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Multicode Comparison of Selected Source-Term Computer Codes

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MULTICODE COMPARISON OF SELECTED SOURCE-TERM COMPUTER CODES

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ABSTRACT

This report summarizes the results of a study to assess the predictive capabilities of three radionuclide inventory/depletion computer codes, ORIGEN2, ORIGEN-S, and CINDER-2. This task was accomplished through a series of comparisons of their output for several light-water reactor (LWR) models (i.e., verification). Of the five cases chosen, two modeled typical boiling-water reactors (BWR) at burnups of 27.5 and 40 GWd/MTU and two represented typical pressurized-water reactors (PWR) at burnups of 33 and 50 GWd/MTU. In the fifth case, identical input data were used for each of the codes to examine the results of decay only and to show differences in nuclear decay constants and decay heat rates. Comparisons were made for several different characteristics (mass, radioactivity, and decay heat rate) for 52 radionuclides and for nine decay periods ranging from 30 d to 10,000 years. Only fission products and actinides were considered. The results are presented in comparative-ratio tables for each of the characteristics, decay periods, and cases. A brief summary description of each of the codes has been included. Of the more than 21,000 individual comparisons made for the three codes (taken two at a time), nearly half (45%) agreed to within 1%, and an additional 17% fell within the range of 1 to 5%. Approximately 8% of the comparison results disagreed by more than 30%. However, relatively good agreement was obtained for most of the radionuclides that are expected to contribute the greatest impact to waste disposal. Even though some defects have been noted, each of the codes in the comparison appears to produce respectable results.

1. INTRODUCTION

The prediction of the radionuclide content and the resulting associated characteristics or properties of spent fuel from nuclear power plants and of high-level radioactive wastes (HLW) from fuel reprocessing and other sources is a major concern of the Department of Energy's (DOE) Office of Civilian Radioactive Waste Management (OCRWM) because it has been designated to site, design, and construct transportation, storage, and disposal systems for such materials. These radiological properties, which continue to change with the composition and the age of the material, are difficult to quantify. The DOE/OCRWM will utilize this information as input data to many of their designers and licensing applicants in the areas of performance assessment (source terms), heat transfer (thermal generation rates), criticality (radionuclide composition), and shielding (gamma and neutron generation rates).

Several technical computer codes are available that will permit the calculation of the radiological characteristics of interest. The most sophisticated tools for depletion analyses that characterize the major radionuclide composition of discharged spent fuel are multidimensional codes that allow full consideration of the spatial change in the flux spectrum throughout one assembly or an entire reactor core. However, most of these codes are expensive to run, difficult to use, and do not predict all of the needed characteristics. In addition, many (but not all) of these codes allow only a limited number of radionuclides. Historically, the above disadvantages of the multidimensional depletion analysis tools have been circumvented by the development of "point" or "pseudo-point" depletion codes that allow flexibility and ease of use. These codes are able to compute an almost unlimited number of radionuclide inventories and associated characteristic quantities (decay heat, toxicity, radiation spectra, etc.) in a flexible and useful format. One method of testing these codes for computational features, capabilities, and accuracy is through verification and benchmarking. Verification is a process that demonstrates the ability of a computer code to perform correctly its stated capabilities. This process is performed primarily through a set of test problems designed to show that the stated equations are solved in a satisfactory manner, but not necessarily indicating that the model is a valid representation of any particular physical system. The objective of validation is to ensure that the model embodied in a computer program is a correct representation of the process or system for which it is intended. A benchmark is a standard condition that may be used in the verification of computer codes and models. Oak Ridge National Laboratory (ORNL) is currently developing guidelines for verifying, validating, and enhancing a source-term code that will be used in licensing procedures by DOE/OCRWM.

