	194.740	
Bounding:		389.480	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.29	1.00	
Bounding:	0.57		

Estimated EOL HM/Given EOL HM: 1.00

¹ Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (GA) 1 Fuel decay start date: 2035
 SNF ID #: 728 Estimates as of: 2030
 Fuel Units & Descr: 52 - ELEMENT Template: TRIGA-AJ (LW/U-Zrx, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=9.41kg ; EOL=9.33kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00018
Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.47

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec
Ac-227	8.0632E-10	91.729	183.459	0.00E+00	7.40E-08	1.48E-07	Avg. MeV	
Am-241	2.2586E-03	91.729	183.459	0.00E+00	2.07E-01	4.14E-01	0.0150	3.104E+13
Am-242m	1.9925E-06	91.729	183.459	0.00E+00	1.83E-04	3.66E-04	0.0250	6.739E+12
Am-243	2.3323E-07	91.729	183.459	0.00E+00	2.14E-05	4.28E-05	0.0375	8.395E+12
C-14	4.3308E-05	91.729	183.459	0.00E+00	3.97E-03	7.95E-03	0.0575	6.436E+12
Cl-36	4.3023E-08	91.729	183.459	0.00E+00	3.95E-06	7.89E-06	0.0850	4.505E+12
Cm-243	2.7429E-07	91.729	183.459	0.00E+00	2.52E-05	5.03E-05	0.1250	6.737E+12
Cm-244	3.1504E-06	91.729	183.459	0.00E+00	2.89E-04	5.78E-04	0.2250	3.761E+12
Co-60	3.1008E-02	91.729	183.459	0.00E+00	2.84E+00	5.69E+00	0.3750	1.674E+12
Cs-134	1.0367E-01	91.729	183.459	0.00E+00	9.51E+00	1.90E+01	0.5750	2.122E+13
Cs-135	3.1549E-05	91.729	183.459	0.00E+00	2.89E-03	5.79E-03	0.8500	5.223E+12
Cs-137	2.7564E+00	91.729	183.459	0.00E+00	2.53E+02	5.06E+02	1.2500	5.415E+12
Eu-154	1.3490E+00	91.729	183.459	0.00E+00	1.24E+02	2.47E+02	1.7500	1.550E+11
Eu-155	4.3880E-01	91.729	183.459	0.00E+00	4.03E+01	8.05E+01	2.2500	1.884E+10
Fe-55	8.6782E-03	91.729	183.459	0.00E+00	7.96E-01	1.59E+00	2.7500	1.530E+08
H-3	1.0805E-02	91.729	183.459	0.00E+00	9.91E-01	1.98E+00	3.5000	1.789E+07
I-129	7.3805E-07	91.729	183.459	0.00E+00	6.77E-05	1.35E-04	5.0000	1.105E+02
Kr-85	2.5218E-01	91.729	183.459	0.00E+00	2.31E+01	4.63E+01	7.0000	1.252E+01
Np-237	1.4463E-06	91.729	183.459	0.00E+00	1.33E-04	2.65E-04	11.0000	1.426E+00
Pa-231	3.5970E-09	91.729	183.459	0.00E+00	3.30E-07	6.60E-07		
Pb-210	8.2511E-15	91.729	183.459	0.00E+00	7.57E-13	1.51E-12		
Pm-147	2.0767E+00	91.729	183.459	0.00E+00	1.90E+02	3.81E+02		
Pu-238	1.3514E-03	91.729	183.459	0.00E+00	1.24E-01	2.48E-01		
Pu-239	5.6947E-03	91.729	183.459	0.00E+00	5.22E-01	1.04E+00		
Pu-240	2.2647E-03	91.729	183.459	0.00E+00	2.08E-01	4.15E-01		
Pu-241	1.2574E-01	91.729	183.459	0.00E+00	1.15E+01	2.31E+01		
Pu-242	3.0602E-07	91.729	183.459	0.00E+00	2.81E-05	5.61E-05		
Ra-226	5.7353E-14	91.729	183.459	0.00E+00	5.26E-12	1.05E-11		
Ra-228	1.8150E-10	91.729	183.459	0.00E+00	1.66E-08	3.33E-08		
Ru-106	9.3744E-02	91.729	183.459	0.00E+00	8.60E+00	1.72E+01		
Se-79	1.2938E-05	91.729	183.459	0.00E+00	1.19E-03	2.37E-03		
Sn-126	1.2239E-05	91.729	183.459	0.00E+00	1.12E-03	2.25E-03		
Sr-90	2.6000E+00	91.729	183.459	0.00E+00	2.38E+02	4.77E+02		
Tc-99	4.4120E-04	91.729	183.459	0.00E+00	4.05E-02	8.09E-02		
Th-229	1.4749E-10	91.729	183.459	0.00E+00	1.35E-08	2.71E-08		
Th-230	1.9549E-11	91.729	183.459	0.00E+00	1.79E-09	3.59E-09		
Th-232	2.3744E-10	91.729	183.459	0.00E+00	2.18E-08	4.36E-08		
Tl-208	1.9459E-08	91.729	183.459	0.00E+00	1.78E-06	3.57E-06		
U-232	5.6015E-08	91.729	183.459	0.00E+00	5.14E-06	1.03E-05		
U-233	1.3132E-07	91.729	183.459	0.00E+00	1.20E-05	2.41E-05		
U-234	1.7323E-07	91.729	183.459	0.00E+00	1.59E-05	3.18E-05		
U-235	-2.6159E-06	91.729	0.000	4.03E-03	3.79E-03	4.03E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2717E-05	91.729	183.459	0.00E+00	1.17E-03	2.33E-03	4.61E+00	9.22E+00
U-238	-3.8857E-08	91.729	0.000	2.54E-03	2.53E-03	2.54E-03	Total	Total
Y-90	2.6015E+00	91.729	183.459	0.00E+00	2.39E+02	4.77E+02		
Other Radionuclides					3.49E+02	6.97E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.8109242	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	91.729	79.416	
Bounding:		183.459	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.26	0.87	
Bounding:	0.53		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (GA)
 SNF ID #: 870
 Fuel Units & Desc.: 246 - ELEMENT
 Heavy Metal Mass: BOL=46.74kg ; EOL=45.19kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1970
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 2.22

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.6842E-09	1,479.313	2,958.626	0.00E+00	1.28E-05	2.57E-05	Avg. MeV	
Am-241	4.9459E-03	1,479.313	2,958.626	0.00E+00	7.32E+00	1.46E+01	0.0150	1.451E+14
Am-242m	1.6241E-06	1,479.313	2,958.626	0.00E+00	2.40E-03	4.80E-03	0.0250	3.008E+13
Am-243	2.3233E-07	1,479.313	2,958.626	0.00E+00	3.44E-04	6.87E-04	0.0375	2.714E+13
C-14	4.3083E-05	1,479.313	2,958.626	0.00E+00	6.37E-02	1.27E-01	0.0575	2.840E+13
Cl-36	4.3023E-08	1,479.313	2,958.626	0.00E+00	6.36E-05	1.27E-04	0.0850	1.694E+13
Cm-243	9.1880E-08	1,479.313	2,958.626	0.00E+00	1.36E-04	2.72E-04	0.1250	1.257E+13
Cm-244	5.6346E-07	1,479.313	2,958.626	0.00E+00	8.34E-04	1.67E-03	0.2250	1.487E+13
Co-60	8.3699E-05	1,479.313	2,958.626	0.00E+00	1.24E-01	2.48E-01	0.3750	6.416E+12
Cs-134	2.8211E-08	1,479.313	2,958.626	0.00E+00	4.17E-05	8.35E-05	0.5750	1.077E+14
Cs-135	3.1549E-05	1,479.313	2,958.626	0.00E+00	4.67E-02	9.33E-02	0.8500	2.933E+12
Cs-137	9.7519E-01	1,479.313	2,958.626	0.00E+00	1.44E+03	2.89E+03	1.2500	2.480E+12
Eu-154	3.5970E-02	1,479.313	2,958.626	0.00E+00	5.32E+01	1.06E+02	1.7500	8.892E+10
Eu-155	8.1774E-04	1,479.313	2,958.626	0.00E+00	1.21E+00	2.42E+00	2.2500	3.016E+06
Fe-55	5.3940E-08	1,479.313	2,958.626	0.00E+00	7.98E-05	1.60E-04	2.7500	1.425E+06
H-3	8.6571E-04	1,479.313	2,958.626	0.00E+00	1.28E+00	2.56E+00	3.5000	3.954E+03
I-129	7.3805E-07	1,479.313	2,958.626	0.00E+00	1.09E-03	2.18E-03	5.0000	1.663E+03
Kr-85	1.3771E-02	1,479.313	2,958.626	0.00E+00	2.04E+01	4.07E+01	7.0000	1.875E+02
Np-237	1.5218E-06	1,479.313	2,958.626	0.00E+00	2.25E-03	4.50E-03	11.0000	2.131E+01
Pa-231	1.4152E-08	1,479.313	2,958.626	0.00E+00	2.09E-05	4.19E-05		
Pb-210	7.9774E-13	1,479.313	2,958.626	0.00E+00	1.18E-09	2.36E-09		
Pm-147	1.4362E-05	1,479.313	2,958.626	0.00E+00	2.12E-02	4.25E-02		
Pu-238	9.4782E-04	1,479.313	2,958.626	0.00E+00	1.40E+00	2.80E+00		
Pu-239	5.6872E-03	1,479.313	2,958.626	0.00E+00	8.41E+00	1.68E+01		
Pu-240	2.2541E-03	1,479.313	2,958.626	0.00E+00	3.33E+00	6.67E+00		
Pu-241	1.4433E-02	1,479.313	2,958.626	0.00E+00	2.14E+01	4.27E+01		
Pu-242	3.0602E-07	1,479.313	2,958.626	0.00E+00	4.53E-04	9.05E-04		
Ra-226	1.8857E-12	1,479.313	2,958.626	0.00E+00	2.79E-09	5.58E-09		
Ra-228	2.3729E-10	1,479.313	2,958.626	0.00E+00	3.51E-07	7.02E-07		
Ru-106	3.4857E-15	1,479.313	2,958.626	0.00E+00	5.16E-12	1.03E-11		
Se-79	1.2931E-05	1,479.313	2,958.626	0.00E+00	1.91E-02	3.83E-02		
Sn-126	1.2235E-05	1,479.313	2,958.626	0.00E+00	1.81E-02	3.62E-02		
Sr-90	8.9173E-01	1,479.313	2,958.626	0.00E+00	1.32E+03	2.64E+03		
Tc-99	4.4120E-04	1,479.313	2,958.626	0.00E+00	6.53E-01	1.31E+00		
Th-229	8.2752E-10	1,479.313	2,958.626	0.00E+00	1.22E-06	2.45E-06		
Th-230	1.4908E-10	1,479.313	2,958.626	0.00E+00	2.21E-07	4.41E-07		
Th-232	2.3744E-10	1,479.313	2,958.626	0.00E+00	3.51E-07	7.03E-07		
Tl-208	1.3668E-08	1,479.313	2,958.626	0.00E+00	2.02E-05	4.04E-05		
U-232	3.6797E-08	1,479.313	2,958.626	0.00E+00	5.44E-05	1.09E-04		
U-233	1.3164E-07	1,479.313	2,958.626	0.00E+00	1.95E-04	3.89E-04		
U-234	3.3865E-07	1,479.313	2,958.626	0.00E+00	5.01E-04	1.00E-03		
U-235	-2.6144E-06	1,479.313	0.000	2.01E-02	1.62E-02	2.01E-02		
U-236	1.2722E-05	1,479.313	2,958.626	0.00E+00	1.88E-02	3.76E-02		
U-238	-3.8857E-08	1,479.313	0.000	1.26E-02	1.25E-02	1.26E-02		
Y-90	8.9203E-01	1,479.313	2,958.626	0.00E+00	1.32E+03	2.64E+03		
Other Radionuclides					1.65E+03	3.30E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.70E+01	3.40E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.9	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	455.528	1,479.313	
Bounding:		2,958.626	

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

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.86	3.25	1.00
Bounding:	1.71		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (GERMANY) ¹Fuel decay start date: 2010
 SNF ID #: 305 Estimates as of: 2030
 Fuel Units & Descr: 15 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=2.93kg ; EOL=2.88kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.14

Radionuclide	II. Estimates		Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
	m	x _n						Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.6436E-09	40.094	80.187	0.00E+00	1.06E-07	2.12E-07	Avg. MeV		
Am-241	3.1429E-03	40.094	80.187	0.00E+00	1.26E-01	2.52E-01	0.0150	8.036E+12	
Am-242m	1.3195E-06	40.094	80.187	0.00E+00	5.29E-05	1.06E-04	0.0250	1.673E+12	
Am-243	1.4753E-07	40.094	80.187	0.00E+00	5.92E-06	1.18E-05	0.0375	1.449E+12	
C-14	1.2847E-04	40.094	80.187	0.00E+00	5.15E-03	1.03E-02	0.0575	1.559E+12	
Cl-36	2.8120E-06	40.094	80.187	0.00E+00	1.13E-04	2.25E-04	0.0850	9.411E+11	
Cm-243	1.2465E-07	40.094	80.187	0.00E+00	5.00E-06	1.00E-05	0.1250	6.151E+11	
Cm-244	9.5564E-07	40.094	80.187	0.00E+00	3.83E-05	7.66E-05	0.2250	8.081E+11	
Co-60	1.7880E-01	40.094	80.187	0.00E+00	7.17E+00	1.43E+01	0.3750	3.542E+11	
Cs-134	5.8692E-04	40.094	80.187	0.00E+00	2.35E-02	4.71E-02	0.5750	5.825E+12	
Cs-135	3.2195E-05	40.094	80.187	0.00E+00	1.29E-03	2.58E-03	0.8500	6.566E+10	
Cs-137	1.9489E+00	40.094	80.187	0.00E+00	7.81E+01	1.56E+02	1.2500	1.088E+12	
Eu-154	4.5895E-03	40.094	80.187	0.00E+00	1.84E-01	3.68E-01	1.7500	1.687E+09	
Eu-155	3.6045E-03	40.094	80.187	0.00E+00	1.45E-01	2.89E-01	2.2500	5.810E+06	
Fe-55	1.4185E-02	40.094	80.187	0.00E+00	5.69E-01	1.14E+00	2.7500	6.402E+04	
H-3	4.7895E-03	40.094	80.187	0.00E+00	1.92E-01	3.84E-01	3.5000	3.583E+02	
I-129	7.3684E-07	40.094	80.187	0.00E+00	2.95E-05	5.91E-05	5.0000	4.347E+01	
Kr-85	9.5820E-02	40.094	80.187	0.00E+00	3.84E+00	7.68E+00	7.0000	4.913E+00	
Np-237	1.2552E-06	40.094	80.187	0.00E+00	5.03E-05	1.01E-04	11.0000	5.592E-01	
Pa-231	7.0406E-09	40.094	80.187	0.00E+00	2.82E-07	5.65E-07			
Pb-210	5.8000E-14	40.094	80.187	0.00E+00	2.33E-12	4.65E-12			
Pm-147	4.0075E-02	40.094	80.187	0.00E+00	1.61E+00	3.21E+00			
Pu-238	9.2256E-04	40.094	80.187	0.00E+00	3.70E-02	7.40E-02			
Pu-239	5.5278E-03	40.094	80.187	0.00E+00	2.22E-01	4.43E-01			
Pu-240	2.1248E-03	40.094	80.187	0.00E+00	8.52E-02	1.70E-01			
Pu-241	4.9549E-02	40.094	80.187	0.00E+00	1.99E+00	3.97E+00			
Pu-242	2.3128E-07	40.094	80.187	0.00E+00	9.27E-06	1.85E-05			
Ra-226	2.4526E-13	40.094	80.187	0.00E+00	9.83E-12	1.97E-11			
Ra-228	2.4015E-10	40.094	80.187	0.00E+00	9.63E-09	1.93E-08			
Ru-106	3.0602E-06	40.094	80.187	0.00E+00	1.23E-04	2.45E-04			
Se-79	1.3015E-05	40.094	80.187	0.00E+00	5.22E-04	1.04E-03			
Sn-126	1.2165E-05	40.094	80.187	0.00E+00	4.88E-04	9.76E-04			
Sr-90	1.8226E+00	40.094	80.187	0.00E+00	7.31E+01	1.46E+02			
Tc-99	4.4241E-04	40.094	80.187	0.00E+00	1.77E-02	3.55E-02			
Th-229	3.0962E-10	40.094	80.187	0.00E+00	1.24E-08	2.48E-08			
Th-230	4.2346E-11	40.094	80.187	0.00E+00	1.70E-09	3.40E-09			
Th-232	2.5278E-10	40.094	80.187	0.00E+00	1.01E-08	2.03E-08			
Th-208	1.5820E-08	40.094	80.187	0.00E+00	6.34E-07	1.27E-06			
U-232	4.2647E-08	40.094	80.187	0.00E+00	1.71E-06	3.42E-06			
U-233	1.2211E-07	40.094	80.187	0.00E+00	4.90E-06	9.79E-06			
U-234	1.9955E-07	40.094	80.187	0.00E+00	8.00E-06	1.60E-05			
U-235	-2.6194E-06	40.094	0.000	1.26E-03	1.16E-03	1.26E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)	
U-236	1.2693E-05	40.094	80.187	0.00E+00	5.09E-04	1.02E-03	1.00E+00	2.01E+00	
U-238	-3.6331E-08	40.094	0.000	7.86E-04	7.85E-04	7.86E-04	Total	Total	
Y-90	1.8241E+00	40.094	80.187	0.00E+00	7.31E+01	1.46E+02			
Other Radionuclides					7.72E+01	1.54E+02			

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00000041	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	28.507	40.094	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		80.187	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.40	1.41	1.00
Bounding:	0.80		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (GERMANY) 1Fuel decay start date: 201C
 SNF ID #: 465 Estimates as of: 203C
 Fuel Units & Descr: 65 - ELEMENT Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=11.70kg ; EOL=11.57kg 2Template Burnup(MWd): 6.6E
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.0001E
Template Decay Time: 20 years:

Estimated
 Canister usage:
 18"x10"
 0.59

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.4556E-09	124.087	248.175	0.00E+00	3.05E-07	6.09E-07	Avg. MeV	
Am-241	3.8752E-03	124.087	248.175	0.00E+00	4.81E-01	9.62E-01	0.0150	2.547E+13
Am-242m	1.8617E-06	124.087	248.175	0.00E+00	2.31E-04	4.62E-04	0.0250	5.259E+12
Am-243	2.3293E-07	124.087	248.175	0.00E+00	2.89E-05	5.78E-05	0.0375	5.505E+12
C-14	4.3233E-05	124.087	248.175	0.00E+00	5.36E-03	1.07E-02	0.0575	5.088E+12
Cl-36	4.3023E-08	124.087	248.175	0.00E+00	5.34E-06	1.07E-05	0.0850	3.098E+12
Cm-243	1.9053E-07	124.087	248.175	0.00E+00	2.36E-05	4.73E-05	0.1250	3.477E+12
Cm-244	1.7744E-06	124.087	248.175	0.00E+00	2.20E-04	4.40E-04	0.2250	2.807E+12
Co-60	4.3188E-03	124.087	248.175	0.00E+00	5.36E-01	1.07E+00	0.3750	1.153E+12
Cs-134	6.7188E-04	124.087	248.175	0.00E+00	8.34E-02	1.67E-01	0.5750	1.838E+13
Cs-135	3.1549E-05	124.087	248.175	0.00E+00	3.91E-03	7.83E-03	0.8500	1.955E+12
Cs-137	1.9489E+00	124.087	248.175	0.00E+00	2.42E+02	4.84E+02	1.2500	2.106E+12
Eu-154	4.0301E-01	124.087	248.175	0.00E+00	5.00E+01	1.00E+02	1.7500	6.310E+10
Eu-155	5.4000E-02	124.087	248.175	0.00E+00	6.70E+00	1.34E+01	2.2500	1.000E+06
Fe-55	1.5955E-04	124.087	248.175	0.00E+00	1.98E-02	3.96E-02	2.7500	1.665E+05
H-3	4.6571E-03	124.087	248.175	0.00E+00	5.78E-01	1.16E+00	3.5000	1.156E+03
I-129	7.3805E-07	124.087	248.175	0.00E+00	9.16E-05	1.83E-04	5.0000	1.468E+02
Kr-85	9.5684E-02	124.087	248.175	0.00E+00	1.19E+01	2.37E+01	7.0000	1.658E+01
Np-237	1.4618E-06	124.087	248.175	0.00E+00	1.81E-04	3.63E-04	11.0000	1.887E+00
Pa-231	6.4782E-09	124.087	248.175	0.00E+00	8.04E-07	1.61E-06		
Pb-210	6.3158E-14	124.087	248.175	0.00E+00	7.84E-12	1.57E-11		
Pm-147	3.9564E-02	124.087	248.175	0.00E+00	4.91E+00	9.82E+00		
Pu-238	1.2008E-03	124.087	248.175	0.00E+00	1.49E-01	2.98E-01		
Pu-239	5.6917E-03	124.087	248.175	0.00E+00	7.06E-01	1.41E+00		
Pu-240	2.2617E-03	124.087	248.175	0.00E+00	2.81E-01	5.61E-01		
Pu-241	6.1113E-02	124.087	248.175	0.00E+00	7.58E+00	1.52E+01		
Pu-242	3.0602E-07	124.087	248.175	0.00E+00	3.80E-05	7.59E-05		
Ra-226	2.6707E-13	124.087	248.175	0.00E+00	3.31E-11	6.63E-11		
Ra-228	2.2556E-10	124.087	248.175	0.00E+00	2.80E-08	5.60E-08		
Ru-106	3.1293E-06	124.087	248.175	0.00E+00	3.88E-04	7.77E-04		
Se-79	1.2935E-05	124.087	248.175	0.00E+00	1.61E-03	3.21E-03		
Sn-126	1.2238E-05	124.087	248.175	0.00E+00	1.52E-03	3.04E-03		
Sr-90	1.8195E+00	124.087	248.175	0.00E+00	2.26E+02	4.52E+02		
Tc-99	4.4120E-04	124.087	248.175	0.00E+00	5.47E-02	1.09E-01		
Th-229	3.3308E-10	124.087	248.175	0.00E+00	4.13E-08	8.27E-08		
Th-230	4.6526E-11	124.087	248.175	0.00E+00	5.77E-09	1.15E-08		
Th-232	2.3744E-10	124.087	248.175	0.00E+00	2.95E-08	5.89E-08		
Tl-208	1.8195E-08	124.087	248.175	0.00E+00	2.26E-06	4.52E-06		
U-232	4.9098E-08	124.087	248.175	0.00E+00	6.09E-06	1.22E-05		
U-233	1.3140E-07	124.087	248.175	0.00E+00	1.63E-05	3.26E-05		
U-234	2.2571E-07	124.087	248.175	0.00E+00	2.80E-05	5.60E-05		
U-235	-2.6159E-06	124.087	0.000	4.99E-03	4.66E-03	4.99E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2719E-05	124.087	248.175	0.00E+00	1.58E-03	3.16E-03	3.22E+00	6.44E+00
U-238	-3.8857E-08	124.087	0.000	3.16E-03	3.15E-03	3.16E-03	Total	Total
Y-90	1.8211E+00	124.087	248.175	0.00E+00	2.26E+02	4.52E+02		
Other Radionuclides					2.60E+02	5.20E+02		

Thermal Power
 Nominal Heat Output (Watts) Bounding Heat Output (Watts)
 3.22E+00 6.44E+00
 Total Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.7222222	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	57.014	124.087	
Bounding:		248.175	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.29	2.18	
Bounding:	0.57		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (GERMANY) 1 Fuel decay start date: 2010
 SNF ID #: 474 Estimates as of: 2030
 Fuel Units & Descr: 70 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=13.65kg ; EOL=13.38kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.63

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.6436E-09	260.608	521.216	0.00E+00	6.89E-07	1.38E-06		
Am-241	3.1429E-03	260.608	521.216	0.00E+00	8.19E-01	1.64E+00	0.0150	5.223E+13
Am-242m	1.3195E-06	260.608	521.216	0.00E+00	3.44E-04	6.88E-04	0.0250	1.087E+13
Am-243	1.4753E-07	260.608	521.216	0.00E+00	3.84E-05	7.69E-05	0.0375	9.420E+12
C-14	1.2847E-04	260.608	521.216	0.00E+00	3.35E-02	6.70E-02	0.0575	1.013E+13
Ci-36	2.8120E-06	260.608	521.216	0.00E+00	7.33E-04	1.47E-03	0.0850	6.117E+12
Cm-243	1.2465E-07	260.608	521.216	0.00E+00	3.25E-05	6.50E-05	0.1250	3.998E+12
Cm-244	9.5564E-07	260.608	521.216	0.00E+00	2.49E-04	4.98E-04	0.2250	5.253E+12
Co-60	1.7880E-01	260.608	521.216	0.00E+00	4.66E+01	9.32E+01	0.3750	2.302E+12
Cs-134	5.8692E-04	260.608	521.216	0.00E+00	1.53E-01	3.06E-01	0.5750	3.786E+13
Cs-135	3.2195E-05	260.608	521.216	0.00E+00	8.39E-03	1.68E-02	0.8500	4.268E+11
Cs-137	1.9489E+00	260.608	521.216	0.00E+00	5.08E+02	1.02E+03	1.2500	7.072E+12
Eu-154	4.5895E-03	260.608	521.216	0.00E+00	1.20E+00	2.39E+00	1.7500	1.097E+10
Eu-155	3.6045E-03	260.608	521.216	0.00E+00	9.39E-01	1.88E+00	2.2500	3.777E+07
Fe-55	1.4185E-02	260.608	521.216	0.00E+00	3.70E+00	7.39E+00	2.7500	4.161E+05
H-3	4.7895E-03	260.608	521.216	0.00E+00	1.25E+00	2.50E+00	3.5000	2.321E+03
I-129	7.3684E-07	260.608	521.216	0.00E+00	1.92E-04	3.84E-04	5.0000	2.792E+02
Kr-85	9.5820E-02	260.608	521.216	0.00E+00	2.50E+01	4.99E+01	7.0000	3.155E+01
Np-237	1.2552E-06	260.608	521.216	0.00E+00	3.27E-04	6.54E-04	11.0000	3.591E+00
Pa-231	7.0406E-09	260.608	521.216	0.00E+00	1.83E-06	3.67E-06		
Pb-210	5.8000E-14	260.608	521.216	0.00E+00	1.51E-11	3.02E-11		
Pm-147	4.0075E-02	260.608	521.216	0.00E+00	1.04E+01	2.09E+01		
Pu-238	9.2256E-04	260.608	521.216	0.00E+00	2.40E-01	4.81E-01		
Pu-239	5.5278E-03	260.608	521.216	0.00E+00	1.44E+00	2.88E+00		
Pu-240	2.1248E-03	260.608	521.216	0.00E+00	5.54E-01	1.11E+00		
Pu-241	4.9549E-02	260.608	521.216	0.00E+00	1.29E+01	2.58E+01		
Pu-242	2.3128E-07	260.608	521.216	0.00E+00	6.03E-05	1.21E-04		
Ra-226	2.4526E-13	260.608	521.216	0.00E+00	6.39E-11	1.28E-10		
Ra-228	2.4015E-10	260.608	521.216	0.00E+00	6.26E-08	1.25E-07		
Ru-106	3.0602E-06	260.608	521.216	0.00E+00	7.97E-04	1.59E-03		
Se-79	1.3015E-05	260.608	521.216	0.00E+00	3.39E-03	6.78E-03		
Sn-126	1.2165E-05	260.608	521.216	0.00E+00	3.17E-03	6.34E-03		
Sr-90	1.8226E+00	260.608	521.216	0.00E+00	4.75E+02	9.50E+02		
Tc-99	4.4241E-04	260.608	521.216	0.00E+00	1.15E-01	2.31E-01		
Th-229	3.0962E-10	260.608	521.216	0.00E+00	8.07E-08	1.61E-07		
Th-230	4.2346E-11	260.608	521.216	0.00E+00	1.10E-08	2.21E-08		
Th-232	2.5278E-10	260.608	521.216	0.00E+00	6.59E-08	1.32E-07		
Th-208	1.5820E-08	260.608	521.216	0.00E+00	4.12E-06	8.25E-06		
U-232	4.2647E-08	260.608	521.216	0.00E+00	1.11E-05	2.22E-05		
U-233	1.2211E-07	260.608	521.216	0.00E+00	3.18E-05	6.36E-05		
U-234	1.9955E-07	260.608	521.216	0.00E+00	5.20E-05	1.04E-04		
U-235	-2.6194E-06	260.608	0.000	5.90E-03	5.22E-03	5.90E-03		
U-236	1.2693E-05	260.608	521.216	0.00E+00	3.31E-03	6.62E-03		
U-238	-3.6331E-08	260.608	0.000	3.67E-03	3.66E-03	3.67E-03		
Y-90	1.8241E+00	260.608	521.216	0.00E+00	4.75E+02	9.51E+02		
Other Radionuclides					5.02E+02	1.00E+03		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00000041	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	133.033	260.608	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		521.216	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.56	1.96	1.00
Bounding:	1.12		

¹ Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (HANFORD)
 SNF ID #: 876
 Fuel Units & Descr: 59 - ELEMENT
 Heavy Metal Mass: BOL=10.92kg ; EOL=10.84kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1973
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.66
 Template BOL Heavy Metal Mass (MT): 0.00016
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.53

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Avg. MeV	
Ac-227	8.6842E-09	73.212	146.423	0.00E+00	6.36E-07	1.27E-06		
Am-241	4.9459E-03	73.212	146.423	0.00E+00	3.62E-01	7.24E-01	0.0150	7.180E+12
Am-242m	1.6241E-06	73.212	146.423	0.00E+00	1.19E-04	2.38E-04	0.0250	1.489E+12
Am-243	2.3233E-07	73.212	146.423	0.00E+00	1.70E-05	3.40E-05	0.0375	1.343E+12
C-14	4.3083E-05	73.212	146.423	0.00E+00	3.15E-03	6.31E-03	0.0575	1.406E+12
Cl-36	4.3023E-08	73.212	146.423	0.00E+00	3.15E-06	6.30E-06	0.0850	8.386E+11
Cm-243	9.1880E-08	73.212	146.423	0.00E+00	6.73E-06	1.35E-05	0.1250	6.223E+11
Cm-244	5.6346E-07	73.212	146.423	0.00E+00	4.13E-05	8.25E-05	0.2250	7.360E+11
Co-60	8.3699E-05	73.212	146.423	0.00E+00	6.13E-03	1.23E-02	0.3750	3.175E+11
Cs-134	2.8211E-08	73.212	146.423	0.00E+00	2.07E-06	4.13E-06	0.5750	5.331E+12
Cs-135	3.1549E-05	73.212	146.423	0.00E+00	2.31E-03	4.62E-03	0.8500	1.452E+11
Cs-137	9.7519E-01	73.212	146.423	0.00E+00	7.14E+01	1.43E+02	1.2500	1.227E+11
Eu-154	3.5970E-02	73.212	146.423	0.00E+00	2.63E+00	5.27E+00	1.7500	4.401E+09
Eu-155	8.1774E-04	73.212	146.423	0.00E+00	5.99E-02	1.20E-01	2.2500	1.493E+05
Fe-55	5.3940E-08	73.212	146.423	0.00E+00	3.95E-06	7.90E-06	2.7500	7.051E+04
H-3	8.6571E-04	73.212	146.423	0.00E+00	6.34E-02	1.27E-01	3.5000	2.081E+02
I-129	7.3805E-07	73.212	146.423	0.00E+00	5.40E-05	1.08E-04	5.0000	8.767E+01
Kr-85	1.3771E-02	73.212	146.423	0.00E+00	1.01E+00	2.02E+00	7.0000	9.896E+00
Np-237	1.5218E-06	73.212	146.423	0.00E+00	1.11E-04	2.23E-04	11.0000	1.125E+00
Pa-231	1.4152E-08	73.212	146.423	0.00E+00	1.04E-06	2.07E-06		
Pb-210	7.9774E-13	73.212	146.423	0.00E+00	5.84E-11	1.17E-10		
Pm-147	1.4362E-05	73.212	146.423	0.00E+00	1.05E-03	2.10E-03		
Pu-238	9.4782E-04	73.212	146.423	0.00E+00	6.94E-02	1.39E-01		
Pu-239	5.6872E-03	73.212	146.423	0.00E+00	4.16E-01	8.33E-01		
Pu-240	2.2541E-03	73.212	146.423	0.00E+00	1.65E-01	3.30E-01		
Pu-241	1.4433E-02	73.212	146.423	0.00E+00	1.06E+00	2.11E+00		
Pu-242	3.0602E-07	73.212	146.423	0.00E+00	2.24E-05	4.48E-05		
Ra-226	1.8857E-12	73.212	146.423	0.00E+00	1.38E-10	2.76E-10		
Ra-228	2.3729E-10	73.212	146.423	0.00E+00	1.74E-08	3.47E-08		
Ru-106	3.4857E-15	73.212	146.423	0.00E+00	2.55E-13	5.10E-13		
Se-79	1.2931E-05	73.212	146.423	0.00E+00	9.47E-04	1.89E-03		
Sn-126	1.2235E-05	73.212	146.423	0.00E+00	8.96E-04	1.79E-03		
Sr-90	8.9173E-01	73.212	146.423	0.00E+00	6.53E+01	1.31E+02		
Tc-99	4.4120E-04	73.212	146.423	0.00E+00	3.23E-02	6.46E-02		
Th-229	8.2752E-10	73.212	146.423	0.00E+00	6.06E-08	1.21E-07		
Th-230	1.4908E-10	73.212	146.423	0.00E+00	1.09E-08	2.18E-08		
Th-232	2.3744E-10	73.212	146.423	0.00E+00	1.74E-08	3.48E-08		
Tl-208	1.3668E-08	73.212	146.423	0.00E+00	1.00E-06	2.00E-06		
U-232	3.6797E-08	73.212	146.423	0.00E+00	2.69E-06	5.39E-06		
U-233	1.3164E-07	73.212	146.423	0.00E+00	9.64E-06	1.93E-05		
U-234	3.3865E-07	73.212	146.423	0.00E+00	2.48E-05	4.96E-05		
U-235	-2.6144E-06	73.212	0.000	4.72E-03	4.53E-03	4.72E-03		
U-236	1.2722E-05	73.212	146.423	0.00E+00	9.31E-04	1.86E-03		
U-238	-3.8857E-08	73.212	0.000	2.93E-03	2.93E-03	2.93E-03	8.42E-01	1.68E+00
Y-90	8.9203E-01	73.212	146.423	0.00E+00	6.53E+01	1.31E+02	Total	Total
Other Radionuclides					8.17E+01	1.63E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.42E-01	1.68E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	53.189	73.212	
Bounding:		146.423	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.18	1.38	
Bounding:	0.36		

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (HANNOVER)
 SNF ID #: 303
 Fuel Units & Descr: 71 - ELEMENT
 Heavy Metal Mass: BOL=13.56kg ; EOL=13.42kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1996
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.64

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.8271E-09	135.542	271.083	0.00E+00	5.19E-07	1.04E-06	Avg. MeV	
Am-241	4.4195E-03	135.542	271.083	0.00E+00	5.99E-01	1.20E+00	0.0150	2.450E+13
Am-242m	1.8195E-06	135.542	271.083	0.00E+00	2.47E-04	4.93E-04	0.0250	5.061E+12
Am-243	2.3278E-07	135.542	271.083	0.00E+00	3.16E-05	6.31E-05	0.0375	5.069E+12
C-14	4.3203E-05	135.542	271.083	0.00E+00	5.86E-03	1.17E-02	0.0575	4.861E+12
Cl-36	4.3023E-08	135.542	271.083	0.00E+00	5.83E-06	1.17E-05	0.0850	2.924E+12
Cm-243	1.6872E-07	135.542	271.083	0.00E+00	2.29E-05	4.57E-05	0.1250	2.972E+12
Cm-244	1.4660E-06	135.542	271.083	0.00E+00	1.99E-04	3.97E-04	0.2250	2.645E+12
Co-60	2.2376E-03	135.542	271.083	0.00E+00	3.03E-01	6.07E-01	0.3750	1.100E+12
Cs-134	1.2525E-04	135.542	271.083	0.00E+00	1.70E-02	3.40E-02	0.5750	1.779E+13
Cs-135	3.1549E-05	135.542	271.083	0.00E+00	4.28E-03	8.55E-03	0.8500	1.469E+12
Cs-137	1.7368E+00	135.542	271.083	0.00E+00	2.35E+02	4.71E+02	1.2500	1.541E+12
Eu-154	2.6947E-01	135.542	271.083	0.00E+00	3.65E+01	7.30E+01	1.7500	4.718E+10
Eu-155	2.6857E-02	135.542	271.083	0.00E+00	3.64E+00	7.28E+00	2.2500	7.240E+05
Fe-55	4.2105E-05	135.542	271.083	0.00E+00	5.71E-03	1.14E-02	2.7500	1.667E+05
H-3	3.5173E-03	135.542	271.083	0.00E+00	4.77E-01	9.53E-01	3.5000	4.090E+02
I-129	7.3805E-07	135.542	271.083	0.00E+00	1.00E-04	2.00E-04	5.0000	1.603E+02
Kr-85	6.9263E-02	135.542	271.083	0.00E+00	9.39E+00	1.88E+01	7.0000	1.810E+01
Np-237	1.4752E-06	135.542	271.083	0.00E+00	2.00E-04	4.00E-04	11.0000	2.059E+00
Pa-231	8.3970E-09	135.542	271.083	0.00E+00	1.14E-06	2.28E-06		
Pb-210	1.4995E-13	135.542	271.083	0.00E+00	2.03E-11	4.07E-11		
Pm-147	1.0567E-02	135.542	271.083	0.00E+00	1.43E+00	2.86E+00		
Pu-238	1.1543E-03	135.542	271.083	0.00E+00	1.56E-01	3.13E-01		
Pu-239	5.6917E-03	135.542	271.083	0.00E+00	7.71E-01	1.54E+00		
Pu-240	2.2602E-03	135.542	271.083	0.00E+00	3.06E-01	6.13E-01		
Pu-241	4.8045E-02	135.542	271.083	0.00E+00	6.51E+00	1.30E+01		
Pu-242	3.0602E-07	135.542	271.083	0.00E+00	4.15E-05	8.30E-05		
Ra-226	5.1293E-13	135.542	271.083	0.00E+00	6.95E-11	1.39E-10		
Ra-228	2.3323E-10	135.542	271.083	0.00E+00	3.16E-08	6.32E-08		
Ru-106	1.0075E-07	135.542	271.083	0.00E+00	1.37E-05	2.73E-05		
Se-79	1.2935E-05	135.542	271.083	0.00E+00	1.75E-03	3.51E-03		
Sn-126	1.2238E-05	135.542	271.083	0.00E+00	1.66E-03	3.32E-03		
Sr-90	1.6165E+00	135.542	271.083	0.00E+00	2.19E+02	4.38E+02		
Tc-99	4.4120E-04	135.542	271.083	0.00E+00	5.98E-02	1.20E-01		
Th-229	4.5684E-10	135.542	271.083	0.00E+00	6.19E-08	1.24E-07		
Th-230	6.8271E-11	135.542	271.083	0.00E+00	9.25E-09	1.85E-08		
Th-232	2.3744E-10	135.542	271.083	0.00E+00	3.22E-08	6.44E-08		
Ti-208	1.7368E-08	135.542	271.083	0.00E+00	2.35E-06	4.71E-06		
U-232	4.6797E-08	135.542	271.083	0.00E+00	6.34E-06	1.27E-05		
U-233	1.3146E-07	135.542	271.083	0.00E+00	1.78E-05	3.56E-05		
U-234	2.5729E-07	135.542	271.083	0.00E+00	3.49E-05	6.97E-05		
U-235	2.6159E-06	135.542	0.000	5.86E-03	5.51E-03	5.86E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2719E-05	135.542	271.083	0.00E+00	1.72E-03	3.45E-03	3.02E+00	6.04E+00
U-238	-3.8857E-08	135.542	0.000	3.65E-03	3.64E-03	3.65E-03	Total	Total
Y-90	1.6165E+00	135.542	271.083	0.00E+00	2.19E+02	4.38E+02		
Other Radionuclides					2.55E+02	5.10E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00391594	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	132.166	135.542	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		271.083	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.27	1.03	1.00
Bounding:	0.54		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (HANNOVER) 1 Fuel decay start date: 1999
 SNF ID #: 473 Estimates as of: 2030
 Fuel Units & Descr: 5 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=.97kg ; EOL=.95kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.05

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	4.1459E-09	21.479	42.957	0.00E+00	8.90E-08	1.78E-07		
Am-241	3.5850E-03	21.479	42.957	0.00E+00	7.70E-02	1.54E-01	0.0150	3.813E+12
Am-242m	1.2899E-06	21.479	42.957	0.00E+00	2.77E-05	5.54E-05	0.0250	7.927E+11
Am-243	1.4747E-07	21.479	42.957	0.00E+00	3.17E-06	6.34E-06	0.0375	6.878E+11
C-14	1.2839E-04	21.479	42.957	0.00E+00	2.76E-03	5.52E-03	0.0575	7.406E+11
Cl-36	2.8120E-06	21.479	42.957	0.00E+00	6.04E-05	1.21E-04	0.0850	4.464E+11
Cm-243	1.1038E-07	21.479	42.957	0.00E+00	2.37E-06	4.74E-06	0.1250	2.913E+11
Cm-244	7.8917E-07	21.479	42.957	0.00E+00	1.70E-05	3.39E-05	0.2250	3.840E+11
Co-60	9.2647E-02	21.479	42.957	0.00E+00	1.99E+00	3.98E+00	0.3750	1.677E+12
Cs-134	1.0940E-04	21.479	42.957	0.00E+00	2.35E-03	4.70E-03	0.5750	2.780E+12
Cs-135	3.2195E-05	21.479	42.957	0.00E+00	6.92E-04	1.38E-03	0.8500	2.984E+10
Cs-137	1.7368E+00	21.479	42.957	0.00E+00	3.73E+01	7.46E+01	1.2500	3.064E+11
Eu-154	3.0677E-03	21.479	42.957	0.00E+00	6.59E-02	1.32E-01	1.7500	7.770E+08
Eu-155	1.7925E-03	21.479	42.957	0.00E+00	3.85E-02	7.70E-02	2.2500	1.638E+06
Fe-55	3.7444E-03	21.479	42.957	0.00E+00	8.04E-02	1.61E-01	2.7500	2.770E+04
H-3	3.6180E-03	21.479	42.957	0.00E+00	7.77E-02	1.55E-01	3.5000	5.871E+01
I-129	7.3684E-07	21.479	42.957	0.00E+00	1.58E-05	3.17E-05	5.0000	2.288E+01
Kr-85	6.9368E-02	21.479	42.957	0.00E+00	1.49E+00	2.98E+00	7.0000	2.584E+00
Np-237	1.2662E-06	21.479	42.957	0.00E+00	2.72E-05	5.44E-05	11.0000	2.939E-01
Pa-231	9.1654E-09	21.479	42.957	0.00E+00	1.97E-07	3.94E-07		
Pb-210	1.3728E-13	21.479	42.957	0.00E+00	2.95E-12	5.90E-12		
Pm-147	1.0702E-02	21.479	42.957	0.00E+00	2.30E-01	4.60E-01		
Pu-238	8.8692E-04	21.479	42.957	0.00E+00	1.90E-02	3.81E-02		
Pu-239	5.5263E-03	21.479	42.957	0.00E+00	1.19E-01	2.37E-01		
Pu-240	2.1233E-03	21.479	42.957	0.00E+00	4.56E-02	9.12E-02		
Pu-241	3.8962E-02	21.479	42.957	0.00E+00	8.37E-01	1.67E+00		
Pu-242	2.3128E-07	21.479	42.957	0.00E+00	4.97E-06	9.94E-06		
Ra-226	4.6752E-13	21.479	42.957	0.00E+00	1.00E-11	2.01E-11		
Ra-228	2.4827E-10	21.479	42.957	0.00E+00	5.33E-09	1.07E-08		
Ru-106	9.8526E-08	21.479	42.957	0.00E+00	2.12E-06	4.23E-06		
Se-79	1.3015E-05	21.479	42.957	0.00E+00	2.80E-04	5.59E-04		
Sn-126	1.2165E-05	21.479	42.957	0.00E+00	2.61E-04	5.23E-04		
Sr-90	1.6195E+00	21.479	42.957	0.00E+00	3.48E+01	6.96E+01		
Tc-99	4.4241E-04	21.479	42.957	0.00E+00	9.50E-03	1.90E-02		
Th-229	4.2451E-10	21.479	42.957	0.00E+00	9.12E-09	1.82E-08		
Th-230	6.1398E-11	21.479	42.957	0.00E+00	1.32E-09	2.64E-09		
Th-232	2.5278E-10	21.479	42.957	0.00E+00	5.43E-09	1.09E-08		
Ti-208	1.5098E-08	21.479	42.957	0.00E+00	3.24E-07	6.49E-07		
U-232	4.0662E-08	21.479	42.957	0.00E+00	8.73E-07	1.75E-06		
U-233	1.2217E-07	21.479	42.957	0.00E+00	2.62E-06	5.25E-06		
U-234	2.2391E-07	21.479	42.957	0.00E+00	4.81E-06	9.62E-06		
U-235	-2.6194E-06	21.479	0.000	4.16E-04	3.60E-04	4.16E-04	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2695E-05	21.479	42.957	0.00E+00	2.73E-04	5.45E-04	4.56E-01	9.12E-01
U-238	-3.6331E-08	21.479	0.000	2.62E-04	2.61E-04	2.62E-04	Total	Total
Y-90	1.6195E+00	21.479	42.957	0.00E+00	3.48E+01	6.96E+01		
Other Radionuclides					3.70E+01	7.39E+01		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.81481481	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	2.368	21.479	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		42.957	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.65	9.07	1.00
Bounding:	1.30		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (HEIDELBERG)
 SNF ID #: 464
 Fuel Units & Descr: 65 - ELEMENT
 Heavy Metal Mass: BOL=11.65kg ; EOL=11.40kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18" x 10"
 0.59

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.4556E-09	283.804	567.607	0.00E+00	6.97E-07	1.39E-06	Avg. MeV	
Am-241	3.8752E-03	283.804	567.607	0.00E+00	1.10E+00	2.20E+00	0.0150	5.825E+13
Am-242m	1.8617E-06	283.804	567.607	0.00E+00	5.28E-04	1.06E-03	0.0250	1.203E+13
Am-243	2.3293E-07	283.804	567.607	0.00E+00	6.61E-05	1.32E-04	0.0375	1.259E+13
C-14	4.3233E-05	283.804	567.607	0.00E+00	1.23E-02	2.45E-02	0.0575	1.164E+13
Cl-36	4.3023E-08	283.804	567.607	0.00E+00	1.22E-05	2.44E-05	0.0850	7.085E+12
Cm-243	1.9053E-07	283.804	567.607	0.00E+00	5.41E-05	1.08E-04	0.1250	7.953E+12
Cm-244	1.7744E-06	283.804	567.607	0.00E+00	5.04E-04	1.01E-03	0.2250	6.420E+12
Co-60	4.3188E-03	283.804	567.607	0.00E+00	1.23E+00	2.45E+00	0.3750	2.638E+12
Cs-134	6.7188E-04	283.804	567.607	0.00E+00	1.91E-01	3.81E-01	0.5750	4.203E+13
Cs-135	3.1549E-05	283.804	567.607	0.00E+00	8.95E-03	1.79E-02	0.8500	4.471E+12
Cs-137	1.9489E+00	283.804	567.607	0.00E+00	5.53E+02	1.11E+03	1.2500	4.817E+12
Eu-154	4.0301E-01	283.804	567.607	0.00E+00	1.14E+02	2.29E+02	1.7500	1.443E+11
Eu-155	5.4000E-02	283.804	567.607	0.00E+00	1.53E+01	3.07E+01	2.2500	2.288E+06
Fe-55	1.5955E-04	283.804	567.607	0.00E+00	4.53E-02	9.06E-02	2.7500	3.807E+05
H-3	4.6571E-03	283.804	567.607	0.00E+00	1.32E+00	2.64E+00	3.5000	2.622E+03
I-129	7.3805E-07	283.804	567.607	0.00E+00	2.09E-04	4.19E-04	5.0000	3.262E+02
Kr-85	9.5684E-02	283.804	567.607	0.00E+00	2.72E+01	5.43E+01	7.0000	3.684E+01
Np-237	1.4618E-06	283.804	567.607	0.00E+00	4.15E-04	8.30E-04	11.0000	4.190E+00
Pa-231	6.4782E-09	283.804	567.607	0.00E+00	1.84E-06	3.68E-06		
Pb-210	6.3158E-14	283.804	567.607	0.00E+00	1.79E-11	3.58E-11		
Pm-147	3.9564E-02	283.804	567.607	0.00E+00	1.12E+01	2.25E+01		
Pu-238	1.2008E-03	283.804	567.607	0.00E+00	3.41E-01	6.82E-01		
Pu-239	5.6917E-03	283.804	567.607	0.00E+00	1.82E+00	3.23E+00		
Pu-240	2.2617E-03	283.804	567.607	0.00E+00	6.42E-01	1.28E+00		
Pu-241	6.1113E-02	283.804	567.607	0.00E+00	1.73E+01	3.47E+01		
Pu-242	3.0602E-07	283.804	567.607	0.00E+00	8.68E-05	1.74E-04		
Ra-226	2.6707E-13	283.804	567.607	0.00E+00	7.58E-11	1.52E-10		
Ra-228	2.2556E-10	283.804	567.607	0.00E+00	6.40E-08	1.28E-07		
Ru-106	3.1293E-06	283.804	567.607	0.00E+00	8.88E-04	1.78E-03		
Se-79	1.2935E-05	283.804	567.607	0.00E+00	3.67E-03	7.34E-03		
Sn-126	1.2238E-05	283.804	567.607	0.00E+00	3.47E-03	6.95E-03		
Sr-90	1.8195E+00	283.804	567.607	0.00E+00	5.16E+02	1.03E+03		
Tc-99	4.4120E-04	283.804	567.607	0.00E+00	1.25E-01	2.50E-01		
Th-229	3.3308E-10	283.804	567.607	0.00E+00	9.45E-08	1.89E-07		
Th-230	4.6526E-11	283.804	567.607	0.00E+00	1.32E-08	2.64E-08		
Th-232	2.3744E-10	283.804	567.607	0.00E+00	6.74E-08	1.35E-07		
Th-208	1.8195E-08	283.804	567.607	0.00E+00	5.16E-06	1.03E-05		
U-232	4.9098E-08	283.804	567.607	0.00E+00	1.39E-05	2.79E-05		
U-233	1.3140E-07	283.804	567.607	0.00E+00	3.73E-05	7.46E-05		
U-234	2.2571E-07	283.804	567.607	0.00E+00	6.41E-05	1.28E-04		
U-235	-2.6159E-06	283.804	0.000	5.06E-03	4.31E-03	5.06E-03		
U-236	1.2719E-05	283.804	567.607	0.00E+00	3.61E-03	7.22E-03		
U-238	-3.8857E-08	283.804	0.000	3.13E-03	3.12E-03	3.13E-03		
Y-90	1.8211E+00	283.804	567.607	0.00E+00	5.17E+02	1.03E+03		
Other Radionuclides					5.94E+02	1.19E+03		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.08410778	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	283.804	235.766	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		567.607	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.66	0.83	
Bounding:	1.32		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (HEIDELBERG) ¹Fuel decay start date: 2006
 SNF ID #: 1044 Estimates as of: 2030
 Fuel Units & Descr: 56 - ELEMENT Template: TRIGA-SS (LW/U-Zr x, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=10.71kg ; EOL=10.56kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00019E
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.50

Radionuclide	II. Estimates		Gamma Sources					
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	2.6436E-09	208.814	417.628	0.00E+00	5.52E-07	1.10E-06	0.0150	4.185E+13
Am-241	3.1429E-03	208.814	417.628	0.00E+00	6.56E-01	1.31E+00	0.0250	8.712E+12
Am-242m	1.3195E-06	208.814	417.628	0.00E+00	2.76E-04	5.51E-04	0.0375	7.548E+12
Am-243	1.4753E-07	208.814	417.628	0.00E+00	3.08E-05	6.16E-05	0.0575	8.119E+12
C-14	1.2847E-04	208.814	417.628	0.00E+00	2.68E-02	5.37E-02	0.0850	4.902E+12
Cl-36	2.8120E-06	208.814	417.628	0.00E+00	5.87E-04	1.17E-03	0.1250	3.203E+12
Co-243	1.2465E-07	208.814	417.628	0.00E+00	2.60E-05	5.21E-05	0.2250	4.209E+12
Co-244	9.5564E-07	208.814	417.628	0.00E+00	2.00E-04	3.99E-04	0.3750	1.845E+12
Co-60	1.7880E-01	208.814	417.628	0.00E+00	3.73E+01	7.47E+01	0.5750	3.034E+13
Cs-134	5.8692E-04	208.814	417.628	0.00E+00	1.23E-01	2.45E-01	0.8500	3.419E+11
Cs-135	3.2195E-05	208.814	417.628	0.00E+00	6.72E-03	1.34E-02	1.2500	5.667E+12
Cs-137	1.9489E+00	208.814	417.628	0.00E+00	4.07E+02	8.14E+02	1.7500	8.788E+09
Eu-154	4.5895E-03	208.814	417.628	0.00E+00	9.58E-01	1.92E+00	2.2500	3.026E+07
Eu-155	3.6045E-03	208.814	417.628	0.00E+00	7.53E-01	1.51E+00	2.7500	3.334E+05
Fe-55	1.4185E-02	208.814	417.628	0.00E+00	2.96E+00	5.92E+00	3.5000	1.859E+03
H-3	4.7895E-03	208.814	417.628	0.00E+00	1.00E+00	2.00E+00	5.0000	2.236E+02
I-129	7.3684E-07	208.814	417.628	0.00E+00	1.54E-04	3.08E-04	7.0000	2.527E+01
Kr-85	9.5820E-02	208.814	417.628	0.00E+00	2.00E+01	4.00E+01	11.0000	2.876E+00
Np-237	1.2552E-06	208.814	417.628	0.00E+00	2.62E-04	5.24E-04		
Pa-231	7.0406E-09	208.814	417.628	0.00E+00	1.47E-06	2.94E-06		
Pb-210	5.8000E-14	208.814	417.628	0.00E+00	1.21E-11	2.42E-11		
Pm-147	4.0075E-02	208.814	417.628	0.00E+00	8.37E+00	1.67E+01		
Pu-238	9.2256E-04	208.814	417.628	0.00E+00	1.93E-01	3.85E-01		
Pu-239	5.5278E-03	208.814	417.628	0.00E+00	1.15E+00	2.31E+00		
Pu-240	2.1248E-03	208.814	417.628	0.00E+00	4.44E-01	8.87E-01		
Pu-241	4.9549E-02	208.814	417.628	0.00E+00	1.03E+01	2.07E+01		
Pu-242	2.3128E-07	208.814	417.628	0.00E+00	4.83E-05	9.66E-05		
Ra-226	2.4526E-13	208.814	417.628	0.00E+00	5.12E-11	1.02E-10		
Ra-228	2.4015E-10	208.814	417.628	0.00E+00	5.01E-08	1.00E-07		
Ru-106	3.0602E-06	208.814	417.628	0.00E+00	6.39E-04	1.28E-03		
Se-79	1.3015E-05	208.814	417.628	0.00E+00	2.72E-03	5.44E-03		
Sn-126	1.2165E-05	208.814	417.628	0.00E+00	2.54E-03	5.08E-03		
Sr-90	1.8226E+00	208.814	417.628	0.00E+00	3.81E+02	7.61E+02		
Tc-99	4.4241E-04	208.814	417.628	0.00E+00	9.24E-02	1.85E-01		
Th-229	3.0962E-10	208.814	417.628	0.00E+00	6.47E-08	1.29E-07		
Th-230	4.2346E-11	208.814	417.628	0.00E+00	8.84E-09	1.77E-08		
Th-232	2.5278E-10	208.814	417.628	0.00E+00	5.28E-08	1.06E-07		
Tl-208	1.5820E-08	208.814	417.628	0.00E+00	3.30E-06	6.61E-06		
U-232	4.2647E-08	208.814	417.628	0.00E+00	8.91E-06	1.78E-05		
U-233	1.2211E-07	208.814	417.628	0.00E+00	2.55E-05	5.10E-05		
U-234	1.9955E-07	208.814	417.628	0.00E+00	4.17E-05	8.33E-05		
U-235	-2.6194E-06	208.814	0.000	4.57E-03	4.02E-03	4.57E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	208.814	417.628	0.00E+00	2.65E-03	5.30E-03	5.22E+00	1.04E+01
U-238	-3.6331E-08	208.814	0.000	2.89E-03	2.88E-03	2.89E-03	Total	Total
Y-90	1.8241E+00	208.814	417.628	0.00E+00	3.81E+02	7.62E+02		
Other Radionuclides					4.02E+02	8.04E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.72849245	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	208.814	149.682	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:		417.628	

Checks			
	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.57	0.72	0.99
Bounding:	1.14		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (IFE) (ENGLAND)
 SNF ID #: 1043
 Fuel Units & Descr: 2 - ELEMENT
 Heavy Metal Mass: BOL= .38kg ; EOL= .37kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.02

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.6436E-09	10.634	21.267	0.00E+00	2.81E-08	5.62E-08	Avg. MeV	
Am-241	3.1429E-03	10.634	21.267	0.00E+00	3.34E-02	6.68E-02	0.0150	2.131E+12
Am-242m	1.3195E-06	10.634	21.267	0.00E+00	1.40E-05	2.81E-05	0.0250	4.437E+11
Am-243	1.4753E-07	10.634	21.267	0.00E+00	1.57E-06	3.14E-06	0.0375	3.844E+11
C-14	1.2847E-04	10.634	21.267	0.00E+00	1.37E-03	2.73E-03	0.0575	4.135E+11
Cf-36	2.8120E-06	10.634	21.267	0.00E+00	2.99E-05	5.98E-05	0.0850	2.496E+11
Cm-243	1.2465E-07	10.634	21.267	0.00E+00	1.33E-06	2.65E-06	0.1250	1.631E+11
Cm-244	9.5564E-07	10.634	21.267	0.00E+00	1.02E-05	2.03E-05	0.2250	2.143E+11
Co-60	1.7880E-01	10.634	21.267	0.00E+00	1.90E+00	3.80E+00	0.3750	9.393E+10
Cs-134	5.8692E-04	10.634	21.267	0.00E+00	6.24E-03	1.25E-02	0.5750	1.545E+12
Cs-135	3.2195E-05	10.634	21.267	0.00E+00	3.42E-04	6.85E-04	0.8500	1.741E+10
Cs-137	1.9489E+00	10.634	21.267	0.00E+00	2.07E+01	4.14E+01	1.2500	2.886E+11
Eu-154	4.5895E-03	10.634	21.267	0.00E+00	4.88E-02	9.76E-02	1.7500	4.475E+08
Eu-155	3.6045E-03	10.634	21.267	0.00E+00	3.83E-02	7.67E-02	2.2500	1.541E+06
Fe-55	1.4185E-02	10.634	21.267	0.00E+00	1.51E-01	3.02E-01	2.7500	1.698E+04
H-3	4.7895E-03	10.634	21.267	0.00E+00	5.09E-02	1.02E-01	3.5000	9.445E+01
I-129	7.3684E-07	10.634	21.267	0.00E+00	7.84E-06	1.57E-05	5.0000	1.128E+01
Kr-85	9.5820E-02	10.634	21.267	0.00E+00	1.02E+00	2.04E+00	7.0000	1.274E+00
Np-237	1.2552E-06	10.634	21.267	0.00E+00	1.33E-05	2.67E-05	11.0000	1.450E-01
Pa-231	7.0406E-09	10.634	21.267	0.00E+00	7.49E-08	1.50E-07		
Pb-210	5.8000E-14	10.634	21.267	0.00E+00	6.17E-13	1.23E-12		
Pm-147	4.0075E-02	10.634	21.267	0.00E+00	4.26E-01	8.52E-01		
Pu-238	9.2256E-04	10.634	21.267	0.00E+00	9.81E-03	1.96E-02		
Pu-239	5.5278E-03	10.634	21.267	0.00E+00	5.88E-02	1.18E-01		
Pu-240	2.1248E-03	10.634	21.267	0.00E+00	2.26E-02	4.52E-02		
Pu-241	4.9549E-02	10.634	21.267	0.00E+00	5.27E-01	1.05E+00		
Pu-242	2.3128E-07	10.634	21.267	0.00E+00	2.46E-06	4.92E-06		
Ra-226	2.4526E-13	10.634	21.267	0.00E+00	2.61E-12	5.22E-12		
Ra-228	2.4015E-10	10.634	21.267	0.00E+00	2.55E-09	5.11E-09		
Ru-106	3.0602E-06	10.634	21.267	0.00E+00	3.25E-05	6.51E-05		
Sa-79	1.3015E-05	10.634	21.267	0.00E+00	1.38E-04	2.77E-04		
Sn-126	1.2165E-05	10.634	21.267	0.00E+00	1.29E-04	2.59E-04		
Sr-90	1.8226E+00	10.634	21.267	0.00E+00	1.94E+01	3.88E+01		
Tc-99	4.4241E-04	10.634	21.267	0.00E+00	4.70E-03	9.41E-03		
Th-229	3.0962E-10	10.634	21.267	0.00E+00	3.29E-09	6.58E-09		
Th-230	4.2346E-11	10.634	21.267	0.00E+00	4.50E-10	9.01E-10		
Th-232	2.5278E-10	10.634	21.267	0.00E+00	2.69E-09	5.38E-09		
Ti-208	1.5820E-08	10.634	21.267	0.00E+00	1.68E-07	3.36E-07		
U-232	4.2647E-08	10.634	21.267	0.00E+00	4.53E-07	9.07E-07		
U-233	1.2211E-07	10.634	21.267	0.00E+00	1.30E-06	2.60E-06		
U-234	1.9955E-07	10.634	21.267	0.00E+00	2.12E-06	4.24E-06		
U-235	-2.6194E-06	10.634	0.000	1.62E-04	1.34E-04	1.62E-04		
U-236	1.2693E-05	10.634	21.267	0.00E+00	1.35E-04	2.70E-04		
U-238	-3.6331E-08	10.634	0.000	1.01E-04	1.01E-04	1.01E-04		
Y-90	1.8241E+00	10.634	21.267	0.00E+00	1.94E+01	3.88E+01		
Other Radionuclides					2.05E+01	4.10E+01		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.94680851	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	10.634	8.973	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		21.267	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.83	0.84	1.00
Bounding:	1.66		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (IFE) (ITALY)
 SNF ID #: 929
 Fuel Units & Descr: 2 - ELEMENT
 Heavy Metal Mass: BOL=.38kg ; EOL=.37kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1999
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.02

