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ORNL/CSD/TM-244

Reactivity and Isotopic Composition of Spent PWR Fuel as a Function of Initial Enrichment, Burnup, and Cooling Time

S. P. Cerne
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P. M. Westfall

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REACTIVITY AND ISOTOPIC COMPOSITION OF SPENT PWR FUEL AS A FUNCTION OF INITIAL ENRICHMENT, BURNUP, AND COOLING TIME

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ABSTRACT

The purpose of this study is to present the reactivity loss of spent PWR fuel due to burnup in terms of the infinite lattice multiplications factor, k_∞. Calculations were performed using the SAS2 and CSAS1 control modules of the SCALE system. The k_∞ values were calculated for all combinations of six enrichments, seven burnups, and five cooling times.

The results are presented as a primary function of enrichment in both tabular and graphic form. An equation has been developed to estimate the tabulated values of k_∞'s by specifying enrichment, cooling time, and burnup. Atom densities for fresh fuel, and spent fuel at cooling times of 2, 10, and 20 years are included.

1. INTRODUCTION

At present, criticality analyses of shipping casks for Safety Analyses Reports for Packaging (SARPs) are typically performed using the assumption of fresh fuel. The reduction in reactivity due to fuel burnup is not usually taken into account. However, the application of burnup credit has already been established for uses such as fuel pool storage design. "Applying reactivity equivalence for burnup credit in the design of spent fuel storage racks has been NRC approved in a number of currently operating storage facilities"[1] Much interest has been expressed in qualifying procedures for taking into consideration burnup credit in shipping cask design.[2,3]

This report presents the effects that various enrichments, cooling times, and burnups have on the infinite lattice multiplication factor (k_∞) values of spent fuel. The approach taken was to calculate the k_∞ for a fuel pin cell typical of a Westinghouse 17 x 17 pressurized-water- reactor (PWR) assembly.* Calculations were performed using the SAS2,[4] SAS2H,† and CSAS1[5] control modules of the SCALE[6] computational system. The k_∞ was determined for combinations of six initial enrichments, seven burnups, and five cooling times using the SAS2 module and is presented with the values for the fresh fuel that were calculated with the CSAS1 module.

The results are presented graphically as well as in tables. Atom densities corresponding to cooling times of 2, 10, and 20 years, as well as those of the fresh fuel, are in the Appendix. In addition, an equation is presented to estimate the tabulated value of k_∞ as a function of the enrichment, burnup, and cooling time of a fuel assembly.

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*Assembly specifications: lattice pitch = 1.2598 cm, fuel OD = 0.8357 cm, clad OD = 0.9499 cm, clad thickness = 0.0571 cm, UO_2 density = 9.88 g/cm^3.

†An inhouse version of SAS2.

2. DESCRIPTION OF COMPUTER CODES

The Shielding Analysis Sequence No. 2 (SAS2) control module in SCALE was used to compute fuel depletion and spent fuel decay in all cases except for those with fresh fuel. SAS2 calls several functional modules in the SCALE system during execution. The BONAMI-S[7] and NITAWL-S[8] codes are used for resonance self-shielding of multigroup cross-section data, while XSDRNPM-S[9] performs a discrete ordinates neutron transport analysis that produces cell-weighted cross sections. The COUPLE,[10] code is used to place burnup-dependent cell-weighted cross sections in libraries used by ORIGEN-S[11] for a depletion analysis. Figure 1 shows the computational flow path of the SAS2 control module. Typically, use of the SAS2 module would continue past the final ORIGEN-S case and through all modules for shielding analysis ending with XSDOSE. However, the SAS2 module allows execution to be halted so that data can be saved or altered before the case is restarted. For this study, calculation of the shielding analysis was not performed. The methods and models applied by SAS2 are presented in greater detail elsewhere.[4,6]

A partial verification of the k_∞ computed by SAS2 was performed by comparisons with k_∞ values calculated by SAS2H, an improved version of SAS2. The SAS2H model includes an additional neutronics computation that simulates the effects of water holes (guide tubes) or burnable poisson rods which may be included within fuel assemblies.

The CSAS1 module was used to calculate k_∞ values for fresh fuel. As in SAS2, this control module incorporates the BONAMI-S, NITAWL-S, and XSDRNPM-S codes. Further discussion of this control module can also be found elsewhere.[5,6]

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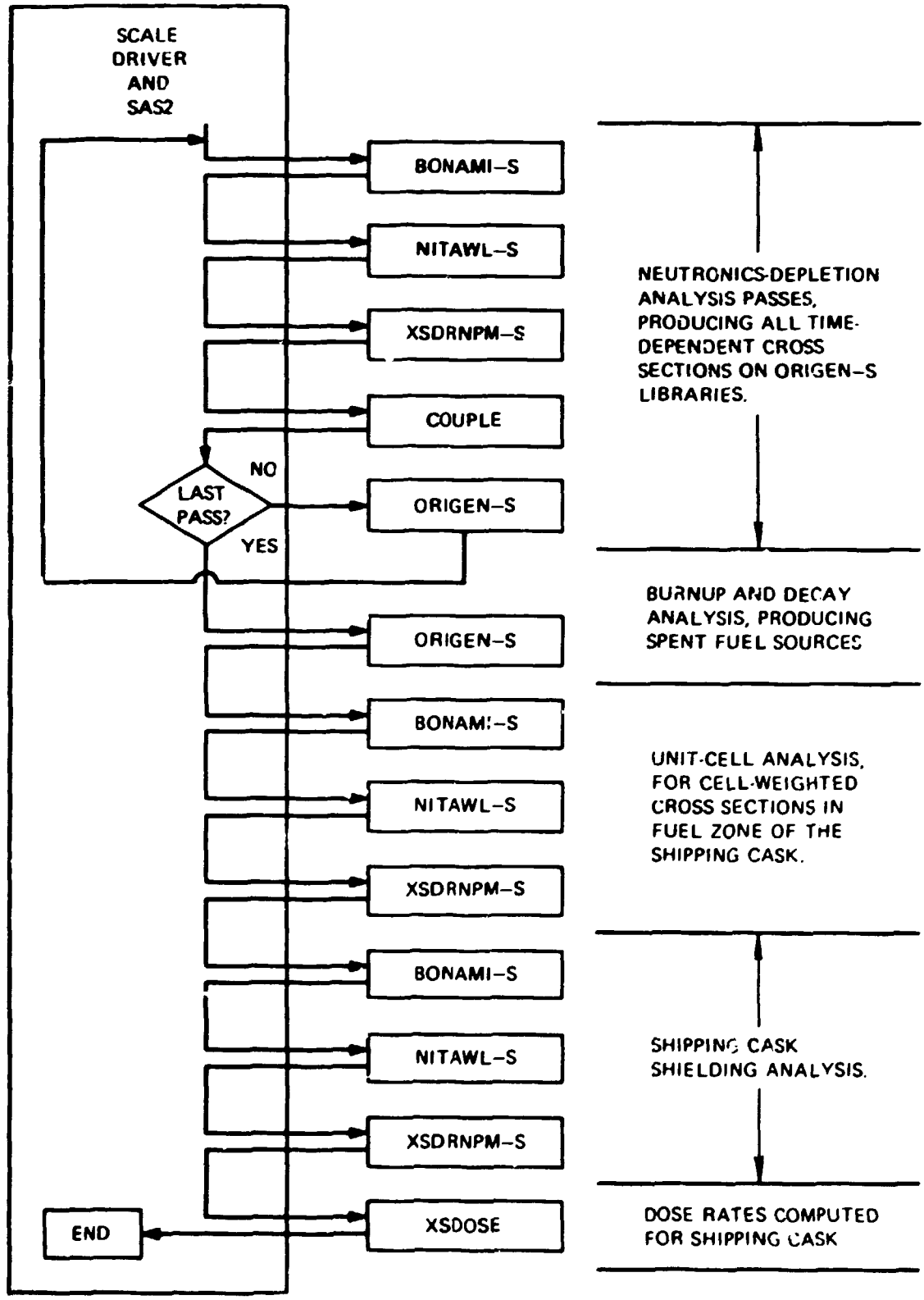

Fig. 1. Basic computational flow path invoked by SAS2.

3. DESCRIPTION OF DATA INPUT

Data input to the codes consisted of weight percents (wt %) for the enrichments, the power history used to obtain a particular burnup, and the cooling time between fuel removal and shipping.

For enrichment variation, values in wt % ^{235}U of 3.00, 3.25, 3.50, 3.75, 4.00, and 4.25 were used. Weight percents were calculated for the ^{234}U and ^{236}U isotopes by using initial fuel inventory ratios from the Yankee Core test fuel assembly.[12] In the calculation of the weight percents, constant ratios to the ^{235}U weight percent were used as follows:

$$^{234}U \text{ wt \%} = 0.0089 \times {}^{235}U \text{ wt \%} \quad (1)$$

$$^{236}U \text{ wt \%} = 0.0046 \times {}^{235}U \text{ wt \%} \quad (2)$$

$$^{238}U \text{ wt \%} = 100 - ({}^{234}U \text{ wt \%} + {}^{235}U \text{ wt \%} + {}^{236}U \text{ wt \%}) \quad (3)$$

The resulting isotopic inventories appear in Table 1 and were used for describing the uranium content of the fuel at each initial enrichment.

Table 1. Weight percents of uranium isotopes in fuel

^{234}U%	^{235}U%	^{236}U%	^{238}U%
0.027	3.00	0.014	96.959
0.029	3.25	0.015	96.706
0.031	3.50	0.016	96.453
0.033	3.75	0.017	96.200
0.036	4.00	0.018	95.946
0.038	4.25	0.020	95.692

Also required were the number of years of exposure and the power at which the assembly was in the reactor. Combinations of years (or cycles) of exposure and power of the assembly provided fuel burnups of 5, 15, 18, 25, 33, 45, and 60 GWd/metric tons of uranium (MTU). In the calculation of the power, the reactor was considered up 293.33 days per year (an 80% uptime). For example, the power for the three-cycle 33-GWd/MTU cases was 37.5 MW/MTU. Given the mass of uranium fuel per assembly (0.4614 MTU), the power per fuel assembly could be calculated. Equations (4)-(6) are used for finding the power for each burnup.

For Burnup = 5 GWd/MTU $\quad$ *Power = Burnup X 0.4614/(2 X 293.33 d)* $\quad$ (4)

For Burnup = 15,18,25,33 GWd/MTU $\quad$ *Power = Burnup X 0.4614/(3 X 293.33 d)* $\quad$ (5)

For Burnup = 45,60 GWd/MTU $\quad$ *Power = Burnup X 0.4614/(4 X 293.33 d)* $\quad$ (6)

Table 2 contains the burnups, assembly powers, and number of cycles in the reactor. In using SAS2, the normal operation of the code makes one pass through all of the modules for each 1-year cycle and then performs a final ORIGEN-S calculation to account for the decay of the fission products in the spent fuel during the cooling time. However, since the k_∞ values calculated by XSDRNPM-S were desired for several

cooling times, the control module was forced to run through an additional zero-power cycle that corresponded to each cooling time in order to calculate these values. To do this, the data were input as if the fuel were in the reactor for five additional cycles. The water moderator density was set to 100% theoretical density for all cooling-cycle calculations. The uptime for these additional cycles was reduced to a negligible amount that did not affect the fuel composition, and the downtime was set equal to the desired number of years cooling (see Fig. 2). By this method, SAS2 was able to provide k_{∞} values at various cooling times for each case of burnup and enrichment without having to run additional cases for each cooling time.

Table 2. Input calculated for burnups

Burnup (GWd/MTU)	Power (MW)	Reactor years
5	3.9324	2
15	7.8648	3
18	9.4377	3
25	13.1080	3
33	17.3025	3
45	17.6957	4
60	23.5943	4

The SAS2 cases were set up to request time-dependent cross sections to be computed by NITAWL-S and XSDRNPM-S for the 13 actinide isotopes and the 23 most dominant fission-product-absorber nuclides. The atom densities computed for these nuclides at 2, 10, and 20 years after fuel discharge are shown in the Appendix.

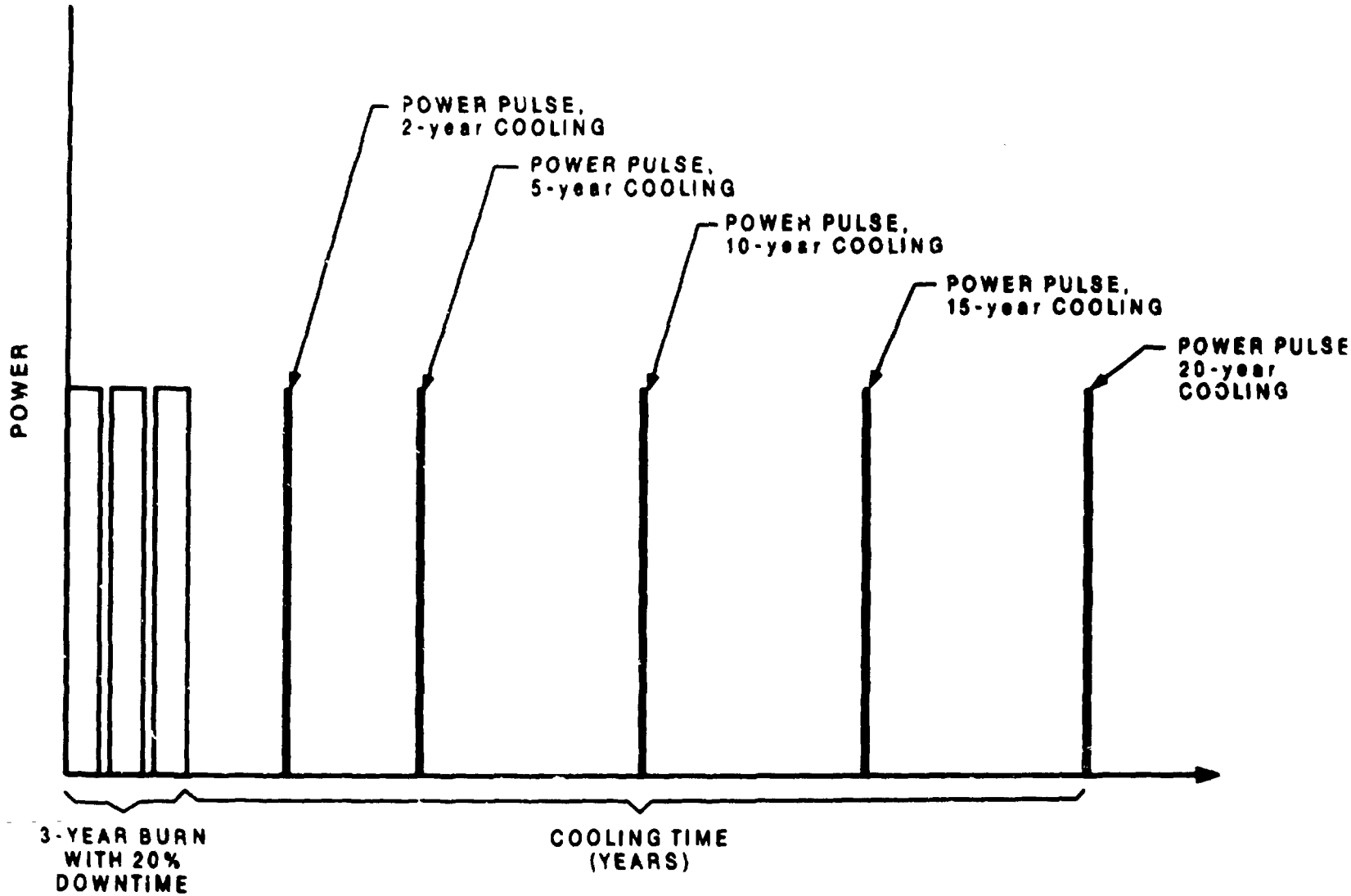

Fig. 2. Fuel history model for SAS2.

4. RESULTS AND DISCUSSIONS

The k_{∞} values were recorded from the output of XSDRNPM-S in the SAS2 and CSAS1 runs. The values for combinations of six enrichments, seven burnups, and five cooling times, as well as the fresh fuel, are shown in Tables 3–8. In addition, the values were plotted in Figs. 3–8. These graphs are presented in order by enrichment, and each has curves ranging from fresh fuel (highest curve) to a burnup of 60 GWd/MTU (lowest curve). Also, an Equation was developed for estimating the tabulated values of k_{∞} as a function of enrichment, burnup, and cooling time. This equation was determined by specifying various forms of an equation, as well as the data points, to the SAS procedure GLM.[13] The best fit of the data, Eq. (7), had an average difference of 0.3% between the estimated results and the actual results. The equation for calculating k_{∞} is the following:

$$\begin{aligned} k_{\infty} = {} & 1.060 - 0.010 \times B - 0.002 \times C + 0.114 \times E + 7.081 \times 10^{-5} \times B^2 \\ & + 7.565 \times 10^{-5} \times C^2 - 0.007 \times E^2 - 2.671 \times 10^{-4} \times B \times E \\ & - 1.145 \times 10^{-4} \times B \times C + 2.318 \times 10^{-4} \times C \times E \\ & + 9.366 \times 10^{-6} \times B \times C \times E, \end{aligned} \tag{7}$$

where B is burnup in GWd/MTU, C is cooling time in years, and E is enrichment in weight percent ^{235}U.

Table 3. k_∞ Values for 3.00 wt % ^{235}U

Fresh Fuel k_∞ = 1.33806 Burnup (GWD/MTU)							
Cooling Time, Years	5	15	18	25	33	45	60
2	1.27998	1.17548	1.14967	1.09536	1.04286	9.81129-01	9.21894-01
5	1.27933	1.16906	1.14108	1.08165	1.02372	9.55787-01	8.90985-01
10	1.27830	1.16025	1.12941	1.06341	9.98773-01	9.23608-01	8.52703-01
15	1.27752	1.15352	1.12053	1.04969	9.80226-01	9.00139-01	8.25277-01
20	1.27697	1.14840	1.11379	1.03928	9.66241-01	8.82598-01	8.04964-01

Table 4. k_∞ Values for 3.25 wt % ^{235}U

Fresh Fuel k_∞ = 1.35602 Burnup (GWD/MTU)							
Cooling Time, Years	5	15	18	25	33	45	60
2	1.29789	1.19344	1.16744	1.11254	1.05881	9.94308-01	9.31419-01
5	1.29736	1.18765	1.15960	1.09977	1.04067	9.69810-01	9.01057-01
10	1.29650	1.17965	1.14891	1.08273	1.01694	9.38644-01	8.63392-01
15	1.29583	1.17354	1.14076	1.06989	9.99295-01	9.15894-01	8.36385-01
20	1.29536	1.16889	1.13458	1.06017	9.86003-01	8.98899-01	8.16382-01

Table 5. k_∞ Values for 3.50 wt % ^{235}U

Fresh Fuel k_∞ = 1.37182 Burnup (GWD/MTU)							
Cooling Time, Years	5	15	18	25	33	45	60
2	1.31403	1.21010	1.18406	1.12879	1.07428	1.00758	9.41381-01
5	1.31361	1.20488	1.17689	1.11690	1.05710	9.83946-01	9.11612-01
10	1.31287	1.19761	1.16708	1.10098	1.03457	9.53811-01	8.74609-01
15	1.31231	1.19203	1.15959	1.08897	1.01780	9.31799-01	8.48060-01
20	1.31191	1.18781	1.15390	1.07987	1.00515	9.15356-01	8.28395-01

Table 6. k_∞ Values for 3.75 wt % ^{235}U

	Fresh Fuel k_∞ = 1.38583 Burnup (GWD/MTU)						
Cooling Time, Years	5	15	18	25	33	45	60
2	1.32865	1.22558	1.19958	1.14482	1.08919	1.02081	9.51729-01
5	1.32831	1.22085	1.19302	1.13374	1.07293	9.98041-01	9.22585-01
10	1.32768	1.21423	1.18400	1.11886	1.05156	9.68960-01	8.86299-01
15	1.32719	1.20913	1.17710	1.10761	1.03563	9.47694-01	8.60244-01
20	1.32686	1.20527	1.17186	1.09910	1.02362	9.31811-01	8.40944-01

Table 7. k_∞ Values for 4.00 wt % ^{235}U

	Fresh Fuel k_∞ = 1.39827 Burnup (GWD/MTU)						
Cooling Time, Years	5	15	18	25	33	45	60
2	1.34186	1.23992	1.21404	1.15938	1.10350	1.03389	9.62356-01
5	1.34159	1.23563	1.20804	1.14906	1.08812	1.01199	9.33874-01
10	1.34106	1.22958	1.19972	1.13514	1.06786	9.83976-01	8.98361-01
15	1.34064	1.22491	1.19335	1.12461	1.05273	9.63458-01	8.72824-01
20	1.34035	1.22138	1.18852	1.11663	1.04133	9.48134-01	8.53913-01

Table 8. k_∞ Values for 4.25 wt % ^{235}U

	Fresh Fuel k_∞ = 1.40949 Burnup (GWD/MTU)						
Cooling Time, Years	5	15	18	25	33	45	60
2	1.35395	1.25329	1.22757	1.17314	1.11714	1.04671	9.73110-01
5	1.35374	1.24939	1.22207	1.16351	1.10261	1.02567	9.45316-01
10	1.35329	1.24365	1.21440	1.15049	1.08340	9.98709-01	9.10600-01
15	1.35293	1.23957	1.20851	1.14061	1.06904	9.78934-01	8.85615-01
20	1.35268	1.23633	1.20404	1.13313	1.05822	9.64162-01	8.67111-01

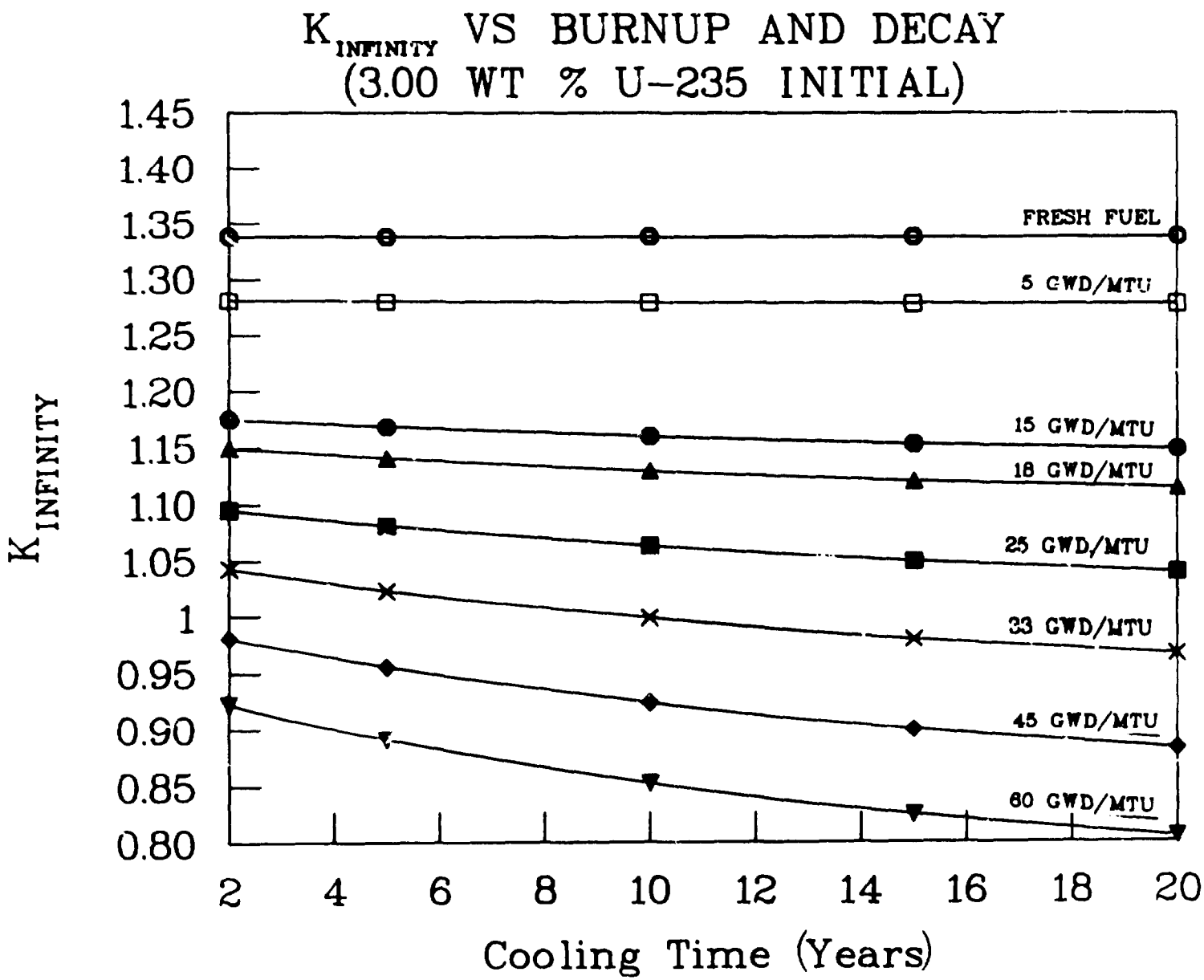

Fig. 3. K_{∞} vs burnup and decay for 3.00 wt % ^{235}U.