This report summarizes the results of a cooperative effort between ORNL and Los Alamos National Laboratory (LANL) directed toward comparing the predictions of three radionuclide inventory/depletion computer codes, ORIGEN2, ORIGEN-S, and CINDER-2 (i.e., verification). The work was cooperative in the sense that direct interaction occurred between staff members of ORNL, who performed the ORIGEN2 and ORIGEN-S calculations, and LANL, who performed the CINDER-2 calculations. Several meetings were held among the participants to develop the following five test problems — one examining decay only, two modeling generic BWRs at two burnups, and two modeling generic PWRs at two burnups. The methodologies utilized by these codes are discussed in Sect. 2. The test problems are described in Sect. 3, and the methods of comparison are given in Sect. 4. The results are presented in Sect. 5, reconciliation of major differences are discussed in Sect. 6, and recommendations are listed in Sect. 7. This verification effort does not necessarily indicate which code is "best" or the most accurate. The comparisons may be used to identify where there is need for improved models as indicated by significant differences in predictions (e.g., the extended burnup BWR model).

2. SUMMARY DESCRIPTION OF CODES

As noted in Sect. 1, the codes used in the present comparative assessment study were ORIGEN2,[1] ORIGEN-S,[2] and CINDER-2.[3] This section will briefly describe these codes. Code abstracts with more detail are provided in Appendix A. Each of these codes computes time-dependent concentrations and source terms of a large number of nuclides, which are simultaneously generated or depleted through neutronic transmutation, fission, radioactive decay, input feed rates, and physical or chemical removal rates. The calculations may pertain to fuel irradiation within nuclear reactors, or the storage, management, transportation, or subsequent chemical processing of removed fuel elements.

The original ORIGEN code[4] was released in 1973 and has since been updated to produce two separate codes—ORIGEN2 and ORIGEN-S. All three of these codes use the same basic matrix exponential expansion model and numerical scheme. However, the updated versions have data libraries that are significantly improved from those of ORIGEN. The updated versions of ORIGEN also provide burnup-dependent cross sections and a number of minor modifications (e.g., calculation of fission energy release) that are improvements over the original version. The primary differences between ORIGEN-S and ORIGEN2 are in the nuclear data libraries used by the two codes. Both codes use virtually identical decay data (half-life, branching ratios, and recoverable energy per decay) and photon data (energies and intensities of gamma- and X-ray spectra). There are differences in the cross sections and fission product yield data, however. These codes have been distributed worldwide by the ORNL Radiation Shielding Information Center.

The ORIGEN2 code uses specific cross-section and fission-product yield libraries that have been developed for a number of reactor models. Here, a reactor model means a combination of a particular kind of reactor and a specified fuel cycle, for example, a uranium-fueled PWR using a once-through fuel cycle. Several cross-section libraries are available for different reactor models,[5] and work is currently under way at ORNL to update the libraries for the latest light-water reactor (LWR) designs. The cross-section libraries for ORIGEN2 were developed by performing spatially detailed multigroup reactor physics and depletion calculations for each of the specific reactor models, and collapsing the multigroup libraries to one group for use by ORIGEN2. Burnup-dependent cross sections for the important actinide nuclides are built into ORIGEN2 for each reactor model. For the depletion analyses performed in this study, the generic PWR and BWR libraries are described in ref. 6.

One of the primary objectives in developing ORIGEN-S was that the calculations be able to utilize multi-energy-group neutron flux and cross sections in any group structure. Utilization of the multigroup data is automated via the COUPLE code, which was developed in conjunction with ORIGEN-S. COUPLE uses supplied multigroup data to update (as a function of burnup) nuclide cross sections and calculate appropriate ORIGEN-S spectral parameters (THERM, RES, FAST) to be used for nuclides where multigroup cross sections are not provided. ORIGEN-S can be run stand-alone using available card image data libraries or with one or more time-dependent binary libraries that are created with COUPLE.

ORIGEN-S and COUPLE were developed as modules of the SCALE[7] modular code system. Within SCALE, multigroup fluxes and cross sections are provided to COUPLE via the XSDRNPM module — a 1-D discrete ordinates transport code. Burnup-dependent libraries are created for ORIGEN-S by employing successive passes through XSDRNPM-S and COUPLE using the desired multigroup cross-section library. Each successive XSDRNPM-S calculation uses irradiation time-dependent compositions evaluated by ORIGEN-S and pertinent information on the reactor history which affects the lattice cell flux calculation. This procedure is automated in SCALE with the SAS2 control module.[8]

The CINDER[9] series of codes is the major alternative to the ORIGEN-type codes in the United States. Various CINDER versions have been developed and used at LANL. The major differences between the versions are the available data libraries and the codes to which they interface to obtain the neutronic data. The CINDER-2 version used in this study interfaces with EPRI-CELL[10] to obtain the updated flux spectra and cross sections at four spatial points within a unit cell model (similar to the SAS2/ORIGEN-S approach). CINDER-2 performs the depletion analysis in four energy groups using the Bateman equation solution of the balance equations for each chain of nuclides coupled through the decay or transmutation processes. Various nuclide chains are available in libraries, which are simply read from the input data stream.