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4.1459E-09	13.065	26.129	0.00E+00	5.42E-08	1.08E-07	Avg. MeV	
Am-241	3.5850E-03	13.065	26.129	0.00E+00	4.68E-02	9.37E-02	0.0150	2.319E+12
Am-242m	1.2899E-06	13.065	26.129	0.00E+00	1.69E-05	3.37E-05	0.0250	4.822E+11
Am-243	1.4747E-07	13.065	26.129	0.00E+00	1.93E-06	3.85E-06	0.0375	4.183E+11
C-14	1.2839E-04	13.065	26.129	0.00E+00	1.68E-03	3.35E-03	0.0575	4.505E+11
Cl-36	2.8120E-06	13.065	26.129	0.00E+00	3.67E-05	7.35E-05	0.0850	2.715E+11
Co-243	1.1038E-07	13.065	26.129	0.00E+00	1.44E-06	2.88E-06	0.1250	1.772E+11
Co-244	7.8917E-07	13.065	26.129	0.00E+00	1.03E-05	2.06E-05	0.2250	2.335E+11
Co-60	9.2647E-02	13.065	26.129	0.00E+00	1.21E+00	2.42E+00	0.3750	1.020E+11
Cs-134	1.0940E-04	13.065	26.129	0.00E+00	1.43E-03	2.86E-03	0.5750	1.691E+12
Cs-135	3.2195E-05	13.065	26.129	0.00E+00	4.21E-04	8.41E-04	0.8500	1.815E+10
Cs-137	1.7368E+00	13.065	26.129	0.00E+00	2.27E+01	4.54E+01	1.2500	1.864E+11
Eu-154	3.0677E-03	13.065	26.129	0.00E+00	4.01E-02	8.02E-02	1.7500	4.726E+08
Eu-155	1.7925E-03	13.065	26.129	0.00E+00	2.34E-02	4.68E-02	2.2500	9.964E+05
Fe-55	3.7444E-03	13.065	26.129	0.00E+00	4.89E-02	9.78E-02	2.7500	1.685E+04
H-3	3.6180E-03	13.065	26.129	0.00E+00	4.73E-02	9.45E-02	3.5000	3.541E+01
I-129	7.3684E-07	13.065	26.129	0.00E+00	9.63E-06	1.93E-05	5.0000	1.379E+01
Kr-85	6.9368E-02	13.065	26.129	0.00E+00	9.06E-01	1.81E+00	7.0000	1.557E+00
Np-237	1.2662E-06	13.065	26.129	0.00E+00	1.65E-05	3.31E-05	11.0000	1.770E-01
Pa-231	9.1654E-09	13.065	26.129	0.00E+00	1.20E-07	2.39E-07		
Pb-210	1.3728E-13	13.065	26.129	0.00E+00	1.79E-12	3.59E-12		
Pm-147	1.0702E-02	13.065	26.129	0.00E+00	1.40E-01	2.80E-01		
Pu-238	8.8692E-04	13.065	26.129	0.00E+00	1.16E-02	2.32E-02		
Pu-239	5.5263E-03	13.065	26.129	0.00E+00	7.22E-02	1.44E-01		
Pu-240	2.1233E-03	13.065	26.129	0.00E+00	2.77E-02	5.55E-02		
Pu-241	3.8962E-02	13.065	26.129	0.00E+00	5.09E-01	1.02E+00		
Pu-242	2.3128E-07	13.065	26.129	0.00E+00	3.02E-06	6.04E-06		
Ra-226	4.6752E-13	13.065	26.129	0.00E+00	6.11E-12	1.22E-11		
Ra-228	2.4827E-10	13.065	26.129	0.00E+00	3.24E-09	6.49E-09		
Ru-106	9.8526E-08	13.065	26.129	0.00E+00	1.29E-06	2.57E-06		
Se-79	1.3015E-05	13.065	26.129	0.00E+00	1.70E-04	3.40E-04		
Sn-126	1.2165E-05	13.065	26.129	0.00E+00	1.59E-04	3.18E-04		
Sr-90	1.6195E+00	13.065	26.129	0.00E+00	2.12E+01	4.23E+01		
Tc-99	4.4241E-04	13.065	26.129	0.00E+00	5.78E-03	1.16E-02		
Th-229	4.2451E-10	13.065	26.129	0.00E+00	5.55E-09	1.11E-08		
Th-230	6.1398E-11	13.065	26.129	0.00E+00	8.02E-10	1.60E-09		
Th-232	2.5278E-10	13.065	26.129	0.00E+00	3.30E-09	6.60E-09		
Tl-208	1.5098E-08	13.065	26.129	0.00E+00	1.97E-07	3.94E-07		
U-232	4.0662E-08	13.065	26.129	0.00E+00	5.31E-07	1.06E-06		
U-233	1.2217E-07	13.065	26.129	0.00E+00	1.60E-06	3.19E-06		
U-234	2.2391E-07	13.065	26.129	0.00E+00	2.93E-06	5.85E-06		
U-235	-2.6194E-06	13.065	0.000	1.66E-04	1.32E-04	1.66E-04		
U-236	1.2695E-05	13.065	26.129	0.00E+00	1.66E-04	3.32E-04		
U-238	-3.6331E-08	13.065	0.000	1.03E-04	1.02E-04	1.03E-04		
Y-90	1.6195E+00	13.065	26.129	0.00E+00	2.12E+01	4.23E+01		
Other Radionuclides					2.25E+01	4.50E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.77E-01	5.55E-01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (very close to 20%)
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.10443864	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
13.065	13.065	10.501	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
26.129	26.129	26.129	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
1.00	1.00	0.80	0.99
2.00	2.00		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (IFE) (OSU)	¹ Fuel decay start date: 2025
SNF ID #: 1040	Estimates as of: 2030
Fuel Units & Descr: 2 - ELEMENT	Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
Heavy Metal Mass: BOL=39kg ; EOL=38kg	² Template Burnup(MWd): 6.65
ROD Storage Site: INEEL	Template BOL Heavy Metal Mass (MT): 0.000195
	Template Decay Time: 5 years

Estimated
Canister usage:
18"x10"
0.02

II. Estimates

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	9.546	19.092	0.00E+00	8.13E-09	1.63E-08	Avg. MeV	
Am-241	1.8331E-03	9.546	19.092	0.00E+00	1.75E-02	3.50E-02	0.0150	3.086E+12
Am-242m	1.4129E-06	9.546	19.092	0.00E+00	1.35E-05	2.70E-05	0.0250	6.790E+11
Am-243	1.4774E-07	9.546	19.092	0.00E+00	1.41E-06	2.82E-06	0.0375	5.782E+11
C-14	1.2871E-04	9.546	19.092	0.00E+00	1.23E-03	2.46E-03	0.0575	5.935E+11
Cf-252	2.8120E-06	9.546	19.092	0.00E+00	2.68E-05	5.37E-05	0.0850	3.677E+11
Cm-243	1.7940E-07	9.546	19.092	0.00E+00	1.71E-06	3.43E-06	0.1250	2.670E+11
Cm-244	1.6962E-06	9.546	19.092	0.00E+00	1.62E-05	3.24E-05	0.2250	3.119E+11
Co-60	1.2839E+00	9.546	19.092	0.00E+00	1.23E+01	2.45E+01	0.3750	1.583E+11
Cs-134	9.0541E-02	9.546	19.092	0.00E+00	8.64E-01	1.73E+00	0.5750	2.104E+12
Cs-135	3.2195E-05	9.546	19.092	0.00E+00	3.07E-04	6.15E-04	0.8500	9.031E+10
Cs-137	2.7564E+00	9.546	19.092	0.00E+00	2.63E+01	5.26E+01	1.2500	1.834E+12
Eu-154	1.5368E-02	9.546	19.092	0.00E+00	1.47E-01	2.93E-01	1.7500	1.223E+09
Eu-155	2.9293E-02	9.546	19.092	0.00E+00	2.80E-01	5.59E-01	2.2500	1.971E+09
Fe-55	7.7158E-01	9.546	19.092	0.00E+00	7.37E+00	1.47E+01	2.7500	1.564E+07
H-3	1.1111E-02	9.546	19.092	0.00E+00	1.06E-01	2.12E-01	3.5000	1.820E+06
I-129	7.3684E-07	9.546	19.092	0.00E+00	7.03E-06	1.41E-05	5.0000	1.025E+01
Kr-85	2.5263E-01	9.546	19.092	0.00E+00	2.41E+00	4.82E+00	7.0000	1.160E+00
Np-237	1.2427E-06	9.546	19.092	0.00E+00	1.19E-05	2.37E-05	11.0000	1.322E-01
Pa-231	3.8511E-09	9.546	19.092	0.00E+00	3.68E-08	7.35E-08		
Pb-210	7.3880E-15	9.546	19.092	0.00E+00	7.05E-14	1.41E-13		
Pm-147	2.1023E+00	9.546	19.092	0.00E+00	2.01E+01	4.01E+01		
Pu-238	1.0383E-03	9.546	19.092	0.00E+00	9.91E-03	1.98E-02		
Pu-239	5.5293E-03	9.546	19.092	0.00E+00	5.28E-02	1.06E-01		
Pu-240	2.1278E-03	9.546	19.092	0.00E+00	2.03E-02	4.06E-02		
Pu-241	1.0195E-01	9.546	19.092	0.00E+00	9.73E-01	1.95E+00		
Pu-242	2.3128E-07	9.546	19.092	0.00E+00	2.21E-06	4.42E-06		
Ra-226	5.2782E-14	9.546	19.092	0.00E+00	5.04E-13	1.01E-12		
Ra-228	1.9338E-10	9.546	19.092	0.00E+00	1.85E-09	3.69E-09		
Ru-106	9.1684E-02	9.546	19.092	0.00E+00	8.75E-01	1.75E+00		
Se-79	1.3018E-05	9.546	19.092	0.00E+00	1.24E-04	2.49E-04		
Sn-126	1.2167E-05	9.546	19.092	0.00E+00	1.16E-04	2.32E-04		
Sr-90	2.6045E+00	9.546	19.092	0.00E+00	2.49E+01	4.97E+01		
Tc-99	4.4241E-04	9.546	19.092	0.00E+00	4.22E-03	8.45E-03		
Th-229	1.3713E-10	9.546	19.092	0.00E+00	1.31E-09	2.62E-09		
Th-230	1.8090E-11	9.546	19.092	0.00E+00	1.73E-10	3.45E-10		
Th-232	2.5278E-10	9.546	19.092	0.00E+00	2.41E-09	4.83E-09		
Ti-208	1.6947E-08	9.546	19.092	0.00E+00	1.62E-07	3.24E-07		
U-232	4.8737E-08	9.546	19.092	0.00E+00	4.65E-07	9.30E-07		
U-233	1.2203E-07	9.546	19.092	0.00E+00	1.16E-06	2.33E-06		
U-234	1.5925E-07	9.546	19.092	0.00E+00	1.52E-06	3.04E-06		
U-235	-2.6194E-06	9.546	0.000	1.68E-04	1.43E-04	1.68E-04		
U-236	1.2693E-05	9.546	19.092	0.00E+00	1.21E-04	2.42E-04		
U-238	-3.6331E-08	9.546	0.000	1.05E-04	1.05E-04	1.05E-04		
Y-90	2.6060E+00	9.546	19.092	0.00E+00	2.49E+01	4.98E+01		
Other Radionuclides					3.44E+01	6.88E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.56E-01	1.11E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.9	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	3.801	9.546	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		19.092	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.72	2.51	1.00
Bounding:	1.44		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (IFE) (U OF AZ)
 SNF ID #: 973
 Fuel Units & Descr: 2 - ELEMENT
 Heavy Metal Mass: BOL=.39kg ; EOL=.38kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 203;
 Estimates as of: 2031
 Template: TRIGA-SS (LW/U-2rx, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.6;
 Template BOL Heavy Metal Mass (MT): 0.00019;
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.02

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	11.455	22.911	0.00E+00	9.76E-09	1.95E-08	Avg. MeV	
Am-241	1.8331E-03	11.455	22.911	0.00E+00	2.10E-02	4.20E-02	0.0150	3.703E+12
Am-242m	1.4129E-06	11.455	22.911	0.00E+00	1.62E-05	3.24E-05	0.0250	8.148E+11
Am-243	1.4774E-07	11.455	22.911	0.00E+00	1.69E-06	3.38E-06	0.0375	6.939E+11
C-14	1.2871E-04	11.455	22.911	0.00E+00	1.47E-03	2.95E-03	0.0575	7.122E+11
Cl-36	2.8120E-06	11.455	22.911	0.00E+00	3.22E-05	6.44E-05	0.0850	4.412E+11
Cm-243	1.7940E-07	11.455	22.911	0.00E+00	2.06E-06	4.11E-06	0.1250	3.204E+11
Cm-244	1.6962E-06	11.455	22.911	0.00E+00	1.94E-05	3.89E-05	0.2250	3.743E+11
Co-60	1.2839E+00	11.455	22.911	0.00E+00	1.47E+01	2.94E+01	0.3750	1.899E+11
Cs-134	9.0541E-02	11.455	22.911	0.00E+00	1.04E+00	2.07E+00	0.5750	2.525E+12
Cs-135	3.2195E-05	11.455	22.911	0.00E+00	3.69E-04	7.38E-04	0.8500	1.084E+11
Cs-137	2.7564E+00	11.455	22.911	0.00E+00	3.16E+01	6.32E+01	1.2500	2.201E+12
Eu-154	1.5368E-02	11.455	22.911	0.00E+00	1.76E-01	3.52E-01	1.7500	1.467E+09
Eu-155	2.9293E-02	11.455	22.911	0.00E+00	3.36E-01	6.71E-01	2.2500	2.365E+09
Fe-55	7.7158E-01	11.455	22.911	0.00E+00	8.84E+00	1.77E+01	2.7500	1.877E+07
H-3	1.1111E-02	11.455	22.911	0.00E+00	1.27E-01	2.55E-01	3.5000	2.185E+06
I-129	7.3684E-07	11.455	22.911	0.00E+00	8.44E-06	1.69E-05	5.0000	1.225E+01
Kr-85	2.5263E-01	11.455	22.911	0.00E+00	2.89E+00	5.79E+00	7.0000	1.387E+00
Np-237	1.2427E-06	11.455	22.911	0.00E+00	1.42E-05	2.85E-05	11.0000	1.580E-01
Pa-231	3.8511E-09	11.455	22.911	0.00E+00	4.41E-08	8.82E-08		
Pb-210	7.3880E-15	11.455	22.911	0.00E+00	8.46E-14	1.69E-13		
Pm-147	2.1023E+00	11.455	22.911	0.00E+00	2.41E+01	4.82E+01		
Pu-238	1.0383E-03	11.455	22.911	0.00E+00	1.19E-02	2.38E-02		
Pu-239	5.5293E-03	11.455	22.911	0.00E+00	6.33E-02	1.27E-01		
Pu-240	2.1278E-03	11.455	22.911	0.00E+00	2.44E-02	4.87E-02		
Pu-241	1.0195E-01	11.455	22.911	0.00E+00	1.17E+00	2.34E+00		
Pu-242	2.3128E-07	11.455	22.911	0.00E+00	2.65E-06	5.30E-06		
Ra-226	5.2782E-14	11.455	22.911	0.00E+00	6.05E-13	1.21E-12		
Ra-228	1.9338E-10	11.455	22.911	0.00E+00	2.22E-09	4.43E-09		
Ru-106	9.1684E-02	11.455	22.911	0.00E+00	1.05E+00	2.10E+00		
Se-79	1.3018E-05	11.455	22.911	0.00E+00	1.49E-04	2.98E-04		
Sn-126	1.2167E-05	11.455	22.911	0.00E+00	1.39E-04	2.79E-04		
Sr-90	2.6045E+00	11.455	22.911	0.00E+00	2.98E+01	5.97E+01		
Tc-99	4.4241E-04	11.455	22.911	0.00E+00	5.07E-03	1.01E-02		
Th-229	1.3713E-10	11.455	22.911	0.00E+00	1.57E-09	3.14E-09		
Th-230	1.8090E-11	11.455	22.911	0.00E+00	2.07E-10	4.14E-10		
Th-232	2.5278E-10	11.455	22.911	0.00E+00	2.90E-09	5.79E-09		
Th-208	1.6947E-08	11.455	22.911	0.00E+00	1.94E-07	3.88E-07		
U-232	4.8737E-08	11.455	22.911	0.00E+00	5.58E-07	1.12E-06		
U-233	1.2203E-07	11.455	22.911	0.00E+00	1.40E-06	2.80E-06		
U-234	1.5925E-07	11.455	22.911	0.00E+00	1.82E-06	3.65E-06		
U-235	-2.6194E-06	11.455	0.000	1.69E-04	1.39E-04	1.69E-04		
U-236	1.2693E-05	11.455	22.911	0.00E+00	1.45E-04	2.91E-04		
U-238	-3.6331E-08	11.455	0.000	1.05E-04	1.04E-04	1.05E-04		
Y-90	2.6060E+00	11.455	22.911	0.00E+00	2.99E+01	5.97E+01		
Other Radionuclides					4.13E+01	8.26E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.67E+01	1.33E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	1.900	11.455	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		22.911	Bounding burnup assumed to be twice nominal burnup.

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

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (IFE) (U OF AZ) 1 Fuel decay start date: 1998
 SNF ID #: 972 Estimates as of: 2030
 Fuel Units & Descr: 1 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=20kg ; EOL=19kg 2Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.01

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	4.1459E-09	6.682	13.365	0.00E+00	2.77E-08	5.54E-08	0.0150	1.186E+12
Am-241	3.5850E-03	6.682	13.365	0.00E+00	2.40E-02	4.79E-02	0.0250	2.466E+11
Am-242m	1.2899E-06	6.682	13.365	0.00E+00	8.62E-06	1.72E-05	0.0375	2.140E+11
Am-243	1.4747E-07	6.682	13.365	0.00E+00	9.85E-07	1.97E-06	0.0575	2.304E+11
C-14	1.2839E-04	6.682	13.365	0.00E+00	8.58E-04	1.72E-03	0.0850	1.389E+11
Cl-36	2.8120E-06	6.682	13.365	0.00E+00	1.88E-05	3.76E-05	0.1250	9.061E+10
Cm-243	1.1038E-07	6.682	13.365	0.00E+00	7.38E-07	1.48E-06	0.2250	1.195E+11
Cm-244	7.8917E-07	6.682	13.365	0.00E+00	5.27E-06	1.05E-05	0.3750	5.216E+10
Co-60	9.2647E-02	6.682	13.365	0.00E+00	6.19E-01	1.24E+00	0.5750	8.648E+11
Cs-134	1.0940E-04	6.682	13.365	0.00E+00	7.31E-04	1.46E-03	0.8500	9.285E+09
Cs-135	3.2195E-05	6.682	13.365	0.00E+00	2.15E-04	4.30E-04	1.2500	9.534E+10
Cs-137	1.7368E+00	6.682	13.365	0.00E+00	1.16E+01	2.32E+01	1.7500	2.417E+08
Eu-154	3.0677E-03	6.682	13.365	0.00E+00	2.05E-02	4.10E-02	2.2500	5.096E+05
Eu-155	1.7925E-03	6.682	13.365	0.00E+00	1.20E-02	2.40E-02	2.7500	8.617E+03
Fe-55	3.7444E-03	6.682	13.365	0.00E+00	2.50E-02	5.00E-02	3.5000	1.811E+01
H-3	3.6180E-03	6.682	13.365	0.00E+00	2.42E-02	4.84E-02	5.0000	7.052E+00
I-129	7.3684E-07	6.682	13.365	0.00E+00	4.92E-06	9.85E-06	7.0000	7.961E-01
Kr-85	6.9368E-02	6.682	13.365	0.00E+00	4.64E-01	9.27E-01	11.0000	9.055E-02
Np-237	1.2662E-06	6.682	13.365	0.00E+00	8.46E-06	1.69E-05		
Pa-231	9.1654E-09	6.682	13.365	0.00E+00	6.12E-08	1.22E-07		
Pb-210	1.3728E-13	6.682	13.365	0.00E+00	9.17E-13	1.83E-12		
Pm-147	1.0702E-02	6.682	13.365	0.00E+00	7.15E-02	1.43E-01		
Pu-238	8.8692E-04	6.682	13.365	0.00E+00	5.93E-03	1.19E-02		
Pu-239	5.5263E-03	6.682	13.365	0.00E+00	3.69E-02	7.39E-02		
Pu-240	2.1233E-03	6.682	13.365	0.00E+00	1.42E-02	2.84E-02		
Pu-241	3.8962E-02	6.682	13.365	0.00E+00	2.60E-01	5.21E-01		
Pu-242	2.3128E-07	6.682	13.365	0.00E+00	1.55E-06	3.09E-06		
Ra-226	4.6752E-13	6.682	13.365	0.00E+00	3.12E-12	6.25E-12		
Ra-228	2.4827E-10	6.682	13.365	0.00E+00	1.66E-09	3.32E-09		
Ru-106	9.8526E-08	6.682	13.365	0.00E+00	6.58E-07	1.32E-06		
Se-79	1.3015E-05	6.682	13.365	0.00E+00	8.70E-05	1.74E-04		
Sn-126	1.2165E-05	6.682	13.365	0.00E+00	8.13E-05	1.63E-04		
Sr-90	1.6195E+00	6.682	13.365	0.00E+00	1.08E+01	2.16E+01		
Tc-99	4.4241E-04	6.682	13.365	0.00E+00	2.96E-03	5.91E-03		
Th-229	4.2451E-10	6.682	13.365	0.00E+00	2.84E-09	5.67E-09		
Th-230	6.1398E-11	6.682	13.365	0.00E+00	4.10E-10	8.21E-10		
Th-232	2.5278E-10	6.682	13.365	0.00E+00	1.69E-09	3.38E-09		
Th-208	1.5098E-08	6.682	13.365	0.00E+00	1.01E-07	2.02E-07		
U-232	4.0662E-08	6.682	13.365	0.00E+00	2.72E-07	5.43E-07		
U-233	1.2217E-07	6.682	13.365	0.00E+00	8.16E-07	1.63E-06		
U-234	2.2391E-07	6.682	13.365	0.00E+00	1.50E-06	2.99E-06		
U-235	-2.6194E-06	6.682	0.000	8.43E-05	6.68E-05	8.43E-05		
U-236	1.2695E-05	6.682	13.365	0.00E+00	8.48E-05	1.70E-04		
U-238	-3.6331E-08	6.682	0.000	5.24E-05	5.22E-05	5.24E-05		
Y-90	1.6195E+00	6.682	13.365	0.00E+00	1.08E+01	2.16E+01		
Other Radionuclides					1.15E+01	2.30E+01		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	1.900	6.682	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		13.365	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	1.00	3.52	
Bounding:	2.01		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (IFE) (U OF IL)
 SNF ID #: 1048
 Fuel Units & Descr: 8 - ELEMENT
 Heavy Metal Mass: BOL=1.56kg ; EOL=1.53kg
 ROD Storage Site: INEEL

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

Est mated
 Canister usage:
 18"x10"
 0.07

Radionuclide	II. Estimates		x _b	b	y _n	y _b	Gamma Sources	
	m	x _n					Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	8.5173E-10	30.408	60.815	0.00E+00	2.59E-08	5.18E-08	0.0150	9.829E+12
Am-241	1.8331E-03	30.408	60.815	0.00E+00	5.57E-02	1.11E-01	0.0250	2.163E+12
Am-242m	1.4129E-06	30.408	60.815	0.00E+00	4.30E-05	8.59E-05	0.0375	1.842E+12
Am-243	1.4774E-07	30.408	60.815	0.00E+00	4.49E-06	8.99E-06	0.0575	1.891E+12
C-14	1.2871E-04	30.408	60.815	0.00E+00	3.91E-03	7.83E-03	0.0850	1.171E+12
Cf-252	2.8120E-06	30.408	60.815	0.00E+00	8.55E-05	1.71E-04	0.1250	8.505E+11
Cm-243	1.7940E-07	30.408	60.815	0.00E+00	5.46E-06	1.09E-05	0.2250	9.935E+11
Cm-244	1.6962E-06	30.408	60.815	0.00E+00	5.16E-05	1.03E-04	0.3750	5.042E+11
Co-60	1.2839E+00	30.408	60.815	0.00E+00	3.90E+01	7.81E+01	0.5750	6.703E+12
Cs-134	9.0541E-02	30.408	60.815	0.00E+00	2.75E+00	5.51E+00	0.8500	2.877E+11
Cs-135	3.2195E-05	30.408	60.815	0.00E+00	9.79E-04	1.96E-03	1.2500	5.842E+12
Cs-137	2.7564E+00	30.408	60.815	0.00E+00	8.38E+01	1.68E+02	1.7500	3.895E+09
Eu-154	1.5368E-02	30.408	60.815	0.00E+00	4.67E-01	9.35E-01	2.2500	6.278E+09
Eu-155	2.9293E-02	30.408	60.815	0.00E+00	8.91E-01	1.78E+00	2.7500	4.981E+07
Fe-55	7.7158E-01	30.408	60.815	0.00E+00	2.35E+01	4.69E+01	3.5000	5.799E+06
H-3	1.1111E-02	30.408	60.815	0.00E+00	3.38E-01	6.76E-01	5.0000	3.284E+01
I-129	7.3684E-07	30.408	60.815	0.00E+00	2.24E-05	4.48E-05	7.0000	3.718E+00
Kr-85	2.5263E-01	30.408	60.815	0.00E+00	7.68E+00	1.54E+01	11.0000	4.237E-01
Np-237	1.2427E-06	30.408	60.815	0.00E+00	3.78E-05	7.56E-05		
Pa-231	3.8511E-09	30.408	60.815	0.00E+00	1.17E-07	2.34E-07		
Pb-210	7.3880E-15	30.408	60.815	0.00E+00	2.25E-13	4.49E-13		
Pm-147	2.1023E+00	30.408	60.815	0.00E+00	6.39E+01	1.28E+02		
Pu-238	1.0383E-03	30.408	60.815	0.00E+00	3.16E-02	6.31E-02		
Pu-239	5.5293E-03	30.408	60.815	0.00E+00	1.68E-01	3.36E-01		
Pu-240	2.1278E-03	30.408	60.815	0.00E+00	6.47E-02	1.29E-01		
Pu-241	1.0195E-01	30.408	60.815	0.00E+00	3.10E+00	6.20E+00		
Pu-242	2.3128E-07	30.408	60.815	0.00E+00	7.03E-06	1.41E-05		
Ra-226	5.2782E-14	30.408	60.815	0.00E+00	1.60E-12	3.21E-12		
Ra-228	1.9338E-10	30.408	60.815	0.00E+00	5.88E-09	1.18E-08		
Ru-106	9.1684E-02	30.408	60.815	0.00E+00	2.79E+00	5.58E+00		
Se-79	1.3018E-05	30.408	60.815	0.00E+00	3.96E-04	7.92E-04		
Sn-126	1.2167E-05	30.408	60.815	0.00E+00	3.70E-04	7.40E-04		
Sr-90	2.6045E+00	30.408	60.815	0.00E+00	7.92E+01	1.58E+02		
Tc-99	4.4241E-04	30.408	60.815	0.00E+00	1.35E-02	2.69E-02		
Th-229	1.3713E-10	30.408	60.815	0.00E+00	4.17E-09	8.34E-09		
Th-230	1.8090E-11	30.408	60.815	0.00E+00	5.50E-10	1.10E-09		
Th-232	2.5278E-10	30.408	60.815	0.00E+00	7.69E-09	1.54E-08		
Ti-208	1.6947E-08	30.408	60.815	0.00E+00	5.15E-07	1.03E-06		
U-232	4.8737E-08	30.408	60.815	0.00E+00	1.48E-06	2.96E-06		
U-233	1.2203E-07	30.408	60.815	0.00E+00	3.71E-06	7.42E-06		
U-234	1.5925E-07	30.408	60.815	0.00E+00	4.84E-06	9.68E-06		
U-235	-2.6194E-06	30.408	0.000	6.74E-04	5.95E-04	6.74E-04		
U-236	1.2693E-05	30.408	60.815	0.00E+00	3.86E-04	7.72E-04		
U-238	-3.6331E-08	30.408	0.000	4.19E-04	4.18E-04	4.19E-04		
Y-90	2.6060E+00	30.408	60.815	0.00E+00	7.92E+01	1.58E+02		
Other Radionuclides					1.10E+02	2.19E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.77E+00	3.54E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	30.408	29.020	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:		60.815	

Checks		
	Burnup Multiplier	Estimated Burnup/Given Burnup
Nominal:	0.57	0.95
Bounding:	1.14	
		Estimated EOL HM/Given EOL HM
		1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (IFE) (UC-IRVINE)
 SNF ID #: 824
 Fuel Units & Descr: 5 - ELEMENT
 Heavy Metal Mass: BOL= .92kg ; EOL=.92kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.05

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec
Ac-227	8.5173E-10	8.932	17.864	0.00E+00	7.61E-09	1.52E-08	Avg. MeV	
Am-241	1.8331E-03	8.932	17.864	0.00E+00	1.64E-02	3.27E-02	0.0150	2.897E+12
Am-242m	1.4129E-06	8.932	17.864	0.00E+00	1.26E-05	2.52E-05	0.0250	6.353E+11
Am-243	1.4774E-07	8.932	17.864	0.00E+00	1.32E-06	2.64E-06	0.0375	5.410E+11
C-14	1.2871E-04	8.932	17.864	0.00E+00	1.15E-03	2.30E-03	0.0575	5.553E+11
Cl-36	2.8120E-06	8.932	17.864	0.00E+00	2.51E-05	5.02E-05	0.0850	3.440E+11
Cm-243	1.7940E-07	8.932	17.864	0.00E+00	1.60E-06	3.20E-06	0.1250	2.498E+11
Cm-244	1.6962E-06	8.932	17.864	0.00E+00	1.52E-05	3.03E-05	0.2250	2.919E+11
Co-60	1.2839E+00	8.932	17.864	0.00E+00	1.15E+01	2.29E+01	0.3750	1.481E+11
Cs-134	9.0541E-02	8.932	17.864	0.00E+00	8.09E-01	1.62E+00	0.5750	1.969E+12
Cs-135	3.2195E-05	8.932	17.864	0.00E+00	2.88E-04	5.75E-04	0.8500	8.450E+10
Cs-137	2.7564E+00	8.932	17.864	0.00E+00	2.46E+01	4.92E+01	1.2500	1.716E+12
Eu-154	1.5368E-02	8.932	17.864	0.00E+00	1.37E-01	2.75E-01	1.7500	1.144E+09
Eu-155	2.9293E-02	8.932	17.864	0.00E+00	2.62E-01	5.23E-01	2.2500	1.844E+09
Fe-55	7.7158E-01	8.932	17.864	0.00E+00	6.89E+00	1.38E+01	2.7500	1.463E+07
H-3	1.1111E-02	8.932	17.864	0.00E+00	9.92E-02	1.98E-01	3.5000	1.703E+06
I-129	7.3684E-07	8.932	17.864	0.00E+00	6.58E-06	1.32E-05	5.0000	9.930E+00
Kr-85	2.5263E-01	8.932	17.864	0.00E+00	2.26E+00	4.51E+00	7.0000	1.125E+00
Np-237	1.2427E-06	8.932	17.864	0.00E+00	1.11E-05	2.22E-05	11.0000	1.282E-01
Pa-231	3.8511E-09	8.932	17.864	0.00E+00	3.44E-08	6.88E-08		
Pb-210	7.3880E-15	8.932	17.864	0.00E+00	6.60E-14	1.32E-13		
Pm-147	2.1023E+00	8.932	17.864	0.00E+00	1.88E+01	3.76E+01		
Pu-238	1.0383E-03	8.932	17.864	0.00E+00	9.27E-03	1.85E-02		
Pu-239	5.5293E-03	8.932	17.864	0.00E+00	4.94E-02	9.88E-02		
Pu-240	2.1278E-03	8.932	17.864	0.00E+00	1.90E-02	3.80E-02		
Pu-241	1.0195E-01	8.932	17.864	0.00E+00	9.11E-01	1.82E+00		
Pu-242	2.3128E-07	8.932	17.864	0.00E+00	2.07E-06	4.13E-06		
Ra-226	5.2782E-14	8.932	17.864	0.00E+00	4.71E-13	9.43E-13		
Ra-228	1.9338E-10	8.932	17.864	0.00E+00	1.73E-09	3.45E-09		
Ru-106	9.1684E-02	8.932	17.864	0.00E+00	8.19E-01	1.64E+00		
Se-79	1.3018E-05	8.932	17.864	0.00E+00	1.16E-04	2.33E-04		
Sn-126	1.2167E-05	8.932	17.864	0.00E+00	1.09E-04	2.17E-04		
Sr-90	2.6045E+00	8.932	17.864	0.00E+00	2.33E+01	4.65E+01		
Tc-99	4.4241E-04	8.932	17.864	0.00E+00	3.95E-03	7.90E-03		
Th-229	1.3713E-10	8.932	17.864	0.00E+00	1.22E-09	2.45E-09		
Th-230	1.8090E-11	8.932	17.864	0.00E+00	1.62E-10	3.23E-10		
Th-232	2.5278E-10	8.932	17.864	0.00E+00	2.26E-09	4.52E-09		
Tl-208	1.6947E-08	8.932	17.864	0.00E+00	1.51E-07	3.03E-07		
U-232	4.8737E-08	8.932	17.864	0.00E+00	4.35E-07	8.71E-07		
U-233	1.2203E-07	8.932	17.864	0.00E+00	1.09E-06	2.18E-06		
U-234	1.5925E-07	8.932	17.864	0.00E+00	1.42E-06	2.84E-06		
U-235	-2.6194E-06	8.932	0.000	3.96E-04	3.73E-04	3.96E-04		
U-236	1.2693E-05	8.932	17.864	0.00E+00	1.13E-04	2.27E-04		
U-238	-3.6331E-08	8.932	0.000	2.46E-04	2.46E-04	2.46E-04		
Y-90	2.6060E+00	8.932	17.864	0.00E+00	2.33E+01	4.66E+01		
Other Radionuclides					3.22E+01	6.44E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.20E-01	1.04E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.99996708	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	8.932		
Bounding:		17.864	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.29	0.00	
Bounding:	0.57		

Estimated EOL HM/Given EOL HM: 0.99

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (IFE) (UC-IRVINE) 1Fuel decay start date: 2035
 SNF ID #: 1051 Estimates as of: 2030
 Fuel Units & Descr: 1 - ELEMENT Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=19kg ; EOL=19kg 2Template Burnup(MWd): 6.66
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 5 year:

Estimated
 Canister usage:
 18"x10"
 0.01

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	8.5173E-10	1.867	3.735	0.00E+00	1.59E-09	3.18E-09	0.0150	6.036E+11
Am-241	1.8331E-03	1.867	3.735	0.00E+00	3.42E-03	6.85E-03	0.0250	1.328E+11
Am-242m	1.4129E-06	1.867	3.735	0.00E+00	2.64E-06	5.28E-06	0.0375	1.131E+11
Am-243	1.4774E-07	1.867	3.735	0.00E+00	2.76E-07	5.52E-07	0.0575	1.161E+11
C-14	1.2871E-04	1.867	3.735	0.00E+00	2.40E-04	4.81E-04	0.0850	7.192E+10
Cl-36	2.8120E-06	1.867	3.735	0.00E+00	5.25E-06	1.05E-05	0.1250	5.223E+10
Cm-243	1.7940E-07	1.867	3.735	0.00E+00	3.35E-07	6.70E-07	0.2250	6.101E+10
Cm-244	1.6962E-06	1.867	3.735	0.00E+00	3.17E-06	6.33E-06	0.3750	3.096E+10
Co-60	1.2839E+00	1.867	3.735	0.00E+00	2.40E+00	4.79E+00	0.5750	4.116E+11
Cs-134	9.0541E-02	1.867	3.735	0.00E+00	1.69E-01	3.38E-01	0.8500	1.766E+10
Cs-135	3.2195E-05	1.867	3.735	0.00E+00	6.01E-05	1.20E-04	1.2500	3.588E+11
Cs-137	2.7564E+00	1.867	3.735	0.00E+00	5.15E+00	1.03E+01	1.7500	2.392E+08
Eu-154	1.5368E-02	1.867	3.735	0.00E+00	2.87E-02	5.74E-02	2.2500	3.855E+08
Eu-155	2.9293E-02	1.867	3.735	0.00E+00	5.47E-02	1.09E-01	2.7500	3.059E+06
Fe-55	7.7158E-01	1.867	3.735	0.00E+00	1.44E+00	2.88E+00	3.5000	3.561E+05
H-3	1.1111E-02	1.867	3.735	0.00E+00	2.07E-02	4.15E-02	5.0000	2.076E+00
I-129	7.3684E-07	1.867	3.735	0.00E+00	1.38E-06	2.75E-06	7.0000	2.352E-01
Kr-85	2.5263E-01	1.867	3.735	0.00E+00	4.72E-01	9.43E-01	11.0000	2.680E-02
Np-237	1.2427E-06	1.867	3.735	0.00E+00	2.32E-06	4.64E-06		
Pa-231	3.8511E-09	1.867	3.735	0.00E+00	7.19E-09	1.44E-08		
Pb-210	7.3880E-15	1.867	3.735	0.00E+00	1.38E-14	2.76E-14		
Pm-147	2.1023E+00	1.867	3.735	0.00E+00	3.93E+00	7.85E+00		
Pu-238	1.0383E-03	1.867	3.735	0.00E+00	1.94E-03	3.88E-03		
Pu-239	5.5293E-03	1.867	3.735	0.00E+00	1.03E-02	2.07E-02		
Pu-240	2.1278E-03	1.867	3.735	0.00E+00	3.97E-03	7.95E-03		
Pu-241	1.0195E-01	1.867	3.735	0.00E+00	1.90E-01	3.81E-01		
Pu-242	2.3128E-07	1.867	3.735	0.00E+00	4.32E-07	8.64E-07		
Ra-226	5.2782E-14	1.867	3.735	0.00E+00	9.86E-14	1.97E-13		
Ra-228	1.9338E-10	1.867	3.735	0.00E+00	3.61E-10	7.22E-10		
Ru-106	9.1684E-02	1.867	3.735	0.00E+00	1.71E-01	3.42E-01		
Se-79	1.3018E-05	1.867	3.735	0.00E+00	2.43E-05	4.86E-05		
Sn-126	1.2167E-05	1.867	3.735	0.00E+00	2.27E-05	4.54E-05		
Sr-90	2.6045E+00	1.867	3.735	0.00E+00	4.86E+00	9.73E+00		
Tc-99	4.4241E-04	1.867	3.735	0.00E+00	8.26E-04	1.65E-03		
Th-229	1.3713E-10	1.867	3.735	0.00E+00	2.56E-10	5.12E-10		
Th-230	1.8090E-11	1.867	3.735	0.00E+00	3.38E-11	6.76E-11		
Th-232	2.5278E-10	1.867	3.735	0.00E+00	4.72E-10	9.44E-10		
Tl-208	1.6947E-08	1.867	3.735	0.00E+00	3.16E-08	6.33E-08		
U-232	4.8737E-08	1.867	3.735	0.00E+00	9.10E-08	1.82E-07		
U-233	1.2203E-07	1.867	3.735	0.00E+00	2.28E-07	4.56E-07		
U-234	1.5925E-07	1.867	3.735	0.00E+00	2.97E-07	5.95E-07		
U-235	-2.6194E-06	1.867	0.000	8.28E-05	7.79E-05	8.28E-05		
U-236	1.2693E-05	1.867	3.735	0.00E+00	2.37E-05	4.74E-05		
U-238	-3.6331E-08	1.867	0.000	5.15E-05	5.14E-05	5.15E-05		
Y-90	2.6060E+00	1.867	3.735	0.00E+00	4.87E+00	9.73E+00		
Other Radionuclides					6.73E+00	1.35E+01		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZHX	U	
BOL Enrichment %:	20.00002088	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	1.867	1.432	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		3.735	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.29	0.77	
Bounding:	0.57		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (INDONESIA)
 SNF ID #: 475
 Fuel Units & Descr: 174 - ELEMENT
 Heavy Metal Mass: BOL=33.93kg ; EOL=33.25kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 1.57

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.6436E-09	647.797	1,295.593	0.00E+00	1.71E-06	3.43E-06		
Am-241	3.1429E-03	647.797	1,295.593	0.00E+00	2.04E+00	4.07E+00	0.0150	1.298E+14
Am-242m	1.3195E-06	647.797	1,295.593	0.00E+00	8.55E-04	1.71E-03	0.0250	2.703E+13
Am-243	1.4753E-07	647.797	1,295.593	0.00E+00	9.56E-05	1.91E-04	0.0375	2.341E+13
C-14	1.2847E-04	647.797	1,295.593	0.00E+00	8.32E-02	1.66E-01	0.0575	2.519E+13
Cl-36	2.8120E-06	647.797	1,295.593	0.00E+00	1.82E-03	3.64E-03	0.0850	1.521E+13
Cm-243	1.2465E-07	647.797	1,295.593	0.00E+00	8.07E-05	1.61E-04	0.1250	9.938E+12
Cm-244	9.5564E-07	647.797	1,295.593	0.00E+00	6.19E-04	1.24E-03	0.2250	1.306E+13
Co-60	1.7880E-01	647.797	1,295.593	0.00E+00	1.16E+02	2.32E+02	0.3750	5.722E+12
Cs-134	5.8692E-04	647.797	1,295.593	0.00E+00	3.80E-01	7.60E-01	0.5750	9.412E+13
Cs-135	3.2195E-05	647.797	1,295.593	0.00E+00	2.09E-02	4.17E-02	0.8500	1.061E+12
Cs-137	1.9489E+00	647.797	1,295.593	0.00E+00	1.26E+03	2.52E+03	1.2500	1.758E+13
Eu-154	4.5895E-03	647.797	1,295.593	0.00E+00	2.97E+00	5.95E+00	1.7500	2.726E+10
Eu-155	3.6045E-03	647.797	1,295.593	0.00E+00	2.33E+00	4.67E+00	2.2500	9.388E+07
Fe-55	1.4185E-02	647.797	1,295.593	0.00E+00	9.19E+00	1.84E+01	2.7500	1.034E+06
H-3	4.7895E-03	647.797	1,295.593	0.00E+00	3.10E+00	6.21E+00	3.5000	5.770E+03
I-129	7.3684E-07	647.797	1,295.593	0.00E+00	4.77E-04	9.55E-04	5.0000	6.941E+02
Kr-85	9.5820E-02	647.797	1,295.593	0.00E+00	6.21E+01	1.24E+02	7.0000	7.843E+01
Np-237	1.2552E-06	647.797	1,295.593	0.00E+00	8.13E-04	1.63E-03	11.0000	8.926E+00
Pa-231	7.0406E-09	647.797	1,295.593	0.00E+00	4.56E-06	9.12E-06		
Pb-210	5.8000E-14	647.797	1,295.593	0.00E+00	3.76E-11	7.51E-11		
Pm-147	4.0075E-02	647.797	1,295.593	0.00E+00	2.60E+01	5.19E+01		
Pu-238	9.2256E-04	647.797	1,295.593	0.00E+00	5.98E-01	1.20E+00		
Pu-239	5.5278E-03	647.797	1,295.593	0.00E+00	3.58E+00	7.16E+00		
Pu-240	2.1248E-03	647.797	1,295.593	0.00E+00	1.38E+00	2.75E+00		
Pu-241	4.9549E-02	647.797	1,295.593	0.00E+00	3.21E+01	6.42E+01		
Pu-242	2.3128E-07	647.797	1,295.593	0.00E+00	1.50E-04	3.00E-04		
Ra-226	2.4526E-13	647.797	1,295.593	0.00E+00	1.59E-10	3.18E-10		
Ra-228	2.4015E-10	647.797	1,295.593	0.00E+00	1.56E-07	3.11E-07		
Ru-106	3.0602E-06	647.797	1,295.593	0.00E+00	1.98E-03	3.96E-03		
Se-79	1.3015E-05	647.797	1,295.593	0.00E+00	8.43E-03	1.69E-02		
Sn-126	1.2165E-05	647.797	1,295.593	0.00E+00	7.88E-03	1.58E-02		
Sr-90	1.8226E+00	647.797	1,295.593	0.00E+00	1.18E+03	2.36E+03		
Tc-99	4.4241E-04	647.797	1,295.593	0.00E+00	2.87E-01	5.73E-01		
Th-229	3.0962E-10	647.797	1,295.593	0.00E+00	2.01E-07	4.01E-07		
Th-230	4.2346E-11	647.797	1,295.593	0.00E+00	2.74E-08	5.49E-08		
Th-232	2.5278E-10	647.797	1,295.593	0.00E+00	1.64E-07	3.28E-07		
Tl-208	1.5820E-08	647.797	1,295.593	0.00E+00	1.02E-05	2.05E-05		
U-232	4.2647E-08	647.797	1,295.593	0.00E+00	2.76E-05	5.53E-05		
U-233	1.2211E-07	647.797	1,295.593	0.00E+00	7.91E-05	1.58E-04		
U-234	1.9955E-07	647.797	1,295.593	0.00E+00	1.29E-04	2.59E-04		
U-235	-2.6194E-06	647.797	0.000	1.47E-02	1.30E-02	1.47E-02		
U-236	1.2693E-05	647.797	1,295.593	0.00E+00	8.22E-03	1.64E-02		
U-238	-3.6331E-08	647.797	0.000	9.12E-03	9.10E-03	9.12E-03		
Y-90	1.8241E+00	647.797	1,295.593	0.00E+00	1.18E+03	2.36E+03		
Other Radionuclides					1.25E+03	2.49E+03		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00000041	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	330.682	647.797	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		1,295.593	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.56	1.96	1.00
Bounding:	1.12		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (INDONESIA)
 SNF ID #: 476
 Fuel Units & Descr: 71 - ELEMENT
 Heavy Metal Mass: BOL=13.85kg ; EOL=13.57kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.66
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 20 year;

Estimated
 Canister usage:
 18"x10"
 0.64

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.6436E-09	264.331	528.662	0.00E+00	6.99E-07	1.40E-06	Avg. MeV	
Am-241	3.1429E-03	264.331	528.662	0.00E+00	8.31E-01	1.66E+00	0.0150	5.298E+13
Am-242m	1.3195E-06	264.331	528.662	0.00E+00	3.49E-04	6.98E-04	0.0250	1.103E+13
Am-243	1.4753E-07	264.331	528.662	0.00E+00	3.90E-05	7.80E-05	0.0375	9.554E+12
C-14	1.2847E-04	264.331	528.662	0.00E+00	3.40E-02	6.79E-02	0.0575	1.028E+13
Ci-36	2.8120E-06	264.331	528.662	0.00E+00	7.43E-04	1.49E-03	0.0850	6.205E+12
Cm-243	1.2465E-07	264.331	528.662	0.00E+00	3.29E-05	6.59E-05	0.1250	4.055E+12
Cm-244	9.5564E-07	264.331	528.662	0.00E+00	2.53E-04	5.05E-04	0.2250	5.328E+12
Co-60	1.7880E-01	264.331	528.662	0.00E+00	4.73E+01	9.45E+01	0.3750	2.335E+12
Cs-134	5.8692E-04	264.331	528.662	0.00E+00	1.55E-01	3.10E-01	0.5750	3.840E+13
Cs-135	3.2195E-05	264.331	528.662	0.00E+00	8.51E-03	1.70E-02	0.8500	4.329E+11
Cs-137	1.9489E+00	264.331	528.662	0.00E+00	5.15E+02	1.03E+03	1.2500	7.173E+12
Eu-154	4.5895E-03	264.331	528.662	0.00E+00	1.21E+00	2.43E+00	1.7500	1.112E+10
Eu-155	3.6045E-03	264.331	528.662	0.00E+00	9.53E-01	1.91E+00	2.2500	3.831E+07
Fe-55	1.4185E-02	264.331	528.662	0.00E+00	3.75E+00	7.50E+00	2.7500	4.221E+05
H-3	4.7895E-03	264.331	528.662	0.00E+00	1.27E+00	2.53E+00	3.5000	2.354E+03
I-129	7.3684E-07	264.331	528.662	0.00E+00	1.95E-04	3.90E-04	5.0000	2.832E+02
Kr-85	9.5820E-02	264.331	528.662	0.00E+00	2.53E+01	5.07E+01	7.0000	3.200E+01
Np-237	1.2552E-06	264.331	528.662	0.00E+00	3.32E-04	6.64E-04	11.0000	3.642E+00
Pa-231	7.0406E-09	264.331	528.662	0.00E+00	1.86E-06	3.72E-06		
Pb-210	5.8000E-14	264.331	528.662	0.00E+00	1.53E-11	3.07E-11		
Pm-147	4.0075E-02	264.331	528.662	0.00E+00	1.06E+01	2.12E+01		
Pu-238	9.2256E-04	264.331	528.662	0.00E+00	2.44E-01	4.88E-01		
Pu-239	5.5278E-03	264.331	528.662	0.00E+00	1.46E+00	2.92E+00		
Pu-240	2.1248E-03	264.331	528.662	0.00E+00	5.62E-01	1.12E+00		
Pu-241	4.9549E-02	264.331	528.662	0.00E+00	1.31E+01	2.62E+01		
Pu-242	2.3128E-07	264.331	528.662	0.00E+00	6.11E-05	1.22E-04		
Ra-226	2.4526E-13	264.331	528.662	0.00E+00	6.48E-11	1.30E-10		
Ra-228	2.4015E-10	264.331	528.662	0.00E+00	6.35E-08	1.27E-07		
Ru-106	3.0602E-06	264.331	528.662	0.00E+00	8.09E-04	1.62E-03		
Se-79	1.3015E-05	264.331	528.662	0.00E+00	3.44E-03	6.88E-03		
Sn-126	1.2165E-05	264.331	528.662	0.00E+00	3.22E-03	6.43E-03		
Sr-90	1.8226E+00	264.331	528.662	0.00E+00	4.82E+02	9.64E+02		
Tc-99	4.4241E-04	264.331	528.662	0.00E+00	1.17E-01	2.34E-01		
Th-229	3.0962E-10	264.331	528.662	0.00E+00	8.18E-08	1.64E-07		
Th-230	4.2346E-11	264.331	528.662	0.00E+00	1.12E-08	2.24E-08		
Th-232	2.5278E-10	264.331	528.662	0.00E+00	6.68E-08	1.34E-07		
Ti-208	1.5820E-08	264.331	528.662	0.00E+00	4.18E-06	8.36E-06		
U-232	4.2647E-08	264.331	528.662	0.00E+00	1.13E-05	2.25E-05		
U-233	1.2211E-07	264.331	528.662	0.00E+00	3.23E-05	6.46E-05		
U-234	1.9955E-07	264.331	528.662	0.00E+00	5.27E-05	1.05E-04		
U-235	-2.6194E-06	264.331	0.000	5.98E-03	5.29E-03	5.98E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	264.331	528.662	0.00E+00	3.36E-03	6.71E-03	6.61E+00	1.32E+01
U-238	-3.6331E-08	264.331	0.000	3.72E-03	3.71E-03	3.72E-03	Total	Total
Y-90	1.8241E+00	264.331	528.662	0.00E+00	4.82E+02	9.64E+02		
Other Radionuclides					5.09E+02	1.02E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.61E+00	1.32E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00000041	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:	134.933	264.331	
Bounding:		528.662	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.56	1.96	
Bounding:	1.12		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ITALY)
 SNF ID #: 467
 Fuel Units & Descr: 64 - ELEMENT
 Heavy Metal Mass: BOL=11.93kg ; EOL=11.90kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1997
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.58

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	3.8271E-09	58.133	116.266	0.00E+00	2.22E-07	4.45E-07		
Am-241	4.4195E-03	58.133	116.266	0.00E+00	2.57E-01	5.14E-01	0.0150	1.051E+13
Am-242m	1.8195E-06	58.133	116.266	0.00E+00	1.06E-04	2.12E-04	0.0250	2.171E+12
Am-243	2.3278E-07	58.133	116.266	0.00E+00	1.35E-05	2.71E-05	0.0375	2.174E+12
C-14	4.3203E-05	58.133	116.266	0.00E+00	2.51E-03	5.02E-03	0.0575	2.085E+12
Cl-36	4.3023E-08	58.133	116.266	0.00E+00	2.50E-06	5.00E-06	0.0850	1.254E+12
Cm-243	1.6872E-07	58.133	116.266	0.00E+00	9.81E-06	1.96E-05	0.1250	1.275E+12
Cm-244	1.4660E-06	58.133	116.266	0.00E+00	8.52E-05	1.70E-04	0.2250	1.135E+12
Co-60	2.2376E-03	58.133	116.266	0.00E+00	1.30E-01	2.60E-01	0.3750	4.718E+11
Cs-134	1.2525E-04	58.133	116.266	0.00E+00	7.28E-03	1.46E-02	0.5750	7.632E+11
Cs-135	3.1549E-05	58.133	116.266	0.00E+00	1.83E-03	3.67E-03	0.8500	6.299E+11
Cs-137	1.7368E+00	58.133	116.266	0.00E+00	1.01E+02	2.02E+02	1.2500	6.610E+11
Eu-154	2.6947E-01	58.133	116.266	0.00E+00	1.57E+01	3.13E+01	1.7500	2.023E+10
Eu-155	2.6857E-02	58.133	116.266	0.00E+00	1.56E+00	3.12E+00	2.2500	3.105E+05
Fe-55	4.2105E-05	58.133	116.266	0.00E+00	2.45E-03	4.90E-03	2.7500	7.150E+04
H-3	3.5173E-03	58.133	116.266	0.00E+00	2.04E-01	4.09E-01	3.5000	1.843E+02
I-129	7.3805E-07	58.133	116.266	0.00E+00	4.29E-05	8.58E-05	5.0000	7.258E+01
Kr-85	6.9263E-02	58.133	116.266	0.00E+00	4.03E+00	8.05E+00	7.0000	8.203E+00
Np-237	1.4752E-06	58.133	116.266	0.00E+00	8.58E-05	1.72E-04	11.0000	9.336E-01
Pa-231	8.3970E-09	58.133	116.266	0.00E+00	4.88E-07	9.76E-07		
Pb-210	1.4995E-13	58.133	116.266	0.00E+00	8.72E-12	1.74E-11		
Pm-147	1.0567E-02	58.133	116.266	0.00E+00	6.14E-01	1.23E+00		
Pu-238	1.1543E-03	58.133	116.266	0.00E+00	6.71E-02	1.34E-01		
Pu-239	5.6917E-03	58.133	116.266	0.00E+00	3.31E-01	6.62E-01		
Pu-240	2.2602E-03	58.133	116.266	0.00E+00	1.31E-01	2.63E-01		
Pu-241	4.8045E-02	58.133	116.266	0.00E+00	2.79E+00	5.59E+00		
Pu-242	3.0602E-07	58.133	116.266	0.00E+00	1.78E-05	3.56E-05		
Ra-226	5.1293E-13	58.133	116.266	0.00E+00	2.98E-11	5.96E-11		
Ra-228	2.3323E-10	58.133	116.266	0.00E+00	1.36E-08	2.71E-08		
Ru-106	1.0075E-07	58.133	116.266	0.00E+00	5.86E-06	1.17E-05		
Se-79	1.2935E-05	58.133	116.266	0.00E+00	7.52E-04	1.50E-03		
Sn-126	1.2238E-05	58.133	116.266	0.00E+00	7.11E-04	1.42E-03		
Sr-90	1.6165E+00	58.133	116.266	0.00E+00	9.40E+01	1.88E+02		
Tc-99	4.4120E-04	58.133	116.266	0.00E+00	2.56E-02	5.13E-02		
Th-229	4.5684E-10	58.133	116.266	0.00E+00	2.66E-08	5.31E-08		
Th-230	6.8271E-11	58.133	116.266	0.00E+00	3.97E-09	7.94E-09		
Th-232	2.3744E-10	58.133	116.266	0.00E+00	1.38E-08	2.76E-08		
Tl-208	1.7368E-08	58.133	116.266	0.00E+00	1.01E-06	2.02E-06		
U-232	4.6797E-08	58.133	116.266	0.00E+00	2.72E-06	5.44E-06		
U-233	1.3146E-07	58.133	116.266	0.00E+00	7.64E-06	1.53E-05		
U-234	2.5729E-07	58.133	116.266	0.00E+00	1.50E-05	2.99E-05		
U-235	-2.6159E-06	58.133	0.000	5.10E-03	4.94E-03	5.10E-03		
U-236	1.2719E-05	58.133	116.266	0.00E+00	7.39E-04	1.48E-03		
U-238	-3.8857E-08	58.133	0.000	3.22E-03	3.21E-03	3.22E-03		
Y-90	1.6165E+00	58.133	116.266	0.00E+00	9.40E+01	1.88E+02		
Other Radionuclides					1.09E+02	2.19E+02		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.76448407	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	58.133	24.436	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		116.266	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.13	0.42	1.00
Bounding:	0.26		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ITALY) Fuel decay start date: 201C
 SNF ID #: 466 Estimates as of: 203C
 Fuel Units & Descr: 60 - ELEMENT Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=10.80kg ; EOL=10.74kg Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.0001E
Template Decay Time: 20 years

Estimated
Canister usage:
18"x10"
0.54

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.4556E-09	57.271	114.542	0.00E+00	1.41E-07	2.81E-07		
Am-241	3.8752E-03	57.271	114.542	0.00E+00	2.22E-01	4.44E-01	0.0150	1.175E+13
Am-242m	1.8617E-06	57.271	114.542	0.00E+00	1.07E-04	2.13E-04	0.0250	2.427E+12
Am-243	2.3293E-07	57.271	114.542	0.00E+00	1.33E-05	2.67E-05	0.0375	2.541E+12
C-14	4.3233E-05	57.271	114.542	0.00E+00	2.48E-03	4.95E-03	0.0575	2.348E+12
Cl-36	4.3023E-08	57.271	114.542	0.00E+00	2.46E-06	4.93E-06	0.0850	1.430E+12
Cm-243	1.9053E-07	57.271	114.542	0.00E+00	1.09E-05	2.18E-05	0.1250	1.605E+12
Cm-244	1.7744E-06	57.271	114.542	0.00E+00	1.02E-04	2.03E-04	0.2250	1.298E+12
Co-60	4.3188E-03	57.271	114.542	0.00E+00	2.47E-01	4.95E-01	0.3750	5.323E+11
Cs-134	6.7188E-04	57.271	114.542	0.00E+00	3.85E-02	7.70E-02	0.5750	8.481E+12
Cs-135	3.1549E-05	57.271	114.542	0.00E+00	1.81E-03	3.61E-03	0.8500	9.023E+11
Cs-137	1.9489E+00	57.271	114.542	0.00E+00	1.12E+02	2.23E+02	1.2500	9.721E+11
Eu-154	4.0301E-01	57.271	114.542	0.00E+00	2.31E+01	4.62E+01	1.7500	2.912E+10
Eu-155	5.4000E-02	57.271	114.542	0.00E+00	3.09E+00	6.19E+00	2.2500	4.617E+05
Fe-55	1.5955E-04	57.271	114.542	0.00E+00	9.14E-03	1.83E-02	2.7500	7.683E+04
H-3	4.6571E-03	57.271	114.542	0.00E+00	2.67E-01	5.33E-01	3.5000	5.412E+02
I-129	7.3805E-07	57.271	114.542	0.00E+00	4.23E-05	8.45E-05	5.0000	7.108E+01
Kr-85	9.5684E-02	57.271	114.542	0.00E+00	5.48E+00	1.10E+01	7.0000	8.038E-00
Np-237	1.4618E-06	57.271	114.542	0.00E+00	8.37E-05	1.67E-04	11.0000	9.151E-01
Pa-231	6.4782E-09	57.271	114.542	0.00E+00	3.71E-07	7.42E-07		
Pb-210	6.3158E-14	57.271	114.542	0.00E+00	3.62E-12	7.23E-12		
Pm-147	3.9564E-02	57.271	114.542	0.00E+00	2.27E+00	4.53E+00		
Pu-238	1.2008E-03	57.271	114.542	0.00E+00	6.88E-02	1.38E-01		
Pu-239	5.6917E-03	57.271	114.542	0.00E+00	3.26E-01	6.52E-01		
Pu-240	2.2617E-03	57.271	114.542	0.00E+00	1.30E-01	2.59E-01		
Pu-241	6.1113E-02	57.271	114.542	0.00E+00	3.50E+00	7.00E+00		
Pu-242	3.0602E-07	57.271	114.542	0.00E+00	1.75E-05	3.51E-05		
Ra-226	2.6707E-13	57.271	114.542	0.00E+00	1.53E-11	3.06E-11		
Ra-228	2.2556E-10	57.271	114.542	0.00E+00	1.29E-08	2.58E-08		
Ru-106	3.1293E-06	57.271	114.542	0.00E+00	1.79E-04	3.58E-04		
Se-79	1.2935E-05	57.271	114.542	0.00E+00	7.41E-04	1.48E-03		
Sn-126	1.2238E-05	57.271	114.542	0.00E+00	7.01E-04	1.40E-03		
Sr-90	1.8195E+00	57.271	114.542	0.00E+00	1.04E+02	2.08E+02		
Tc-99	4.4120E-04	57.271	114.542	0.00E+00	2.53E-02	5.05E-02		
Th-229	3.3308E-10	57.271	114.542	0.00E+00	1.91E-08	3.82E-08		
Th-230	4.6526E-11	57.271	114.542	0.00E+00	2.66E-09	5.33E-09		
Th-232	2.3744E-10	57.271	114.542	0.00E+00	1.36E-08	2.72E-08		
Tl-208	1.8195E-08	57.271	114.542	0.00E+00	1.04E-06	2.08E-06		
U-232	4.9098E-08	57.271	114.542	0.00E+00	2.81E-06	5.62E-06		
U-233	1.3140E-07	57.271	114.542	0.00E+00	7.53E-06	1.51E-05		
U-234	2.2571E-07	57.271	114.542	0.00E+00	1.29E-05	2.59E-05		
U-235	-2.6159E-06	57.271	0.000	4.67E-03	4.52E-03	4.67E-03		
U-236	1.2719E-05	57.271	114.542	0.00E+00	7.28E-04	1.46E-03		
U-238	-3.8857E-08	57.271	0.000	2.90E-03	2.90E-03	2.90E-03		
Y-90	1.8211E+00	57.271	114.542	0.00E+00	1.04E+02	2.09E+02		
Other Radionuclides					1.20E+02	2.40E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.49E+00	2.97E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	52.628	57.271	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		114.542	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.14	1.09	1.00
Bounding:	0.29		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ITALY) ¹Fuel decay start date: 2010
 SNF ID #: 477 Estimates as of: 2030
 Fuel Units & Descr: 48 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=9.36kg ; EOL=9.17kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.43

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.6436E-09	178.703	357.405	0.00E+00	4.72E-07	9.45E-07	Avg. MeV	
Am-241	3.1429E-03	178.703	357.405	0.00E+00	5.62E-01	1.12E+00	0.0150	3.582E+13
Am-242m	1.3195E-06	178.703	357.405	0.00E+00	2.36E-04	4.72E-04	0.0250	7.456E+12
Am-243	1.4753E-07	178.703	357.405	0.00E+00	2.64E-05	5.27E-05	0.0375	6.459E+12
C-14	1.2847E-04	178.703	357.405	0.00E+00	2.30E-02	4.59E-02	0.0575	6.949E+12
Cl-36	2.8120E-06	178.703	357.405	0.00E+00	5.03E-04	1.01E-03	0.0850	4.195E+12
Cm-243	1.2465E-07	178.703	357.405	0.00E+00	2.23E-05	4.45E-05	0.1250	2.742E+12
Cm-244	9.5564E-07	178.703	357.405	0.00E+00	1.71E-04	3.42E-04	0.2250	3.602E+12
Co-60	1.7880E-01	178.703	357.405	0.00E+00	3.20E+01	6.39E+01	0.3750	1.579E+13
Cs-134	5.8692E-04	178.703	357.405	0.00E+00	1.05E-01	2.10E-01	0.5750	2.596E+12
Cs-135	3.2195E-05	178.703	357.405	0.00E+00	5.75E-03	1.15E-02	0.8500	2.926E+11
Cs-137	1.9489E+00	178.703	357.405	0.00E+00	3.48E+02	6.97E+02	1.2500	4.849E+12
Eu-154	4.5895E-03	178.703	357.405	0.00E+00	8.20E-01	1.64E+00	1.7500	7.521E+09
Eu-155	3.6045E-03	178.703	357.405	0.00E+00	6.44E-01	1.29E+00	2.2500	2.590E+07
Fe-55	1.4185E-02	178.703	357.405	0.00E+00	2.53E+00	5.07E+00	2.7500	2.854E+05
H-3	4.7895E-03	178.703	357.405	0.00E+00	8.56E-01	1.71E+00	3.5000	1.592E+03
I-129	7.3684E-07	178.703	357.405	0.00E+00	1.32E-04	2.63E-04	5.0000	1.915E+02
Kr-85	9.5820E-02	178.703	357.405	0.00E+00	1.71E+01	3.42E+01	7.0000	2.164E+01
Np-237	1.2552E-06	178.703	357.405	0.00E+00	2.24E-04	4.49E-04	11.0000	2.462E+00
Pa-231	7.0406E-09	178.703	357.405	0.00E+00	1.26E-06	2.52E-06		
Pb-210	5.8000E-14	178.703	357.405	0.00E+00	1.04E-11	2.07E-11		
Pm-147	4.0075E-02	178.703	357.405	0.00E+00	7.16E+00	1.43E+01		
Pu-238	9.2256E-04	178.703	357.405	0.00E+00	1.65E-01	3.30E-01		
Pu-239	5.5278E-03	178.703	357.405	0.00E+00	9.88E-01	1.98E+00		
Pu-240	2.1248E-03	178.703	357.405	0.00E+00	3.80E-01	7.59E-01		
Pu-241	4.9549E-02	178.703	357.405	0.00E+00	8.85E+00	1.77E+01		
Pu-242	2.3128E-07	178.703	357.405	0.00E+00	4.13E-05	8.27E-05		
Ra-226	2.4526E-13	178.703	357.405	0.00E+00	4.38E-11	8.77E-11		
Ra-228	2.4015E-10	178.703	357.405	0.00E+00	4.29E-08	8.58E-08		
Ru-106	3.0602E-06	178.703	357.405	0.00E+00	5.47E-04	1.09E-03		
Se-79	1.3015E-05	178.703	357.405	0.00E+00	2.33E-03	4.65E-03		
Sn-126	1.2165E-05	178.703	357.405	0.00E+00	2.17E-03	4.35E-03		
Sr-90	1.8226E+00	178.703	357.405	0.00E+00	3.26E+02	6.51E+02		
Tc-99	4.4241E-04	178.703	357.405	0.00E+00	7.91E-02	1.58E-01		
Th-229	3.0962E-10	178.703	357.405	0.00E+00	5.53E-08	1.11E-07		
Th-230	4.2346E-11	178.703	357.405	0.00E+00	7.57E-09	1.51E-08		
Th-232	2.5278E-10	178.703	357.405	0.00E+00	4.52E-08	9.03E-08		
Tl-208	1.5820E-08	178.703	357.405	0.00E+00	2.83E-06	5.65E-06		
U-232	4.2647E-08	178.703	357.405	0.00E+00	7.62E-06	1.52E-05		
U-233	1.2211E-07	178.703	357.405	0.00E+00	2.18E-05	4.36E-05		
U-234	1.9955E-07	178.703	357.405	0.00E+00	3.57E-05	7.13E-05		
U-235	2.6194E-06	178.703	0.000	4.05E-03	3.58E-03	4.05E-03		
U-236	1.2693E-05	178.703	357.405	0.00E+00	2.27E-03	4.54E-03		
U-238	-3.6331E-08	178.703	0.000	2.52E-03	2.51E-03	2.52E-03		
Y-90	1.8241E+00	178.703	357.405	0.00E+00	3.26E+02	6.52E+02		
Other Radionuclides					3.44E+02	6.88E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.47E+00	8.94E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	SST (304)	SST
BOL HM Constituents:	U-ZrHX	U
BOL Enrichment %:	20	10 to 20