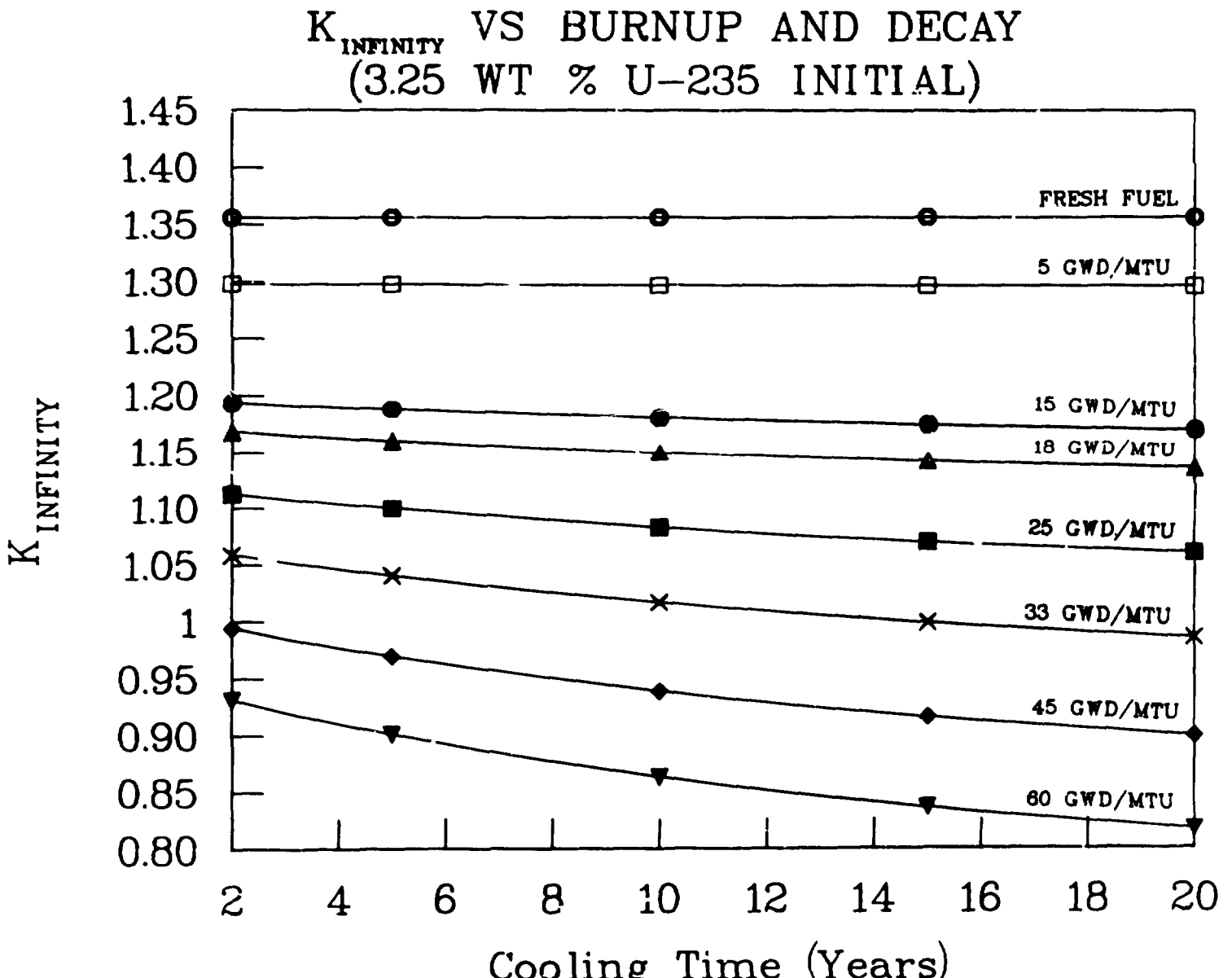

Fig. 4. K_{∞} vs burnup and decay for 3.25 wt % ^{235}U.

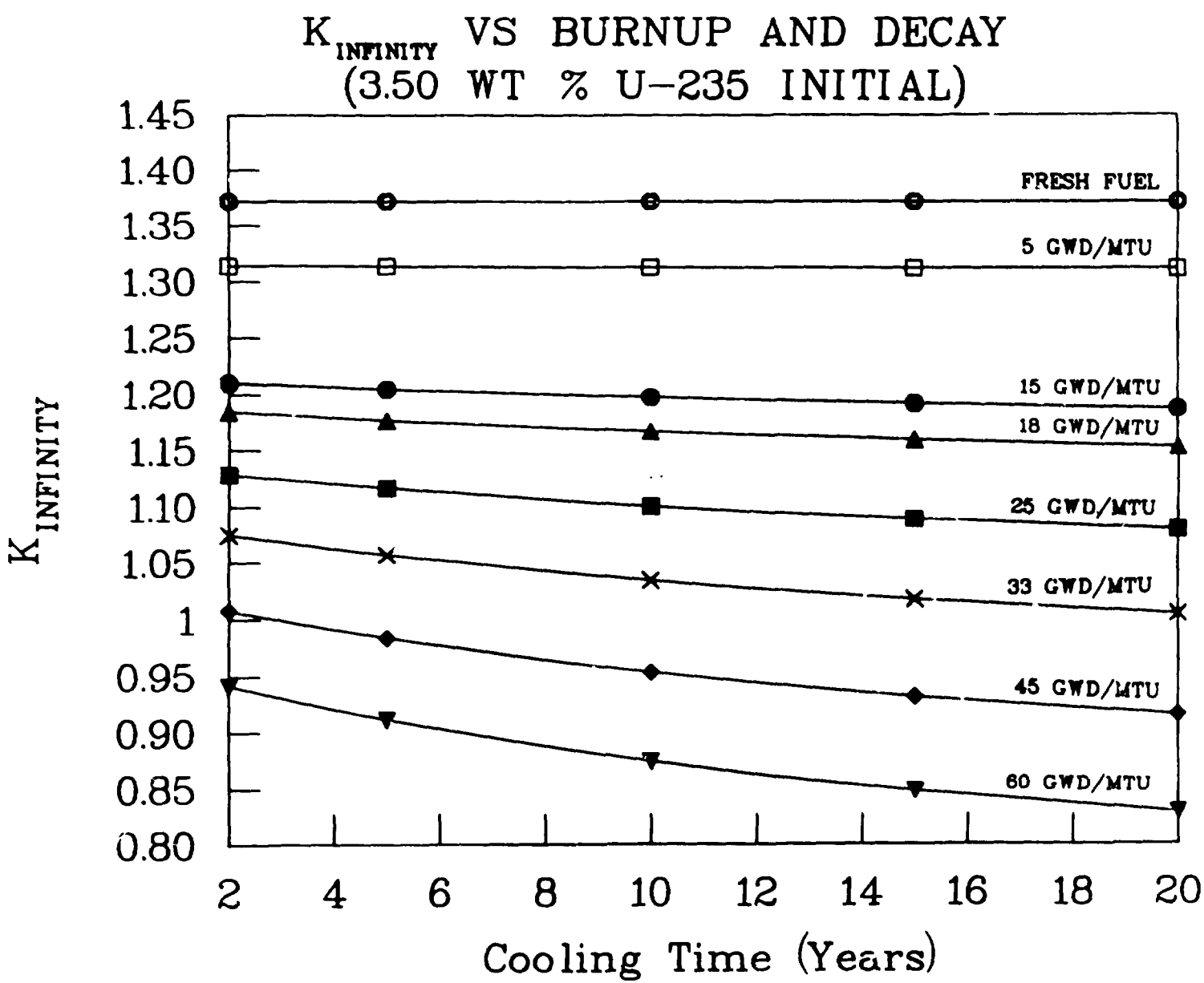

Fig. 5. K_{∞} vs burnup and decay for 3.50 wt % ^{235}U.

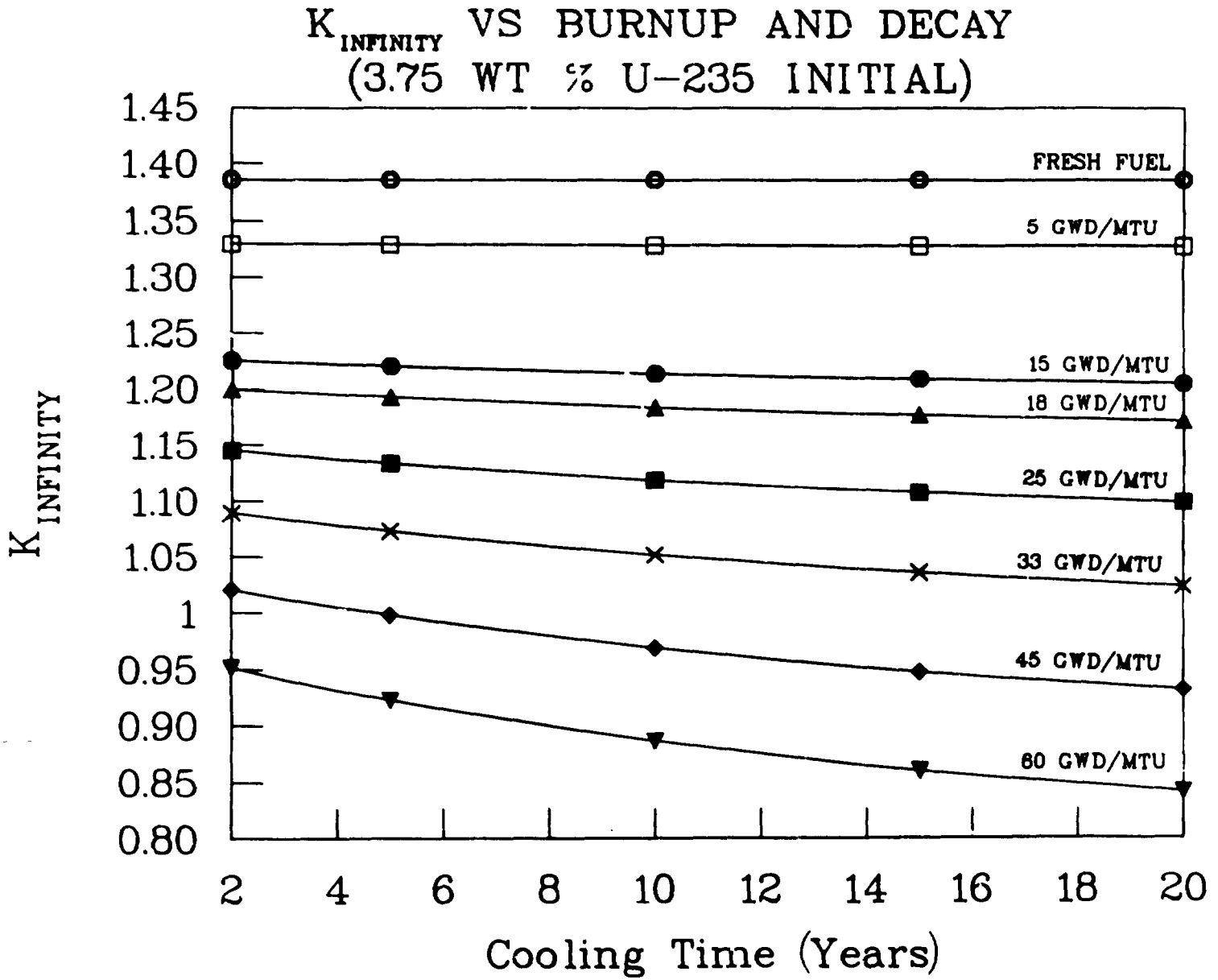

Fig. 6. K_{∞} vs burnup and decay for 3.75 wt % ^{235}U.

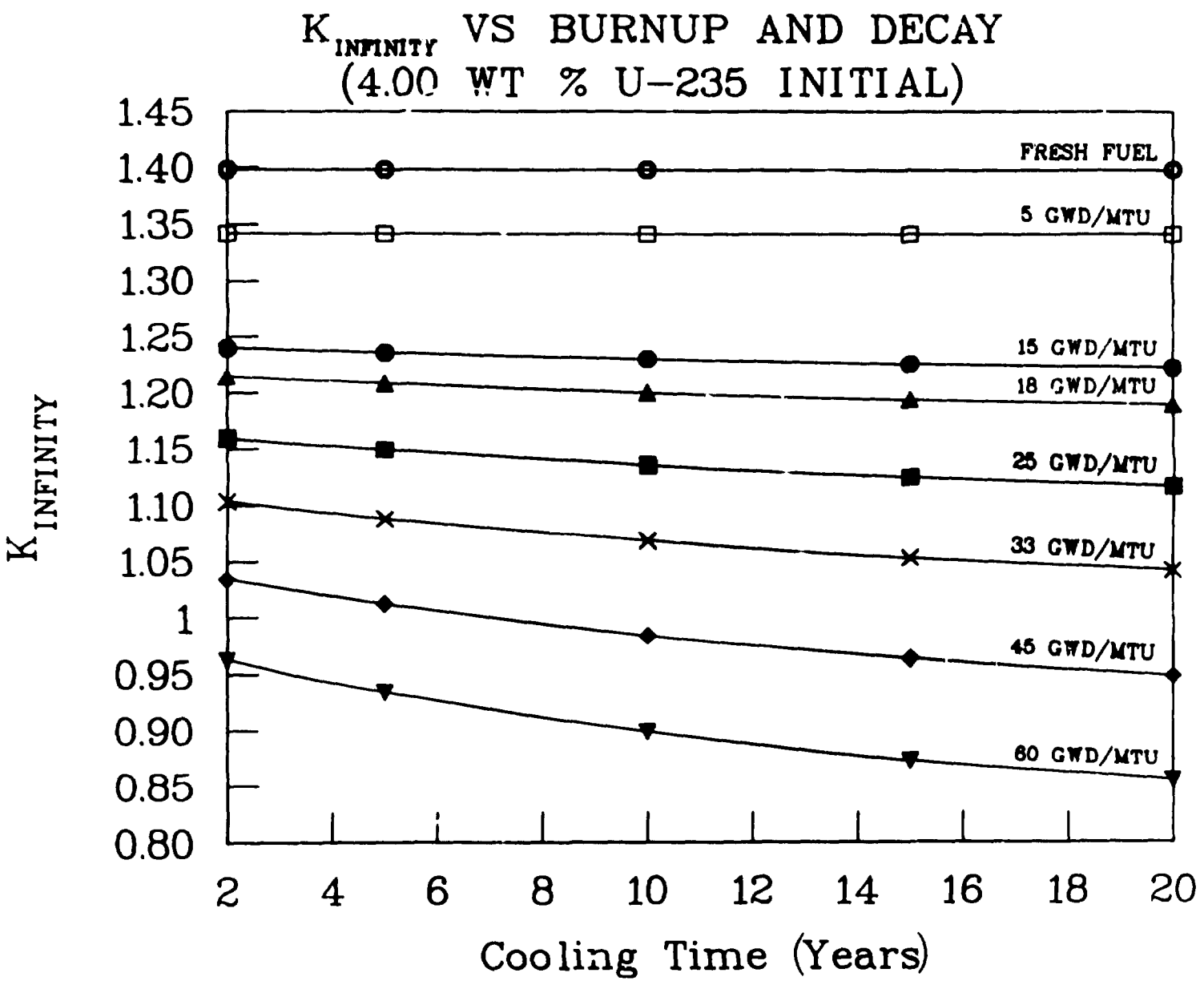

Fig. 7. K_{∞} vs burnup and decay for 4.00 wt % ^{235}U.

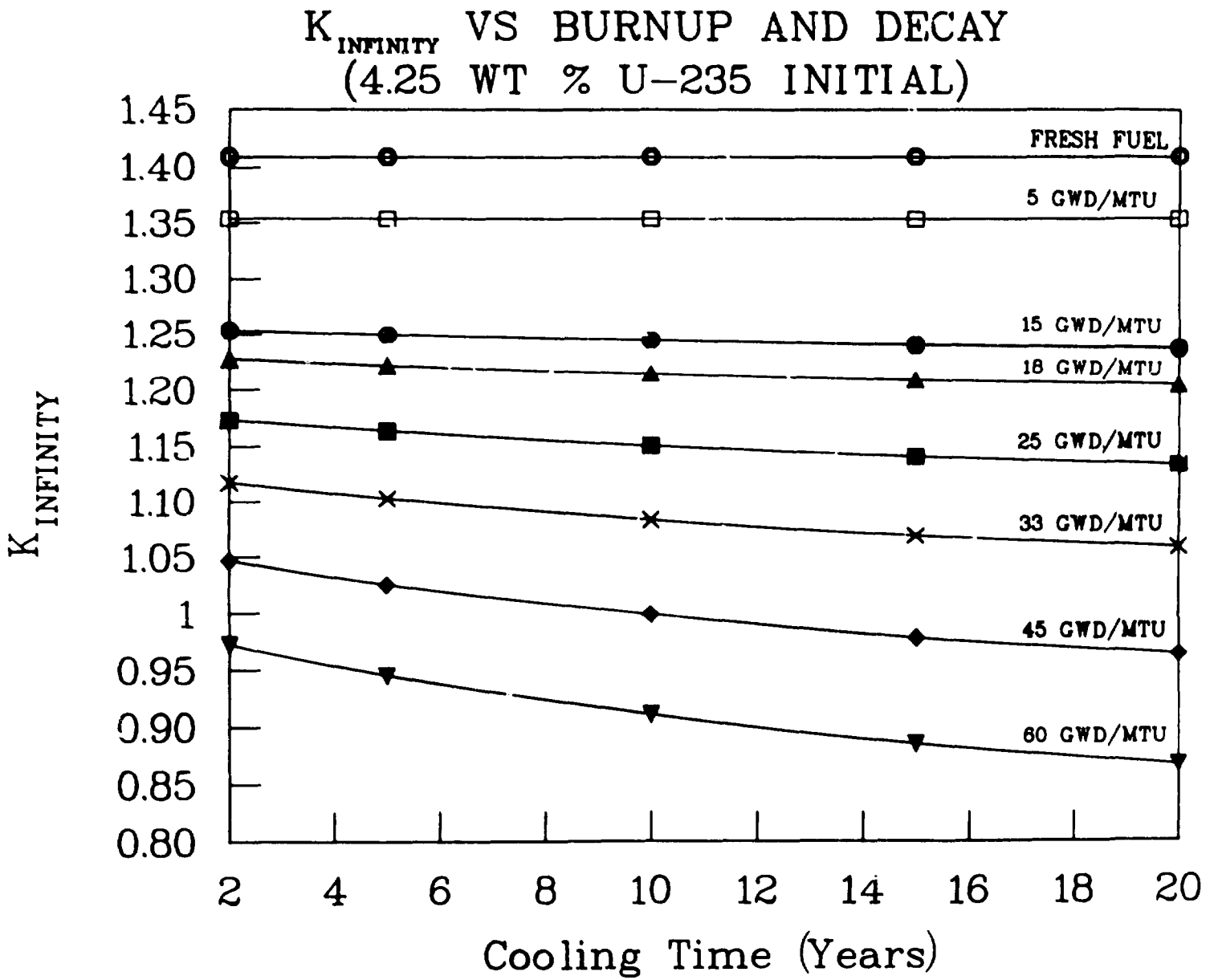

Fig. 8. K_{∞} vs burnup and decay for 4.25 wt % ^{235}U.

In modeling the burnup history of the assembly, a completely filled lattice is assumed by SAS2, thereby eliminating water holes. Although this model overestimates the generation of ^{239}Pu and thus results in a conservative prediction of k_∞, it should not be concluded that the effect of water holes would necessarily produce lower (i.e., more conservative) values of k_∞. The 18- and 33-GWd/MTU cases at 3.75 wt % ^{235}U and a 2-year cooling time were also analyzed by the SAS2H control module. The calculated k_∞ were 1.215 and 1.092, respectively. These results are 1.3% and 0.3% greater than the same cases in Table 6, computed by SAS2.

It is always prudent to address the question of the degree to which results such as these computed values of k_∞ should be applied. At the very least, this somewhat academic parametric study shows that significant burnup credit is inherent in spent fuel over a considerable range in the parameters of reactor exposure, initial enrichment, and cooling time. As an initial estimate of system multiplication, one could simply take the k_∞ computed here and a first-order buckling correction for the leakage. Since an infinite lattice of fuel pins, and even an infinite array of fuel assemblies containing water holes, is usually undermoderated, the actual arrangement of fuel elements in the cask could produce a more reactive system than that used in a simplified infinite lattice. With regard to equipment design and criticality safety qualification procedures, it is not within the scope of this project to determine the specific degree to which these data should be used. As a general rule, one should undertake a detailed analysis of the exact description of the spent fuel shipping cask. As a starting point, one could use the atom densities of the most significant nuclides, which are given in the Appendix.

Note that the reactivity losses due to burnup may not always be additive. For example, the decrease in reactivity from neutron poisons built into the cask may not be additive to that from fission products. However, the credit resulting from the decrease in total fission cross section is, in fact, substantially independent of reduced reactivity from absorbers.

5. CONCLUSION

Reactivity credits of 4 to 40%, based on an infinite lattice, are indicated for the burnup of spent PWR fuel (Figs. 3–8). With this demonstration of large potential savings in reactivity control requirements, further analyses on specific casks and burned fuel are justified. This work shows promise that the credit taken for actual casks may significantly affect either the need for fixed absorbers or the capacity in terms of the number of fuel assemblies.

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APPENDIX

ATOM DENSITY TABLES

In the following tables, the atom densities from the cases run are listed. Again, the cases reported are for combinations of enrichments of 3.00, 3.25, 3.50, 3.75, 4.00, and 4.25 wt % ^{235}U and burnups of 5, 15, 18, 25, 33, 45, and 60 GWd/MTU. However, note that only atom densities for cooling times of 2, 10, and 20 years have been included.