As evidenced by the above discussion, one of the major important differences between point depletion codes is in the way neutronic data (primarily neutron cross sections) are prepared for use in a calculation. All the codes utilize burnup-dependent neutron cross sections for the depletion. However, appropriate neutron flux spectra for an assembly are required to generate the effective neutron cross sections for the subsequent point depletion calculation. Multidimensional neutronics analyses using specific reactor models and power history data have been performed to generate "generic" burnup-dependent cross-section libraries for ORIGEN2. The complexity and expense of this approach precludes the generation of such libraries for all the various assembly geometries, fissile enrichments, void fractions, or reactor power histories. Instead, the user tries to use the available library that best matches the application. The CINDER-2 and ORIGEN-S approach is to utilize auxiliary codes that incorporate somewhat simpler (typically one-dimensional lattice cell) neutronic analyses to obtain the burnup-dependent flux spectra. This approach allows burnup-dependent cross-section libraries to be routinely prepared for the user-specified assembly characteristics and irradiation history using modular codes developed for this purpose. Application of the "packaged" libraries beyond their model definition and the potential inadequacy of a simpler neutronic analysis are, respectively, the main disadvantages of the above methods. This study provides some insight into the effect of these two approaches on data preparation for important output variables.

3. CASE DESCRIPTIONS

The cases were chosen in order to achieve two goals:

1. to permit comparisons dependent on decay characteristics only; and
2. to permit comparisons dependent on both decay data and cross-section data used during the range in exposure to be experienced in commercial reactors.

Results from ORIGEN2, CINDER-2, and ORIGEN-S were to be compared in several different units for various nuclides important to reactor waste systems analyses and several global-type units or characteristics. The 66 radionuclides requested for the comparison are listed in Table 1. Ultimately, results for 52 radionuclides were provided by all codes. Activation product radionuclides (i.e., radioactive nuclides produced by irradiation of stable nuclides in structural materials) were not compared because they are not available in the CINDER-2 libraries.

In this project, the term "burnup" has been defined as the "atomic % fission." Also, the term "exposure," or "exposure level," was defined to mean the energy produced in units of gigawatt days/metric ton initial uranium (GWd/MTU). Each code was to apply equal burnups to each case, or approximately equal exposure levels. The purpose of using equal atomic % fissions was to eliminate energy per fission data as a cause for variations in results.

Table 1. Radionuclide listing for multicode comparison

Se-79	Sn-126	Eu-155	Pu-238
Kr-85	I-129	Nd-143	Pu-239
Sr-89	Cs-133	Nd-144	Pu-240
Sr-90	Cs-134	Nd-145	Pu-241
Y-90	Cs-135	Nd-146	Pu-242
Y-91	Cs-137	Ra-226[a]	Am-241
Zr-93	Ce-144	Th-230[a]	Am-242
Zr-95	Pr-144[a]	Th-232[a]	Am-243
Nb-93m[a]	Pm-147	U-232[a]	Cm-242
Nb-94[a]	Sm-147	U-233[a]	Cm-243
Nb-95	Sm-148	U-234	Cm-244
Tc-99	Sm-149	U-235	Cm-245
Ru-106	Sm-150	U-236	Cm-246
Rh-106[a]	Sm-151	U-238	Cm-247[a]
Pd-107	Sm-152	Np-236[a]	Cm-248[a]
Sb-125	Eu-153	Np-237	
Sb-126m[a]	Eu-154	Pu-236[a]	

[a]Not included in CINDER-2 printout.

The results given for each nuclide were to be in the following units:

1. mass, in gram-atoms (moles);
2. radioactivity, in curies (Ci); and
3. decay heat rate, in watts (W).