Basis for Parameter Differences:

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:	91.223	178.703
Bounding:		357.405

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

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.56	1.96
Bounding:	1.12	

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ITALY)
 SNF ID #: 1080
 Fuel Units & Descr: 140 - ELEMENT
 Heavy Metal Mass: BOL=26.89kg ; EOL=25.31kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2005
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-ZrX, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.26

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.6436E-09	1,510.189	3,020.377	0.00E+00	3.99E-06	7.98E-06	0.0150	3.027E+14
Am-241	3.1429E-03	1,510.189	3,020.377	0.00E+00	4.75E+00	9.49E+00	0.0250	6.301E+13
Am-242m	1.3195E-06	1,510.189	3,020.377	0.00E+00	1.99E-03	3.99E-03	0.0375	5.459E+13
Am-243	1.4753E-07	1,510.189	3,020.377	0.00E+00	2.23E-04	4.46E-04	0.0575	5.872E+13
C-14	1.2847E-04	1,510.189	3,020.377	0.00E+00	1.94E-01	3.88E-01	0.0850	3.545E+13
Ci-36	2.8120E-06	1,510.189	3,020.377	0.00E+00	4.25E-03	8.49E-03	0.1250	2.317E+13
Cm-243	1.2465E-07	1,510.189	3,020.377	0.00E+00	1.88E-04	3.76E-04	0.2250	3.044E+13
Cm-244	9.5564E-07	1,510.189	3,020.377	0.00E+00	1.44E-03	2.89E-03	0.3750	1.334E+13
Co-60	1.7880E-01	1,510.189	3,020.377	0.00E+00	2.70E+02	5.40E+02	0.5750	2.194E+14
Cs-134	5.8692E-04	1,510.189	3,020.377	0.00E+00	8.86E-01	1.77E+00	0.8500	2.473E+12
Cs-135	3.2195E-05	1,510.189	3,020.377	0.00E+00	4.86E-02	9.72E-02	1.2500	4.098E+13
Cs-137	1.9489E+00	1,510.189	3,020.377	0.00E+00	2.94E+03	5.89E+03	1.7500	6.356E+10
Eu-154	4.5895E-03	1,510.189	3,020.377	0.00E+00	6.93E+00	1.39E+01	2.2500	2.189E+08
Eu-155	3.6045E-03	1,510.189	3,020.377	0.00E+00	5.44E+00	1.09E+01	2.7500	2.411E+06
Fe-55	1.4185E-02	1,510.189	3,020.377	0.00E+00	2.14E+01	4.28E+01	3.5000	1.337E+04
H-3	4.7895E-03	1,510.189	3,020.377	0.00E+00	7.23E+00	1.45E+01	5.0000	1.588E+03
I-129	7.3684E-07	1,510.189	3,020.377	0.00E+00	1.11E-03	2.23E-03	7.0000	1.791E+02
Kr-85	9.5820E-02	1,510.189	3,020.377	0.00E+00	1.45E+02	2.89E+02	11.0000	2.038E+01
Np-237	1.2552E-06	1,510.189	3,020.377	0.00E+00	1.90E-03	3.79E-03		
Pa-231	7.0406E-09	1,510.189	3,020.377	0.00E+00	1.06E-05	2.13E-05		
Pb-210	5.8000E-14	1,510.189	3,020.377	0.00E+00	8.76E-11	1.75E-10		
Pm-147	4.0075E-02	1,510.189	3,020.377	0.00E+00	6.06E+01	1.21E+02		
Pu-238	9.2256E-04	1,510.189	3,020.377	0.00E+00	1.39E+00	2.79E+00		
Pu-239	5.5278E-03	1,510.189	3,020.377	0.00E+00	8.35E+00	1.67E+01		
Pu-240	2.1248E-03	1,510.189	3,020.377	0.00E+00	3.21E+00	6.42E+00		
Pu-241	4.9549E-02	1,510.189	3,020.377	0.00E+00	7.48E+01	1.50E+02		
Pu-242	2.3128E-07	1,510.189	3,020.377	0.00E+00	3.49E-04	6.99E-04		
Ra-226	2.4526E-13	1,510.189	3,020.377	0.00E+00	3.70E-10	7.41E-10		
Ra-228	2.4015E-10	1,510.189	3,020.377	0.00E+00	3.63E-07	7.25E-07		
Ru-106	3.0602E-06	1,510.189	3,020.377	0.00E+00	4.62E-03	9.24E-03		
Se-79	1.3015E-05	1,510.189	3,020.377	0.00E+00	1.97E-02	3.93E-02		
Sn-126	1.2165E-05	1,510.189	3,020.377	0.00E+00	1.84E-02	3.67E-02		
Sr-90	1.8226E+00	1,510.189	3,020.377	0.00E+00	2.75E+03	5.50E+03		
Tc-99	4.4241E-04	1,510.189	3,020.377	0.00E+00	6.68E-01	1.34E+00		
Th-229	3.0962E-10	1,510.189	3,020.377	0.00E+00	4.68E-07	9.35E-07		
Th-230	4.2346E-11	1,510.189	3,020.377	0.00E+00	6.40E-08	1.28E-07		
Th-232	2.5278E-10	1,510.189	3,020.377	0.00E+00	3.82E-07	7.63E-07		
Th-208	1.5820E-08	1,510.189	3,020.377	0.00E+00	2.39E-05	4.78E-05		
U-232	4.2647E-08	1,510.189	3,020.377	0.00E+00	6.44E-05	1.29E-04		
U-233	1.2211E-07	1,510.189	3,020.377	0.00E+00	1.84E-04	3.69E-04		
U-234	1.9955E-07	1,510.189	3,020.377	0.00E+00	3.01E-04	6.03E-04		
U-235	2.6194E-06	1,510.189	0.000	1.16E-02	7.68E-03	1.16E-02		
U-236	1.2693E-05	1,510.189	3,020.377	0.00E+00	1.92E-02	3.83E-02		
U-238	3.6331E-08	1,510.189	0.000	7.23E-03	7.17E-03	7.23E-03		
Y-90	1.8241E+00	1,510.189	3,020.377	0.00E+00	2.75E+03	5.51E+03		
Other Radionuclides					2.91E+03	5.82E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.78E+01	7.56E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.02640698	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	917.381	1,510.189	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		3,020.377	

Checks		
	Burnup Multiplier	Estimated Burnup/Given Burnup
Nominal:	1.65	1.65
Bounding:	3.29	
		Estimated EOL HM/Given EOL HM
		1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ITALY) 1Fuel decay start date: 1999
 SNF ID #: 478 Estimates as of: 2030
 Fuel Units & Descr: 71 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=13.64kg ; EOL=12.84kg 2Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.64

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4.1459E-09	765.881	1,531.763	0.00E+00	3.18E-06	6.35E-06	Avg. MeV	
Am-241	3.5850E-03	765.881	1,531.763	0.00E+00	2.75E+00	5.49E+00	0.0150	1.360E+14
Am-242m	1.2899E-06	765.881	1,531.763	0.00E+00	9.88E-04	1.98E-03	0.0250	2.827E+13
Am-243	1.4747E-07	765.881	1,531.763	0.00E+00	1.13E-04	2.26E-04	0.0375	2.452E+13
C-14	1.2839E-04	765.881	1,531.763	0.00E+00	9.83E-02	1.97E-01	0.0575	2.641E+13
Cf-252	2.8120E-06	765.881	1,531.763	0.00E+00	2.15E-03	4.31E-03	0.0850	1.592E+13
Cm-243	1.1038E-07	765.881	1,531.763	0.00E+00	8.45E-05	1.69E-04	0.1250	1.039E+13
Cm-244	7.8917E-07	765.881	1,531.763	0.00E+00	6.04E-04	1.21E-03	0.2250	1.369E+13
Co-60	9.2647E-02	765.881	1,531.763	0.00E+00	7.10E+01	1.42E+02	0.3750	5.978E+12
Cs-134	1.0940E-04	765.881	1,531.763	0.00E+00	8.38E-02	1.68E-01	0.5750	9.912E+13
Cs-135	3.2195E-05	765.881	1,531.763	0.00E+00	2.47E-02	4.93E-02	0.8500	1.064E+13
Cs-137	1.7368E+00	765.881	1,531.763	0.00E+00	1.33E+03	2.66E+03	1.2500	1.093E+13
Eu-154	3.0677E-03	765.881	1,531.763	0.00E+00	2.35E+00	4.70E+00	1.7500	2.771E+10
Eu-155	1.7925E-03	765.881	1,531.763	0.00E+00	1.37E+00	2.75E+00	2.2500	5.841E+07
Fe-55	3.7444E-03	765.881	1,531.763	0.00E+00	2.87E+00	5.74E+00	2.7500	9.876E+05
H-3	3.6180E-03	765.881	1,531.763	0.00E+00	2.77E+00	5.54E+00	3.5000	2.063E+03
I-129	7.3684E-07	765.881	1,531.763	0.00E+00	5.64E-04	1.13E-03	5.0000	8.028E+02
Kr-85	6.9368E-02	765.881	1,531.763	0.00E+00	5.31E+01	1.06E+02	7.0000	9.062E+01
Np-237	1.2662E-06	765.881	1,531.763	0.00E+00	9.70E-04	1.94E-03	11.0000	1.031E+01
Pa-231	9.1654E-09	765.881	1,531.763	0.00E+00	7.02E-06	1.40E-05		
Pb-210	1.3728E-13	765.881	1,531.763	0.00E+00	1.05E-10	2.10E-10		
Pm-147	1.0702E-02	765.881	1,531.763	0.00E+00	8.20E+00	1.64E+01		
Pu-238	8.8692E-04	765.881	1,531.763	0.00E+00	6.79E-01	1.36E+00		
Pu-239	5.5263E-03	765.881	1,531.763	0.00E+00	4.23E+00	8.47E+00		
Pu-240	2.1233E-03	765.881	1,531.763	0.00E+00	1.63E+00	3.25E+00		
Pu-241	3.8962E-02	765.881	1,531.763	0.00E+00	2.98E+01	5.97E+01		
Pu-242	2.3128E-07	765.881	1,531.763	0.00E+00	1.77E-04	3.54E-04		
Ra-226	4.6752E-13	765.881	1,531.763	0.00E+00	3.58E-10	7.16E-10		
Ra-228	2.4827E-10	765.881	1,531.763	0.00E+00	1.90E-07	3.80E-07		
Ru-106	9.8526E-08	765.881	1,531.763	0.00E+00	7.55E-05	1.51E-04		
Se-79	1.3015E-05	765.881	1,531.763	0.00E+00	9.97E-03	1.99E-02		
Sn-126	1.2165E-05	765.881	1,531.763	0.00E+00	9.32E-03	1.86E-02		
Sr-90	1.6195E+00	765.881	1,531.763	0.00E+00	1.24E+03	2.48E+03		
Tc-99	4.4241E-04	765.881	1,531.763	0.00E+00	3.39E-01	6.78E-01		
Th-229	4.2451E-10	765.881	1,531.763	0.00E+00	3.25E-07	6.50E-07		
Th-230	6.1398E-11	765.881	1,531.763	0.00E+00	4.70E-08	9.40E-08		
Th-232	2.5278E-10	765.881	1,531.763	0.00E+00	1.94E-07	3.87E-07		
Tl-208	1.5098E-08	765.881	1,531.763	0.00E+00	1.16E-05	2.31E-05		
U-232	4.0662E-08	765.881	1,531.763	0.00E+00	3.11E-05	6.23E-05		
U-233	1.2217E-07	765.881	1,531.763	0.00E+00	9.36E-05	1.87E-04		
U-234	2.2391E-07	765.881	1,531.763	0.00E+00	1.71E-04	3.43E-04		
U-235	2.6194E-06	765.881	0.000	5.90E-03	3.90E-03	5.90E-03		
U-236	1.2695E-05	765.881	1,531.763	0.00E+00	9.72E-03	1.94E-02		
U-238	-3.6331E-08	765.881	0.000	3.67E-03	3.64E-03	3.67E-03		
Y-90	1.6195E+00	765.881	1,531.763	0.00E+00	1.24E+03	2.48E+03		
Other Radionuclides					1.32E+03	2.64E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.83E+01	3.25E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.02640698	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	465.243	765.881	
Bounding:		1,531.763	

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

Checks				
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/Given EOL HM	
Nominal:	1.65	1.65		1.00
Bounding:	3.29			

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (JAPAN) 1 Fuel decay start date: 2010
 SNF ID #: 481 Estimates as of: 2030
 Fuel Units & Descr: 71 - ELEMENT Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=13.85kg ; EOL=13.77kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00018
Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.64

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.4556E-09	134.933	269.867	0.00E+00	3.31E-07	6.63E-07		
Am-241	3.8752E-03	134.933	269.867	0.00E+00	5.23E-01	1.05E+00	0.0150	2.770E+13
Am-242m	1.8617E-06	134.933	269.867	0.00E+00	2.51E-04	5.02E-04	0.0250	5.719E+12
Am-243	2.3293E-07	134.933	269.867	0.00E+00	3.14E-05	6.29E-05	0.0375	5.986E+12
C-14	4.3233E-05	134.933	269.867	0.00E+00	5.83E-03	1.17E-02	0.0575	5.539E+12
Cl-36	4.3023E-08	134.933	269.867	0.00E+00	5.81E-06	1.16E-05	0.0850	3.368E+12
Cm-243	1.9053E-07	134.933	269.867	0.00E+00	2.57E-05	5.14E-05	0.1250	3.781E+12
Cm-244	1.7744E-06	134.933	269.867	0.00E+00	2.39E-04	4.79E-04	0.2250	3.053E+12
Co-60	4.3188E-03	134.933	269.867	0.00E+00	5.83E-01	1.17E+00	0.3750	1.254E+12
Cs-134	6.7188E-04	134.933	269.867	0.00E+00	9.07E-02	1.81E-01	0.5750	1.998E+13
Cs-135	3.1549E-05	134.933	269.867	0.00E+00	4.26E-03	8.51E-03	0.8500	2.126E+12
Cs-137	1.9489E+00	134.933	269.867	0.00E+00	2.63E+02	5.26E+02	1.2500	2.290E+12
Eu-154	4.0301E-01	134.933	269.867	0.00E+00	5.44E+01	1.09E+02	1.7500	6.861E+10
Eu-155	5.4000E-02	134.933	269.867	0.00E+00	7.29E+00	1.46E+01	2.2500	1.088E+06
Fe-55	1.5955E-04	134.933	269.867	0.00E+00	2.15E-02	4.31E-02	2.7500	1.810E+05
H-3	4.6571E-03	134.933	269.867	0.00E+00	6.28E-01	1.26E+00	3.5000	1.258E+03
I-129	7.3805E-07	134.933	269.867	0.00E+00	9.96E-05	1.99E-04	5.0000	1.603E+02
Kr-85	9.5684E-02	134.933	269.867	0.00E+00	1.29E+01	2.58E+01	7.0000	1.811E+01
Np-237	1.4618E-06	134.933	269.867	0.00E+00	1.97E-04	3.94E-04	11.0000	2.061E+00
Pa-231	6.4782E-09	134.933	269.867	0.00E+00	8.74E-07	1.75E-06		
Pb-210	6.3158E-14	134.933	269.867	0.00E+00	8.52E-12	1.70E-11		
Pm-147	3.9564E-02	134.933	269.867	0.00E+00	5.34E+00	1.07E+01		
Pu-238	1.2008E-03	134.933	269.867	0.00E+00	1.62E-01	3.24E-01		
Pu-239	5.6917E-03	134.933	269.867	0.00E+00	7.68E-01	1.54E+00		
Pu-240	2.2617E-03	134.933	269.867	0.00E+00	3.05E-01	6.10E-01		
Pu-241	6.1113E-02	134.933	269.867	0.00E+00	8.25E+00	1.65E+01		
Pu-242	3.0602E-07	134.933	269.867	0.00E+00	4.13E-05	8.26E-05		
Ra-226	2.6707E-13	134.933	269.867	0.00E+00	3.60E-11	7.21E-11		
Ra-228	2.2556E-10	134.933	269.867	0.00E+00	3.04E-08	6.09E-08		
Ru-106	3.1293E-06	134.933	269.867	0.00E+00	4.22E-04	8.45E-04		
Se-79	1.2935E-05	134.933	269.867	0.00E+00	1.75E-03	3.49E-03		
Sn-126	1.2238E-05	134.933	269.867	0.00E+00	1.65E-03	3.30E-03		
Sr-90	1.8195E+00	134.933	269.867	0.00E+00	2.46E+02	4.91E+02		
Tc-99	4.4120E-04	134.933	269.867	0.00E+00	5.95E-02	1.19E-01		
Th-229	3.3308E-10	134.933	269.867	0.00E+00	4.49E-08	8.99E-08		
Th-230	4.6526E-11	134.933	269.867	0.00E+00	6.28E-09	1.26E-08		
Th-232	2.3744E-10	134.933	269.867	0.00E+00	3.20E-08	6.41E-08		
Tl-208	1.8195E-08	134.933	269.867	0.00E+00	2.46E-06	4.91E-06		
U-232	4.9098E-08	134.933	269.867	0.00E+00	6.62E-06	1.32E-05		
U-233	1.3140E-07	134.933	269.867	0.00E+00	1.77E-05	3.55E-05		
U-234	2.2571E-07	134.933	269.867	0.00E+00	3.05E-05	6.09E-05		
U-235	-2.6159E-06	134.933	0.000	5.98E-03	5.63E-03	5.98E-03		
U-236	1.2719E-05	134.933	269.867	0.00E+00	1.72E-03	3.43E-03		
U-238	-3.8857E-08	134.933	0.000	3.72E-03	3.72E-03	3.72E-03		
Y-90	1.8211E+00	134.933	269.867	0.00E+00	2.46E+02	4.91E+02		
Other Radionuclides					2.83E+02	5.65E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.50E+00	7.01E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00000073	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	134.933	67.771	
Bounding:		269.867	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.26	0.50	
Bounding:	0.53		

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (JAPAN)
 SNF ID #: 479
 Fuel Units & Descr: 73 - ELEMENT
 Heavy Metal Mass: BOL=14.24kg : EOL=14.09kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 0.66

Radionuclide	m	x _n	x _b	b			y _b		Gamma Sources	
				Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)		
Ac-227	2.6436E-09	139.373	278.745	0.00E+00	3.68E-07	7.37E-07	Avg. MeV			
Am-241	3.1429E-03	139.373	278.745	0.00E+00	4.38E-01	8.76E-01	0.0150	2.793E+13		
Am-242m	1.3195E-06	139.373	278.745	0.00E+00	1.84E-04	3.68E-04	0.0250	5.815E+12		
Am-243	1.4753E-07	139.373	278.745	0.00E+00	2.06E-05	4.11E-05	0.0375	5.038E+12		
C-14	1.2847E-04	139.373	278.745	0.00E+00	1.79E-02	3.58E-02	0.0575	5.419E+12		
Cl-36	2.8120E-06	139.373	278.745	0.00E+00	3.92E-04	7.84E-04	0.0850	3.272E+12		
Cm-243	1.2465E-07	139.373	278.745	0.00E+00	1.74E-05	3.47E-05	0.1250	2.138E+12		
Cm-244	9.5564E-07	139.373	278.745	0.00E+00	1.33E-04	2.66E-04	0.2250	2.809E+12		
Co-60	1.7880E-01	139.373	278.745	0.00E+00	2.49E+01	4.98E+01	0.3750	1.231E+12		
Cs-134	5.8692E-04	139.373	278.745	0.00E+00	8.18E-02	1.64E-01	0.5750	2.025E+13		
Cs-135	3.2195E-05	139.373	278.745	0.00E+00	4.49E-03	8.97E-03	0.8500	2.282E+11		
Cs-137	1.9489E+00	139.373	278.745	0.00E+00	2.72E+02	5.43E+02	1.2500	3.782E+12		
Eu-154	4.5895E-03	139.373	278.745	0.00E+00	6.40E-01	1.28E+00	1.7500	5.866E+09		
Eu-155	3.6045E-03	139.373	278.745	0.00E+00	5.02E-01	1.00E+00	2.2500	2.020E+07		
Fe-55	1.4185E-02	139.373	278.745	0.00E+00	1.98E+00	3.95E+00	2.7500	2.226E+05		
H-3	4.7895E-03	139.373	278.745	0.00E+00	6.68E-01	1.34E+00	3.5000	1.251E+03		
I-129	7.3684E-07	139.373	278.745	0.00E+00	1.03E-04	2.05E-04	5.0000	1.536E+02		
Kr-85	9.5820E-02	139.373	278.745	0.00E+00	1.34E+01	2.67E+01	7.0000	1.737E+01		
Np-237	1.2552E-06	139.373	278.745	0.00E+00	1.75E-04	3.50E-04	11.0000	1.977E+00		
Pa-231	7.0406E-09	139.373	278.745	0.00E+00	9.81E-07	1.96E-06				
Pb-210	5.8000E-14	139.373	278.745	0.00E+00	8.08E-12	1.62E-11				
Pm-147	4.0075E-02	139.373	278.745	0.00E+00	5.59E+00	1.12E+01				
Pu-238	9.2256E-04	139.373	278.745	0.00E+00	1.29E-01	2.57E-01				
Pu-239	5.5278E-03	139.373	278.745	0.00E+00	7.70E-01	1.54E+00				
Pu-240	2.1248E-03	139.373	278.745	0.00E+00	2.96E-01	5.92E-01				
Pu-241	4.9549E-02	139.373	278.745	0.00E+00	6.91E+00	1.38E+01				
Pu-242	2.3128E-07	139.373	278.745	0.00E+00	3.22E-05	6.45E-05				
Ra-226	2.4526E-13	139.373	278.745	0.00E+00	3.42E-11	6.84E-11				
Ra-228	2.4015E-10	139.373	278.745	0.00E+00	3.35E-08	6.69E-08				
Ru-106	3.0602E-06	139.373	278.745	0.00E+00	4.27E-04	8.53E-04				
Se-79	1.3015E-05	139.373	278.745	0.00E+00	1.81E-03	3.63E-03				
Sn-126	1.2165E-05	139.373	278.745	0.00E+00	1.70E-03	3.39E-03				
Sr-90	1.8226E+00	139.373	278.745	0.00E+00	2.54E+02	5.08E+02				
Tc-99	4.4241E-04	139.373	278.745	0.00E+00	6.17E-02	1.23E-01				
Th-229	3.0962E-10	139.373	278.745	0.00E+00	4.32E-08	8.63E-08				
Th-230	4.2346E-11	139.373	278.745	0.00E+00	5.90E-09	1.18E-08				
Th-232	2.5278E-10	139.373	278.745	0.00E+00	3.52E-08	7.05E-08				
Tl-208	1.5820E-08	139.373	278.745	0.00E+00	2.20E-06	4.41E-06				
U-232	4.2647E-08	139.373	278.745	0.00E+00	5.94E-06	1.19E-05				
U-233	1.2211E-07	139.373	278.745	0.00E+00	1.70E-05	3.40E-05				
U-234	1.9955E-07	139.373	278.745	0.00E+00	2.78E-05	5.56E-05				
U-235	-2.6194E-06	139.373	0.000	6.15E-03	5.79E-03	6.15E-03				
U-236	1.2693E-05	139.373	278.745	0.00E+00	1.77E-03	3.54E-03				
U-238	-3.6331E-08	139.373	0.000	3.83E-03	3.82E-03	3.83E-03				
Y-90	1.8241E+00	139.373	278.745	0.00E+00	2.54E+02	5.08E+02				
Other Radionuclides					2.68E+02	5.37E+02				

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.49E+00	6.97E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	138.734	139.373	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		278.745	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.29	1.00	1.00
Bounding:	0.57		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (KSU)
 SNF ID #: 804
 Fuel Units & Descr: 3 - ELEMENT
 Heavy Metal Mass: BOL=.54kg ; EOL=.51kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-ZrX, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000118
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.03

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg MeV	
Ac-227	8.0632E-10	25.772	51.544	0.00E+00	2.08E-08	4.16E-08	0.0150	8.721E+12
Am-241	2.2586E-03	25.772	51.544	0.00E+00	5.82E-02	1.16E-01	0.0250	1.893E+12
Am-242m	1.9925E-06	25.772	51.544	0.00E+00	5.14E-05	1.03E-04	0.0375	2.359E+12
Am-243	2.3323E-07	25.772	51.544	0.00E+00	6.01E-06	1.20E-05	0.0575	1.808E+12
C-14	4.3308E-05	25.772	51.544	0.00E+00	1.12E-03	2.23E-03	0.0850	1.266E+12
Cl-36	4.3023E-08	25.772	51.544	0.00E+00	1.11E-06	2.22E-06	0.1250	1.893E+12
Cm-243	2.7429E-07	25.772	51.544	0.00E+00	7.07E-06	1.41E-05	0.2250	1.057E+12
Cm-244	3.1504E-06	25.772	51.544	0.00E+00	8.12E-05	1.62E-04	0.3750	4.702E+11
Co-60	3.1008E-02	25.772	51.544	0.00E+00	7.99E-01	1.60E+00	0.5750	5.962E+12
Cs-134	1.0367E-01	25.772	51.544	0.00E+00	2.67E+00	5.34E+00	0.8500	1.467E+12
Cs-135	3.1549E-05	25.772	51.544	0.00E+00	8.13E-04	1.63E-03	1.2500	1.521E+12
Cs-137	2.7564E+00	25.772	51.544	0.00E+00	7.10E+01	1.42E+02	1.7500	4.354E+10
Eu-154	1.3490E+00	25.772	51.544	0.00E+00	3.48E+01	6.95E+01	2.2500	5.292E+09
Eu-155	4.3880E-01	25.772	51.544	0.00E+00	1.13E+01	2.26E+01	2.7500	4.298E+07
Fe-55	8.6782E-03	25.772	51.544	0.00E+00	2.24E-01	4.47E-01	3.5000	5.025E+06
H-3	1.0805E-02	25.772	51.544	0.00E+00	2.78E-01	5.57E-01	5.0000	2.973E+01
I-129	7.3805E-07	25.772	51.544	0.00E+00	1.90E-05	3.80E-05	7.0000	3.365E+00
Kr-85	2.5218E-01	25.772	51.544	0.00E+00	6.50E+00	1.30E+01	11.0000	3.834E-01
Np-237	1.4463E-06	25.772	51.544	0.00E+00	3.73E-05	7.45E-05		
Pa-231	3.5970E-09	25.772	51.544	0.00E+00	9.27E-08	1.85E-07		
Pb-210	8.2511E-15	25.772	51.544	0.00E+00	2.13E-13	4.25E-13		
Pm-147	2.0767E+00	25.772	51.544	0.00E+00	5.35E+01	1.07E+02		
Pu-238	1.3514E-03	25.772	51.544	0.00E+00	3.48E-02	6.97E-02		
Pu-239	5.6947E-03	25.772	51.544	0.00E+00	1.47E-01	2.94E-01		
Pu-240	2.2647E-03	25.772	51.544	0.00E+00	5.84E-02	1.17E-01		
Pu-241	1.2574E-01	25.772	51.544	0.00E+00	3.24E+00	6.48E+00		
Pu-242	3.0602E-07	25.772	51.544	0.00E+00	7.89E-06	1.58E-05		
Ra-226	5.7353E-14	25.772	51.544	0.00E+00	1.48E-12	2.96E-12		
Ra-228	1.8150E-10	25.772	51.544	0.00E+00	4.68E-09	9.36E-09		
Ru-106	9.3744E-02	25.772	51.544	0.00E+00	2.42E+00	4.83E+00		
Se-79	1.2938E-05	25.772	51.544	0.00E+00	3.33E-04	6.67E-04		
Sn-126	1.2239E-05	25.772	51.544	0.00E+00	3.15E-04	6.31E-04		
Sr-90	2.6000E+00	25.772	51.544	0.00E+00	6.70E+01	1.34E+02		
Tc-99	4.4120E-04	25.772	51.544	0.00E+00	1.14E-02	2.27E-02		
Th-229	1.4749E-10	25.772	51.544	0.00E+00	3.80E-09	7.60E-09		
Th-230	1.9549E-11	25.772	51.544	0.00E+00	5.04E-10	1.01E-09		
Th-232	2.3744E-10	25.772	51.544	0.00E+00	6.12E-09	1.22E-08		
Tl-208	1.9459E-08	25.772	51.544	0.00E+00	5.01E-07	1.00E-06		
U-232	5.6015E-08	25.772	51.544	0.00E+00	1.44E-06	2.89E-06		
U-233	1.3132E-07	25.772	51.544	0.00E+00	3.38E-06	6.77E-06		
U-234	1.7323E-07	25.772	51.544	0.00E+00	4.46E-06	8.93E-06		
U-235	-2.6159E-06	25.772	0.000	2.33E-04	1.66E-04	2.33E-04		
U-236	1.2717E-05	25.772	51.544	0.00E+00	3.28E-04	6.55E-04		
U-238	-3.8857E-08	25.772	0.000	1.45E-04	1.44E-04	1.45E-04		
Y-90	2.6015E+00	25.772	51.544	0.00E+00	6.70E+01	1.34E+02		
Other Radionuclides					9.80E+01	1.96E+02		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.99999834	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		25.772	
Bounding:		51.544	

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:	1.29	
Bounding:	2.58	

Estimated EOL HM/ Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (KSU) ¹Fuel decay start date: 1973
 SNF ID #: 871 Estimates as of: 2030
 Fuel Units & Descr: 61 - ELEMENT Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=11.29kg ; EOL=11.21kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.55

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.6842E-09	109.984	219.967	0.00E+00	9.55E-07	1.91E-06		
Am-241	4.9459E-03	109.984	219.967	0.00E+00	5.44E-01	1.09E+00	0.0150	1.079E+13
Am-242m	1.6241E-06	109.984	219.967	0.00E+00	1.79E-04	3.57E-04	0.0250	2.236E+12
Am-243	2.3233E-07	109.984	219.967	0.00E+00	2.56E-05	5.11E-05	0.0375	2.018E+12
C-14	4.3083E-05	109.984	219.967	0.00E+00	4.74E-03	9.48E-03	0.0575	2.112E+12
Cl-36	4.3023E-08	109.984	219.967	0.00E+00	4.73E-06	9.46E-06	0.0850	1.260E+12
Cm-243	9.1880E-08	109.984	219.967	0.00E+00	1.01E-05	2.02E-05	0.1250	9.348E+11
Cm-244	5.6346E-07	109.984	219.967	0.00E+00	6.20E-05	1.24E-04	0.2250	1.106E+12
Co-60	8.3699E-05	109.984	219.967	0.00E+00	9.21E-03	1.84E-02	0.3750	4.770E+11
Cs-134	2.8211E-08	109.984	219.967	0.00E+00	3.10E-06	6.21E-06	0.5750	8.009E+12
Cs-135	3.1549E-05	109.984	219.967	0.00E+00	3.47E-03	6.94E-03	0.8500	2.181E+11
Cs-137	9.7519E-01	109.984	219.967	0.00E+00	1.07E+02	2.15E+02	1.2500	1.844E+11
Eu-154	3.5970E-02	109.984	219.967	0.00E+00	3.96E+00	7.91E+00	1.7500	6.611E+09
Eu-155	8.1774E-04	109.984	219.967	0.00E+00	8.99E-02	1.80E-01	2.2500	2.243E+05
Fe-55	5.3940E-08	109.984	219.967	0.00E+00	5.93E-06	1.19E-05	2.7500	1.059E+05
H-3	8.6571E-04	109.984	219.967	0.00E+00	9.52E-02	1.90E-01	3.5000	3.053E+02
I-129	7.3805E-07	109.984	219.967	0.00E+00	8.12E-05	1.62E-04	5.0000	1.285E+02
Kr-85	1.3771E-02	109.984	219.967	0.00E+00	1.51E+00	3.03E+00	7.0000	1.450E+01
Np-237	1.5218E-06	109.984	219.967	0.00E+00	1.67E-04	3.35E-04	11.0000	1.649E+00
Pa-231	1.4152E-08	109.984	219.967	0.00E+00	1.56E-06	3.11E-06		
Pb-210	7.9774E-13	109.984	219.967	0.00E+00	8.77E-11	1.75E-10		
Pm-147	1.4362E-05	109.984	219.967	0.00E+00	1.58E-03	3.16E-03		
Pu-238	9.4782E-04	109.984	219.967	0.00E+00	1.04E-01	2.08E-01		
Pu-239	5.6872E-03	109.984	219.967	0.00E+00	6.26E-01	1.25E+00		
Pu-240	2.2541E-03	109.984	219.967	0.00E+00	2.48E-01	4.96E-01		
Pu-241	1.4433E-02	109.984	219.967	0.00E+00	1.59E+00	3.17E+00		
Pu-242	3.0602E-07	109.984	219.967	0.00E+00	3.37E-05	6.73E-05		
Ra-226	1.8857E-12	109.984	219.967	0.00E+00	2.07E-10	4.15E-10		
Ra-228	2.3729E-10	109.984	219.967	0.00E+00	2.61E-08	5.22E-08		
Ru-106	3.4857E-15	109.984	219.967	0.00E+00	3.83E-13	7.67E-13		
Se-79	1.2931E-05	109.984	219.967	0.00E+00	1.42E-03	2.84E-03		
Sn-126	1.2235E-05	109.984	219.967	0.00E+00	1.35E-03	2.69E-03		
Sr-90	8.9173E-01	109.984	219.967	0.00E+00	9.81E+01	1.96E+02		
Tc-99	4.4120E-04	109.984	219.967	0.00E+00	4.85E-02	9.71E-02		
Th-229	8.2752E-10	109.984	219.967	0.00E+00	9.10E-08	1.82E-07		
Th-230	1.4908E-10	109.984	219.967	0.00E+00	1.64E-08	3.28E-08		
Th-232	2.3744E-10	109.984	219.967	0.00E+00	2.61E-08	5.22E-08		
Th-234	1.3668E-08	109.984	219.967	0.00E+00	1.50E-06	3.01E-06		
U-232	3.6797E-08	109.984	219.967	0.00E+00	4.05E-06	8.09E-06		
U-233	1.3164E-07	109.984	219.967	0.00E+00	1.45E-05	2.90E-05		
U-234	3.3865E-07	109.984	219.967	0.00E+00	3.72E-05	7.45E-05		
U-235	-2.6144E-06	109.984	0.000	4.88E-03	4.59E-03	4.88E-03		
U-236	1.2722E-05	109.984	219.967	0.00E+00	1.40E-03	2.80E-03		
U-238	-3.8857E-08	109.984	0.000	3.03E-03	3.03E-03	3.03E-03		
Y-90	8.9203E-01	109.984	219.967	0.00E+00	9.81E+01	1.96E+02		
Other Radionuclides					1.23E+02	2.46E+02		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	109.984	75.693	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		219.967	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.26	0.69	1.00
Bounding:	0.53		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (MEXICO)
 SNF ID #: 482
 Fuel Units & Descr: 151 - ELEMENT
 Heavy Metal Mass: BOL=29.45kg ; EOL=28.40kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2006
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 1.36

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.6436E-09	994.605	1,989.209	0.00E+00	2.63E-06	5.26E-06	Avg. MeV	
Am-241	3.1429E-03	994.605	1,989.209	0.00E+00	3.13E+00	6.25E+00	0.0150	1.993E+14
Am-242m	1.3195E-06	994.605	1,989.209	0.00E+00	1.31E-03	2.62E-03	0.0250	4.150E+13
Am-243	1.4753E-07	994.605	1,989.209	0.00E+00	1.47E-04	2.93E-04	0.0375	3.595E+13
C-14	1.2847E-04	994.605	1,989.209	0.00E+00	1.28E-01	2.56E-01	0.0575	3.867E+13
Cl-36	2.8120E-06	994.605	1,989.209	0.00E+00	2.80E-03	5.59E-03	0.0850	2.335E+13
Cm-243	1.2465E-07	994.605	1,989.209	0.00E+00	1.24E-04	2.48E-04	0.1250	1.526E+13
Cm-244	9.5564E-07	994.605	1,989.209	0.00E+00	9.50E-04	1.90E-03	0.2250	2.005E+13
Co-60	1.7880E-01	994.605	1,989.209	0.00E+00	1.78E+02	3.56E+02	0.3750	8.786E+12
Cs-134	5.8692E-04	994.605	1,989.209	0.00E+00	5.84E-01	1.17E+00	0.5750	1.445E+14
Cs-135	3.2195E-05	994.605	1,989.209	0.00E+00	3.20E-02	6.40E-02	0.8500	1.629E+12
Cs-137	1.9489E+00	994.605	1,989.209	0.00E+00	1.94E+03	3.88E+03	1.2500	2.699E+13
Eu-154	4.5895E-03	994.605	1,989.209	0.00E+00	4.56E+00	9.13E+00	1.7500	4.186E+10
Eu-155	3.6045E-03	994.605	1,989.209	0.00E+00	3.59E+00	7.17E+00	2.2500	1.441E+08
Fe-55	1.4185E-02	994.605	1,989.209	0.00E+00	1.41E+01	2.82E+01	2.7500	1.588E+06
H-3	4.7895E-03	994.605	1,989.209	0.00E+00	4.76E+00	9.53E+00	3.5000	8.826E+03
I-129	7.3684E-07	994.605	1,989.209	0.00E+00	7.33E-04	1.47E-03	5.0000	1.052E+03
Kr-85	9.5820E-02	994.605	1,989.209	0.00E+00	9.53E+01	1.91E+02	7.0000	1.188E+02
Np-237	1.2552E-06	994.605	1,989.209	0.00E+00	1.25E-03	2.50E-03	11.0000	1.352E+01
Pa-231	7.0406E-09	994.605	1,989.209	0.00E+00	7.00E-06	1.40E-05		
Pb-210	5.8000E-14	994.605	1,989.209	0.00E+00	5.77E-11	1.15E-10		
Pm-147	4.0075E-02	994.605	1,989.209	0.00E+00	3.99E+01	7.97E+01		
Pu-238	9.2256E-04	994.605	1,989.209	0.00E+00	9.18E-01	1.84E+00		
Pu-239	5.5278E-03	994.605	1,989.209	0.00E+00	5.50E+00	1.10E+01		
Pu-240	2.1248E-03	994.605	1,989.209	0.00E+00	2.11E+00	4.23E+00		
Pu-241	4.9549E-02	994.605	1,989.209	0.00E+00	4.93E+01	9.86E+01		
Pu-242	2.3128E-07	994.605	1,989.209	0.00E+00	2.30E-04	4.60E-04		
Ra-226	2.4526E-13	994.605	1,989.209	0.00E+00	2.44E-10	4.88E-10		
Ra-228	2.4015E-10	994.605	1,989.209	0.00E+00	2.39E-07	4.78E-07		
Ru-106	3.0602E-06	994.605	1,989.209	0.00E+00	3.04E-03	6.09E-03		
Se-79	1.3015E-05	994.605	1,989.209	0.00E+00	1.29E-02	2.59E-02		
Sn-126	1.2165E-05	994.605	1,989.209	0.00E+00	1.21E-02	2.42E-02		
Sr-90	1.8226E+00	994.605	1,989.209	0.00E+00	1.81E+03	3.63E+03		
Tc-99	4.4241E-04	994.605	1,989.209	0.00E+00	4.40E-01	8.80E-01		
Th-229	3.0962E-10	994.605	1,989.209	0.00E+00	3.08E-07	6.16E-07		
Th-230	4.2346E-11	994.605	1,989.209	0.00E+00	4.21E-08	8.42E-08		
Th-232	2.5278E-10	994.605	1,989.209	0.00E+00	2.51E-07	5.03E-07		
Th-208	1.5820E-08	994.605	1,989.209	0.00E+00	1.57E-05	3.15E-05		
U-232	4.2647E-08	994.605	1,989.209	0.00E+00	4.24E-05	8.48E-05		
U-233	1.2211E-07	994.605	1,989.209	0.00E+00	1.21E-04	2.43E-04		
U-234	1.9955E-07	994.605	1,989.209	0.00E+00	1.98E-04	3.97E-04		
U-235	-2.6194E-06	994.605	0.000	1.27E-02	1.01E-02	1.27E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	994.605	1,989.209	0.00E+00	1.26E-02	2.52E-02	2.49E+01	4.98E+01
U-238	-3.6331E-08	994.605	0.000	7.92E-03	7.88E-03	7.92E-03	Total	Total
Y-90	1.8241E+00	994.605	1,989.209	0.00E+00	1.81E+03	3.63E+03		
Other Radionuclides					1.92E+03	3.83E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00000041	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		994.605	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,989.209	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.99	
Bounding:	1.98	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (MNRC) ¹Fuel decay start date: 2035
 SNF ID #: 704 Estimates as of: 2030
 Fuel Units & Descr: 6 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=4.97kg ; EOL=4.97kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18" x 10"
 0.05

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	8.5173E-10	94.964	470.665	0.00E+00	8.09E-08	4.01E-07	Avg. MeV	
Am-241	1.8331E-03	94.964	470.665	0.00E+00	1.74E-01	8.63E-01	0.0150	7.607E+13
Am-242m	1.4129E-06	94.964	470.665	0.00E+00	1.34E-04	6.65E-04	0.0250	1.674E+13
Am-243	1.4774E-07	94.964	470.665	0.00E+00	1.40E-05	6.95E-05	0.0375	1.425E+13
C-14	1.2871E-04	94.964	470.665	0.00E+00	1.22E-02	6.06E-02	0.0575	1.463E+13
Cl-36	2.8120E-06	94.964	470.665	0.00E+00	2.67E-04	1.32E-03	0.0850	9.064E+12
Cm-243	1.7940E-07	94.964	470.665	0.00E+00	1.70E-05	8.44E-05	0.1250	6.582E+12
Cm-244	1.6962E-06	94.964	470.665	0.00E+00	1.61E-04	7.98E-04	0.2250	7.689E+12
Co-60	1.2839E+00	94.964	470.665	0.00E+00	1.22E+02	6.04E+02	0.3750	3.902E+12
Cs-134	9.0541E-02	94.964	470.665	0.00E+00	8.60E+00	4.26E+01	0.5750	5.188E+13
Cs-135	3.2195E-05	94.964	470.665	0.00E+00	3.06E-03	1.52E-02	0.8500	2.226E+12
Cs-137	2.7564E+00	94.964	470.665	0.00E+00	2.62E+02	1.30E+03	1.2500	4.521E+13
Eu-154	1.5368E-02	94.964	470.665	0.00E+00	1.46E+00	7.23E+00	1.7500	3.014E+10
Eu-155	2.9293E-02	94.964	470.665	0.00E+00	2.78E+00	1.38E+01	2.2500	4.859E+10
Fe-55	7.7158E-01	94.964	470.665	0.00E+00	7.33E+01	3.63E+02	2.7500	3.855E+08
H-3	1.1111E-02	94.964	470.665	0.00E+00	1.06E+00	5.23E+00	3.5000	4.488E+07
I-129	7.3684E-07	94.964	470.665	0.00E+00	7.00E-05	3.47E-04	5.0000	2.497E+02
Kr-85	2.5263E-01	94.964	470.665	0.00E+00	2.40E+01	1.19E+02	7.0000	2.827E+01
Np-237	1.2427E-06	94.964	470.665	0.00E+00	1.18E-04	5.85E-04	11.0000	3.220E+00
Pa-231	3.8511E-09	94.964	470.665	0.00E+00	3.66E-07	1.81E-06		
Pb-210	7.3880E-15	94.964	470.665	0.00E+00	7.02E-13	3.48E-12		
Pm-147	2.1023E+00	94.964	470.665	0.00E+00	2.00E+02	9.89E+02		
Pu-238	1.0383E-03	94.964	470.665	0.00E+00	9.86E-02	4.89E-01		
Pu-239	5.5293E-03	94.964	470.665	0.00E+00	5.25E-01	2.60E+00		
Pu-240	2.1278E-03	94.964	470.665	0.00E+00	2.02E-01	1.00E+00		
Pu-241	1.0195E-01	94.964	470.665	0.00E+00	9.68E+00	4.80E+01		
Pu-242	2.3128E-07	94.964	470.665	0.00E+00	2.20E-05	1.09E-04		
Ra-226	5.2782E-14	94.964	470.665	0.00E+00	5.01E-12	2.48E-11		
Ra-228	1.9338E-10	94.964	470.665	0.00E+00	1.84E-08	9.10E-08		
Ru-106	9.1684E-02	94.964	470.665	0.00E+00	8.71E+00	4.32E+01		
Se-79	1.3018E-05	94.964	470.665	0.00E+00	1.24E-03	6.13E-03		
Sn-126	1.2167E-05	94.964	470.665	0.00E+00	1.16E-03	5.73E-03		
Sr-90	2.6045E+00	94.964	470.665	0.00E+00	2.47E+02	1.23E+03		
Tc-99	4.4241E-04	94.964	470.665	0.00E+00	4.20E-02	2.08E-01		
Th-229	1.3713E-10	94.964	470.665	0.00E+00	1.30E-08	6.45E-08		
Th-230	1.8090E-11	94.964	470.665	0.00E+00	1.72E-09	8.51E-09		
Th-232	2.5278E-10	94.964	470.665	0.00E+00	2.40E-08	1.19E-07		
Tl-208	1.6947E-08	94.964	470.665	0.00E+00	1.61E-06	7.98E-06		
U-232	4.8737E-08	94.964	470.665	0.00E+00	4.63E-06	2.29E-05		
U-233	1.2203E-07	94.964	470.665	0.00E+00	1.16E-05	5.74E-05		
U-234	1.5925E-07	94.964	470.665	0.00E+00	1.51E-05	7.50E-05		
U-235	-2.6194E-06	94.964	0.000	2.13E-03	1.88E-03	2.13E-03		
U-236	1.2693E-05	94.964	470.665	0.00E+00	1.21E-03	5.97E-03		
U-238	-3.6331E-08	94.964	0.000	1.34E-03	1.34E-03	1.34E-03		
Y-90	2.6060E+00	94.964	470.665	0.00E+00	2.47E+02	1.23E+03		
Other Radionuclides					3.42E+02	1.70E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.53E+00	2.74E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-Zr/HX	U	
BOL Enrichment %:	19.82495894	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		94.964	Nominal burnup assumed to be 2% of BOL heavy metal mass.
Bounding:	470.665	189.929	Bounding burnup taken directly from SFD (converted to MWd).

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.56		0.98
Bounding:	2.77	0.40	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (MNRC) ¹Fuel decay start date: 2035
 SNF ID #: 1053 Estimates as of: 2030
 Fuel Units & Descr: 8 - ELEMENT Template: TRIGA-SS (LW/U-Z x, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=3.96kg ; EOL=3.96kg ²Template Burnup(MWd): 6.6E
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00019E
Template Decay Time: 5 years

Estimated
Canister usage:
18"x10"
0.07

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	75.651	373.524	0.00E+00	6.44E-08	3.18E-07		
Am-241	1.8331E-03	75.651	373.524	0.00E+00	1.39E-01	6.85E-01	0.0150	6.037E+13
Am-242m	1.4129E-06	75.651	373.524	0.00E+00	1.07E-04	5.28E-04	0.0250	1.328E+13
Am-243	1.4774E-07	75.651	373.524	0.00E+00	1.12E-05	5.52E-05	0.0375	1.131E+13
Ci-14	1.2871E-04	75.651	373.524	0.00E+00	9.74E-03	4.81E-02	0.0575	1.161E+13
Ci-36	2.8120E-06	75.651	373.524	0.00E+00	2.13E-04	1.05E-03	0.0850	7.194E+12
Cm-243	1.7940E-07	75.651	373.524	0.00E+00	1.36E-05	6.70E-05	0.1250	5.224E+12
Cm-244	1.6962E-06	75.651	373.524	0.00E+00	1.28E-04	6.34E-04	0.2250	6.102E+12
Co-60	1.2839E+00	75.651	373.524	0.00E+00	9.71E+01	4.80E+02	0.3750	3.097E+12
Cs-134	9.0541E-02	75.651	373.524	0.00E+00	6.85E+00	3.38E+01	0.5750	4.117E+13
Cs-135	3.2195E-05	75.651	373.524	0.00E+00	2.44E-03	1.20E-02	0.8500	1.767E+12
Cs-137	2.7564E+00	75.651	373.524	0.00E+00	2.09E+02	1.03E+03	1.2500	3.588E+13
Eu-154	1.5368E-02	75.651	373.524	0.00E+00	1.16E+00	5.74E+00	1.7500	2.392E+10
Eu-155	2.9293E-02	75.651	373.524	0.00E+00	2.22E+00	1.09E+01	2.2500	3.856E+10
Fe-55	7.7158E-01	75.651	373.524	0.00E+00	5.84E+01	2.88E+02	2.7500	3.059E+08
H-3	1.1111E-02	75.651	373.524	0.00E+00	8.41E-01	4.15E+00	3.5000	3.562E-07
I-129	7.3684E-07	75.651	373.524	0.00E+00	5.57E-05	2.75E-04	5.0000	1.982E-02
Kr-85	2.5263E-01	75.651	373.524	0.00E+00	1.91E+01	9.44E+01	7.0000	2.244E+01
Np-237	1.2427E-06	75.651	373.524	0.00E+00	9.40E-05	4.64E-04	11.0000	2.556E+00
Pa-231	3.8511E-09	75.651	373.524	0.00E+00	2.91E-07	1.44E-06		
Pb-210	7.3880E-15	75.651	373.524	0.00E+00	5.59E-13	2.76E-12		
Pm-147	2.1023E+00	75.651	373.524	0.00E+00	1.59E+02	7.85E+02		
Pu-238	1.0383E-03	75.651	373.524	0.00E+00	7.86E-02	3.88E-01		
Pu-239	5.5293E-03	75.651	373.524	0.00E+00	4.18E-01	2.07E+00		
Pu-240	2.1278E-03	75.651	373.524	0.00E+00	1.61E-01	7.95E-01		
Pu-241	1.0195E-01	75.651	373.524	0.00E+00	7.71E+00	3.81E+01		
Pu-242	2.3128E-07	75.651	373.524	0.00E+00	1.75E-05	8.64E-05		
Ra-226	5.2782E-14	75.651	373.524	0.00E+00	3.99E-12	1.97E-11		
Ra-228	1.9338E-10	75.651	373.524	0.00E+00	1.46E-08	7.22E-08		
Ru-106	9.1684E-02	75.651	373.524	0.00E+00	6.94E+00	3.42E+01		
Se-79	1.3018E-05	75.651	373.524	0.00E+00	9.85E-04	4.86E-03		
Sn-126	1.2167E-05	75.651	373.524	0.00E+00	9.20E-04	4.54E-03		
Sr-90	2.6045E+00	75.651	373.524	0.00E+00	1.97E+02	9.73E+02		
Tc-99	4.4241E-04	75.651	373.524	0.00E+00	3.35E-02	1.65E-01		
Th-229	1.3713E-10	75.651	373.524	0.00E+00	1.04E-08	5.12E-08		
Th-230	1.8090E-11	75.651	373.524	0.00E+00	1.37E-09	6.76E-09		
Th-232	2.5278E-10	75.651	373.524	0.00E+00	1.91E-08	9.44E-08		
Tl-208	1.6947E-08	75.651	373.524	0.00E+00	1.28E-06	6.33E-06		
U-232	4.8737E-08	75.651	373.524	0.00E+00	3.69E-06	1.82E-05		
U-233	1.2203E-07	75.651	373.524	0.00E+00	9.23E-06	4.56E-05		
U-234	1.5925E-07	75.651	373.524	0.00E+00	1.20E-05	5.95E-05		
U-235	-2.6194E-06	75.651	0.000	1.69E-03	1.49E-03	1.69E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2693E-05	75.651	373.524	0.00E+00	9.60E-04	4.74E-03	4.40E+00	2.17E+01
U-238	-3.6331E-08	75.651	0.000	1.07E-03	1.07E-03	1.07E-03	Total	Total
Y-90	2.6060E+00	75.651	373.524	0.00E+00	1.97E+02	9.73E+02		
Other Radionuclides					2.73E+02	1.35E+03		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.74990819	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		75.651	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup taken directly from SFD (converted to MWd).
Bounding:	373.524	151.301	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.56	
Bounding:	2.76	0.41

Estimated EOL HM/Given EOL HM 0.98

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (MNRC)
 SNF ID #: 1054
 Fuel Units & Descr: 84 - ELEMENT
 Heavy Metal Mass: BOL=41.61kg : EOL=40.56kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18" x 10"
 0.76

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	1,002.338	2,004.675	0.00E+00	8.54E-07	1.71E-06	Avg. MeV	
Am-241	1.8331E-03	1,002.338	2,004.675	0.00E+00	1.84E+00	3.67E+00	0.0150	3.240E+14
Am-242m	1.4129E-06	1,002.338	2,004.675	0.00E+00	1.42E-03	2.83E-03	0.0250	7.129E+13
Am-243	1.4774E-07	1,002.338	2,004.675	0.00E+00	1.48E-04	2.96E-04	0.0375	6.071E+13
C-14	1.2871E-04	1,002.338	2,004.675	0.00E+00	1.29E-01	2.58E-01	0.0575	6.232E+13
Cl-36	2.8120E-06	1,002.338	2,004.675	0.00E+00	2.82E-03	5.64E-03	0.0850	3.861E+13
Cm-243	1.7940E-07	1,002.338	2,004.675	0.00E+00	1.80E-04	3.60E-04	0.1250	2.803E+13
Cm-244	1.6962E-06	1,002.338	2,004.675	0.00E+00	1.70E-03	3.40E-03	0.2250	3.275E+13
Co-60	1.2839E+00	1,002.338	2,004.675	0.00E+00	1.29E+03	2.57E+03	0.3750	1.662E+13
Cs-134	9.0541E-02	1,002.338	2,004.675	0.00E+00	9.08E+01	1.82E+02	0.5750	2.210E+14
Cs-135	3.2195E-05	1,002.338	2,004.675	0.00E+00	3.23E-02	6.45E-02	0.8500	9.482E+12
Cs-137	2.7564E+00	1,002.338	2,004.675	0.00E+00	2.76E+03	5.53E+03	1.2500	1.926E+14
Eu-154	1.5368E-02	1,002.338	2,004.675	0.00E+00	1.54E+01	3.08E+01	1.7500	1.284E+11
Eu-155	2.9293E-02	1,002.338	2,004.675	0.00E+00	2.94E+01	5.87E+01	2.2500	2.069E+11
Fe-55	7.7158E-01	1,002.338	2,004.675	0.00E+00	7.73E+02	1.55E+03	2.7500	1.642E+09
H-3	1.1111E-02	1,002.338	2,004.675	0.00E+00	1.11E+01	2.23E+01	3.5000	1.912E+08
I-129	7.3684E-07	1,002.338	2,004.675	0.00E+00	7.39E-04	1.48E-03	5.0000	1.076E+03
Kr-85	2.5263E-01	1,002.338	2,004.675	0.00E+00	2.53E+02	5.06E+02	7.0000	1.219E+02
Np-237	1.2427E-06	1,002.338	2,004.675	0.00E+00	1.25E-03	2.49E-03	11.0000	1.389E+01
Pa-231	3.8511E-09	1,002.338	2,004.675	0.00E+00	3.86E-06	7.72E-06		
Pb-210	7.3880E-15	1,002.338	2,004.675	0.00E+00	7.41E-12	1.48E-11		
Pm-147	2.1023E+00	1,002.338	2,004.675	0.00E+00	2.11E+03	4.21E+03		
Pu-238	1.0383E-03	1,002.338	2,004.675	0.00E+00	1.04E+00	2.08E+00		
Pu-239	5.5293E-03	1,002.338	2,004.675	0.00E+00	5.54E+00	1.11E+01		
Pu-240	2.1278E-03	1,002.338	2,004.675	0.00E+00	2.13E+00	4.27E+00		
Pu-241	1.0195E-01	1,002.338	2,004.675	0.00E+00	1.02E+02	2.04E+02		
Pu-242	2.3128E-07	1,002.338	2,004.675	0.00E+00	2.32E-04	4.64E-04		
Ra-226	5.2782E-14	1,002.338	2,004.675	0.00E+00	5.29E-11	1.06E-10		
Ra-228	1.9338E-10	1,002.338	2,004.675	0.00E+00	1.94E-07	3.88E-07		
Ru-106	9.1684E-02	1,002.338	2,004.675	0.00E+00	9.19E+01	1.84E+02		
Se-79	1.3018E-05	1,002.338	2,004.675	0.00E+00	1.30E-02	2.61E-02		
Sn-126	1.2167E-05	1,002.338	2,004.675	0.00E+00	1.22E-02	2.44E-02		
Sr-90	2.6045E+00	1,002.338	2,004.675	0.00E+00	2.61E+03	5.22E+03		
Tc-99	4.4241E-04	1,002.338	2,004.675	0.00E+00	4.43E-01	8.87E-01		
Th-229	1.3713E-10	1,002.338	2,004.675	0.00E+00	1.37E-07	2.75E-07		
Th-230	1.8090E-11	1,002.338	2,004.675	0.00E+00	1.81E-08	3.63E-08		
Th-232	2.5278E-10	1,002.338	2,004.675	0.00E+00	2.53E-07	5.07E-07		
Tl-208	1.6947E-08	1,002.338	2,004.675	0.00E+00	1.70E-05	3.40E-05		
U-232	4.8737E-08	1,002.338	2,004.675	0.00E+00	4.89E-05	9.77E-05		
U-233	1.2203E-07	1,002.338	2,004.675	0.00E+00	1.22E-04	2.45E-04		
U-234	1.5925E-07	1,002.338	2,004.675	0.00E+00	1.60E-04	3.19E-04		
U-235	-2.6194E-06	1,002.338	0.000	1.78E-02	1.51E-02	1.78E-02		
U-236	1.2693E-05	1,002.338	2,004.675	0.00E+00	1.27E-02	2.54E-02		
U-238	-3.6331E-08	1,002.338	0.000	1.12E-02	1.12E-02	1.12E-02		
Y-90	2.6060E+00	1,002.338	2,004.675	0.00E+00	2.61E+03	5.22E+03		
Other Radionuclides					3.61E+03	7.23E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.83E+01	1.17E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.74990819	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	784.424	1,002.338	
Bounding:		2,004.675	

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

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.71	1.28	
Bounding:	1.41		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (MSU)
 SNF ID #: 878
 Fuel Units & Descr: 58 - ELEMENT
 Heavy Metal Mass: BOL=10.73kg ; EOL=10.65kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1971
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-ZrX, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000118
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.52

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.6842E-09	71.971	143.941	0.00E+00	6.25E-07	1.25E-06	0.0150	7.058E+12
Am-241	4.9459E-03	71.971	143.941	0.00E+00	3.56E-01	7.12E-01	0.0250	1.463E+12
Am-242m	1.6241E-06	71.971	143.941	0.00E+00	1.17E-04	2.34E-04	0.0375	1.321E+12
Am-243	2.3233E-07	71.971	143.941	0.00E+00	1.67E-05	3.34E-05	0.0575	1.382E+12
C-14	4.3083E-05	71.971	143.941	0.00E+00	3.10E-03	6.20E-03	0.0850	8.244E+11
Cl-36	4.3023E-08	71.971	143.941	0.00E+00	3.10E-06	6.19E-06	0.1250	6.117E+11
Cm-243	9.1890E-08	71.971	143.941	0.00E+00	6.61E-06	1.32E-05	0.2250	7.235E+11
Cm-244	5.6346E-07	71.971	143.941	0.00E+00	4.06E-05	8.11E-05	0.3750	3.121E+11
Co-60	8.3699E-05	71.971	143.941	0.00E+00	6.02E-03	1.20E-02	0.5750	5.241E+12
Cs-134	2.8211E-08	71.971	143.941	0.00E+00	2.03E-06	4.06E-06	0.8500	1.427E+11
Cs-135	3.1549E-05	71.971	143.941	0.00E+00	2.27E-03	4.54E-03	1.2500	1.206E+11
Cs-137	9.7519E-01	71.971	143.941	0.00E+00	7.02E+01	1.40E+02	1.7500	4.326E+09
Eu-154	3.5970E-02	71.971	143.941	0.00E+00	2.59E+00	5.18E+00	2.2500	1.468E+05
Eu-155	8.1774E-04	71.971	143.941	0.00E+00	5.89E-02	1.18E-01	2.7500	6.932E+04
Fe-55	5.3940E-08	71.971	143.941	0.00E+00	3.88E-06	7.76E-06	3.5000	2.046E+02
H-3	8.6571E-04	71.971	143.941	0.00E+00	6.23E-02	1.25E-01	5.0000	8.618E+01
I-129	7.3805E-07	71.971	143.941	0.00E+00	5.31E-05	1.06E-04	7.0000	9.728E+00
Kr-85	1.3771E-02	71.971	143.941	0.00E+00	9.91E-01	1.98E+00	11.0000	1.106E+00
Np-237	1.5218E-06	71.971	143.941	0.00E+00	1.10E-04	2.19E-04		
Pa-231	1.4152E-08	71.971	143.941	0.00E+00	1.02E-06	2.04E-06		
Pb-210	7.9774E-13	71.971	143.941	0.00E+00	5.74E-11	1.15E-10		
Pm-147	1.4362E-05	71.971	143.941	0.00E+00	1.03E-03	2.07E-03		
Pu-238	9.4782E-04	71.971	143.941	0.00E+00	6.82E-02	1.36E-01		
Pu-239	5.6872E-03	71.971	143.941	0.00E+00	4.09E-01	8.19E-01		
Pu-240	2.2541E-03	71.971	143.941	0.00E+00	1.62E-01	3.24E-01		
Pu-241	1.4433E-02	71.971	143.941	0.00E+00	1.04E+00	2.08E+00		
Pu-242	3.0602E-07	71.971	143.941	0.00E+00	2.20E-05	4.40E-05		
Ra-226	1.8857E-12	71.971	143.941	0.00E+00	1.36E-10	2.71E-10		
Ra-228	2.3729E-10	71.971	143.941	0.00E+00	1.71E-08	3.42E-08		
Ru-106	3.4857E-15	71.971	143.941	0.00E+00	2.51E-13	5.02E-13		
Se-79	1.2931E-05	71.971	143.941	0.00E+00	9.31E-04	1.86E-03		
Sn-126	1.2235E-05	71.971	143.941	0.00E+00	8.81E-04	1.76E-03		
Sr-90	8.9173E-01	71.971	143.941	0.00E+00	6.42E+01	1.28E+02		
Tc-99	4.4120E-04	71.971	143.941	0.00E+00	3.18E-02	6.35E-02		
Th-229	8.2752E-10	71.971	143.941	0.00E+00	5.96E-08	1.19E-07		
Th-230	1.4908E-10	71.971	143.941	0.00E+00	1.07E-08	2.15E-08		
Th-232	2.3744E-10	71.971	143.941	0.00E+00	1.71E-08	3.42E-08		
Th-208	1.3668E-08	71.971	143.941	0.00E+00	9.84E-07	1.97E-06		
U-232	3.6797E-08	71.971	143.941	0.00E+00	2.65E-06	5.30E-06		
U-233	1.3164E-07	71.971	143.941	0.00E+00	9.47E-06	1.89E-05		
U-234	3.3865E-07	71.971	143.941	0.00E+00	2.44E-05	4.87E-05		
U-235	-2.6144E-06	71.971	0.000	4.64E-03	4.45E-03	4.64E-03		
U-236	1.2722E-05	71.971	143.941	0.00E+00	9.16E-04	1.83E-03		
U-238	-3.8857E-08	71.971	0.000	2.89E-03	2.88E-03	2.89E-03		
Y-90	8.9203E-01	71.971	143.941	0.00E+00	6.42E+01	1.28E+02		
Other Radionuclides					8.04E+01	1.61E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.28E+01	1.65E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	52.287	71.971	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		143.941	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.18	1.38	1.00
Bounding:	0.36		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (MSU) 1 Fuel decay start date: 1982
 SNF ID #: 873 Estimates as of: 2030
 Fuel Units & Descr: 48 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=9.36kg ; EOL=8.29kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.43