ATOM DENSITIES FOR INITIAL FUEL,

ATOMS/BARN-CM

(3.00% ENRICH)

ISOTOPE	AT. DENSITY
U-234	6.0528E-06
U-235	6.6966E-04
U-236	3.1118E-06
U-238	2.1370E-02
O-16	4.4097E-02

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.00% ENRICH 5 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	5.6056E-04	U-234	5.6086E-06	U-234	5.6122E-06
U-235	5.5052E-04	U-235	5.5054E-04	U-235	5.5055E-04
U-236	2.5085E-05	U-236	2.5090E-05	U-236	2.5095E-05
U-238	2.1285E-02	U-238	2.1285E-02	U-238	2.1285E-02
0-16	4.4097E-02	0-16	4.4097E-02	0-16	4.4097E-02
RH-103	4.1499E-04	RH-103	4.1499E-06	RH-103	4.1498E-04
SM-149	8.1901E-08	SM-149	8.1901E-08	SM-149	8.1901E-08
ND-143	6.4570E-04	ND-143	6.4570E-06	ND-143	6.4570E-06
TC-99	7.0959E-06	TC-99	7.0958E-06	TC-99	7.0955E-06
SM-152	6.3747E-07	SM-152	6.3758E-07	SM-152	6.3767E-07
SM-151	2.5410E-07	SM-151	2.3891E-07	SM-151	2.2120E-07
SM-147	1.2689E-06	SM-147	2.2753E-06	SM-147	2.4037E-06
GD-155	1.0754E-08	GD-155	3.0893E-08	GD-155	3.8257E-08
EU-153	2.9172E-07	EU-153	2.9172E-07	EU-153	2.9172E-07
MO-95	7.2078E-06	MO-95	7.2087E-06	MO-95	7.2087E-06
ND-145	4.4298E-06	ND-145	4.4298E-06	ND-145	4.4298E-06
AG-109	2.1371E-07	AG-109	2.1371E-07	AG-109	2.1371E-07
SM-150	1.3191E-04	SM-150	1.3191E-06	SM-150	1.3191E-06
RU-101	6.1114E-06	RU-101	6.1114E-06	RU-101	6.1114E-06
PM-147	1.1446E-06	PM-147	1.3825E-07	PM-147	9.8443E-09
EU-154	2.3726E-08	EU-154	1.2451E-08	EU-154	5.5614E-09
EU-155	2.9922E-08	EU-155	9.7831E-09	EU-155	2.4186E-09
PD-105	1.7623E-06	PD-105	1.7623E-06	PD-105	1.7623E-06
CS-135	4.8530E-06	CS-135	4.8530E-06	CS-135	4.8530E-06
ZR-93	7.1682E-06	ZR-93	7.1681E-06	ZR-93	7.1681E-06
PR-141	6.7506E-06	PR-141	6.7506E-06	PR-141	6.7506E-06
PD-108	3.8923E-07	PD-108	3.8923E-07	PD-108	3.8923E-07
CS-133	7.7918E-06	CS-133	7.7918E-06	CS-133	7.7918E-06
NP-237	9.4198E-07	NP-237	9.4688E-07	NP-237	9.5897E-07
PU-238	5.1125E-08	PU-238	4.8071E-08	PU-238	4.4433E-08
PU-239	5.7011E-05	PU-239	5.6998E-05	PU-239	5.6982E-05
PU-240	5.1004E-06	PU-240	5.0960E-06	PU-240	5.0907E-06
PU-241	1.3295E-06	PU-241	9.1173E-07	PU-241	5.6896E-07
PU-242	5.3660E-08	PU-242	5.3661E-08	PU-242	5.3663E-08
AM-241	1.6162E-07	AM-241	5.7451E-07	AM-241	9.0519E-07
AM-243	1.5745E-09	AM-243	1.5733E-09	AM-243	1.5719E-08
CM-244	4.4481E-11	CM-244	3.2749E-11	CM-244	2.2334E-11

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.00% ENRICH 15 GWD/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	4.7788E-06	U-234	4.8227E-06	U-234	4.8740E-06
U-235	3.7518E-04	U-235	3.7521E-04	U-235	3.7524E-04
U-236	5.6222E-05	U-236	5.6242E-05	U-236	5.6266E-05
U-238	2.1105E-02	U-238	2.1105E-02	U-238	2.1105E-02
0-16	4.4097E-02	0-16	4.4097E-02	0-16	4.4097E-02
RH-103	1.2497E-05	RH-103	1.2497E-05	RH-103	1.2497E-05
SM-149	1.1549E-07	SM-149	1.1549E-07	SM-149	1.1549E-07
ND-143	1.7056E-05	ND-143	1.7056E-05	ND-143	1.7056E-05
TC-99	2.0313E-05	TC-99	2.0313E-05	TC-99	2.0312E-05
SM-152	2.1320E-06	SM-152	2.1322E-06	SM-152	2.1325E-06
SM-151	4.1844E-07	SM-151	3.9344E-07	SM-151	3.6427E-07
SM-147	3.3934E-06	SM-147	5.5761E-06	SM-147	5.8546E-06
GD-155	3.8534E-08	GD-155	1.1374E-07	GD-155	1.4124E-07
EU-153	1.3507E-06	EU-153	1.3507E-06	EU-153	1.3507E-06
MO-95	2.0399E-05	MO-95	2.0401E-05	MO-95	2.0401E-05
ND-145	1.2375E-05	ND-145	1.2375E-05	ND-145	1.2375E-05
AG-109	1.1675E-06	AG-109	1.1675E-06	AG-109	1.1675E-06
SM-150	4.5577E-06	SM-150	4.5577E-06	SM-150	4.5577E-06
RU-101	1.8386E-05	RU-101	1.8386E-05	RU-101	1.8386E-05
PM-147	2.4825E-06	PM-147	2.9985E-07	PM-147	2.1350E-08
EU-154	2.5140E-07	EU-154	1.3193E-07	EU-154	5.8926E-08
EU-155	1.1174E-07	EU-155	3.6534E-08	EU-155	9.0324E-09
PD-105	6.3326E-06	PD-105	6.3326E-06	PD-105	6.3326E-06
CS-135	1.0790E-05	CS-135	1.0790E-05	CS-135	1.0790E-05
ZR-93	1.9947E-05	ZR-93	1.9947E-05	ZR-93	1.9947E-05
PR-141	1.9699E-05	PR-141	1.9699E-05	PR-141	1.9699E-05
PD-108	2.1618E-06	PD-108	2.1618E-06	PD-108	2.1618E-06
CS-133	2.2255E-05	CS-133	2.2255E-05	CS-133	2.2255E-05
NP-237	4.2309E-06	NP-237	4.2779E-06	NP-237	4.3912E-06
PU-238	7.1658E-07	PU-238	6.7562E-07	PU-238	6.2471E-07
PU-239	1.1561E-04	PU-239	1.1559E-04	PU-239	1.1555E-04
PU-240	2.2839E-05	PU-240	2.2824E-05	PU-240	2.2804E-05
PU-241	1.2189E-05	PU-241	8.3588E-06	PU-241	5.2162E-06
PU-242	1.6160E-06	PU-242	1.6160E-06	PU-242	1.6161E-06
AM-241	1.6383E-06	AM-241	5.4216E-06	AM-241	8.4508E-06
AM-243	1.6641E-07	AM-243	1.6629E-07	AM-243	1.6613E-07
CM-244	1.6299E-08	CM-244	1.2000E-08	CM-244	8.1841E-09

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.00% ENRICH 18 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	4.5500E-06	U-234	4.6177E-06	U-234	4.6967E-06
U-235	3.3405E-04	U-235	3.3408E-04	U-235	3.3412E-04
U-236	6.3093E-05	U-236	6.3116E-05	U-236	6.3146E-05
U-238	2.1048E-02	U-238	2.1048E-02	U-238	2.1048E-02
O-16	4.4097E-02	O-16	4.4097E-02	O-16	4.4097E-02
RH-103	1.4897E-05	RH-103	1.4897E-05	RH-103	1.4897E-05
SM-149	1.2739E-07	SM-149	1.2739E-07	SM-149	1.2739E-07
ND-143	1.9750E-05	ND-143	1.9750E-05	ND-143	1.9750E-05
TC-99	2.4039E-05	TC-99	2.4038E-05	TC-99	2.4037E-05
SM-152	2.5428E-06	SM-152	2.5431E-06	SM-152	2.5433E-06
SM-151	4.5970E-07	SM-151	4.3223E-07	SM-151	4.0019E-07
SM-147	3.8247E-06	SM-147	6.2917E-06	SM-147	6.6065E-06
GD-155	5.1581E-08	GD-155	1.5312E-07	GD-155	1.9025E-07
EU-153	1.7490E-06	EU-153	1.7490E-06	EU-153	1.7490E-06
MO-95	2.4115E-05	MO-95	2.4117E-05	MO-95	2.4117E-05
ND-145	1.4563E-05	ND-145	1.4563E-05	ND-145	1.4563E-05
AG-109	1.5235E-06	AG-109	1.5235E-06	AG-109	1.5235E-06
SM-150	5.6871E-06	SM-150	5.6871E-06	SM-150	5.6871E-06
RU-101	2.2053E-05	RU-101	2.2053E-05	RU-101	2.2053E-05
PM-147	2.8059E-06	PM-147	3.3890E-07	PM-147	2.4132E-08
EU-154	3.7132E-07	EU-154	1.9486E-07	EU-154	8.7036E-08
EU-155	1.5086E-07	EU-155	4.9325E-08	EU-155	1.2194E-08
PD-105	7.7018E-06	PD-105	7.7018E-06	PD-105	7.7018E-06
CS-135	1.1728E-05	CS-135	1.1728E-05	CS-135	1.1728E-05
ZR-93	2.3487E-05	ZR-93	2.3487E-05	ZR-93	2.3487E-05
PR-141	2.3472E-05	PR-141	2.3472E-05	PR-141	2.3472E-05
PD-108	2.8636E-06	PD-108	2.8636E-06	PD-108	2.8636E-06
CS-133	2.6314E-05	CS-133	2.6314E-05	CS-133	2.6314E-05
NP-237	5.4216E-06	NP-237	5.4839E-06	NP-237	5.6346E-06
PU-238	1.1030E-06	PU-238	1.0401E-06	PU-238	9.6174E-07
PU-239	1.2571E-04	PU-239	1.2568E-04	PU-239	1.2564E-04
PU-240	2.8030E-05	PU-240	2.8017E-05	PU-240	2.7997E-05
PU-241	1.6226E-05	PU-241	1.1127E-05	PU-241	6.9438E-06
PU-242	2.6263E-06	PU-242	2.6264E-06	PU-242	2.6265E-06
AM-241	2.1687E-06	AM-241	7.2052E-06	AM-241	1.1237E-05
AM-243	3.3173E-07	AM-243	3.3148E-07	AM-243	3.3117E-07
CM-244	4.0396E-08	CM-244	2.9741E-08	CM-244	2.0283E-08

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.00% ENRICH 25 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	4.0533E-06	U-234	4.1973E-06	U-234	4.3651E-06
U-235	2.5367E-04	U-235	2.5370E-04	U-235	2.5374E-04
U-236	7.5656E-05	U-236	7.5689E-05	U-236	7.5731E-05
U-238	2.0911E-02	U-238	2.0911E-02	U-238	2.0911E-02
O-16	4.4097E-02	O-16	4.4097E-02	O-16	4.4097E-02
RH-103	2.0192E-05	RH-103	2.0192E-05	RH-103	2.0192E-05
SM-149	1.6117E-07	SM-149	1.6117E-07	SM-149	1.6117E-07
ND-143	2.5293E-05	ND-143	2.5293E-05	ND-143	2.5293E-05
TC-99	3.2315E-05	TC-99	3.2314E-05	TC-99	3.2313E-05
SM-152	3.4478E-06	SM-152	3.4481E-06	SM-152	3.4483E-06
SM-151	5.5616E-07	SM-151	5.2292E-07	SM-151	4.8416E-07
SM-147	4.6016E-06	SM-147	7.5970E-06	SM-147	7.9792E-06
GD-155	9.1889E-08	GD-155	2.7506E-07	GD-155	3.4204E-07
EU-153	2.7483E-06	EU-153	2.7483E-06	EU-153	2.7483E-06
MO-95	3.2424E-05	MO-95	3.2426E-05	MO-95	3.2426E-05
ND-145	1.9369E-05	ND-145	1.9369E-05	ND-145	1.9369E-05
AG-109	2.4115E-06	AG-109	2.4115E-06	AG-109	2.4115E-06
SM-150	8.4682E-06	SM-150	8.4682E-06	SM-150	8.4682E-06
RU-101	3.0552E-05	RU-101	3.0551E-05	RU-101	3.0551E-05
PM-147	3.4069E-06	PM-147	4.1150E-07	PM-147	2.9301E-08
EU-154	7.3069E-07	EU-154	3.8345E-07	EU-154	1.7126E-07
EU-155	2.7215E-07	EU-155	8.8980E-08	EU-155	2.1998E-08
PD-105	1.0766E-05	PD-105	1.0766E-05	PD-105	1.0766E-05
CS-135	1.3372E-05	CS-135	1.3372E-05	CS-135	1.3372E-05
ZR-93	3.1336E-05	ZR-93	3.1335E-05	ZR-93	3.1335E-05
PR-141	3.2107E-05	PR-141	3.2107E-05	PR-141	3.2107E-05
PD-108	4.7142E-06	PD-108	4.7142E-06	PD-108	4.7142E-06
CS-133	3.5297E-05	CS-133	3.5297E-05	CS-133	3.5297E-05
NP-237	8.3334E-06	NP-237	8.4299E-06	NP-237	8.6640E-06
PU-238	2.3434E-06	PU-238	2.2098E-06	PU-238	2.0429E-06
PU-239	1.4197E-04	PU-239	1.4194E-04	PU-239	1.4190E-04
PU-240	3.8931E-05	PU-240	3.8949E-05	PU-240	3.8952E-05
PU-241	2.5307E-05	PU-241	1.7354E-05	PU-241	1.0830E-05
PU-242	5.8751E-06	PU-242	5.8752E-06	PU-242	5.8753E-06
AM-241	3.3244E-06	AM-241	1.1180E-05	AM-241	1.7471E-05
AM-243	1.0587E-06	AM-243	1.0579E-06	AM-243	1.0569E-06
CM-244	1.9237E-07	CM-244	1.4163E-07	CM-244	9.6594E-08

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.00% ENRICH 33 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	3.5494E-06	U-234	3.8114E-06	U-234	4.1166E-06
U-235	1.8348E-04	U-235	1.8351E-04	U-235	1.8356E-04
U-236	8.5123E-05	U-236	8.5164E-05	U-236	8.5217E-05
U-238	2.0749E-02	U-238	2.0749E-02	U-238	2.0749E-02
O-16	4.4097E-02	O-16	4.4097E-02	O-16	4.4097E-02
RH-103	2.5665E-05	RH-103	2.5665E-05	RH-103	2.5665E-05
SM-149	1.9260E-07	SM-149	1.9260E-07	SM-149	1.9260E-07
ND-143	3.0495E-05	ND-143	3.0495E-05	ND-143	3.0495E-05
TC-99	4.1091E-05	TC-99	4.1090E-05	TC-99	4.1089E-05
SM-152	4.3753E-06	SM-152	4.3756E-06	SM-152	4.3757E-06
SM-151	6.5810E-07	SM-151	6.1878E-07	SM-151	5.7291E-07
SM-147	5.1829E-06	SM-147	8.6072E-06	SM-147	9.0442E-06
GD-155	1.5202E-07	GD-155	4.5767E-07	GD-155	5.6943E-07
EU-153	3.9170E-06	EU-153	3.9170E-06	EU-153	3.9170E-06
MO-95	4.1372E-05	MO-95	.1375E-05	MO-95	4.1375E-05
ND-145	2.4399E-05	ND-145	2.4399E-05	ND-145	2.4399E-05
AG-109	3.4655E-06	AG-109	3.4655E-06	AG-109	3.4655E-06
SM-150	1.1688E-05	SM-150	1.1688E-05	SM-150	1.1688E-05
RU-101	4.0137E-05	RU-101	4.0137E-05	RU-101	4.0137E-05
PM-147	3.8948E-06	PM-147	4.7043E-07	PM-147	3.3497E-08
EU-154	1.2370E-06	EU-154	6.4915E-07	EU-154	2.8994E-07
EU-155	4.5412E-07	EU-155	1.4847E-07	EU-155	3.6707E-08
PD-105	1.3959E-05	PD-105	1.3959E-05	PD-105	1.3959E-05
CS-135	1.4709E-05	CS-135	1.4709E-05	CS-135	1.4709E-05
ZR-93	3.9711E-05	ZR-93	3.9711E-05	ZR-93	3.9710E-05
PR-141	4.1720E-05	PR-141	4.1720E-05	PR-141	4.1721 E-05
PD-108	7.1035E-06	PD-108	7.1035E-06	PD-108	7.1035E-06
CS-133	4.4763E-05	CS-133	4.4763E-05	CS-133	4.4763E-05
NP-237	1.1643E-05	NP-237	1.1772E-05	NP-237	1.2086E-05
PU-238	4.2632E-06	PU-238	4.0190E-06	PU-238	3.7150E-06
PU-239	1.5267E-04	PU-239	1.5264E-04	PU-239	1.5260E-04
PU-240	4.9060E-05	PU-240	4.9191E-05	PU-240	4.9292E-05
PU-241	3.4096E-05	PU-241	2.3382E-05	PU-241	1.4591E-05
PU-242	1.0744E-05	PU-242	1.0744E-05	PU-242	1.0744E-05
AM-241	4.3754E-06	AM-241	1.4961E-05	AM-241	2.3438E-05
AM-243	2.5565E-06	AM-243	2.5545E-06	AM-243	2.5521E-06
CM-244	6.5622E-07	CM-244	4.8314E-07	CM-244	3.2949E-07

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.00% ENRICH 45 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	2.9311E-06	U-234	3.4352E-06	U-234	4.0224E-06
U-235	1.1123E-04	U-235	1.1127E-04	U-235	1.1132E-04
U-236	9.1868E-05	U-236	9.1920E-05	U-236	9.1987E-05
U-238	2.0492E-02	U-238	2.0492E-02	U-238	2.0492E-02
0-16	4.4097E-02	0-16	4.4097E-02	0-16	4.4097E-02
RH-103	3.2128E-05	RH-103	3.2128E-05	RH-103	3.2128E-05
SM-149	2.0420E-07	SM-149	2.0420E-07	SM-149	2.0420E-07
ND-143	3.6373E-05	ND-143	3.6373E-05	ND-143	3.6373E-05
TC-99	5.2793E-05	TC-99	5.2792E-05	TC-99	5.2790E-05
SM-152	5.5748E-06	SM-152	5.5751E-06	SM-152	5.5753E-06
SM-151	7.9642E-07	SM-151	7.4883E-07	SM-151	6.9332E-07
SM-147	6.1313E-06	SM-147	9.6667E-06	SM-147	1.0117E-05
GD-155	2.5627E-07	GD-155	7.7001E-07	GD-155	9.5787E-07
EU-153	5.5590E-06	EU-153	5.5591E-06	EU-153	5.5591E-06
MO-95	5.3571E-05	MO-95	5.3574E-05	MO-95	5.3574E-05
ND-145	3.1156E-05	ND-145	3.1156E-05	ND-145	3.1156E-04
AG-109	5.0013E-06	AG-109	5.0013E-06	AG-109	5.0013E-06
SM-150	1.6087E-05	SM-150	1.6087E-05	SM-150	1.6087E-05
RU-101	5.4146E-05	RU-101	5.4146E-05	RU-101	5.4146E-05
PM-147	4.0210E-06	PM-147	4.8568E-07	PM-147	3.4583E-08
EU-154	2.0578E-06	EU-154	1.0799E-06	EU-154	4.8235E-07
EU-155	7.6330E-07	EU-155	2.4956E-07	EU-155	6.1598E-08
PD-105	2.0284E-05	PD-105	2.0284E-05	PD-105	2.0284E-05
CS-135	1.9889E-05	CS-135	1.9888E-05	CS-135	1.9888E-05
ZR-93	5.1268E-05	ZR-93	5.1267E-05	ZR-93	5.1267E-05
PR-141	5.5638E-05	PR-141	5.5638E-05	PR-141	5.5638E-05
PD-108	1.1021E-05	PD-108	1.1021E-05	PD-108	1.1201E-05
CS-133	5.7231E-05	CS-133	5.7230E-05	CS-133	5.7230E-05
NP-237	1.6136E-05	NP-237	1.6300E-05	NP-237	1.6699E-05
PU-238	8.2035E-06	PU-238	7.7312E-06	PU-238	7.1460E-06
PU-239	1.6284E-04	PU-239	1.6280E-04	PU-239	1.6276E-04
PU-240	6.1837E-05	PU-240	6.2378E-05	PU-240	6.2839E-05
PU-241	4.2903E-05	PU-241	2.9421E-05	PU-241	1.8360E-05
PU-242	1.8834E-05	PU-242	1.8834E-05	PU-242	1.8834E-05
AM-241	5.7140E-06	AM-241	1.9031E-05	AM-241	2.9694E-05
AM-243	5.9277E-06	AM-243	5.9233E-06	AM-243	5.9177E-06
CM-244	2.2503E-06	CM-244	1.6568E-06	CM-244	1.1299E-06

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.00% ENRICH 60 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	2.3302E-06	U-234	3.1390E-06	U-234	4.0811E-06
U-235	5.8130E-05	U-235	5.8169E-05	U-235	5.8217E-05
U-236	9.2139E-05	U-236	9.2201E-05	U-236	9.2279E-05
U-238	2.0161E-02	U-238	2.0161E-02	U-238	2.0161E-02
O-16	4.4097E-02	O-16	4.4097E-02	O-16	4.4097E-02
RH-103	3.8822E-05	RH-103	3.8822E-05	RH-103	3.8822E-05
SM-149	2.4901E-07	SM-149	2.4901E-07	SM-149	2.4901E-07
ND-143	4.1404E-05	ND-143	4.1404E-05	ND-143	4.1404E-05
TC-99	6.5574E-05	TC-99	6.5572E-05	TC-99	6.5570E-05
SM-152	7.0186E-06	SM-152	7.0188E-06	SM-152	7.0190E-06
SM-151	9.7942E-07	SM-151	9.2090E-07	SM-151	8.5263E-07
SM-147	6.3229E-06	SM-147	1.0197E-05	SM-147	1.0691E-05
GD-155	3.9237E-07	GD-155	1.1846E-06	GD-155	1.4744E-06
EU-153	7.4407E-06	EU-153	7.4408E-06	EU-153	7.4408E-06
MO-95	6.7678E-05	MO-95	6.7682E-05	MO-95	6.7682E-05
ND-145	3.8498E-05	ND-145	3.8498E-05	ND-145	3.8498E-05
AG-109	6.7766E-06	AG-109	6.7766E-06	AG-109	6.7766E-06
SM-150	2.2167E-05	SM-150	2.2167E-05	SM-150	2.2167E-05
RU-101	7.1074E-05	RU-101	7.1074E-05	RU-101	7.1074E-05
PM-147	4.4062E-06	PM-147	5.3220E-07	PM-147	3.7895E-08
EU-154	3.0964E-06	EU-154	1.6249E-06	EU-154	7.2578E-07
EU-155	1.1771E-06	EU-155	3.8487E-07	EU-155	9.5153E-08
PD-105	2.5409E-05	PD-105	2.5409E-05	PD-105	2.5409E-05
CS-135	2.2281E-05	CS-135	2.2281E-05	CS-135	2.2280E-05
ZR-93	6.4520E-05	ZR-93	6.4520E-05	ZR-93	6.4520E-05
PR-141	7.2411E-05	PR-141	7.2411E-05	PR-141	7.2411E-05
PD-108	1.6220E-05	PD-108	1.6220E-05	PD-108	1.6220E-05
CS-133	7.0674E-05	CS-133	7.0674E-05	CS-133	7.0674E-05
NP-237	2.0383E-05	NP-237	2.0571E-05	NP-237	2.1029E-05
PU-238	1.3169E-05	PU-238	1.2404E-05	PU-238	1.1463E-05
PU-239	1.6832E-04	PU-239	1.6829E-04	PU-239	1.6826E-04
PU-240	7.1529E-05	PU-240	7.3101E-05	PU-240	7.4472E-05
PU-241	5.0012E-05	PU-241	3.4296E-05	PU-241	2.1402E-05
PU-242	2.9260E-05	PU-242	2.9260E-05	PU-242	2.9260E-05
AM-241	6.3285E-06	AM-241	2.1856E-05	AM-241	3.4292E-05
AM-243	1.1328E-05	AM-243	1.1320E-05	AM-243	1.1309E-05
CM-244	6.1917E-06	CM-244	4.5586E-06	CM-244	3.1089E-06

ATOM DENSITIES FOR INITIAL FUEL,

ATOMS/BARN-CM

(3.25% ENRICH)