Aggregate parameters employed were:

1. actinide, fission product, and total decay heat rate in watts;
2. photon source spectra in the ORIGEN2 energy group structure;
3. (α,n), spontaneous fission and total neutron emission rates; and
4. neutron emission energy spectra.

While the neutron emission rates computed by all codes could be compared,the neutron energy spectra cannot be computed by ORIGEN2 and the comparisons of these spectra were limited to the other two code results. The energy group boundaries are given in Tables 2 and 3 for photon and neutron spectra, respectively.

Table 2. Photon energy group structure (MeV)[a]

Group	Lower energy boundary	Upper energy boundary
1	0.000	0.020
2	0.020	0.030
3	0.030	0.045
4	0.045	0.070
5	0.070	0.100
6	0.100	0.150
7	0.150	0.300
8	0.300	0.450
9	0.450	0.700
10	0.700	1.000
11	1.000	1.500
12	1.500	2.000
13	2.000	2.500
14	2.500	3.000
15	3.000	4.000
16	4.000	6.000
17	6.000	8.000
18	8.000	11.000

[a]Million electron volts.

Table 3. Neutron energy group structure (MeV)[a]

Group	Lower energy boundary	Upper energy boundary
1	0.000	0.202
2	0.202	0.408
3	0.408	0.608
4	0.608	0.781
5	0.781	1.003
6	1.003	1.225
7	1.225	1.423
8	1.423	1.572
9	1.572	1.827
10	1.827	2.019
11	2.019	2.466
12	2.466	3.012
13	3.012	3.679
14	3.579	4.066
15	4.066	4.966
16	4.966	6.065
17	6.065	8.187
18	8.187	10.000
19	10.000	14.918
20	14.918	19.640

[a]Million electron volts.

This report summarizes the results for the individual nuclides as well as the actinide, fisson product, and total decay heat rates. The aggregate parameters described as items 2–4 of that list will be addressed in detail in a forthcoming report. They are mentioned here as a part of the overall project definition.

The results for all cases were to be computed and tabulated at the following decay times, after discharge: 30 d and 1, 5, 10, 20, 50, 300, 1,000, and 10,000 years.

There were five different cases from which the results computed by ORIGEN2, EPRI-CELL/CINDER-2, and SAS2H/ORIGEN-S codes, or tandem code sets, were to be compared. The titles describing the five cases were:

1. The Decay-Only Case
2. The Typical PWR Exposure Case
3. The Extended PWR Exposure Case
4. The Typical BWR Exposure Case
5. The Extended BWR Exposure Case

The general criteria used for the reactor model calculations are given in the following:

1. all sites are to use the most up-to-date data libraries available;
2. fuel will be uranium dioxide;
3. fuel impurities will not be considered;
4. nonfuel components and cladding will not be compared;
5. constant power level will be used — 100% capacity factor;
6. atomic % fission from ORIGEN2 case will be used;
7. exposure time will be the same as that used by ORIGEN2;
8. basis of output will be 1 metric ton of initial uranium;
9. control rods will be withdrawn completely for each reactor or control rod assembly; and
10. up-to-date reactor model data will be used.

A description of the details of the five cases is presented in the following section.

3.1. DESCRIPTION OF THE DECAY-ONLY CASE

The units and cooling times that were used are specified above. Other specifications for the decay-only case are as follows:

1. information to be given in gram-atoms (moles);
2. exact ORIGEN2 data appear in Appendix B, g-atoms follows Z number of nuclide;
3. input basis same as output, metric ton of initial uranium; and
4. initial inventory used by all codes was that calculated by ORIGEN2 for the discharge of a PWR of 33 GWd/MTU with 0.029, 3.2, and 96.771 wt % ^{234}U, ^{235}U, and ^{238}U, respectively, at 37.5 MW/MTU.

3.2. DESCRIPTION OF TYPICAL PWR EXPOSURE CASE

Data specifying the PWR assembly are listed in Table 4. A general schematic of the assembly is shown in Fig. 1. The exposure time is 880 d. The burnup of the case is 3.443 at. % fissions, or about 33-GWd/MTU exposure level.