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.7038E-09	1,021.812	2,043.623	0.00E+00	6.85E-06	1.37E-05		
Am-241	3.9068E-03	1,021.812	2,043.623	0.00E+00	3.99E+00	7.98E+00	0.0150	1.426E+14
Am-242m	1.2325E-06	1,021.812	2,043.623	0.00E+00	1.26E-03	2.52E-03	0.0250	2.964E+13
Am-243	1.4732E-07	1,021.812	2,043.623	0.00E+00	1.51E-04	3.01E-04	0.0375	2.575E+13
C-14	1.2824E-04	1,021.812	2,043.623	0.00E+00	1.31E-01	2.62E-01	0.0575	2.774E+13
Cl-36	2.8120E-06	1,021.812	2,043.623	0.00E+00	2.87E-03	5.75E-03	0.0850	1.669E+13
Cm-243	8.6556E-08	1,021.812	2,043.623	0.00E+00	8.84E-05	1.77E-04	0.1250	1.086E+13
Cm-244	5.3835E-07	1,021.812	2,043.623	0.00E+00	5.50E-04	1.10E-03	0.2250	1.438E+13
Co-60	2.4887E-02	1,021.812	2,043.623	0.00E+00	2.54E+01	5.09E+01	0.3750	6.271E+12
Cs-134	3.8030E-06	1,021.812	2,043.623	0.00E+00	3.89E-03	7.77E-03	0.5750	1.049E+14
Cs-135	3.2195E-05	1,021.812	2,043.623	0.00E+00	3.29E-02	6.58E-02	0.8500	1.073E+12
Cs-137	1.3788E+00	1,021.812	2,043.623	0.00E+00	1.41E+03	2.82E+03	1.2500	4.165E+12
Eu-154	1.3711E-03	1,021.812	2,043.623	0.00E+00	1.40E+00	2.80E+00	1.7500	2.787E+10
Eu-155	4.4361E-04	1,021.812	2,043.623	0.00E+00	4.53E-01	9.07E-01	2.2500	2.283E+07
Fe-55	2.6075E-04	1,021.812	2,043.623	0.00E+00	2.68E-01	5.33E-01	2.7500	1.049E+06
H-3	2.0647E-03	1,021.812	2,043.623	0.00E+00	2.11E+00	4.22E+00	3.5000	2.521E+03
I-129	7.3684E-07	1,021.812	2,043.623	0.00E+00	7.53E-04	1.51E-03	5.0000	1.061E+03
Kr-85	3.6346E-02	1,021.812	2,043.623	0.00E+00	3.71E+01	7.43E+01	7.0000	1.197E+02
Np-237	1.2844E-06	1,021.812	2,043.623	0.00E+00	1.31E-03	2.62E-03	11.0000	1.361E+01
Pa-231	1.2352E-08	1,021.812	2,043.623	0.00E+00	1.26E-05	2.52E-05		
Pb-210	3.5338E-13	1,021.812	2,043.623	0.00E+00	3.61E-10	7.22E-10		
Pm-147	7.6346E-04	1,021.812	2,043.623	0.00E+00	7.80E-01	1.56E+00		
Pu-238	8.1970E-04	1,021.812	2,043.623	0.00E+00	8.38E-01	1.68E+00		
Pu-239	5.5248E-03	1,021.812	2,043.623	0.00E+00	5.65E+00	1.13E+01		
Pu-240	2.1203E-03	1,021.812	2,043.623	0.00E+00	2.17E+00	4.33E+00		
Pu-241	2.4075E-02	1,021.812	2,043.623	0.00E+00	2.46E+01	4.92E+01		
Pu-242	2.3128E-07	1,021.812	2,043.623	0.00E+00	2.36E-04	4.73E-04		
Ra-226	9.6481E-13	1,021.812	2,043.623	0.00E+00	9.86E-10	1.97E-09		
Ra-228	2.5188E-10	1,021.812	2,043.623	0.00E+00	2.57E-07	5.15E-07		
Ru-106	1.0214E-10	1,021.812	2,043.623	0.00E+00	1.04E-07	2.09E-07		
Se-79	1.3014E-05	1,021.812	2,043.623	0.00E+00	1.33E-02	2.66E-02		
Sn-126	1.2164E-05	1,021.812	2,043.623	0.00E+00	1.24E-02	2.49E-02		
Sr-90	1.2762E+00	1,021.812	2,043.623	0.00E+00	1.30E+03	2.61E+03		
Tc-99	4.4241E-04	1,021.812	2,043.623	0.00E+00	4.52E-01	9.04E-01		
Th-229	5.9684E-10	1,021.812	2,043.623	0.00E+00	6.10E-07	1.22E-06		
Th-230	9.3880E-11	1,021.812	2,043.623	0.00E+00	9.59E-08	1.92E-07		
Th-232	2.5278E-10	1,021.812	2,043.623	0.00E+00	2.58E-07	5.17E-07		
Th-208	1.3723E-08	1,021.812	2,043.623	0.00E+00	1.40E-05	2.80E-05		
U-232	3.6932E-08	1,021.812	2,043.623	0.00E+00	3.77E-05	7.55E-05		
U-233	1.2224E-07	1,021.812	2,043.623	0.00E+00	1.25E-04	2.50E-04		
U-234	2.5714E-07	1,021.812	2,043.623	0.00E+00	2.63E-04	5.26E-04		
U-235	-2.6194E-06	1,021.812	0.000	4.05E-03	1.37E-03	4.05E-03		
U-236	1.2695E-05	1,021.812	2,043.623	0.00E+00	1.30E-02	2.59E-02		
U-238	-3.6331E-08	1,021.812	0.000	2.52E-03	2.48E-03	2.52E-03		
Y-90	1.2765E+00	1,021.812	2,043.623	0.00E+00	1.30E+03	2.61E+03		
Other Radionuclides					1.41E+03	2.81E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.64E+01	3.29E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,021.812	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		2,043.623	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	3.20		1.00
Bounding:	6.40		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (REED COLLEGE)
 SNF ID #: 775
 Fuel Units & Descr: 9 - ELEMENT
 Heavy Metal Mass: BOL=1.72kg ; EOL=1.71kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2026
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-Z x, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.12

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	12.887	25.774	0.00E+00	1.10E-08	2.20E-08	Avg. MeV	
Am-241	1.8331E-03	12.887	25.774	0.00E+00	2.36E-02	4.72E-02	0.0150	4.166E+12
Am-242m	1.4129E-06	12.887	25.774	0.00E+00	1.82E-05	3.64E-05	0.0250	9.166E+11
Am-243	1.4774E-07	12.887	25.774	0.00E+00	1.90E-06	3.81E-06	0.0375	7.806E+11
C-14	1.2871E-04	12.887	25.774	0.00E+00	1.66E-03	3.32E-03	0.0575	8.012E+11
Cf-36	2.8120E-06	12.887	25.774	0.00E+00	3.62E-05	7.25E-05	0.0850	4.964E+11
Cm-243	1.7940E-07	12.887	25.774	0.00E+00	2.31E-06	4.62E-06	0.1250	3.604E+11
Cm-244	1.6962E-06	12.887	25.774	0.00E+00	2.19E-05	4.37E-05	0.2250	4.211E+11
Co-60	1.2839E+00	12.887	25.774	0.00E+00	1.65E+01	3.31E+01	0.3750	2.137E+11
Cs-134	9.0541E-02	12.887	25.774	0.00E+00	1.17E+00	2.33E+00	0.5750	2.841E+12
Cs-135	3.2195E-05	12.887	25.774	0.00E+00	4.15E-04	8.30E-04	0.8500	1.219E+11
Cs-137	2.7564E+00	12.887	25.774	0.00E+00	3.55E+01	7.10E+01	1.2500	2.476E+12
Eu-154	1.5368E-02	12.887	25.774	0.00E+00	1.98E-01	3.96E-01	1.7500	1.651E+09
Eu-155	2.9293E-02	12.887	25.774	0.00E+00	3.78E-01	7.55E-01	2.2500	2.661E+09
Fe-55	7.7158E-01	12.887	25.774	0.00E+00	9.94E+00	1.99E+01	2.7500	2.111E+07
H-3	1.1111E-02	12.887	25.774	0.00E+00	1.43E-01	2.86E-01	3.5000	2.458E+06
I-129	7.3684E-07	12.887	25.774	0.00E+00	9.50E-06	1.90E-05	5.0000	1.457E+01
Kr-85	2.5263E-01	12.887	25.774	0.00E+00	3.26E+00	6.51E+00	7.0000	1.651E+00
Np-237	1.2427E-06	12.887	25.774	0.00E+00	1.60E-05	3.20E-05	11.0000	1.892E-01
Pa-231	3.8511E-09	12.887	25.774	0.00E+00	4.96E-08	9.93E-08		
Pb-210	7.3880E-15	12.887	25.774	0.00E+00	9.52E-14	1.90E-13		
Pm-147	2.1023E+00	12.887	25.774	0.00E+00	2.71E+01	5.42E+01		
Pu-238	1.0383E-03	12.887	25.774	0.00E+00	1.34E-02	2.68E-02		
Pu-239	5.5293E-03	12.887	25.774	0.00E+00	7.13E-02	1.43E-01		
Pu-240	2.1278E-03	12.887	25.774	0.00E+00	2.74E-02	5.48E-02		
Pu-241	1.0195E-01	12.887	25.774	0.00E+00	1.31E+00	2.63E+00		
Pu-242	2.3128E-07	12.887	25.774	0.00E+00	2.98E-06	5.96E-06		
Ra-226	5.2782E-14	12.887	25.774	0.00E+00	6.80E-13	1.36E-12		
Ra-228	1.9338E-10	12.887	25.774	0.00E+00	2.49E-09	4.98E-09		
Ru-106	9.1684E-02	12.887	25.774	0.00E+00	1.18E+00	2.36E+00		
Se-79	1.3018E-05	12.887	25.774	0.00E+00	1.68E-04	3.36E-04		
Sn-126	1.2167E-05	12.887	25.774	0.00E+00	1.57E-04	3.14E-04		
Sr-90	2.6045E+00	12.887	25.774	0.00E+00	3.36E+01	6.71E+01		
Tc-99	4.4241E-04	12.887	25.774	0.00E+00	5.70E-03	1.14E-02		
Th-229	1.3713E-10	12.887	25.774	0.00E+00	1.77E-09	3.53E-09		
Th-230	1.8090E-11	12.887	25.774	0.00E+00	2.33E-10	4.66E-10		
Th-232	2.5278E-10	12.887	25.774	0.00E+00	3.26E-09	6.52E-09		
Tl-208	1.6947E-08	12.887	25.774	0.00E+00	2.18E-07	4.37E-07		
U-232	4.8737E-08	12.887	25.774	0.00E+00	6.28E-07	1.26E-06		
U-233	1.2203E-07	12.887	25.774	0.00E+00	1.57E-06	3.15E-06		
U-234	1.5925E-07	12.887	25.774	0.00E+00	2.05E-06	4.10E-06		
U-235	-2.6194E-06	12.887	0.000	7.49E-04	7.15E-04	7.49E-04		
U-236	1.2693E-05	12.887	25.774	0.00E+00	1.64E-04	3.27E-04		
U-238	-3.6331E-08	12.887	0.000	4.61E-04	4.61E-04	4.61E-04		
Y-90	2.6060E+00	12.887	25.774	0.00E+00	3.36E+01	6.72E+01		
Other Radionuclides					4.65E+01	9.29E+01		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.50E-01	1.50E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons: This fuel matches on all parameters except enrichment (very close to 20%).
Fuel Cladding:	SST	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.15706806	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
12.887		12.887	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
25.774		25.774	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
0.22	0.22		1.00
0.44	0.44		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ROMANIA)
 SNF ID #: 1078
 Fuel Units & Descr: 498 - ELEMENT
 Heavy Metal Mass: BOL=124.50kg ; EOL=121.46kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 4.49

II. Estimates

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.6436E-09	2,899.906	5,799.812	0.00E+00	7.67E-06	1.53E-05	Avg. MeV	
Am-241	3.1429E-03	2,899.906	5,799.812	0.00E+00	9.11E+00	1.82E+01	0.0150	5.812E+14
Am-242m	1.3195E-06	2,899.906	5,799.812	0.00E+00	3.83E-03	7.65E-03	0.0250	1.210E+14
Am-243	1.4753E-07	2,899.906	5,799.812	0.00E+00	4.28E-04	8.56E-04	0.0375	1.048E+14
C-14	1.2847E-04	2,899.906	5,799.812	0.00E+00	3.73E-01	7.45E-01	0.0575	1.128E+14
Cf-36	2.8120E-06	2,899.906	5,799.812	0.00E+00	8.15E-03	1.63E-02	0.0850	6.807E+13
Cm-243	1.2465E-07	2,899.906	5,799.812	0.00E+00	3.61E-04	7.23E-04	0.1250	4.449E+13
Cm-244	9.5564E-07	2,899.906	5,799.812	0.00E+00	2.77E-03	5.54E-03	0.2250	5.845E+13
Co-60	1.7880E-01	2,899.906	5,799.812	0.00E+00	5.18E+02	1.04E+03	0.3750	2.562E+13
Cs-134	5.8692E-04	2,899.906	5,799.812	0.00E+00	1.70E+00	3.40E+00	0.5750	4.213E+14
Cs-135	3.2195E-05	2,899.906	5,799.812	0.00E+00	9.34E-02	1.87E-01	0.8500	4.749E+12
Cs-137	1.9489E+00	2,899.906	5,799.812	0.00E+00	5.65E+03	1.13E+04	1.2500	7.870E+13
Eu-154	4.5895E-03	2,899.906	5,799.812	0.00E+00	1.33E+01	2.66E+01	1.7500	1.220E+11
Eu-155	3.6045E-03	2,899.906	5,799.812	0.00E+00	1.05E+01	2.09E+01	2.2500	4.203E+08
Fe-55	1.4185E-02	2,899.906	5,799.812	0.00E+00	4.11E+01	8.23E+01	2.7500	4.631E-06
H-3	4.7895E-03	2,899.906	5,799.812	0.00E+00	1.39E+01	2.78E+01	3.5000	2.579E+04
I-129	7.3684E-07	2,899.906	5,799.812	0.00E+00	2.14E-03	4.27E-03	5.0000	3.090E+03
Kr-85	9.5820E-02	2,899.906	5,799.812	0.00E+00	2.78E+02	5.56E+02	7.0000	3.491E+02
Np-237	1.2552E-06	2,899.906	5,799.812	0.00E+00	3.64E-03	7.28E-03	11.0000	3.973E+01
Pa-231	7.0406E-09	2,899.906	5,799.812	0.00E+00	2.04E-05	4.08E-05		
Pb-210	5.8000E-14	2,899.906	5,799.812	0.00E+00	1.68E-10	3.36E-10		
Pm-147	4.0075E-02	2,899.906	5,799.812	0.00E+00	1.16E+02	2.32E+02		
Pu-238	9.2256E-04	2,899.906	5,799.812	0.00E+00	2.68E+00	5.35E+00		
Pu-239	5.5278E-03	2,899.906	5,799.812	0.00E+00	1.60E+01	3.21E+01		
Pu-240	2.1248E-03	2,899.906	5,799.812	0.00E+00	6.16E+00	1.23E+01		
Pu-241	4.9549E-02	2,899.906	5,799.812	0.00E+00	1.44E+02	2.87E+02		
Pu-242	2.3128E-07	2,899.906	5,799.812	0.00E+00	6.71E-04	1.34E-03		
Ra-226	2.4526E-13	2,899.906	5,799.812	0.00E+00	7.11E-10	1.42E-09		
Ra-228	2.4015E-10	2,899.906	5,799.812	0.00E+00	6.96E-07	1.39E-06		
Ru-106	3.0602E-06	2,899.906	5,799.812	0.00E+00	8.87E-03	1.77E-02		
Se-79	1.3015E-05	2,899.906	5,799.812	0.00E+00	3.77E-02	7.55E-02		
Sn-126	1.2165E-05	2,899.906	5,799.812	0.00E+00	3.53E-02	7.06E-02		
Sr-90	1.8226E+00	2,899.906	5,799.812	0.00E+00	5.29E+03	1.06E+04		
Tc-99	4.4241E-04	2,899.906	5,799.812	0.00E+00	1.28E+00	2.57E+00		
Th-229	3.0962E-10	2,899.906	5,799.812	0.00E+00	8.98E-07	1.80E-06		
Th-230	4.2346E-11	2,899.906	5,799.812	0.00E+00	1.23E-07	2.46E-07		
Th-232	2.5278E-10	2,899.906	5,799.812	0.00E+00	7.33E-07	1.47E-06		
Tl-208	1.5820E-08	2,899.906	5,799.812	0.00E+00	4.59E-05	9.18E-05		
U-232	4.2647E-08	2,899.906	5,799.812	0.00E+00	1.24E-04	2.47E-04		
U-233	1.2211E-07	2,899.906	5,799.812	0.00E+00	3.54E-04	7.08E-04		
U-234	1.9955E-07	2,899.906	5,799.812	0.00E+00	5.79E-04	1.16E-03		
U-235	-2.6194E-06	2,899.906	0.000	5.35E-02	4.59E-02	5.35E-02		
U-236	1.2693E-05	2,899.906	5,799.812	0.00E+00	3.68E-02	7.36E-02		
U-238	-3.6331E-08	2,899.906	0.000	3.35E-02	3.34E-02	3.35E-02		
Y-90	1.8241E+00	2,899.906	5,799.812	0.00E+00	5.29E+03	1.06E+04		
Other Radionuclides					5.58E+03	1.12E+04		

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

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx	U	
BOL Enrichment %:	19.9	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
2,899.906	1,213.377	2,899.906	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
5,799.812		5,799.812	

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

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (SLOVENIA)
 SNF ID #: 1079
 Fuel Units & Descr: 149 - ELEMENT
 Heavy Metal Mass: BOL=28.58kg ; EOL=27.45kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 1.34

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.6436E-09	1,080.997	2,161.995	0.00E+00	2.86E-06	5.72E-06		
Am-241	3.1429E-03	1,080.997	2,161.995	0.00E+00	3.40E+00	6.79E+00	0.0150	2.167E+14
Am-242m	1.3195E-06	1,080.997	2,161.995	0.00E+00	1.43E-03	2.85E-03	0.0250	4.510E+13
Am-243	1.4753E-07	1,080.997	2,161.995	0.00E+00	1.59E-04	3.19E-04	0.0375	3.907E+13
C-14	1.2847E-04	1,080.997	2,161.995	0.00E+00	1.39E-01	2.78E-01	0.0575	4.203E+13
Cl-36	2.8120E-06	1,080.997	2,161.995	0.00E+00	3.04E-03	6.08E-03	0.0850	2.537E+13
Co-243	1.2465E-07	1,080.997	2,161.995	0.00E+00	1.35E-04	2.69E-04	0.1250	1.658E+13
Co-244	9.5564E-07	1,080.997	2,161.995	0.00E+00	1.03E-03	2.07E-03	0.2250	2.179E+13
Co-60	1.7880E-01	1,080.997	2,161.995	0.00E+00	1.93E+02	3.87E+02	0.3750	9.549E+12
Cs-134	5.8692E-04	1,080.997	2,161.995	0.00E+00	6.34E-01	1.27E+00	0.5750	1.571E+14
Cs-135	3.2195E-05	1,080.997	2,161.995	0.00E+00	3.48E-02	6.96E-02	0.8500	1.770E+12
Cs-137	1.9489E+00	1,080.997	2,161.995	0.00E+00	2.11E+03	4.21E+03	1.2500	2.934E+13
Eu-154	4.5895E-03	1,080.997	2,161.995	0.00E+00	4.96E+00	9.92E+00	1.7500	4.549E+10
Eu-155	3.6045E-03	1,080.997	2,161.995	0.00E+00	3.90E+00	7.79E+00	2.2500	1.567E+08
Fe-55	1.4185E-02	1,080.997	2,161.995	0.00E+00	1.53E+01	3.07E+01	2.7500	1.728E+06
H-3	4.7895E-03	1,080.997	2,161.995	0.00E+00	5.18E+00	1.04E+01	3.5000	9.587E+03
I-129	7.3684E-07	1,080.997	2,161.995	0.00E+00	7.97E-04	1.59E-03	5.0000	1.141E+03
Kr-85	9.5820E-02	1,080.997	2,161.995	0.00E+00	1.04E+02	2.07E+02	7.0000	1.289E+02
Np-237	1.2552E-06	1,080.997	2,161.995	0.00E+00	1.36E-03	2.71E-03	11.0000	1.466E+01
Pa-231	7.0406E-09	1,080.997	2,161.995	0.00E+00	7.61E-06	1.52E-05		
Pb-210	5.8000E-14	1,080.997	2,161.995	0.00E+00	6.27E-11	1.25E-10		
Pm-147	4.0075E-02	1,080.997	2,161.995	0.00E+00	4.33E+01	8.66E+01		
Pu-238	9.2256E-04	1,080.997	2,161.995	0.00E+00	9.97E-01	1.99E+00		
Pu-239	5.5278E-03	1,080.997	2,161.995	0.00E+00	5.98E+00	1.20E+01		
Pu-240	2.1248E-03	1,080.997	2,161.995	0.00E+00	2.30E+00	4.59E+00		
Pu-241	4.9549E-02	1,080.997	2,161.995	0.00E+00	5.36E+01	1.07E+02		
Pu-242	2.3128E-07	1,080.997	2,161.995	0.00E+00	2.50E-04	5.00E-04		
Ra-226	2.4526E-13	1,080.997	2,161.995	0.00E+00	2.65E-10	5.30E-10		
Ra-228	2.4015E-10	1,080.997	2,161.995	0.00E+00	2.60E-07	5.19E-07		
Ru-106	3.0602E-06	1,080.997	2,161.995	0.00E+00	3.31E-03	6.62E-03		
Se-79	1.3015E-05	1,080.997	2,161.995	0.00E+00	1.41E-02	2.81E-02		
Sn-126	1.2165E-05	1,080.997	2,161.995	0.00E+00	1.32E-02	2.63E-02		
Sr-90	1.8226E+00	1,080.997	2,161.995	0.00E+00	1.97E+03	3.94E+03		
Tc-99	4.4241E-04	1,080.997	2,161.995	0.00E+00	4.78E-01	9.56E-01		
Th-229	3.0962E-10	1,080.997	2,161.995	0.00E+00	3.35E-07	6.69E-07		
Th-230	4.2346E-11	1,080.997	2,161.995	0.00E+00	4.58E-08	9.16E-08		
Th-232	2.5278E-10	1,080.997	2,161.995	0.00E+00	2.73E-07	5.47E-07		
Tl-208	1.5820E-08	1,080.997	2,161.995	0.00E+00	1.71E-05	3.42E-05		
U-232	4.2647E-08	1,080.997	2,161.995	0.00E+00	4.61E-05	9.22E-05		
U-233	1.2211E-07	1,080.997	2,161.995	0.00E+00	1.32E-04	2.64E-04		
U-234	1.9955E-07	1,080.997	2,161.995	0.00E+00	2.16E-04	4.31E-04		
U-235	-2.6194E-06	1,080.997	0.000	1.23E-02	9.45E-03	1.23E-02		
U-236	1.2693E-05	1,080.997	2,161.995	0.00E+00	1.37E-02	2.74E-02		
U-238	-3.6331E-08	1,080.997	0.000	7.70E-03	7.66E-03	7.70E-03		
Y-90	1.8241E+00	1,080.997	2,161.995	0.00E+00	1.97E+03	3.94E+03		
Other Radionuclides					2.08E+03	4.16E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
2.70E+01	5.41E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHx	U	
BOL Enrichment %:	19.8857762	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,080.997	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		2,161.995	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.11		1.00
Bounding:	2.22		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (SLOVENIA)
 SNF ID #: 488
 Fuel Units & Descr: 122 - ELEMENT
 Heavy Metal Mass: BOL=23.40kg : EOL=22.59kg
 ROD Storage Site: INEEL

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

Estimated
 Canister usage:
 18"x10"
 1.10

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.6436E-09	768.650	1,537.300	0.00E+00	2.03E-06	4.06E-06	Avg. MeV	
Am-241	3.1429E-03	768.650	1,537.300	0.00E+00	2.42E+00	4.83E+00	0.0150	1.541E+14
Am-242m	1.3195E-06	768.650	1,537.300	0.00E+00	1.01E-03	2.03E-03	0.0250	3.207E+13
Am-243	1.4753E-07	768.650	1,537.300	0.00E+00	1.13E-04	2.27E-04	0.0375	2.778E+13
C-14	1.2847E-04	768.650	1,537.300	0.00E+00	9.87E-02	1.97E-01	0.0575	2.989E+13
Cl-36	2.8120E-06	768.650	1,537.300	0.00E+00	2.16E-03	4.32E-03	0.0850	1.804E+13
Cm-243	1.2465E-07	768.650	1,537.300	0.00E+00	9.58E-05	1.92E-04	0.1250	1.179E+13
Cm-244	9.5564E-07	768.650	1,537.300	0.00E+00	7.35E-04	1.47E-03	0.2250	1.549E+13
Co-60	1.7880E-01	768.650	1,537.300	0.00E+00	1.37E+02	2.75E+02	0.3750	6.790E+12
Cs-134	5.8692E-04	768.650	1,537.300	0.00E+00	4.51E-01	9.02E-01	0.5750	1.117E+14
Cs-135	3.2195E-05	768.650	1,537.300	0.00E+00	2.47E-02	4.95E-02	0.8500	1.259E+12
Cs-137	1.9489E+00	768.650	1,537.300	0.00E+00	1.50E+03	3.00E+03	1.2500	2.086E+13
Eu-154	4.5895E-03	768.650	1,537.300	0.00E+00	3.53E+00	7.06E+00	1.7500	3.235E+10
Eu-155	3.6045E-03	768.650	1,537.300	0.00E+00	2.77E+00	5.54E+00	2.2500	1.114E+08
Fe-55	1.4185E-02	768.650	1,537.300	0.00E+00	1.09E+01	2.18E+01	2.7500	1.227E+06
H-3	4.7895E-03	768.650	1,537.300	0.00E+00	3.68E+00	7.36E+00	3.5000	6.822E+03
I-129	7.3684E-07	768.650	1,537.300	0.00E+00	5.66E-04	1.13E-03	5.0000	8.131E+02
Kr-85	9.5820E-02	768.650	1,537.300	0.00E+00	7.37E+01	1.47E+02	7.0000	9.186E+01
Np-237	1.2552E-06	768.650	1,537.300	0.00E+00	9.65E-04	1.93E-03	11.0000	1.045E+01
Pa-231	7.0406E-09	768.650	1,537.300	0.00E+00	5.41E-06	1.08E-05		
Pb-210	5.8000E-14	768.650	1,537.300	0.00E+00	4.46E-11	8.92E-11		
Pm-147	4.0075E-02	768.650	1,537.300	0.00E+00	3.08E+01	6.16E+01		
Pu-238	9.2256E-04	768.650	1,537.300	0.00E+00	7.09E-01	1.42E+00		
Pu-239	5.5278E-03	768.650	1,537.300	0.00E+00	4.25E+00	8.50E+00		
Pu-240	2.1248E-03	768.650	1,537.300	0.00E+00	1.63E+00	3.27E+00		
Pu-241	4.9549E-02	768.650	1,537.300	0.00E+00	3.81E+01	7.62E+01		
Pu-242	2.3128E-07	768.650	1,537.300	0.00E+00	1.78E-04	3.56E-04		
Ra-226	2.4526E-13	768.650	1,537.300	0.00E+00	1.89E-10	3.77E-10		
Ra-228	2.4015E-10	768.650	1,537.300	0.00E+00	1.85E-07	3.69E-07		
Ru-106	3.0602E-06	768.650	1,537.300	0.00E+00	2.35E-03	4.70E-03		
Se-79	1.3015E-05	768.650	1,537.300	0.00E+00	1.00E-02	2.00E-02		
Sn-126	1.2165E-05	768.650	1,537.300	0.00E+00	9.35E-03	1.87E-02		
Sr-90	1.8226E+00	768.650	1,537.300	0.00E+00	1.40E+03	2.80E+03		
Tc-99	4.4241E-04	768.650	1,537.300	0.00E+00	3.40E-01	6.80E-01		
Th-229	3.0962E-10	768.650	1,537.300	0.00E+00	2.38E-07	4.76E-07		
Th-230	4.2346E-11	768.650	1,537.300	0.00E+00	3.25E-08	6.51E-08		
Th-232	2.5278E-10	768.650	1,537.300	0.00E+00	1.94E-07	3.89E-07		
Tl-208	1.5820E-08	768.650	1,537.300	0.00E+00	1.22E-05	2.43E-05		
U-232	4.2647E-08	768.650	1,537.300	0.00E+00	3.28E-05	6.56E-05		
U-233	1.2211E-07	768.650	1,537.300	0.00E+00	9.39E-05	1.88E-04		
U-234	1.9955E-07	768.650	1,537.300	0.00E+00	1.53E-04	3.07E-04		
U-235	-2.6194E-06	768.650	0.000	1.01E-02	8.04E-03	1.01E-02		
U-236	1.2693E-05	768.650	1,537.300	0.00E+00	9.76E-03	1.95E-02	1.92E+01	3.85E+01
U-238	-3.6331E-08	768.650	0.000	6.30E-03	6.27E-03	6.30E-03	Total	Total
Y-90	1.8241E+00	768.650	1,537.300	0.00E+00	1.40E+03	2.80E+03		
Other Radionuclides					1.48E+03	2.96E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.92E+01	3.85E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.8857762	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate: Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
	From SFD	Estimated	
Nominal:		768.650	
Bounding:		1,537.300	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.96		
Bounding:	1.93		
			1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (SLOVENIA)
 SNF ID #: 468
 Fuel Units & Descr: 67 - ELEMENT
 Heavy Metal Mass: BOL=11.88kg ; EOL=11.53kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1996
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.66
 Template BOL, Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 25 year;

Estimated
 Canister usage:
 18"x10"
 0.60

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	3.8271E-09	405.208	810.416	0.00E+00	1.55E-06	3.10E-06	0.0150	7.324E+13
Am-241	4.4195E-03	405.208	810.416	0.00E+00	1.79E+00	3.58E+00	0.0250	1.519E+13
Am-242m	1.8195E-06	405.208	810.416	0.00E+00	7.37E-04	1.47E-03	0.0375	1.515E+13
Am-243	2.3278E-07	405.208	810.416	0.00E+00	9.43E-05	1.89E-04	0.0575	1.453E+13
C-14	4.3203E-05	405.208	810.416	0.00E+00	1.75E-02	3.50E-02	0.0850	8.741E+12
Ci-36	4.3023E-08	405.208	810.416	0.00E+00	1.74E-05	3.49E-05	0.1250	8.886E+12
Cm-243	1.6872E-07	405.208	810.416	0.00E+00	6.84E-05	1.37E-04	0.2250	7.908E+12
Cm-244	1.4660E-06	405.208	810.416	0.00E+00	5.94E-04	1.19E-03	0.3750	3.289E+12
Co-60	2.2376E-03	405.208	810.416	0.00E+00	9.07E-01	1.81E+00	0.5750	5.320E+13
Cs-134	1.2525E-04	405.208	810.416	0.00E+00	5.08E-02	1.02E-01	0.8500	4.390E+12
Cs-135	3.1549E-05	405.208	810.416	0.00E+00	1.28E-02	2.56E-02	1.2500	4.607E+12
Cs-137	1.7368E+00	405.208	810.416	0.00E+00	7.04E+02	1.41E+03	1.7500	1.410E+11
Eu-154	2.6947E-01	405.208	810.416	0.00E+00	1.09E+02	2.18E+02	2.2500	2.164E+06
Eu-155	2.6857E-02	405.208	810.416	0.00E+00	1.09E+01	2.18E+01	2.7500	4.983E+05
Fe-55	4.2105E-05	405.208	810.416	0.00E+00	1.71E-02	3.41E-02	3.5000	1.181E+03
H-3	3.5173E-03	405.208	810.416	0.00E+00	1.43E+00	2.85E+00	5.0000	4.615E+02
I-129	7.3805E-07	405.208	810.416	0.00E+00	2.99E-04	5.98E-04	7.0000	5.206E+01
Kr-85	6.9263E-02	405.208	810.416	0.00E+00	2.81E+01	5.61E+01	11.0000	5.919E+00
Np-237	1.4752E-06	405.208	810.416	0.00E+00	5.98E-04	1.20E-03		
Pa-231	8.3970E-09	405.208	810.416	0.00E+00	3.40E-06	6.81E-06		
Pb-210	1.4995E-13	405.208	810.416	0.00E+00	6.08E-11	1.22E-10		
Pm-147	1.0567E-02	405.208	810.416	0.00E+00	4.28E+00	8.56E+00		
Pu-238	1.1543E-03	405.208	810.416	0.00E+00	4.68E-01	9.35E-01		
Pu-239	5.6917E-03	405.208	810.416	0.00E+00	2.31E+00	4.61E+00		
Pu-240	2.2602E-03	405.208	810.416	0.00E+00	9.16E-01	1.83E+00		
Pu-241	4.8045E-02	405.208	810.416	0.00E+00	1.95E+01	3.89E+01		
Pu-242	3.0602E-07	405.208	810.416	0.00E+00	1.24E-04	2.48E-04		
Ra-226	5.1293E-13	405.208	810.416	0.00E+00	2.08E-10	4.16E-10		
Ra-228	2.3323E-10	405.208	810.416	0.00E+00	9.45E-08	1.89E-07		
Ru-106	1.0075E-07	405.208	810.416	0.00E+00	4.08E-05	8.17E-05		
Se-79	1.2935E-05	405.208	810.416	0.00E+00	5.24E-03	1.05E-02		
Sn-126	1.2238E-05	405.208	810.416	0.00E+00	4.96E-03	9.92E-03		
Sr-90	1.6165E+00	405.208	810.416	0.00E+00	6.55E+02	1.31E+03		
Tc-99	4.4120E-04	405.208	810.416	0.00E+00	1.79E-01	3.58E-01		
Th-229	4.5684E-10	405.208	810.416	0.00E+00	1.85E-07	3.70E-07		
Th-230	6.8271E-11	405.208	810.416	0.00E+00	2.77E-08	5.53E-08		
Th-232	2.3744E-10	405.208	810.416	0.00E+00	9.62E-08	1.92E-07		
Tl-208	1.7368E-08	405.208	810.416	0.00E+00	7.04E-06	1.41E-05		
U-232	4.6797E-08	405.208	810.416	0.00E+00	1.90E-05	3.79E-05		
U-233	1.3146E-07	405.208	810.416	0.00E+00	5.33E-05	1.07E-04		
U-234	2.5729E-07	405.208	810.416	0.00E+00	1.04E-04	2.09E-04		
U-235	-2.6159E-06	405.208	0.000	5.14E-03	4.08E-03	5.14E-03		
U-236	1.2719E-05	405.208	810.416	0.00E+00	5.15E-03	1.03E-02		
U-238	-3.8857E-08	405.208	0.000	3.19E-03	3.18E-03	3.19E-03		
Y-90	1.6165E+00	405.208	810.416	0.00E+00	6.55E+02	1.31E+03		
Other Radionuclides					7.63E+02	1.53E+03		

Thermal Power		
	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
	9.02E+00	1.80E+01
Total	Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.00337313	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	405.208	332.554	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		810.416	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.92	0.82	0.99
Bounding:	1.85		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (SO. KOREA) 1Fuel decay start date: 1972
 SNF ID #: 483 Estimates as of: 2030
 Fuel Units & Descr: 69 - ELEMENT Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
 Heavy Metal Mass: BOL=13.11kg ; EOL=12.96kg 2Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.00018
Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.62

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg MeV	
Ac-227	8.6842E-09	383.310	766.620	0.00E+00	3.33E-06	6.66E-06		
Am-241	4.9459E-03	383.310	766.620	0.00E+00	1.90E+00	3.79E+00	0.0150	3.759E+13
Am-242m	1.6241E-06	383.310	766.620	0.00E+00	6.23E-04	1.25E-03	0.0250	7.793E+12
Am-243	2.3233E-07	383.310	766.620	0.00E+00	8.91E-05	1.78E-04	0.0375	7.033E+12
C-14	4.3083E-05	383.310	766.620	0.00E+00	1.65E-02	3.30E-02	0.0575	7.360E+12
Cl-36	4.3023E-08	383.310	766.620	0.00E+00	1.65E-05	3.30E-05	0.0850	4.391E+12
Cm-243	9.1880E-08	383.310	766.620	0.00E+00	3.52E-05	7.04E-05	0.1250	3.258E+12
Cm-244	5.6346E-07	383.310	766.620	0.00E+00	2.16E-04	4.32E-04	0.2250	3.853E+12
Co-60	8.3699E-05	383.310	766.620	0.00E+00	3.21E-02	6.42E-02	0.3750	1.662E+12
Cs-134	2.8211E-08	383.310	766.620	0.00E+00	1.08E-05	2.16E-05	0.5750	2.791E+13
Cs-135	3.1549E-05	383.310	766.620	0.00E+00	1.21E-02	2.42E-02	0.8500	7.601E+11
Cs-137	9.7519E-01	383.310	766.620	0.00E+00	3.74E+02	7.48E+02	1.2500	6.425E+11
Eu-154	3.5970E-02	383.310	766.620	0.00E+00	1.38E+01	2.76E+01	1.7500	2.304E+10
Eu-155	8.1774E-04	383.310	766.620	0.00E+00	3.13E-01	6.27E-01	2.2500	7.815E+05
Fe-55	5.3940E-08	383.310	766.620	0.00E+00	2.07E-05	4.14E-05	2.7500	3.691E+05
H-3	8.6571E-04	383.310	766.620	0.00E+00	3.32E-01	6.64E-01	3.5000	1.026E+03
I-129	7.3805E-07	383.310	766.620	0.00E+00	2.83E-04	5.66E-04	5.0000	4.316E+02
Kr-85	1.3771E-02	383.310	766.620	0.00E+00	5.28E+00	1.06E+01	7.0000	4.866E+01
Np-237	1.5218E-06	383.310	766.620	0.00E+00	5.83E-04	1.17E-03	11.0000	5.530E+00
Pa-231	1.4152E-08	383.310	766.620	0.00E+00	5.42E-06	1.08E-05		
Pb-210	7.9774E-13	383.310	766.620	0.00E+00	3.06E-10	6.12E-10		
Pm-147	1.4362E-05	383.310	766.620	0.00E+00	5.51E-03	1.10E-02		
Pu-238	9.4782E-04	383.310	766.620	0.00E+00	3.63E-01	7.27E-01		
Pu-239	5.6872E-03	383.310	766.620	0.00E+00	2.18E+00	4.36E+00		
Pu-240	2.2541E-03	383.310	766.620	0.00E+00	8.64E-01	1.73E+00		
Pu-241	1.4433E-02	383.310	766.620	0.00E+00	5.53E+00	1.11E+01		
Pu-242	3.0602E-07	383.310	766.620	0.00E+00	1.17E-04	2.35E-04		
Ra-226	1.8857E-12	383.310	766.620	0.00E+00	7.23E-10	1.45E-09		
Ra-228	2.3729E-10	383.310	766.620	0.00E+00	9.10E-08	1.82E-07		
Ru-106	3.4857E-15	383.310	766.620	0.00E+00	1.34E-12	2.67E-12		
Se-79	1.2931E-05	383.310	766.620	0.00E+00	4.96E-03	9.91E-03		
Sn-126	1.2235E-05	383.310	766.620	0.00E+00	4.69E-03	9.38E-03		
Sr-90	8.9173E-01	383.310	766.620	0.00E+00	3.42E+02	6.84E+02		
Tc-99	4.4120E-04	383.310	766.620	0.00E+00	1.69E-01	3.38E-01		
Th-229	8.2752E-10	383.310	766.620	0.00E+00	3.17E-07	6.34E-07		
Th-230	1.4908E-10	383.310	766.620	0.00E+00	5.71E-08	1.14E-07		
Th-232	2.3744E-10	383.310	766.620	0.00E+00	9.10E-08	1.82E-07		
Tl-208	1.3668E-08	383.310	766.620	0.00E+00	5.24E-06	1.05E-05		
U-232	3.6797E-08	383.310	766.620	0.00E+00	1.41E-05	2.82E-05		
U-233	1.3164E-07	383.310	766.620	0.00E+00	5.05E-05	1.01E-04		
U-234	3.3865E-07	383.310	766.620	0.00E+00	1.30E-04	2.60E-04		
U-235	-2.6144E-06	383.310	0.000	5.67E-03	4.66E-03	5.67E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.2722E-05	383.310	766.620	0.00E+00	4.88E-03	9.75E-03	4.41E+00	8.81E+00
U-238	-3.8857E-08	383.310	0.000	3.53E-03	3.51E-03	3.53E-03	Total	Total
Y-90	8.9203E-01	383.310	766.620	0.00E+00	3.42E+02	6.84E+02		
Other Radionuclides					4.28E+02	8.56E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	383.310	144.896	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:		766.620	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.79	0.38
Bounding:	1.58	

Estimated EOL HM/Given EOL HM 0.98

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (SO. KOREA)
 SNF ID #: 484
 Fuel Units & Descr: 104 - ELEMENT
 Heavy Metal Mass: BOL=19.76kg ; EOL=19.26kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1996
 Estimates as of: 2030
 Template: TRIGA-SS (LW/U-ZrX, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 0.94

Radionuclide	Ct/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4.1459E-09	476.540	953.080	0.00E+00	1.98E-06	3.95E-06	Avg. MeV	
Am-241	3.5850E-03	476.540	953.080	0.00E+00	1.71E+00	3.42E+00	0.0150	8.460E+13
Am-242m	1.2899E-06	476.540	953.080	0.00E+00	6.15E-04	1.23E-03	0.0250	1.759E+13
Am-243	1.4747E-07	476.540	953.080	0.00E+00	7.03E-05	1.41E-04	0.0375	1.526E+13
C-14	1.2839E-04	476.540	953.080	0.00E+00	6.12E-02	1.22E-01	0.0575	1.643E+13
Cl-36	2.8120E-06	476.540	953.080	0.00E+00	1.34E-03	2.68E-03	0.0850	9.905E+12
Cm-243	1.1038E-07	476.540	953.080	0.00E+00	5.26E-05	1.05E-04	0.1250	6.462E+12
Cm-244	7.8917E-07	476.540	953.080	0.00E+00	3.76E-04	7.52E-04	0.2250	8.519E+12
Co-60	9.2647E-02	476.540	953.080	0.00E+00	4.41E+01	8.83E+01	0.3750	3.720E+12
Cs-134	1.0940E-04	476.540	953.080	0.00E+00	5.21E-02	1.04E-01	0.5750	6.167E+13
Cs-135	3.2195E-05	476.540	953.080	0.00E+00	1.53E-02	3.07E-02	0.8500	6.621E+11
Cs-137	1.7368E+00	476.540	953.080	0.00E+00	8.28E+02	1.66E+03	1.2500	6.799E+12
Eu-154	3.0677E-03	476.540	953.080	0.00E+00	1.46E+00	2.92E+00	1.7500	1.724E+10
Eu-155	1.7925E-03	476.540	953.080	0.00E+00	8.54E-01	1.71E+00	2.2500	3.634E+07
Fe-55	3.7444E-03	476.540	953.080	0.00E+00	1.78E+00	3.57E+00	2.7500	6.145E+05
H-3	3.6180E-03	476.540	953.080	0.00E+00	1.72E+00	3.45E+00	3.5000	1.300E+03
I-129	7.3684E-07	476.540	953.080	0.00E+00	3.51E-04	7.02E-04	5.0000	5.005E+02
Kr-85	6.9368E-02	476.540	953.080	0.00E+00	3.31E+01	6.61E+01	7.0000	5.719E+01
Np-237	1.2662E-06	476.540	953.080	0.00E+00	6.03E-04	1.21E-03	11.0000	6.506E+00
Pa-231	9.1654E-09	476.540	953.080	0.00E+00	4.37E-06	8.74E-06		
Pb-210	1.3728E-13	476.540	953.080	0.00E+00	6.54E-11	1.31E-10		
Pm-147	1.0702E-02	476.540	953.080	0.00E+00	5.10E+00	1.02E+01		
Pu-238	8.8692E-04	476.540	953.080	0.00E+00	4.23E-01	8.45E-01		
Pu-239	5.5263E-03	476.540	953.080	0.00E+00	2.63E+00	5.27E+00		
Pu-240	2.1233E-03	476.540	953.080	0.00E+00	1.01E+00	2.02E+00		
Pu-241	3.8962E-02	476.540	953.080	0.00E+00	1.86E+01	3.71E+01		
Pu-242	2.3128E-07	476.540	953.080	0.00E+00	1.10E-04	2.20E-04		
Ra-226	4.6752E-13	476.540	953.080	0.00E+00	2.23E-10	4.46E-10		
Ra-228	2.4827E-10	476.540	953.080	0.00E+00	1.18E-07	2.37E-07		
Ru-106	9.8526E-08	476.540	953.080	0.00E+00	4.70E-05	9.39E-05		
Se-79	1.3015E-05	476.540	953.080	0.00E+00	6.20E-03	1.24E-02		
Sn-126	1.2165E-05	476.540	953.080	0.00E+00	5.80E-03	1.16E-02		
Sr-90	1.6195E+00	476.540	953.080	0.00E+00	7.72E+02	1.54E+03		
Tc-99	4.4241E-04	476.540	953.080	0.00E+00	2.11E-01	4.22E-01		
Th-229	4.2451E-10	476.540	953.080	0.00E+00	2.02E-07	4.05E-07		
Th-230	6.1398E-11	476.540	953.080	0.00E+00	2.93E-08	5.85E-08		
Th-232	2.5278E-10	476.540	953.080	0.00E+00	1.20E-07	2.41E-07		
Th-208	1.5098E-08	476.540	953.080	0.00E+00	7.19E-06	1.44E-05		
U-232	4.0662E-08	476.540	953.080	0.00E+00	1.94E-05	3.88E-05		
U-233	1.2217E-07	476.540	953.080	0.00E+00	5.82E-05	1.16E-04		
U-234	2.2391E-07	476.540	953.080	0.00E+00	1.07E-04	2.13E-04		
U-235	-2.6194E-06	476.540	0.000	8.54E-03	7.29E-03	8.54E-03		
U-236	1.2695E-05	476.540	953.080	0.00E+00	6.05E-03	1.21E-02		
U-238	-3.6331E-08	476.540	0.000	5.31E-03	5.30E-03	5.31E-03		
Y-90	1.6195E+00	476.540	953.080	0.00E+00	7.72E+02	1.54E+03		
Other Radionuclides					8.20E+02	1.64E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.01E+01	2.02E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		476.540	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		953.080	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.71		1.00
Bounding:	1.41		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (SLOVENIA) ¹Fuel decay start date: 2010
 SNF ID #: 731 Estimates as of: 2030
 Fuel Units & Descr: 10 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=4.95kg ; EOL=4.75kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.09

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.6436E-09	186.617	373.234	0.00E+00	4.93E-07	9.87E-07	0.0150	3.740E+13
Am-241	3.1429E-03	186.617	373.234	0.00E+00	5.87E-01	1.17E+00	0.0250	7.786E+12
Am-242m	1.3195E-06	186.617	373.234	0.00E+00	2.46E-04	4.93E-04	0.0375	6.745E+12
Am-243	1.4753E-07	186.617	373.234	0.00E+00	2.75E-05	5.51E-05	0.0575	7.256E+12
C-14	1.2847E-04	186.617	373.234	0.00E+00	2.40E-02	4.79E-02	0.0850	4.381E+12
Cl-36	2.8120E-06	186.617	373.234	0.00E+00	5.25E-04	1.05E-03	0.1250	2.863E+12
Cm-243	1.2465E-07	186.617	373.234	0.00E+00	2.33E-05	4.65E-05	0.2250	3.761E+12
Cm-244	9.5564E-07	186.617	373.234	0.00E+00	1.78E-04	3.57E-04	0.3750	1.648E+12
Co-60	1.7880E-01	186.617	373.234	0.00E+00	3.34E+01	6.67E+01	0.5750	2.711E+13
Cs-134	5.8692E-04	186.617	373.234	0.00E+00	1.10E-01	2.19E-01	0.8500	3.056E+11
Cs-135	3.2195E-05	186.617	373.234	0.00E+00	6.01E-03	1.20E-02	1.2500	5.064E+12
Cs-137	1.9489E+00	186.617	373.234	0.00E+00	3.64E+02	7.27E+02	1.7500	7.854E+09
Eu-154	4.5895E-03	186.617	373.234	0.00E+00	8.56E-01	1.71E+00	2.2500	2.704E+07
Eu-155	3.6045E-03	186.617	373.234	0.00E+00	6.73E-01	1.35E+00	2.7500	2.980E+05
Fe-55	1.4185E-02	186.617	373.234	0.00E+00	2.65E+00	5.29E+00	3.5000	1.655E+03
H-3	4.7895E-03	186.617	373.234	0.00E+00	8.94E-01	1.79E+00	5.0000	1.970E+02
I-129	7.3684E-07	186.617	373.234	0.00E+00	1.38E-04	2.75E-04	7.0000	2.225E+01
Kr-85	9.5820E-02	186.617	373.234	0.00E+00	1.79E+01	3.58E+01	11.0000	2.532E+00
Np-237	1.2552E-06	186.617	373.234	0.00E+00	2.34E-04	4.68E-04		
Pa-231	7.0406E-09	186.617	373.234	0.00E+00	1.31E-06	2.63E-06		
Pb-210	5.8000E-14	186.617	373.234	0.00E+00	1.08E-11	2.16E-11		
Pm-147	4.0075E-02	186.617	373.234	0.00E+00	7.48E+00	1.50E+01		
Pu-238	9.2256E-04	186.617	373.234	0.00E+00	1.72E-01	3.44E-01		
Pu-239	5.5278E-03	186.617	373.234	0.00E+00	1.03E+00	2.06E+00		
Pu-240	2.1248E-03	186.617	373.234	0.00E+00	3.97E-01	7.93E-01		
Pu-241	4.9549E-02	186.617	373.234	0.00E+00	9.25E+00	1.85E+01		
Pu-242	2.3128E-07	186.617	373.234	0.00E+00	4.32E-05	8.63E-05		
Ra-226	2.4526E-13	186.617	373.234	0.00E+00	4.58E-11	9.15E-11		
Ra-228	2.4015E-10	186.617	373.234	0.00E+00	4.48E-08	8.96E-08		
Ru-106	3.0602E-06	186.617	373.234	0.00E+00	5.71E-04	1.14E-03		
Se-79	1.3015E-05	186.617	373.234	0.00E+00	2.43E-03	4.86E-03		
Sn-126	1.2165E-05	186.617	373.234	0.00E+00	2.27E-03	4.54E-03		
Sr-90	1.8226E+00	186.617	373.234	0.00E+00	3.40E+02	6.80E+02		
Tc-99	4.4241E-04	186.617	373.234	0.00E+00	8.26E-02	1.65E-01		
Th-229	3.0962E-10	186.617	373.234	0.00E+00	5.78E-08	1.16E-07		
Th-230	4.2346E-11	186.617	373.234	0.00E+00	7.90E-09	1.58E-08		
Th-232	2.5278E-10	186.617	373.234	0.00E+00	4.72E-08	9.43E-08		
Ti-208	1.5820E-08	186.617	373.234	0.00E+00	2.95E-06	5.90E-06		
U-232	4.2647E-08	186.617	373.234	0.00E+00	7.96E-06	1.59E-05		
U-233	1.2211E-07	186.617	373.234	0.00E+00	2.28E-05	4.56E-05		
U-234	1.9955E-07	186.617	373.234	0.00E+00	3.72E-05	7.45E-05		
U-235	-2.6194E-06	186.617	0.000	2.11E-03	1.63E-03	2.11E-03		
U-236	1.2693E-05	186.617	373.234	0.00E+00	2.37E-03	4.74E-03		
U-238	-3.6331E-08	186.617	0.000	1.33E-03	1.33E-03	1.33E-03		
Y-90	1.8241E+00	186.617	373.234	0.00E+00	3.40E+02	6.81E+02		
Other Radionuclides					3.59E+02	7.19E+02		

Thermal Power	
Nominal Output (Watts)	Bounding Heat Output (Watts)
4.67E+00	9.34E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.76747705	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	186.617	186.148	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		373.234	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.11	1.00	1.00
Bounding:	2.21		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (THAILAND) ¹Fuel decay start date: 2010
 SNF ID #: 489 Estimates as of: 2030
 Fuel Units & Descr: 100 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=19.50kg ; EOL=19.30kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.90

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)		Avg. MeV
Ac-227	2.6436E-09	190.921	381.843	0.00E+00	5.05E-07	1.01E-06		
Am-241	3.1429E-03	190.921	381.843	0.00E+00	6.00E-01	1.20E+00	0.0150	3.827E+13
Am-242m	1.3195E-06	190.921	381.843	0.00E+00	2.52E-04	5.04E-04	0.0250	7.966E+12
Am-243	1.4753E-07	190.921	381.843	0.00E+00	2.82E-05	5.63E-05	0.0375	6.901E+12
C-14	1.2847E-04	190.921	381.843	0.00E+00	2.45E-02	4.91E-02	0.0575	7.424E+12
Cl-36	2.8120E-06	190.921	381.843	0.00E+00	5.37E-04	1.07E-03	0.0850	4.482E+12
Cm-243	1.2465E-07	190.921	381.843	0.00E+00	2.38E-05	4.76E-05	0.1250	2.929E+12
Cm-244	9.5564E-07	190.921	381.843	0.00E+00	1.82E-04	3.65E-04	0.2250	3.848E+12
Co-60	1.7880E-01	190.921	381.843	0.00E+00	3.41E+01	6.83E+01	0.3750	1.686E+12
Cs-134	5.8692E-04	190.921	381.843	0.00E+00	1.12E-01	2.24E-01	0.5750	2.774E+13
Cs-135	3.2195E-05	190.921	381.843	0.00E+00	6.15E-03	1.23E-02	0.8500	3.126E+11
Cs-137	1.9489E+00	190.921	381.843	0.00E+00	3.72E+02	7.44E+02	1.2500	5.181E+12
Eu-154	4.5895E-03	190.921	381.843	0.00E+00	8.76E-01	1.75E+00	1.7500	8.035E+09
Eu-155	3.6045E-03	190.921	381.843	0.00E+00	6.88E-01	1.38E+00	2.2500	2.767E+07
Fe-55	1.4185E-02	190.921	381.843	0.00E+00	2.71E+00	5.42E+00	2.7500	3.049E+05
H-3	4.7895E-03	190.921	381.843	0.00E+00	9.14E-01	1.83E+00	3.5000	1.714E+03
I-129	7.3684E-07	190.921	381.843	0.00E+00	1.41E-04	2.81E-04	5.0000	2.105E+02
Kr-85	9.5820E-02	190.921	381.843	0.00E+00	1.83E+01	3.66E+01	7.0000	2.379E+01
Np-237	1.2552E-06	190.921	381.843	0.00E+00	2.40E-04	4.79E-04	11.0000	2.709E+00
Pa-231	7.0406E-09	190.921	381.843	0.00E+00	1.34E-06	2.69E-06		
Pb-210	5.8000E-14	190.921	381.843	0.00E+00	1.11E-11	2.21E-11		
Pm-147	4.0075E-02	190.921	381.843	0.00E+00	7.65E+00	1.53E+01		
Pu-238	9.2256E-04	190.921	381.843	0.00E+00	1.76E-01	3.52E-01		
Pu-239	5.5278E-03	190.921	381.843	0.00E+00	1.06E+00	2.11E+00		
Pu-240	2.1248E-03	190.921	381.843	0.00E+00	4.06E-01	8.11E-01		
Pu-241	4.9549E-02	190.921	381.843	0.00E+00	9.46E+00	1.89E+01		
Pu-242	2.3128E-07	190.921	381.843	0.00E+00	4.42E-05	8.83E-05		
Ra-226	2.4526E-13	190.921	381.843	0.00E+00	4.68E-11	9.37E-11		
Ra-228	2.4015E-10	190.921	381.843	0.00E+00	4.58E-08	9.17E-08		
Ru-106	3.0602E-06	190.921	381.843	0.00E+00	5.84E-04	1.17E-03		
Se-79	1.3015E-05	190.921	381.843	0.00E+00	2.48E-03	4.97E-03		
Sn-126	1.2165E-05	190.921	381.843	0.00E+00	2.32E-03	4.65E-03		
Sr-90	1.8226E+00	190.921	381.843	0.00E+00	3.48E+02	6.96E+02		
Tc-99	4.4241E-04	190.921	381.843	0.00E+00	8.45E-02	1.69E-01		
Th-229	3.0962E-10	190.921	381.843	0.00E+00	5.91E-08	1.18E-07		
Th-230	4.2346E-11	190.921	381.843	0.00E+00	8.08E-09	1.62E-08		
Th-232	2.5278E-10	190.921	381.843	0.00E+00	4.83E-08	9.65E-08		
Th-232	1.5820E-08	190.921	381.843	0.00E+00	3.02E-06	6.04E-06		
U-232	4.2647E-08	190.921	381.843	0.00E+00	8.14E-06	1.63E-05		
U-233	1.2211E-07	190.921	381.843	0.00E+00	2.33E-05	4.66E-05		
U-234	1.9955E-07	190.921	381.843	0.00E+00	3.81E-05	7.62E-05		
U-235	-2.6194E-06	190.921	0.000	8.43E-03	7.93E-03	8.43E-03		
U-236	1.2693E-05	190.921	381.843	0.00E+00	2.42E-03	4.85E-03		
U-238	-3.6331E-08	190.921	0.000	5.24E-03	5.24E-03	5.24E-03		
Y-90	1.8241E+00	190.921	381.843	0.00E+00	3.48E+02	6.97E+02		
Other Radionuclides					3.68E+02	7.35E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.78E+00	9.55E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		190.921	
Bounding:		381.843	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.29		
Bounding:	0.57		

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (TURKEY) ¹Fuel decay start date: 2010
 SNF ID #: 490 Estimates as of: 2030
 Fuel Units & Descr: 79 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=15.41kg : EOL=15.25kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.71

II. Estimates	m	x _a	x _b	b	y _a	y _b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.6436E-09	150.828	301.656	0.00E+00	3.99E-07	7.97E-07	Avg. MeV	
Am-241	3.1429E-03	150.828	301.656	0.00E+00	4.74E-01	9.48E-01	0.0150	3.023E+13
Am-242m	1.3195E-06	150.828	301.656	0.00E+00	1.99E-04	3.98E-04	0.0250	6.293E+12
Am-243	1.4753E-07	150.828	301.656	0.00E+00	2.23E-05	4.45E-05	0.0375	5.452E+12
C-14	1.2847E-04	150.828	301.656	0.00E+00	1.94E-02	3.88E-02	0.0575	5.865E+12
Cl-36	2.8120E-06	150.828	301.656	0.00E+00	4.24E-04	8.48E-04	0.0850	5.540E+12
Cm-243	1.2468E-07	150.828	301.656	0.00E+00	1.88E-05	3.76E-05	0.1250	2.314E+12
Cm-244	9.5564E-07	150.828	301.656	0.00E+00	1.44E-04	2.88E-04	0.2250	3.040E+12
Co-60	1.7880E-01	150.828	301.656	0.00E+00	2.70E+01	5.39E+01	0.3750	1.332E+12
Cs-134	5.8692E-04	150.828	301.656	0.00E+00	8.85E-02	1.77E-01	0.5750	2.191E+13
Cs-135	3.2195E-05	150.828	301.656	0.00E+00	4.86E-03	9.71E-03	0.8500	2.470E+11
Cs-137	1.9489E+00	150.828	301.656	0.00E+00	2.94E+02	5.88E+02	1.2500	4.093E+12
Eu-154	4.5895E-03	150.828	301.656	0.00E+00	6.92E-01	1.38E+00	1.7500	6.348E+09
Eu-155	3.6045E-03	150.828	301.656	0.00E+00	5.44E-01	1.09E+00	2.2500	2.186E+07
Fe-55	1.4185E-02	150.828	301.656	0.00E+00	2.14E+00	4.28E+00	2.7500	2.409E+05
H-3	4.7895E-03	150.828	301.656	0.00E+00	7.22E-01	1.44E+00	3.5000	1.354E+03
I-129	7.3684E-07	150.828	301.656	0.00E+00	1.11E-04	2.22E-04	5.0000	1.663E+02
Kr-85	9.5820E-02	150.828	301.656	0.00E+00	1.45E+01	2.89E+01	7.0000	1.880E+01
Np-237	1.2552E-06	150.828	301.656	0.00E+00	1.89E-04	3.79E-04	11.0000	2.140E+00
Pa-231	7.0406E-09	150.828	301.656	0.00E+00	1.06E-06	2.12E-06		
Pb-210	5.8000E-14	150.828	301.656	0.00E+00	8.75E-12	1.75E-11		
Pm-147	4.0075E-02	150.828	301.656	0.00E+00	6.04E+00	1.21E+01		
Pu-238	9.2256E-04	150.828	301.656	0.00E+00	1.39E-01	2.78E-01		
Pu-239	5.5278E-03	150.828	301.656	0.00E+00	8.34E-01	1.67E+00		
Pu-240	2.1248E-03	150.828	301.656	0.00E+00	3.20E-01	6.41E-01		
Pu-241	4.9549E-02	150.828	301.656	0.00E+00	7.47E+00	1.49E+01		
Pu-242	2.3128E-07	150.828	301.656	0.00E+00	3.49E-05	6.98E-05		
Ra-226	2.4526E-13	150.828	301.656	0.00E+00	3.70E-11	7.40E-11		
Ra-228	2.4015E-10	150.828	301.656	0.00E+00	3.62E-08	7.24E-08		
Ru-106	3.0602E-06	150.828	301.656	0.00E+00	4.62E-04	9.23E-04		
Se-79	1.3015E-05	150.828	301.656	0.00E+00	1.96E-03	3.93E-03		
Sn-126	1.2165E-05	150.828	301.656	0.00E+00	1.83E-03	3.67E-03		
Sr-90	1.8226E+00	150.828	301.656	0.00E+00	2.75E+02	5.50E+02		
Tc-99	4.4241E-04	150.828	301.656	0.00E+00	6.67E-02	1.33E-01		
Th-229	3.0962E-10	150.828	301.656	0.00E+00	4.67E-08	9.34E-08		
Th-230	4.2346E-11	150.828	301.656	0.00E+00	6.39E-09	1.28E-08		
Th-232	2.5278E-10	150.828	301.656	0.00E+00	3.81E-08	7.63E-08		
Tl-208	1.5820E-08	150.828	301.656	0.00E+00	2.39E-06	4.77E-06		
U-232	4.2647E-08	150.828	301.656	0.00E+00	6.43E-06	1.29E-05		
U-233	1.2211E-07	150.828	301.656	0.00E+00	1.84E-05	3.68E-05		
U-234	1.9955E-07	150.828	301.656	0.00E+00	3.01E-05	6.02E-05		
U-235	-2.6194E-06	150.828	0.000	6.66E-03	6.26E-03	6.66E-03		
U-236	1.2693E-05	150.828	301.656	0.00E+00	1.91E-03	3.83E-03		
U-238	-3.6331E-08	150.828	0.000	4.14E-03	4.14E-03	4.14E-03		
Y-90	1.8241E+00	150.828	301.656	0.00E+00	2.75E+02	5.50E+02		
Other Radionuclides					2.90E+02	5.81E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.77E+00	7.55E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	SST (304)	SST
BOL HM Constituents:	U-ZrHX	U
BOL Enrichment %:	20	10 to 20