ISOTOPE	AT. DENSITY
U-234	6.5011E-06
U-235	7.2546E-04
U-236	3.3341E-06
U-238	2.1314E-02
O-16	4.4098E-02

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.25% ENRICH 5 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	6.0404E-06	U-234	6.0433E-06	U-234	6.0466E-06
U-235	6.0448E-04	U-235	6.0449E-04	U-235	6.0451E-04
U-236	2.5857E-05	U-236	2.5861E-05	U-236	2.5866E-05
U-238	2.1232E-02	U-238	2.1232E-02	U-238	2.1232E-02
0-16	4.4098E-02	0-16	4.4098E-02	0-16	4.4098E-02
RH-103	4.1200E-06	RH-103	4.1200E-06	RH-103	4.1200E-06
SM-149	8.7685E-08	SM-149	8.7685E-08	SM-149	8.7685E-08
ND-143	6.4984E-06	ND-143	6.4984E-06	ND-143	6.4984E-06
TC-99	7.1063E-06	TC-99	7.1061E-06	TC-99	7.1059E-06
SM-152	6.2190E-07	SM-152	6.2201E-07	SM-152	6.2210E-07
SM-151	2.6507E-07	SM-151	2.4923E-07	SM-151	2.3075E-07
SM-147	1.2749E-06	SM-147	2.2861E-06	SM-147	2.4152E-06
GD-155	1.0775E-08	GD-155	3.0788E-08	GD-155	3.8 77E-08
EU-153	2.8611E-07	EU-153	2.8611E-07	EU-153	2.8611E-07
MO-95	7.2340E-06	MO-95	7.2349E-06	MO-95	7.2349E-06
ND-145	4.4457E-06	ND-145	4.4457E-06	ND-145	4.4457E-06
AG-109	1.9986E-07	AG-109	1.9986E-07	AG-109	1.9986E-07
SM-150	1.3088E-06	SM-150	1.3088E-06	SM-150	1.3088E-06
RU-101	6.1069E-06	RU-101	6.1069E-06	RU-101	6.1069E-06
PM-147	1.1501E-06	PM-147	1.3892E-07	PM-147	9.8921E-09
EU-154	2.2505E-08	EU-154	1.1810E-08	EU-154	5.2751E-09
EU-155	2.9735E-08	EU-155	9.7219E-09	EU-155	2.4035E-09
PD-105	1.7233E-06	PD-105	1.7233E-06	PD-105	1.7233E-06
CS-135	5.0151E-06	CS-135	5.0151E-06	CS-135	5.0151E-06
ZR-93	7.2050E-06	ZR-93	7.2050E-06	ZR-93	7.2050E-06
PR-141	6.7651E-06	PR-141	6.76513E-06	PR-141	6.7651E-06
PD-108	3.6604E-07	PD-108	3.6604E-07	PD-108	3.6604E-07
CS-133	7.8029E-06	CS-133	7.8029E-06	CS-133	7.8029E-06
NP-237	9.3523E-07	NP-237	9.3967E-07	NP-237	9.5062E-07
PU-238	4.8516E-08	PU-238	4.5611E-08	PU-238	4.2158E-08
PU-239	5.5991E-05	PU-239	5.5978E-05	PU-239	5.5962E-05
PU-240	4.7257E-06	PU-240	4.7217E-06	PU-240	4.7167E-06
PU-241	1.2037E-06	PU-241	8.2548E-07	PU-241	5.1513E-07
PU-242	4.5024E-08	PU-242	4.5026E-08	PU-242	4.5027E-08
AM-241	1.4626E-07	AM-241	5.2009E-07	AM-241	8.1949E-07
AM-243	1.2788E-09	AM-243	1.2779E-09	AM-243	1.2767E-09
CM-244	3.4763E-11	CM-244	2.5594E-11	CM-244	1.7455E-11

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.25% ENRICH 15 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	5.1812E-06	U-234	5.2232E-06	U-234	5.2721E-06
U-235	4.2187E-04	U-235	4.2189E-04	U-235	4.2193E-04
U-236	5.8661E-05	U-236	5.8680E-05	U-236	5.8703E-05
U-238	2.1057E-02	U-238	2.1057E-02	U-238	2.1057E-02
0-16	4.4098E-02	0-16	4.4098E-02	0-16	4.4098E-02
RH-103	1.2380E-05	RH-103	1.2380E-05	RH-103	1.2380E-05
SM-149	1.2147E-07	SM-149	1.2147E-07	SM-149	1.2147E-07
ND-143	1.7299E-05	ND-143	1.7299E-05	ND-143	1.7299E-05
TC-99	2.0375E-05	TC-99	2.0375E-05	TC-99	2.0374E-05
SM-152	2.1020E-06	SM-152	2.1023E-06	SM-152	2.1025E-06
SM-151	4.3723E-07	SM-151	4.1110E-07	SM-151	3.8063E-07
SM-147	3.4332E-06	SM-147	5.6413E-06	SM-147	5.9231E-06
GD-155	3.7749E-08	GD-155	1.1108E-07	GD-155	1.3790E-07
EU-153	1.3164E-06	EU-153	1.3164E-06	EU-153	1.3164E-06
MO-95	2.0538E-05	MO-95	2.0540E-05	MO-95	2.0540E-05
ND-145	1.2464E-05	ND-145	1.2464E-05	ND-145	1.2464E-05
AG-109	1.0994E-06	AG-109	1.0994E-06	AG-109	1.0994E-06
SM-150	4.5200E-06	SM-150	4.5200E-06	SM-150	4.5200E-06
RU-101	1.8362E-05	RU-101	1.8362E-05	RU-101	1.8362E-05
PM-147	2.5115E-06	PM-147	3.0335E-07	PM-147	2.1600E-08
EU-154	2.3873E-07	EU-154	1.2528E-07	EU-154	5.5958E-08
EU-155	1.0896E-07	EU-155	3.5625E-08	EU-155	8.8075E-09
PD-105	6.1541E-06	PD-105	6.1541E-06	PD-105	6.1541E-06
CS-135	1.1272E-05	CS-135	1.1272E-05	CS-135	1.1272E-05
ZR-93	2.0142E-05	ZR-93	2.0142E-05	ZR-93	2.0142E-05
PR-141	1.9771E-05	PR-141	1.9771E-05	PR-141	1.9771E-05
PD-108	2.0349E-06	PD-108	2.0349E-06	PD-108	2.0349E-06
CS-133	2.2322E-05	CS-133	2.2322E-05	CS-133	2.2322E-05
NP-237	4.2375E-06	NP-237	4.2820E-06	NP-237	4.3894E-06
PU-238	6.8447E-07	PU-238	6.4520E-07	PU-238	5.9658E-07
PU-239	1.1577E-04	PU-239	1.1575E-04	PU-239	1.1571E-04
PU-240	2.1682E-05	PU-240	2.1667E-05	PU-240	2.1647E-05
PU-241	1.1549E-05	PU-241	7.9199E-06	PU-241	4.9423E-06
PU-242	1.4204E-06	PU-242	1.4204E-06	PU-242	1.4205E-06
AM-241	1.5525E-06	AM-241	5.1372E-06	AM-241	8.0073E-06
AM-243	1.4141E-07	AM-243	1.4131E-07	AM-243	1.4117E-07
CM-244	1.3296E-08	CM-244	9.7891E-09	CM-244	6.6760E-09

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.25% ENRICH 18 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	4.9417E-06	U-234	5.0067E-06	U-234	5.0824E-06
U-235	3.7819E-04	U-235	3.7922E-04	U-235	3.7826E-04
U-236	6.6082E-05	U-236	6.6104E-05	U-236	6.6133E-05
U-238	2.1002E-02	U-238	2.1002E-02	U-238	2.1002E-02
O-16	4.4098E-02	O-16	4.4098E-02	O-16	4.4098E-02
RH-103	1.4760E-05	RH-103	1.4760E-05	RH-103	1.4760E-05
SM-149	1.3348E-07	SM-149	1.3348E-07	SM-149	1.3348E-07
ND-143	2.0070E-05	ND-143	2.0070E-05	ND-143	2.0070E-05
TC-99	2.4122E-05	TC-99	2.4121E-05	TC-99	2.4120E-05
SM-152	2.5110E-06	SM-152	2.5113E-06	SM-152	2.5115E-06
SM-151	4.7912E-07	SM-151	4.5049E-07	SM-151	4.1710E-07
SM-147	3.8765E-06	SM-147	6.3763E-06	SM-147	6.6953E-06
GD-155	5.0330E-08	GD-155	1.4902E-07	GD-155	1.8511E-07
MO-95	2.4295E-05	MO-95	2.4297E-05	MO-95	2.4297E-05
EU-153	1.7063E-06	EU-153	1.7063E-06	EU-153	1.7063E-06
ND-145	1.4680E-05	ND-145	1.4680E-05	ND-145	1.4680E-05
AG-109	1.4389E-06	AG-109	1.4389E-06	AG-109	1.4389E-06
SM-150	5.6370E-06	SM-150	5.6370E-06	SM-150	5.6370E-06
RU-101	2.2023E-05	RU-101	2.2023E-05	RU-101	2.2023E-05
PM-147	2.8432E-06	PM-147	3.4341E-07	PM-147	2.4453E-08
EU-154	3.5356E-07	EU-154	1.8554E-07	EU-154	8.2874E-08
EU-155	1.4663E-07	EU-155	4.7942E-08	EU-155	1.1852E-08
PD-105	7.4875E-06	PD-105	7.4875E-06	PD-105	7.4875E-06
CS-135	1.2285E-05	CS-135	1.2285E-05	CS-135	1.2285E-05
ZR-93	2.3738E-05	ZR-93	2.3738E-05	ZR-93	2.3738E-05
PR-141	2.3565E-05	PR-141	2.3565E-05	PR-141	2.3565E-05
PD-108	2.7005E-06	PD-108	2.7005E-06	PD-108	2.7005E-06
CS-133	2.6404E-05	CS-133	2.6404E-05	CS-133	2.6404E-05
NP-237	5.4466E-06	NP-237	5.5062E-06	NP-237	5.6503E-06
PU-238	1.0583E-06	PU-238	9.9776E-07	PU-238	9.2254E-07
PU-239	1.2637E-04	PU-239	1.2635E-04	PU-239	1.2631E-04
PU-240	2.6750E-05	PU-240	2.6736E-05	PU-240	2.6716E-05
PU-241	1.5513E-05	PU-241	1.0638E-05	PU-241	6.6387E-06
PU-242	2.3306E-06	PU-242	2.3307E-06	PU-242	2.3308E-06
AM-241	2.0747E-06	AM-241	6.8899E-06	AM-241	1.0745E-05
AM-243	2.8488E-07	AM-243	2.8466E-07	AM-243	2.8439E-07
CM-244	3.3296E-08	CM-244	2.4514E-08	CM-244	1.6718E-08

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.25% ENRICH 25 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	4.4[illegible]6E-06	U-234	4.5583E-06	U-234	4.7210E-06
U-235	[illegible]169E-04	U-235	2.9172E-04	U-235	2.9176E-04
U-236	7.9919E-05	U-236	7.9951E-05	U-236	7.9991E-05
U-238	2.0869E-02	U-238	2.0869E-02	U-238	2.0869E-02
O-16	4.4098E-02	O-16	4.4098E-02	O-16	4.4098E-02
RH-103	2.0027E-05	RH-103	2.0027E-05	RH-103	2.0027E-05
SM-149	1.6671E-07	SM-149	1.6671E-07	SM-149	1.6671E-07
ND-143	2.5806E-05	ND-143	2.5806E-05	ND-143	2.5806E-05
TC-99	3.2454E-05	TC-99	3.2453E-05	TC-99	3.2452E-05
SM-152	3.4157E-06	SM-152	3.4160E-06	SM-152	3.4162E-06
SM-151	5.7889E-07	SM-151	5.4430E-07	SM-151	5.0395E-07
SM-147	4.6807E-06	SM-147	7.7252E-06	SM-147	8.1137E-06
GD-155	8.9469E-08	GD-155	2.6731E-07	GD-155	3.3234E-07
EU-153	2.6907E-06	EU-153	2.6907E-06	EU-153	2.6907E-06
MO-95	3.2704E-05	MO-95	3.2707E-05	MO-95	3.2707E-05
ND-145	1.9553E-05	ND-145	1.9553E-05	ND-145	1.9553E-05
AG-109	2.2931E-06	AG-109	2.2931E-06	AG-109	2.2931E-06
SM-150	8.5128E-06	SM-150	8.5128E-06	SM-150	8.5128E-06
RU-101	3.0510E-05	RU-101	3.0510E-05	RU-101	3.0510E-05
PM-147	3.4627E-06	PM-147	4.1824E-07	PM-147	2.9781E-08
EU-154	7.0102E-07	EU-154	3.6788E-07	EU-154	1.6431E-07
EU-155	2.6423E-07	EU-155	8.6391E-08	EU-155	2.1358E-08
PD-105	1.0486E-05	PD-105	1.0486E-05	PD-105	1.0486E-05
CS-135	1.4060E-05	CS-135	1.4060E-05	CS-135	1.4060E-05
ZR-93	3.1723E-05	ZR-93	3.1723E-05	ZR-93	3.1722E-05
PR-141	3.2253E-05	PR-141	3.2253E-05	PR-141	3.2253E-05
PD-108	4.4656E-06	PD-108	4.4656E-06	PD-108	4.4656E-06
CS-133	3.5449E-05	CS-133	3.5449E-05	CS-133	3.5449E-05
NP-237	8.4318E-06	NP-237	8.5257E-06	NP-237	8.7535E-06
PU-238	2.2734E-06	PU-238	2.1434E-06	PU-238	1.9815E-06
PU-239	1.4369E-04	PU-239	1.4366E-04	PU-239	1.4362E-04
PU-240	3.7550E-05	PU-240	3.7561E-05	PU-240	3.7559E-05
PU-241	2.4613E-05	PU-241	1.6878E-05	PU-241	1.0533E-05
PU-242	5.3118E-06	PU-242	5.3119E-06	PU-242	5.3120E-06
AM-241	3.2387E-06	AM-241	1.0879E-05	AM-241	1.6997E-05
AM-243	9.2928E-07	AM-243	9.2858E-07	AM-243	9.2771E-07
CM-244	1.6206E-07	CM-244	1.1932E-07	CM-244	8.1375E-08

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.25% ENRICH 33 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	3.8836E-06	U-234	4.1409E-06	U-234	4.4407E-06
U-235	2.1465E-04	U-235	2.1468E-04	U-235	2.1473E-04
U-236	9.0735E-05	U-236	9.0775E-05	U-236	9.0826E-05
U-238	2.0711E-02	U-238	2.0711E-02	U-238	2.0711E-02
O-16	4.4098E-02	O-16	4.4098E-02	O-16	4.4098E-02
RH-103	2.5498E-05	RH-103	2.5498E-05	RH-103	2.5498E-05
SM-149	1.9962E-07	SM-149	1.9962E-07	SM-149	1.9962E-07
ND-143	3.1233E-05	ND-143	3.1233E-05	ND-143	3.1233E-05
TC-99	4.1302E-05	TC-99	4.1301E-05	TC-99	4.1300E-05
SM-152	4.3424E-06	SM-152	4.3427E-06	SM-152	4.3429E-06
SM-151	6.8090E-07	SM-151	6.4022E-07	SM-151	5.9276E-07
SM-147	5.2883E-06	SM-147	8.7766E-06	SM-147	9.2217E-06
GD-155	1.4868E-07	GD-155	4.4699E-07	GD-155	5.5607E-07
EU-153	3.8513E-06	EU-153	3.8513E-06	EU-153	3.8513E-06
MO-95	4.1769E-05	MO-95	4.1772E-05	MO-95	4.1772E-05
ND-145	2.4662E-05	ND-145	2.4662E-05	ND-145	2.4662E-05
AG-109	3.3186E-06	AG-109	3.3186E-06	AG-109	3.3186E-06
SM-150	1.1632E-05	SM-150	1.1632E-05	SM-150	1.1632E-05
RU-101	4.0086E-05	RU-101	4.0086E-05	RU-101	4.0086E-05
PM-147	3.9675E-06	PM-147	4.7921E-07	PM-147	3.1422E-08
EU-154	1.1972E-06	EU-154	6.2830E-07	EU-154	2.8063E-07
EU-155	4.4321E-07	EU-155	1.4490E-07	EU-155	3.5825E-08
PD-105	1.3633E-05	PD-105	1.3633E-05	PD-105	1.3633E-05
CS-135	1.5483E-05	CS-135	1.5483E-05	CS-135	1.5483E-05
ZR-93	4.0252E-05	ZR-93	4.0251E-05	ZR-93	4.0251E-05
PR-141	4.1929E-05	PR-141	4.1929E-05	PR-141	4.1929E-05
PD-108	6.7626E-06	PD-108	6.7626E-06	PD-108	6.7626E-06
CS-133	4.4995E-05	CS-133	4.4995E-05	CS-133	4.4995E-05
NP-237	1.1875E-05	NP-237	1.2002E-05	NP-237	1.2312E-05
PU-238	4.1884E-06	PU-238	3.9480E-06	PU-238	3.6495E-06
PU-239	1.5524E-04	PU-239	1.5521E-04	PU-239	1.5516E-04
PU-240	4.7785E-05	PU-240	4.7894E-05	PU-240	4.7975E-05
PU-241	3.3658E-05	PU-241	2.3081E-05	PU-241	1.4403E-05
PU-242	9.8820E-06	PU-242	9.8821E-06	PU-242	9.8822E-06
AM-241	4.3308E-06	AM-241	1.4780E-05	AM-241	2.3147E-05
AM-243	2.2922E-06	AM-243	2.2905E-06	AM-243	2.2883E-06
CM-244	5.6507E-07	CM-244	4.1603E-07	CM-244	2.8373E-07

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.25% ENRICH 45 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	3.2182E-06	U-234	3.7213E-06	U-234	4.3073E-06
U-235	1.3315E-04	U-235	1.3319E-04	U-235	1.3324E-04
U-236	9.9141E-05	U-236	9.9192E-05	U-236	9.9258E-05
U-238	2.0461E-02	U-238	2.0461E-02	U-238	2.0461E-02
O-16	4.4098E-02	O-16	4.4098E-02	O-16	4.4098E-02
RH-103	3.2025E-05	RH-103	3.2025E-05	RH-103	3.2025E-05
SM-149	2.1065E-07	SM-149	2.1065E-07	SM-149	2.1065E-07
ND-143	3.7406E-05	ND-143	3.7406E-05	ND-143	3.7406E-05
TC-99	5.3126E-05	TC-99	5.3125E-05	TC-99	5.3123E-05
SM-152	5.5498E-06	SM-152	5.5501E-06	SM-152	5.5503E-06
SM-151	8.1960E-07	SM-151	7.7063E-07	SM-151	7.1351E-07
SM-147	6.2740E-06	SM-147	9.8760E-06	SM-147	1.0336E-05
GD-155	2.5303E-07	GD-155	7.5932E-07	GD-155	9.4447E-07
EU-153	5.4990E-06	EU-153	5.4990E-06	EU-153	5.4990E-06
MO-95	5.4138E-05	MO-95	5.4141E-05	MO-95	5.4141E-05
ND-145	3.1529E-05	ND-145	3.1529E-05	ND-145	3.1529E-05
AG-109	4.8336E-06	AG-109	4.8336E-06	AG-109	4.8336E-06
SM-150	1.6055E-05	SM-150	1.6054E-05	SM-150	1.6054E-05
RU-101	5.4095E-05	RU-101	5.4095E-05	RU-101	5.4095E-05
PM-147	4.0976E-06	PM-147	4.9493E-07	PM-147	3.5242E-08
EU-154	2.0147E-06	EU-154	1.0573E-06	EU-154	4.7224E-07
EU-155	7.5224E-07	EU-155	2.4594E-07	EU-155	6.0804E-08
PD-105	1.9867E-05	PD-105	1.9867E-05	PD-105	1.9867E-05
CS-135	2.0827E-05	CS-135	2.0827E-05	CS-135	2.0827E-05
ZR-93	5.2020E-05	ZR-93	5.2020E-05	ZR-93	5.2020E-05
PR-141	5.5940E-05	PR-141	5.5940E-05	PR-141	5.5940E-05
PD-108	1.0566E-05	PD-108	1.0566E-05	PD-108	1.0566E-05
CS-133	5.7603E-05	CS-133	5.7603E-05	CS-133	5.7603E-05
NP-237	1.6631E-05	NP-237	1.6796E-05	NP-237	1.7195E-05
PU-238	8.1872E-06	PU-238	7.7152E-06	PU-238	7.1313E-06
PU-239	1.6584E-04	PU-239	1.6580E-04	PU-239	1.6576E-04
PU-240	6.0863E-05	PU-240	6.1337E-05	PU-240	6.1738E-05
PU-241	4.2914E-05	PU-241	2.9428E-05	PU-241	1.8364E-05
PU-242	1.7683E-05	PU-242	1.7683E-05	PU-242	1.7683E-05
AM-241	5.7415E-06	AM-241	1.9061E-05	AM-241	2.9727E-05
AM-243	5.4562E-06	AM-243	5.4521E-06	AM-243	5.4470E-06
CM-244	1.9920E-06	CM-244	1.4666E-06	CM-244	1.0002E-06

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.25% ENRICH 60 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	2.5638E-06	U-234	3.3870E-06	U-234	4.3459E-06
U-235	7.1347E-05	U-235	7.1386E-05	U-235	7.1436E-05
U-236	1.0067E-04	U-236	1.0073E-04	U-236	1.0081E-04
U-238	2.0135E-02	U-238	2.0135E-02	U-238	2.0135E-02
O-16	4.4098E-02	O-16	4.4098E-02	O-16	4.4098E-02
RH-103	3.8815E-05	RH-103	3.8815E-05	RH-103	3.8815E-05
SM-149	2.5514E-07	SM-149	2.5514E-07	SM-149	2.5514E-07
ND-143	4.2686E-05	ND-143	4.2686E-05	ND-143	4.2686E-05
TC-99	6.6027E-05	TC-99	6.6025E-05	TC-99	6.6023E-05
SM-152	7.0025E-06	SM-152	7.0028E-06	SM-152	7.0030E-06
SM-151	1.0039E-06	SM-151	9.4399E-07	SM-151	8.7402E-07
SM-147	6.4698E-06	SM-147	1.0409E-05	SM-147	1.0911E-05
GD-155	3.9158E-07	GD-155	1.1813E-06	GD-155	1.4701E-06
EU-153	7.4009E-06	EU-153	7.4010E-06	EU-153	7.4010E-06
MO-95	6.8406E-05	MO-95	6.8410E-05	MO-95	6.8410E-05
ND-145	3.8974E-05	ND-145	3.8974E-05	ND-145	3.8974E-05
AG-109	6.6088E-06	AG-109	6.6088E-06	AG-109	6.6088E-06
SM-150	2.2197E-05	SM-150	2.2196E-05	SM-150	2.2196E-05
RU-101	7.1032E-05	RU-101	7.1032E-05	RU-101	7.1032E-05
PM-147	4.4802E-06	PM-147	5.4114E-07	PM-147	3.8532E-08
EU-154	3.0647E-06	EU-154	1.6083E-06	EU-154	7.1835E-07
EU-155	1.1734E-06	EU-155	3.8364E-07	EU-155	9.4848E-08
PD-105	2.4998E-05	PD-105	2.4998E-05	PD-105	2.4998E-05
CS-135	2.3195E-05	CS-135	2.3195E-05	CS-135	2.3195E-05
ZR-93	6.5471E-05	ZR-93	6.5470E-05	ZR-93	6.5470E-05
PR-141	7.2814E-05	PR-141	7.2814E-05	PR-141	7.2814E-05
PD-108	1.5670E-05	PD-108	1.5670E-05	PD-108	1.5670E-05
CS-133	7.1182E-05	CS-133	7.1182E-05	CS-133	7.1182E-05
NP-237	2.1272E-05	NP-237	2.1462E-05	NP-237	2.1926E-05
PU-238	1.3404E-05	PU-238	1.2624E-05	PU-238	1.1667E-05
PU-239	1.7140E-04	PU-239	1.7137E-04	PU-239	1.7133E-04
PU-240	7.1006E-05	PU-240	7.2433E-05	PU-240	7.3677E-05
PU-241	5.0519E-05	PU-241	3.4644E-05	PU-241	2.1619E-05
PU-242	2.7994E-05	PU-242	2.7994E-05	PU-242	2.7994E-05
AM-241	6.4219E-06	AM-241	2.2107E-05	AM-241	3.4667E-05
AM-243	1.0693E-05	AM-243	1.0685E-05	AM-243	1.0675E-05
CM-244	5.6411E-06	CM-244	4.1532E-06	CM-244	2.8324E-06

ATOM DENSITIES FOR INITIAL FUEL,

ATOMS/BARN-CM

(3.50% ENRICH)