3.3. EXTENDED PWR EXPOSURE CASE

The data specifying the PWR assembly are the same as that in Table 4 except: the water density is 0.73 g-cm^{-3}; the fuel composition is 4.5 wt % ^{235}U, 0.0400 wt % ^{234}U and 95.46 wt % ^{238}U; and the UO_2 density is 94% of theoretical. The assembly is shown in Fig. 1. The exposure time is 1333.33 d. The burnup is 5.206 at. % burnup, or about 50 GWd/MTU.

Table 4. PWR assembly description, 33 GWd/MTU case

Assembly general data	
Lattice, designer	17 x 17, Westinghouse
Type	Control rod[a]
Water density, av, g-cm^{-3}	0.7295
Water temperature, K	570
Soluble boron (av of cycle), ppm (wt)	550
Number of water holes	24
Number of instrument tubes	1
Fuel rod	
Pellet diameter, in.	0.3225
Gap (diametrical), in.	0.0065
Rod OD, in.	0.374
Fuel rod pitch, in.	0.496
Pellet stack density, % TD	94.5
Clad material	Zircaloy-4
Active fuel length, in.	144
Plenum (fuel rod) length, in.	7
^{234}U wt %	0.0275
^{235}U wt %	3.1
^{238}U wt %	96.8725
Fuel temperature, K	811
Clad temperature, K	620
Water holes	
Guide tube ID, in.	0.45
Guide tube OD, in.	0.482
Material	Zircaloy-4

[a]As opposed to burnable poison rod assemblies. The control rods were considered to be withdrawn leaving only the guide tube and "water hole."