Basis for Parameter Differences:

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:		150.828
Bounding:		301.656

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

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.29	
Bounding:	0.57	

Estimated EOL HM/ Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (U OF AZ)
 SNF ID #: 59
 Fuel Units & Descr: 84 - ELEMENT
 Heavy Metal Mass: BOL=16.38kg ; EOL=15.75kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2033
 Estimates as of: 2033
 Template: TRIGA-SS (LW/U-ZrX, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.76

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.5173E-10	601.403	1,202.805	0.00E+00	5.12E-07	1.02E-06	Avg. MeV	
Am-241	1.8331E-03	601.403	1,202.805	0.00E+00	1.10E+00	2.20E+00	0.0150	1.944E+14
Am-242m	1.4129E-06	601.403	1,202.805	0.00E+00	8.50E-04	1.70E-03	0.0250	4.278E+13
Am-243	1.4774E-07	601.403	1,202.805	0.00E+00	8.89E-05	1.78E-04	0.0375	3.643E+13
C-14	1.2871E-04	601.403	1,202.805	0.00E+00	7.74E-02	1.55E-01	0.0575	3.739E+13
Cl-36	2.8120E-06	601.403	1,202.805	0.00E+00	1.69E-03	3.38E-03	0.0850	2.316E+13
Cm-243	1.7940E-07	601.403	1,202.805	0.00E+00	1.08E-04	2.16E-04	0.1250	1.682E+13
Cm-244	1.6962E-06	601.403	1,202.805	0.00E+00	1.02E-03	2.04E-03	0.2250	1.965E+13
Co-60	1.2839E+00	601.403	1,202.805	0.00E+00	7.72E+02	1.54E+03	0.3750	9.972E+12
Cs-134	9.0541E-02	601.403	1,202.805	0.00E+00	5.45E+01	1.09E+02	0.5750	1.326E+14
Cs-135	3.2195E-05	601.403	1,202.805	0.00E+00	1.94E-02	3.87E-02	0.8500	5.689E+12
Cs-137	2.7564E+00	601.403	1,202.805	0.00E+00	1.66E+03	3.32E+03	1.2500	1.155E+14
Eu-154	1.5368E-02	601.403	1,202.805	0.00E+00	9.24E+00	1.85E+01	1.7500	7.703E+10
Eu-155	2.9293E-02	601.403	1,202.805	0.00E+00	1.76E+01	3.52E+01	2.2500	1.242E+11
Fe-55	7.7158E-01	601.403	1,202.805	0.00E+00	4.64E+02	9.28E+02	2.7500	9.852E+08
H-3	1.1111E-02	601.403	1,202.805	0.00E+00	6.68E+00	1.34E+01	3.5000	1.147E+08
I-129	7.3684E-07	601.403	1,202.805	0.00E+00	4.43E-04	8.86E-04	5.0000	6.404E+02
Kr-85	2.5263E-01	601.403	1,202.805	0.00E+00	1.52E+02	3.04E+02	7.0000	7.250E+01
Np-237	1.2427E-06	601.403	1,202.805	0.00E+00	7.47E-04	1.49E-03	11.0000	8.260E+00
Pa-231	3.8511E-09	601.403	1,202.805	0.00E+00	2.32E-06	4.63E-06		
Pb-210	7.3880E-15	601.403	1,202.805	0.00E+00	4.44E-12	8.89E-12		
Pm-147	2.1023E+00	601.403	1,202.805	0.00E+00	1.26E+03	2.53E+03		
Pu-238	1.0383E-03	601.403	1,202.805	0.00E+00	6.24E-01	1.25E+00		
Pu-239	5.5293E-03	601.403	1,202.805	0.00E+00	3.33E+00	6.65E+00		
Pu-240	2.1278E-03	601.403	1,202.805	0.00E+00	1.28E+00	2.56E+00		
Pu-241	1.0195E-01	601.403	1,202.805	0.00E+00	6.13E+01	1.23E+02		
Pu-242	2.3128E-07	601.403	1,202.805	0.00E+00	1.39E-04	2.78E-04		
Ra-226	5.2782E-14	601.403	1,202.805	0.00E+00	3.17E-11	6.35E-11		
Ra-228	1.9338E-10	601.403	1,202.805	0.00E+00	1.16E-07	2.33E-07		
Ru-106	9.1684E-02	601.403	1,202.805	0.00E+00	5.51E+01	1.10E+02		
Se-79	1.3018E-05	601.403	1,202.805	0.00E+00	7.83E-03	1.57E-02		
Sn-126	1.2167E-05	601.403	1,202.805	0.00E+00	7.32E-03	1.46E-02		
Sr-90	2.6045E+00	601.403	1,202.805	0.00E+00	1.57E+03	3.13E+03		
Tc-99	4.4241E-04	601.403	1,202.805	0.00E+00	2.66E-01	5.32E-01		
Th-229	1.3713E-10	601.403	1,202.805	0.00E+00	8.25E-08	1.65E-07		
Th-230	1.8090E-11	601.403	1,202.805	0.00E+00	1.09E-08	2.18E-08		
Th-232	2.5278E-10	601.403	1,202.805	0.00E+00	1.52E-07	3.04E-07		
Ti-208	1.6947E-08	601.403	1,202.805	0.00E+00	1.02E-05	2.04E-05		
U-232	4.8737E-08	601.403	1,202.805	0.00E+00	2.93E-05	5.86E-05		
U-233	1.2203E-07	601.403	1,202.805	0.00E+00	7.34E-05	1.47E-04		
U-234	1.5925E-07	601.403	1,202.805	0.00E+00	9.58E-05	1.92E-04		
U-235	-2.6194E-06	601.403	0.000	7.08E-03	5.50E-03	7.08E-03		
U-236	1.2693E-05	601.403	1,202.805	0.00E+00	7.63E-03	1.53E-02		
U-238	-3.6331E-08	601.403	0.000	4.40E-03	4.38E-03	4.40E-03		
Y-90	2.6060E+00	601.403	1,202.805	0.00E+00	1.57E+03	3.13E+03		
Other Radionuclides					2.17E+03	4.34E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.50E+01	7.00E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		601.403	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		1,202.805	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	1.08		1.00
Bounding:	2.15		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (U OF AZ) ¹Fuel decay start date: 2035
 SNF ID #: 975 Estimates as of: 2030
 Fuel Units & Descr: 8 - ELEMENT Template: TRIGA-SS (LW/U-Zrx, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=1.50kg ; EOL=1.50kg ²Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.07

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.5173E-10	21.915	43.829	0.00E+00	1.87E-08	3.73E-08	0.0150	7.084E+12
Am-241	1.8331E-03	21.915	43.829	0.00E+00	4.02E-02	8.03E-02	0.0250	1.559E+12
Am-242m	1.4129E-06	21.915	43.829	0.00E+00	3.10E-05	6.19E-05	0.0375	1.327E+12
Am-243	1.4774E-07	21.915	43.829	0.00E+00	3.24E-06	6.48E-06	0.0575	1.362E+12
C-14	1.2871E-04	21.915	43.829	0.00E+00	2.82E-03	5.64E-03	0.0850	8.441E+11
Cl-36	2.8120E-06	21.915	43.829	0.00E+00	6.16E-05	1.23E-04	0.1250	6.129E+11
Cm-243	1.7940E-07	21.915	43.829	0.00E+00	3.93E-06	7.86E-06	0.2250	7.161E+11
Cm-244	1.6962E-06	21.915	43.829	0.00E+00	3.72E-05	7.43E-05	0.3750	3.634E+11
Co-60	1.2839E+00	21.915	43.829	0.00E+00	2.81E+01	5.63E+01	0.5750	4.831E+12
Cs-134	9.0541E-02	21.915	43.829	0.00E+00	1.98E+00	3.97E+00	0.8500	2.073E+11
Cs-135	3.2195E-05	21.915	43.829	0.00E+00	7.06E-04	1.41E-03	1.2500	4.211E+12
Cs-137	2.7564E+00	21.915	43.829	0.00E+00	6.04E+01	1.21E+02	1.7500	2.807E+09
Eu-154	1.5368E-02	21.915	43.829	0.00E+00	3.37E-01	6.74E-01	2.2500	4.524E+09
Eu-155	2.9293E-02	21.915	43.829	0.00E+00	6.42E-01	1.28E+00	2.7500	3.590E+07
Fe-55	7.7158E-01	21.915	43.829	0.00E+00	1.69E+01	3.38E+01	3.5000	4.179E+06
H-3	1.1111E-02	21.915	43.829	0.00E+00	2.43E-01	4.87E-01	5.0000	2.391E+01
I-129	7.3684E-07	21.915	43.829	0.00E+00	1.61E-05	3.23E-05	7.0000	2.708E+00
Kr-85	2.5263E-01	21.915	43.829	0.00E+00	5.54E+00	1.11E+01	11.0000	3.086E-01
Np-237	1.2427E-06	21.915	43.829	0.00E+00	2.72E-05	5.45E-05		
Pa-231	3.8511E-09	21.915	43.829	0.00E+00	8.44E-08	1.69E-07		
Pb-210	7.3880E-15	21.915	43.829	0.00E+00	1.62E-13	3.24E-13		
Pm-147	2.1023E+00	21.915	43.829	0.00E+00	4.61E+01	9.21E+01		
Pu-238	1.0383E-03	21.915	43.829	0.00E+00	2.28E-02	4.55E-02		
Pu-239	5.5293E-03	21.915	43.829	0.00E+00	1.21E-01	2.42E-01		
Pu-240	2.1278E-03	21.915	43.829	0.00E+00	4.66E-02	9.33E-02		
Pu-241	1.0195E-01	21.915	43.829	0.00E+00	2.23E+00	4.47E+00		
Pu-242	2.3128E-07	21.915	43.829	0.00E+00	5.07E-06	1.01E-05		
Ra-226	5.2782E-14	21.915	43.829	0.00E+00	1.16E-12	2.31E-12		
Ra-228	1.9338E-10	21.915	43.829	0.00E+00	4.24E-09	8.48E-09		
Ru-106	9.1684E-02	21.915	43.829	0.00E+00	2.01E+00	4.02E+00		
Se-79	1.3018E-05	21.915	43.829	0.00E+00	2.85E-04	5.71E-04		
Sn-126	1.2167E-05	21.915	43.829	0.00E+00	2.67E-04	5.33E-04		
Sr-90	2.6045E+00	21.915	43.829	0.00E+00	5.71E+01	1.14E+02		
Tc-99	4.4241E-04	21.915	43.829	0.00E+00	9.70E-03	1.94E-02		
Th-229	1.3713E-10	21.915	43.829	0.00E+00	3.01E-09	6.01E-09		
Th-230	1.8090E-11	21.915	43.829	0.00E+00	3.96E-10	7.93E-10		
Th-232	2.5278E-10	21.915	43.829	0.00E+00	5.54E-09	1.11E-08		
Tl-208	1.6947E-08	21.915	43.829	0.00E+00	3.71E-07	7.43E-07		
U-232	4.8737E-08	21.915	43.829	0.00E+00	1.07E-06	2.14E-06		
U-233	1.2203E-07	21.915	43.829	0.00E+00	2.67E-06	5.35E-06		
U-234	1.5925E-07	21.915	43.829	0.00E+00	3.49E-06	6.98E-06		
U-235	-2.6194E-06	21.915	0.000	5.95E-04	5.38E-04	5.95E-04		
U-236	1.2693E-05	21.915	43.829	0.00E+00	2.78E-04	5.56E-04		
U-238	-3.6331E-08	21.915	0.000	4.11E-04	4.10E-04	4.11E-04		
Y-90	2.6060E+00	21.915	43.829	0.00E+00	5.71E+01	1.14E+02		
Other Radionuclides					7.90E+01	1.58E+02		

Thermal Power		
Nominal Output (Watts)	Bounding Heat Output (Watts)	
1.28E+00	2.55E+00	
Total	Total	

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	18.3974873	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	21.915		Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		43.829	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.43	0.00	0.99
Bounding:	0.86		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (U OF ILL)	¹ Fuel decay start date: 2035	Estimated Canister usage: 18"x10" 1.20
SNF ID #: 449	Estimates as of: 2030	
Fuel Units & Descr: 133 - ELEMENT	Template: TRIGA-SS (LW/U-ZrX, SST, 10 to 20%, U)	
Heavy Metal Masa: BOL=25.94kg ; EOL=23.99kg	² Template Burnup(MWd): 6.65	
ROD Storage Site: INEEL	Template BOL Heavy Metal Mass (MT): 0.000195	
	Template Decay Time: 5 years	

Radionuclide	H. Estimates			Gamma Sources				
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	8.5173E-10	1,853.656	3,707.313	0.00E+00	1.58E-06	3.16E-06	0.0150	5.992E+14
Am-241	1.8331E-03	1,853.656	3,707.313	0.00E+00	3.40E+00	6.80E+00	0.0250	1.318E+14
Am-242m	1.4129E-06	1,853.656	3,707.313	0.00E+00	2.62E-03	5.24E-03	0.0375	1.123E+14
Am-243	1.4774E-07	1,853.656	3,707.313	0.00E+00	2.74E-04	5.48E-04	0.0575	1.152E+14
C-14	1.2871E-04	1,853.656	3,707.313	0.00E+00	2.39E-01	4.77E-01	0.0850	7.140E+13
Cl-36	2.8120E-06	1,853.656	3,707.313	0.00E+00	5.21E-03	1.04E-02	0.1250	5.185E+13
Cm-243	1.7940E-07	1,853.656	3,707.313	0.00E+00	3.33E-04	6.65E-04	0.2250	6.057E+13
Cm-244	1.6962E-06	1,853.656	3,707.313	0.00E+00	3.14E-03	6.29E-03	0.3750	3.074E+13
Cm-60	1.2839E+00	1,853.656	3,707.313	0.00E+00	2.38E+03	4.76E+03	0.5750	4.086E+14
Cs-134	9.0541E-02	1,853.656	3,707.313	0.00E+00	1.68E+02	3.36E+02	0.8500	1.754E+13
Cs-135	3.2195E-05	1,853.656	3,707.313	0.00E+00	5.97E-02	1.19E-01	1.2500	3.561E+14
Cs-137	2.7564E+00	1,853.656	3,707.313	0.00E+00	5.11E+03	1.02E+04	1.7500	2.374E+11
Eu-154	1.5368E-02	1,853.656	3,707.313	0.00E+00	2.85E+01	5.70E+01	2.2500	3.827E+11
Eu-155	2.9293E-03	1,853.656	3,707.313	0.00E+00	5.43E+01	1.09E+02	2.7500	3.037E+09
Fe-55	7.7158E-01	1,853.656	3,707.313	0.00E+00	1.43E+03	2.86E+03	3.5000	3.535E+08
H-3	1.1111E-02	1,853.656	3,707.313	0.00E+00	2.06E+01	4.12E+01	5.0000	1.959E+03
I-129	7.3684E-07	1,853.656	3,707.313	0.00E+00	1.37E-03	2.73E-03	7.0000	2.217E+02
Kr-85	2.5263E-01	1,853.656	3,707.313	0.00E+00	4.68E+02	9.37E+02	11.0000	2.526E+01
Np-237	1.2427E-06	1,853.656	3,707.313	0.00E+00	2.30E-03	4.61E-03		
Pa-231	3.8511E-09	1,853.656	3,707.313	0.00E+00	7.14E-06	1.43E-05		
Pb-210	7.3880E-15	1,853.656	3,707.313	0.00E+00	1.37E-11	2.74E-11		
Pm-147	2.1023E+00	1,853.656	3,707.313	0.00E+00	3.90E+03	7.79E+03		
Pu-238	1.0383E-03	1,853.656	3,707.313	0.00E+00	1.92E+00	3.85E+00		
Pu-239	5.5293E-03	1,853.656	3,707.313	0.00E+00	1.02E+01	2.05E+01		
Pu-240	2.1278E-03	1,853.656	3,707.313	0.00E+00	3.94E+00	7.89E+00		
Pu-241	1.0195E-01	1,853.656	3,707.313	0.00E+00	1.89E+02	3.78E+02		
Pu-242	2.3128E-07	1,853.656	3,707.313	0.00E+00	4.29E-04	8.57E-04		
Ra-226	5.2782E-14	1,853.656	3,707.313	0.00E+00	9.78E-11	1.96E-10		
Ra-228	1.9338E-10	1,853.656	3,707.313	0.00E+00	3.58E-07	7.17E-07		
Ru-106	9.1684E-02	1,853.656	3,707.313	0.00E+00	1.70E+02	3.40E+02		
Se-79	1.3018E-05	1,853.656	3,707.313	0.00E+00	2.41E-02	4.83E-02		
Sn-126	1.2167E-05	1,853.656	3,707.313	0.00E+00	2.26E-02	4.51E-02		
Sr-90	2.6045E+00	1,853.656	3,707.313	0.00E+00	4.83E+03	9.66E+03		
Tc-99	4.4241E-04	1,853.656	3,707.313	0.00E+00	8.20E-01	1.64E+00		
Th-229	1.3713E-10	1,853.656	3,707.313	0.00E+00	2.54E-07	5.08E-07		
Th-230	1.8090E-11	1,853.656	3,707.313	0.00E+00	3.35E-08	6.71E-08		
Th-232	2.5278E-10	1,853.656	3,707.313	0.00E+00	4.69E-07	9.37E-07		
Th-208	1.6947E-08	1,853.656	3,707.313	0.00E+00	3.14E-05	6.28E-05		
U-232	4.8737E-08	1,853.656	3,707.313	0.00E+00	9.03E-05	1.81E-04		
U-233	1.2203E-07	1,853.656	3,707.313	0.00E+00	2.26E-04	4.52E-04		
U-234	1.5925E-07	1,853.656	3,707.313	0.00E+00	2.95E-04	5.90E-04		
U-235	-2.6194E-06	1,853.656	0.000	1.12E-02	6.35E-03	1.12E-02		
U-236	1.2693E-05	1,853.656	3,707.313	0.00E+00	2.35E-02	4.71E-02		
U-238	-3.6331E-08	1,853.656	0.000	6.97E-03	6.91E-03	6.97E-03		
Y-90	2.6060E+00	1,853.656	3,707.313	0.00E+00	4.83E+03	9.66E+03		
Other Radionuclides					6.68E+03	1.34E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	LW AND U ZIRC HYDRIDE	Used LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd)²			Basis for burnup used in estimate:
Nomina:	From SFD	Estimated 1,853.656	
Bounding:		3,707.313	

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

Checks			Estimated EOL HM/Given EOL HM
Nomina:	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Bounding:	2.10 4.19	1.00	

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (U OF UTAH)
 SNF ID #: 699
 Fuel Units & Descr: 63 - ELEMENT
 Heavy Metal Mass: BOL=11.00kg ; EOL=10.72kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.57

II. Estimates	m	x _a	x _b	b	y _a	y _b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.0632E-10	264.593	529.186	0.00E+00	2.13E-07	4.27E-07	Avg. MeV	
Am-241	2.2586E-03	264.593	529.186	0.00E+00	5.98E-01	1.20E+00	0.0150	8.954E+13
Am-242m	1.9925E-06	264.593	529.186	0.00E+00	5.27E-04	1.05E-03	0.0250	1.944E+13
Am-243	2.3323E-07	264.593	529.186	0.00E+00	6.17E-05	1.23E-04	0.0375	2.421E+13
C-14	4.3308E-05	264.593	529.186	0.00E+00	1.15E-02	2.29E-02	0.0575	1.856E+13
Cl-36	4.3023E-08	264.593	529.186	0.00E+00	1.14E-05	2.28E-05	0.0850	1.299E+13
Cm-243	2.7429E-07	264.593	529.186	0.00E+00	7.26E-05	1.45E-04	0.1250	1.943E+13
Cm-244	3.1504E-06	264.593	529.186	0.00E+00	8.34E-04	1.67E-03	0.2250	1.085E+13
Co-60	3.1008E-02	264.593	529.186	0.00E+00	8.20E+00	1.64E+01	0.3750	4.828E+12
Cs-134	1.0367E-01	264.593	529.186	0.00E+00	2.74E+01	5.49E+01	0.5750	6.121E+13
Cs-135	3.1549E-05	264.593	529.186	0.00E+00	8.35E-03	1.67E-02	0.8500	1.507E+13
Cs-137	2.7564E+00	264.593	529.186	0.00E+00	7.29E+02	1.46E+03	1.2500	1.562E+13
Eu-154	1.3490E+00	264.593	529.186	0.00E+00	3.57E+02	7.14E+02	1.7500	4.470E+11
Eu-155	4.3880E-01	264.593	529.186	0.00E+00	1.16E+02	2.32E+02	2.2500	5.434E+10
Fe-55	8.6782E-03	264.593	529.186	0.00E+00	2.30E+00	4.59E+00	2.7500	4.413E+08
H-3	1.0805E-02	264.593	529.186	0.00E+00	2.86E+00	5.72E+00	3.5000	5.159E+07
I-129	7.3805E-07	264.593	529.186	0.00E+00	1.95E-04	3.91E-04	5.0000	3.087E+02
Kr-85	2.5218E-01	264.593	529.186	0.00E+00	6.67E+01	1.33E+02	7.0000	3.494E+01
Np-237	1.4463E-06	264.593	529.186	0.00E+00	3.83E-04	7.65E-04	11.0000	3.981E+00
Pa-231	3.5970E-09	264.593	529.186	0.00E+00	9.52E-07	1.90E-06		
Pb-210	8.2511E-15	264.593	529.186	0.00E+00	2.18E-12	4.37E-12		
Pm-147	2.0767E+00	264.593	529.186	0.00E+00	5.49E+02	1.10E+03		
Pu-238	1.3514E-03	264.593	529.186	0.00E+00	3.58E-01	7.15E-01		
Pu-239	5.6947E-03	264.593	529.186	0.00E+00	1.51E+00	3.01E+00		
Pu-240	2.2647E-03	264.593	529.186	0.00E+00	5.99E-01	1.20E+00		
Pu-241	1.2574E-01	264.593	529.186	0.00E+00	3.33E+01	6.65E+01		
Pu-242	3.0602E-07	264.593	529.186	0.00E+00	8.10E-05	1.62E-04		
Ra-226	5.7353E-14	264.593	529.186	0.00E+00	1.52E-11	3.04E-11		
Ra-228	1.8150E-10	264.593	529.186	0.00E+00	4.80E-08	9.60E-08		
Ru-106	9.3744E-02	264.593	529.186	0.00E+00	2.48E+01	4.96E+01		
Se-79	1.2938E-05	264.593	529.186	0.00E+00	3.42E-03	6.85E-03		
Sn-126	1.2239E-05	264.593	529.186	0.00E+00	3.24E-03	6.48E-03		
Sr-90	2.6000E+00	264.593	529.186	0.00E+00	6.88E+02	1.38E+03		
Tc-99	4.4120E-04	264.593	529.186	0.00E+00	1.17E-01	2.33E-01		
Th-229	1.4749E-10	264.593	529.186	0.00E+00	3.90E-08	7.80E-08		
Th-230	1.9549E-11	264.593	529.186	0.00E+00	5.17E-09	1.03E-08		
Th-232	2.3744E-10	264.593	529.186	0.00E+00	6.28E-08	1.26E-07		
Tl-208	1.9459E-08	264.593	529.186	0.00E+00	5.15E-06	1.03E-05		
U-232	5.6015E-08	264.593	529.186	0.00E+00	1.48E-05	2.96E-05		
U-233	1.3132E-07	264.593	529.186	0.00E+00	3.47E-05	6.95E-05		
U-234	1.7323E-07	264.593	529.186	0.00E+00	4.58E-05	9.17E-05		
U-235	-2.6159E-06	264.593	0.000	4.73E-03	4.04E-03	4.73E-03		
U-236	1.2717E-05	264.593	529.186	0.00E+00	3.36E-03	6.73E-03		
U-238	-3.8857E-08	264.593	0.000	2.96E-03	2.95E-03	2.96E-03		
Y-90	2.6015E+00	264.593	529.186	0.00E+00	6.88E+02	1.38E+03		
Other Radionuclides					1.01E+03	2.01E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.33E+01	2.66E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary		
	From SFD	Used
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE
Fuel Cladding:	ALUM (6061)	ALUM
BOL HM Constituents:	U-ZrHX	U
BOL Enrichment %:	19.8969819	10 to 20

Basis for Parameter Differences:

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:	214.408	264.593
Bounding:		529.186

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

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.65	1.23
Bounding:	1.30	

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (UC BERKLEY) 1 Fuel decay start date: 1992
 SNF ID #: 874 Estimates as of: 2030
 Fuel Units & Descr: 111 - ELEMENT Template: TRIGA-SS (LW/U-ZrX, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=21.65kg ; EOL=19.17kg 2 Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 35 years

Estimated
Canister usage:
18" x10"
1.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	6.7038E-09	2,362.939	4,725.879	0.00E+00	1.58E-05	3.17E-05	0.0150	3.299E+14
Am-241	3.9068E-03	2,362.939	4,725.879	0.00E+00	9.23E+00	1.85E+01	0.0250	6.854E+13
Am-242m	1.2325E-06	2,362.939	4,725.879	0.00E+00	2.91E-03	5.82E-03	0.0375	5.955E+13
Am-243	1.4732E-07	2,362.939	4,725.879	0.00E+00	3.48E-04	6.96E-04	0.0575	6.416E+13
C-14	1.2824E-04	2,362.939	4,725.879	0.00E+00	3.03E-01	6.06E-01	0.0850	2.512E+13
Cl-36	2.8120E-06	2,362.939	4,725.879	0.00E+00	6.64E-03	1.33E-02	0.1250	3.325E+13
Cm-243	8.6556E-08	2,362.939	4,725.879	0.00E+00	2.05E-04	4.09E-04	0.2250	1.450E+13
Cm-244	5.3835E-07	2,362.939	4,725.879	0.00E+00	1.27E-03	2.54E-03	0.3750	2.425E+13
Co-60	2.4887E-02	2,362.939	4,725.879	0.00E+00	5.88E+01	1.18E+02	0.8500	2.482E+12
Cs-134	3.8030E-06	2,362.939	4,725.879	0.00E+00	8.99E-03	1.80E-02	1.2500	9.632E+12
Cs-135	3.2195E-05	2,362.939	4,725.879	0.00E+00	7.61E-02	1.52E-01	1.7500	6.444E+10
Cs-137	1.3788E+00	2,362.939	4,725.879	0.00E+00	3.26E+03	6.52E+03	2.2500	5.279E+07
Eu-154	1.3711E-03	2,362.939	4,725.879	0.00E+00	3.24E+00	6.48E+00	2.7500	2.426E+06
Eu-155	4.4361E-04	2,362.939	4,725.879	0.00E+00	1.05E+00	2.10E+00	3.5000	5.829E+03
Fe-55	2.6075E-04	2,362.939	4,725.879	0.00E+00	6.16E-01	1.23E+00	5.0000	2.453E+03
H-3	2.0647E-03	2,362.939	4,725.879	0.00E+00	4.88E+00	9.76E+00	7.0000	2.768E+02
I-129	7.3684E-07	2,362.939	4,725.879	0.00E+00	1.74E-03	3.48E-03	11.0000	3.147E+01
Kr-85	3.6346E-02	2,362.939	4,725.879	0.00E+00	8.59E+01	1.72E+02		
Np-237	1.2844E-06	2,362.939	4,725.879	0.00E+00	3.03E-03	6.07E-03		
Pa-231	1.2352E-08	2,362.939	4,725.879	0.00E+00	2.92E-05	5.84E-05		
Pb-210	3.5338E-13	2,362.939	4,725.879	0.00E+00	8.35E-10	1.67E-09		
Pm-147	7.6346E-04	2,362.939	4,725.879	0.00E+00	1.80E+00	3.61E+00		
Pu-238	8.1970E-04	2,362.939	4,725.879	0.00E+00	1.94E+00	3.87E+00		
Pu-239	5.5248E-03	2,362.939	4,725.879	0.00E+00	1.31E+01	2.61E+01		
Pu-240	2.1203E-03	2,362.939	4,725.879	0.00E+00	5.01E+00	1.00E+01		
Pu-241	2.4075E-02	2,362.939	4,725.879	0.00E+00	5.69E+01	1.14E+02		
Pu-242	2.3128E-07	2,362.939	4,725.879	0.00E+00	5.46E-04	1.09E-03		
Ra-226	9.6481E-13	2,362.939	4,725.879	0.00E+00	2.28E-09	4.56E-09		
Ra-228	2.5188E-10	2,362.939	4,725.879	0.00E+00	5.95E-07	1.19E-06		
Ru-106	1.0214E-10	2,362.939	4,725.879	0.00E+00	2.41E-07	4.83E-07		
Se-79	1.3014E-05	2,362.939	4,725.879	0.00E+00	3.08E-02	6.15E-02		
Sn-126	1.2164E-05	2,362.939	4,725.879	0.00E+00	2.87E-02	5.75E-02		
Sr-90	1.2762E+00	2,362.939	4,725.879	0.00E+00	3.02E+03	6.03E+03		
Tc-99	4.4241E-04	2,362.939	4,725.879	0.00E+00	1.05E+00	2.09E+00		
Th-229	5.9684E-10	2,362.939	4,725.879	0.00E+00	1.41E-06	2.82E-06		
Th-230	9.3880E-11	2,362.939	4,725.879	0.00E+00	2.22E-07	4.44E-07		
Th-232	2.5278E-10	2,362.939	4,725.879	0.00E+00	5.97E-07	1.19E-06		
Tl-208	1.3723E-08	2,362.939	4,725.879	0.00E+00	3.24E-05	6.49E-05		
U-232	3.6932E-08	2,362.939	4,725.879	0.00E+00	8.73E-05	1.75E-04		
U-233	1.2224E-07	2,362.939	4,725.879	0.00E+00	2.89E-04	5.78E-04		
U-234	2.5714E-07	2,362.939	4,725.879	0.00E+00	6.08E-04	1.22E-03		
U-235	-2.6194E-06	2,362.939	0.000	9.35E-03	3.17E-03	9.35E-03		
U-236	1.2695E-05	2,362.939	4,725.879	0.00E+00	3.00E-02	6.00E-02		
U-238	-3.6331E-08	2,362.939	0.000	5.82E-03	5.73E-03	5.82E-03		
Y-90	1.2765E+00	2,362.939	4,725.879	0.00E+00	3.02E+03	6.03E+03		
Other Radionuclides					3.25E+03	6.50E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.80E+01	7.60E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		2,362.939	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		4,725.879	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	3.20		1.00
Bounding:	6.40		

¹ Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
² Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (UNIV. OF TEXAS)
 SNF ID #: 877
 Fuel Units & Descr: 69 - ELEMENT
 Heavy Metal Mass: BOL=12.77kg ; EOL=12.68kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1973
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 0.62

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.6842E-09	85.620	171.241	0.00E+00	7.44E-07	1.49E-06	0.0150	8.397E+12
Am-241	4.9459E-03	85.620	171.241	0.00E+00	4.23E-01	8.47E-01	0.0250	1.741E+12
Am-242m	1.6241E-06	85.620	171.241	0.00E+00	1.39E-04	2.78E-04	0.0375	1.571E+12
Am-243	2.3233E-07	85.620	171.241	0.00E+00	1.99E-05	3.98E-05	0.0575	1.644E+12
C-14	4.3083E-05	85.620	171.241	0.00E+00	3.69E-03	7.38E-03	0.0850	9.807E+11
Cl-36	4.3023E-08	85.620	171.241	0.00E+00	3.68E-06	7.37E-06	0.1250	7.277E+11
Co-243	9.1880E-08	85.620	171.241	0.00E+00	7.87E-06	1.57E-05	0.2250	8.608E+11
Co-244	5.6346E-07	85.620	171.241	0.00E+00	4.82E-05	9.65E-05	0.3750	3.713E+11
Co-60	8.3699E-05	85.620	171.241	0.00E+00	7.17E-03	1.43E-02	0.5750	6.235E+12
Cs-134	2.8211E-08	85.620	171.241	0.00E+00	2.42E-06	4.83E-06	0.8500	1.698E+11
Cs-135	3.1549E-05	85.620	171.241	0.00E+00	2.70E-03	5.40E-03	1.2500	1.435E+11
Cs-137	9.7519E-01	85.620	171.241	0.00E+00	8.35E+01	1.67E+02	1.7500	5.147E+09
Eu-154	3.5970E-02	85.620	171.241	0.00E+00	3.08E+00	6.16E+00	2.2500	1.748E+05
Eu-155	8.1774E-04	85.620	171.241	0.00E+00	7.00E-02	1.40E-01	2.7500	8.247E+04
Fe-55	5.3940E-08	85.620	171.241	0.00E+00	4.62E-06	9.24E-06	3.5000	2.434E+02
H-3	8.6571E-04	85.620	171.241	0.00E+00	7.41E-02	1.48E-01	5.0000	1.025E+02
I-129	7.3805E-07	85.620	171.241	0.00E+00	6.32E-05	1.26E-04	7.0000	1.157E+01
Kr-85	1.3771E-02	85.620	171.241	0.00E+00	1.18E+00	2.36E+00	11.0000	1.316E+00
Np-237	1.5218E-06	85.620	171.241	0.00E+00	1.30E-04	2.61E-04		
Pa-231	1.4152E-08	85.620	171.241	0.00E+00	1.21E-06	2.42E-06		
Pb-210	7.9774E-13	85.620	171.241	0.00E+00	6.83E-11	1.37E-10		
Pm-147	1.4362E-05	85.620	171.241	0.00E+00	1.23E-03	2.46E-03		
Pu-238	9.4782E-04	85.620	171.241	0.00E+00	8.12E-02	1.62E-01		
Pu-239	5.6872E-03	85.620	171.241	0.00E+00	4.87E-01	9.74E-01		
Pu-240	2.2541E-03	85.620	171.241	0.00E+00	1.93E-01	3.86E-01		
Pu-241	1.4439E-02	85.620	171.241	0.00E+00	1.24E+00	2.47E+00		
Pu-242	3.0602E-07	85.620	171.241	0.00E+00	2.62E-05	5.24E-05		
Ra-226	1.8857E-12	85.620	171.241	0.00E+00	1.61E-10	3.23E-10		
Ra-228	2.3729E-10	85.620	171.241	0.00E+00	2.03E-08	4.06E-08		
Ru-106	3.4857E-15	85.620	171.241	0.00E+00	2.98E-13	5.97E-13		
Se-79	1.2931E-05	85.620	171.241	0.00E+00	1.11E-03	2.21E-03		
Sn-126	1.2235E-05	85.620	171.241	0.00E+00	1.05E-03	2.10E-03		
Sr-90	8.9173E-01	85.620	171.241	0.00E+00	7.64E+01	1.53E+02		
Tc-99	4.4120E-04	85.620	171.241	0.00E+00	3.78E-02	7.56E-02		
Th-229	8.2752E-10	85.620	171.241	0.00E+00	7.09E-08	1.42E-07		
Th-230	1.4908E-10	85.620	171.241	0.00E+00	1.28E-08	2.55E-08		
Th-232	2.3744E-10	85.620	171.241	0.00E+00	2.03E-08	4.07E-08		
Tl-208	1.3668E-08	85.620	171.241	0.00E+00	1.17E-06	2.34E-06		
U-232	3.6797E-08	85.620	171.241	0.00E+00	3.15E-06	6.30E-06		
U-233	1.3164E-07	85.620	171.241	0.00E+00	1.13E-05	2.25E-05		
U-234	3.3865E-07	85.620	171.241	0.00E+00	2.90E-05	5.80E-05		
U-235	-2.6144E-06	85.620	0.000	5.52E-03	5.29E-03	5.52E-03		
U-236	1.2722E-05	85.620	171.241	0.00E+00	1.09E-03	2.18E-03		
U-238	-3.8857E-08	85.620	0.000	3.43E-03	3.43E-03	3.43E-03		
Y-90	8.9203E-01	85.620	171.241	0.00E+00	7.64E+01	1.53E+02		
Other Radionuclides					9.56E+01	1.91E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
9.84E-01	1.97E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	62.204	85.620	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		171.241	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.18	1.38	1.00
Bounding:	0.36		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (USGS)
 SNF ID #: 964
 Fuel Units & Descr: 1 - ELEMENT
 Heavy Metal Mass: BOL= .18kg ; EOL= .18kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 203E
 Estimates as of: 203C
 Template: TRIGA-SS (LW/U-Zr, SST, 10 to 20%, U)
²Template Burnup(MWd): 6.6E
 Template BOL Heavy Metal Mass (MT): 0.00019E
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.01

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	8.5173E-10	0.764	1.527	0.00E+00	6.50E-10	1.30E-09	Avg. MeV	
Am-241	1.8331E-03	0.764	1.527	0.00E+00	1.40E-03	2.80E-03	0.0150	2.469E+11
Am-242m	1.4129E-06	0.764	1.527	0.00E+00	1.08E-06	2.16E-06	0.0250	5.432E+10
Am-243	1.4774E-07	0.764	1.527	0.00E+00	1.13E-07	2.26E-07	0.0375	4.626E+10
C-14	1.2871E-04	0.764	1.527	0.00E+00	9.83E-05	1.97E-04	0.0575	4.748E+10
Cl-36	2.8120E-06	0.764	1.527	0.00E+00	2.15E-06	4.30E-06	0.0850	2.942E+10
Cm-243	1.7940E-07	0.764	1.527	0.00E+00	1.37E-07	2.74E-07	0.1250	2.136E+10
Cm-244	1.6962E-06	0.764	1.527	0.00E+00	1.30E-06	2.59E-06	0.2250	2.495E+10
Co-60	1.2839E+00	0.764	1.527	0.00E+00	9.81E-01	1.96E+00	0.3750	1.266E+10
Cs-134	9.0541E-02	0.764	1.527	0.00E+00	6.91E-02	1.38E-01	0.5750	1.693E+11
Cs-135	3.2195E-05	0.764	1.527	0.00E+00	2.46E-05	4.92E-05	0.8500	7.224E+09
Cs-137	2.7564E+00	0.764	1.527	0.00E+00	2.11E+00	4.21E+00	1.2500	1.467E+11
Eu-154	1.5368E-02	0.764	1.527	0.00E+00	1.17E-02	2.35E-02	1.7500	9.782E+07
Eu-155	2.9293E-02	0.764	1.527	0.00E+00	2.24E-02	4.47E-02	2.2500	1.577E+08
Fe-55	7.7158E-01	0.764	1.527	0.00E+00	5.89E-01	1.18E+00	2.7500	1.251E+06
H-3	1.1111E-02	0.764	1.527	0.00E+00	8.49E-03	1.70E-02	3.5000	1.456E+05
I-129	7.3684E-07	0.764	1.527	0.00E+00	5.63E-07	1.13E-06	5.0000	9.152E+01
Kr-85	2.5263E-01	0.764	1.527	0.00E+00	1.93E-01	3.86E-01	7.0000	1.038E-01
Np-237	1.2427E-06	0.764	1.527	0.00E+00	9.49E-07	1.90E-06	11.0000	1.184E-02
Pa-231	3.8511E-09	0.764	1.527	0.00E+00	2.94E-09	5.88E-09		
Pb-210	7.3880E-15	0.764	1.527	0.00E+00	5.64E-15	1.13E-14		
Pm-147	2.1023E+00	0.764	1.527	0.00E+00	1.61E+00	3.21E+00		
Pu-238	1.0383E-03	0.764	1.527	0.00E+00	7.93E-04	1.59E-03		
Pu-239	5.5293E-03	0.764	1.527	0.00E+00	4.22E-03	8.45E-03		
Pu-240	2.1278E-03	0.764	1.527	0.00E+00	1.62E-03	3.25E-03		
Pu-241	1.0195E-01	0.764	1.527	0.00E+00	7.79E-02	1.56E-01		
Pu-242	2.3128E-07	0.764	1.527	0.00E+00	1.77E-07	3.53E-07		
Ra-226	5.2782E-14	0.764	1.527	0.00E+00	4.03E-14	8.06E-14		
Ra-228	1.9338E-10	0.764	1.527	0.00E+00	1.48E-10	2.95E-10		
Ru-106	9.1684E-02	0.764	1.527	0.00E+00	7.00E-02	1.40E-01		
Se-79	1.3018E-05	0.764	1.527	0.00E+00	9.94E-06	1.99E-05		
Sn-126	1.2167E-05	0.764	1.527	0.00E+00	9.29E-06	1.86E-05		
Sr-90	2.6045E+00	0.764	1.527	0.00E+00	1.99E+00	3.98E+00		
Tc-99	4.4241E-04	0.764	1.527	0.00E+00	3.38E-04	6.76E-04		
Th-229	1.3713E-10	0.764	1.527	0.00E+00	1.05E-10	2.09E-10		
Th-230	1.8090E-11	0.764	1.527	0.00E+00	1.38E-11	2.76E-11		
Th-232	2.5278E-10	0.764	1.527	0.00E+00	1.93E-10	3.86E-10		
Ti-208	1.6947E-08	0.764	1.527	0.00E+00	1.29E-08	2.59E-08		
U-232	4.8737E-08	0.764	1.527	0.00E+00	3.72E-08	7.44E-08		
U-233	1.2203E-07	0.764	1.527	0.00E+00	9.32E-08	1.86E-07		
U-234	1.5925E-07	0.764	1.527	0.00E+00	1.22E-07	2.43E-07		
U-235	-2.6194E-06	0.764	0.000	7.80E-05	7.60E-05	7.80E-05		
U-236	1.2693E-05	0.764	1.527	0.00E+00	9.69E-06	1.94E-05		
U-238	-3.6331E-08	0.764	0.000	4.97E-05	4.97E-05	4.97E-05		
Y-90	2.6060E+00	0.764	1.527	0.00E+00	1.99E+00	3.98E+00		
Other Radionuclides					2.75E+00	5.51E+00		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.44E-02	8.89E-02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	19.6176994	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		0.764	
Bounding:		1.527	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.12		
Bounding:	0.24		

1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ZAIRE)
 SNF ID #: 487
 Fuel Units & Descr: 56 - ELEMENT
 Heavy Metal Mass: BOL=10.08kg ; EOL=10.05kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 2010
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zrx, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 20 years

Estimated
 Canister usage:
 18"x10"
 0.50

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.4556E-09	147.360	294.719	0.00E+00	3.62E-07	7.24E-07	0.0150	3.025E+13
Am-241	3.8752E-03	147.360	294.719	0.00E+00	5.71E-01	1.14E+00	0.0250	6.245E+12
Am-242m	1.8617E-06	147.360	294.719	0.00E+00	2.74E-04	5.49E-04	0.0375	6.537E+12
Am-243	2.3293E-07	147.360	294.719	0.00E+00	3.43E-05	6.86E-05	0.0575	6.042E+12
C-14	4.3233E-05	147.360	294.719	0.00E+00	6.37E-03	1.27E-02	0.0850	3.679E+12
Ci-36	4.3023E-08	147.360	294.719	0.00E+00	6.34E-06	1.27E-05	0.1250	4.129E+12
Cm-243	1.9053E-07	147.360	294.719	0.00E+00	2.81E-05	5.62E-05	0.2250	3.334E+12
Cm-244	1.7744E-06	147.360	294.719	0.00E+00	2.61E-04	5.23E-04	0.3750	1.370E+12
Co-60	4.3188E-03	147.360	294.719	0.00E+00	6.36E-01	1.27E+00	0.5750	2.182E+13
Cs-134	6.7188E-04	147.360	294.719	0.00E+00	9.90E-02	1.98E-01	0.8500	2.322E+12
Cs-135	3.1549E-05	147.360	294.719	0.00E+00	4.65E-03	9.30E-03	1.2500	2.501E+12
Cs-137	1.9489E+00	147.360	294.719	0.00E+00	2.87E+02	5.74E+02	1.7500	7.493E+10
Eu-154	4.0301E-01	147.360	294.719	0.00E+00	5.94E+01	1.19E+02	2.2500	1.188E+06
Eu-155	5.4000E-02	147.360	294.719	0.00E+00	7.96E+00	1.59E+01	2.7500	1.977E+05
Fe-55	1.5955E-04	147.360	294.719	0.00E+00	2.35E-02	4.70E-02	3.5000	1.367E+03
H-3	4.6571E-03	147.360	294.719	0.00E+00	6.86E-01	1.37E+00	5.0000	1.719E+02
I-129	7.3805E-07	147.360	294.719	0.00E+00	1.09E-04	2.18E-04	7.0000	1.942E+01
Kr-85	9.5684E-02	147.360	294.719	0.00E+00	1.41E+01	2.82E+01	11.0000	2.209E+00
Np-237	1.4618E-06	147.360	294.719	0.00E+00	2.15E-04	4.31E-04		
Pa-231	6.4782E-09	147.360	294.719	0.00E+00	9.55E-07	1.91E-06		
Pb-210	6.3158E-14	147.360	294.719	0.00E+00	9.31E-12	1.86E-11		
Pm-147	3.9564E-02	147.360	294.719	0.00E+00	5.83E+00	1.17E+01		
Pu-238	1.2008E-03	147.360	294.719	0.00E+00	1.77E-01	3.54E-01		
Pu-239	5.6917E-03	147.360	294.719	0.00E+00	8.39E-01	1.68E+00		
Pu-240	2.2617E-03	147.360	294.719	0.00E+00	3.33E-01	6.67E-01		
Pu-241	6.1113E-02	147.360	294.719	0.00E+00	9.01E+00	1.80E+01		
Pu-242	3.0602E-07	147.360	294.719	0.00E+00	4.51E-05	9.02E-05		
Ra-226	2.6707E-13	147.360	294.719	0.00E+00	3.94E-11	7.87E-11		
Ra-228	2.2556E-10	147.360	294.719	0.00E+00	3.32E-08	6.65E-08		
Ru-106	3.1293E-06	147.360	294.719	0.00E+00	4.61E-04	9.22E-04		
Se-79	1.2935E-05	147.360	294.719	0.00E+00	1.91E-03	3.81E-03		
Sn-126	1.2238E-05	147.360	294.719	0.00E+00	1.80E-03	3.61E-03		
Sr-90	1.8195E+00	147.360	294.719	0.00E+00	2.68E+02	5.36E+02		
Tc-99	4.4120E-04	147.360	294.719	0.00E+00	6.50E-02	1.30E-01		
Th-229	3.3308E-10	147.360	294.719	0.00E+00	4.91E-08	9.82E-08		
Th-230	4.6526E-11	147.360	294.719	0.00E+00	6.86E-09	1.37E-08		
Th-232	2.3744E-10	147.360	294.719	0.00E+00	3.50E-08	7.00E-08		
Tl-208	1.8195E-08	147.360	294.719	0.00E+00	2.68E-06	5.36E-06		
U-232	4.9098E-08	147.360	294.719	0.00E+00	7.24E-06	1.45E-05		
U-233	1.3140E-07	147.360	294.719	0.00E+00	1.94E-05	3.87E-05		
U-234	2.2571E-07	147.360	294.719	0.00E+00	3.33E-05	6.65E-05		
U-235	-2.6159E-06	147.360	0.000	4.36E-03	3.97E-03	4.36E-03		
U-236	1.2719E-05	147.360	294.719	0.00E+00	1.87E-03	3.75E-03		
U-238	-3.8857E-08	147.360	0.000	2.71E-03	2.70E-03	2.71E-03		
Y-90	1.8211E+00	147.360	294.719	0.00E+00	2.68E+02	5.37E+02		
Other Radionuclides					3.09E+02	6.17E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.83E+00	7.65E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

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

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	147.360	26.727	Nominal burnup taken directly from SFD (converted to MWd).
Bounding:		294.719	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.40	0.18	0.99
Bounding:	0.79		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRIGA STD (ZAIRE) 1Fuel decay start date: 2010
 SNF ID #: 486 Estimates as of: 2009
 Fuel Units & Descr: 80 - ELEMENT Template: TRIGA-SS (LW/U-ZrX, SST, 10 to 20%, U)
 Heavy Metal Mass: BOL=15.45kg ; EOL=15.29kg 2Template Burnup(MWd): 6.65
 ROD Storage Site: INEEL Template BOL Heavy Metal Mass (MT): 0.000195
Template Decay Time: 20 years

Estimated
Canister usage:
18"x10"
0.72

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)		
Ac-227	2.6436E-09	152.737	305.474	0.00E+00	4.04E-07	8.08E-07	Avg. MeV	
Am-241	3.1429E-03	152.737	305.474	0.00E+00	4.80E-01	9.60E-01	0.0150	3.061E+13
Am-242m	1.3195E-06	152.737	305.474	0.00E+00	2.02E-04	4.03E-04	0.0250	6.372E+12
Am-243	1.4753E-07	152.737	305.474	0.00E+00	2.25E-05	4.51E-05	0.0375	5.521E+12
C-14	1.2847E-04	152.737	305.474	0.00E+00	1.96E-02	3.92E-02	0.0575	5.939E+12
Cl-36	2.8120E-06	152.737	305.474	0.00E+00	4.30E-04	8.59E-04	0.0850	3.585E+12
Cm-243	1.2465E-07	152.737	305.474	0.00E+00	1.90E-05	3.81E-05	0.1250	2.343E+12
Cm-244	9.5564E-07	152.737	305.474	0.00E+00	1.46E-04	2.92E-04	0.2250	3.079E+12
Co-60	1.7880E-01	152.737	305.474	0.00E+00	2.73E+01	5.46E+01	0.3750	1.349E+12
Cs-134	5.8692E-04	152.737	305.474	0.00E+00	8.96E-02	1.79E-01	0.5750	2.219E+13
Cs-135	3.2195E-05	152.737	305.474	0.00E+00	4.92E-03	9.83E-03	0.8500	2.501E+11
Cs-137	1.9489E+00	152.737	305.474	0.00E+00	2.98E+02	5.95E+02	1.2500	4.145E+12
Eu-154	4.5895E-03	152.737	305.474	0.00E+00	7.01E-01	1.40E+00	1.7500	6.428E+09
Eu-155	3.6045E-03	152.737	305.474	0.00E+00	5.51E-01	1.10E+00	2.2500	2.213E+07
Fe-55	1.4185E-02	152.737	305.474	0.00E+00	2.17E+00	4.33E+00	2.7500	2.439E+05
H-3	4.7895E-03	152.737	305.474	0.00E+00	7.32E-01	1.46E+00	3.5000	1.371E+03
I-129	7.3684E-07	152.737	305.474	0.00E+00	1.13E-04	2.25E-04	5.0000	1.689E+02
Kr-85	9.5820E-02	152.737	305.474	0.00E+00	1.46E+01	2.93E+01	7.0000	1.903E+01
Np-237	1.2552E-06	152.737	305.474	0.00E+00	1.92E-04	3.83E-04	11.0000	2.166E+00
Pa-231	7.0406E-09	152.737	305.474	0.00E+00	1.08E-06	2.15E-06		
Pb-210	5.8000E-14	152.737	305.474	0.00E+00	8.86E-12	1.77E-11		
Pm-147	4.0075E-02	152.737	305.474	0.00E+00	6.12E+00	1.22E+01		
Pu-238	9.2256E-04	152.737	305.474	0.00E+00	1.41E-01	2.82E-01		
Pu-239	5.5278E-03	152.737	305.474	0.00E+00	8.44E-01	1.69E+00		
Pu-240	2.1248E-03	152.737	305.474	0.00E+00	3.25E-01	6.49E-01		
Pu-241	4.9549E-02	152.737	305.474	0.00E+00	7.57E+00	1.51E+01		
Pu-242	2.3128E-07	152.737	305.474	0.00E+00	3.53E-05	7.06E-05		
Ra-226	2.4526E-13	152.737	305.474	0.00E+00	3.75E-11	7.49E-11		
Ra-228	2.4015E-10	152.737	305.474	0.00E+00	3.67E-08	7.34E-08		
Ru-106	3.0602E-06	152.737	305.474	0.00E+00	4.67E-04	9.35E-04		
Se-79	1.3015E-05	152.737	305.474	0.00E+00	1.99E-03	3.98E-03		
Sn-126	1.2165E-05	152.737	305.474	0.00E+00	1.86E-03	3.72E-03		
Sr-90	1.8226E+00	152.737	305.474	0.00E+00	2.78E+02	5.57E+02		
Tc-99	4.4241E-04	152.737	305.474	0.00E+00	6.76E-02	1.35E-01		
Th-229	3.0962E-10	152.737	305.474	0.00E+00	4.73E-08	9.46E-08		
Th-230	4.2346E-11	152.737	305.474	0.00E+00	6.47E-09	1.29E-08		
Th-232	2.5278E-10	152.737	305.474	0.00E+00	3.86E-08	7.72E-08		
Tl-208	1.5820E-08	152.737	305.474	0.00E+00	2.42E-06	4.83E-06		
U-232	4.2647E-08	152.737	305.474	0.00E+00	6.51E-06	1.30E-05		
U-233	1.2211E-07	152.737	305.474	0.00E+00	1.87E-05	3.73E-05		
U-234	1.9955E-07	152.737	305.474	0.00E+00	3.05E-05	6.10E-05		
U-235	-2.6194E-06	152.737	0.000	6.68E-03	6.28E-03	6.68E-03		
U-236	1.2693E-05	152.737	305.474	0.00E+00	1.94E-03	3.88E-03		
U-238	-3.6331E-08	152.737	0.000	4.15E-03	4.15E-03	4.15E-03		
Y-90	1.8241E+00	152.737	305.474	0.00E+00	2.79E+02	5.57E+02		
Other Radionuclides					2.94E+02	5.88E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.82E+00	7.64E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	U-ZrHX	U	
BOL Enrichment %:	20.0000041	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		152.737	
Bounding:		305.474	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.29		
Bounding:	0.58		

Estimated EOL HM/Given EOL HM: 1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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 (THAILAND)
 SNF ID #: 633
 Fuel Units & Descr: 31 - MTR TYPE
 Heavy Metal Mass: BOL=5.29kg ; EOL=4.77kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1998
 Estimates as of: 2030
 Template: TRIGA-AI (LW/U-Zr, Alum., 10 to 20%, U)
²Template Burnup(MWd): 6.65
 Template BOL Heavy Metal Mass (MT): 0.00018
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 1.29

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	3.8271E-09	500.072	1,000.145	0.00E+00	1.91E-06	3.83E-06		
Am-241	4.4195E-03	500.072	1,000.145	0.00E+00	2.21E+00	4.42E+00	0.0150	9.039E+13
Am-242m	1.8195E-06	500.072	1,000.145	0.00E+00	9.10E-04	1.82E-03	0.0250	1.867E+13
Am-243	2.3278E-07	500.072	1,000.145	0.00E+00	1.16E-04	2.33E-04	0.0375	1.870E+13
C-14	4.3203E-05	500.072	1,000.145	0.00E+00	2.16E-02	4.32E-02	0.0575	1.793E+13
Cl-36	4.3023E-08	500.072	1,000.145	0.00E+00	2.15E-05	4.30E-05	0.0850	1.079E+13
Co-243	1.6872E-07	500.072	1,000.145	0.00E+00	8.44E-05	1.69E-04	0.1250	1.097E+13
Co-244	1.4660E-06	500.072	1,000.145	0.00E+00	7.33E-04	1.47E-03	0.2250	9.760E+12
Co-60	2.2378E-03	500.072	1,000.145	0.00E+00	1.12E+00	2.24E+00	0.3750	4.059E+12
Cs-134	1.2525E-04	500.072	1,000.145	0.00E+00	6.26E-02	1.25E-01	0.5750	6.565E+13
Cs-135	3.1549E-05	500.072	1,000.145	0.00E+00	1.58E-02	3.16E-02	0.8500	5.418E+12
Cs-137	1.7368E+00	500.072	1,000.145	0.00E+00	8.69E+02	1.74E+03	1.2500	5.686E+12
Eu-154	2.6947E-01	500.072	1,000.145	0.00E+00	1.35E+02	2.70E+02	1.7500	1.741E+11
Eu-155	2.6857E-02	500.072	1,000.145	0.00E+00	1.34E+01	2.69E+01	2.2500	2.671E+06
Fe-55	4.2105E-05	500.072	1,000.145	0.00E+00	2.11E-02	4.21E-02	2.7500	6.149E+05
H-3	3.5173E-03	500.072	1,000.145	0.00E+00	1.76E+00	3.52E+00	3.5000	1.438E+03
I-129	7.3805E-07	500.072	1,000.145	0.00E+00	3.69E-04	7.38E-04	5.0000	5.609E+02
Kr-85	6.9263E-02	500.072	1,000.145	0.00E+00	3.46E+01	6.93E+01	7.0000	6.327E+01
Np-237	1.4752E-06	500.072	1,000.145	0.00E+00	7.38E-04	1.48E-03	11.0000	7.192E+00
Pa-231	8.3970E-09	500.072	1,000.145	0.00E+00	4.20E-06	8.40E-06		
Pb-210	1.4995E-13	500.072	1,000.145	0.00E+00	7.50E-11	1.50E-10		
Pm-147	1.0567E-02	500.072	1,000.145	0.00E+00	5.28E+00	1.06E+01		
Pu-238	1.1543E-03	500.072	1,000.145	0.00E+00	5.77E-01	1.15E+00		
Pu-239	5.6917E-03	500.072	1,000.145	0.00E+00	2.85E+00	5.69E+00		
Pu-240	2.2602E-03	500.072	1,000.145	0.00E+00	1.13E+00	2.26E+00		
Pu-241	4.8045E-02	500.072	1,000.145	0.00E+00	2.40E+01	4.81E+01		
Pu-242	3.0602E-07	500.072	1,000.145	0.00E+00	1.53E-04	3.06E-04		
Ra-226	5.1293E-13	500.072	1,000.145	0.00E+00	2.57E-10	5.13E-10		
Ra-228	2.3323E-10	500.072	1,000.145	0.00E+00	1.17E-07	2.33E-07		
Ru-106	1.0075E-07	500.072	1,000.145	0.00E+00	5.04E-05	1.01E-04		
Se-79	1.2935E-05	500.072	1,000.145	0.00E+00	6.47E-03	1.29E-02		
Sn-126	1.2238E-05	500.072	1,000.145	0.00E+00	6.12E-03	1.22E-02		
Sr-90	1.6165E+00	500.072	1,000.145	0.00E+00	8.08E+02	1.62E+03		
Tc-99	4.4120E-04	500.072	1,000.145	0.00E+00	2.21E-01	4.41E-01		
Th-229	4.5684E-10	500.072	1,000.145	0.00E+00	2.28E-07	4.57E-07		
Th-230	6.8271E-11	500.072	1,000.145	0.00E+00	3.41E-08	6.83E-08		
Th-232	2.3744E-10	500.072	1,000.145	0.00E+00	1.19E-07	2.37E-07		
Tl-208	1.7368E-08	500.072	1,000.145	0.00E+00	8.69E-06	1.74E-05		
U-232	4.6797E-08	500.072	1,000.145	0.00E+00	2.34E-05	4.68E-05		
U-233	1.3146E-07	500.072	1,000.145	0.00E+00	6.57E-05	1.31E-04		
U-234	2.5729E-07	500.072	1,000.145	0.00E+00	1.29E-04	2.57E-04		
U-235	-2.6159E-06	500.072	0.000	1.03E-02	8.98E-03	1.03E-02		
U-236	1.2719E-05	500.072	1,000.145	0.00E+00	6.36E-03	1.27E-02		
U-238	-3.8857E-08	500.072	0.000	1.80E-04	1.60E-04	1.80E-04		
Y-90	1.6165E+00	500.072	1,000.145	0.00E+00	8.08E+02	1.62E+03		
Other Radionuclides					9.41E+02	1.88E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.11E+01	2.23E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LW AND U ZIRC HYDRIDE	LW AND U ZIRC HYDRIDE	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	89.90758798	10 to 20	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		500.072	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		1,000.145	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	2.56		1.00
Bounding:	5.11		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TRU SCRAP SNF
 SNF ID #: 904
 Fuel Units & Descr: 1 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL= : EOL=106.34kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: FERMI (Fast, Zirc. 10 to 40%, U)
²Template Burnup(MWd): 58.6725048
 Template BOL Heavy Metal Mass (MT): 0.018774
 Template Decay Time: 35 years

Estimated
 Canister usage:
 HIC
 4.00

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	9.6110E-08	93,768.994	93,768.994	0.00E+00	9.01E-03	9.01E-03	Avg. MeV	
Am-241	6.5601E-07	93,768.994	93,768.994	0.00E+00	6.15E-02	6.15E-02	0.0150	6.204E+15
Am-242m	0.0000E+00	93,768.994	93,768.994	0.00E+00	0.00E+00	0.00E+00	0.0250	1.289E+15
Am-243	8.3770E-15	93,768.994	93,768.994	0.00E+00	7.86E-10	7.86E-10	0.0375	1.134E+15
C-14	2.1714E-05	93,768.994	93,768.994	0.00E+00	2.04E+00	2.04E+00	0.0575	1.201E+15
Cl-36	5.5188E-08	93,768.994	93,768.994	0.00E+00	5.17E-03	5.17E-03	0.0850	7.264E+14
Cm-243	1.5496E-14	93,768.994	93,768.994	0.00E+00	1.45E-09	1.45E-09	0.1250	4.705E+14
Cm-244	5.2375E-16	93,768.994	93,768.994	0.00E+00	4.91E-11	4.91E-11	0.2250	6.235E+14
Co-60	2.0947E-03	93,768.994	93,768.994	0.00E+00	1.96E+02	1.96E+02	0.3750	2.717E+14
Cs-134	6.2448E-07	93,768.994	93,768.994	0.00E+00	5.86E-02	5.86E-02	0.5750	4.799E+15
Cs-135	4.4996E-05	93,768.994	93,768.994	0.00E+00	4.22E+00	4.22E+00	0.8500	4.432E+13
Cs-137	1.3775E+00	93,768.994	93,768.994	0.00E+00	1.29E+05	1.29E+05	1.2500	2.940E+13
Eu-154	1.8510E-04	93,768.994	93,768.994	0.00E+00	1.74E+01	1.74E+01	1.7500	1.144E+12
Eu-155	1.4163E-03	93,768.994	93,768.994	0.00E+00	1.33E+02	1.33E+02	2.2500	2.017E+08
Fe-55	1.4179E-05	93,768.994	93,768.994	0.00E+00	1.33E+00	1.33E+00	2.7500	1.944E+07
H-3	3.5383E-03	93,768.994	93,768.994	0.00E+00	3.32E+02	3.32E+02	3.5000	1.608E+04
I-129	1.1426E-06	93,768.994	93,768.994	0.00E+00	1.07E-01	1.07E-01	5.0000	5.319E+03
Kr-85	3.8604E-02	93,768.994	93,768.994	0.00E+00	3.62E+03	3.62E+03	7.0000	4.315E+02
Np-237	3.3099E-06	93,768.994	93,768.994	0.00E+00	3.10E-01	3.10E-01	11.0000	3.760E+01
Pa-231	1.8953E-07	93,768.994	93,768.994	0.00E+00	1.78E-02	1.78E-02		
Pb-210	8.9531E-12	93,768.994	93,768.994	0.00E+00	8.40E-07	8.40E-07		
Pm-147	1.1588E-03	93,768.994	93,768.994	0.00E+00	1.09E+02	1.09E+02		
Pu-238	1.7146E-04	93,768.994	93,768.994	0.00E+00	1.61E+01	1.61E+01		
Pu-239	1.9464E-02	93,768.994	93,768.994	0.00E+00	1.83E+03	1.83E+03		
Pu-240	6.7919E-05	93,768.994	93,768.994	0.00E+00	6.37E+00	6.37E+00		
Pu-241	4.1774E-06	93,768.994	93,768.994	0.00E+00	3.92E-01	3.92E-01		
Pu-242	4.3751E-13	93,768.994	93,768.994	0.00E+00	4.10E-08	4.10E-08		
Ra-226	2.4219E-11	93,768.994	93,768.994	0.00E+00	2.27E-06	2.27E-06		
Ra-228	2.3572E-11	93,768.994	93,768.994	0.00E+00	2.21E-06	2.21E-06		
Ru-106	3.0951E-10	93,768.994	93,768.994	0.00E+00	2.90E-05	2.90E-05		
Se-79	1.6488E-05	93,768.994	93,768.994	0.00E+00	1.55E+00	1.55E+00		
Sn-126	3.7564E-05	93,768.994	93,768.994	0.00E+00	3.52E+00	3.52E+00		
Sr-90	1.2052E+00	93,768.994	93,768.994	0.00E+00	1.13E+05	1.13E+05		
Tc-99	4.4825E-04	93,768.994	93,768.994	0.00E+00	4.20E+01	4.20E+01		
Th-229	4.6478E-11	93,768.994	93,768.994	0.00E+00	4.36E-06	4.36E-06		
Th-230	2.2259E-09	93,768.994	93,768.994	0.00E+00	2.09E-04	2.09E-04		
Th-232	2.3691E-11	93,768.994	93,768.994	0.00E+00	2.22E-06	2.22E-06		
Ti-208	5.8256E-09	93,768.994	93,768.994	0.00E+00	5.46E-04	5.46E-04		
U-232	1.5759E-08	93,768.994	93,768.994	0.00E+00	1.48E-03	1.48E-03		
U-233	1.0110E-08	93,768.994	93,768.994	0.00E+00	9.48E-04	9.48E-04		
U-234	4.9001E-06	93,768.994	93,768.994	0.00E+00	4.59E-01	4.59E-01		
U-235	-2.3191E-06	93,768.994	0.000	1.18E-01	0.00E+00	1.18E-01		
U-236	1.2633E-05	93,768.994	93,768.994	0.00E+00	1.18E+00	1.18E+00		
U-238	-9.5407E-08	93,768.994	0.000	5.32E-02	4.42E-02	5.32E-02		
Y-90	1.2053E+00	93,768.994	93,768.994	0.00E+00	1.13E+05	1.13E+05		
Other Radionuclides					1.28E+05	1.28E+05		