ISOTOPE	AT. DENSITY
U-234	6.9494E-06
U-235	7.8127E-04
U-236	3.5563E-06
U-238	2.1258E-02
O-16	4.4100E-02

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.50% ENRICH 5 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	6.4757E-06	U-234	6.4784E-06	U-234	6.4815E-06
U-235	6.5866E-04	U-235	6.5867E-04	U-235	6.5869E-04
U-236	2.6586E-05	U-236	2.6589E-05	U-236	2.6594E-05
U-238	2.1179E-02	U-238	2.1179E-02	U-238	2.1179E-02
O-16	4.4100E-02	O-16	4.4100E-02	O-16	4.4100E-02
RH-103	4.0946E-06	RH-103	4.0946E-06	RH-103	4.0946E-06
SM-149	9.3642E-08	SM-149	9.3642E-08	SM-149	9.3642E-08
ND-143	6.5344E-06	ND-143	6.5344E-06	ND-143	6.5344E-06
TC-99	7.1154E-06	TC-99	7.1152E-06	TC-99	7.1149E-06
SM-152	6.0756E-07	SM-152	6.0767E-07	SM-152	6.0776E-07
SM-151	2.7544E-07	SM-151	2.5898E-07	SM-151	2.3979E-07
SM-147	1.2802E-06	SM-147	2.2958E-06	SM-147	2.4254E-06
GD-155	1.0810E-08	GD-155	3.0723E-08	GD-155	3.8004E-08
EU-153	2.8121E-07	EU-153	2.8121E-07	EU-153	2.8121E-07
MO-95	7.2565E-06	MO-95	7.2574E-06	MO-95	7.2574E-06
ND-145	4.4596E-06	ND-145	4.4596E-06	ND-145	4.4596E-06
AG-109	1.8794E-07	AG-109	1.8794E-07	AG-109	1.8794E-07
SM-150	1.29[illegible]E-06	SM-150	1.2989E-06	SM-150	1.2989E-06
RU-101	6.1031E-06	RU-101	6.1031E-06	RU-101	6.1031E-06
PM-147	1.1551E-06	PM-147	1.3952E-07	PM-147	9.9346E-09
EU-154	2.1443E-08	EU-154	1.1253E-08	EU-154	5.0261E-09
EU-155	2.9585E-08	EU-155	9.6730E-09	EU-155	2.3914E-09
PD-105	1.6897E-06	PD-105	1.6897E-06	PD-105	1.6897E-06
CS-135	5.1648E-06	CS-135	5.1648E-06	CS-135	5.1648E-06
ZR-93	7.2368E-06	ZR-93	7.2368E-06	ZR-93	7.2367E-06
PR-141	6.7777E-06	PR-141	6.7777E-06	PR-141	6.7777E-06
PD-108	3.4613E-07	PD-108	3.4613E-07	PD-108	3.4613E-07
CS-133	7.8127E-06	CS-133	7.8127E-06	CS-133	7.8127E-06
NP-237	9.2941E-07	NP-237	9.3345E-07	NP-237	9.4342E-07
PU-238	4.6256E-08	PU-238	4.3480E-08	PU-238	4.0188E-08
PU-239	5.5043E-05	PU-239	5.5030E-05	PU-239	5.5015E-05
PU-240	4.3992E-06	PU-240	4.3955E-06	PU-240	4.3908E-06
PU-241	1.0958E-06	PU-241	7.5150E-07	PU-241	4.6897E-07
PU-242	3.8175E-08	PU-242	3.8176E-08	PU-242	3.8178E-08
AM-241	1.3310E-07	AM-241	4.7342E-07	AM-241	7.4599E-07
AM-243	1.0523E-09	AM-243	1.0515E-09	AM-243	1.0505E-09
CM-244	2.7611E-11	CM-244	2.0328E-11	CM-244	1.3863E-11

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.50% ENRICH 15 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	5.5857E-06	U-234	5.6259E-06	U-234	5.6727E-06
U-235	4.6952E-04	U-235	4.6954E-04	U-235	4.6958E-04
U-236	6.0934E-05	U-236	6.0951E-05	U-236	6.0973E-05
U-238	2.1009E-02	U-238	2.1009E-02	U-238	2.1009E-02
0-16	4.4100E-02	0-16	4.4100E-02	0-16	4.1100E-02
RH-103	1.2277E-05	RH-103	1.2277E-05	RH-103	1.2277E-05
SM-149	1.2766E-07	SM-149	1.2766E-07	SM-149	1.2766E-07
ND-143	1.7518E-05	ND-143	1.7518E-05	ND-143	1.7518E-05
TC-99	2.0431E-05	TC-99	2.0431E-05	TC-99	2.0430E-05
SM-152	2.0735E-06	SM-152	2.0738E-06	SM-152	2.0741E-06
SM-151	4.5624E-07	SM-151	4.2898E-07	SM-151	3.9718E-07
SM-147	3.4696E-06	SM-147	5.7011E-06	SM-147	5.9858E-06
GD-155	3.7083E-08	GD-155	1.0878E-07	GD-155	1.3500E-07
EU-153	1.2851E-06	EU-153	1.2851E-06	EU-153	1.2851E-06
MO-95	2.0661E-05	MO-95	2.0663E-05	MO-95	2.0663E-05
ND-145	1.2543E-05	ND-145	1.2543E-05	ND-145	1.2543E-05
AG-109	1.0387E-06	AG-109	1.0387E-06	AG-109	1.0387E-06
SM-150	4.4853E-06	SM-150	4.4853E-06	SM-150	4.4853E-06
RU-101	1.8341E-05	RU-101	1.8341E-05	RU-101	1.8341E-05
PM-147	2.5380E-06	PM-147	3.0655E-07	PM-147	2.1828E-08
EU-154	2.2740E-07	EU-154	1.1933E-07	EU-154	5.3301E-08
EU-155	1.0653E-07	EU-155	3.4829E-08	EU-155	8.6109E-09
PD-105	5.9948E-06	PD-105	5.9948E-06	PD-105	5.9948E-06
CS-135	1.1734E-05	CS-135	1.1734E-05	CS-135	1.1734E-05
ZR-93	2.0314E-05	ZR-93	2.0314E-05	ZR-93	2.0314E-05
PR-141	1.9836E-05	PR-141	1.9836E-05	PR-141	1.9836E-05
PD-108	1.9226E-06	PD-108	1.9226E-06	PD-108	1.9226E-06
CS-133	2.2382E-05	CS-133	2.2382E-05	CS-133	2.2382E-05
NP-237	4.2407E-06	NP-237	4.2830E-06	NP-237	4.3848E-06
PU-238	6.5546E-07	PU-238	6.1773E-07	PU-238	5.7117E-07
PU-239	1.1585E-04	PU-239	1.1582E-04	PU-239	1.1579E-04
PU-240	2.0626E-05	PU-240	2.0611E-05	PU-240	2.0592E-05
PU-241	1.0955E-05	PU-241	7.5124E-06	PU-241	4.6881E-06
PU-242	1.2551E-06	PU-242	1.2552E-06	PU-242	1.2552E-06
AM-241	1.4728E-06	AM-241	4.8731E-06	AM-241	7.5956E-06
AM-243	1.2107E-07	AM-243	1.2098E-07	AM-243	1.2086E-07
CM-244	1.0958E-08	CM-244	8.0681E-09	CM-244	5.5023E-09

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.50% ENRICH 18 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	5.3360E-06	U-234	5.3984E-06	U-234	5.4711E-06
U-235	4.2351E-04	U-235	4.2354E-04	U-235	4.2357E-04
U-236	6.8872E-05	U-236	6.8893E-05	U-236	6.8920E-05
U-238	2.0956E-02	U-238	2.0956E-02	U-238	2.0956E-02
O-16	4.4100E-02	O-16	4.4100E-02	O-16	4.4100E-02
RH-103	1.4638E-05	RH-103	1.4638E-05	RH-103	1.4638E-05
SM-149	1.3979E-07	SM-149	1.3979E-07	SM-149	1.3979E-07
ND-143	2.0360E-05	ND-143	2.0360E-05	ND-143	2.0360E-05
TC-99	2.4197E-05	TC-99	2.4196E-05	TC-99	2.4196E-05
SM-152	2.4809E-06	SM-152	2.4812E-06	SM-152	2.4815E-06
SM-151	4.9888E-07	SM-151	4.6907E-07	SM-151	4.3430E-07
SM-147	3.9242E-06	SM-147	6.4543E-06	SM-147	6.7772E-06
GD-155	4.9238E-08	GD-155	1.4540E-07	GD-155	1.8056E-07
EU-153	1.6668E-06	EU-153	1.6668E-06	EU-153	1.6668E-06
MO-95	2.4456E-05	MO-95	2.4458E-05	MO-95	2.4458E-05
ND-145	1.4784E-05	ND-145	1.4784E-05	ND-145	1.4784E-05
AG-109	1.3629E-06	AG-109	1.3629E-06	AG-109	1.3629E-06
SM-150	5.5908E-06	SM-150	5.5908E-06	SM-150	5.5908E-06
RU-101	2.1997E-05	RU-101	2.1997E-05	RU-101	2.1996E-05
PM-147	2.8777E-06	PM-147	3.4758E-07	PM-147	2.4750E-08
EU-154	3.3750E-07	EU-154	1.7711E-07	EU-154	7.9109E-08
EU-155	1.4287E-07	EU-155	4.6713E-08	EU-155	1.1549E-08
PD-105	7.2946E-06	PD-105	7.2946E-06	PD-105	7.2946E-06
CS-135	1.2825E-05	CS-135	1.2825E-05	CS-135	1.2825E-05
ZR-93	2.3962E-05	ZR-93	2.3962E-05	ZR-93	2.3962E-05
PR-141	2.3649E-05	PR-141	2.3649E-05	PR-141	2.3649E-05
PD-108	2.5550E-06	PD-108	2.5550E-06	PD-108	2.5550E-06
CS-133	2.6486E-05	CS-133	2.6486E-05	CS-133	2.6486E-05
NP-237	5.4648E-06	NP-237	5.5218E-06	NP-237	5.6597E-06
PU-238	1.0172E-06	PU-238	9.5880E-07	PU-238	8.8651E-07
PU-239	1.2692E-04	PU-239	1.7689E-04	PU-239	1.2686E-04
PU-240	2.5568E-05	PU-240	2.5554E-05	PU-240	2.5533E-05
PU-241	1.4837E-05	PU-241	1.0175E-05	PU-241	6.3496E-06
PU-242	2.0773E-06	PU-242	2.0774E-06	PU-242	2.0775E-06
AM-241	1.9854E-06	AM-241	6.5909E-06	AM-241	1.0278E-05
AM-243	2.4619E-07	AM-243	2.4600E-07	AM-243	2.4577E-07
CM-244	2.7693E-08	CM-244	2.0389E-08	CM-244	1.3905E-08

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.50% ENRICH 25 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	4.7879E-06	U-234	4.9234E-06	U-234	5.0812E-06
U-235	3.3130E-04	U-235	3.3133E-04	U-235	3.3137E-04
U-236	8.3928E-05	U-236	8.3959E-05	U-236	8.3997E-05
U-238	2.0826E-02	U-238	2.0826E-02	U-238	2.0826E-02
O-16	4.4100E-02	O-16	4.4100E-02	O-16	4.4100E-02
RH-103	1.9877E-05	RH-103	1.9877E-05	RH-103	1.9877E-05
SM-149	1.7370E-07	SM-149	1.7370E-07	SM-149	1.7370E-07
ND-143	2.6277E-05	ND-143	2.6277E-05	ND-143	2.6277E-05
TC-99	5.2583E-05	TC-99	3.2582E-05	TC-99	3.2581E-05
SM-152	3.3805E-06	SM-152	3.3808E-06	SM-152	3.3810E-06
SM-151	6.0014E-07	SM-151	5.6428E-07	SM-151	5.2265E-07
SM-147	4.7548E-06	SM-147	7.8455E-06	SM-147	8.2399E-06
GD-155	8.7226E-08	GD-155	2.6010E-07	GD-155	3.2331E-07
EU-153	2.6344E-06	EU-153	2.6344E-06	EU-153	2.6344E-06
MO-95	3.2959E-05	MO-95	3.2961E-05	MO-95	3.2961E-05
ND-145	1.9721E-05	ND-145	1.9721E-05	ND-145	1.9721E-05
AG-109	2.1847E-06	AG-109	2.1847E-06	AG-109	2.1847E-06
SM-150	8.4463E-06	SM-150	8.4463E-06	SM-150	8.4463E-06
RU-101	3.0472E-05	RU-101	3.0472E-05	RU-101	3.0472E-05
PM-147	3.5153E-06	PM-147	4.2459E-07	PM-147	3.0233E-08
EU-154	6.7312E-07	EU-154	3.5324E-07	EU-154	! 5777E-07
EU-155	2.5685E-07	EU-155	8.3977E-08	EU-155	2.0761E-08
PD-105	1.0229E-05	PD-105	1.0229E-05	PD-105	1.0229E-05
CS-135	1.4738E-05	CS-135	1.4738E-05	CS-135	1.4738E-05
ZR-93	3.2073E-05	ZR-93	3.2073E-05	ZR-93	3.2073E-05
PR-141	3.2386E-05	PR-141	3.2386E-05	PR-141	3.2386E-05
PD-108	4.2406E-06	PD-108	4.2406E-06	PD-108	4.2406E-06
CS-133	3.5590E-05	CS-133	3.5590E-05	CS-133	3.5590E-05
NP-237	8.5121E-06	NP-237	8.6035E-06	NP-237	8.8250E-06
PU-238	2.2057E-06	PU-238	2.0792E-06	PU-238	1.9222E-06
PU-239	1.4526E-04	PU-239	1.4523E-04	PU-239	1.4519E-04
PU-240	3.6240E-05	PU-240	3.6246E-05	PU-240	3.6239E-05
PU-241	2.3919E-05	PU-241	1.6402E-05	PU-241	1.0236E-05
PU-242	4.8154E-06	PU-242	4.8155E-06	PU-242	4.8156E-06
AM-241	3.1522E-06	AM-241	1.0577E-05	AM-241	1.6522E-05
AM-243	8.1892E-07	AM-243	8.1831E-07	AM-243	8.1754E-07
CM-244	1.3742E-07	CM-244	1.0117E-07	CM-244	6.9001E-08

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.50% ENRICH 33 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	4.2231E-06	U-234	4.4755E-06	U-234	4.7696E-06
U-235	2.4772E-04	U-235	2.4776E-04	U-235	2.4780E-04
U-236	9.6071E-05	U-236	9.6111E-05	U-236	9.6160E-05
U-238	2.0672E-02	U-238	2.0672E-02	U-238	2.0672E-02
O-16	4.4100E-02	O-16	4.4100E-02	O-16	4.4100E-02
RH-103	2.5344E-05	RH-103	2.5344E-05	RH-103	2.5344E-05
SM-149	2.0694E-07	SM-149	2.0694E-07	SM-149	2.0694E-07
ND-143	3.1922E-05	ND-143	3.1922E-05	ND-143	3.1922E-05
TC-99	4.1499E-05	TC-99	4.1498E-05	TC-99	4.1497E-05
SM-152	4.3107E-06	SM-152	4.3110E-06	SM-152	4.3112E-06
SM-151	7.0428E-07	SM-151	6.6220E-07	SM-151	6.1311E-07
SM-147	5.3890E-06	SM-147	8.9388E-06	SM-147	9.3917E-06
GD-155	1.4549E-07	GD-155	4.3674E-07	GD-155	5.4324E-07
EU-153	3.7878E-06	EU-153	3.7878E-06	EU-153	3.7878E-06
MO-95	4.2134E-05	MO-95	4.2137E-05	MO-95	4.2137E-05
ND-145	2.4905E-05	ND-145	2.4905E-05	ND-145	2.4905E-05
AG-109	3.1814E-06	AG-109	3.1814E-06	AG-109	3.1814E-06
SM-150	1.1576E-05	SM-150	1.1576E-05	SM-150	1.1576E-05
RU-101	4.0040E-05	RU-101	4.0039E-05	RU-101	4.0039E-05
PM-147	4.0374E-06	PM-147	4.8765E-07	PM-147	3.4723E-08
EU-154	1.1593E-06	EU-154	6.0839E-07	EU-154	2.7174E-07
EU-155	4.3272E-07	EU-155	1.4147E-07	EU-155	3.4977E-08
PD-105	1.3329E-05	PD-105	1.3329E-05	PD-105	1.3329E-05
CS-135	1.6259E-05	CS-135	1.6259E-05	CS-135	1.6259E-05
ZR-93	4.0748E-05	ZR-93	4.0748E-05	ZR-93	4.0747E-05
PR-141	4.2120E-05	PR-141	4.2120E-05	PR-141	4.2120E-05
PD-108	6.4493E-06	PD-108	6.4493E-06	PD-108	6.4493E-06
CS-133	4.5213E-05	CS-133	4.5213E-05	CS-133	4.5213E-05
NP-237	1.2072E-05	NP-237	1.2198E-05	NP-237	1.2503E-05
PU-238	4.1087E-06	PU-238	3.8724E-06	PU-238	3.5796E-06
PU-239	1.5769E-04	PU-239	1.5766E-04	PU-239	1.5762E-04
PU-240	4.6541E-05	PU-240	4.6630E-05	PU-240	4.6695E-05
PU-241	3.3173E-05	PU-241	2.2749E-05	PU-241	1.4196E-05
PU-242	9.0998E-06	PU-242	9.0999E-06	PU-242	9.1000E-06
AM-241	4.2792E-06	AM-241	1.4578E-05	AM-241	2.2825E-05
AM-243	2.0594E-06	AM-243	2.0579E-06	AM-243	2.0559E-06
CM-244	4.8859E-07	CM-244	3.5972E-07	CM-244	2.4532E-07

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.50% ENRICH 45 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	3.5125E-06	U-234	4.0129E-06	U-234	4.5958E-06
U-235	1.5709E-04	U-235	1.5712E-04	U-235	1.5717E-04
U-236	1.0618E-04	U-236	1.0623E-04	U-236	1.0630E-04
U-238	2.0428E-02	U-238	2.0428E-02	U-238	2.0428E-02
O-16	4.4100E-02	O-16	4.4100E-02	O-16	4.4100E-02
RH-103	3.1928E-05	RH-103	3.1928E-05	RH-103	3.1928E-05
SM-149	2.1746E-07	SM-149	2.1746E-07	SM-149	2.1746E-07
ND-143	3.8399E-05	ND-143	3.8399E-05	ND-143	3.8399E-05
TC-99	5.3446E-05	TC-99	5.3444E-05	TC-99	5.3442E-05
SM-152	5.5247E-06	SM-152	5.5251E-06	SM-152	5.5253E-06
SM-151	8.4370E-07	SM-151	7.9329E-07	SM-151	7.3448E-07
SM-147	6.4141E-06	SM-147	1.0083E-05	SM-147	1.0552E-05
GD-155	2.4973E-07	GD-155	7.4843E-07	GD-155	9.3079E-07
EU-153	5.4386E-06	EU-153	5.4387E-06	EU-153	5.4387E-06
MO-95	5.4671E-05	MO-95	5.4674E-05	MO-95	5.4674E-05
ND-145	3.1883E-05	ND-145	3.1883E-05	ND-145	3.1883E-05
AG-109	4.6728E-06	AG-109	4.6728E-06	AG-109	4.6728E-06
SM-150	1.6016E-05	SM-150	1.6016E-05	SM-150	1.6016E-05
RU-101	5.4047E-05	RU-101	5.4047E-05	RU-101	5.4047E-05
PM-147	4.1738E-06	PM-147	5.0414E-07	PM-147	3.5897E-08
EU-154	1.9717E-06	EU-154	1.0347E-06	EU-154	4.6216E-07
EU-155	7.4095E-07	EU-155	2.4225E-07	EU-155	5.9892E-08
PD-105	1.9470E-05	PD-105	1.9470E-05	PD-105	1.9470E-05
CS-135	2.1780E-05	CS-135	2.1780E-05	CS-135	2.1780E-05
ZR-93	5.2725E-05	ZR-93	5.2725E-05	ZR-93	5.2725E-05
PR-141	5.6223E-05	PR-141	5.6223E-05	PR-141	5.6223E-05
PD-108	1.0138E-05	PD-108	1.0138E-05	PD-108	1.0138E-05
CS-133	5.7961E-05	CS-133	5.7961E-05	CS-133	5.7961E-05
NP-237	1.7070E-05	NP-237	1.7235E-05	NP-237	1.7633E-05
PU-238	8.1449E-06	PU-238	7.6748E-06	PU-238	7.0940E-06
PU-239	1.6883E-04	PU-239	1.6879E-04	PU-239	1.6875E-04
PU-240	5.9870E-05	PU-240	6.0285E-05	PU-240	6.0634E-05
PU-241	4.2861E-05	PU-241	2.9392E-05	PU-241	1.8342E-05
PU-242	1.6599E-05	PU-242	1.6599E-05	PU-242	1.6599E-05
AM-241	5.7598E-06	AM-241	1.9063E-05	AM-241	2.9715E-05
AM-243	5.0226E-06	AM-243	5.0188E-06	AM-243	5.0141E-06
CM-244	1.7661E-06	CM-244	1.3002E-06	CM-244	8.8677E-07

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.50% ENRICH 60 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	2.8053E-06	U-234	3.6393E-06	U-234	4.6107E-06
U-235	8.6228E-05	U-235	8.6268E-05	U-235	8.6318E-05
U-236	1.0912E-04	U-236	1.0918E-04	U-236	1.0926E-04
U-238	2.0108E-02	U-238	2.0108E-02	U-238	2.0108E-02
O-16	4.4100E-02	O-16	4.4100E-02	O-16	4.4100E-02
RH-103	3.8805E-05	RH-103	3.8805E-05	RH-103	3.8805E-05
SM-149	2.6165E-07	SM-149	2.6165E-07	SM-149	2.6165E-07
ND-143	4.3952E-05	ND-143	4.3952E-05	ND-143	4.3952E-05
TC-99	6.6473E-05	TC-99	6.6471E-05	TC-99	6.6469E-05
SM-152	6.9852E-06	SM-152	6.9855E-06	SM-152	6.9857E-06
SM-151	1.0295E-06	SM-151	9.6805E-07	SM-151	8.9629E-07
SM-147	6.6187E-06	SM-147	1.0625E-05	SM-147	1.1136E-05
GD-155	3.9050E-07	GD-155	1.1771E-06	GD-155	1.4647E-06
EU-153	7.3581E-06	EU-153	7.3581E-06	EU-153	7.3581E-06
MO-95	6.9108E-05	MO-95	6.9112E-05	MO-95	6.9112E-05
ND-145	3.9436E-05	ND-145	3.9436E-05	ND-145	3.9436E-05
AG-109	6.4434E-06	AG-109	6.4434E-06	AG-109	6.4434E-06
SM-150	2.2215E-05	SM-150	2.2215E-05	SM-150	2.2215E-05
RU-101	7.0993E-05	RU-101	7.0993E-05	RU-101	7.0993E-05
PM-147	4.5566E-06	PM-147	5.5037E-07	PM-147	3.9189E-08
EU-154	3.0309E-06	EU-154	1.5905E-06	EU-154	7.1043E-07
EU-155	1.1687E-06	EU-155	3.8210E-07	EU-155	9.4466E-08
PD-105	2.4598E-05	PD-105	2.4598E-05	PD-105	2.4598E-05
CS-135	2.4138E-05	CS-135	2.4138E-05	CS-135	2.4138E-05
ZR-93	6.6382E-05	ZR-93	6.6382E-05	ZR-93	6.6382E-05
PR-141	7.3198E-05	PR-141	7.3198E-05	PR-141	7.3198E-05
PD-108	1.5142E-05	PD-108	1.5142E-05	PD-108	1.5142E-05
CS-133	7.1684E-05	CS-133	7.1684E-05	CS-133	7.1684E-05
NP-237	2.2087E-05	NP-237	2.2279E-05	NP-237	2.2748E-05
PU-238	1.3581E-05	PU-238	1.2790E-05	PU-238	1.1820E-05
PU-239	1.7453E-04	PU-239	1.7450E-04	PU-239	1.7446E-04
PU-240	7.0444E-05	PU-240	7.1739E-05	PU-240	7.2865E-05
PU-241	5.0979E-05	PU-241	3.4959E-05	PU-241	2.18[illegible]E-05
PU-242	2.6756E-05	PU-242	2.6756E-05	PU-242	2.6756E-05
AM-241	6.5101E-06	AM-241	2.2337E-05	AM-241	3.5012E-05
AM-243	1.0083E-05	AM-243	1.0075E-05	AM-243	1.0066E-05
CM-244	5.1379E-06	CM-244	3.7827E-06	CM-244	2.5798E-06

ATOM DENSITIES FOR INITIAL FUEL,

ATOMS/BARN-CM

(3.75% ENRICH)