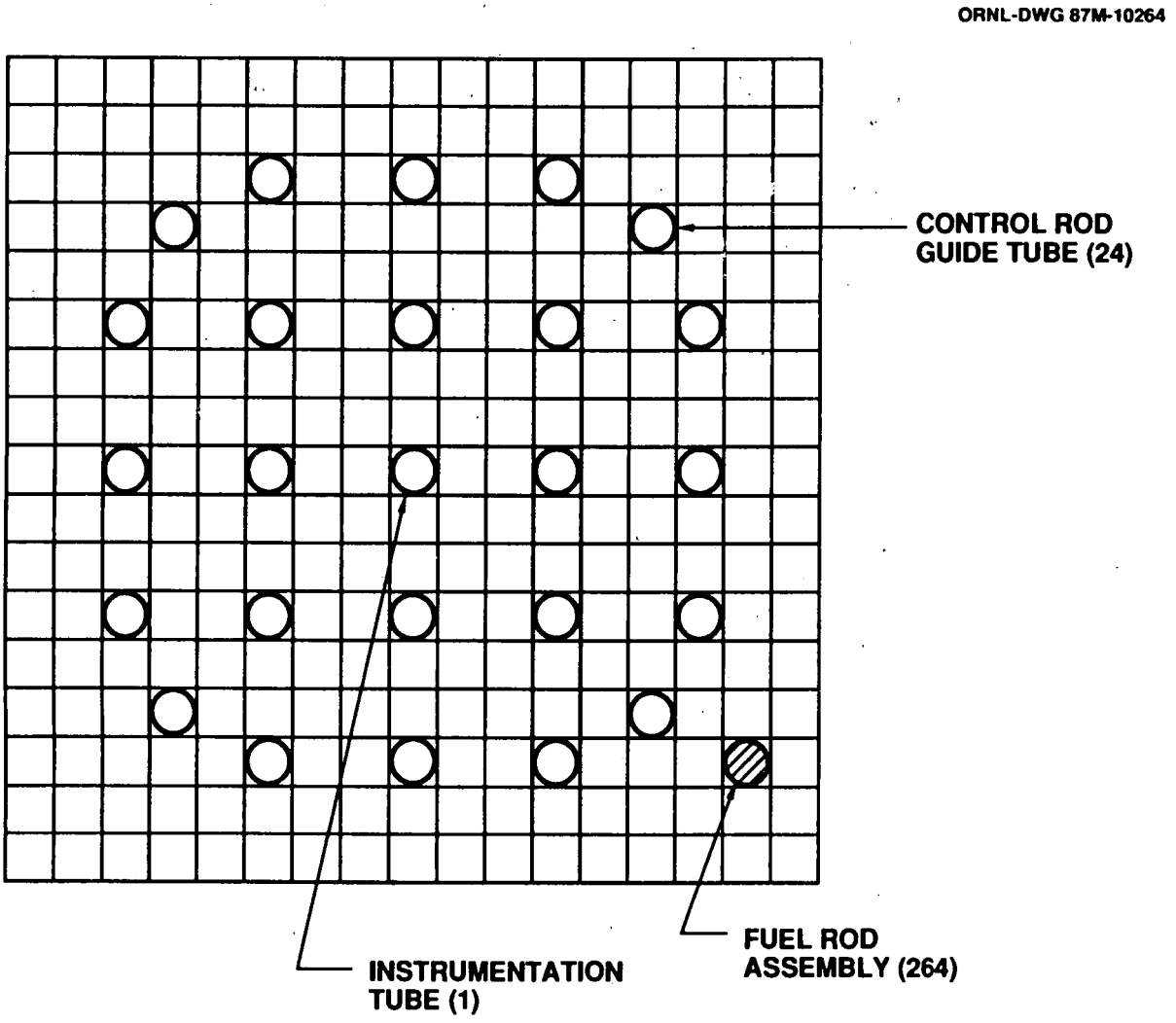

Fig. 1. PWR assembly schematic showing guide tubes or water holes.

3.4. TYPICAL BWR EXPOSURE CASE

Data specifying the BWR assembly and axial water densities are listed in Tables 5 and 6, respectively. A general schematic of the assembly is shown in Fig. 2. The exposure time is 1061.777 d. The burnup of the case is 2.866 at. % fissions, or about 27.5 GWd/MTU. Fuel compositon in place of mixed enrichments is 2.64 wt % ^{235}U, 0.0234 wt % ^{234}U, and 97.3366 wt % ^{238}U.

Table 5. BWR assembly description, 27.5 GWd/MTU case

Assembly general data	
Lattice, designer	8 x 8, General Electric
Type	Burnable poison
Water density, vol-av, g-cm^{-3}	0.392
Water temperature, av K	558
Number of poison rods	4
Number of holes	1
Channel material	Zircaloy-4
Channel water density, av, g-cm^{-3}	0.743
Fuel rod	
Pellet diameter, in.	0.4160
Gap (diametrical), in.	0.0090
Rod OD, in.	0.493
Fuel rod pitch, in.	0.640
Pellet stack density, % TD	94
Clad material	Zircaloy-2
Active fuel length, in.	148
Plenum (fuel rod) length, in.	10
Fuel temperature, K	840
Clad temperature, K	620
Type 1: 31 rods, wt % ^{235}U	2.64[a]
Type 2: 16 rods, wt % ^{235}U	2.30
Type 3: 8 rods, wt % ^{235}U	2.12
Type 4: 4 rods, wt % ^{235}U	1.65
Type 5: 4 rods, wt % ^{235}U	2.30, with 2.0 wt % Gd_2O_3

[a]This enrichment was used for all present analyses since point depletion codes require a single enrichment.

3.5. EXTENDED BWR EXPOSURE CASE

Data giving the fuel rod enrichments and Gd_2O_3 contents of the extended BWR exposure case are listed in Table 7. These apply to the BWR schematic in Fig. 3, with all other assembly and fuel rod data the same as that of the other BWR case as listed in Tables 5 and 6. The exposure time is 1544.400 d. The burnup of the case is 4.172 at. % fissions, or about 40 GWd/MTU. Fuel composition in place of mixed enrichments is 4.15 wt % ^{235}U, 0.0368 wt % ^{234}U, and 95.8132 wt % ^{238}U.