Thermal Power
 Nominal Heat Output (Watts): 1.45E+03
 Bounding Heat Output (Watts): 1.45E+03
 Total: Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences: This Template was used for the following reasons: This fuel matches on all parameters except cladding (unknown) and enrichment (unknown).
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	FAST	FAST	
BOL HM Constituents:	UNKNOWN	ZIRC	
BOL Enrichment %:	U METAL	U	
		10 to 40	

Burnup Summary (MWd) ²			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.
Nominal:	From SFD	Estimated	
Bounding:		93,768.994	
		93,768.994	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
Bounding:	141.08		1.69
	141.08		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: TURKEY POINT
 SNF ID #: 271
 Fuel Units & Descr: 5 - 15 X 15 ROD ARRAY
 Heavy Metal Mass: BOL=2285.00kg ; EOL=2221.60kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1977
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc. 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 50 years

Estimated
 Canister usage:
 PWR
 1.00

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.0733E-09	63,036.295	120,580.802	0.00E+00	6.77E-05	1.29E-04	Avg. MeV	
Am-241	1.4751E-01	63,036.295	120,580.802	0.00E+00	9.30E+03	1.78E+04	0.0150	4.589E+15
Am-242m	2.6809E-04	63,036.295	120,580.802	0.00E+00	1.69E+01	3.23E+01	0.0250	9.195E+14
Am-243	6.2484E-04	63,036.295	120,580.802	0.00E+00	3.94E+01	7.53E+01	0.0375	8.665E+14
C-14	4.7820E-05	63,036.295	120,580.802	0.00E+00	3.01E+00	5.77E+00	0.0575	1.084E+15
Cl-36	8.0297E-07	63,036.295	120,580.802	0.00E+00	5.06E-02	9.68E-02	0.0850	5.066E+14
Cm-243	1.7426E-04	63,036.295	120,580.802	0.00E+00	1.10E+01	2.10E+01	0.1250	3.370E+14
Cm-244	2.7616E-02	63,036.295	120,580.802	0.00E+00	1.74E+03	3.33E+03	0.2250	4.325E+14
Co-60	3.5610E-04	63,036.295	120,580.802	0.00E+00	2.24E+01	4.29E+01	0.3750	1.868E+14
Cs-134	2.6260E-07	63,036.295	120,580.802	0.00E+00	1.66E-02	3.17E-02	0.5750	4.399E+15
Cs-135	1.4433E-05	63,036.295	120,580.802	0.00E+00	9.10E-01	1.74E+00	0.8500	4.295E+13
Cs-137	9.8870E-01	63,036.295	120,580.802	0.00E+00	6.23E+04	1.19E+05	1.2500	2.733E+13
Eu-154	6.0320E-03	63,036.295	120,580.802	0.00E+00	3.80E+02	7.27E+02	1.7500	1.202E+12
Eu-155	2.1770E-04	63,036.295	120,580.802	0.00E+00	1.37E+01	2.63E+01	2.2500	1.975E+08
Fe-55	7.9296E-07	63,036.295	120,580.802	0.00E+00	5.00E-02	9.56E-02	2.7500	6.960E+08
H-3	8.9486E-03	63,036.295	120,580.802	0.00E+00	5.64E+02	1.08E+03	3.5000	4.967E+07
I-129	9.8288E-07	63,036.295	120,580.802	0.00E+00	6.20E-02	1.19E-01	5.0000	2.122E+07
Kr-85	1.0707E-02	63,036.295	120,580.802	0.00E+00	6.75E+02	1.29E+03	7.0000	2.445E+06
Np-237	1.1927E-05	63,036.295	120,580.802	0.00E+00	7.52E-01	1.44E+00	11.0000	2.808E+05
Pa-231	1.4703E-09	63,036.295	120,580.802	0.00E+00	9.27E-05	1.77E-04		
Pb-210	1.6828E-10	63,036.295	120,580.802	0.00E+00	1.06E-05	2.03E-05		
Pm-147	6.9606E-06	63,036.295	120,580.802	0.00E+00	4.39E-01	8.39E-01		
Pu-238	6.6263E-02	63,036.295	120,580.802	0.00E+00	4.18E+03	7.99E+03		
Pu-239	1.1618E-02	63,036.295	120,580.802	0.00E+00	7.32E+02	1.40E+03		
Pu-240	1.5142E-02	63,036.295	120,580.802	0.00E+00	9.55E+02	1.83E+03		
Pu-241	4.3766E-01	63,036.295	120,580.802	0.00E+00	2.76E+04	5.28E+04		
Pu-242	6.4260E-05	63,036.295	120,580.802	0.00E+00	4.05E+00	7.75E+00		
Ra-226	3.8501E-10	63,036.295	120,580.802	0.00E+00	2.43E-05	4.64E-05		
Ra-228	5.2955E-12	63,036.295	120,580.802	0.00E+00	3.34E-07	6.39E-07		
Ru-106	2.0413E-14	63,036.295	120,580.802	0.00E+00	1.29E-09	2.46E-09		
Se-79	1.2376E-05	63,036.295	120,580.802	0.00E+00	7.80E-01	1.49E+00		
Sn-126	2.5210E-05	63,036.295	120,580.802	0.00E+00	1.59E+00	3.04E+00		
Sr-90	6.4163E-01	63,036.295	120,580.802	0.00E+00	4.04E+04	7.74E+04		
Tc-99	3.9357E-04	63,036.295	120,580.802	0.00E+00	2.48E+01	4.75E+01		
Th-229	1.5644E-10	63,036.295	120,580.802	0.00E+00	9.86E-06	1.89E-05		
Th-230	2.7972E-08	63,036.295	120,580.802	0.00E+00	1.76E-03	3.37E-03		
Th-232	5.3036E-12	63,036.295	120,580.802	0.00E+00	3.34E-07	6.40E-07		
Tl-208	1.5136E-07	63,036.295	120,580.802	0.00E+00	9.54E-03	1.83E-02		
U-232	4.1005E-07	63,036.295	120,580.802	0.00E+00	2.58E-02	4.94E-02		
U-233	2.5856E-08	63,036.295	120,580.802	0.00E+00	1.83E-03	3.12E-03		
U-234	5.2665E-05	63,036.295	120,580.802	0.00E+00	3.32E+00	6.35E+00		
U-235	-1.4487E-06	63,036.295	0.000	1.26E-01	3.51E-02	1.26E-01		
U-236	7.5888E-06	63,036.295	120,580.802	0.00E+00	4.78E-01	9.15E-01		
U-238	-2.6129E-07	63,036.295	0.000	7.48E-01	7.32E-01	7.48E-01		
Y-90	6.4180E-01	63,036.295	120,580.802	0.00E+00	4.05E+04	7.74E+04		
Other Radionuclides					6.01E+04	1.15E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.14E+03	2.18E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.55999934	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	63,036.295	60,290.401	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:	63,666.955	120,580.802	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.79	0.96	1.00
Bounding:	1.51	1.89	

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

²Total burnup for all fuel associated with this worksheet must be 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 (ROLLA)
 SNF ID #: 881
 Fuel Units & Descr: 28 - 24 CURVED PLATES
 Heavy Metal Mass: BOL=5.10kg ; EOL=4.77kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1996
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.001166E9
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 1.17

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.1465E-09	307.592	615.184	0.00E+00	3.53E-07	7.05E-07	Avg. MeV	
Am-241	2.3056E-03	307.592	615.184	0.00E+00	7.09E-01	1.42E+00	0.0150	5.756E+13
Am-242m	4.1476E-07	307.592	615.184	0.00E+00	1.28E-04	2.55E-04	0.0250	1.196E+13
Am-243	1.4894E-06	307.592	615.184	0.00E+00	4.58E-04	9.16E-04	0.0375	1.042E+13
C-14	5.7108E-09	307.592	615.184	0.00E+00	1.76E-06	3.51E-06	0.0575	1.118E+13
Cl-36	1.3124E-32	307.592	615.184	0.00E+00	4.04E-30	8.07E-30	0.0850	6.748E+12
Co-243	1.4562E-07	307.592	615.184	0.00E+00	4.48E-05	8.96E-05	0.1250	4.520E+12
Co-244	2.4221E-05	307.592	615.184	0.00E+00	7.45E-03	1.49E-02	0.2250	5.826E+12
Co-60	2.7560E-06	307.592	615.184	0.00E+00	8.48E-04	1.70E-03	0.3750	2.533E+12
Cs-134	5.8851E-04	307.592	615.184	0.00E+00	1.81E-01	3.62E-01	0.5750	4.152E+13
Cs-135	3.4477E-06	307.592	615.184	0.00E+00	1.06E-03	2.12E-03	0.8500	5.983E+11
Cs-137	1.8099E+00	307.592	615.184	0.00E+00	5.57E+02	1.11E+03	1.2500	3.328E+11
Eu-154	1.6386E-02	307.592	615.184	0.00E+00	5.04E+00	1.01E+01	1.7500	1.644E+10
Eu-155	2.3957E-03	307.592	615.184	0.00E+00	7.37E-01	1.47E+00	2.2500	1.172E+06
Fe-55	3.2707E-05	307.592	615.184	0.00E+00	1.01E-02	2.01E-02	2.7500	9.593E+05
H-3	3.4504E-03	307.592	615.184	0.00E+00	1.06E+00	2.12E+00	3.5000	7.248E+02
I-129	7.5300E-07	307.592	615.184	0.00E+00	2.32E-04	4.63E-04	5.0000	2.438E+02
Kr-85	7.8540E-02	307.592	615.184	0.00E+00	2.42E+01	4.83E+01	7.0000	2.683E+01
Np-237	9.5615E-06	307.592	615.184	0.00E+00	2.94E-03	5.88E-03	11.0000	3.001E+00
Pa-231	2.7968E-09	307.592	615.184	0.00E+00	8.60E-07	1.72E-06		
Pb-210	1.2612E-10	307.592	615.184	0.00E+00	3.88E-08	7.76E-08		
Pm-147	1.2952E-02	307.592	615.184	0.00E+00	3.98E+00	7.97E+00		
Pu-238	1.7549E-02	307.592	615.184	0.00E+00	5.40E+00	1.08E+01		
Pu-239	4.2810E-04	307.592	615.184	0.00E+00	1.32E-01	2.63E-01		
Pu-240	2.4357E-04	307.592	615.184	0.00E+00	7.49E-02	1.50E-01		
Pu-241	2.6277E-02	307.592	615.184	0.00E+00	8.08E+00	1.62E+01		
Pu-242	3.6329E-07	307.592	615.184	0.00E+00	1.12E-04	2.23E-04		
Ra-226	4.4444E-10	307.592	615.184	0.00E+00	1.37E-07	2.73E-07		
Ra-228	1.9714E-14	307.592	615.184	0.00E+00	6.06E-12	1.21E-11		
Ru-106	2.0477E-07	307.592	615.184	0.00E+00	6.30E-05	1.26E-04		
Se-79	1.2933E-05	307.592	615.184	0.00E+00	3.98E-03	7.96E-03		
Sn-126	1.1574E-05	307.592	615.184	0.00E+00	3.56E-03	7.12E-03		
Sr-90	1.7092E+00	307.592	615.184	0.00E+00	5.26E+02	1.05E+03		
Tc-99	4.2239E-04	307.592	615.184	0.00E+00	1.30E-01	2.60E-01		
Th-229	7.7260E-12	307.592	615.184	0.00E+00	2.38E-09	4.75E-09		
Th-230	5.8497E-08	307.592	615.184	0.00E+00	1.80E-05	3.60E-05		
Th-232	2.6906E-14	307.592	615.184	0.00E+00	8.28E-12	1.66E-11		
Ti-208	4.4336E-08	307.592	615.184	0.00E+00	1.36E-05	2.73E-05		
U-232	1.2037E-07	307.592	615.184	0.00E+00	3.70E-05	7.40E-05		
U-233	3.0011E-09	307.592	615.184	0.00E+00	9.23E-07	1.85E-06		
U-234	1.8497E-04	307.592	615.184	0.00E+00	5.69E-02	1.14E-01		
U-235	-2.7235E-06	307.592	0.000	1.03E-02	9.45E-03	1.03E-02		
U-236	1.5493E-05	307.592	615.184	0.00E+00	4.77E-03	9.53E-03		
U-238	-4.2851E-09	307.592	0.000	1.13E-04	1.12E-04	1.13E-04		
Y-90	1.7094E+00	307.592	615.184	0.00E+00	5.26E+02	1.05E+03		
Other Radionuclides					5.30E+02	1.06E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.51E+00	1.30E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.40659341	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		307.592	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		615.184	

Checks		
	Burnup Multiplier	Estimated Burnup/ Given Burnup
Nominal:	0.19	
Bounding:	0.38	
		Estimated EOL HM/ Given EOL HM
		1.00

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

²Total burnup for all fuel associated with this worksheet must be 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 (ROLLA) ¹Fuel decay start date: 2035
 SNF ID #: 146 Estimates as of: 2030
 Fuel Units & Descr: 28 - 24 CURVED PLATES Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=31.90kg ; EOL=26.46kg ²Template 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							Gamma Sources	
	m	x _a	x _b	b	y _a	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	1.4545E-10	5,149.513	10,299.025	0.00E+00	7.49E-07	1.50E-06		
Am-241	1.1190E-03	5,149.513	10,299.025	0.00E+00	5.76E+00	1.15E+01	0.0150	1.987E+15
Am-242m	4.5425E-07	5,149.513	10,299.025	0.00E+00	2.34E-03	4.68E-03	0.0250	4.281E+14
Am-243	1.4921E-06	5,149.513	10,299.025	0.00E+00	7.68E-03	1.54E-02	0.0375	3.950E+14
C-14	5.7244E-09	5,149.513	10,299.025	0.00E+00	2.95E-05	5.90E-05	0.0575	3.884E+14
Cl-36	1.3124E-32	5,149.513	10,299.025	0.00E+00	6.76E-29	1.35E-28	0.0850	2.476E+14
Cm-243	2.3676E-07	5,149.513	10,299.025	0.00E+00	1.22E-03	2.44E-03	0.1250	2.144E+14
Cm-244	5.2042E-05	5,149.513	10,299.025	0.00E+00	2.68E-01	5.36E-01	0.2250	2.099E+14
Co-60	3.8208E-05	5,149.513	10,299.025	0.00E+00	1.97E-01	3.94E-01	0.3750	1.016E+14
Cs-134	4.8693E-01	5,149.513	10,299.025	0.00E+00	2.51E+03	5.01E+03	0.5750	1.395E+15
Cs-135	3.4477E-06	5,149.513	10,299.025	0.00E+00	1.78E-02	3.55E-02	0.8500	1.954E+14
Cs-137	2.8731E+00	5,149.513	10,299.025	0.00E+00	1.48E+04	2.96E+04	1.2500	3.636E+13
Eu-154	8.2053E-02	5,149.513	10,299.025	0.00E+00	4.23E+02	8.45E+02	1.7500	1.525E+12
Eu-155	3.9134E-02	5,149.513	10,299.025	0.00E+00	2.02E+02	4.03E+02	2.2500	3.198E+12
Fe-55	6.7429E-03	5,149.513	10,299.025	0.00E+00	3.47E+01	6.94E+01	2.7500	1.840E+10
H-3	1.0599E-02	5,149.513	10,299.025	0.00E+00	5.46E+01	1.09E+02	3.5000	2.041E+09
I-129	7.5300E-07	5,149.513	10,299.025	0.00E+00	3.88E-03	7.76E-03	5.0000	6.119E+03
Kr-85	2.8595E-01	5,149.513	10,299.025	0.00E+00	1.47E+03	2.94E+03	7.0000	6.823E+02
Np-237	9.5479E-06	5,149.513	10,299.025	0.00E+00	4.92E-02	9.83E-02	11.0000	7.691E+01
Pa-231	8.9297E-01	5,149.513	10,299.025	0.00E+00	4.60E-06	9.20E-06		
Pb-210	3.7609E-12	5,149.513	10,299.025	0.00E+00	1.94E-08	3.87E-08		
Pm-147	2.5452E+00	5,149.513	10,299.025	0.00E+00	1.31E+04	2.62E+04		
Pu-238	2.0550E-02	5,149.513	10,299.025	0.00E+00	1.06E+02	2.12E+02		
Pu-239	4.2838E-04	5,149.513	10,299.025	0.00E+00	2.21E+00	4.41E+00		
Pu-240	2.4401E-04	5,149.513	10,299.025	0.00E+00	1.26E+00	2.51E+00		
Pu-241	6.8764E-02	5,149.513	10,299.025	0.00E+00	3.54E+02	7.08E+02		
Pu-242	3.6329E-07	5,149.513	10,299.025	0.00E+00	1.87E-03	3.74E-03		
Ra-226	3.8045E-11	5,149.513	10,299.025	0.00E+00	1.96E-07	3.92E-07		
Ra-228	2.9902E-15	5,149.513	10,299.025	0.00E+00	1.54E-11	3.08E-11		
Ru-106	1.9055E-01	5,149.513	10,299.025	0.00E+00	9.81E+02	1.96E+03		
Se-79	1.2936E-05	5,149.513	10,299.025	0.00E+00	6.66E-02	1.33E-01		
Sn-126	1.1574E-05	5,149.513	10,299.025	0.00E+00	5.96E-02	1.19E-01		
Sr-90	2.7505E+00	5,149.513	10,299.025	0.00E+00	1.42E+04	2.83E+04		
Tc-99	4.2239E-04	5,149.513	10,299.025	0.00E+00	2.18E+00	4.35E+00		
Th-229	1.8848E-12	5,149.513	10,299.025	0.00E+00	9.71E-09	1.94E-08		
Th-230	1.7042E-08	5,149.513	10,299.025	0.00E+00	8.78E-05	1.76E-04		
Th-232	7.8132E-15	5,149.513	10,299.025	0.00E+00	4.02E-11	8.05E-11		
Tl-208	4.4063E-08	5,149.513	10,299.025	0.00E+00	2.27E-04	4.54E-04		
U-232	1.3151E-07	5,149.513	10,299.025	0.00E+00	6.77E-04	1.35E-03		
U-233	1.9564E-09	5,149.513	10,299.025	0.00E+00	1.01E-05	2.01E-05		
U-234	1.8371E-04	5,149.513	10,299.025	0.00E+00	9.46E-01	1.89E+00		
U-235	2.7235E-06	5,149.513	0.000	1.36E-02	0.00E+00	1.36E-02		
U-236	1.5493E-05	5,149.513	10,299.025	0.00E+00	7.98E-02	1.60E-01		
U-238	4.2851E-09	5,149.513	0.000	8.60E-03	8.58E-03	8.60E-03		
Y-90	2.7505E+00	5,149.513	10,299.025	0.00E+00	1.42E+04	2.83E+04		
Other Radionuclides					2.65E+04	5.30E+04		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.75000378	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		5,149.513	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		10,299.025	

Checks		
	Burnup Multiplier	Estimated Burnup/Given Burnup
Nominal:	0.51	
Bounding:	1.03	
		Estimated EOL HM/Given EOL HM
		1.02

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

²Total burnup for all fuel associated with this worksheet must be 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)
 SNF ID #: 272
 Fuel Units & Descr: 259 - ELEMENT
 Heavy Metal Mass: BOL=4.14kg ; EOL=4.09kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.001166E9
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 7.19

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.4545E-10	49.056	98.111	0.00E+00	7.14E-09	1.43E-08	Avg. MeV	
Am-241	1.1190E-03	49.056	98.111	0.00E+00	5.49E-02	1.10E-01	0.0150	1.893E+13
Am-242m	4.5425E-07	49.056	98.111	0.00E+00	2.23E-05	4.46E-05	0.0250	4.078E+12
Am-243	1.4921E-06	49.056	98.111	0.00E+00	7.32E-05	1.46E-04	0.0375	3.763E+12
C-14	5.7244E-09	49.056	98.111	0.00E+00	2.81E-07	5.62E-07	0.0575	3.700E+12
Cl-36	1.3124E-32	49.056	98.111	0.00E+00	6.44E-31	1.29E-30	0.0850	2.358E+12
Cm-243	2.3676E-07	49.056	98.111	0.00E+00	1.16E-05	2.32E-05	0.1250	2.043E+12
Cm-244	5.2042E-05	49.056	98.111	0.00E+00	2.55E-03	5.11E-03	0.2250	1.999E+12
Co-60	3.8208E-05	49.056	98.111	0.00E+00	1.87E-03	3.75E-03	0.3750	9.677E+11
Cs-134	4.8693E-01	49.056	98.111	0.00E+00	2.39E+01	4.78E+01	0.5750	1.329E+12
Cs-135	3.4477E-06	49.056	98.111	0.00E+00	1.69E-04	3.38E-04	0.8500	1.861E+12
Cs-137	2.8731E+00	49.056	98.111	0.00E+00	1.41E+02	2.82E+02	1.2500	3.463E+11
Eu-154	8.2053E-02	49.056	98.111	0.00E+00	4.03E+00	8.05E+00	1.7500	1.452E+10
Eu-155	3.9134E-02	49.056	98.111	0.00E+00	1.92E+00	3.84E+00	2.2500	3.047E+10
Fe-55	6.7429E-03	49.056	98.111	0.00E+00	3.31E-01	6.62E-01	2.7500	1.753E+08
H-3	1.0599E-02	49.056	98.111	0.00E+00	5.20E-01	1.04E+00	3.5000	1.944E+07
I-129	7.5300E-07	49.056	98.111	0.00E+00	3.69E-05	7.39E-05	5.0000	5.843E+01
Kr-85	2.8595E-01	49.056	98.111	0.00E+00	1.40E+01	2.81E+01	7.0000	6.515E+00
Np-237	9.5479E-06	49.056	98.111	0.00E+00	4.68E-04	9.37E-04	11.0000	7.344E-01
Pa-231	8.9297E-10	49.056	98.111	0.00E+00	4.38E-08	8.76E-08		
Pb-210	3.7609E-12	49.056	98.111	0.00E+00	1.84E-10	3.69E-10		
Pm-147	2.5452E+00	49.056	98.111	0.00E+00	1.25E+02	2.50E+02		
Pu-238	2.0550E-02	49.056	98.111	0.00E+00	1.01E+00	2.02E+00		
Pu-239	4.2838E-04	49.056	98.111	0.00E+00	2.10E-02	4.20E-02		
Pu-240	2.4401E-04	49.056	98.111	0.00E+00	1.20E-02	2.39E-02		
Pu-241	6.8764E-02	49.056	98.111	0.00E+00	3.37E+00	6.75E+00		
Pu-242	3.6329E-07	49.056	98.111	0.00E+00	1.78E-05	3.56E-05		
Ra-226	3.8045E-11	49.056	98.111	0.00E+00	1.87E-09	3.73E-09		
Ra-228	2.9902E-15	49.056	98.111	0.00E+00	1.47E-13	2.93E-13		
Ru-106	1.9055E-01	49.056	98.111	0.00E+00	9.35E+00	1.87E+01		
Se-79	1.2936E-05	49.056	98.111	0.00E+00	6.35E-04	1.27E-03		
Sn-126	1.1574E-05	49.056	98.111	0.00E+00	5.68E-04	1.14E-03		
Sr-90	2.7505E+00	49.056	98.111	0.00E+00	1.35E+02	2.70E+02		
Tc-99	4.2239E-04	49.056	98.111	0.00E+00	2.07E-02	4.14E-02		
Th-229	1.8848E-12	49.056	98.111	0.00E+00	9.25E-11	1.85E-10		
Th-230	1.7042E-08	49.056	98.111	0.00E+00	8.36E-07	1.67E-06		
Th-232	7.8132E-15	49.056	98.111	0.00E+00	3.83E-13	7.67E-13		
Ti-208	4.4063E-08	49.056	98.111	0.00E+00	2.16E-06	4.32E-06		
U-232	1.3151E-07	49.056	98.111	0.00E+00	6.45E-06	1.29E-05		
U-233	1.9564E-09	49.056	98.111	0.00E+00	9.60E-08	1.92E-07		
U-234	1.8371E-04	49.056	98.111	0.00E+00	9.01E-03	1.80E-02		
U-235	-2.7235E-06	49.056	0.000	8.34E-03	8.21E-03	8.34E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.5493E-05	49.056	98.111	0.00E+00	7.60E-04	1.52E-03	2.49E+00	4.97E+00
U-238	-4.2851E-09	49.056	0.000	9.54E-05	9.52E-05	9.54E-05	Total	Total
Y-90	2.7505E+00	49.056	98.111	0.00E+00	1.35E+02	2.70E+02		
Other Radionuclides					2.52E+02	5.05E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.15	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	28.179	49.056	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		98.111	Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	0.04	1.74	1.00
Bounding:	0.08		

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

²Total burnup for all fuel associated with this worksheet must be 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)
 SNF ID #: 273
 Fuel Units & Descr: 14 - ELEMENT
 Heavy Metal Mass: BOL=1.00kg ; EOL=1.00kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.58

II. Estimates

Radionuclide	m	x _a	x _b	b	y _a	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	1.4545E-10	0.597	1.194	0.00E+00	8.69E-11	1.74E-10		
Am-241	1.1190E-03	0.597	1.194	0.00E+00	6.68E-04	1.34E-03	0.0150	2.305E+11
Am-242m	4.5425E-07	0.597	1.194	0.00E+00	2.71E-07	5.43E-07	0.0250	4.965E+10
Am-243	1.4921E-06	0.597	1.194	0.00E+00	8.91E-07	1.78E-06	0.0375	4.581E+10
C-14	5.7244E-09	0.597	1.194	0.00E+00	3.42E-09	6.84E-09	0.0575	4.508E+10
Cl-36	1.3124E-32	0.597	1.194	0.00E+00	7.84E-33	1.57E-32	0.0850	2.872E+10
Cm-243	2.3676E-07	0.597	1.194	0.00E+00	1.41E-07	2.83E-07	0.1250	2.487E+10
Cm-244	5.2042E-05	0.597	1.194	0.00E+00	3.11E-05	6.22E-05	0.2250	2.435E+10
Co-60	3.8208E-05	0.597	1.194	0.00E+00	2.28E-05	4.56E-05	0.3750	1.178E+10
Cs-134	4.8693E-01	0.597	1.194	0.00E+00	2.91E-01	5.82E-01	0.5750	1.618E+11
Cs-135	3.4477E-06	0.597	1.194	0.00E+00	2.06E-06	4.12E-06	0.8500	2.266E+10
Cs-137	2.8731E+00	0.597	1.194	0.00E+00	1.72E+00	3.43E+00	1.2500	4.217E+09
Eu-154	8.2053E-02	0.597	1.194	0.00E+00	4.90E-02	9.80E-02	1.7500	1.768E+08
Eu-155	3.9134E-02	0.597	1.194	0.00E+00	2.34E-02	4.67E-02	2.2500	3.709E+08
Fe-55	6.7429E-03	0.597	1.194	0.00E+00	4.03E-03	8.05E-03	2.7500	2.134E+06
H-3	1.0599E-02	0.597	1.194	0.00E+00	6.33E-03	1.27E-02	3.5000	2.367E+05
I-129	7.5300E-07	0.597	1.194	0.00E+00	4.50E-07	8.99E-07	5.0000	1.327E+00
Kr-85	2.8595E-01	0.597	1.194	0.00E+00	1.71E-01	3.42E-01	7.0000	1.502E-01
Np-237	9.5479E-06	0.597	1.194	0.00E+00	5.70E-06	1.14E-05	11.0000	1.710E-02
Pa-231	8.9297E-10	0.597	1.194	0.00E+00	5.33E-10	1.07E-09		
Pb-210	3.7609E-12	0.597	1.194	0.00E+00	2.25E-12	4.49E-12		
Pm-147	2.5452E+00	0.597	1.194	0.00E+00	1.52E+00	3.04E+00		
Pu-238	2.0550E-02	0.597	1.194	0.00E+00	1.23E-02	2.45E-02		
Pu-239	4.2838E-04	0.597	1.194	0.00E+00	2.56E-04	5.12E-04		
Pu-240	2.4401E-04	0.597	1.194	0.00E+00	1.46E-04	2.91E-04		
Pu-241	6.8764E-02	0.597	1.194	0.00E+00	4.11E-02	8.21E-02		
Pu-242	3.6329E-07	0.597	1.194	0.00E+00	2.17E-07	4.34E-07		
Ra-226	3.8045E-11	0.597	1.194	0.00E+00	2.27E-11	4.54E-11		
Ra-228	2.9902E-15	0.597	1.194	0.00E+00	1.79E-15	3.57E-15		
Ru-106	1.9055E-01	0.597	1.194	0.00E+00	1.14E-01	2.28E-01		
Se-79	1.2936E-05	0.597	1.194	0.00E+00	7.73E-06	1.55E-05		
Sn-126	1.1574E-05	0.597	1.194	0.00E+00	6.91E-06	1.38E-05		
Sr-90	2.7505E+00	0.597	1.194	0.00E+00	1.64E+00	3.29E+00		
Tc-99	4.2239E-04	0.597	1.194	0.00E+00	2.52E-04	5.05E-04		
Th-229	1.8848E-12	0.597	1.194	0.00E+00	1.13E-12	2.25E-12		
Th-230	1.7042E-08	0.597	1.194	0.00E+00	1.02E-08	2.04E-08		
Th-232	7.8132E-15	0.597	1.194	0.00E+00	4.67E-15	9.33E-15		
Tl-208	4.4063E-08	0.597	1.194	0.00E+00	2.63E-08	5.26E-08		
U-232	1.3151E-07	0.597	1.194	0.00E+00	7.85E-08	1.57E-07		
U-233	1.9564E-09	0.597	1.194	0.00E+00	1.17E-09	2.34E-09		
U-234	1.8371E-04	0.597	1.194	0.00E+00	1.10E-04	2.19E-04		
U-235	-2.7235E-06	0.597	0.000	4.27E-04	4.25E-04	4.27E-04		
U-236	1.5493E-05	0.597	1.194	0.00E+00	9.25E-06	1.85E-05		
U-238	-4.2851E-09	0.597	0.000	2.68E-04	2.68E-04	2.68E-04		
Y-90	2.7505E+00	0.597	1.194	0.00E+00	1.64E+00	3.29E+00		
Other Radionuclides					3.07E+00	6.14E+00		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	19.8359342	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	0.597		Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:		1.194	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.00	0.00	1.00
Bounding:	0.00		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 275
 Fuel Units & Descr: 41 - 18 FLAT PLATES
 Heavy Metal Mass: BOL=14.32kg ; EOL=14.32kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 1.14

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.4545E-10	271.251	542.502	0.00E+00	3.95E-08	7.89E-08	Avg. MeV	
Am-241	1.1190E-03	271.251	542.502	0.00E+00	3.04E-01	6.07E-01	0.0150	1.047E+14
Am-242m	4.5425E-07	271.251	542.502	0.00E+00	1.23E-04	2.46E-04	0.0250	2.255E+13
Am-243	1.4921E-06	271.251	542.502	0.00E+00	4.05E-04	8.09E-04	0.0375	2.081E+13
C-14	5.7244E-09	271.251	542.502	0.00E+00	1.55E-06	3.11E-06	0.0575	2.046E+13
Cl-36	1.3124E-32	271.251	542.502	0.00E+00	3.56E-30	7.12E-30	0.0850	1.304E+13
Cm-243	2.3676E-07	271.251	542.502	0.00E+00	6.42E-05	1.28E-04	0.1250	1.130E+13
Cm-244	5.2042E-05	271.251	542.502	0.00E+00	1.41E-02	2.82E-02	0.2250	1.105E+13
Co-60	3.8208E-05	271.251	542.502	0.00E+00	1.04E-02	2.07E-02	0.3750	5.351E+12
Cs-134	4.8693E-01	271.251	542.502	0.00E+00	1.32E+02	2.64E+02	0.5750	7.350E+12
Cs-135	3.4477E-06	271.251	542.502	0.00E+00	9.35E-04	1.87E-03	0.8500	1.029E+13
Cs-137	2.8731E+00	271.251	542.502	0.00E+00	7.79E+02	1.56E+03	1.2500	1.915E+12
Eu-154	8.2053E-02	271.251	542.502	0.00E+00	2.23E+01	4.45E+01	1.7500	8.031E+10
Eu-155	3.9134E-02	271.251	542.502	0.00E+00	1.06E+01	2.12E+01	2.2500	1.685E+11
Fe-55	6.7429E-03	271.251	542.502	0.00E+00	1.83E+00	3.66E+00	2.7500	9.691E+08
H-3	1.0599E-02	271.251	542.502	0.00E+00	2.88E+00	5.75E+00	3.5000	1.075E+08
I-129	7.5300E-07	271.251	542.502	0.00E+00	2.04E-04	4.09E-04	5.0000	3.302E+02
Kr-85	2.8595E-01	271.251	542.502	0.00E+00	7.76E+01	1.55E+02	7.0000	3.685E+01
Np-237	9.5479E-06	271.251	542.502	0.00E+00	2.59E-03	5.18E-03	11.0000	4.155E+00
Pa-231	8.9297E-10	271.251	542.502	0.00E+00	2.42E-07	4.84E-07		
Pb-210	3.7609E-12	271.251	542.502	0.00E+00	1.02E-09	2.04E-09		
Pm-147	2.5452E+00	271.251	542.502	0.00E+00	6.90E+02	1.38E+03		
Pu-238	2.0550E-02	271.251	542.502	0.00E+00	5.57E+00	1.11E+01		
Pu-239	4.2838E-04	271.251	542.502	0.00E+00	1.16E-01	2.32E-01		
Pu-240	2.4401E-04	271.251	542.502	0.00E+00	6.62E-02	1.32E-01		
Pu-241	6.8764E-02	271.251	542.502	0.00E+00	1.87E+01	3.73E+01		
Pu-242	3.6329E-07	271.251	542.502	0.00E+00	9.85E-05	1.97E-04		
Ra-226	3.8045E-11	271.251	542.502	0.00E+00	1.03E-08	2.06E-08		
Ra-228	2.9902E-15	271.251	542.502	0.00E+00	8.11E-13	1.62E-12		
Ru-106	1.9055E-01	271.251	542.502	0.00E+00	5.17E+01	1.03E+02		
Se-79	1.2936E-05	271.251	542.502	0.00E+00	3.51E-03	7.02E-03		
Sn-126	1.1574E-05	271.251	542.502	0.00E+00	3.14E-03	6.28E-03		
Sr-90	2.7505E+00	271.251	542.502	0.00E+00	7.46E+02	1.49E+03		
Tc-99	4.2239E-04	271.251	542.502	0.00E+00	1.15E-01	2.29E-01		
Th-229	1.8848E-12	271.251	542.502	0.00E+00	5.11E-10	1.02E-09		
Th-230	1.7042E-08	271.251	542.502	0.00E+00	4.62E-06	9.25E-06		
Th-232	7.8132E-15	271.251	542.502	0.00E+00	2.12E-12	4.24E-12		
Th-208	4.4063E-08	271.251	542.502	0.00E+00	1.20E-05	2.39E-05		
U-232	1.3151E-07	271.251	542.502	0.00E+00	3.57E-05	7.13E-05		
U-233	1.9564E-09	271.251	542.502	0.00E+00	5.31E-07	1.06E-06		
U-234	1.8371E-04	271.251	542.502	0.00E+00	4.98E-02	9.97E-02		
U-235	-2.7235E-06	271.251	0.000	6.10E-03	5.36E-03	6.10E-03		
U-236	1.5493E-05	271.251	542.502	0.00E+00	4.20E-03	8.40E-03		
U-238	-4.2851E-09	271.251	0.000	3.86E-03	3.86E-03	3.86E-03		
Y-90	2.7505E+00	271.251	542.502	0.00E+00	7.46E+02	1.49E+03		
Other Radionuclides					1.40E+03	2.79E+03		

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			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
LIGHT WATER	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.71401492	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
401.054	401.054	271.251	Nominal burnup assumed to be 2% of BOL heavy metal mass. Bounding burnup assumed to be twice nominal burnup.
		542.502	

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup	
0.06	0.06		0.98
Bounding:	0.12	1.35	

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 274
 Fuel Units & Descr: 34 - 18 FLAT PLATES
 Heavy Metal Mass: BOL=4.78kg ; EOL=4.50kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)

²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.94

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.4545E-10	270.469	540.937	0.00E+00	3.93E-08	7.87E-08	Avg. MeV	
Am-241	1.1190E-03	270.469	540.937	0.00E+00	3.03E-01	6.05E-01	0.0150	1.044E+14
Am-242m	4.5425E-07	270.469	540.937	0.00E+00	1.23E-04	2.46E-04	0.0250	2.248E+13
Am-243	1.4921E-06	270.469	540.937	0.00E+00	4.04E-04	8.07E-04	0.0375	2.075E+13
C-14	5.7244E-09	270.469	540.937	0.00E+00	1.55E-06	3.10E-06	0.0575	2.040E+13
Cl-36	1.3124E-32	270.469	540.937	0.00E+00	3.55E-30	7.10E-30	0.0850	1.301E+13
Cm-243	2.3676E-07	270.469	540.937	0.00E+00	6.40E-05	1.28E-04	0.1250	1.126E+13
Cm-244	5.2042E-05	270.469	540.937	0.00E+00	1.41E-02	2.82E-02	0.2250	1.102E+13
Co-60	3.8208E-05	270.469	540.937	0.00E+00	1.03E-02	2.07E-02	0.3750	5.336E+12
Cs-134	4.8693E-01	270.469	540.937	0.00E+00	1.32E+02	2.63E+02	0.5750	7.329E+13
Cs-135	3.4477E-06	270.469	540.937	0.00E+00	9.32E-04	1.86E-03	0.8500	1.026E+13
Cs-137	2.8731E+00	270.469	540.937	0.00E+00	7.77E+02	1.55E+03	1.2500	1.910E+12
Eu-154	8.2053E-02	270.469	540.937	0.00E+00	2.22E+01	4.44E+01	1.7500	8.008E+10
Eu-155	3.9134E-02	270.469	540.937	0.00E+00	1.06E+01	2.12E+01	2.2500	1.680E+11
Fe-55	6.7429E-03	270.469	540.937	0.00E+00	1.82E+00	3.65E+00	2.7500	9.663E+08
H-3	1.0599E-02	270.469	540.937	0.00E+00	2.87E+00	5.73E+00	3.5000	1.072E+08
I-129	7.5300E-07	270.469	540.937	0.00E+00	2.04E-04	4.07E-04	5.0000	3.207E+02
Kr-85	2.8595E-01	270.469	540.937	0.00E+00	7.73E+01	1.55E+02	7.0000	3.576E+01
Np-237	9.5479E-06	270.469	540.937	0.00E+00	2.58E-03	5.16E-03	11.0000	4.030E+00
Pa-231	8.9297E-10	270.469	540.937	0.00E+00	2.42E-07	4.83E-07		
Pb-210	3.7609E-12	270.469	540.937	0.00E+00	1.02E-09	2.03E-09		
Pm-147	2.5452E+00	270.469	540.937	0.00E+00	6.88E+02	1.38E+03		
Pu-238	2.0550E-02	270.469	540.937	0.00E+00	5.56E+00	1.11E+01		
Pu-239	4.2838E-04	270.469	540.937	0.00E+00	1.16E-01	2.32E-01		
Pu-240	2.4401E-04	270.469	540.937	0.00E+00	6.60E-02	1.32E-01		
Pu-241	6.8764E-02	270.469	540.937	0.00E+00	1.86E+01	3.72E+01		
Pu-242	3.6329E-07	270.469	540.937	0.00E+00	9.83E-05	1.97E-04		
Ra-226	3.8045E-11	270.469	540.937	0.00E+00	1.03E-08	2.06E-08		
Ra-228	2.9902E-15	270.469	540.937	0.00E+00	8.09E-13	1.62E-12		
Ru-106	1.9055E-01	270.469	540.937	0.00E+00	5.15E+01	1.03E+02		
Se-79	1.2936E-05	270.469	540.937	0.00E+00	3.50E-03	7.00E-03		
Sn-126	1.1574E-05	270.469	540.937	0.00E+00	3.13E-03	6.26E-03		
Sr-90	2.7505E+00	270.469	540.937	0.00E+00	7.44E+02	1.49E+03		
Tc-99	4.2239E-04	270.469	540.937	0.00E+00	1.14E-01	2.28E-01		
Th-229	1.8848E-12	270.469	540.937	0.00E+00	5.10E-10	1.02E-09		
Th-230	1.7042E-08	270.469	540.937	0.00E+00	4.61E-06	9.22E-06		
Th-232	7.8132E-15	270.469	540.937	0.00E+00	2.11E-12	4.23E-12		
Tl-208	4.4063E-08	270.469	540.937	0.00E+00	1.19E-05	2.38E-05		
U-232	1.3151E-07	270.469	540.937	0.00E+00	3.56E-05	7.11E-05		
U-233	1.9564E-09	270.469	540.937	0.00E+00	5.29E-07	1.06E-06		
U-234	1.8371E-04	270.469	540.937	0.00E+00	4.97E-02	9.94E-02		
U-235	-2.7235E-06	270.469	0.000	9.63E-03	8.89E-03	9.63E-03		
U-236	1.5493E-05	270.469	540.937	0.00E+00	4.19E-03	8.38E-03		
U-238	-4.2851E-09	270.469	0.000	1.10E-04	1.09E-04	1.10E-04		
Y-90	2.7505E+00	270.469	540.937	0.00E+00	7.44E+02	1.49E+03		
Other Radionuclides					1.39E+03	2.78E+03		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (1100)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	93.16325044	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		270.469	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:		540.937	Bounding burnup assumed to be twice nominal burnup.

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.18		1.00
Bounding:	0.36		

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

²Total burnup for all fuel associated with this worksheet must be 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 #: 277
 Fuel Units & Descr: 225 - 18 CURVED PLATES
 Heavy Metal Mass: BOL=190.26kg ; EOL=174.08kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2003
 Estimates as of: 2033
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWD): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 9.38

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.1465E-09	15,320.406	30,640.813	0.00E+00	1.76E-05	3.51E-05	Avg. MeV	
Am-241	2.3056E-03	15,320.406	30,640.813	0.00E+00	3.53E+01	7.06E+01	0.0150	2.867E+15
Am-242m	4.1476E-07	15,320.406	30,640.813	0.00E+00	6.35E-03	1.27E-02	0.0250	5.957E+14
Am-243	1.4894E-06	15,320.406	30,640.813	0.00E+00	2.28E-02	4.56E-02	0.0375	5.188E+14
C-14	5.7108E-09	15,320.406	30,640.813	0.00E+00	8.75E-05	1.75E-04	0.0575	5.570E+14
Cl-36	1.3124E-32	15,320.406	30,640.813	0.00E+00	2.01E-28	4.02E-28	0.0850	3.361E+14
Co-243	1.4562E-07	15,320.406	30,640.813	0.00E+00	2.23E-03	4.46E-03	0.1250	2.251E+14
Co-244	2.4221E-05	15,320.406	30,640.813	0.00E+00	3.71E-01	7.42E-01	0.2250	2.902E+14
Co-60	2.7560E-06	15,320.406	30,640.813	0.00E+00	4.22E-02	8.44E-02	0.3750	1.261E+14
Cs-134	5.8851E-04	15,320.406	30,640.813	0.00E+00	9.02E+00	1.80E+01	0.5750	2.068E+15
Cs-135	3.4477E-06	15,320.406	30,640.813	0.00E+00	5.28E-02	1.06E-01	0.8500	2.980E+13
Cs-137	1.8099E+00	15,320.406	30,640.813	0.00E+00	2.77E+04	5.55E+04	1.2500	1.657E+13
Eu-154	1.6386E-02	15,320.406	30,640.813	0.00E+00	2.51E+02	5.02E+02	1.7500	8.189E+11
Eu-155	2.3957E-03	15,320.406	30,640.813	0.00E+00	3.67E+01	7.34E+01	2.2500	5.838E+07
Fe-55	3.2707E-05	15,320.406	30,640.813	0.00E+00	5.01E-01	1.00E+00	2.7500	4.778E+07
H-3	3.4504E-03	15,320.406	30,640.813	0.00E+00	5.29E+01	1.06E+02	3.5000	3.633E+04
I-129	7.5300E-07	15,320.406	30,640.813	0.00E+00	1.15E-02	2.31E-02	5.0000	1.224E+04
Kr-85	7.8540E-02	15,320.406	30,640.813	0.00E+00	1.20E+03	2.41E+03	7.0000	1.348E+03
Np-237	9.5615E-06	15,320.406	30,640.813	0.00E+00	1.46E-01	2.93E-01	11.0000	1.508E+02
Pa-231	2.7968E-09	15,320.406	30,640.813	0.00E+00	4.28E-05	8.57E-05		
Pb-210	1.2612E-10	15,320.406	30,640.813	0.00E+00	1.93E-06	3.86E-06		
Pm-147	1.2952E-02	15,320.406	30,640.813	0.00E+00	1.98E+02	3.97E+02		
Pu-238	1.7549E-02	15,320.406	30,640.813	0.00E+00	2.69E+02	5.38E+02		
Pu-239	4.2810E-04	15,320.406	30,640.813	0.00E+00	6.56E+00	1.31E+01		
Pu-240	2.4357E-04	15,320.406	30,640.813	0.00E+00	3.73E+00	7.46E+00		
Pu-241	2.6277E-02	15,320.406	30,640.813	0.00E+00	4.03E+02	8.05E+02		
Pu-242	3.6329E-07	15,320.406	30,640.813	0.00E+00	5.57E-03	1.11E-02		
Ra-226	4.4444E-10	15,320.406	30,640.813	0.00E+00	6.81E-06	1.36E-05		
Ra-228	1.9714E-14	15,320.406	30,640.813	0.00E+00	3.02E-10	6.04E-10		
Ru-106	2.0477E-07	15,320.406	30,640.813	0.00E+00	3.14E-03	6.27E-03		
Se-79	1.2933E-05	15,320.406	30,640.813	0.00E+00	1.98E-01	3.96E-01		
Sn-126	1.1574E-05	15,320.406	30,640.813	0.00E+00	1.77E-01	3.55E-01		
Sr-90	1.7092E+00	15,320.406	30,640.813	0.00E+00	2.62E+04	5.24E+04		
Tc-99	4.2239E-04	15,320.406	30,640.813	0.00E+00	6.47E+00	1.29E+01		
Th-229	7.7260E-12	15,320.406	30,640.813	0.00E+00	1.18E-07	2.37E-07		
Th-230	5.8497E-08	15,320.406	30,640.813	0.00E+00	8.96E-04	1.79E-03		
Th-232	2.6906E-14	15,320.406	30,640.813	0.00E+00	4.12E-10	8.24E-10		
Ti-208	4.4336E-08	15,320.406	30,640.813	0.00E+00	6.79E-04	1.36E-03		
U-232	1.2037E-07	15,320.406	30,640.813	0.00E+00	1.84E-03	3.69E-03		
U-233	3.0011E-09	15,320.406	30,640.813	0.00E+00	4.60E-05	9.20E-05		
U-234	1.8497E-04	15,320.406	30,640.813	0.00E+00	2.83E+00	5.67E+00		
U-235	-2.7235E-06	15,320.406	0.000	8.12E-02	3.95E-02	8.12E-02	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.5493E-05	15,320.406	30,640.813	0.00E+00	2.37E-01	4.75E-01	3.24E+02	6.48E+02
U-238	-4.2851E-09	15,320.406	0.000	5.13E-02	5.13E-02	5.13E-02	Total	Total
Y-90	1.7094E+00	15,320.406	30,640.813	0.00E+00	2.62E+04	5.24E+04		
Other Radionuclides					2.64E+04	5.28E+04		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
BOL HM Constituents:	ALUM (6061)	ALUM	
BOL Enrichment %:	U-ALX	U	
	19.74999113	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:	15,320.406	30,640.813	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup
Bounding:	0.26	
	0.51	
		Estimated EOL HM/Given EOL HM
		1.01

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

²Total burnup for all fuel associated with this worksheet must be 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=100.85kg ; EOL=89.88kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1992
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 5.42

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
Radionuclide	Ci/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.0068E-09	10,390.697	20,781.394	0.00E+00	2.09E-05	4.17E-05	Avg. MeV	
Am-241	2.5251E-03	10,390.697	20,781.394	0.00E+00	2.62E+01	5.25E+01	0.0150	1.531E+15
Am-242m	3.9624E-07	10,390.697	20,781.394	0.00E+00	4.12E-03	8.23E-03	0.0250	3.178E+14
Am-243	1.4880E-06	10,390.697	20,781.394	0.00E+00	1.55E-02	3.09E-02	0.0375	2.763E+14
C-14	5.7053E-09	10,390.697	20,781.394	0.00E+00	5.93E-05	1.19E-04	0.0575	2.974E+14
Cl-36	1.3124E-32	10,390.697	20,781.394	0.00E+00	1.36E-28	2.73E-28	0.0850	1.792E+14
Cm-243	1.1419E-07	10,390.697	20,781.394	0.00E+00	1.19E-03	2.37E-03	0.1250	1.183E+14
Cm-244	1.6522E-05	10,390.697	20,781.394	0.00E+00	1.72E-01	3.43E-01	0.2250	1.547E+14
Co-60	7.4047E-07	10,390.697	20,781.394	0.00E+00	7.69E-03	1.54E-02	0.3750	6.728E+13
Cs-134	2.0455E-05	10,390.697	20,781.394	0.00E+00	2.13E-01	4.25E-01	0.5750	1.112E+15
Cs-135	3.4477E-06	10,390.697	20,781.394	0.00E+00	3.58E-02	7.16E-02	0.8500	1.358E+13
Cs-137	1.4365E+00	10,390.697	20,781.394	0.00E+00	1.49E+04	2.99E+04	1.2500	6.571E+12
Eu-154	7.3230E-03	10,390.697	20,781.394	0.00E+00	7.61E+01	1.52E+02	1.7500	3.699E+11
Eu-155	5.9259E-04	10,390.697	20,781.394	0.00E+00	6.16E+00	1.23E+01	2.2500	3.093E+07
Fe-55	2.2791E-06	10,390.697	20,781.394	0.00E+00	2.37E-02	4.74E-02	2.7500	2.951E+07
H-3	1.9698E-03	10,390.697	20,781.394	0.00E+00	2.05E+01	4.09E+01	3.5000	1.724E+04
I-129	7.5300E-07	10,390.697	20,781.394	0.00E+00	7.82E-03	1.56E-02	5.0000	7.045E+03
Kr-85	4.1176E-02	10,390.697	20,781.394	0.00E+00	4.28E+02	8.56E+02	7.0000	7.715E+02
Np-237	9.5752E-06	10,390.697	20,781.394	0.00E+00	9.95E-02	1.99E-01	11.0000	8.603E+01
Pa-231	3.9379E-09	10,390.697	20,781.394	0.00E+00	4.09E-05	8.18E-05		
Pb-210	3.3115E-10	10,390.697	20,781.394	0.00E+00	3.44E-06	6.88E-06		
Pm-147	9.2402E-04	10,390.697	20,781.394	0.00E+00	9.60E+00	1.92E+01		
Pu-238	1.6217E-02	10,390.697	20,781.394	0.00E+00	1.69E+02	3.37E+02		
Pu-239	4.2810E-04	10,390.697	20,781.394	0.00E+00	4.45E+00	8.90E+00		
Pu-240	2.4333E-04	10,390.697	20,781.394	0.00E+00	2.53E+00	5.06E+00		
Pu-241	1.6242E-02	10,390.697	20,781.394	0.00E+00	1.69E+02	3.38E+02		
Pu-242	3.6329E-07	10,390.697	20,781.394	0.00E+00	3.77E-03	7.55E-03		
Ra-226	9.0114E-10	10,390.697	20,781.394	0.00E+00	9.36E-06	1.87E-05		
Ra-228	3.1019E-14	10,390.697	20,781.394	0.00E+00	3.22E-10	6.45E-10		
Ru-106	2.1225E-10	10,390.697	20,781.394	0.00E+00	2.21E-06	4.41E-06		
Se-79	1.2930E-05	10,390.697	20,781.394	0.00E+00	1.34E-01	2.69E-01		
Sn-126	1.1571E-05	10,390.697	20,781.394	0.00E+00	1.20E-01	2.40E-01		
Sr-90	1.3472E+00	10,390.697	20,781.394	0.00E+00	1.40E+04	2.80E+04		
Tc-99	4.2239E-04	10,390.697	20,781.394	0.00E+00	4.39E+00	8.78E+00		
Th-229	1.2407E-11	10,390.697	20,781.394	0.00E+00	1.29E-07	2.58E-07		
Th-230	8.3497E-08	10,390.697	20,781.394	0.00E+00	8.68E-04	1.74E-03		
Th-232	3.8371E-14	10,390.697	20,781.394	0.00E+00	3.99E-10	7.97E-10		
Tl-208	4.0414E-08	10,390.697	20,781.394	0.00E+00	4.20E-04	8.40E-04		
U-232	1.0948E-07	10,390.697	20,781.394	0.00E+00	1.14E-03	2.28E-03		
U-233	3.6275E-09	10,390.697	20,781.394	0.00E+00	3.77E-05	7.54E-05		
U-234	1.8562E-04	10,390.697	20,781.394	0.00E+00	1.93E+00	3.86E+00		
U-235	-2.7235E-06	10,390.697	0.000	4.31E-02	1.48E-02	4.31E-02		
U-236	1.5493E-05	10,390.697	20,781.394	0.00E+00	1.61E-01	3.22E-01		
U-238	-4.2851E-09	10,390.697	0.000	2.72E-02	2.71E-02	2.72E-02		
Y-90	1.3475E+00	10,390.697	20,781.394	0.00E+00	1.40E+04	2.80E+04		
Other Radionuclides					1.42E+04	2.84E+04		

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			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	19.7909823	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		10,390.697	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		20,781.394	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.33		
Bounding:	0.65		

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

²Total burnup for all fuel associated with this worksheet must be 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) ¹Fuel decay start date: 2003
SNF ID #: 1005 **Estimates as of:** 2030
Fuel Units & Descr: 82 - 9 CURVED PLATES **Template:** ATR (Light Water, Num., 60 to 100%, U)
Heavy Metal Mass: BOL=34.67kg ; EOL=32.87kg ²Template Burnup(MWd): 367.2
ROD Storage Site: SRS **Template BOL Heavy Metal Mass (MT):** 0.00116689
Template Decay Time: 25 years

Estimated
 Canister usage:
 18"x10"
 3.42

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.1465E-09	1,708.423	3,416.846	0.00E+00	1.96E-06	3.92E-06	Avg. MeV	
Am-241	2.3056E-03	1,708.423	3,416.846	0.00E+00	3.94E+00	7.88E+00	0.0150	3.197E+14
Am-242m	4.1476E-07	1,708.423	3,416.846	0.00E+00	7.09E-04	1.42E-03	0.0250	6.642E+13
Am-243	1.4894E-06	1,708.423	3,416.846	0.00E+00	2.54E-03	5.09E-03	0.0375	5.785E+13
C-14	5.7108E-09	1,708.423	3,416.846	0.00E+00	9.76E-06	1.95E-05	0.0575	6.212E+13
Cl-36	1.3124E-32	1,708.423	3,416.846	0.00E+00	2.24E-29	4.48E-29	0.0850	3.748E+13
Cm-243	1.4562E-07	1,708.423	3,416.846	0.00E+00	2.49E-04	4.98E-04	0.1250	2.510E+13
Cm-244	2.4221E-05	1,708.423	3,416.846	0.00E+00	4.14E-02	8.28E-02	0.2250	3.236E+13
Co-60	2.7560E-06	1,708.423	3,416.846	0.00E+00	4.71E-03	9.42E-03	0.3750	1.407E+13
Cs-134	5.8851E-04	1,708.423	3,416.846	0.00E+00	1.01E+00	2.01E+00	0.5750	2.306E+14
Cs-135	3.4477E-06	1,708.423	3,416.846	0.00E+00	5.89E-03	1.18E-02	0.8500	3.323E+12
Cs-137	1.8099E+00	1,708.423	3,416.846	0.00E+00	3.09E+03	6.18E+03	1.2500	1.848E+12
Eu-154	1.6386E-02	1,708.423	3,416.846	0.00E+00	2.80E+01	5.60E+01	1.7500	9.132E+10
Eu-155	2.3957E-03	1,708.423	3,416.846	0.00E+00	4.09E+00	8.19E+00	2.2500	6.510E+06
Fe-55	3.2707E-05	1,708.423	3,416.846	0.00E+00	5.59E-02	1.12E-01	2.7500	5.328E+06
H-3	3.4504E-03	1,708.423	3,416.846	0.00E+00	5.89E+00	1.18E+01	3.5000	4.071E+03
I-129	7.5300E-07	1,708.423	3,416.846	0.00E+00	1.29E-03	2.57E-03	5.0000	1.373E+03
Kr-85	7.8540E-02	1,708.423	3,416.846	0.00E+00	1.34E+02	2.68E+02	7.0000	1.513E+02
Np-237	9.5615E-06	1,708.423	3,416.846	0.00E+00	1.63E-02	3.27E-02	11.0000	1.693E+01
Pa-231	2.7968E-09	1,708.423	3,416.846	0.00E+00	4.78E-06	9.56E-06		
Pb-210	1.2612E-10	1,708.423	3,416.846	0.00E+00	2.15E-07	4.31E-07		
Pm-147	1.2952E-02	1,708.423	3,416.846	0.00E+00	2.21E+01	4.43E+01		
Pu-238	1.7549E-02	1,708.423	3,416.846	0.00E+00	3.00E+01	6.00E+01		
Pu-239	4.2810E-04	1,708.423	3,416.846	0.00E+00	7.31E-01	1.46E+00		
Pu-240	2.4357E-04	1,708.423	3,416.846	0.00E+00	4.16E-01	8.32E-01		
Pu-241	2.6277E-02	1,708.423	3,416.846	0.00E+00	4.49E+01	8.98E+01		
Pu-242	3.6329E-07	1,708.423	3,416.846	0.00E+00	6.21E-04	1.24E-03		
Ra-226	4.4444E-10	1,708.423	3,416.846	0.00E+00	7.59E-07	1.52E-06		
Ra-228	1.9714E-14	1,708.423	3,416.846	0.00E+00	3.37E-11	6.74E-11		
Ru-106	2.0477E-07	1,708.423	3,416.846	0.00E+00	3.50E-04	7.00E-04		
Se-79	1.2933E-05	1,708.423	3,416.846	0.00E+00	2.21E-02	4.42E-02		
Sn-126	1.1574E-05	1,708.423	3,416.846	0.00E+00	1.98E-02	3.95E-02		
Sr-90	1.7092E+00	1,708.423	3,416.846	0.00E+00	2.92E+03	5.84E+03		
Tc-99	4.2239E-04	1,708.423	3,416.846	0.00E+00	7.22E-01	1.44E+00		
Th-229	7.7260E-12	1,708.423	3,416.846	0.00E+00	1.32E-08	2.64E-08		
Th-230	5.8497E-08	1,708.423	3,416.846	0.00E+00	9.99E-05	2.00E-04		
Th-232	2.6906E-14	1,708.423	3,416.846	0.00E+00	4.60E-11	9.19E-11		
Ti-208	4.4336E-08	1,708.423	3,416.846	0.00E+00	7.57E-05	1.51E-04		
U-232	1.2037E-07	1,708.423	3,416.846	0.00E+00	2.06E-04	4.11E-04		
U-233	3.0011E-09	1,708.423	3,416.846	0.00E+00	5.13E-06	1.03E-05		
U-234	1.8497E-04	1,708.423	3,416.846	0.00E+00	3.16E-01	6.32E-01		
U-235	-2.7235E-06	1,708.423	0.000	1.48E-02	1.01E-02	1.48E-02		
U-236	1.5493E-05	1,708.423	3,416.846	0.00E+00	2.65E-02	5.29E-02		
U-238	-4.2851E-09	1,708.423	0.000	9.35E-03	9.34E-03	9.35E-03		
Y-90	1.7094E+00	1,708.423	3,416.846	0.00E+00	2.92E+03	5.84E+03		
Other Radionuclides					2.94E+03	5.89E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.61E+01	7.23E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	19.74999113	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		1,708.423	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		3,416.846	

Checks			
	Burnup Multiplier	Estimated Burnup/ Given Burnup	Estimated EOL HM/ Given EOL HM
Nominal:	0.16		
Bounding:	0.31		

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 279
 Fuel Units & Descr: 44 - 22 FLAT PLATES
 Heavy Metal Mass: BOL=7.92kg ; EOL=6.86kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1966
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 50 years