ISOTOPE	AT. DENSITY
U-234	6.0528E-06
U-235	8.3707E-04
U-236	3.7786E-06
U-238	2.1202E-02
O-16	4.4101E-02

ATOM DENSITIES FOR DOMINANT ABSORBERS
IN SPENT FUEL, ATOMS/BARN-CM
(PWR TYPICAL IRRADIATION HISTORY
3.75% ENRICH 5 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	6.9112E-06	U-234	6.9138E-06	U-234	6.9168E-06
U-235	7.1301E-04	U-235	7.1303E-04	U-235	7.1304E-04
U-236	2.7279E-05	U-236	2.7282E-05	U-236	2.7287E-05
U-238	2.1125E-02	U-238	2.1125E-02	U-238	2.1125E-02
O-16	4.4101E-02	O-16	4.4101E-02	O-16	4.4101E-02
RH-103	4.0728E-06	RH-103	4.0728E-06	RH-103	4.0728E-06
SM-149	9.9765E-08	SM-149	9.9765E-08	SM-149	9.9765E-08
ND-143	6.5661E-06	ND-143	6.5661E-06	ND-143	6.5661E-06
TC-99	7.1234E-06	TC-99	7.1232E-06	TC-99	7.1230E-06
SM-152	5.9432E-07	SM-152	5.9444E-07	SM-152	5.9453E-07
SM-151	2.8523E-07	SM-151	2.6819E-07	SM-151	2.4831E-07
SM-147	1.2850E-06	SM-147	2.3044E-06	SM-147	2.4345E-06
GD-155	1.0855E-08	GD-155	3.0687E-08	GD-155	3.7939E-08
EU-153	2.7690E-07	EU-153	2.7690E-07	EU-153	2.7690E-07
MO-95	7.2762E-06	MO-95	7.2771E-06	MO-95	7.2771E-06
ND-145	4.4716E-06	ND-145	4.4716E-06	ND-145	4.4716E-06
AG-109	1.7759E-07	AG-109	1.7759E-07	AG-109	1.7759E-07
SM-150	1.2893E-06	SM-150	1.2893E-06	SM-150	1.2893E-06
RU-101	6.0998E-06	RU-101	6.0998E-06	RU-101	6.0998E-06
PM-147	1.1595E-06	PM-147	1.4005E-07	PM-147	9.9725E-09
EU-154	2.0510E-08	EU-154	1.0763E-08	EU-154	4.8074E-09
EU-155	2.9464E-08	EU-155	9.6335E-09	EU-155	2.3816E-09
PD-105	1.6604E-06	PD-105	1.6604E-06	PD-105	1.6604E-06
CS-135	5.3032E-06	CS-135	5.3031E-06	CS-135	5.3031E-06
ZR-93	7.2645E-06	ZR-93	7.2644E-06	ZR-93	7.2644E-06
PR-141	6.7887E-06	PR-141	6.7887E-06	PR-141	6.7887E-06
PD-108	3.2885E-07	PD-108	3.2885E-07	PD-108	3.2885E-07
CS-133	7.8214E-06	CS-133	7.8214E-06	CS-133	7.8214E-06
NP-237	9.2438E-07	NP-237	9.2807E-07	NP-237	9.3719E-07
PU-238	4.4278E-08	PU-238	4.1616E-08	PU-238	3.8464E-08
PU-239	5.4160E-05	PU-239	5.4147E-05	PU-239	5.4131E-05
PU-240	4.1123E-06	PU-240	4.1088E-06	PU-240	4.1045E-06
PU-241	1.0025E-06	PU-241	6.8747E-07	PU-241	4.2901E-07
PU-242	3.2667E-08	PU-242	3.2668E-08	PU-242	3.2669E-08
AM-241	1.2171E-07	AM-241	4.3304E-07	AM-241	6.8238E-07
AM-243	8.7584E-10	AM-243	8.7519E-10	AM-243	8.7436E-10
CM-244	2.2240E-11	CM-244	1.6374E-11	CM-244	1.1 67E-11

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.75% ENRICH 15 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	5.9919E-06	U-234	6.0304E-06	U-234	6.0753E-06
U-235	5.1798E-04	U-235	5.1801E-04	U-235	5.1804E-04
U-236	6.3060E-05	U-236	6.3077E-05	U-236	6.3098E-05
U-238	2.0960E-02	U-238	2.0960E-02	U-238	2.0960E-02
O-16	4.4101E-02	O-16	4.4101E-02	O-16	4.4101E-02
RH-103	1.2185E-05	RH-103	1.2185E-05	RH-103	1.2185E-05
SM-149	1.3405E-07	SM-149	1.3405E-07	SM-149	1.3405E-07
ND-143	1.7715E-05	ND-143	1.7715E-05	ND-143	1.7715E-05
TC-99	2.0482E-05	TC-99	2.0481E-05	TC-99	2.0481E-05
SM-152	2.0464E-06	SM-152	2.0467E-06	SM-152	2.0470E-06
SM-151	4.7537E-07	SM-151	4.4696E-07	SM-151	4.1383E-07
SM-147	3.5029E-06	SM-147	5.7559E-06	SM-147	6.0434E-06
GD-155	3.6519E-08	GD-155	1.0678E-07	GD-155	1.3247E-07
EU-153	1.2563E-06	EU-153	1.2563E-06	EU-153	1.2563E-06
MO-95	2.0772E-05	MO-95	2.0773E-05	MO-95	2.0773E-05
ND-145	1.2614E-05	ND-145	1.2614E-05	ND-145	1.2614E-05
AG-109	9.8439E-07	AG-109	9.8439E-07	AG-109	9.8439E-07
SM-150	4.4531E-06	SM-150	4.4531E-06	SM-150	4.4531E-06
RU-101	1.8322E-05	RU-101	1.8322E-05	RU-101	1.8322E-05
PM-147	2.5625E-06	PM-147	3.0951E-07	PM-147	2.2038E-08
EU-154	2.1721E-07	EU-154	1.1398E-07	EU-154	5.0912E-08
EU-155	1.0439E-07	EU-155	3.4131E-08	EU-155	8.4383E-09
PD-105	5.8519E-06	PD-105	5.8519E-06	PD-105	5.8519E-06
CS-135	1.2176E-05	CS-135	1.2176E-05	CS-135	1.2176E-05
ZR-93	2.0468E-05	ZR-93	2.0468E-05	ZR-93	2.0468E-05
PR-141	1.9893E-05	PR-141	1.9893E-05	PR-141	1.9893E-05
PD-108	1.8225E-06	PD-108	1.8225E-06	PD-108	1.8225E-06
CS-133	2.2437E-05	CS-133	2.2437E-05	CS-133	2.2437E-05
NP-237	4.2415E-06	NP-237	4.2816E-06	NP-237	4.3783E-06
PU-238	6.2917E-07	PU-238	5.9283E-07	PU-238	5.4814E-07
PU-239	1.1584E-04	PU-239	1.1582E-04	PU-239	1.1578E-04
PU-240	1.9660E-05	PU-240	1.9646E-05	PU-240	1.9627E-05
PU-241	1.0403E-05	PU-241	7.1340E-06	PU-241	4.4519E-06
PU-242	1.1146E-06	PU-242	1.1147E-06	PU-242	1.1147E-06
AM-241	1.3988E-06	AM-241	4.6277E-06	AM-241	7.2131E-06
AM-243	1.0436E-07	AM-243	1.0428E-07	AM-243	1.0418E-07
CM-244	9.1166E-09	CM-244	6.7120E-09	CM-244	4.5775E-09

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.75% ENRICH 18 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	5.7325E-06	U-234	5.7925E-06	U-234	5.8625E-06
U-235	4.6982E-04	U-235	4.6985E-04	U-235	4.6989E-04
U-236	7.1486E-05	U-236	7.1506E-05	U-236	7.1532E-05
U-238	2.0908E-02	U-238	2.0908E-02	U-238	2.0908E-02
O-16	4.4101E-02	O-16	4.4101E-02	O-16	4.4101E-02
RH-103	1.4529E-05	RH-103	1.4529E-05	RH-103	1.4529E-05
SM-149	1.4631E-07	SM-149	1.4631E-07	SM-149	1.4631E-07
ND-143	2.0622E-05	ND-143	2.0622E-05	ND-143	2.0622E-05
TC-99	2.4266E-05	TC-99	2.4265E-05	TC-99	2.4264E-05
SM-152	2.4522E-06	SM-152	2.4525E-06	SM-152	2.4528E-06
SM-151	5.1888E-07	SM-151	4.8788E-07	SM-151	4.5171E-07
SM-147	3.9682E-06	SM-147	6.5[illegible]E-06	SM-147	6.8529E-06
GD-155	4.8282E-08	GD-155	1.4219E-07	GD-155	1.7653E-07
EU-153	1.6303E-06	EU-153	1.6303E-06	EU-153	1.6303E-06
MO-95	2.4600E-05	MO-95	2.4602E-05	MO-95	2.4602E-05
ND-145	1.4878E-05	ND-145	1.4878E-05	ND-145	1.4878E-05
AG-109	1.2944E-06	AG-109	1.2944E-06	AG-109	1.2944E-06
SM-150	5.5481E-06	SM-150	5.5481E-06	SM-150	5.5481E-06
RU-101	2.1973E-05	RU-101	2.1973E-05	RU-101	2.1973E-05
PM-147	2.9097E-06	PM-147	3.5144E-07	PM-147	2.5025E-08
EU-154	3.2293E-07	EU-154	1.6947E-07	EU-154	7.5694E-08
EU-155	1.3952E-07	EU-155	4.5617E-08	EU-155	1.1278E-08
PD-105	7.1203E-06	PD-105	7.1203E-06	PD-105	7.1203E-06
CS-135	1.3345E-05	CS-135	1.3345E-05	CS-135	1.3345E-05
ZR-93	2.4163E-05	ZR-93	2.4163E-05	ZR-93	2.4163E-05
PR-141	2.3724E-05	PR-141	2.3724E-05	PR-141	2.3724E-05
PD-108	2.4247E-06	PD-108	2.4247E-06	PD-108	2.4247E-06
CS-133	2.6561E-05	CS-133	2.6561E-05	CS-133	2.6561E-05
NP-237	5.4777E-06	NP-237	5.5323E-06	NP-237	5.6642E-06
PU-238	9.7936E-07	PU-238	9.2296E-07	PU-238	8.5337E-07
PU-239	1.2736E-04	PU-239	1.2733E-04	PU-239	1.2729E-04
PU-240	2.4476E-05	PU-240	2.4461E-05	PU-240	2.4440E-05
PU-241	1.4198E-05	PU-241	9.7366E-06	PU-241	6.0760E-06
PU-242	1.8593E-06	PU-242	1.8594E-06	PU-242	1.8594E-06
AM-241	1.9008E-06	AM-241	6.3079E-06	AM-241	9.8365E-06
AM-243	2.1400E-07	AM-243	2.1384E-07	AM-243	2.1364E-07
CM-244	2.3224E-08	CM-244	1.7099E-08	CM-244	1.1661E-08

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.75% ENRICH 25 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	5.1609E-06	U-234	5.2923E-06	U-234	5.4454E-06
U-235	3.7227E-04	U-235	3.7230E-04	U-235	3.7235E-04
U-236	8.7709E-05	U-236	8.7738E-05	U-236	8.7775E-05
U-238	2.0782E-02	U-238	2.0782E-02	U-238	2.0782E-02
O-16	4.4101E-02	O-16	4.4101E-02	O-16	4.4101E-02
RH-103	1.9741E-05	RH-103	1.9741E-05	RH-103	1.9741E-05
SM-149	1.7496E-07	SM-149	1.7496E-07	SM-149	1.7496E-07
ND-143	2.6709E-05	ND-143	2.6709E-05	ND-143	2.6709E-05
TC-99	3.2703E-05	TC-99	3.2702E-05	TC-99	3.2701E-05
SM-152	3.3424E-06	SM-152	3.3427E-06	SM-152	3.3430E-06
SM-151	6.1889E-07	SM-151	5.8191E-07	SM-151	5.3878E-07
SM-147	4.8248E-06	SM-147	7.9595E-06	SM-147	8.3595E-06
GD-155	8.5116E-08	GD-155	2.5329E-07	GD-155	3.1479E-07
EU-153	2.5799E-06	EU-153	2.5799E-06	EU-153	2.5799E-06
MO-95	3.3191E-05	MO-95	3.3194E-05	MO-95	3.3194E-05
ND-145	1.9875E-05	ND-145	1.9875E-05	ND-145	1.9875E-05
AG-109	2.0852E-06	AG-109	2.0852E-06	AG-109	2.0852E-06
SM-150	8.3416E-06	SM-150	8.3416E-06	SM-150	8.3416E-06
RU-101	3.0439E-05	RU-101	3.0439E-05	RU-101	3.0439E-05
PM-147	3.5652E-06	PM-147	4.3063E-07	PM-147	3.0663E-08
EU-154	6.4687E-07	EU-154	3.3946E-07	EU-154	1.5162E-07
EU-155	2.4988E-07	EU-155	8.1698E-08	EU-155	2.0198E-08
PD-105	9.9944E-06	PD-105	9.9944E-06	PD-105	9.9944E-06
CS-135	1.5401E-05	CS-135	1.5401E-05	CS-135	1.5401E-05
ZR-93	3.2392E-05	ZR-93	3.2392E-05	ZR-93	3.2392E-05
PR-141	3.2507E-05	PR-141	3.2507E-05	PR-141	3.2506E-05
PD-108	4.0362E-06	PD-108	4.0362E-06	PD-108	4.0362E-06
CS-133	3.5722E-05	CS-133	3.5722E-05	CS-133	3.5722E-05
NP-237	8.5755E-06	NP-237	8.6642E-06	NP-237	8.8793E-06
PU-238	2.1398E-06	PU-238	2.0168E-06	PU-238	1.8643E-06
PU-239	1.4663E-04	PU-239	1.4660E-04	PU-239	1.4656E-04
PU-240	3.4999E-05	PU-240	3.5000E-05	PU-240	3.4990E-05
PU-241	2.3221E-05	PU-241	1.5924E-05	PU-241	9.9376E-06
PU-242	4.3769E-06	PU-242	4.3770E-06	PU-242	4.3772E-06
AM-241	3.0647E-06	AM-241	1.0273E-05	AM-241	1.6045E-05
AM-243	7.2427E-07	AM-243	7.2372E-07	AM-243	7.2304E-07
CM-244	1.1717E-07	CM-244	8.6269E-08	CM-244	5.8834E-08

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.75% ENRICH 33 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
0U-234	4.5675E-06	U-234	4.8148E-06	U-234	5.1030E-06
0U-235	2.8251E-04	U-235	2.8255E-04	U-235	2.8259E-04
0U-236	1.0114E-04	U-236	1.0118E-04	U-236	1.0123E-04
0U-238	2.0632E-02	U-238	2.0632E-02	U-238	2.0632E-02
00-16	4.4101E-02	0-16	4.4101E-02	0-16	4.4101E-02
RH-103	2.5202E-05	RH-103	2.5202E-05	RH-103	2.5202E-05
SM-149	2.1456E-07	SM-149	2.1456E-07	SM-149	2.1456E-07
ND-143	3.2565E-05	ND-143	3.2565E-05	ND-143	3.2565E-05
TC-99	4.1684E-05	TC-99	4.1683E-05	TC-99	4.1682E-05
SM-152	4.2802E-06	SM-152	4.2805E-06	SM-152	4.2807E-06
SM-151	7.2811E-07	SM-151	6.8461E-07	SM-151	6.3386E-07
SM-147	5.4851E-06	SM-147	9.0937E-06	SM-147	9.5542E-06
GD-155	1.4244E-07	GD-155	4.2692E-07	GD-155	5.3095E-07
EU-153	3.7266E-06	EU-153	3.7266E-06	EU-153	3.7266E-06
MO-95	4.2470E-05	MO-95	4.2473E-05	MO-95	4.2473E-05
ND-145	2.5130E-05	ND-145	2.5130E-05	ND-145	2.5130E-05
AG-109	3.0535E-06	AG-109	3.0535E-06	AG-109	3.0535E-06
SM-150	1.1519E-05	SM-150	1.1519E-05	SM-150	1.1519E-05
RU-101	3.9997E-05	RU-101	3.9997E-05	RU-101	3.9997E-05
PM-147	4.1044E-06	PM-147	4.9575E-07	PM-147	3.5300E-08
EU-154	1.1232E-06	EU-154	5.8942E-07	EU-154	2.6327E-07
EU-155	4.2267E-07	EU-155	1.3819E-07	EU-155	3.4165E-08
PD-105	1.3045E-05	PD-105	1.3045E-05	PD-105	1.3045E-05
CS-135	1.7033E-05	CS-135	1.7033E-05	CS-135	1.7033E-05
ZR-93	4.1204E-05	ZR-93	4.1204E-05	ZR-93	4.1204E-05
PR-141	4.2295E-05	PR-141	4.2295E-05	PR-141	4.2295E-05
PD-108	6.1610E-06	PD-108	6.1610E-06	PD-108	6.1610E-06
CS-133	4.5418E-05	CS-133	4.5418E-05	CS-133	4.5418E-05
NP-237	1.2240E-05	NP-237	1.2364E-05	NP-237	1.2665E-05
PU-238	4.0262E-06	PU-238	3.7942E-06	PU-238	3.5073E-06
PU-239	1.6002E-04	PU-239	1.5998E-04	PU-239	1.5994E-04
PU-240	4.5329E-05	PU-240	4.5403E-05	PU-240	4.5454E-05
PU-241	3.2650E-05	PU-241	2.2390E-05	PU-241	1.3972E-05
PU-242	8.3910E-06	PU-242	8.3911E-06	PU-242	8.3912E-06
AM-241	4.2217E-06	AM-241	1.4358E-05	AM-241	2.2475E-05
AM-243	1.8542E-06	AM-243	1.8529E-06	AM-243	1.8511E-06
CM-244	4.2419E-07	CM-244	3.1231E-07	CM-244	2.1299E-07

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.75% ENRICH 45 GWd/MTU)

ISOTOPE	AT DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
0U-234	3.8133E-06	U-234	4.3097E-06	U-234	4.8881E-06
0U-235	1.8292E-04	U-235	1.8296E-04	U-235	1.8301E-04
0U-236	1.1299E-04	U-236	1.1304E-04	U-236	1.1310E-04
0U-238	2.0393E-02	U-238	2.0393E-02	U-238	2.0393E-02
00-16	4.4101E-02	0-16	4.4101E-02	0-16	4.4101E-02
RH-103	3.1834E-05	RH-103	3.1834E-05	RH-103	3.1834E-05
SM-149	2.2461E-07	SM-149	2.2461E-07	SM-149	2.2461E-07
ND-143	3.9349E-05	ND-143	3.9349E-05	ND-143	3.9349E-05
TC-99	5.3750E-05	TC-99	5.3749E-05	TC-99	5.3747E-05
SM-152	5.4999E-06	SM-152	5.5002E-06	SM-152	5.5005E-06
SM-151	8.6858E-07	SM-151	8.1667E-07	SM-151	7.5614E-07
SM-147	6.5509E-06	SM-147	1.0286E-05	SM-147	1.0763E-05
GD-155	2.4639E-07	GD-155	7.3740E-07	GD-155	9.1695E-07
EU-153	5.3783E-06	EU-153	5.3783E-06	EU-153	5.3783E-06
MO-95	5.5172E-05	MO-95	5.5175E-05	MO-95	5.5175E-05
ND-145	3.2217E-05	ND-145	3.2217E-05	ND-145	3.2217E-05
AG-109	4.5191E-06	AG-109	4.5191E-06	AG-109	4.5191E-06
SM-150	1.5974E-05	SM-150	1.5974E-05	SM-150	1.5974E-05
RU-101	5.4003E-05	RU-101	5.4003E-05	RU-101	5.4003E-05
PM-147	4.2491E-06	PM-147	5.1323E-07	PM-147	3.6544E-08
EU-154	1.9290E-06	EU-154	1.0123E-06	EU-154	4.5215E-07
EU-155	7.2952E-07	EU-155	2.3851E-07	EU-155	5.8968E-08
PD-105	1.9092E-05	PD-105	1.9092E-05	PD-105	1.9092E-05
CS-135	2.2742E-05	CS-135	2.2742E-05	CS-135	2.2742E-05
ZR-93	5.3386E-05	ZR-93	5.3386E-05	ZR-93	5.3385E-05
PR-141	5.6486E-05	PR-141	5.6486E-05	PR-141	5.6486E-05
PD-108	9.7378E-06	PD-108	9.7378E-06	PD-108	9.7378E-06
CS-133	5.8304E-05	CS-133	5.8304E-05	CS-133	5.8304E-05
NP-237	1.7457E-05	NP-237	1.7622E-05	NP-237	1.8020E-05
PU-238	8.0819E-06	PU-238	7.6149E-06	PU-238	7.0387E-06
PU-239	1.7178E-04	PU-239	1.7175E-04	PU-239	1.7170E-04
PU-240	5.8861E-05	PU-240	5.9225E-05	PU-240	5.9529E-05
PU-241	4.2747E-05	PU-241	2.^314E-05	PU-241	1.8293E-05
PU-242	1.5581E-05	PU-242	1. 581E-05	PU-242	1.5582E-05
AM-241	5.7688E-06	AM-241	1.9036E-05	AM-241	2.9659E-05
AM-243	4.6252E-06	AM-243	4.6218E-06	AM-243	4.6174E-06
CM-244	1.5687E-06	CM-244	1.1549E-06	CM-244	7.8766E-07

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

3.75% ENRICH 60 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
0U-234	3.0542E-06	U-234	7.8959E-06	U-234	4.8764E-06
0U-235	1.0284E-04	U-235	1.0288E-04	U-235	1.0293E-04
0U-236	1.1746E-04	U-236	1.1752E-04	U-236	1.1759E-04
0U-238	2.0079E-02	U-238	2.0079E-02	U-238	2.0079E-02
00-16	4.4101E-02	0-16	4.4101E-02	0-16	4.4101E-02
RH-103	3.8797E-05	RH-103	3.8797E-05	RH-103	3.8797E-05
SM-149	2.6856E-07	SM-149	2.6856E-07	SM-149	2.6856E-07
ND-143	4.5201E-05	ND-143	4.5201E-05	ND-143	4.5201E-05
TC-99	6.6910E-05	TC-99	6.6908E-05	TC-99	6.6906E-05
SM-152	6.9669E-06	SM-152	6.9672E-06	SM-152	6.9675E-06
SM-151	1.0562E-06	SM-151	9.9315E-07	SM-151	9.1953E-07
SM-147	6.7690E-06	SM-147	1.0844E-05	SM-147	1.1364E-05
GD-155	3.8920E-07	GD-155	1.1720E-06	GD-155	1.4583E-06
EU-153	7.3130E-06	EU-153	7.3130E-06	EU-153	7.3130E-06
MO-95	6.9782E-05	MO-95	6.9787E-05	MO-95	6.9787E-05
ND-145	3.9884E-05	ND-145	3.9884E-05	ND-145	3.9884E-05
AG-109	6.2815E-06	AG-109	6.2815E-06	AG-109	6.2815E-06
SM-150	2.2224E-05	SM-150	2.2224E-05	SM-150	2.2224E-05
RU-101	7.0957E-05	RU-101	7.0957E-05	RU-101	7.0957E-05
PM-147	4.6350E-06	PM-147	5.5983E-07	PM-147	3.9863E-08
EU-154	2.9954E-06	EU-154	1.5719E-06	EU-154	7.0211E-07
EU-155	1.1631E-06	EU-155	3.8029E-07	EU-155	9.4020E-08
PD-105	2.4212E-05	PD-105	2.4212E-05	PD-105	2.4211E-05
CS-135	2.5116E-05	CS-135	2.5116E-05	CS-135	2.5116E-05
ZR-93	6.7253E-05	ZR-93	6.7253E-05	ZR-93	6.7253E-05
PR-141	7.3563E-05	PR-141	7.3563E-05	PR-141	7.3563E-05
PD-108	1.4637E-05	PD-108	1.4637E-05	PD-108	1.4637E-05
CS-133	7.2178E-05	CS-133	7.2178E-05	CS-133	7.2178E-05
NP-237	2.2835E-05	NP-237	2.3029E-05	NP-237	2.3502E-05
PU-238	1.3708E-05	PU-238	1.2908E-05	PU-238	1.1930E-05
PU-239	1.7773E-04	PU-239	1.7770E-04	PU-239	1.7766E-04
PU-240	6.9852E-05	PU-240	7.1027E-05	PU-240	7.2047E-05
PU-241	5.1394E-05	PU-241	3.5244E-05	PU-241	2.1994E-05
PU-242	2.5553E-05	PU-242	2.5553E-05	PU-242	2.5553E-05
AM-241	6.5933E-06	AM-241	2.2549E-05	AM-241	3.5327E-05
AM-243	9.5003E-06	AM-243	9.4931E-06	AM-243	9.4842E-06
CM-244	4.6797E-06	CM-244	3.4454E-06	CM-244	2.3497E-06

ATOM DENSITIES FOR INITIAL FUEL,

ATOMS/BARN-CM

(4.00 ENRICH)