Estimated
 Canister usage:
 18"x10"
 1.83

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.9739E-09	1,012.553	2,025.106	0.00E+00	3.01E-06	6.02E-06	Avg. MeV	
Am-241	2.5986E-03	1,012.553	2,025.106	0.00E+00	2.63E+00	5.26E+00	0.0150	1.043E+14
Am-242m	3.7010E-07	1,012.553	2,025.106	0.00E+00	3.75E-04	7.49E-04	0.0250	2.166E+13
Am-243	1.4858E-06	1,012.553	2,025.106	0.00E+00	1.50E-03	3.01E-03	0.0375	1.882E+13
C-14	5.6944E-09	1,012.553	2,025.106	0.00E+00	5.77E-06	1.15E-05	0.0575	2.027E+13
Cl-36	1.3124E-32	1,012.553	2,025.106	0.00E+00	1.33E-29	2.66E-29	0.0850	1.220E+13
Cm-243	7.9303E-08	1,012.553	2,025.106	0.00E+00	8.03E-05	1.61E-04	0.1250	7.973E+12
Cm-244	9.3083E-06	1,012.553	2,025.106	0.00E+00	9.43E-03	1.89E-02	0.2250	1.053E+13
Co-60	1.0310E-07	1,012.553	2,025.106	0.00E+00	1.04E-04	2.09E-04	0.3750	4.585E+12
Cs-134	1.3254E-07	1,012.553	2,025.106	0.00E+00	1.34E-04	2.68E-04	0.5750	7.661E+13
Cs-135	3.4477E-06	1,012.553	2,025.106	0.00E+00	3.49E-03	6.98E-03	0.8500	8.207E+11
Cs-137	1.0161E+00	1,012.553	2,025.106	0.00E+00	1.03E+03	2.06E+03	1.2500	3.319E+11
Eu-154	2.1879E-03	1,012.553	2,025.106	0.00E+00	2.22E+00	4.43E+00	1.7500	2.175E+10
Eu-155	7.2930E-05	1,012.553	2,025.106	0.00E+00	7.38E-02	1.48E-01	2.2500	2.109E+06
Fe-55	4.1912E-08	1,012.553	2,025.106	0.00E+00	4.24E-05	8.49E-05	2.7500	2.490E+06
H-3	8.4913E-04	1,012.553	2,025.106	0.00E+00	8.60E-01	1.72E+00	3.5000	1.367E+03
I-129	7.5300E-07	1,012.553	2,025.106	0.00E+00	7.62E-04	1.52E-03	5.0000	5.556E+02
Kr-85	1.5615E-02	1,012.553	2,025.106	0.00E+00	1.58E+01	3.16E+01	7.0000	6.043E+01
Np-237	9.5861E-06	1,012.553	2,025.106	0.00E+00	9.71E-03	1.94E-02	11.0000	6.712E+00
Pa-231	5.0790E-09	1,012.553	2,025.106	0.00E+00	5.14E-06	1.03E-05		
Pb-210	6.6176E-10	1,012.553	2,025.106	0.00E+00	6.70E-07	1.34E-06		
Pm-147	1.7606E-05	1,012.553	2,025.106	0.00E+00	1.78E-02	3.57E-02		
Pu-238	1.4406E-02	1,012.553	2,025.106	0.00E+00	1.46E+01	2.92E+01		
Pu-239	4.2783E-04	1,012.553	2,025.106	0.00E+00	4.33E-01	8.66E-01		
Pu-240	2.4297E-04	1,012.553	2,025.106	0.00E+00	2.46E-01	4.92E-01		
Pu-241	7.8949E-03	1,012.553	2,025.106	0.00E+00	7.99E+00	1.60E+01		
Pu-242	3.6329E-07	1,012.553	2,025.106	0.00E+00	3.68E-04	7.36E-04		
Ra-226	1.5169E-09	1,012.553	2,025.106	0.00E+00	1.54E-06	3.07E-06		
Ra-228	4.2429E-14	1,012.553	2,025.106	0.00E+00	4.30E-11	8.59E-11		
Ru-106	7.0833E-15	1,012.553	2,025.106	0.00E+00	7.17E-12	1.43E-11		
Se-79	1.2928E-05	1,012.553	2,025.106	0.00E+00	1.31E-02	2.62E-02		
Sn-126	1.1571E-05	1,012.553	2,025.106	0.00E+00	1.17E-02	2.34E-02		
Sr-90	9.4308E-01	1,012.553	2,025.106	0.00E+00	9.55E+02	1.91E+03		
Tc-99	4.2239E-04	1,012.553	2,025.106	0.00E+00	4.28E-01	8.55E-01		
Th-229	1.7968E-11	1,012.553	2,025.106	0.00E+00	1.82E-08	3.64E-08		
Th-230	1.0855E-07	1,012.553	2,025.106	0.00E+00	1.10E-04	2.20E-04		
Th-232	4.9809E-14	1,012.553	2,025.106	0.00E+00	5.04E-11	1.01E-10		
Tl-208	3.4995E-08	1,012.553	2,025.106	0.00E+00	3.54E-05	7.09E-05		
U-232	9.4798E-08	1,012.553	2,025.106	0.00E+00	9.60E-05	1.92E-04		
U-233	4.2538E-09	1,012.553	2,025.106	0.00E+00	4.31E-06	8.61E-06		
U-234	1.8617E-04	1,012.553	2,025.106	0.00E+00	1.89E-01	3.77E-01		
U-235	-2.7235E-06	1,012.553	0.000	1.59E-02	1.32E-02	1.59E-02		
U-236	1.5493E-05	1,012.553	2,025.106	0.00E+00	1.57E-02	3.14E-02		
U-238	-4.2851E-09	1,012.553	0.000	1.88E-04	1.84E-04	1.88E-04		
Y-90	9.4308E-01	1,012.553	2,025.106	0.00E+00	9.55E+02	1.91E+03		
Other Radionuclides					9.82E+02	1.96E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.20E+01	2.40E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U-ALX	U	
BOL Enrichment %:	92.93756073	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	230.236	1,012.553	Nominal burnup calculated from the heavy metal mass destroyed.
Bounding:	280.841	2,025.106	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	
Bounding:	0.81	7.21	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

SNF Name: UNIV OF VIRGINIA
 SNF ID #: 952
 Fuel Units & Descr: 20 - 22 FLAT PLATES
 Heavy Metal Mass: BOL=24.31kg ; EOL=23.96kg
 ROD Storage Site: SRS

¹Fuel decay start date: 1963
 Estimates as of: 2000
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116649
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.83

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	2.0068E-09	327.669	655.337	0.00E+00	6.58E-07	1.32E-06		
Am-241	2.5251E-03	327.669	655.337	0.00E+00	8.27E-01	1.65E+00	0.0150	4.827E+13
Am-242m	3.9624E-07	327.669	655.337	0.00E+00	1.30E-04	2.60E-04	0.0250	1.002E+13
Am-243	1.4880E-06	327.669	655.337	0.00E+00	4.88E-04	9.75E-04	0.0375	8.712E+12
C-14	5.7053E-09	327.669	655.337	0.00E+00	1.87E-06	3.74E-06	0.0575	9.377E+12
Cl-36	1.3124E-32	327.669	655.337	0.00E+00	4.30E-30	8.60E-30	0.0850	5.650E+12
Cm-243	1.1419E-07	327.669	655.337	0.00E+00	3.74E-05	7.48E-05	0.1250	3.732E+12
Cm-244	1.6522E-05	327.669	655.337	0.00E+00	5.41E-03	1.08E-02	0.2250	4.878E+12
Co-60	7.4047E-07	327.669	655.337	0.00E+00	2.43E-04	4.85E-04	0.3750	2.122E+12
Cs-134	2.0455E-05	327.669	655.337	0.00E+00	6.70E-03	1.34E-02	0.5750	3.507E+13
Cs-135	3.4477E-06	327.669	655.337	0.00E+00	1.13E-03	2.26E-03	0.8500	4.284E+11
Cs-137	1.4365E+00	327.669	655.337	0.00E+00	4.71E+02	9.41E+02	1.2500	2.072E+11
Eu-154	7.3230E-03	327.669	655.337	0.00E+00	2.40E+00	4.80E+00	1.7500	1.166E+10
Eu-155	5.9259E-04	327.669	655.337	0.00E+00	1.94E-01	3.88E-01	2.2500	9.754E+05
Fe-55	2.2791E-06	327.669	655.337	0.00E+00	7.47E-04	1.49E-03	2.7500	9.305E+05
H-3	1.9698E-03	327.669	655.337	0.00E+00	6.45E-01	1.29E+00	3.5000	5.742E+02
I-129	7.5300E-07	327.669	655.337	0.00E+00	2.47E-04	4.93E-04	5.0000	2.353E+02
Kr-85	4.1176E-02	327.669	655.337	0.00E+00	1.35E+01	2.70E+01	7.0000	2.584E+01
Np-237	9.5752E-06	327.669	655.337	0.00E+00	3.14E-03	6.27E-03	11.0000	2.887E+00
Pa-231	3.9379E-09	327.669	655.337	0.00E+00	1.29E-06	2.58E-06		
Pb-210	3.3115E-10	327.669	655.337	0.00E+00	1.09E-07	2.17E-07		
Pm-147	9.2402E-04	327.669	655.337	0.00E+00	3.03E-01	6.06E-01		
Pu-238	1.6217E-02	327.669	655.337	0.00E+00	5.31E+00	1.06E+01		
Pu-239	4.2810E-04	327.669	655.337	0.00E+00	1.40E-01	2.81E-01		
Pu-240	2.4333E-04	327.669	655.337	0.00E+00	7.97E-02	1.59E-01		
Pu-241	1.6242E-02	327.669	655.337	0.00E+00	5.32E+00	1.06E+01		
Pu-242	3.6329E-07	327.669	655.337	0.00E+00	1.19E-04	2.38E-04		
Ra-226	9.0114E-10	327.669	655.337	0.00E+00	2.95E-07	5.91E-07		
Ra-228	3.1019E-14	327.669	655.337	0.00E+00	1.02E-11	2.03E-11		
Ru-106	2.1225E-10	327.669	655.337	0.00E+00	6.95E-08	1.39E-07		
Se-79	1.2930E-05	327.669	655.337	0.00E+00	4.24E-03	8.47E-03		
Sn-126	1.1571E-05	327.669	655.337	0.00E+00	3.79E-03	7.58E-03		
Sr-90	1.3472E+00	327.669	655.337	0.00E+00	4.41E+02	8.83E+02		
Tc-99	4.2239E-04	327.669	655.337	0.00E+00	1.38E-01	2.77E-01		
Th-229	1.2407E-11	327.669	655.337	0.00E+00	4.07E-09	8.13E-09		
Th-230	8.3497E-08	327.669	655.337	0.00E+00	2.74E-05	5.47E-05		
Th-232	3.8371E-14	327.669	655.337	0.00E+00	1.26E-11	2.51E-11		
Tl-208	4.0414E-08	327.669	655.337	0.00E+00	1.32E-05	2.65E-05		
U-232	1.0948E-07	327.669	655.337	0.00E+00	3.59E-05	7.17E-05		
U-233	3.6275E-09	327.669	655.337	0.00E+00	1.19E-06	2.38E-06		
U-234	1.8562E-04	327.669	655.337	0.00E+00	6.08E-02	1.22E-01		
U-235	2.7235E-06	327.669	0.000	1.04E-02	9.50E-03	1.04E-02		
U-236	1.5493E-05	327.669	655.337	0.00E+00	5.08E-03	1.02E-02		
U-238	4.2851E-09	327.669	0.000	6.55E-03	6.55E-03	6.55E-03		
Y-90	1.3475E+00	327.669	655.337	0.00E+00	4.42E+02	8.83E+02		
Other Radionuclides					4.48E+02	8.97E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
5.48E+00	1.10E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD: LIGHT WATER	Used: LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
Fuel Cladding:	ALUM (6061)	ALUM	
BOL HM Constituents:	U3Si2	U	
BOL Enrichment %:	19.77478682	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD: 327.669	Estimated: 327.669	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		655.337	

Checks		
Nominal:	Burnup Multiplier: 0.04	Estimated Burnup/Given Burnup: 1.00
Bounding:	0.09	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: US/UK FUEL PINS
 SNF ID #: 356
 Fuel Units & Descr: 66 · ROD
 Heavy Metal Mass: BOL= ; EOL=8.04kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1994
 Estimates as of: 2030
 Template: (Worst Case)
²Template Burnup(MWd): 62.5
 Template BOL Heavy Metal Mass (MT): 0.00186865
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18"x10"
 0.51

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.3072E-06	7,639.694	7,639.694	0.00E+00	1.76E-02	1.76E-02	Avg. MeV	
Am-241	8.4448E+00	7,639.694	7,639.694	0.00E+00	6.45E+04	6.45E+04	0.0150	9.362E+15
Am-242m	1.6848E-02	7,639.694	7,639.694	0.00E+00	1.29E+02	1.29E+02	0.0250	1.863E+15
Am-243	1.6320E-02	7,639.694	7,639.694	0.00E+00	1.25E+02	1.25E+02	0.0375	1.627E+15
C-14	1.2090E-01	7,639.694	7,639.694	0.00E+00	9.24E+02	9.24E+02	0.0575	2.560E+15
Cl-36	2.2849E-03	7,639.694	7,639.694	0.00E+00	1.75E+01	1.75E+01	0.0850	9.994E+14
Cm-243	8.6624E-04	7,639.694	7,639.694	0.00E+00	6.62E+00	6.62E+00	0.1250	7.833E+14
Cm-244	1.6848E-01	7,639.694	7,639.694	0.00E+00	1.29E+03	1.29E+03	0.2250	8.658E+14
Co-60	2.8086E+01	7,639.694	7,639.694	0.00E+00	2.15E+05	2.15E+05	0.3750	3.703E+14
Cs-134	3.4148E-04	7,639.694	7,639.694	0.00E+00	2.61E+00	2.61E+00	0.5750	6.022E+15
Cs-135	4.3976E-04	7,639.694	7,639.694	0.00E+00	3.36E+00	3.36E+00	0.8500	2.301E+14
Cs-137	2.1049E+01	7,639.694	7,639.694	0.00E+00	1.61E+05	1.61E+05	1.2500	1.609E+16
Eu-154	1.2500E+00	7,639.694	7,639.694	0.00E+00	9.55E+03	9.55E+03	1.7500	7.116E+12
Eu-155	6.8986E-02	7,639.694	7,639.694	0.00E+00	5.27E+02	5.27E+02	2.2500	8.436E+10
Fe-55	2.9308E-01	7,639.694	7,639.694	0.00E+00	2.24E+03	2.24E+03	2.7500	2.377E+10
H-3	2.4311E-01	7,639.694	7,639.694	0.00E+00	1.86E+03	1.86E+03	3.5000	1.903E+07
I-129	1.0618E-05	7,639.694	7,639.694	0.00E+00	8.11E-02	8.11E-02	5.0000	8.080E+06
Kr-85	5.9882E-01	7,639.694	7,639.694	0.00E+00	4.57E+03	4.57E+03	7.0000	9.253E+05
Np-237	1.5668E-04	7,639.694	7,639.694	0.00E+00	1.20E+00	1.20E+00	11.0000	1.059E+05
Pa-231	2.8656E-06	7,639.694	7,639.694	0.00E+00	2.19E-02	2.19E-02		
Pb-210	2.3918E-08	7,639.694	7,639.694	0.00E+00	1.83E-04	1.83E-04		
Pm-147	1.6900E-02	7,639.694	7,639.694	0.00E+00	1.29E+02	1.29E+02		
Pu-238	-8.6123E-01	7,639.694	0.000	2.07E+03	0.00E+00	2.07E+03		
Pu-239	-4.8440E-02	7,639.694	0.000	2.50E+02	0.00E+00	2.50E+02		
Pu-240	-3.0095E-01	7,639.694	0.000	3.19E+02	0.00E+00	3.19E+02		
Pu-241	-1.0411E+02	7,639.694	0.000	8.22E+04	0.00E+00	8.22E+04		
Pu-242	-1.1381E-04	7,639.694	0.000	1.38E+00	5.12E-01	1.38E+00		
Ra-226	6.4400E-08	7,639.694	7,639.694	0.00E+00	4.92E-04	4.92E-04		
Ra-228	5.9952E-07	7,639.694	7,639.694	0.00E+00	4.58E-03	4.58E-03		
Ru-106	8.5526E-07	7,639.694	7,639.694	0.00E+00	6.53E-03	6.53E-03		
Se-79	1.9181E-04	7,639.694	7,639.694	0.00E+00	1.47E+00	1.47E+00		
Sn-126	1.6671E-04	7,639.694	7,639.694	0.00E+00	1.27E+00	1.27E+00		
Sr-90	1.9799E+01	7,639.694	7,639.694	0.00E+00	1.51E+05	1.51E+05		
Tc-99	6.7678E-03	7,639.694	7,639.694	0.00E+00	5.17E+01	5.17E+01		
Th-229	1.7488E-06	7,639.694	7,639.694	0.00E+00	1.34E-02	1.34E-02		
Th-230	5.8704E-06	7,639.694	7,639.694	0.00E+00	4.48E-02	4.48E-02		
Th-232	6.0208E-07	7,639.694	7,639.694	0.00E+00	4.60E-03	4.60E-03		
Ti-208	8.7573E-05	7,639.694	7,639.694	0.00E+00	6.69E-01	6.69E-01		
U-232	2.3706E-04	7,639.694	7,639.694	0.00E+00	1.81E+00	1.81E+00		
U-233	3.6128E-04	7,639.694	7,639.694	0.00E+00	2.76E+00	2.76E+00		
U-234	1.2788E-02	7,639.694	7,639.694	0.00E+00	9.77E+01	9.77E+01		
U-235	5.7486E-04	7,639.694	7,639.694	6.92E-03	4.40E+00	4.40E+00		
U-236	2.3485E-04	7,639.694	7,639.694	0.00E+00	1.79E+00	1.79E+00		
U-238	1.1581E-04	7,639.694	7,639.694	8.61E-04	8.86E-01	8.86E-01		
Y-90	1.9804E+01	7,639.694	7,639.694	0.00E+00	1.51E+05	1.51E+05		
Other Radionuclides					4.71E+05	4.71E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.53E+03	7.62E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
	GRAPHITE	(Worst Case)	This Template was used for the following reasons: This fuel didn't closely match any existing templates, therefore the worst case template was used.
Fuel Cladding:	SST (316)	SST/Inconel	
BOL HM Constituents:	PuO2-UO2	U, Th, & Pu	
BOL Enrichment %:		0 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		7,639.694	Nominal burnup set equal to bounding burnup. Bounding burnup estimated by assuming BOL heavy metal mass was twice EOL.
Bounding:		7,639.694	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	14.21		591.64
Bounding:	14.21		

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 855
 Fuel Units & Descr: 7 - ROD
 Heavy Metal Mass: BOL=6.58kg ; EOL=4.04kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1962
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.62
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.19

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.2581E-09	2,413.708	4,827.416	0.00E+00	3.04E-06	6.07E-06	Avg. MeV	
Am-241	1.4761E-01	2,413.708	4,827.416	0.00E+00	3.56E+02	7.13E+02	0.0150	1.307E+14
Am-242m	2.5032E-04	2,413.708	4,827.416	0.00E+00	6.04E-01	1.21E+00	0.0250	2.596E+13
Am-243	6.2387E-04	2,413.708	4,827.416	0.00E+00	1.51E+00	3.01E+00	0.0375	2.427E+13
C-14	4.7739E-05	2,413.708	4,827.416	0.00E+00	1.15E-01	2.30E-01	0.0575	3.330E+13
Cl-36	8.0297E-07	2,413.708	4,827.416	0.00E+00	1.94E-03	3.88E-03	0.0850	1.421E+13
Cm-243	1.2099E-04	2,413.708	4,827.416	0.00E+00	2.92E-01	5.84E-01	0.1250	9.266E+12
Cm-244	1.5560E-02	2,413.708	4,827.416	0.00E+00	3.76E+01	7.51E+01	0.2250	1.208E+13
Co-60	4.9580E-05	2,413.708	4,827.416	0.00E+00	1.20E-01	2.39E-01	0.3750	5.228E+12
Cs-134	1.7022E-09	2,413.708	4,827.416	0.00E+00	4.11E-06	8.22E-06	0.5750	1.245E+14
Cs-135	1.4433E-05	2,413.708	4,827.416	0.00E+00	3.48E-02	6.97E-02	0.8500	9.977E+11
Cs-137	6.9929E-01	2,413.708	4,827.416	0.00E+00	1.69E+03	3.38E+03	1.2500	4.665E+11
Eu-154	1.8023E-03	2,413.708	4,827.416	0.00E+00	4.35E+00	8.70E+00	1.7500	2.684E+10
Eu-155	2.6793E-05	2,413.708	4,827.416	0.00E+00	6.47E-02	1.29E-01	2.2500	4.727E+06
Fe-55	1.4580E-08	2,413.708	4,827.416	0.00E+00	3.52E-05	7.04E-05	2.7500	2.351E+07
H-3	3.8566E-03	2,413.708	4,827.416	0.00E+00	9.31E+00	1.86E+01	3.5000	1.167E+06
I-129	9.8288E-07	2,413.708	4,827.416	0.00E+00	2.37E-03	4.74E-03	5.0000	4.983E+05
Kr-85	4.0617E-03	2,413.708	4,827.416	0.00E+00	9.80E+00	1.96E+01	7.0000	5.735E+04
Np-237	1.2645E-05	2,413.708	4,827.416	0.00E+00	3.05E-02	6.10E-02	11.0000	6.583E+03
Pa-231	1.6376E-09	2,413.708	4,827.416	0.00E+00	3.95E-06	7.91E-06		
Pb-210	2.8795E-10	2,413.708	4,827.416	0.00E+00	6.95E-07	1.39E-06		
Pm-147	1.3264E-07	2,413.708	4,827.416	0.00E+00	3.20E-04	6.40E-04		
Pu-238	5.8882E-02	2,413.708	4,827.416	0.00E+00	1.42E+02	2.84E+02		
Pu-239	1.1613E-02	2,413.708	4,827.416	0.00E+00	2.80E+01	5.61E+01		
Pu-240	1.5142E-02	2,413.708	4,827.416	0.00E+00	3.65E+01	7.31E+01		
Pu-241	2.1269E-01	2,413.708	4,827.416	0.00E+00	5.13E+02	1.03E+03		
Pu-242	6.4260E-05	2,413.708	4,827.416	0.00E+00	1.55E-01	3.10E-01		
Ra-226	5.8689E-10	2,413.708	4,827.416	0.00E+00	1.42E-06	2.83E-06		
Ra-228	5.3036E-12	2,413.708	4,827.416	0.00E+00	1.28E-08	2.56E-08		
Ru-106	6.8136E-19	2,413.708	4,827.416	0.00E+00	1.64E-15	3.29E-15		
Se-79	1.2372E-05	2,413.708	4,827.416	0.00E+00	2.99E-02	5.97E-02		
Sn-126	2.5194E-05	2,413.708	4,827.416	0.00E+00	6.08E-02	1.22E-01		
Sr-90	4.4913E-01	2,413.708	4,827.416	0.00E+00	1.08E+03	2.17E+03		
Tc-99	3.9357E-04	2,413.708	4,827.416	0.00E+00	9.50E-01	1.90E+00		
Th-229	1.9331E-10	2,413.708	4,827.416	0.00E+00	4.67E-07	9.33E-07		
Th-230	3.5223E-08	2,413.708	4,827.416	0.00E+00	8.50E-05	1.70E-04		
Th-232	5.3085E-12	2,413.708	4,827.416	0.00E+00	1.28E-08	2.56E-08		
Ti-208	1.3102E-07	2,413.708	4,827.416	0.00E+00	3.16E-04	6.33E-04		
U-232	3.5497E-07	2,413.708	4,827.416	0.00E+00	8.57E-04	1.71E-03		
U-233	2.6647E-08	2,413.708	4,827.416	0.00E+00	6.43E-05	1.29E-04		
U-234	5.5023E-05	2,413.708	4,827.416	0.00E+00	1.33E-01	2.66E-01		
U-235	-1.4485E-06	2,413.708	0.000	3.29E-03	0.00E+00	3.29E-03		
U-236	7.5969E-06	2,413.708	4,827.416	0.00E+00	1.83E-02	3.67E-02		
U-238	-2.6129E-07	2,413.708	0.000	1.70E-03	1.07E-03	1.70E-03		
Y-90	4.4913E-01	2,413.708	4,827.416	0.00E+00	1.08E+03	2.17E+03		
Other Radionuclides					1.63E+03	3.27E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.54E+01	7.08E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	ZIRC-2	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	23.16820093	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
		2,413.708	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		4,827.416	

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup
	10.48	
Bounding:	20.97	
		Estimated EOL HM/ Given EOL HM
		1.03

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VBWR (GENEVA)
 SNF ID #: 285
 Fuel Units & Descr: 4 - CANISTER OF SCRAP
 Heavy Metal Mass: BOL=12.54kg ; EOL=12.39kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1961
 Estimates as of: 2030
 Template: Pathfinder (Light Water, SST, 60 to 100%, U)
²Template Burnup(MWd): 6.01
 Template BOL Heavy Metal Mass (MT): 0.00012882
 Template Decay Time: 65 years

Estimated
 Canister usage:
 18"x10"
 0.31

Radionuclide	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
	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)	Avg. MeV	
Ac-227	4.5940E-08	135.651	271.303	0.00E+00	6.23E-06	1.25E-05	0.0150	9.903E+12
Am-241	1.1471E-04	135.651	271.303	0.00E+00	1.56E-02	3.11E-02	0.0250	2.057E+12
Am-242m	7.4210E-09	135.651	271.303	0.00E+00	1.01E-06	2.01E-06	0.0375	1.788E+12
Am-243	9.8236E-10	135.651	271.303	0.00E+00	1.33E-07	2.67E-07	0.0575	1.919E+12
C-14	2.2928E-04	135.651	271.303	0.00E+00	3.11E-02	6.22E-02	0.0850	1.159E+12
Cl-36	1.2260E-06	135.651	271.303	0.00E+00	1.66E-04	3.33E-04	0.1250	7.514E+11
Cm-243	1.2000E-10	135.651	271.303	0.00E+00	1.63E-08	3.26E-08	0.2250	9.989E+11
Cm-244	7.3577E-10	135.651	271.303	0.00E+00	9.98E-08	2.00E-07	0.3750	4.356E+11
Co-60	1.3732E-03	135.651	271.303	0.00E+00	1.86E-01	3.73E-01	0.5750	7.328E+12
Cs-134	1.2709E-10	135.651	271.303	0.00E+00	1.72E-08	3.45E-08	0.8500	7.117E+10
Cs-135	3.0316E-05	135.651	271.303	0.00E+00	4.11E-03	8.22E-03	1.2500	5.151E+10
Cs-137	7.2579E-01	135.651	271.303	0.00E+00	9.85E+01	1.97E+02	1.7500	1.831E+09
Eu-154	5.9750E-05	135.651	271.303	0.00E+00	8.11E-03	1.62E-02	2.2500	3.463E+05
Eu-155	1.0577E-05	135.651	271.303	0.00E+00	1.43E-03	2.87E-03	2.7500	1.551E+05
Fe-55	4.1631E-07	135.651	271.303	0.00E+00	5.65E-05	1.13E-04	3.5000	3.325E+01
H-3	4.6722E-04	135.651	271.303	0.00E+00	6.34E-02	1.27E-01	5.0000	1.402E+01
I-129	7.3195E-07	135.651	271.303	0.00E+00	9.93E-05	1.99E-04	7.0000	1.584E+00
Kr-85	5.9418E-03	135.651	271.303	0.00E+00	8.06E-01	1.61E+00	11.0000	1.802E-01
Np-237	1.1499E-06	135.651	271.303	0.00E+00	1.56E-04	3.12E-04		
Pa-231	7.0899E-08	135.651	271.303	0.00E+00	9.62E-06	1.92E-05		
Pb-210	2.2363E-12	135.651	271.303	0.00E+00	3.03E-10	6.07E-10		
Pm-147	4.2296E-07	135.651	271.303	0.00E+00	5.74E-05	1.15E-04		
Pu-238	2.3295E-04	135.651	271.303	0.00E+00	3.16E-02	6.32E-02		
Pu-239	6.6722E-04	135.651	271.303	0.00E+00	9.05E-02	1.81E-01		
Pu-240	8.6556E-05	135.651	271.303	0.00E+00	1.17E-02	2.35E-02		
Pu-241	1.6889E-04	135.651	271.303	0.00E+00	2.29E-02	4.58E-02		
Pu-242	1.9717E-09	135.651	271.303	0.00E+00	2.67E-07	5.35E-07		
Ra-226	4.5740E-12	135.651	271.303	0.00E+00	6.20E-10	1.24E-09		
Ra-228	8.3511E-12	135.651	271.303	0.00E+00	1.13E-09	2.27E-09		
Ru-106	2.0516E-19	135.651	271.303	0.00E+00	2.78E-17	5.57E-17		
Se-79	1.3220E-05	135.651	271.303	0.00E+00	1.79E-03	3.59E-03		
Sn-126	1.1489E-05	135.651	271.303	0.00E+00	1.56E-03	3.12E-03		
Sr-90	6.6872E-01	135.651	271.303	0.00E+00	9.07E+01	1.81E+02		
Tc-99	4.6639E-04	135.651	271.303	0.00E+00	6.33E-02	1.27E-01		
Th-229	2.3727E-11	135.651	271.303	0.00E+00	3.22E-09	6.44E-09		
Th-230	2.7354E-10	135.651	271.303	0.00E+00	3.71E-08	7.42E-08		
Th-232	8.3594E-12	135.651	271.303	0.00E+00	1.13E-09	2.27E-09		
Ti-208	1.6228E-08	135.651	271.303	0.00E+00	2.20E-06	4.40E-06		
U-232	4.3960E-08	135.651	271.303	0.00E+00	5.96E-06	1.19E-05		
U-233	3.3344E-09	135.651	271.303	0.00E+00	4.52E-07	9.05E-07		
U-234	4.0749E-07	135.651	271.303	0.00E+00	5.53E-05	1.11E-04		
U-235	-2.7761E-06	135.651	0.000	5.99E-03	5.62E-03	5.99E-03		
U-236	1.6190E-05	135.651	271.303	0.00E+00	2.20E-03	4.39E-03		
U-238	-2.8547E-09	135.651	0.000	3.28E-03	3.28E-03	3.28E-03		
Y-90	6.6889E-01	135.651	271.303	0.00E+00	9.07E+01	1.81E+02		
Other Radionuclides					1.23E+02	2.46E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.10E+00	2.21E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches on all parameters except enrichment.
Fuel Cladding:	SST (304)	SST	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	22.12897667	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:		135.651	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:		271.303	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.23		1.00
Bounding:	0.46		

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VEPCO
 SNF ID #: 286
 Fuel Units & Descr: 20 - 15 X 15 ROD ARRAY
 Heavy Metal Mass: BOL=9148.29kg ; EOL=8832.18kg
 ROD Storage Sits: INEEL

¹Fuel decay start date: 1983
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc. 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 35 years

Estimated
 Canister usage:
 PWR
 1.00

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.7758E-10	300,603.756	601,207.512	0.00E+00	2.64E-04	5.28E-04	Avg. MeV	
Am-241	1.4352E-01	300,603.756	601,207.512	0.00E+00	4.31E+04	8.63E+04	0.0150	3.235E+16
Am-242m	2.8698E-04	300,603.756	601,207.512	0.00E+00	8.63E+01	1.73E+02	0.0250	6.523E+15
Am-243	6.2565E-04	300,603.756	601,207.512	0.00E+00	1.88E+02	3.76E+02	0.0375	6.222E+15
C-14	4.7901E-05	300,603.756	601,207.512	0.00E+00	1.44E+01	2.88E+01	0.0575	7.188E+15
Cl-36	8.0297E-07	300,603.756	601,207.512	0.00E+00	2.41E-01	4.83E-01	0.0850	3.620E+15
Cm-243	2.5081E-04	300,603.756	601,207.512	0.00E+00	7.54E+01	1.51E+02	0.1250	2.512E+15
Cm-244	4.9015E-02	300,603.756	601,207.512	0.00E+00	1.47E+04	2.95E+04	0.2250	3.104E+15
Co-60	2.5581E-03	300,603.756	601,207.512	0.00E+00	7.69E+02	1.54E+03	0.3750	1.335E+15
Cs-134	4.0536E-05	300,603.756	601,207.512	0.00E+00	1.22E+01	2.44E+01	0.5750	3.104E+16
Cs-135	1.4433E-05	300,603.756	601,207.512	0.00E+00	4.34E+00	8.68E+00	0.8500	4.294E+14
Cs-137	1.3979E+00	300,603.756	601,207.512	0.00E+00	4.20E+05	8.40E+05	1.2500	4.218E+14
Eu-154	2.0203E-02	300,603.756	601,207.512	0.00E+00	6.07E+03	1.21E+04	1.7500	1.263E+13
Eu-155	1.7684E-03	300,603.756	601,207.512	0.00E+00	5.32E+02	1.06E+03	2.2500	2.034E+09
Fe-55	4.3136E-05	300,603.756	601,207.512	0.00E+00	1.30E+01	2.59E+01	2.7500	4.167E+09
H-3	2.0769E-02	300,603.756	601,207.512	0.00E+00	6.24E+03	1.25E+04	3.5000	4.292E+08
I-129	9.8288E-07	300,603.756	601,207.512	0.00E+00	2.95E-01	5.91E-01	5.0000	1.835E+08
Kr-85	2.8214E-02	300,603.756	601,207.512	0.00E+00	8.48E+03	1.70E+04	7.0000	2.115E+07
Np-237	1.1218E-05	300,603.756	601,207.512	0.00E+00	3.37E+00	6.74E+00	11.0000	2.429E+06
Pa-231	1.3036E-09	300,603.756	601,207.512	0.00E+00	3.92E-04	7.84E-04		
Pb-210	8.5078E-11	300,603.756	601,207.512	0.00E+00	2.56E-05	5.11E-05		
Pm-147	3.6531E-04	300,603.756	601,207.512	0.00E+00	1.10E+02	2.20E+02		
Pu-238	7.4564E-02	300,603.756	601,207.512	0.00E+00	2.24E+04	4.48E+04		
Pu-239	1.1623E-02	300,603.756	601,207.512	0.00E+00	3.49E+03	6.99E+03		
Pu-240	1.5132E-02	300,603.756	601,207.512	0.00E+00	4.55E+03	9.10E+03		
Pu-241	9.0036E-01	300,603.756	601,207.512	0.00E+00	2.71E+05	5.41E+05		
Pu-242	6.4260E-05	300,603.756	601,207.512	0.00E+00	1.93E+01	3.86E+01		
Ra-226	2.2804E-10	300,603.756	601,207.512	0.00E+00	6.85E-05	1.37E-04		
Ra-228	5.2713E-12	300,603.756	601,207.512	0.00E+00	1.58E-06	3.17E-06		
Ru-106	6.1160E-10	300,603.756	601,207.512	0.00E+00	1.84E-04	3.68E-04		
Se-79	1.2377E-05	300,603.756	601,207.512	0.00E+00	3.72E+00	7.44E+00		
Sn-126	2.5210E-05	300,603.756	601,207.512	0.00E+00	7.58E+00	1.52E+01		
Sr-90	9.1667E-01	300,603.756	601,207.512	0.00E+00	2.76E+05	5.51E+05		
Tc-99	3.9357E-04	300,603.756	601,207.512	0.00E+00	1.18E+02	2.37E+02		
Th-229	1.2057E-10	300,603.756	601,207.512	0.00E+00	3.62E-05	7.25E-05		
Th-230	2.1043E-08	300,603.756	601,207.512	0.00E+00	6.33E-03	1.27E-02		
Th-232	5.2972E-12	300,603.756	601,207.512	0.00E+00	1.59E-06	3.18E-06		
Ti-208	1.7474E-07	300,603.756	601,207.512	0.00E+00	5.25E-02	1.05E-01		
U-232	4.7368E-07	300,603.756	601,207.512	0.00E+00	1.42E-01	2.85E-01		
U-233	2.5097E-08	300,603.756	601,207.512	0.00E+00	7.54E-03	1.51E-02		
U-234	5.0000E-05	300,603.756	601,207.512	0.00E+00	1.50E+01	3.01E+01		
U-235	-1.4489E-06	300,603.756	0.000	5.90E-01	1.55E-01	5.90E-01		
U-236	7.5824E-06	300,603.756	601,207.512	0.00E+00	2.28E+00	4.56E+00		
U-238	-2.6129E-07	300,603.756	0.000	2.98E+00	2.98E+00	2.98E+00		
Y-90	9.1699E-01	300,603.756	601,207.512	0.00E+00	2.76E+05	5.51E+05		
Other Radionuclides					4.04E+05	8.07E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.91E+03	1.38E+04
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.986167273	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	268,593.677	300,603.756	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
Bounding:	288,637.572	601,207.512	

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.94	1.12	1.00
Bounding:	1.88	2.08	

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VEPCO
 SNF ID #: 700
 Fuel Units & Descr: 12 - 15 X 15 ROD ARRAY
 Heavy Metal Mass: BOL=5488.20kg ; EOL=5313.52kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1981
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 35 years

Estimated
 Canister usage:
 PWR
 1.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.7758E-10	166,112.798	332,225.596	0.00E+00	1.46E-04	2.92E-04	0.0150	1.788E+16
Am-241	1.4352E-01	166,112.798	332,225.596	0.00E+00	2.38E+04	4.77E+04	0.0250	3.605E+15
Am-242m	2.8698E-04	166,112.798	332,225.596	0.00E+00	4.77E+01	9.53E+01	0.0375	3.438E+15
Am-243	6.2565E-04	166,112.798	332,225.596	0.00E+00	1.04E+02	2.08E+02	0.0575	3.972E+15
C-14	4.7901E-05	166,112.798	332,225.596	0.00E+00	7.96E+00	1.59E+01	0.0850	2.000E+15
Cl-36	8.0297E-07	166,112.798	332,225.596	0.00E+00	1.33E-01	2.67E-01	0.1250	1.388E+15
Cm-243	2.5081E-04	166,112.798	332,225.596	0.00E+00	4.17E+01	8.33E+01	0.2250	1.715E+15
Cm-244	4.9015E-02	166,112.798	332,225.596	0.00E+00	8.14E+03	1.63E+04	0.3750	7.375E+14
Co-60	2.5581E-03	166,112.798	332,225.596	0.00E+00	4.25E+02	8.50E+02	0.5750	1.715E+16
Cs-134	4.0536E-05	166,112.798	332,225.596	0.00E+00	6.73E+00	1.35E+01	0.8500	2.373E+14
Cs-135	1.4433E-05	166,112.798	332,225.596	0.00E+00	2.40E+00	4.80E+00	1.2500	2.331E+14
Cs-137	1.3979E+00	166,112.798	332,225.596	0.00E+00	2.32E+05	4.64E+05	1.7500	6.982E+12
Eu-154	2.0203E-02	166,112.798	332,225.596	0.00E+00	3.36E+03	6.71E+03	2.2500	1.124E+09
Eu-155	1.7684E-03	166,112.798	332,225.596	0.00E+00	2.94E+02	5.88E+02	2.7500	2.303E+09
Fe-55	4.3136E-05	166,112.798	332,225.596	0.00E+00	7.17E+00	1.43E+01	3.5000	2.372E+08
H-3	2.0769E-02	166,112.798	332,225.596	0.00E+00	3.45E+03	6.90E+03	5.0000	1.014E+08
I-129	9.8288E-07	166,112.798	332,225.596	0.00E+00	1.63E-01	3.27E-01	7.0000	1.169E+07
Kr-85	2.8214E-02	166,112.798	332,225.596	0.00E+00	4.69E+03	9.37E+03	11.0000	1.342E+06
Np-237	1.1218E-05	166,112.798	332,225.596	0.00E+00	1.86E+00	3.73E+00		
Pa-231	1.3036E-09	166,112.798	332,225.596	0.00E+00	2.17E-04	4.33E-04		
Pb-210	8.5078E-11	166,112.798	332,225.596	0.00E+00	1.41E-05	2.83E-05		
Pm-147	3.6531E-04	166,112.798	332,225.596	0.00E+00	6.07E+01	1.21E+02		
Pu-238	7.4564E-02	166,112.798	332,225.596	0.00E+00	1.24E+04	2.48E+04		
Pu-239	1.1623E-02	166,112.798	332,225.596	0.00E+00	1.93E+03	3.86E+03		
Pu-240	1.5132E-02	166,112.798	332,225.596	0.00E+00	2.51E+03	5.03E+03		
Pu-241	9.0036E-01	166,112.798	332,225.596	0.00E+00	1.50E+05	2.99E+05		
Pu-242	6.4260E-05	166,112.798	332,225.596	0.00E+00	1.07E+01	2.13E+01		
Ra-226	2.2804E-10	166,112.798	332,225.596	0.00E+00	3.79E-05	7.58E-05		
Ra-228	5.2713E-12	166,112.798	332,225.596	0.00E+00	8.76E-07	1.75E-06		
Ru-106	6.1160E-10	166,112.798	332,225.596	0.00E+00	1.02E-04	2.03E-04		
Se-79	1.2377E-05	166,112.798	332,225.596	0.00E+00	2.06E+00	4.11E+00		
Sn-126	2.5210E-05	166,112.798	332,225.596	0.00E+00	4.19E+00	8.38E+00		
Sr-90	9.1667E-01	166,112.798	332,225.596	0.00E+00	1.52E+05	3.05E+05		
Tc-99	3.9357E-04	166,112.798	332,225.596	0.00E+00	6.54E+01	1.31E+02		
Th-229	1.2057E-10	166,112.798	332,225.596	0.00E+00	2.00E-05	4.01E-05		
Th-230	2.1043E-08	166,112.798	332,225.596	0.00E+00	3.50E-03	6.99E-03		
Th-232	5.2972E-12	166,112.798	332,225.596	0.00E+00	8.80E-07	1.76E-06		
Tl-208	1.7474E-07	166,112.798	332,225.596	0.00E+00	2.90E-02	5.81E-02		
U-232	4.7368E-07	166,112.798	332,225.596	0.00E+00	7.87E-02	1.57E-01		
U-233	2.5097E-08	166,112.798	332,225.596	0.00E+00	4.17E-03	8.34E-03		
U-234	5.0000E-05	166,112.798	332,225.596	0.00E+00	8.31E+00	1.66E+01		
U-235	-1.4489E-06	166,112.798	0.000	3.36E-01	9.54E-02	3.36E-01		
U-236	7.5824E-06	166,112.798	332,225.596	0.00E+00	1.26E+00	2.52E+00		
U-238	-2.6129E-07	166,112.798	0.000	1.79E+00	1.75E+00	1.79E+00		
Y-90	9.1699E-01	166,112.798	332,225.596	0.00E+00	1.52E+05	3.05E+05		
Other Radionuclides					2.23E+05	4.46E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.82E+03	7.64E+03
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.833496228	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	161,133.552	166,112.798	
Bounding:	173,158.198	332,225.596	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Nominal:	0.86	1.03	
Bounding:	1.73	1.92	

Estimated EOL HM/Given EOL HM: 1.00

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VEPCO (T-11 ASSEMBLY)
 SNF ID #: 993
 Fuel Units & Descr: 1 - 15 X 15 ROD ARRAY
 Heavy Metal Mass: BOL=457.41kg ; EOL=440.00kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1983
 Estimates as of: 2030
 Template: PWR (Light Water, Zirc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 35 years

Estimated
 Canister usage:
 HIC
 1.00

II. Estimates							Gamma Sources	
	m	x _n	x _b	b	y _n	y _b	Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.7758E-10	16,560.176	33,120.351	0.00E+00	1.45E-05	2.91E-05	0.0150	1.782E+15
Am-241	1.4352E-01	16,560.176	33,120.351	0.00E+00	2.38E+03	4.75E+03	0.0250	3.594E+14
Am-242m	2.8698E-04	16,560.176	33,120.351	0.00E+00	4.75E+00	9.50E+00	0.0375	3.427E+14
Am-243	6.2565E-04	16,560.176	33,120.351	0.00E+00	1.04E+01	2.07E+01	0.0575	3.960E+14
C-14	4.7901E-05	16,560.176	33,120.351	0.00E+00	7.93E-01	1.59E+00	0.0850	1.994E+14
Ci-36	8.0297E-07	16,560.176	33,120.351	0.00E+00	1.33E-02	2.66E-02	0.1250	1.384E+14
Cm-243	2.5081E-04	16,560.176	33,120.351	0.00E+00	4.15E+00	8.31E+00	0.2250	1.710E+14
Cm-244	4.9015E-02	16,560.176	33,120.351	0.00E+00	8.12E+02	1.62E+03	0.3750	7.352E+13
Co-60	2.5581E-03	16,560.176	33,120.351	0.00E+00	4.24E+01	8.47E+01	0.5750	1.710E+15
Cs-134	4.0536E-05	16,560.176	33,120.351	0.00E+00	6.71E-01	1.34E+00	0.8500	2.366E+13
Cs-135	1.4433E-05	16,560.176	33,120.351	0.00E+00	2.39E-01	4.78E-01	1.2500	2.324E+13
Cs-137	1.3979E+00	16,560.176	33,120.351	0.00E+00	2.32E+04	4.63E+04	1.7500	6.960E+11
Eu-154	2.0203E-02	16,560.176	33,120.351	0.00E+00	3.35E+02	6.69E+02	2.2500	1.121E+08
Eu-155	1.7684E-03	16,560.176	33,120.351	0.00E+00	2.93E+01	5.86E+01	2.7500	2.296E+08
Fe-55	4.3136E-05	16,560.176	33,120.351	0.00E+00	7.14E-01	1.43E+00	3.5000	2.364E+07
H-3	2.0769E-02	16,560.176	33,120.351	0.00E+00	3.44E+02	6.88E+02	5.0000	1.011E+07
I-129	9.8288E-07	16,560.176	33,120.351	0.00E+00	1.63E-02	3.26E-02	7.0000	1.165E+06
Kr-85	2.8214E-02	16,560.176	33,120.351	0.00E+00	4.67E+02	9.34E+02	11.0000	1.338E+05
Np-237	1.1218E-05	16,560.176	33,120.351	0.00E+00	1.86E-01	3.72E-01		
Pa-231	1.3036E-09	16,560.176	33,120.351	0.00E+00	2.16E-05	4.32E-05		
Pb-210	8.5078E-11	16,560.176	33,120.351	0.00E+00	1.41E-06	2.82E-06		
Pm-147	3.6531E-04	16,560.176	33,120.351	0.00E+00	6.05E+00	1.21E+01		
Pu-238	7.4564E-02	16,560.176	33,120.351	0.00E+00	1.23E+03	2.47E+03		
Pu-239	1.1623E-02	16,560.176	33,120.351	0.00E+00	1.92E+02	3.85E+02		
Pu-240	1.5132E-02	16,560.176	33,120.351	0.00E+00	2.51E+02	5.01E+02		
Pu-241	9.0038E-01	16,560.176	33,120.351	0.00E+00	1.49E+04	2.98E+04		
Pu-242	6.4260E-05	16,560.176	33,120.351	0.00E+00	1.06E+00	2.13E+00		
Ra-226	2.2804E-10	16,560.176	33,120.351	0.00E+00	3.78E-06	7.55E-06		
Ra-228	5.2713E-12	16,560.176	33,120.351	0.00E+00	8.73E-08	1.75E-07		
Ru-106	6.1160E-10	16,560.176	33,120.351	0.00E+00	1.01E-05	2.03E-05		
Se-79	1.2377E-05	16,560.176	33,120.351	0.00E+00	2.05E-01	4.10E-01		
Sn-126	2.5210E-05	16,560.176	33,120.351	0.00E+00	4.17E-01	8.35E-01		
Sr-90	9.1667E-01	16,560.176	33,120.351	0.00E+00	1.52E+04	3.04E+04		
Tc-99	3.9357E-04	16,560.176	33,120.351	0.00E+00	6.52E+00	1.30E+01		
Th-229	1.2057E-10	16,560.176	33,120.351	0.00E+00	2.00E-06	3.99E-06		
Th-230	2.1043E-08	16,560.176	33,120.351	0.00E+00	3.48E-04	6.97E-04		
Th-232	5.2972E-12	16,560.176	33,120.351	0.00E+00	8.77E-08	1.75E-07		
Th-208	1.7474E-07	16,560.176	33,120.351	0.00E+00	2.89E-03	5.79E-03		
U-232	4.7368E-07	16,560.176	33,120.351	0.00E+00	7.84E-03	1.57E-02		
U-233	2.5097E-08	16,560.176	33,120.351	0.00E+00	4.16E-04	8.31E-04		
U-234	5.0000E-05	16,560.176	33,120.351	0.00E+00	8.28E-01	1.66E+00		
U-235	-1.4489E-06	16,560.176	0.000	2.95E-02	5.52E-03	2.95E-02		
U-236	7.5824E-06	16,560.176	33,120.351	0.00E+00	1.26E-01	2.51E-01		
U-238	-2.6129E-07	16,560.176	0.000	1.49E-01	1.45E-01	1.49E-01		
Y-90	9.1699E-01	16,560.176	33,120.351	0.00E+00	1.52E+04	3.04E+04		
Other Radionuclides					2.22E+04	4.45E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.61E+02	7.62E+02
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.986167273	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	13,429.684	16,560.176	
Bounding:	14,431.879	33,120.351	

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

Checks			Estimated EOL HM/Given EOL HM
	Burnup Multiplier	Estimated Burnup/Given Burnup	
Nominal:	1.03	1.23	
Bounding:	2.07	2.29	

Estimated EOL HM/Given EOL HM: 1.00

¹Reactor shutdown, core removal, storage, shipping or other date confirming that irradiation ceased for fuel.
²Total burnup for all fuel associated with this worksheet must be divided by BOL heavy metal mass to get specific burnup values (MWd/MT).

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VEPCO (T-11 RODS) ¹Fuel decay start date: 1983
 SNF ID #: 1049 Estimates as of: 2030
 Fuel Units & Descr: 9 - ROD Template: PWR (Light Water, Zirc. 0 to 5%, U)
 Heavy Metal Mass: BOL=20.18kg ; EOL=19.68kg ²Template 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"
 0.07

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	8.7758E-10	592.479	955.137	0.00E+00	5.20E-07	8.38E-07	Avg. MeV	
Am-241	1.4352E-01	592.479	955.137	0.00E+00	8.50E+01	1.37E+02	0.0150	5.139E+13
Am-242m	2.8698E-04	592.479	955.137	0.00E+00	1.70E-01	2.74E-01	0.0250	1.036E+13
Am-243	6.2565E-04	592.479	955.137	0.00E+00	3.71E-01	5.98E-01	0.0375	9.884E+12
C-14	4.7901E-05	592.479	955.137	0.00E+00	2.84E-02	4.58E-02	0.0575	1.142E+13
Cl-36	8.0297E-07	592.479	955.137	0.00E+00	4.76E-04	7.67E-04	0.0850	5.750E+12
Cm-243	2.5081E-04	592.479	955.137	0.00E+00	1.49E-01	2.40E-01	0.1250	3.990E+12
Cm-244	4.9015E-02	592.479	955.137	0.00E+00	2.90E+01	4.68E+01	0.2250	4.931E+12
Co-60	2.5581E-03	592.479	955.137	0.00E+00	1.52E+00	2.44E+00	0.3750	2.120E+12
Cs-134	4.0536E-05	592.479	955.137	0.00E+00	2.40E-02	3.87E-02	0.5750	4.932E+13
Cs-135	1.4433E-05	592.479	955.137	0.00E+00	8.55E-03	1.38E-02	0.8500	6.822E+11
Cs-137	1.3979E+00	592.479	955.137	0.00E+00	8.28E+02	1.34E+03	1.2500	6.702E+11
Eu-154	2.0203E-02	592.479	955.137	0.00E+00	1.20E+01	1.93E+01	1.7500	2.007E+10
Eu-155	1.7684E-03	592.479	955.137	0.00E+00	1.05E+00	1.69E+00	2.2500	3.232E+06
Fe-55	4.3136E-05	592.479	955.137	0.00E+00	2.56E-02	4.12E-02	2.7500	6.620E+06
H-3	2.0769E-02	592.479	955.137	0.00E+00	1.23E+01	1.98E+01	3.5000	6.819E+05
I-129	9.8288E-07	592.479	955.137	0.00E+00	5.82E-04	9.39E-04	5.0000	2.915E+05
Kr-85	2.8214E-02	592.479	955.137	0.00E+00	1.67E+01	2.69E+01	7.0000	3.359E+04
Np-237	1.1218E-05	592.479	955.137	0.00E+00	6.65E-03	1.07E-02	11.0000	3.858E+03
Pa-231	1.3036E-09	592.479	955.137	0.00E+00	7.72E-07	1.25E-06		
Pb-210	8.5078E-11	592.479	955.137	0.00E+00	5.04E-08	8.13E-08		
Pm-147	3.6531E-04	592.479	955.137	0.00E+00	2.16E-01	3.49E-01		
Pu-238	7.4564E-02	592.479	955.137	0.00E+00	4.42E+01	7.12E+01		
Pu-239	1.1623E-02	592.479	955.137	0.00E+00	6.89E+00	1.11E+01		
Pu-240	1.5132E-02	592.479	955.137	0.00E+00	8.97E+00	1.45E+01		
Pu-241	9.0036E-01	592.479	955.137	0.00E+00	5.33E+02	8.60E+02		
Pu-242	6.4260E-05	592.479	955.137	0.00E+00	3.81E-02	6.14E-02		
Ra-226	2.2804E-10	592.479	955.137	0.00E+00	1.35E-07	2.18E-07		
Ra-228	5.2713E-12	592.479	955.137	0.00E+00	3.12E-09	5.03E-09		
Ru-106	6.1160E-10	592.479	955.137	0.00E+00	3.62E-07	5.84E-07		
Se-79	1.2377E-05	592.479	955.137	0.00E+00	7.33E-03	1.18E-02		
Sn-126	2.5210E-05	592.479	955.137	0.00E+00	1.49E-02	2.41E-02		
Sr-90	9.1667E-01	592.479	955.137	0.00E+00	5.43E+02	8.76E+02		
Tc-99	3.9357E-04	592.479	955.137	0.00E+00	2.33E-01	3.76E-01		
Th-229	1.2057E-10	592.479	955.137	0.00E+00	7.14E-08	1.15E-07		
Th-230	2.1043E-08	592.479	955.137	0.00E+00	1.25E-05	2.01E-05		
Th-232	5.2972E-12	592.479	955.137	0.00E+00	3.14E-09	5.06E-09		
Th-208	1.7474E-07	592.479	955.137	0.00E+00	1.04E-04	1.67E-04		
U-232	4.7368E-07	592.479	955.137	0.00E+00	2.81E-04	4.52E-04		
U-233	2.5097E-08	592.479	955.137	0.00E+00	1.49E-05	2.40E-05		
U-234	5.0000E-05	592.479	955.137	0.00E+00	2.96E-02	4.78E-02		
U-235	-1.4489E-06	592.479	0.000	1.30E-03	4.44E-04	1.30E-03		
U-236	7.5824E-06	592.479	955.137	0.00E+00	4.49E-03	7.24E-03		
U-238	-2.6129E-07	592.479	0.000	6.58E-03	6.43E-03	6.58E-03		
Y-90	9.1699E-01	592.479	955.137	0.00E+00	5.43E+02	8.76E+02		
Other Radionuclides					7.95E+02	1.28E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.36E+01	2.20E+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:	ZIRC-4	ZIRC
BOL HM Constituents:	UO2	U
BOL Enrichment %:	2.986165227	0 to 5

Basis for Parameter Differences:

Burnup Summary (MWd) ²		
	From SFD	Estimated
Nominal:	592.479	477.569
Bounding:	636.693	955.137

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:	0.84	0.81
Bounding:	1.35	1.50

Estimated EOL HM/ Given EOL HM: 0.99

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

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

Fuel Radionuclide Inventory Worksheet

I. Fuel and Template Information

Fuel Name: VEPCO (T-11)
 SNF ID #: 994
 Fuel Units & Descr: 3 - ROD
 Heavy Metal Mass: BOL=6.73kg : EOL=6.56kg
 ROD Storage Site: INEEL

¹Fuel decay start date: 1983
 Estimates as of: 2030
 Template: PWR (Light Water, 2irc, 0 to 5%, U)
²Template Burnup(MWd): 61.92
 Template BOL Heavy Metal Mass (MT): 0.00176911
 Template Decay Time: 35 years

Estimated
 Canister usage:
 18" x 10"
 0.02

II. Estimates	m	x _n	x _b	b	y _n	y _b	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
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)	Avg. MeV	
Ac-227	8.7758E-10	197.493	318.379	0.00E+00	1.73E-07	2.79E-07		
Am-241	1.4352E-01	197.493	318.379	0.00E+00	2.83E+01	4.57E+01	0.0150	1.713E+13
Am-242m	2.8698E-04	197.493	318.379	0.00E+00	5.67E-02	9.14E-02	0.0250	3.454E+12
Am-243	6.2565E-04	197.493	318.379	0.00E+00	1.24E-01	1.99E-01	0.0375	3.295E+12
C-14	4.7901E-05	197.493	318.379	0.00E+00	9.46E-03	1.53E-02	0.0575	3.807E+12
Cl-36	8.0297E-07	197.493	318.379	0.00E+00	1.59E-04	2.56E-04	0.0850	1.917E+12
Cm-243	2.5081E-04	197.493	318.379	0.00E+00	4.95E-02	7.99E-02	0.1250	1.330E+12
Cm-244	4.9015E-02	197.493	318.379	0.00E+00	9.68E+00	1.56E+01	0.2250	1.644E+12
Co-60	2.5581E-03	197.493	318.379	0.00E+00	5.05E-01	8.14E-01	0.3750	7.067E+11
Cs-134	4.0536E-05	197.493	318.379	0.00E+00	8.01E-03	1.29E-02	0.5750	1.644E+13
Cs-135	1.4433E-05	197.493	318.379	0.00E+00	2.85E-03	4.60E-03	0.8500	2.274E+11
Cs-137	1.3979E+00	197.493	318.379	0.00E+00	2.76E+02	4.45E+02	1.2500	2.234E+11
Eu-154	2.0203E-02	197.493	318.379	0.00E+00	3.99E+00	6.43E+00	1.7500	6.691E+09
Eu-155	1.7684E-03	197.493	318.379	0.00E+00	3.49E-01	5.63E-01	2.2500	1.077E+06
Fe-55	4.3136E-05	197.493	318.379	0.00E+00	8.52E-03	1.37E-02	2.7500	2.207E+06
H-3	2.0769E-02	197.493	318.379	0.00E+00	4.10E+00	6.61E+00	3.5000	2.273E+05
I-129	9.8288E-07	197.493	318.379	0.00E+00	1.94E-04	3.13E-04	5.0000	9.716E+04
Kr-85	2.8214E-02	197.493	318.379	0.00E+00	5.57E+00	8.98E+00	7.0000	1.120E+04
Np-237	1.1218E-05	197.493	318.379	0.00E+00	2.22E-03	3.57E-03	11.0000	1.286E+03
Pa-231	1.3036E-09	197.493	318.379	0.00E+00	2.57E-07	4.15E-07		
Pb-210	8.5078E-11	197.493	318.379	0.00E+00	1.68E-08	2.71E-08		
Pm-147	3.6531E-04	197.493	318.379	0.00E+00	7.21E-02	1.16E-01		
Pu-238	7.4564E-02	197.493	318.379	0.00E+00	1.47E+01	2.37E+01		
Pu-239	1.1623E-02	197.493	318.379	0.00E+00	2.30E+00	3.70E+00		
Pu-240	1.5132E-02	197.493	318.379	0.00E+00	2.99E+00	4.82E+00		
Pu-241	9.0036E-01	197.493	318.379	0.00E+00	1.78E+02	2.87E+02		
Pu-242	6.4260E-05	197.493	318.379	0.00E+00	1.27E-02	2.05E-02		
Ra-226	2.2804E-10	197.493	318.379	0.00E+00	4.50E-08	7.26E-08		
Ra-228	5.2713E-12	197.493	318.379	0.00E+00	1.04E-09	1.68E-09		
Ru-106	6.1160E-10	197.493	318.379	0.00E+00	1.21E-07	1.95E-07		
Se-79	1.2377E-05	197.493	318.379	0.00E+00	2.44E-03	3.94E-03		
Sn-126	2.5210E-05	197.493	318.379	0.00E+00	4.98E-03	8.03E-03		
Sr-90	9.1667E-01	197.493	318.379	0.00E+00	1.81E+02	2.92E+02		
Tc-99	3.9357E-04	197.493	318.379	0.00E+00	7.77E-02	1.25E-01		
Th-229	1.2057E-10	197.493	318.379	0.00E+00	2.38E-08	3.84E-08		
Th-230	2.1043E-08	197.493	318.379	0.00E+00	4.16E-06	6.70E-06		
Th-232	5.2972E-12	197.493	318.379	0.00E+00	1.05E-09	1.69E-09		
Tl-208	1.7474E-07	197.493	318.379	0.00E+00	3.45E-05	5.56E-05		
U-232	4.7368E-07	197.493	318.379	0.00E+00	9.35E-05	1.51E-04		
U-233	2.5097E-08	197.493	318.379	0.00E+00	4.96E-06	7.99E-06		
U-234	5.0000E-05	197.493	318.379	0.00E+00	9.87E-03	1.59E-02		
U-235	-1.4489E-06	197.493	0.000	4.34E-04	1.48E-04	4.34E-04		
U-236	7.5824E-06	197.493	318.379	0.00E+00	1.50E-03	2.41E-03		
U-238	-2.6129E-07	197.493	0.000	2.19E-03	2.14E-03	2.19E-03		
Y-90	9.1699E-01	197.493	318.379	0.00E+00	1.81E+02	2.92E+02		
Other Radionuclides					2.65E+02	4.27E+02		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.54E+00	7.32E+00
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
	From SFD	Used	
Reactor Moderator:	LIGHT WATER	LIGHT WATER	
Fuel Cladding:	ZIRC-4	ZIRC	
BOL HM Constituents:	UO2	U	
BOL Enrichment %:	2.986165227	0 to 5	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
	From SFD	Estimated	
Nominal:	197.493	159.189	Nominal burnup taken directly from SFD (converted to MWd). Bounding burnup assumed to be twice nominal burnup.
Bounding:	212.231	318.379	

Checks			
	Burnup Multiplier	Estimated Burnup/Given Burnup	Estimated EOL HM/Given EOL HM
Nominal:	0.84	0.81	
Bounding:	1.35	1.50	

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

²Total burnup for all fuel associated with this worksheet must be 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
 SNF ID #: 287
 Fuel Units & Descr: 26 - 18 FLAT PLATES
 Heavy Metal Mass: BOL=22.78kg ; EOL=22.75kg
 ROD Storage Site: SRS

¹Fuel decay start date: 2035
 Estimates as of: 2030
 Template: ATR (Light Water, Alum., 60 to 100%, U)
²Template Burnup(MWd): 367.2
 Template BOL Heavy Metal Mass (MT): 0.00116689
 Template Decay Time: 5 years

Estimated
 Canister usage:
 18"x10"
 0.72

II. Estimates

Radionuclide	C/MWd From Template	Nominal Fuel Burnup (MWd) ²	Bounding Fuel Burnup (MWd) ²	Initial Activity (Ci)	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.4545E-10	22.160	44.321	0.00E+00	3.22E-09	6.45E-09	Avg. MeV	
Am-241	1.1190E-03	22.160	44.321	0.00E+00	2.48E-02	4.96E-02	0.0150	8.551E+12
Am-242m	4.5425E-07	22.160	44.321	0.00E+00	1.01E-05	2.01E-05	0.0250	1.842E+12
Am-243	1.4921E-06	22.160	44.321	0.00E+00	3.31E-05	6.61E-05	0.0375	1.700E+12
C-14	5.7244E-09	22.160	44.321	0.00E+00	1.27E-07	2.54E-07	0.0575	1.671E+12
Cl-36	1.3124E-32	22.160	44.321	0.00E+00	2.91E-31	5.82E-31	0.0850	1.066E+12
Cm-243	2.3676E-07	22.160	44.321	0.00E+00	5.25E-06	1.05E-05	0.1250	9.228E+11
Cm-244	5.2042E-05	22.160	44.321	0.00E+00	1.15E-03	2.31E-03	0.2250	9.039E+11
Co-60	3.8208E-05	22.160	44.321	0.00E+00	8.47E-04	1.69E-03	0.3750	4.372E+11
Cs-134	4.8693E-01	22.160	44.321	0.00E+00	1.08E+01	2.16E+01	0.5750	6.005E+12
Cs-135	3.4477E-06	22.160	44.321	0.00E+00	7.64E-05	1.53E-04	0.8500	8.408E+11
Cs-137	2.8731E+00	22.160	44.321	0.00E+00	6.37E+01	1.27E+02	1.2500	1.565E+11
Eu-154	8.2053E-02	22.160	44.321	0.00E+00	1.82E+00	3.64E+00	1.7500	6.561E+09
Eu-155	3.9134E-02	22.160	44.321	0.00E+00	8.67E-01	1.73E+00	2.2500	1.376E+10
Fe-55	6.7429E-03	22.160	44.321	0.00E+00	1.49E-01	2.99E-01	2.7500	7.917E+07
H-3	1.0599E-02	22.160	44.321	0.00E+00	2.35E-01	4.70E-01	3.5000	8.783E+06
I-129	7.5300E-07	22.160	44.321	0.00E+00	1.67E-05	3.34E-05	5.0000	4.043E+01
Kr-85	2.8595E-01	22.160	44.321	0.00E+00	6.34E+00	1.27E+01	7.0000	4.559E+00
Np-237	9.5479E-06	22.160	44.321	0.00E+00	2.12E-04	4.23E-04	11.0000	5.175E-01
Pa-231	8.9297E-10	22.160	44.321	0.00E+00	1.98E-08	3.96E-08		
Pb-210	3.7609E-12	22.160	44.321	0.00E+00	8.33E-11	1.67E-10		
Pm-147	2.5452E+00	22.160	44.321	0.00E+00	5.64E+01	1.13E+02		
Pu-238	2.0550E-02	22.160	44.321	0.00E+00	4.55E-01	9.11E-01		
Pu-239	4.2838E-04	22.160	44.321	0.00E+00	9.49E-03	1.90E-02		
Pu-240	2.4401E-04	22.160	44.321	0.00E+00	5.41E-03	1.08E-02		
Pu-241	6.8764E-02	22.160	44.321	0.00E+00	1.52E+00	3.05E+00		
Pu-242	3.6329E-07	22.160	44.321	0.00E+00	8.05E-06	1.61E-05		
Ra-226	3.8045E-11	22.160	44.321	0.00E+00	8.43E-10	1.69E-09		
Ra-228	2.9902E-15	22.160	44.321	0.00E+00	6.63E-14	1.33E-13		
Ru-106	1.9055E-01	22.160	44.321	0.00E+00	4.22E+00	8.45E+00		
Se-79	1.2936E-05	22.160	44.321	0.00E+00	2.87E-04	5.73E-04		
Sn-126	1.1574E-05	22.160	44.321	0.00E+00	2.56E-04	5.13E-04		
Sr-90	2.7505E+00	22.160	44.321	0.00E+00	6.10E+01	1.22E+02		
Tc-99	4.2239E-04	22.160	44.321	0.00E+00	9.36E-03	1.87E-02		
Th-229	1.8848E-12	22.160	44.321	0.00E+00	4.18E-11	8.35E-11		
Th-230	1.7042E-08	22.160	44.321	0.00E+00	3.78E-07	7.55E-07		
Th-232	7.8132E-15	22.160	44.321	0.00E+00	1.73E-13	3.46E-13		
Tl-208	4.4063E-08	22.160	44.321	0.00E+00	9.76E-07	1.95E-06		
U-232	1.3151E-07	22.160	44.321	0.00E+00	2.91E-06	5.83E-06		
U-233	1.9564E-09	22.160	44.321	0.00E+00	4.34E-08	8.67E-08		
U-234	1.8371E-04	22.160	44.321	0.00E+00	4.07E-03	8.14E-03		
U-235	-2.7235E-06	22.160	0.000	9.78E-03	9.72E-03	9.78E-03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-236	1.5493E-05	22.160	44.321	0.00E+00	3.43E-04	6.87E-04	1.12E+00	2.25E+00
U-238	-4.2851E-09	22.160	0.000	6.13E-03	6.13E-03	6.13E-03	Total	Total
Y-90	2.7505E+00	22.160	44.321	0.00E+00	6.10E+01	1.22E+02		
Other Radionuclides					1.14E+02	2.28E+02		

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
BOL HM Constituents:	ALUM (6061)	ALUM	
BOL Enrichment %:	U-ALX	U	
	19.8630137	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:	22.160	44.321	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.