ISOTOPE	AT. DENSITY
U-234	8.0703E-06
U-235	8.9287E-04
U-236	4.0008E-06
U-238	2.1146E-02
O-16	4.4102E-02

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.00% ENRICH 5 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	7.5573E-06	U-234	7.5598E-06	U-234	7.5626E-06
U-235	7.6753E-04	U-235	7.6755E-04	U-235	7.6756E-04
U-236	2.7941E-05	U-236	2.7945E-05	U-236	2.7949E-05
U-238	2.1071E-02	U-238	2.1071E-02	U-238	2.1071E-02
O-16	4.4102E-02	O-16	4.4102E-02	O-16	4.4102E-02
RH-103	4.0538E-06	RH-103	4.0538E-06	RH-103	4.0538E-06
SM-149	1.0605E-07	SM-149	1.0605E-07	SM-149	1.0605E-07
ND-143	6.5941E-06	ND-143	6.5941E-06	ND-143	6.5941E-06
TC-99	7.1306E-06	TC-99	7.1304E-06	TC-99	7.1302E-06
SM-152	5.8207E-07	SM-152	5.8218E-07	SM-152	5.8227E-07
SM-151	2.9445E-07	SM-151	2.7686E-07	SM-151	2.5634E-07
SM-147	1.2892E-06	SM-147	2.3122E-06	SM-147	2.4427E-06
GD-155	1.0909E-08	GD-155	3.0674E-08	GD-155	3.7902E-08
EU-153	2.7307E-07	EU-153	2.7307E-07	EU-153	2.7307E-07
MO-95	7.2935E-06	MO-95	7.2944E-06	MO-95	7.2944E-06
ND-145	4.4822E-06	ND-145	4.4822E-06	ND-145	4.4822E-06
AG-109	1.6852E-07	AG-109	1.6852E-07	AG-109	1.6852E-07
SM-150	1.2800E-06	SM-150	1.2800E-06	SM-150	1.2800E-06
RU-101	6.0969E-06	RU-101	6.0969E-06	RU-101	6.0969E-06
PM-147	1.1635E-06	PM-147	1.4053E-07	PM-147	1.0006E-08
EU-154	1.9682E-08	EU-154	1.0329E-08	EU-154	4.6134E-09
EU-155	2.9366E-08	EU-155	9.6013E-09	EU-155	2.3737E-09
PD-105	1.6347E-06	PD-105	1.6347E-06	PD-105	1.6347E-06
CS-135	5.4313E-06	CS-135	5.4313E-06	CS-135	5.4313E-06
ZR-93	7.2887E-06	ZR-93	7.2886E-06	ZR-93	7.2886E-06
PR-141	6.7983E-06	PR-141	6.7983E-06	PR-141	6.7983E-06
PD-108	3.1374E-07	PD-108	3.1374E-07	PD-108	3.1374E-07
CS-133	7.8292E-06	CS-133	7.8292E-06	CS-133	7.8292E-06
NP-237	9.2000E-07	NP-237	9.2340E-07	NP-237	9.3177E-07
PU-238	4.2529E-08	PU-238	3.9968E-08	PU-238	3.6941E-08
PU-239	5.3333E-05	PU-239	5.3320E-05	PU-239	5.3305E-05
PU-240	3.8582E-06	PU-240	3.8549E-06	PU-240	3.8508E-06
PU-241	9.2101E-07	PU-241	6.3159E-07	PU-241	3.9414E-07
PU-242	2.8180E-08	PU-242	2.8182E-08	PU-242	2.8183E-08
AM-241	1.1178E-07	AM-241	3.9781E-07	AM-241	6.2688E-07
AM-243	7.3625E-10	AM-243	7.3570E-10	AM-243	7.3501E-10
CM-244	1.8136E-11	CM-244	1.3352E-11	CM-244	9.1062E-12

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.00% ENRICH 15 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	6.5828E-06	U-234	6.6199E-06	U-234	6.6630E-06
U-235	5.6719E-04	U-235	5.6721E-04	U-235	5.6725E-04
U-236	6.5060E-05	U-236	6.5076E-05	U-236	6.5096E-05
U-238	2.0910E-02	U-238	2.0910E-02	U-238	2.0910E-02
O-16	4.4102E-02	O-16	4.4102E-02	O-16	4.4102E-02
RH-103	1.2104E-05	RH-103	1.2104E-05	RH-103	1.2104E-05
SM-149	1.4065E-07	SM-149	1.4065E-07	SM-149	1.4065E-07
ND-143	1.7893E-05	ND-143	1.7893E-05	ND-143	1.7893E-05
TC-99	2.0528E-05	TC-99	2.0528E-05	TC-99	2.0527E-05
SM-152	2.0204E-06	SM-152	2.0208E-06	SM-152	2.0211E-06
SM-151	4.9455E-07	SM-151	4.6500E-07	SM-151	4.3053E-07
SM-147	3.5337E-06	SM-147	5.8065E-06	SM-147	6.0965E-06
GD-155	3.6042E-08	GD-155	1.0503E-07	GD-155	1.3026E-07
EU-153	1.2297E-06	EU-153	1.2298E-06	EU-153	1.2298E-06
MO-95	2.0870E-05	MO-95	2.0872E-05	MO-95	2.0872E-05
ND-145	1.2678E-05	ND-145	1.2678E-05	ND-145	1.2678E-05
AG-109	9.3548E-07	AG-109	9.3548E-07	AG-109	9.3548E-07
SM-150	4.4229E-06	SM-150	4.4229E-06	SM-150	4.4229E-06
RU-101	1.8305E-05	RU-101	1.8305E-05	RU-101	1.8305E-05
PM-147	2.5850E-06	PM-147	3.1223E-07	PM-147	2.2232E-08
EU-154	2.0799E-07	EU-154	1.0915E-07	EU-154	4.8752E-08
EU-155	1.0250E-07	EU-155	3.3515E-08	EU-155	8.2858E-09
PD-105	5.7231E-06	PD-105	5.7231E-06	PD-105	5.7231E-06
CS-135	1.2599E-05	CS-135	1.2599E-05	CS-135	1.2599E-05
ZR-93	2.0605E-05	ZR-93	2.0605E-05	ZR-93	2.0605E-05
PR-141	1.9944E-05	PR-141	1.9944E-05	PR-141	1.9944E-05
PD-108	1.7330E-06	PD-108	1.7330E-06	PD-108	1.7330E-06
CS-133	2.2488E-05	CS-133	2.2488E-05	CS-133	2.2488E-05
NP-237	4.2403E-06	NP-237	4.2785E-06	NP-237	4.3704E-06
PU-238	6.0523E-07	PU-238	5.7017E-07	PU-238	5.2718E-07
PU-239	1.1577E-04	PU-239	1.1575E-04	PU-239	1.1571E-04
PU-240	1.8774E-05	PU-240	1.8760E-05	PU-240	1.8742E-05
PU-241	9.8895E-06	PU-241	6.7818E-06	PU-241	4.2321E-06
PU-242	9.9437E-07	PU-242	9.9441E-07	PU-242	9.9446E-07
AM-241	1.3298E-06	AM-241	4.3994E-06	AM-241	6.8571E-06
AM-243	9.0518E-08	AM-243	9.0450E-08	AM-243	9.0366E-08
CM-244	7.6479E-09	CM-244	5.6307E-09	CM-244	3.8401E-09

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.00% ENRICH 18 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	6.3064E-06	U-234	6.3643E-06	U-234	6.4317E-06
U-235	5.1706E-04	U-235	5.1709E-04	U-235	5.1712E-04
U-236	7.3946E-05	U-236	7.3966E-05	U-236	7.3991E-05
U-238	2.0859E-02	U-238	2.0859E-02	U-238	2.0859E-02
O-16	4.4102E-02	O-16	4.4102E-02	O-16	4.4102E-02
RH-103	1.4431E-05	RH-103	1.4431E-05	RH-103	1.4431E-05
SM-149	1.5305E-07	SM-149	1.5305E-07	SM-149	1.5305E-07
ND-143	2.0861E-05	ND-143	2.0861E-05	ND-143	2.0861E-05
SM-152	2.4248E-06	SM-152	2.4252E-06	SM-152	2.4255E-06
SM-151	5.3907E-07	SM-151	5.0686E-07	SM-151	4.6929E-07
SM-147	4.0090E-06	SM-147	6.5934E-06	SM-147	6.9232E-06
GD-155	4.7445E-08	GD-155	1.3933E-07	GD-155	1.7293E-07
EU-153	1.5964E-06	EU-153	1.5964E-06	EU-153	1.5964E-06
MO-95	2.4730E-05	MO-95	2.4732E-05	MO-95	2.4732E-05
ND-145	1.4963E-05	ND-145	1.4963E-05	ND-145	1.4963E-05
AG-109	1.2322E-06	AG-109	1.2322E-06	AG-109	1.2322E-06
SM-150	5.5083E-06	SM-150	5.5082E-06	SM-150	5.5082E-06
RU-101	2.1951E-05	RU-101	2.1951E-05	RU-101	2.1951E-05
PM-147	2.9394E-06	PM-147	3.5503E-07	PM-147	2.5280E-08
EU-154	3.0965E-07	EU-154	1.6250E-07	EU-154	7.2580E-08
EU-155	1.3652E-07	EU-155	4.4636E-08	EU-155	1.1035E-08
PD-105	6.9620E-06	PD-105	6.9620E-06	PD-105	6.9620E-06
CS-135	1.3848E-05	CS-135	1.3848E-05	CS-135	1.3847E-05
ZR-93	2.4343E-05	ZR-93	2.4343E-05	ZR-93	2.4343E-05
PR-141	2.3791E-05	PR-141	2.3791E-05	PR-141	2.3791E-05
PD-108	2.3073E-06	PD-108	2.3073E-06	PD-108	2.3073E-06
CS-133	2.6630E-05	CS-133	2.6630E-05	CS-133	2.6630E-05
NP-237	5.4864E-06	NP-237	5.5387E-06	NP-237	5.6650E-06
PU-238	9.4445E-07	PU-238	8.8992E-07	PU-238	8.2281E-07
PU-239	1.2770E-04	PU-239	1.2767E-04	PU-239	1.2763E-04
PU-240	2.3463E-05	PU-240	2.3448E-05	PU-240	2.3428E-05
PU-241	1.3593E-05	PU-241	9.3218E-06	PU-241	5.8172E-06
PU-242	1.6705E-06	PU-242	1.6706E-06	PU-242	1.6707E-06
AM-241	1.8206E-06	AM-241	6.0399E-06	AM-241	9.4182E-06
AM-243	1.8702E-07	AM-243	1.8688E-07	AM-243	1.8670E-07
CM-244	1.9623E-08	CM-244	1.4447E-08	CM-244	9.8529E-09

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.00% ENRICH 25 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	5.6947E-06	U-234	5.8223E-06	U-234	5.9769E-06
U-235	4.1457E-04	U-235	4.1461E-04	U-235	4.1465E-04
U-236	9.1280E-05	U-236	9.1309E-05	U-236	9.1344E-05
U-238	2.0737E-02	U-238	2.0737E-02	U-238	2.0737E-02
O-16	4.4102E-02	O-16	4.4102E-02	O-16	4.4102E-02
RH-103	1.9618E-05	RH-103	1.9618E-05	RH-103	1.9618E-05
SM-149	1.8203E-07	SM-149	1.8203E-07	SM-149	1.8203E-07
ND-143	2.7107E-05	ND-143	2.7107E-05	ND-143	2.7107E-05
TC-99	3.2812E-05	TC-99	3.2811E-05	TC-99	3.2810E-05
SM-152	3.3122E-06	SM-152	3.3126E-06	SM-152	3.3128E-06
SM-151	6.4058E-07	SM-151	6.0230E-07	SM-151	5.5766E-07
SM-147	4.8901E-06	SM-147	8.0659E-06	SM-147	8.4711E-06
GD-155	8.3253E-08	GD-155	2.4723E-07	GD-155	3.0720E-07
EU-153	2.5309E-06	EU-153	2.5309E-06	EU-153	2.5309E-06
MO-95	3.3402E-05	MO-95	3.3404E-05	MO-95	3.3404E-05
ND-145	2.0015E-05	ND-145	2.0015E-05	ND-145	2.0015E-05
AG-109	1.9938E-06	AG-109	1.9938E-06	AG-109	1.9938E-06
SM-150	8.2746E-06	SM-150	8.2746E-06	SM-150	8.2746E-06
RU-101	3.0408E-05	RU-101	3.0408E-05	RU-101	3.0408E-05
PM-147	3.6120E-06	PM-147	4.3627E-07	PM-147	3.1065E-08
EU-154	6.2307E-07	EU-154	3.2697E-07	EU-154	1.4604E-07
EU-155	2.4364E-07	EU-155	7.9658E-08	EU-155	1.9693E-08
PD-105	9.7773E-06	PD-105	9.7773E-06	PD-105	9.7772E-06
CS-135	1.6054E-05	CS-135	1.6054E-05	CS-135	1.6054E-05
ZR-93	3.2681E-05	ZR-93	3.2681E-05	ZR-93	3.2681E-05
PR-141	3.2615E-05	PR-141	3.2615E-05	PR-141	3.2615E-05
PD-108	3.8501E-06	PD-108	3.8501E-06	PD-108	3.8501E-06
CS-133	3.5843E-05	CS-133	3.5843E-05	CS-133	3.5843E-05
NP-237	8.6287E-06	NP-237	8.7149E-06	NP-237	8.9237E-06
PU-238	2.0775E-06	PU-238	1.9578E-06	PU-238	1.8100E-06
PU-239	1.4792E-04	PU-239	1.4789E-04	PU-239	1.4785E-04
PU-240	3.3823E-05	PU-240	3.3820E-05	PU-240	3.3808E-05
PU-241	2.2540E-05	PU-241	1.5457E-05	PU-241	9.6459E-06
PU-242	3.9882E-06	PU-242	3.9883E-06	PU-242	3.9885E-06
AM-241	2.9786E-06	AM-241	9.9755E-06	AM-241	1.5578E-05
AM-243	6.4303E-07	AM-243	6.4255E-07	AM-243	6.4195E-07
CM-244	1.0051E-07	CM-244	7.4006E-08	CM-244	5.0471E-08

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.00% ENRICH 33 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	5.0555E-06	U-234	5.2976E-06	U-234	5.5797E-06
U-235	3.1893E-04	U-235	3.1897E-04	U-235	3.1902E-04
U-236	1.0598E-04	U-236	1.0601E-04	U-236	1.0606E-04
U-238	2.0590E-02	U-238	2.0590E-02	U-238	2.0590E-02
O-16	4.4102E-02	O-16	4.4102E-02	O-16	4.4102E-02
RH-103	2.5070E-05	RH-103	2.5070E-05	RH-103	2.5070E-05
SM-149	2.2247E-07	SM-149	2.2247E-07	SM-149	2.2247E-07
ND-143	3.3164E-05	ND-143	3.3164E-05	ND-143	3.3164E-05
TC-99	4.1857E-05	TC-99	4.1856E-05	TC-99	4.1855E-05
SM-152	4.2508E-06	SM-152	4.2512E-06	SM-152	4.2514E-06
SM-151	7.5237E-07	SM-151	7.0741E-07	SM-151	6.5498E-07
SM-147	5.5767E-06	SM-147	9.2419E-06	SM-147	9.7096E-06
GD-155	1.3954E-07	GD-155	4.1754E-07	GD-155	5.1920E-07
EU-153	3.6676E-06	EU-153	3.6676E-06	EU-153	3.6676E-06
MO-95	4.2780E-05	MO-95	4.2783E-05	MO-95	4.2783E-05
ND-145	2.5339E-05	ND-145	2.5339E-05	ND-145	2.5339E-05
AG-109	2.9339E-06	AG-109	2.9339E-06	AG-109	2.9339E-06
SM-150	1.1463E-05	SM-150	1.1463E-05	SM-150	1.1463E-05
RU-101	3.9958E-05	RU-101	3.9958E-05	RU-101	3.9957E-05
PM-147	4.1687E-06	PM-147	5.0352E-07	PM-147	3.5853E-08
EU-154	1.0887E-06	EU-154	5.7136E-07	EU-154	2.5520E-07
EU-155	4.1304E-07	EU-155	1.3504E-07	EU-155	3.3387E-08
PD-105	1.2780E-05	PD-105	1.2780E-05	PD-105	1.2780E-05
CS-135	1.7804E-05	CS-135	1.7804E-05	CS-135	1.7804E-05
ZR-93	4.1624E-05	ZR-93	4.1624E-05	ZR-93	4.1624E-05
PR-141	4.2456E-05	PR-141	4.2456E-05	PR-141	4.2456E-05
PD-108	5.8952E-06	PD-108	5.8952E-06	PD-108	5.8952E-06
CS-133	4.5610E-05	CS-133	4.5610E-05	CS-133	4.5610E-05
NP-237	1.2384E-05	NP-237	1.2505E-05	NP-237	1.2802E-05
PU-238	3.9422E-06	PU-238	3.7147E-06	PU-238	3.4339E-06
PU-239	1.6221E-04	PU-239	1.6217E-04	PU-239	1.6213E-04
PU-240	4.4152E-05	PU-240	4.4212E-05	PU-240	4.4252E-05
PU-241	3.2096E-05	PU-241	2.2010E-05	PU-241	1.3735E-05
PU-242	7.7479E-06	PU-242	7.7481E-06	PU-242	7.7482E-06
AM-241	4.1592E-06	AM-241	1.4123E-05	AM-241	2.2102E-05
AM-243	1.6730E-06	AM-243	1.6718E-06	AM-243	1.6702E-06
CM-244	3.6971E-07	CM-244	2.7220E-07	CM-244	1.8563E-07

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.00% ENRICH 45 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	4.2338E-06	U-234	4.7253E-06	U-234	5.2979E-06
U-235	2.1064E-04	U-235	2.1068E-04	U-235	2.1073E-04
U-236	1.1956E-04	U-236	1.1961E-04	U-236	1.1967E-04
U-238	2.0357E-02	U-238	2.0357E-02	U-238	2.0357E-02
O-16	4.4102E-02	O-16	4.4102E-02	O-16	4.4102E-02
RH-103	3.1746E-05	RH-103	3.1746E-05	RH-103	3.1746E-05
SM-149	2.3211E-07	SM-149	2.3211E-07	SM-149	2.3211E-07
ND-143	4.0254E-05	ND-143	4.0254E-05	ND-143	4.0254E-05
TC-99	5.4041E-05	TC-99	5.4040E-05	TC-99	5.4038E-05
SM-152	5.4754E-06	SM-152	5.4758E-06	SM-152	5.4761E-06
SM-151	8.9419E-07	SM-151	8.4076E-07	SM-151	7.7843E-07
SM-147	6.6844E-06	SM-147	1.0485E-05	SM-147	1.0970E-05
GD-155	2.4304E-07	GD-155	7.2628E-07	GD-155	9.0299E-07
EU-153	5.3183E-06	EU-153	5.3183E-06	EU-153	5.3183E-06
MO-95	5.5642E-05	MO-95	5.5645E-05	MO-95	5.5645E-05
ND-145	3.2533E-05	ND-145	3.2533E-05	ND-145	3.2533E-05
AG-109	4.3723E-06	AG-109	4.3723E-06	AG-109	4.3723E-06
SM-150	1.5928E-05	SM-150	1.5928E-05	SM-150	1.5928E-05
RU-101	5.3962E-05	RU-101	5.3962E-05	RU-101	5.3962E-05
PM-147	4.3233E-06	PM-147	5.2219E-07	PM-147	3.7182E-08
EU-154	1.8868E-06	EU-154	9.9016E-07	EU-154	4.4226E-07
EU-155	7.1799E-07	EU-155	2.3474E-07	EU-155	5.8035E-08
PD-105	1.8732E-05	PD-105	1.8732E-05	PD-105	1.8732E-05
CS-135	2.3709E-05	CS-135	2.3708E-05	CS-135	2.3708E-05
ZR-93	5.4004E-05	ZR-93	5.4004E-05	ZR-93	5.4004E-05
PR-141	5.6731E-05	PR-141	5.6731E-05	PR-141	5.6731E-05
PD-108	9.3614E-06	PD-108	9.3614E-06	PD-108	9.3[illegible]4E-06
CS-133	5.8632E-05	CS-133	5.8632E-05	CS-133	5.8632E-05
NP-237	1.7799E-05	NP-237	1.7964E-05	NP-237	1.8360E-05
PU-238	8.0020E-06	PU-238	7.5391E-06	PU-238	6.9688E-06
PU-239	1.7469E-04	PU-239	1.7465E-04	PU-239	1.7461E-04
PU-240	5.7846E-05	PU-240	5.8165E-05	PU-240	5.8430E-05
PU-241	4.2571E-05	PU-241	2.9193E-05	PU-241	1.8218E-05
PU-242	1.4628E-05	PU-242	1.4628E-05	PU-242	1.4628E-05
AM-241	5.7685E-06	AM-241	1.8981E-05	AM-241	2.9560E-05
AM-243	4.2610E-06	AM-243	4.2578E-06	AM-243	4.2538E-06
CM-244	1.3958E-06	CM-244	1.0276E-06	CM-244	7.0086E-07

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.00% ENRICH 60 GWDd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	3.3970E-06	U-234	4.2437E-06	U-234	5.2299E-06
U-235	1.2123E-04	U-235	1.2127E-04	U-235	1.2132E-04
U-236	1.2567E-04	U-236	1.2573E-04	U-236	1.2580E-04
U-238	2.0049E-02	U-238	2.0049E-02	U-238	2.0049E-02
O-16	4.4102E-02	O-16	4.4102E-02	O-16	4.4102E-02
RH-103	3.8788E-05	RH-103	3.8788E-05	RH-103	3.8788E-05
SM-149	2.7587E-07	SM-149	2.7587E-07	SM-149	2.7587E-07
ND-143	4.6425E-05	ND-143	4.6425E-05	ND-143	4.6425E-05
TC-99	6.7337E-05	TC-99	6.7336E-05	TC-99	6.7333E-05
SM-152	6.9481E-06	SM-152	6.9484E-06	SM-152	6.9487E-06
SM-151	1.0839E-06	SM-151	1.0192E-06	SM-151	9.4365E-07
SM-147	6.9200E-06	SM-147	1.1065E-05	SM-147	1.1594E-05
GD-155	3.8764E-07	GD-155	1.1662E-06	GD-155	1.4509E-06
EU-153	7.2657E-06	EU-153	7.2657E-06	EU-153	7.2657E-06
MO-95	7.0429E-05	MO-95	7.0433E-05	MO-95	7.0433E-05
ND-145	4.0317E-05	ND-145	4.0317E-05	ND-145	4.0317E-05
AG-109	6.1231E-06	AG-109	6.1231E-06	AG-109	6.1231E-06
SM-150	2.2224E-05	SM-150	2.2224E-05	SM-150	2.2224E-05
RU-101	7.0924E-05	RU-101	7.0924E-05	RU-101	7.0924E-05
PM-147	4.7149E-06	PM-147	5.6949E-07	PM-147	4.0550E-08
EU-154	2.9583E-06	EU-154	1.5524E-06	EU-154	6.9342E-07
EU-155	1.1567E-06	EU-155	3.7820E-07	EU-155	9.2504E-08
PD-105	2.3836E-05	PD-105	2.3836E-05	PD-105	2.3836E-05
CS-135	2.6120E-05	CS-135	2.6120E-05	CS-135	2.6120E-05
ZR-93	6.8086E-05	ZR-93	6.8085E-05	ZR-93	6.8085E-05
PR-141	7.3910E-05	PR-141	7.3910E-05	PR-141	7.3910E-05
PD-108	1.4152E-05	PD-108	1.4152E-05	PD-108	1.4152E-05
CS-133	7.2661E-05	CS-133	7.2661E-05	CS-133	7.2661E-05
NP-237	2.3519E-05	NP-237	2.3715E-05	NP-237	2.4191E-05
PU-238	1.3789E-05	PU-238	1.2984E-05	PU-238	1.2000E-05
PU-239	1.8097E-04	PU-239	1.8094E-04	PU-239	1.8090E-04
PU-240	6.9227E-05	PU-240	7.0292E-05	PU-240	7.1215E-05
PU-241	5.1756E-05	PU-241	3.5492E-05	PU-241	2.2148E-05
PU-242	2.4385E-05	PU-242	2.4386E-05	PU-242	2.4386E-05
AM-241	6.6701E-06	AM-241	2.2738E-05	AM-241	3.5605E-05
AM-243	8.9440E-06	AM-243	8.9373E-06	AM-243	8.9289E-06
CM-244	4.2626E-06	CM-244	3.1383E-06	CM-244	2.1403E-06

ATOM DENSITIES FOR INITIAL FUEL,

ATOMS/BARN-CM

(4.25 ENRICH)