Checks			Estimated EOL HM/Given EOL HM
Nominal:	Burnup Multiplier	Estimated Burnup/ Given Burnup	
Bounding:	0.00	1.00	1.00
	0.01		

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: ZPRL (TAIWAN) 1 Fuel decay start date: 1997
 SNF ID #: 554 Estimates as of: 2030
 Fuel Units & Descr: 35 - ASSEMBLY Template: ATR (Light Water, Alum., 60 to 100%, U)
 Heavy Metal Mass: BOL=23.75kg ; EOL=23.35kg 2 Template Burnup(MWd): 367.2
 ROD Storage Site: SRS Template BOL Heavy Metal Mass (MT): 0.00116689
Template Decay Time: 25 years

Estimated
 Canister usage:
 18" x 10"
 0.97

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)	Gamma Sources	
							Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.1465E-09	377.861	755.721	0.00E+00	4.33E-07	8.66E-07	Avg. MeV	
Am-241	2.3056E-03	377.861	755.721	0.00E+00	8.71E-01	1.74E+00	0.0150	7.071E+13
Am-242m	4.1476E-07	377.861	755.721	0.00E+00	1.57E-04	3.13E-04	0.0250	1.469E+13
Am-243	1.4894E-06	377.861	755.721	0.00E+00	5.63E-04	1.13E-03	0.0375	1.279E+13
C-14	5.7108E-09	377.861	755.721	0.00E+00	2.16E-06	4.32E-06	0.0575	1.374E+13
Cl-36	1.3124E-32	377.861	755.721	0.00E+00	4.96E-30	9.92E-30	0.0850	8.290E+12
Cr-243	1.4562E-07	377.861	755.721	0.00E+00	5.50E-05	1.10E-04	0.1250	5.552E+12
Cr-244	2.4221E-05	377.861	755.721	0.00E+00	9.15E-03	1.83E-02	0.2250	7.157E+12
Co-60	2.7560E-06	377.861	755.721	0.00E+00	1.04E-03	2.08E-03	0.3750	3.111E+12
Cs-134	5.8851E-04	377.861	755.721	0.00E+00	2.22E-01	4.45E-01	0.5750	5.101E+13
Cs-135	3.4477E-06	377.861	755.721	0.00E+00	1.30E-03	2.61E-03	0.8500	7.350E+11
Cs-137	1.8099E+00	377.861	755.721	0.00E+00	6.84E+02	1.37E+03	1.2500	4.088E+11
Eu-154	1.6386E-02	377.861	755.721	0.00E+00	6.19E+00	1.24E+01	1.7500	2.020E+10
Eu-155	2.3957E-03	377.861	755.721	0.00E+00	9.05E-01	1.81E+00	2.2500	1.440E+06
Fe-55	3.2707E-05	377.861	755.721	0.00E+00	1.24E-02	2.47E-02	2.7500	1.178E+06
H-3	3.4504E-03	377.861	755.721	0.00E+00	1.30E+00	2.61E+00	3.5000	9.237E+02
H-129	7.5300E-07	377.861	755.721	0.00E+00	2.85E-04	5.69E-04	5.0000	3.138E+02
Kr-85	7.8540E-02	377.861	755.721	0.00E+00	2.97E+01	5.94E+01	7.0000	3.461E+01
Np-237	9.5615E-06	377.861	755.721	0.00E+00	3.61E-03	7.23E-03	11.0000	3.877E+00
Pa-231	2.7968E-09	377.861	755.721	0.00E+00	1.06E-06	2.11E-06		
Pb-210	1.2612E-10	377.861	755.721	0.00E+00	4.77E-08	9.53E-08		
Pm-147	1.2952E-02	377.861	755.721	0.00E+00	4.89E+00	9.79E+00		
Pu-238	1.7549E-02	377.861	755.721	0.00E+00	6.63E+00	1.33E+01		
Pu-239	4.2810E-04	377.861	755.721	0.00E+00	1.62E-01	3.24E-01		
Pu-240	2.4357E-04	377.861	755.721	0.00E+00	9.20E-02	1.84E-01		
Pu-241	2.6277E-02	377.861	755.721	0.00E+00	9.93E+00	1.99E+01		
Pu-242	3.6329E-07	377.861	755.721	0.00E+00	1.37E-04	2.75E-04		
Ra-226	4.4444E-10	377.861	755.721	0.00E+00	1.68E-07	3.36E-07		
Ra-228	1.9714E-14	377.861	755.721	0.00E+00	7.45E-12	1.49E-11		
Ru-106	2.0477E-07	377.861	755.721	0.00E+00	7.74E-05	1.55E-04		
Se-79	1.2933E-05	377.861	755.721	0.00E+00	4.89E-03	9.77E-03		
Sn-126	1.1574E-05	377.861	755.721	0.00E+00	4.37E-03	8.75E-03		
Sr-90	1.7092E+00	377.861	755.721	0.00E+00	6.46E+02	1.29E+03		
Tc-99	4.2239E-04	377.861	755.721	0.00E+00	1.60E-01	3.19E-01		
Th-229	7.7260E-12	377.861	755.721	0.00E+00	2.92E-09	5.84E-09		
Th-230	5.8497E-08	377.861	755.721	0.00E+00	2.21E-05	4.42E-05		
Th-232	2.6906E-14	377.861	755.721	0.00E+00	1.02E-11	2.03E-11		
Th-208	4.4336E-08	377.861	755.721	0.00E+00	1.68E-05	3.35E-05		
U-232	1.2037E-07	377.861	755.721	0.00E+00	4.55E-05	9.10E-05		
U-233	3.0011E-09	377.861	755.721	0.00E+00	1.13E-06	2.27E-06		
U-234	1.8497E-04	377.861	755.721	0.00E+00	6.99E-02	1.40E-01		
U-235	-2.7235E-06	377.861	0.000	1.01E-02	9.11E-03	1.01E-02		
U-236	1.5493E-05	377.861	755.721	0.00E+00	5.85E-03	1.17E-02		
U-238	-4.2851E-09	377.861	0.000	6.41E-03	6.40E-03	6.41E-03		
Y-90	1.7094E+00	377.861	755.721	0.00E+00	6.46E+02	1.29E+03		
Other Radionuclides					6.51E+02	1.30E+03		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
7.99E+00	1.60E+01
Total	Total

III. Template Selection Summary, Burnup Summary, and Checks

Template Selection Summary			Basis for Parameter Differences:
Reactor Moderator:	From SFD	Used	
Fuel Cladding:	LIGHT WATER	LIGHT WATER	This Template was used for the following reasons: This fuel matches ATR Template on all but one parameter (enrichment) making ATR a reasonable match.
BOL HM Constituents:	ALUM	ALUM	
BOL Enrichment %:	U-ALX	U	
	19.74998117	60 to 100	

Burnup Summary (MWd) ²			Basis for burnup used in estimate:
Nominal:	From SFD	Estimated	
Bounding:		377.861	Nominal burnup calculated from the heavy metal mass destroyed. Bounding burnup assumed to be twice nominal burnup.
		755.721	

Checks		
Nominal:	Burnup Multiplier	Estimated Burnup/Given Burnup
Bounding:	0.05	
	0.10	
		Estimated EOL HM/Given EOL HM
		1.00

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

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

2030 Summary, Totals for all Spent Fuels

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
			Avg. MeV	
Ac-227	5.79E+01	1.18E+02		
Am-241	2.24E+06	4.13E+06	0.0150	2.476E+18
Am-242m	4.75E+03	8.82E+03	0.0250	5.108E+17
Am-243	4.05E+03	7.58E+03	0.0375	4.628E+17
C-14	1.82E+04	2.79E+04	0.0575	5.266E+17
Cl-36	2.98E+02	4.67E+02	0.0850	2.875E+17
Cm-243	1.13E+03	2.17E+03	0.1250	2.043E+17
Cm-244	1.35E+05	2.58E+05	0.2250	2.467E+17
Co-60	7.98E+05	1.17E+06	0.3750	1.092E+17
Cs-134	6.70E+05	1.21E+06	0.5750	1.979E+18
Cs-135	3.13E+02	5.78E+02	0.8500	6.815E+16
Cs-137	2.77E+07	5.14E+07	1.2500	1.081E+17
Eu-154	3.35E+05	6.10E+05	1.7500	1.011E+15
Eu-155	9.11E+04	1.65E+05	2.2500	7.543E+14
Fe-55	5.33E+04	1.01E+05	2.7500	5.775E+14
H-3	1.06E+05	1.92E+05	3.5000	4.895E+11
I-129	1.95E+01	3.63E+01	5.0000	1.775E+09
Kr-85	9.54E+05	1.76E+06	7.0000	2.040E+08
Np-237	2.11E+02	3.93E+02	11.0000	2.339E+07
Pa-231	7.05E+01	1.43E+02		
Pb-210	4.04E-02	5.57E-02		
Pm-147	3.57E+06	6.43E+06		
Pu-238	8.49E+05	1.60E+06		
Pu-239	4.75E+05	7.70E+05		
Pu-240	3.64E+05	6.20E+05		
Pu-241	9.38E+06	2.25E+07		
Pu-242	5.06E+02	8.38E+02		
Ra-226	7.98E-02	1.08E-01		
Ra-228	3.43E+00	7.03E+00		
Ru-106	2.60E+05	4.67E+05		
Se-79	2.91E+02	5.39E+02		
Sn-126	2.81E+02	5.15E+02		
Sr-90	2.27E+07	4.19E+07		
Tc-99	8.85E+03	1.63E+04		
Th-229	4.76E+01	9.76E+01		
Th-230	4.89E+00	6.78E+00		
Th-232	8.01E+00	8.17E+00		
Th-208	8.03E+03	1.63E+04		
U-232	2.17E+04	4.42E+04		
U-233	1.82E+04	2.21E+04		
U-234	7.29E+03	1.03E+04		
U-235	1.43E+02	2.16E+02		
U-236	2.83E+02	4.98E+02		
U-238	7.77E+02	7.89E+02		
Y-90	2.27E+07	4.19E+07		
Other Radionuclides	3.48E+07	6.31E+07		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
4.87E+05	8.54E+05
Total	Total

Total Canister Usage Summary						
	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	1398.6	1441.8	165.3	27.0	171.4	419.0

Bare Fuel Transfers	
166	Assemblies

2030 Summary, Totals for 18" x 10' Canister

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
			Avg. MeV	
Ac-227	5.01E+00	9.99E+00		
Am-241	6.09E+05	1.10E+06	0.0150	1.016E+18
Am-242m	1.08E+03	2.02E+03	0.0250	2.133E+17
Am-243	1.12E+03	2.08E+03	0.0375	1.914E+17
C-14	1.16E+04	1.79E+04	0.0575	2.104E+17
Cf-252	2.11E+02	3.30E+02	0.0850	1.212E+17
Cm-243	8.10E+01	1.56E+02	0.1250	9.360E+16
Cm-244	1.25E+04	2.34E+04	0.2250	1.037E+17
Co-60	5.33E+05	8.30E+05	0.3750	4.751E+16
Cs-134	6.63E+05	1.19E+06	0.5750	7.251E+17
Cs-135	5.80E+01	1.07E+02	0.8500	5.326E+16
Cs-137	9.56E+06	1.76E+07	1.2500	7.453E+16
Eu-154	2.00E+05	3.66E+05	1.7500	5.589E+14
Eu-155	6.52E+04	1.19E+05	2.2500	7.531E+14
Fe-55	4.92E+04	9.48E+04	2.7500	4.341E+13
H-3	3.40E+04	5.96E+04	3.5000	4.845E+11
I-129	4.29E+00	7.74E+00	5.0000	1.648E+08
Kr-85	5.65E+05	1.04E+06	7.0000	1.884E+07
Np-237	6.19E+01	1.12E+02	11.0000	2.154E+06
Pa-231	5.69E+00	1.14E+01		
Pb-210	1.27E-02	1.64E-02		
Pm-147	3.50E+06	6.31E+06		
Pu-238	2.51E+05	4.34E+05		
Pu-239	4.92E+04	6.17E+04		
Pu-240	2.70E+04	4.93E+04		
Pu-241	2.19E+06	7.75E+06		
Pu-242	1.30E+02	1.52E+02		
Ra-226	2.64E-02	3.46E-02		
Ra-228	2.48E-01	4.91E-01		
Ru-106	2.58E+05	4.65E+05		
Se-79	7.58E+01	1.35E+02		
Sn-126	7.19E+01	1.30E+02		
Sr-90	8.90E+06	1.64E+07		
Tc-99	2.39E+03	4.30E+03		
Th-229	3.89E+00	7.77E+00		
Th-230	1.67E+00	2.27E+00		
Th-232	5.95E-01	6.30E-01		
Tl-208	5.56E+02	1.11E+03		
U-232	1.51E+03	3.01E+03		
U-233	1.76E+03	1.93E+03		
U-234	2.78E+03	4.00E+03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-235	5.68E+01	9.74E+01	1.72E+05	3.12E+05
U-236	9.07E+01	1.58E+02	Total	Total
U-238	1.64E+01	2.26E+01		
Y-90	8.90E+06	1.64E+07		
Other Radionuclides	1.57E+07	2.79E+07		

Total Canister Usage Summary						
	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	1398.6	0.0	0.0	0.0	0.0	0.0

Bare Fuel Transfers
0 Assemblies

2030 Summary, Totals for 18" x 15' Canister

Radionuclide	Nominal Fuel Inventories(CI)	Bounding Fuel Inventories(CI)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.21E+01	4.14E+01	Avg. MeV	
Am-241	5.18E+05	8.44E+05	0.0150	6.140E+17
Am-242m	2.28E+03	4.34E+03	0.0250	1.255E+17
Am-243	1.31E+03	2.33E+03	0.0375	1.146E+17
C-14	3.73E+03	4.22E+03	0.0575	1.277E+17
Cl-36	4.57E+01	5.43E+01	0.0850	7.053E+16
Cm-243	6.67E+02	1.32E+03	0.1250	4.783E+16
Cm-244	6.32E+04	1.22E+05	0.2250	6.056E+16
Co-60	1.92E+05	2.02E+05	0.3750	2.615E+16
Cs-134	6.27E+03	1.03E+04	0.5750	5.199E+17
Cs-135	1.27E+02	2.29E+02	0.8500	7.297E+15
Cs-137	8.02E+06	1.40E+07	1.2500	1.929E+16
Eu-154	8.58E+04	1.50E+05	1.7500	2.157E+14
Eu-155	2.16E+04	3.98E+04	2.2500	9.768E+10
Fe-55	3.21E+03	4.52E+03	2.7500	2.010E+14
H-3	4.01E+04	7.04E+04	3.5000	1.925E+09
I-129	5.80E+00	1.02E+01	5.0000	8.044E+08
Kr-85	2.23E+05	3.93E+05	7.0000	9.258E+07
Np-237	5.39E+01	9.29E+01	11.0000	1.062E+07
Pa-231	2.68E+01	5.01E+01		
Pb-210	2.14E-02	2.58E-02		
Pm-147	5.29E+04	9.88E+04		
Pu-238	3.19E+05	6.18E+05		
Pu-239	1.93E+05	2.45E+05		
Pu-240	1.42E+05	1.84E+05		
Pu-241	4.11E+06	6.66E+06		
Pu-242	1.38E+02	2.47E+02		
Ra-226	4.18E-02	4.97E-02		
Ra-228	1.72E+00	3.37E+00		
Ru-106	2.02E+01	3.91E+01		
Se-79	8.89E+01	1.54E+02		
Sn-126	1.33E+02	2.45E+02		
Sr-90	6.32E+06	1.08E+07		
Tc-99	2.53E+03	4.23E+03		
Th-229	2.33E+01	4.59E+01		
Th-230	2.44E+00	2.89E+00		
Th-232	3.45E+00	3.54E+00		
Tl-208	3.06E+03	5.73E+03		
U-232	8.29E+03	1.55E+04		
U-233	4.06E+03	6.80E+03		
U-234	3.32E+03	3.87E+03		
U-235	2.16E+01	3.07E+01		
U-236	7.59E+01	1.10E+02		
U-238	4.20E+01	4.30E+01		
Y-90	6.32E+06	1.08E+07		
Other Radionuclides	8.63E+06	1.46E+07		
			Thermal Power	
			Nominal Heat	
			Output	Bounding Heat
			(Watts)	Output (Watts)
			1.28E+05	2.18E+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	1441.8	0.0	0.0	0.0	0.0

Bare Fuel Transfers	
0	Assemblies

2030 Summary, Totals for 24" x 10' Canister

Radionuclide	Nominal Fuel Inventories(CI)	Bounding Fuel Inventories(CI)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.65E-03	3.30E-03	Avg. MeV	
Am-241	2.07E+03	4.15E+03	0.0150	1.210E+17
Am-242m	3.25E-01	6.51E-01	0.0250	2.512E+16
Am-243	1.22E+00	2.44E+00	0.0375	2.183E+16
C-14	4.68E-03	9.37E-03	0.0575	2.350E+16
Cl-36	1.08E-26	2.16E-26	0.0850	1.416E+16
Cm-243	9.38E-02	1.88E-01	0.1250	9.352E+15
Cm-244	1.36E+01	2.71E+01	0.2250	1.222E+16
Co-60	6.08E-01	1.22E+00	0.3750	5.317E+15
Cs-134	1.68E+01	3.36E+01	0.5750	8.788E+16
Cs-135	2.83E+00	5.66E+00	0.8500	1.073E+15
Cs-137	1.18E+06	2.36E+06	1.2500	5.192E+14
Eu-154	6.01E+03	1.20E+04	1.7500	2.923E+13
Eu-155	4.87E+02	9.73E+02	2.2500	2.444E+09
Fe-55	1.87E+00	3.74E+00	2.7500	2.332E+09
H-3	1.62E+03	3.23E+03	3.5000	1.351E+06
I-129	6.18E-01	1.24E+00	5.0000	5.521E+05
Kr-85	3.38E+04	6.76E+04	7.0000	6.043E+04
Np-237	7.86E+00	1.57E+01	11.0000	6.737E+03
Pa-231	3.23E-03	6.47E-03		
Pb-210	2.72E-04	5.44E-04		
Pm-147	7.59E+02	1.52E+03		
Pu-238	1.33E+04	2.66E+04		
Pu-239	3.52E+02	7.03E+02		
Pu-240	2.00E+02	4.00E+02		
Pu-241	1.33E+04	2.67E+04		
Pu-242	2.98E-01	5.97E-01		
Ra-226	7.40E-04	1.48E-03		
Ra-228	2.55E-08	5.09E-08		
Ru-106	1.74E-04	3.49E-04		
Se-79	1.06E+01	2.12E+01		
Sn-126	9.50E+00	1.90E+01		
Sr-90	1.11E+06	2.21E+06		
Tc-99	3.47E+02	6.94E+02		
Th-229	1.02E-05	2.04E-05		
Th-230	6.86E-02	1.37E-01		
Th-232	3.15E-08	6.30E-08		
Ti-208	3.32E-02	6.64E-02		
U-232	8.99E-02	1.80E-01		
U-233	2.98E-03	5.96E-03		
U-234	1.52E+02	3.05E+02		
U-235	4.95E+00	7.19E+00		
U-236	1.27E+01	2.54E+01		
U-238	7.88E-02	8.23E-02		
Y-90	1.11E+06	2.21E+06		
Other Radionuclides	1.12E+06	2.25E+06		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.37E+04	2.75E+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

2030 Summary, Totals for 24" x 15' Canister

Radionuclide	Nominal Fuel Inventories(CI)	Bounding Fuel Inventories(CI)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.74E+01	4.84E+01	Avg. MeV	
Am-241	6.85E+01	1.21E+02	0.0150	4.104E+16
Am-242m	4.17E-01	7.37E-01	0.0250	8.451E+15
Am-243	8.77E-02	1.55E-01	0.0375	7.223E+15
C-14	2.60E+01	4.60E+01	0.0575	7.895E+15
Cl-36	5.10E-01	9.01E-01	0.0850	5.043E+15
Cm-243	8.61E-02	1.52E-01	0.1250	3.160E+15
Cm-244	3.98E+00	7.04E+00	0.2250	4.522E+15
Co-60	2.46E+02	4.35E+02	0.3750	1.816E+15
Cs-134	7.21E+00	1.27E+01	0.5750	2.773E+16
Cs-135	8.06E+00	1.42E+01	0.8500	4.954E+14
Cs-137	4.16E+05	7.35E+05	1.2500	2.189E+14
Eu-154	2.42E+03	4.28E+03	1.7500	3.414E+13
Eu-155	1.86E+02	3.29E+02	2.2500	9.921E+08
Fe-55	6.48E-01	1.14E+00	2.7500	2.439E+14
H-3	5.99E+02	1.06E+03	3.5000	9.483E+05
I-129	4.46E-01	7.89E-01	5.0000	2.988E+05
Kr-85	1.76E+04	3.12E+04	7.0000	2.163E+04
Np-237	3.55E-02	6.28E-02	11.0000	1.648E+03
Pa-231	3.38E+01	5.98E+01		
Pb-210	4.01E-03	7.09E-03		
Pm-147	7.38E+01	1.30E+02		
Pu-238	1.20E+02	2.11E+02		
Pu-239	7.75E+00	1.37E+01		
Pu-240	4.56E+00	8.05E+00		
Pu-241	4.14E+02	7.31E+02		
Pu-242	1.15E-02	2.03E-02		
Ra-226	6.03E-03	1.07E-02		
Ra-228	1.30E+00	2.30E+00		
Ru-106	1.13E-05	2.00E-05		
Se-79	9.97E+00	1.76E+01		
Sn-126	1.12E+01	1.98E+01		
Sr-90	4.20E+05	7.43E+05		
Tc-99	9.16E+01	1.62E+02		
Th-229	1.82E+01	3.21E+01		
Th-230	3.22E-01	5.69E-01		
Th-232	3.60E+00	3.62E+00		
Tl-208	3.93E+03	6.95E+03		
U-232	1.06E+04	1.88E+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	4.20E+05	7.43E+05		
Other Radionuclides	4.69E+05	8.30E+05		
			Thermal Power	
			Nominal Heat	
			Output	Bounding Heat
			(Watts)	Output (Watts)
			7.83E+03	1.38E+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

2030 Summary, Totals for High Integrity Canister (HIC)

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
			Avg. MeV	
Ac-227	3.32E+00	1.77E+01		
Am-241	3.37E+04	3.85E+04	0.0150	3.447E+16
Am-242m	3.22E+02	3.31E+02	0.0250	7.082E+15
Am-243	9.27E+01	1.13E+02	0.0375	6.486E+15
C-14	3.00E+01	4.90E+01	0.0575	7.065E+15
Cl-36	4.56E-01	8.20E-01	0.0850	4.063E+15
Cm-243	8.09E+01	8.78E+01	0.1250	2.658E+15
Cm-244	4.77E+03	6.03E+03	0.2250	3.532E+15
Co-60	2.64E+03	3.90E+03	0.3750	1.491E+15
Cs-134	2.93E+02	3.65E+02	0.5750	2.993E+16
Cs-135	1.52E+01	2.00E+01	0.8500	4.012E+14
Cs-137	5.44E+05	8.04E+05	1.2500	4.840E+14
Eu-154	3.97E+03	5.72E+03	1.7500	1.855E+13
Eu-155	2.16E+03	2.32E+03	2.2500	9.876E+11
Fe-55	7.79E+02	1.35E+03	2.7500	8.904E+13
H-3	2.84E+03	3.67E+03	3.5000	1.335E+09
I-129	4.91E-01	7.57E-01	5.0000	3.933E+07
Kr-85	1.30E+04	2.31E+04	7.0000	4.525E+06
Np-237	2.20E+00	2.62E+00	11.0000	5.192E+05
Pa-231	4.11E+00	2.18E+01		
Pb-210	5.02E-04	2.61E-03		
Pm-147	1.54E+04	1.70E+04		
Pu-238	9.56E+03	1.20E+04		
Pu-239	3.56E+03	8.84E+03		
Pu-240	7.47E+03	7.95E+03		
Pu-241	8.50E+04	2.25E+05		
Pu-242	9.13E+00	1.12E+01		
Ra-226	7.72E-04	3.95E-03		
Ra-228	1.57E-01	8.40E-01		
Ru-106	1.13E+03	1.19E+03		
Se-79	6.09E+00	1.17E+01		
Sn-126	1.48E+01	2.15E+01		
Sr-90	3.54E+05	6.03E+05		
Tc-99	1.71E+02	2.32E+02		
Th-229	2.20E+00	1.17E+01		
Th-230	4.25E-02	2.12E-01		
Th-232	3.56E-01	3.59E-01		
Tl-208	4.75E+02	2.54E+03		
U-232	1.29E+03	6.87E+03		
U-233	1.09E+03	1.21E+03		
U-234	3.57E+01	1.58E+02		
U-235	2.10E-01	4.4E-01		
U-236	2.49E+00	2.78E+00		
U-238	4.69E-01	5.3E-01		
Y-90	3.54E+05	6.03E+05		
Other Radionuclides	5.59E+05	8.48E+05		

	Thermal Power	
	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
	Total	Total
U-232	7.45E+03	1.23E+04
U-233		
U-234		
U-235		
U-236		
U-238		
Y-90		
Other Radionuclides		

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	171.4	0.0

Bare Fuel Transfers
0 Assemblies

2030 Summary, Totals for MCO

Radionuclide	Nominal Fuel Inventories(CI)	Bounding Fuel Inventories(CI)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
			Avg. MeV	
Ac-227	6.74E-03	1.35E-02		
Am-241	7.76E+05	1.55E+06	0.0150	5.259E+17
Am-242m	5.09E+02	1.02E+03	0.0250	1.068E+17
Am-243	6.03E+02	1.21E+03	0.0375	9.852E+16
C-14	6.81E+02	1.36E+03	0.0575	1.193E+17
Cl-36	3.48E-01	6.96E-01	0.0850	5.902E+16
Cm-243	7.56E+01	1.51E+02	0.1250	3.864E+16
Cm-244	1.38E+04	2.76E+04	0.2250	5.053E+16
Co-60	2.18E+02	4.36E+02	0.3750	2.190E+16
Cs-134	7.65E-01	1.53E+00	0.5750	4.800E+17
Cs-135	7.86E+01	1.57E+02	0.8500	4.138E+15
Cs-137	6.50E+06	1.30E+07	1.2500	1.868E+15
Eu-154	1.69E+04	3.37E+04	1.7500	1.110E+14
Eu-155	3.51E+02	7.02E+02	2.2500	1.140E+10
Fe-55	7.23E-01	1.45E+00	2.7500	5.300E+09
H-3	1.04E+04	2.08E+04	3.5000	6.171E+08
I-129	6.61E+00	1.32E+01	5.0000	2.621E+08
Kr-85	7.75E+04	1.55E+05	7.0000	2.995E+07
Np-237	7.01E+01	1.40E+02	11.0000	3.426E+06
Pa-231	1.44E-02	2.89E-02		
Pb-210	6.18E-04	1.24E-03		
Pm-147	8.47E+01	1.69E+02		
Pu-238	1.57E+05	3.13E+05		
Pu-239	2.12E+05	4.24E+05		
Pu-240	1.70E+05	3.40E+05		
Pu-241	2.32E+06	4.64E+06		
Pu-242	1.32E+02	2.64E+02		
Ra-226	1.83E-03	3.66E-03		
Ra-228	2.44E-06	4.88E-06		
Ru-106	1.50E-07	3.00E-07		
Se-79	8.37E+01	1.67E+02		
Sn-126	1.09E+01	2.19E+01		
Sr-90	4.55E+06	9.09E+06		
Tc-99	2.79E+03	5.59E+03		
Th-229	9.02E-05	1.80E-04		
Th-230	1.93E-01	3.86E-01		
Th-232	2.48E-06	4.96E-06		
Th-208	6.56E-02	1.31E-01		
U-232	1.78E-01	3.56E-01		
U-233	2.25E-02	4.50E-02		
U-234	4.99E+02	9.98E+02		
U-235	4.76E+01	5.71E+01		
U-236	8.92E+01	1.78E+02		
U-238	7.02E+02	7.05E+02		
Y-90	4.55E+06	9.10E+06		
Other Radionuclides	6.26E+06	1.25E+07		
			Thermal Power	
			Nominal Heat	
			Output	Bounding Heat
			(Watts)	Output (Watts)
			1.06E+05	2.11E+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	419.0

Bare Fuel Transfers	
0	Assemblies

2030 Summary, Totals for Bare Fuel Transfers

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	4.49E-02	8.98E-02	Avg. MeV	
Am-241	3.00E+05	5.96E+05	0.0150	1.234E+17
Am-242m	5.58E+02	1.11E+03	0.0250	2.465E+16
Am-243	9.29E+02	1.84E+03	0.0375	2.276E+16
C-14	2.13E+03	4.26E+03	0.0575	3.082E+16
Cl-36	4.02E+01	8.04E+01	0.0850	1.353E+16
Cm-243	2.27E+02	4.48E+02	0.1250	9.292E+15
Cm-244	4.02E+04	7.97E+04	0.2250	1.161E+16
Co-60	6.88E+04	1.38E+05	0.3750	5.009E+15
Cs-134	1.91E+01	3.82E+01	0.5750	1.088E+17
Cs-135	2.29E+01	4.55E+01	0.8500	1.491E+15
Cs-137	1.49E+06	2.94E+06	1.2500	1.121E+16
Eu-154	1.93E+04	3.84E+04	1.7500	4.329E+13
Eu-155	1.10E+03	2.19E+03	2.2500	5.854E+10
Fe-55	1.14E+02	2.27E+02	2.7500	1.049E+11
H-3	1.66E+04	3.30E+04	3.5000	1.179E+09
I-129	1.21E+00	2.39E+00	5.0000	5.037E+08
Kr-85	2.34E+04	4.65E+04	7.0000	5.801E+07
Np-237	1.49E+01	2.94E+01	11.0000	6.660E+06
Pa-231	5.17E-02	1.03E-01		
Pb-210	9.51E-04	1.90E-03		
Pm-147	1.80E+02	3.60E+02		
Pu-238	9.96E+04	1.91E+05		
Pu-239	1.70E+04	2.95E+04		
Pu-240	1.78E+04	3.83E+04		
Pu-241	6.70E+05	3.22E+06		
Pu-242	9.65E+01	1.63E+02		
Ra-226	2.18E-03	4.35E-03		
Ra-228	1.04E-02	2.08E-02		
Ru-106	2.85E-04	5.71E-04		
Se-79	1.63E+01	3.22E+01		
Sn-126	2.92E+01	5.76E+01		
Sr-90	1.05E+06	2.07E+06		
Tc-99	5.31E+02	1.05E+03		
Th-229	3.91E-02	7.82E-02		
Th-230	1.57E-01	3.13E-01		
Th-232	1.04E-02	2.08E-02		
Tl-208	1.47E+00	2.94E+00		
U-232	3.99E+00	7.97E+00		
U-233	6.25E+00	1.25E+01		
U-234	2.74E+02	5.46E+02		
U-235	1.17E+01	2.31E+01		
U-236	1.21E+01	2.40E+01		
U-238	1.62E+01	1.85E+01		
Y-90	1.05E+06	2.07E+06		
Other Radionuclides	2.07E+06	4.11E+06		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
3.16E+04	6.24E+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

2030 Summary, TSPA Category 2: Pu/U Alloy

Radionuclide	Nominal Fuel Inventories(CI)	Bounding Fuel Inventories(CI)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.74E-02	2.98E-02	Avg. MeV	
Am-241	1.49E+04	1.49E+04	0.0150	2.976E+16
Am-242m	1.95E+00	1.95E+00	0.0250	6.155E+15
Am-243	1.30E+00	1.30E+00	0.0375	5.421E+15
C-14	7.12E+02	7.14E+02	0.0575	5.928E+15
Cl-36	5.96E-03	1.19E-02	0.0850	3.456E+15
Cm-243	1.53E-01	1.54E-01	0.1250	2.244E+15
Cm-244	2.10E+00	2.10E+00	0.2250	2.974E+15
Co-60	8.14E+02	8.41E+02	0.3750	1.295E+15
Cs-134	5.61E-04	9.12E-04	0.5750	2.315E+16
Cs-135	8.94E+00	1.29E+01	0.8500	2.184E+14
Cs-137	5.38E+05	6.23E+05	1.2500	1.392E+14
Eu-154	3.88E+02	3.92E+02	1.7500	5.640E+12
Eu-155	2.11E+01	3.63E+01	2.2500	9.311E+08
Fe-55	3.52E-02	5.82E-02	2.7500	8.079E+08
H-3	2.93E+03	3.06E+03	3.5000	3.198E+06
I-129	5.74E-01	6.74E-01	5.0000	1.339E+06
Kr-85	4.75E+03	6.03E+03	7.0000	1.503E+05
Np-237	3.96E+00	4.25E+00	11.0000	1.703E+04
Pa-231	2.84E-02	4.97E-02		
Pb-210	9.31E-03	9.31E-03		
Pm-147	2.14E+00	4.05E+00		
Pu-238	3.22E+03	3.23E+03		
Pu-239	1.35E+04	1.52E+04		
Pu-240	5.27E+03	5.28E+03		
Pu-241	2.18E+04	2.18E+04		
Pu-242	1.29E+00	1.29E+00		
Ra-226	1.87E-02	1.88E-02		
Ra-228	7.56E-04	7.58E-04		
Ru-106	8.91E-10	1.78E-09		
Se-79	9.36E+00	1.08E+01		
Sn-126	1.09E+01	1.42E+01		
Sr-90	4.65E+05	5.39E+05		
Tc-99	3.18E+02	3.58E+02		
Th-229	4.39E-03	4.39E-03		
Th-230	1.08E+00	1.08E+00		
Th-232	7.56E-04	7.58E-04		
Tl-208	2.24E-02	2.29E-02		
U-232	6.00E-02	6.12E-02		
U-233	5.81E-01	5.82E-01		
U-234	1.48E+03	1.48E+03		
U-235	2.02E+00	2.37E+00		
U-236	1.79E+01	1.91E+01		
U-238	1.33E+00	1.42E+00		
Y-90	4.65E+05	5.39E+05		
Other Radionuclides	5.18E+05	6.04E+05		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
6.97E+03	7.93E+03
Total	Total

Total Canister Usage Summary						
	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	8.7	7.6	0.0	0.0	2.0	0.0

Bare Fuel Transfers	
0	Assemblies

2030 Summary, TSPA Category 3: U/Pu Carbide

Radionuclide	Nominal Fuel Inventories(CI)	Bounding Fuel Inventories(CI)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	5.30E-08	9.72E-08	Avg. MeV	
Am-241	1.09E+03	1.88E+03	0.0150	5.043E+14
Am-242m	1.61E+01	2.99E+01	0.0250	1.003E+14
Am-243	9.01E-01	1.67E+00	0.0375	1.165E+14
C-14	2.18E-01	4.05E-01	0.0575	1.162E+14
Cl-36	2.87E-06	5.32E-06	0.0850	5.579E+13
Cm-243	3.36E+00	6.27E+00	0.1250	3.922E+13
Cm-244	1.31E+01	2.46E+01	0.2250	4.504E+13
Co-60	2.76E+01	5.21E+01	0.3750	1.952E+13
Cs-134	1.25E+01	2.37E+01	0.5750	7.914E+14
Cs-135	4.00E-01	7.41E-01	0.8500	8.206E+12
Cs-137	1.16E+04	2.16E+04	1.2500	9.786E+12
Eu-154	1.31E+02	2.47E+02	1.7500	2.222E+11
Eu-155	1.11E+02	2.09E+02	2.2500	4.427E+07
Fe-55	3.06E+00	5.78E+00	2.7500	2.567E+08
H-3	3.13E+01	5.89E+01	3.5000	1.178E+06
I-129	1.08E-02	2.00E-02	5.0000	3.993E+05
Kr-85	2.26E+02	4.26E+02	7.0000	4.558E+04
Np-237	3.17E-02	5.85E-02	11.0000	5.213E+03
Pa-231	1.06E-07	1.96E-07		
Pb-210	2.16E-08	3.89E-08		
Pm-147	1.26E+02	2.38E+02		
Pu-238	1.22E+02	2.28E+02		
Pu-239	1.02E+03	1.31E+03		
Pu-240	8.42E+02	9.90E+02		
Pu-241	1.85E+04	3.00E+04		
Pu-242	2.73E-01	3.53E-01		
Ra-226	6.89E-08	1.25E-07		
Ra-228	2.06E-12	3.79E-12		
Ru-106	1.21E-01	2.29E-01		
Se-79	8.49E-02	1.57E-01		
Sn-126	3.68E-01	6.82E-01		
Sr-90	4.14E+03	7.73E+03		
Tc-99	3.30E+00	6.13E+00		
Th-229	2.32E-08	4.26E-08		
Th-230	8.98E-06	1.65E-05		
Th-232	2.71E-12	4.98E-12		
Tl-208	3.89E-03	7.23E-03		
U-232	1.05E-02	1.96E-02		
U-233	4.90E-06	9.01E-06		
U-234	3.64E-02	6.73E-02		
U-235	2.05E-04	2.70E-04		
U-236	1.52E-03	2.82E-03		
U-238	1.82E-02	1.97E-02		
Y-90	4.14E+03	7.73E+03		
Other Radionuclides	1.17E+04	2.18E+04		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.85E+02	3.04E+02
Total	Total

Total Canister Usage Summary						
	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	1.2	2.3	0.0	0.0	1.0	0.0

Bare Fuel Transfers	
0	Assemblies

2030 Summary, TSPA Category 4: MOX

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	2.31E-01	4.03E-01	Avg. MeV	
Am-241	9.30E+05	1.62E+06	0.0150	2.031E+17
Am-242m	3.37E+03	6.13E+03	0.0250	3.990E+16
Am-243	1.62E+03	2.82E+03	0.0375	3.761E+16
C-14	1.12E+04	1.95E+04	0.0575	5.782E+16
Cl-36	2.12E+02	3.68E+02	0.0850	2.161E+16
Cm-243	4.56E+02	8.52E+02	0.1250	1.538E+16
Cm-244	1.12E+04	1.91E+04	0.2250	1.831E+16
Co-60	6.53E+05	9.30E+05	0.3750	7.923E+15
Cs-134	1.47E+03	2.83E+03	0.5750	1.871E+17
Cs-135	8.80E+01	1.60E+02	0.8500	3.159E+15
Cs-137	2.82E+06	5.06E+06	1.2500	7.122E+16
Eu-154	6.04E+04	1.00E+05	1.7500	9.128E+13
Eu-155	1.45E+04	2.71E+04	2.2500	3.706E+11
Fe-55	4.28E+03	5.07E+03	2.7500	4.656E+11
H-3	1.50E+04	2.56E+04	3.5000	4.222E+08
I-129	2.26E+00	4.11E+00	5.0000	1.667E+08
Kr-85	5.21E+04	9.20E+04	7.0000	1.899E+07
Np-237	1.89E+01	3.33E+01	11.0000	2.168E+06
Pa-231	2.66E-01	4.62E-01		
Pb-210	4.11E-03	7.33E-03		
Pm-147	1.50E+04	2.87E+04		
Pu-238	1.52E+05	2.53E+05		
Pu-239	1.74E+05	2.12E+05		
Pu-240	1.28E+05	1.67E+05		
Pu-241	4.57E+06	1.32E+07		
Pu-242	1.76E+02	1.97E+02		
Ra-226	9.46E-03	1.68E-02		
Ra-228	5.57E-02	9.68E-02		
Ru-106	1.42E+01	2.74E+01		
Se-79	2.78E+01	4.97E+01		
Sn-126	5.90E+01	1.09E+02		
Sr-90	1.84E+06	3.23E+06		
Tc-99	1.02E+03	1.82E+03		
Th-229	2.03E-01	3.57E-01		
Th-230	6.84E-01	1.20E+00		
Th-232	5.58E-02	9.69E-02		
Tl-208	7.62E+00	1.32E+01		
U-232	2.06E+01	3.58E+01		
U-233	3.35E+01	5.81E+01		
U-234	1.19E+03	2.07E+03		
U-235	5.40E+01	9.33E+01		
U-236	2.19E+01	3.81E+01		
U-238	1.34E+01	2.15E+01		
Y-90	1.84E+06	3.23E+06		
Other Radionuclides	6.26E+06	1.10E+07		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
8.41E+04	1.39E+05
Total	Total

Total Canister Usage Summary						
	18" x 10"	18" x 15"	24" x 10"	24" x 15"	HIC	MCO
Number of Canisters	13.3	127.5	0.0	0.0	5.0	0.0

Bare Fuel Transfers		BWR	PWR
3	Assemblies	3	0

2030 Summary, TSPA Category 5: U/Th Carbide

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.68E+00	7.82E+00	Avg. MeV	
Am-241	2.92E+03	6.19E+03	0.0150	1.215E+17
Am-242m	2.16E+00	4.56E+00	0.0250	2.486E+16
Am-243	4.24E+01	8.99E+01	0.0375	2.164E+16
C-14	2.13E+01	4.51E+01	0.0575	2.331E+16
Cl-36	9.82E-01	2.08E+00	0.0850	1.407E+16
Cm-243	2.09E+01	4.38E+01	0.1250	9.422E+15
Cm-244	5.05E+03	1.05E+04	0.2250	1.220E+16
Co-60	2.93E+02	5.92E+02	0.3750	5.277E+15
Cs-134	2.32E+01	4.65E+01	0.5750	8.594E+16
Cs-135	2.27E+01	4.82E+01	0.8500	1.272E+15
Cs-137	1.10E+06	2.30E+06	1.2500	7.679E+14
Eu-154	1.10E+04	2.25E+04	1.7500	3.899E+13
Eu-155	6.72E+02	1.36E+03	2.2500	2.968E+09
Fe-55	2.74E-02	5.49E-02	2.7500	3.872E+13
H-3	2.90E+03	5.98E+03	3.5000	1.652E+08
I-129	9.29E-01	1.97E+00	5.0000	7.040E+07
Kr-85	2.87E+04	5.90E+04	7.0000	8.087E+06
Np-237	1.16E+01	2.45E+01	11.0000	9.271E+05
Pa-231	4.36E+00	9.25E+00		
Pb-210	1.55E-03	3.34E-03		
Pm-147	9.28E+01	1.86E+02		
Pu-238	1.44E+05	3.04E+05		
Pu-239	1.25E+02	2.65E+02		
Pu-240	2.51E+02	5.33E+02		
Pu-241	1.47E+04	3.04E+04		
Pu-242	3.58E+00	7.59E+00		
Ra-226	2.99E-03	6.44E-03		
Ra-228	8.46E-01	1.79E+00		
Ru-106	2.39E-05	4.79E-05		
Se-79	1.94E+01	4.12E+01		
Sn-126	2.04E+01	4.33E+01		
Sr-90	1.05E+06	2.19E+06		
Tc-99	3.07E+02	6.51E+02		
Th-229	1.07E+01	2.29E+01		
Th-230	1.86E-01	3.98E-01		
Th-232	2.63E+00	2.70E+00		
Ti-208	5.23E+02	1.10E+03		
U-232	1.42E+03	2.99E+03		
U-233	1.90E+03	4.02E+03		
U-234	2.68E+02	5.69E+02		
U-235	3.81E+00	5.40E+00		
U-236	7.94E+00	1.68E+01		
U-238	4.85E-02	5.37E-02		
Y-90	1.05E+06	2.19E+06		
Other Radionuclides	1.06E+06	2.21E+06		
			Thermal Power	
			Nominal Heat	
			Output (Watts)	Bounding Heat Output (Watts)
			1.79E+04	3.76E+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	567.3	0.0	0.0	1.0	0.0

Bare Fuel Transfers	
0	Assemblies

2030 Summary, TSPA Category 6: U/Th Oxide

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	5.39E+01	1.09E+02	Avg. MeV	
Am-241	7.77E+03	1.55E+04	0.0150	9.001E+16
Am-242m	1.60E+01	3.21E+01	0.0250	1.851E+16
Am-243	1.49E+01	2.99E+01	0.0375	1.583E+16
C-14	1.60E+02	3.21E+02	0.0575	1.749E+16
Cl-36	3.06E+00	6.14E+00	0.0850	1.103E+16
Cm-243	9.44E-01	1.89E+00	0.1250	6.934E+15
Cm-244	1.60E+02	3.20E+02	0.2250	9.894E+15
Co-60	2.58E+04	5.17E+04	0.3750	3.972E+15
Cs-134	1.24E+01	2.52E+01	0.5750	6.079E+16
Cs-135	1.61E+01	3.26E+01	0.8500	1.111E+15
Cs-137	7.94E+05	1.61E+06	1.2500	4.261E+15
Eu-154	5.38E+03	1.09E+04	1.7500	7.561E+13
Eu-155	3.80E+02	7.70E+02	2.2500	2.207E+10
Fe-55	2.66E+02	5.32E+02	2.7500	5.338E+14
H-3	1.29E+03	2.62E+03	3.5000	7.126E+06
I-129	8.77E-01	1.78E+00	5.0000	2.799E+06
Kr-85	3.18E+04	6.47E+04	7.0000	2.938E+05
Np-237	2.11E-01	4.24E-01	11.0000	3.185E+04
Pa-231	6.57E-01	1.33E-02		
Pb-210	8.13E-03	1.65E-02		
Pm-147	1.39E-02	2.82E-02		
Pu-238	2.92E+03	5.86E+03		
Pu-239	3.92E+02	7.84E+02		
Pu-240	2.74E+02	5.47E+02		
Pu-241	4.48E+04	8.96E+04		
Pu-242	2.24E+00	4.49E+00		
Ra-226	1.23E-02	2.50E-02		
Ra-228	2.53E+00	5.13E+00		
Ru-106	7.92E-04	1.59E-03		
Se-79	1.95E+01	3.96E+01		
Sn-126	2.19E+01	4.45E+01		
Sr-90	8.00E+05	1.62E+06		
Tc-99	1.84E+02	3.73E+02		
Th-229	3.67E+01	7.43E+01		
Th-230	6.39E-01	1.30E+00		
Th-232	5.29E+00	5.34E+00		
Tl-208	7.49E+03	1.52E+04		
U-232	2.03E+04	4.12E+04		
U-233	1.61E+04	1.80E+04		
U-234	4.59E+02	9.30E+02		
U-235	5.59E-01	1.11E+00		
U-236	2.85E-01	5.72E-01		
U-238	1.07E-01	2.12E-01		
Y-90	8.00E+05	1.62E+06		
Other Radionuclides	9.33E+05	1.89E+06		
			Thermal Power	
			Nominal Heat	
			Output	Bounding Heat
			(Watts)	Output (Watts)
			1.56E+04	3.11E+04
			Total	Total

Total Canister Usage Summary						
	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	10.8	13.0	0.0	27.0	9.0	0.0

Bare Fuel Transfers	
0	Assemblies

2030 Summary, TSPA Category 7: U-Metal

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.06E-02	1.69E-02	Avg. MeV	
Am-241	7.52E+05	1.48E+06	0.0150	5.175E+17
Am-242m	4.40E+02	8.76E+02	0.0250	1.052E+17
Am-243	3.80E+02	7.52E+02	0.0375	9.679E+16
C-14	3.09E+03	3.75E+03	0.0575	1.168E+17
Cl-36	3.72E+01	3.73E+01	0.0850	5.816E+16
Cm-243	1.46E+01	2.85E+01	0.1250	3.804E+16
Cm-244	3.66E+03	7.21E+03	0.2250	4.981E+16
Co-60	1.04E+04	1.05E+04	0.3750	2.161E+16
Cs-134	5.69E+01	5.76E+01	0.5750	4.687E+17
Cs-135	7.84E+01	1.52E+02	0.8500	4.025E+15
Cs-137	6.54E+06	1.27E+07	1.2500	2.518E+15
Eu-154	1.50E+04	2.97E+04	1.7500	1.077E+14
Eu-155	6.41E+02	9.16E+02	2.2500	8.468E+11
Fe-55	1.66E+02	1.67E+02	2.7500	1.137E+10
H-3	9.79E+03	1.69E+04	3.5000	1.416E+09
I-129	6.67E+00	1.29E+01	5.0000	1.340E+08
Kr-85	7.81E+04	1.52E+05	7.0000	1.519E+07
Np-237	7.01E+01	1.36E+02	11.0000	1.731E+06
Pa-231	2.01E-02	3.40E-02		
Pb-210	7.84E-03	8.40E-03		
Pm-147	1.21E+04	1.22E+04		
Pu-238	1.37E+05	2.69E+05		
Pu-239	2.22E+05	4.31E+05		
Pu-240	1.71E+05	3.37E+05		
Pu-241	2.20E+06	4.36E+06		
Pu-242	1.11E+02	2.20E+02		
Ra-226	1.64E-02	1.80E-02		
Ra-228	5.17E-04	5.18E-04		
Ru-106	1.06E+03	1.06E+03		
Se-79	8.73E+01	1.66E+02		
Sn-126	9.17E+00	1.14E+01		
Sr-90	4.65E+06	8.97E+06		
Tc-99	2.89E+03	5.54E+03		
Th-229	3.18E-03	3.22E-03		
Th-230	1.03E+00	1.21E+00		
Th-232	5.18E-04	5.18E-04		
Tl-208	3.91E-02	5.41E-02		
U-232	1.05E-01	1.46E-01		
U-233	4.31E-01	4.44E-01		
U-234	1.64E+03	2.12E+03		
U-235	4.78E+01	5.73E+01		
U-236	1.00E+02	1.86E+02		
U-238	7.00E+02	7.02E+02		
Y-90	4.65E+06	8.97E+06		
Other Radionuclides	6.82E+06	1.28E+07		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.05E+05	2.04E+05
Total	Total

Total Canister Usage Summary						
	16" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	13.7	1.4	0.0	0.0	2.0	401.0

Bare Fuel Transfers	
0	Assemblies

2030 Summary, TSPA Category 8: U-Oxide

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	3.19E-02	5.04E-02	Avg. MeV	
Am-241	4.94E+05	9.35E+05	0.0150	3.44E+17
Am-242m	8.82E+02	1.71E+03	0.0250	6.97E+16
Am-243	1.95E+03	3.79E+03	0.0375	6.47E+16
C-14	2.98E+03	3.46E+03	0.0575	7.69E+16
Cl-36	4.42E+01	5.20E+01	0.0850	3.86E+16
Cm-243	6.28E+02	1.22E+03	0.1250	2.60E+16
Cm-244	1.11E+05	2.16E+05	0.2250	3.31E+16
Co-60	5.60E+04	7.73E+04	0.3750	1.43E+16
Cs-134	1.11E+03	2.22E+03	0.5750	3.12E+17
Cs-135	6.88E+01	1.20E+02	0.8500	3.66E+15
Cs-137	4.78E+06	8.45E+06	1.2500	7.89E+15
Eu-154	3.75E+04	7.18E+04	1.7500	1.02E+14
Eu-155	3.20E+03	5.93E+03	2.2500	1.53E+12
Fe-55	9.58E+03	1.87E+04	2.7500	6.44E+10
H-3	4.65E+04	8.65E+04	3.5000	5.01E+09
I-129	3.93E+00	7.01E+00	5.0000	1.36E+09
Kr-85	7.92E+04	1.37E+05	7.0000	1.56E+08
Np-237	4.13E+01	7.59E+01	11.0000	1.80E+07
Pa-231	5.07E-02	7.77E-02		
Pb-210	8.70E-03	9.29E-03		
Pm-147	9.75E+03	1.90E+04		
Pu-238	2.23E+05	4.29E+05		
Pu-239	5.13E+04	8.61E+04		
Pu-240	5.30E+04	9.75E+04		
Pu-241	1.99E+06	3.81E+06		
Pu-242	2.04E+02	3.95E+02		
Ra-226	1.77E-02	1.90E-02		
Ra-228	1.97E-03	3.36E-03		
Ru-106	8.83E+02	1.77E+03		
Se-79	5.51E+01	9.51E+01		
Sn-126	9.20E+01	1.69E+02		
Sr-90	3.44E+06	5.92E+06		
Tc-99	1.76E+03	3.05E+03		
Th-229	1.03E-02	1.70E-02		
Th-230	1.04E+00	1.14E+00		
Th-232	1.97E-03	3.36E-03		
Th-208	6.79E-01	1.30E+00		
U-232	1.84E+00	3.52E+00		
U-233	1.37E+00	2.27E+00	Thermal Power	
U-234	1.48E+03	1.66E+03	Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
U-235	1.14E+01	1.80E+01	7.90E+04	1.42E+05
U-236	4.89E+01	7.61E+01	Total	Total
U-238	5.82E+01	5.93E+01		
Y-90	3.44E+06	5.93E+06		
Other Radionuclides	5.33E+06	9.00E+06		

Total Canister Usage Summary						
	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	250.6	486.7	0.0	0.0	134.8	18.0

Bare Fuel Transfers		BWR	PWR
163	Assemblies	84	79

2030 Summary, TSPA Category 9: AI-Based Fuel

Radionuclide	Nominal Fuel Inventories(Ci)	Bounding Fuel Inventories(Ci)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	5.85E-03	1.15E-02	Avg. MeV	
Am-241	3.16E+04	6.07E+04	0.0150	1.139E+18
Am-242m	9.33E+00	1.82E+01	0.0250	2.400E+17
Am-243	3.85E+01	6.73E+01	0.0375	2.149E+17
C-14	1.53E+00	3.03E+00	0.0575	2.222E+17
Cl-36	1.46E-03	2.90E-03	0.0850	1.369E+17
Cm-243	6.11E+00	1.08E+01	0.1250	1.035E+17
Cm-244	3.17E+03	5.22E+03	0.2250	1.173E+17
Co-60	2.33E+02	4.43E+02	0.3750	5.336E+16
Cs-134	6.56E+05	1.18E+06	0.5750	8.182E+17
Cs-135	2.13E+01	4.05E+01	0.8500	5.335E+16
Cs-137	1.08E+07	2.01E+07	1.2500	1.314E+16
Eu-154	1.94E+05	3.53E+05	1.7500	5.695E+14
Eu-155	6.75E+04	1.21E+05	2.2500	7.430E+14
Fe-55	1.06E+04	1.92E+04	2.7500	4.284E+12
H-3	2.68E+04	4.94E+04	3.5000	4.743E+11
I-129	4.00E+00	7.58E+00	5.0000	3.799E+07
Kr-85	6.61E+05	1.21E+06	7.0000	4.340E+06
Np-237	6.39E+01	1.17E+02	11.0000	4.959E+05
Pa-231	1.36E-02	2.66E-02		
Pb-210	7.41E-04	1.47E-03		
Pm-147	3.46E+06	6.22E+06		
Pu-238	1.85E+05	3.27E+05		
Pu-239	1.01E+04	1.98E+04		
Pu-240	5.35E+03	1.05E+04		
Pu-241	5.02E+05	9.53E+05		
Pu-242	6.04E+00	1.12E+01		
Ra-226	2.12E-03	4.19E-03		
Ra-228	7.74E-06	1.54E-05		
Ru-106	2.54E+05	4.56E+05		
Se-79	6.95E+01	1.32E+02		
Sn-126	6.17E+01	1.17E+02		
Sr-90	1.01E+07	1.89E+07		
Tc-99	2.27E+03	4.31E+03		
Th-229	4.97E-05	9.70E-05		
Th-230	2.28E-01	4.46E-01		
Th-232	8.17E-06	1.62E-05		
Tl-208	2.07E-01	3.87E-01		
U-232	5.78E-01	1.08E+00		
U-233	1.99E-02	3.81E-02		
U-234	7.63E+02	1.45E+03		
U-235	2.21E+01	3.68E+01		
U-236	8.31E+01	1.57E+02		
U-238	3.50E+00	3.54E+00		
Y-90	1.01E+07	1.89E+07		
Other Radionuclides	1.35E+07	2.48E+07		

Thermal Power	
Nominal Heat Output (Watts)	Bounding Heat Output (Watts)
1.52E+05	2.83E+05
Total	Total

Total Canister Usage Summary						
	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	NICO
Number of Canisters	1012.2	235.8	165.3	0.0	2.0	0.0

Bare Fuel Transfers	
0	Assemblies

2030 Summary, TSPA Category 10: Miscellaneous SNF

Radionuclide	Nominal Fuel Inventories(CI)	Bounding Fuel Inventories(CI)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	1.27E-02	1.64E-02	Avg. MeV	
Am-241	2.75E+03	5.47E+03	0.0150	6.668E+15
Am-242m	6.11E+00	1.20E+01	0.0250	1.378E+15
Am-243	1.46E+01	1.96E+01	0.0375	1.211E+15
C-14	3.87E+01	7.54E+01	0.0575	1.354E+15
Cl-36	7.00E-01	1.40E+00	0.0850	7.740E+14
Cm-243	4.71E-01	9.01E-01	0.1250	5.026E+14
Cm-244	1.89E+01	3.76E+01	0.2250	6.640E+14
Co-60	4.67E+02	7.38E+02	0.3750	2.892E+14
Cs-134	1.36E+00	2.49E+00	0.5750	5.142E+15
Cs-135	4.40E+00	4.56E+00	0.8500	4.927E+13
Cs-137	1.34E+05	1.38E+05	1.2500	7.261E+13
Eu-154	7.39E+01	1.28E+02	1.7500	1.284E+12
Eu-155	1.45E+02	1.55E+02	2.2500	4.251E+08
Fe-55	1.84E+00	2.31E+00	2.7500	2.459E+10
H-3	3.51E+02	3.69E+02	3.5000	8.881E+05
I-129	1.12E-01	1.16E-01	5.0000	3.618E+05
Kr-85	3.68E+03	3.73E+03	7.0000	4.078E+04
Np-237	3.77E-01	4.42E-01	11.0000	4.626E+03
Pa-231	2.19E-02	2.61E-02		
Pb-210	2.48E-05	4.88E-05		
Pm-147	1.22E+02	1.33E+02		
Pu-238	6.76E+02	1.35E+03		
Pu-239	2.08E+03	2.22E+03		
Pu-240	1.90E+02	2.88E+02		
Pu-241	5.75E+03	1.09E+04		
Pu-242	7.15E-01	1.40E+00		
Ra-226	5.07E-05	9.92E-05		
Ra-228	3.12E-04	6.21E-04		
Ru-106	1.26E-02	2.36E-02		
Se-79	1.62E+00	1.68E+00		
Sn-126	3.61E+00	3.70E+00		
Sr-90	1.17E+05	1.20E+05		
Tc-99	4.45E+01	4.69E+01		
Th-229	3.07E-03	6.14E-03		
Th-230	3.04E-03	5.86E-03		
Th-232	2.73E-02	2.73E-02		
Tl-208	3.51E-01	7.00E-01		
U-232	9.49E-01	1.90E+00		
U-233	8.66E+01	8.68E+01		
U-234	4.40E+00	8.33E+00		
U-235	2.09E-01	5.02E-01		
U-236	1.26E+00	1.33E+00		
U-238	8.60E-02	1.30E-01		
Y-90	1.17E+05	1.20E+05		
Other Radionuclides	1.43E+05	1.57E+05		
			Thermal Power	
			Nominal Heat	
			Output	Bounding Heat
			(Watts)	Output (Watts)
			1.64E+03	1.81E+03
			Total	Total

Total Canister Usage Summary						
	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCO
Number of Canisters	1.3	0.1	0.0	0.0	8.0	0.0

Bare Fuel Transfers	
0	Assemblies

2030 Summary, TSPA Category 11: U-Zr-Hx

Radionuclide	Nominal Fuel Inventories(CI)	Bounding Fuel Inventories(CI)	Gamma Sources	
			Photon Energy Group	Total Photons/sec (bounding)
Ac-227	5.51E-04	7.48E-04	Avg. MeV	
Am-241	7.35E+02	1.35E+03	0.0150	2.336E+16
Am-242m	8.97E-01	1.75E+00	0.0250	5.009E+15
Am-243	1.09E+00	2.16E+00	0.0375	4.507E+15
C-14	1.51E+01	2.66E+01	0.0575	4.552E+15
Cf-252	3.19E-01	5.59E-01	0.0850	2.816E+15
Cm-243	8.90E-01	1.76E+00	0.1250	2.234E+15
Cm-244	8.06E+01	1.60E+02	0.2250	2.403E+15
Co-60	5.07E+04	1.02E+05	0.3750	1.130E+15
Cs-134	1.12E+04	2.25E+04	0.5750	1.712E+16
Cs-135	3.59E+00	6.28E+00	0.8500	1.299E+15
Cs-137	2.20E+05	4.22E+05	1.2500	8.090E+15
Eu-154	1.05E+04	2.10E+04	1.7500	1.870E+13
Eu-155	3.95E+03	7.91E+03	2.2500	8.505E+12
Fe-55	2.84E+04	5.73E+04	2.7500	7.091E+10
H-3	6.34E+02	1.26E+03	3.5000	8.264E+09
I-129	9.15E-02	1.62E-01	5.0000	1.111E+06
Kr-85	1.39E+04	2.78E+04	7.0000	1.276E+05
Np-237	5.45E-01	1.05E+00	11.0000	1.462E+04
Pa-231	1.01E-03	1.48E-03		
Pb-210	1.94E-07	3.51E-07		
Pm-147	7.48E+04	1.51E+05		
Pu-238	1.71E+03	3.38E+03		
Pu-239	5.50E+02	9.46E+02		
Pu-240	2.34E+02	4.08E+02		
Pu-241	1.24E+04	2.45E+04		
Pu-242	1.96E-01	3.82E-01		
Ra-226	5.20E-07	9.61E-07		
Ra-228	2.15E-05	3.59E-05		
Ru-106	3.94E+03	7.94E+03		
Se-79	1.62E+00	2.88E+00		
Sn-126	1.52E+00	2.70E+00		
Sr-90	2.06E+05	3.94E+05		
Tc-99	5.41E+01	9.56E+01		
Th-229	5.34E-05	8.00E-05		
Th-230	5.46E-05	1.04E-04		
Th-232	2.35E-05	4.00E-05		
Tl-208	5.86E-03	1.13E-02		
U-232	1.63E-02	3.17E-02		
U-233	1.36E-02	2.37E-02	Thermal Power	
U-234	2.07E-01	4.02E-01	Nominal Heat	
U-235	8.40E-01	1.12E+00	Output (Watts)	Bounding Heat Output (Watts)
U-236	1.62E+00	2.88E+00	3.80E+03	7.40E+03
U-238	5.21E-01	5.25E-01	Total	Total
Y-90	2.06E+05	3.95E+05		
Other Radionuclides	2.56E+05	4.94E+05		

Total Canister Usage Summary						
	18" x 10'	18" x 15'	24" x 10'	24" x 15'	HIC	MCD
Number of Canisters	86.9	0.0	0.0	0.0	6.7	0.0

Bare Fuel Transfers	
0	Assemblies