ISOTOPE	AT. DENSITY
U-234	8.5186E-06
U-235	9.4867E-04
U-236	4.4454E-06
U-238	2.1090E-02
O-16	4.4104E-02

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.25% ENRICH 5 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	7.9940E-06	U-234	7.9964E-06	U-234	7.9992E-0
U-235	8.2217E-04	U-235	8.2218E-04	U-235	8.2220E-04
U-236	2.8794E-05	U-236	2.8797E-05	U-236	2.8801E-05
U-238	2.1017E-02	U-238	2.1017E-02	U-238	2.1017E-02
0-16	4.4104E-02	0-16	4.4104E-02	0-16	4.4104E-02
RH-103	4.0371E-06	RH-103	4.0371E-06	RH-103	4.0371E-06
SM-149	1.1249E-07	SM-149	1.1249E-07	SM-149	1.1249E-07
ND-143	6.6190E-06	ND-143	6.6190E-06	ND-143	6.6190E-06
TC-99	7.1371E-06	TC-99	7.1369E-06	TC-99	7.1366E-06
SM-152	5.7071E-07	SM-152	5.7082E-07	SM-152	5.7091E-07
SM-151	3.0312E-07	SM-151	2.8501E-07	SM-151	2.6388E-07
SM-147	1.2931E-06	SM-147	2.3193E-06	SM-147	2.4502E-06
GD-155	1.0968E-08	GD-155	3.0678E-08	GD-155	3.7886E-08
EU-153	2.6965E-07	EU-153	2.6965E-07	EU-153	2.6965E-07
MO-95	7.3088E-06	MO-95	7.3097E-06	MO-95	7.3097E-06
ND-145	4.4917E-06	ND-145	4.4917E-06	ND-145	4.4917E-06
AG-109	1.6051E-07	AG-109	1.6051E-07	AG-109	1.6051E-07
SM-150	1.2708E-06	SM-150	1.2708E-06	SM-150	1.2708E-06
RU-101	6.0943E-06	RU-101	6.0943E-06	RU-101	6.0943E-06
PM-147	1.1671E-06	PM-147	1.4097E-07	PM-147	1.0037E-08
EU-154	1.8943E-08	EU-154	9.9412E-09	EU-154	4.4402E-09
EU-155	2.9285E-08	EU-155	9.5748E-09	EU-155	2.3671E-09
PD-105	1.6119E-06	PD-105	1.6119E-06	PD-105	1.6119E-06
CS-135	5.5501E-06	CS-135	5.5501E-06	CS-135	5.5501E-06
ZR-93	7.3101E-06	ZR-93	7.3101E-06	ZR-93	7.3101E-06
PR-141	6.8068E-06	PR-141	6.8068E-06	PR-141	6.8068E-06
PD-108	3.0040E-07	PD-108	3.0040E-07	PD-108	3.0040E-07
CS-133	7.8363E-06	CS-133	7.8363E-06	CS-133	7.8363E-06
NP-237	9.2178E-07	NP-237	9.2491E-07	NP-237	9.3263E-07
PU-238	4.1254E-08	PU-238	3.8766E-08	PU-238	3.5829E-08
PU-239	5.2554E-05	PU-239	5.2542E-05	PU-239	5.2527E-05
PU-240	3.6315E-06	PU-240	3.6284E-06	PU-240	3.6245E-06
PU-241	8.4936E-07	PU-241	5.8245E-07	PU-241	3.6347E-07
PU-242	2.4486E-08	PU-242	2.4487E-08	PU-242	2.4488E-08
AM-241	1.0306E-07	AM-241	3.6683E-07	AM-241	5.7808E-07
AM-243	6.2438E-10	AM-243	6.2391E-10	AM-243	6.2332E-10
CM-244	1.4949E-11	CM-244	1.1006E-11	CM-244	7.5061E-12

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.25% ENRICH 15 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	6.9933E-06	U-234	7.0292E-06	U-234	7.0709E-06
U-235	6.1696E-04	U-235	6.1698E-04	U-235	6.1701E-04
U-236	6.7153E-05	U-236	6.7169E-05	U-236	6.7188E-05
U-238	2.0860E-02	U-238	2.0860E-02	U-238	2.0860E-02
O-16	4.4104E-02	O-16	4.4104E-02	O-16	4.4104E-02
RH-103	1.2032E-05	RH-103	1.2032E-05	RH-103	1.2032E-05
SM-149	1.4742E-07	SM-149	1.4742E-07	SM-149	1.4742E-07
ND-143	1.8054E-05	ND-143	1.8054E-05	ND-143	1.8054E-05
TC-99	2.0570E-05	TC-99	2.0570E-05	TC-99	2.0569E-05
SM-152	1.9955E-06	SM-152	1.9959E-06	SM-152	1.9962E-06
SM-151	5.1367E-07	SM-151	4.8297E-07	SM-151	4.4717E-07
SM-147	3.5621E-06	SM-147	5.8533E-06	SM-147	6.1456E-06
GD-155	3.5638E-08	GD-155	1.0350E-07	GD-155	1.2832E-07
EU-153	1.2052E-06	EU-153	1.2052E-06	EU-153	1.2052E-06
MO-95	2.0959E-05	MO-95	2.0961E-05	MO-95	2.0961E-05
ND-145	1.2736E-05	ND-145	1.2736E-05	ND-145	1.2736E-05
AG-109	8.9129E-07	AG-109	8.9129E-07	AG-109	8.9129E-07
SM-150	4.3946E-06	SM-150	4.3946E-06	SM-150	4.3946E-06
RU-101	1.8290E-05	RU-101	1.8290E-05	RU-101	1.8290E-05
PM-147	2.6059E-06	PM-147	3.1475E-07	PM-147	2.2412E-08
EU-154	1.9964E-07	EU-154	1.0476E-07	EU-154	4.6794E-08
EU-155	1.0083E-07	EU-155	3.2968E-08	EU-155	8.1506E-09
PD-105	5.6065E-06	PD-105	5.6065E-06	PD-105	5.6065E-06
CS-135	1.3002E-05	CS-135	1.3002E-05	CS-135	1.3002E-05
ZR-93	2.0729E-05	ZR-93	2.0729E-05	ZR-93	2.0729E-05
PR-141	1.9991E-05	PR-141	1.9990E-05	PR-141	1.9990E-05
PD-108	1.6524E-06	PD-108	1.6524E-06	PD-108	1.6524E-06
CS-133	2.2534E-05	CS-133	2.2534E-05	CS-133	2.2534E-05
NP-237	4.2517E-06	NP-237	4.2880E-06	NP-237	4.3755E-06
PU-238	5.8558E-07	PU-238	5.5155E-07	PU-238	5.0996E-07
PU-239	1.1565E-04	PU-239	1.1562E-04	PU-239	1.1559E-04
PU-240	1.7959E-05	PU-240	1.7945E-05	PU-240	1.7928E-05
PU-241	9.4113E-06	PU-241	6.4538E-06	PU-241	4.0274E-06
PU-242	8.9084E-07	PU-242	8.9088E-07	PU-242	8.9093E-07
AM-241	1.2656E-06	AM-241	4.1867E-06	AM-241	6.5256E-06
AM-243	7.8960E-08	AM-243	7.8900E-08	AM-243	7.8826E-08
CM-244	6.4654E-09	CM-244	4.7601E-09	CM-244	3.2463E-09

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.25% ENRICH 18 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	6.7083E-06	U-234	6.7644E-06	U-234	6.8297E-06
U-235	5.6500E-04	U-235	5.6503E-04	U-235	5.6507E-04
U-236	7.6470E-05	U-236	7.6489E-05	U-236	7.6513E-05
U-238	2.0810E-02	U-238	2.0810E-02	U-238	2.0810E-02
O-16	4.4104E-02	O-16	4.4104E-02	O-16	4.4104E-02
RH-103	1.4344E-05	RH-103	1.4344E-05	RH-103	1.4344E-05
SM-149	1.5997E-07	SM-149	1.5997E-07	SM-149	1.5997E-07
ND-143	2.1078E-05	ND-143	2.1078E-05	ND-143	2.1078E-05
TC-99	2.4387E-05	TC-99	2.4386E-05	TC-99	2.4385E-05
SM-152	2.3985E-06	SM-152	2.3989E-06	SM-152	2.3992E-06
SM-151	5.5931E-07	SM-151	5.2589E-07	SM-151	4.8631E-07
SM-147	4.0469E-06	SM-147	6.6557E-06	SM-147	6.9885E-06
GD-155	4.6710E-08	GD-155	1.3678E-07	GD-155	1.6971E-07
EU-153	1.5648E-06	EU-153	1.5648E-06	EU-153	1.5648E-06
MO-95	2.4848E-05	MO-95	2.4850E-05	MO-95	2.4850E-05
ND-145	1.5041E-05	ND-145	1.5041E-05	ND-145	1.5041E-05
AG-109	1.1758E-06	AG-109	1.1758E-06	AG-109	1.1758E-06
SM-150	5.4710E-06	SM-150	5.4710E-06	SM-150	5.4710E-06
RU-101	2.1932E-05	RU-101	2.1932E-05	RU-101	2.1932E-05
PM-147	2.9671E-06	PM-147	3.5838E-07	PM-147	2.5518E-08
EU-154	2.9752E-07	EU-154	1.5613E-07	EU-154	6.9738E-08
EU-155	1.3382E-07	EU-155	4.3754E-08	EU-155	1.0817E-08
PD-105	6.8180E-06	PD-105	6.8180E-06	PD-105	6.8180E-06
CS-135	1.4331E-05	CS-135	1.4331E-05	CS-135	1.4331E-05
ZR-93	2.4507E-05	ZR-93	2.4506E-05	ZR-93	2.4506E-05
PR-141	2.3852E-05	PR-141	2.3852E-05	PR-141	2.3852E-05
PD-108	2.2013E-06	PD-108	2.2013E-06	PD-108	2.2013E-06
CS-133	2.6693E-05	CS-133	2.6693E-05	CS-133	2.6693E-05
NP-237	5.5077E-06	NP-237	5.5578E-06	NP-237	5.6788E-06
PU-238	9.1526E-07	PU-238	8.6226E-07	PU-238	7.9723E-07
PU-239	1.2794E-04	PU-239	1.2791E-04	PU-239	1.2788E-04
PU-240	2.2524E-05	PU-240	2.2509E-05	PU-240	2.2489E-05
PU-241	1.3021E-05	PU-241	8.9295E-06	PU-241	5.5724E-06
PU-242	1.5064E-06	PU-242	1.5065E-06	PU-242	1.5066E-06
AM-241	1.7447E-06	AM-241	5.7864E-06	AM-241	9.0226E-06
AM-243	1.6426E-07	AM-243	1.6414E-07	AM-243	1.6398E-07
CM-244	1.6695E-08	CM-244	1.2292E-08	CM-244	8.3831E-09

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.25% ENRICH 25 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	6.0754E-06	U-234	6.1996E-06	U-234	6.3443E-06
U-235	4.5791E-04	U-235	4.5794E-04	U-235	4.5799E-04
U-236	9.4855E-05	U-236	9.4883E-05	U-236	9.4917E-05
U-238	2.0691E-02	U-238	2.0691E-02	U-238	2.0691E-02
O-16	4.4104E-02	O-16	4.4104E-02	O-16	4.4104E-02
RH-103	1.9505E-05	RH-103	1.9505E-05	RH-103	1.9505E-05
SM-149	1.8930E-07	SM-149	1.8930E-07	SM-149	1.8930E-07
ND-143	2.7473E-05	ND-143	2.7473E-05	ND-143	2.7473E-05
TC-99	3.2914E-05	TC-99	3.2913E-05	TC-99	3.2912E-05
SM-152	3.2834E-06	SM-152	3.2838E-06	SM-152	3.2841E-06
SM-151	6.6250E-07	SM-151	6.2291E-07	SM-151	5.7674E-07
SM-147	4.9514E-06	SM-147	8.1659E-06	SM-147	8.5760E-06
GD-155	8.1549E-08	GD-155	2.4165E-07	GD-155	3.0020E-07
EU-153	2.4848E-06	EU-153	2.4848E-06	EU-153	2.4848E-06
MO-95	3.3594E-05	MO-95	3.3597E-05	MO-95	3.3597E-05
ND-145	2.0143E-05	ND-145	2.0143E-05	ND-145	2.0143E-05
AG-109	1.9097E-06	AG-109	1.9097E-06	AG-109	1.9097E-06
SM-150	8.2124E-06	SM-150	8.2124E-06	SM-150	8.2124E-06
RU-101	3.0380E-05	RU-101	3.0380E-05	RU-101	3.0380E-05
PM-147	3.6560E-06	PM-147	4.4158E-07	PM-147	3.1443E-08
EU-154	6.0099E-07	EU-154	3.1538E-07	EU-154	1.4086E-07
EU-155	2.3788E-07	EU-155	7.7775E-08	EU-155	1.9228E-08
PD-105	9.5772E-06	PD-105	9.5772E-06	PD-105	9.5772E-06
CS-135	1.6692E-05	CS-135	1.6692E-05	CS-135	1.6692E-05
ZR-93	3.2945E-05	ZR-93	3.2945E-05	ZR-93	3.2945E-05
PR-141	3.2714E-05	PR-141	3.2714E-05	PR-141	3.2714E-05
PD-108	3.6803E-06	PD-108	3.6803E-06	PD-108	3.6803E-06
CS-133	3.5956E-05	CS-133	3.5956E-05	CS-133	3.5956E-05
NP-237	8.6913E-06	NP-237	8.7750E-06	NP-237	8.9777E-06
PU-238	2.0236E-06	PU-238	1.9067E-06	PU-238	1.7628E-06
PU-239	1.4907E-04	PU-239	1.4904E-04	PU-239	1.4900E-04
PU-240	3.2709E-05	PU-240	3.2704E-05	PU-240	3.2690E-05
PU-241	2.1871E-05	PU-241	1.4998E-05	PU-241	9.3598E-06
PU-242	3.6434E-06	PU-242	3.6435E-06	PU-242	3.6437E-06
AM-241	2.8936E-06	AM-241	9.6829E-06	AM-241	1.5119E-05
AM-243	5.7300E-07	AM-243	5.7257E-07	AM-243	5.7203E-07
CM-244	8.6707E-08	CM-244	6.3837E-08	CM-244	4.3536E-08

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN CM

(PWR TYPICAL IRRADIATION HISTORY

4.25% ENRICH 33 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	5.4106E-06	U-234	5.6480E-06	U-234	5.9246E-06
U-235	3.5669E-04	U-235	3.5673E-04	U-235	3.5678E-04
U-236	1.1077E-04	U-236	1.1080E-04	U-236	1.1085E-04
U-238	2.0547E-02	U-238	2.0547E-02	U-238	2.0547E-02
O-16	4.4104E-02	O-16	4.4104E-02	O-16	4.4104E-02
RH-103	2.4948E-05	RH-103	2.4948E-05	RH-103	2.4948E-05
SM-149	2.3064E-07	SM-149	2.3064E-07	SM-149	2.3064E-07
ND-143	3.3722E-05	ND-143	3.3722E-05	ND-143	3.3722E-05
TC-99	4.2019E-05	TC-99	4.2018E-05	TC-99	4.2017E-05
SM-152	4.2271E-06	SM-152	4.2275E-06	SM-152	4.2278E-06
SM-151	7.7794E-07	SM-151	7.3146E-07	SM-151	6.7724E-07
SM-147	5.6638E-06	SM-147	9.3830E-06	SM-147	9.8575E-06
GD-155	1.3683E-07	GD-155	4.0874E-07	GD-155	5.0817E-07
EU-153	3.6132E-06	EU-153	3.6132E-06	EU-153	3.6132E-06
MO-95	4.3066E-05	MO-95	4.3070E-05	MO-95	4.3070E-05
ND-145	2.5533E-05	ND-145	2.5533E-05	ND-145	2.5533E-05
AG-109	2.8224E-06	AG-109	2.8224E-06	AG-109	2.8224E-06
SM-150	1.1440E-05	SM-150	1.1440E-05	SM-150	1.1440E-05
RU-101	3.9922E-05	RU-101	3.9922E-05	RU-101	3.9922E-05
PM-147	4.2301E-06	PM-147	5.1093E-07	PM-147	3.6381E-08
EU-154	1.0566E-06	EU-154	5.5451E-07	EU-154	2.4767E-07
EU-155	4.0400E-07	EU-155	1.3208E-07	EU-155	3.2655E-08
PD-105	1.2533E-05	PD-105	1.2533E-05	PD-105	1.2533E-05
CS-135	1.8567E-05	CS-135	1.8566E-05	CS-135	1.8566E-05
ZR-93	4.2011E-05	ZR-93	4.2011E-05	ZR-93	4.2011E-05
PR-141	4.2604E-05	PR-141	4.2604E-05	PR-141	4.2604E-05
PD-108	5.6500E-06	PD-108	5.6500E-06	PD-108	5.6500E-06
CS-133	4.5791E-05	CS-133	4.5791E-05	CS-133	4.5791E-05
NP-237	1.2529E-05	NP-237	1.2649E-05	NP-237	1.2939E-05
PU-238	3.8666E-06	PU-238	3.6430E-06	PU-238	3.3676E-06
PU-239	1.6426E-04	PU-239	1.6422E-04	PU-239	1.6418E-04
PU-240	4.3014E-05	PU-240	4.3063E-05	PU-240	4.3093E-05
PU-241	3.1518E-05	PU-241	2.1614E-05	PU-241	1.3488E-05
PU-242	7.1654E-06	PU-242	7.1655E-06	PU-242	7.1656E-06
AM-241	4.0925E-06	AM-241	1.3877E-05	AM-241	2.1712E-05
AM-243	1.5130E-06	AM-243	1.5118E-06	AM-243	1.5104E-06
CM-244	3.2352E-07	CM-244	2.3819E-07	CM-244	1.6244E-07

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.25% ENRICH 45 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	4.5489E-06	U-234	5.0354E-06	U-234	5.6023E-06
U-235	2.3998E-04	U-235	2.4002E-04	U-235	2.4007E-04
U-236	1.2607E-04	U-236	1.2612E-04	U-236	1.2618E-04
U-238	2.0319E-02	U-238	2.0319E-02	U-238	2.0319E-02
O-16	4.4104E-02	O-16	4.4104E-02	O-16	4.4104E-02
RH-103	3.1661E-05	RH-103	3.1661E-05	RH-103	3.1661E-05
SM-149	2.3991E-07	SM-149	2.3991E-07	SM-149	2.3991E-07
ND-143	4.1113E-05	ND-143	4.1113E-05	ND-143	4.1113E-05
TC-99	5.4317E-05	TC-99	5.4316E-05	TC-99	5.4314E-05
SM-152	5.4513E-06	SM-152	5.4517E-06	SM-152	5.4520E-06
SM-151	9.2029E-07	SM-151	8.6530E-07	SM-151	8.0116E-07
SM-147	6.8137E-06	SM-147	1.0678E-05	SM-147	1.1171E-05
GD-155	2.3970E-07	GD-155	7.1519E-07	GD-155	8.8906E-07
EU-153	5.2589E-06	EU-153	5.2589E-06	EU-153	5.2589E-06
MO-95	5.6083E-05	MO-95	5.6086E-05	MO-95	5.6086E-05
ND-145	3.2831E-05	ND-145	3.2831E-05	ND-145	3.2831E-05
AG-109	4.2325E-06	AG-109	4.2325E-06	AG-109	4.2325E-06
SM-150	1.5880E-05	SM-150	1.5880E-05	SM-150	1.5880E-05
RU-101	5.3923E-05	RU-101	5.3923E-05	RU-101	5.3923E-05
PM-147	4.3957E-06	PM-147	5.3093E-07	PM-147	3.7805E-08
EU-154	1.8454E-06	EU-154	9.6845E-07	EU-154	4.3256E-07
EU-155	7.0647E-07	EU-155	2.3098E-07	EU-155	5.7104E-08
PD-105	1.8391E-05	PD-105	1.8391E-05	PD-105	1.8391E-05
CS-135	2.4674E-05	CS-135	2.4674E-05	CS-135	2.4674E-05
ZR-93	5.4583E-05	ZR-93	5.4582E-05	ZR-93	5.4582E-05
PR-141	5.6960E-05	PR-141	5.6960E-05	PR-141	5.6960E-05
PD-108	9.0090E-06	PD-108	9.0090E-06	PD-108	9.0090E-06
CS-133	5.8943E-05	CS-133	5.8943E-05	CS-133	5.8943E-05
NP-237	1.8126E-05	NP-237	1.8290E-05	NP-237	1.8685E-05
PU-238	7.9224E-06	PU-238	7.4637E-06	PU-238	6.8991E-06
PU-239	1.7751E-04	PU-239	1.7748E-04	PU-239	1.7443E-04
PU-240	5.6827E-05	PU-240	5.7107E-05	PU-240	5.7338E-05
PU-241	4.2339E-05	PU-241	2.9034E-05	PU-241	1.8119E-05
PU-242	1.3738E-05	PU-242	1.3739E-05	PU-242	1.3739E-05
AM-241	5.7591E-06	AM-241	1.8900E-05	AM-241	2.9421E-05
AM-243	3.9288E-06	AM-243	3.9258E-06	AM-243	3.9222E-06
CM-244	1.2448E-06	CM-244	9.1650E-07	CM-244	6.2504E-07

ATOM DENSITIES FOR DOMINANT ABSORBERS

IN SPENT FUEL, ATOMS/BARN-CM

(PWR TYPICAL IRRADIATION HISTORY

4.25% ENRICH 60 GWd/MTU)

ISOTOPE	AT. DENSITY 2 YEAR COOL	ISOTOPE	AT. DENSITY 10 YEAR COOL	ISOTOPE	AT. DENSITY 20 YEAR COOL
U-234	3.6626E-06	U-234	4.5128E-06	U-234	5.5032E-06
U-235	1.4121E-04	U-235	1.4126E-04	U-235	1.4131E-04
U-236	1.3387E-04	U-236	1.3393E-04	U-236	1.3400E-04
U-238	2.0018E-02	U-238	2.0018E-02	U-238	2.0018E-02
O-16	4.4104E-02	O-16	4.4104E-02	O-16	3.3379E-02
RH-103	3.8778E-05	RH-103	3.8778E-05	RH-103	3.8778E-05
SM-149	2.8350E-07	SM-149	2.8350E-07	SM-149	2.8350E-07
ND-143	4.7612E-05	ND-143	4.7612E-05	ND-143	4.7612E-05
TC-99	6.7751E-05	TC-99	6.7750E-05	TC-99	6.7747E-05
SM-152	6.9287E-06	SM-152	6.9290E-06	SM-152	6.9293E-06
SM-151	1.1123E-06	SM-151	1.0459E-06	SM-151	9.6838E-07
SM-147	7.0700E-06	SM-147	1.1286E-05	SM-147	1.1824E-05
GD-155	3.8585E-07	GD-155	1.1596E-06	GD-155	1.4425E-06
EU-153	7.2168E-06	EU-153	7.2168E-06	EU-153	7.2168E-06
MO-95	7.1046E-05	MO-95	7.1051E-05	MO-95	7.1051E-05
ND-145	4.0733E-05	ND-145	4.0732E-05	ND-145	4.0732E-05
AG-109	5.9688E-06	AG-109	5.9688E-06	AG-109	5.9688E-06
SM-150	2.2216E-05	SM-150	2.2216E-05	SM-150	2.2216E-05
RU-101	7.0893E-05	RU-101	7.0893E-05	RU-101	7.0893E-05
PM-147	4.7953E-06	PM-147	5.7920E-07	PM-147	4.1242E-08
EU-154	2.9201E-06	EU-154	1.5324E-06	EU-154	6.8446E-07
EU-155	1.1496E-06	EU-155	3.7586E-07	EU-155	9.2924E-08
PD-105	2.3474E-05	PD-105	2.3474E-05	PD-105	2.3474E-05
CS-135	2.7143E-05	CS-135	2.7143E-05	CS-135	2.7142E-05
ZR-93	6.8877E-05	ZR-93	6.8877E-05	ZR-93	6.8877E-05
PR-141	7.4238E-05	PR-141	7.4238E-05	PR-141	7.4238E-05
PD-108	1.3691E-05	PD-108	1.3691E-05	PD-108	1.3691E-05
CS-133	7.3130E-05	CS-133	7.3130E-05	CS-133	7.3130E-05
NP-237	2.4169E-05	NP-237	2.4366E-05	NP-237	2.4846E-05
PU-238	1.3848E-05	PU-238	1.3039E-05	PU-238	1.2051E-05
PU-239	1.8422E-04	PU-239	1.8418E-04	PU-239	1.8414E-04
PU-240	6.8575E-05	PU-240	6.9541E-05	PU-240	7.0376E-05
PU-241	5.2056E-05	PU-241	3.5698E-05	PU-241	2.2277E-05
PU-242	2.3261E-05	PU-242	2.3262E-05	PU-242	2.3262E-05
AM-241	6.7388E-06	AM-241	2.2899E-05	AM-241	3.5840E-05
AM-243	8.4171E-06	AM-243	8.4108E-06	AM-243	8.4029E-06
CM-244	3.8849E-06	CM-244	2.8602E-06	CM-244	1.9506E-06

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