Table 6. Axial water densities of BWR

Top of node (Z, in.)	Density at Z ($g\text{-}cm^{-3}$)	Average density in node ($g\text{-}cm^{-3}$)	Average water temperature (K)
30.83	0.692	0.743	552
43.17	0.569	0.600	558
55.50	0.472	0.494	558
67.83	0.400	0.417	558
80.17	0.347	0.360	558
98.67	0.293	0.309	558
123.33	0.250	0.264	558
148.00	0.228	0.234	558

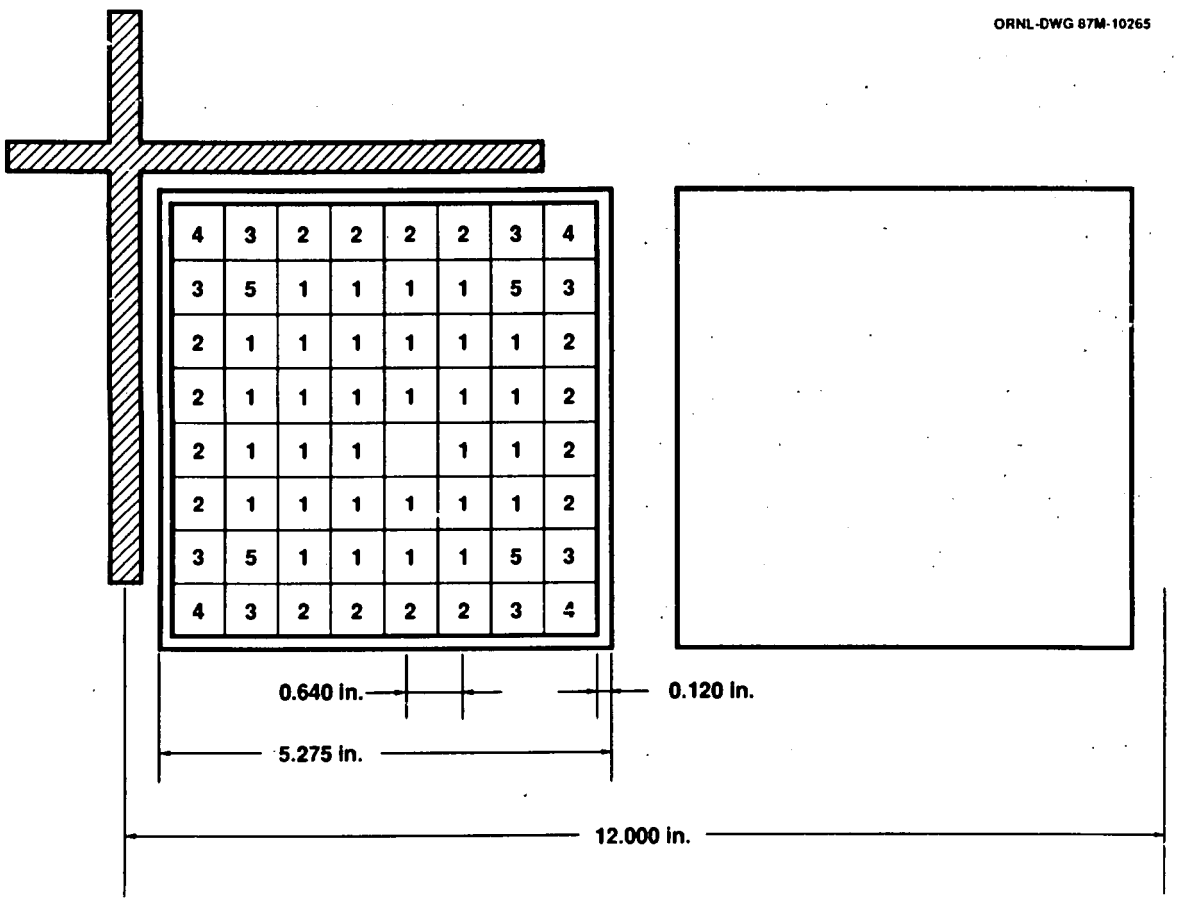

Fig. 2. BWR assembly schematic, 27.5-GWd/MTU case.

Table 7. Fuel enrichments of BWR assembly for 40-GWd/MTU case

Type and number	Wt % ^{235}U enrichment
Type 1: 29 rods	4.15[a]
Type 2: 16 rods	2.90
Type 3: 8 rods	2.65
Type 4: 4 rods	2.00
Type 5: 2 rods	4.15, 2 wt % Gd_2O_3
Type 6: 4 rods	2.90, 3 wt % Gd_2O_3

[a]This enrichment was used for all present analyses since point depletion codes require single enrichment.

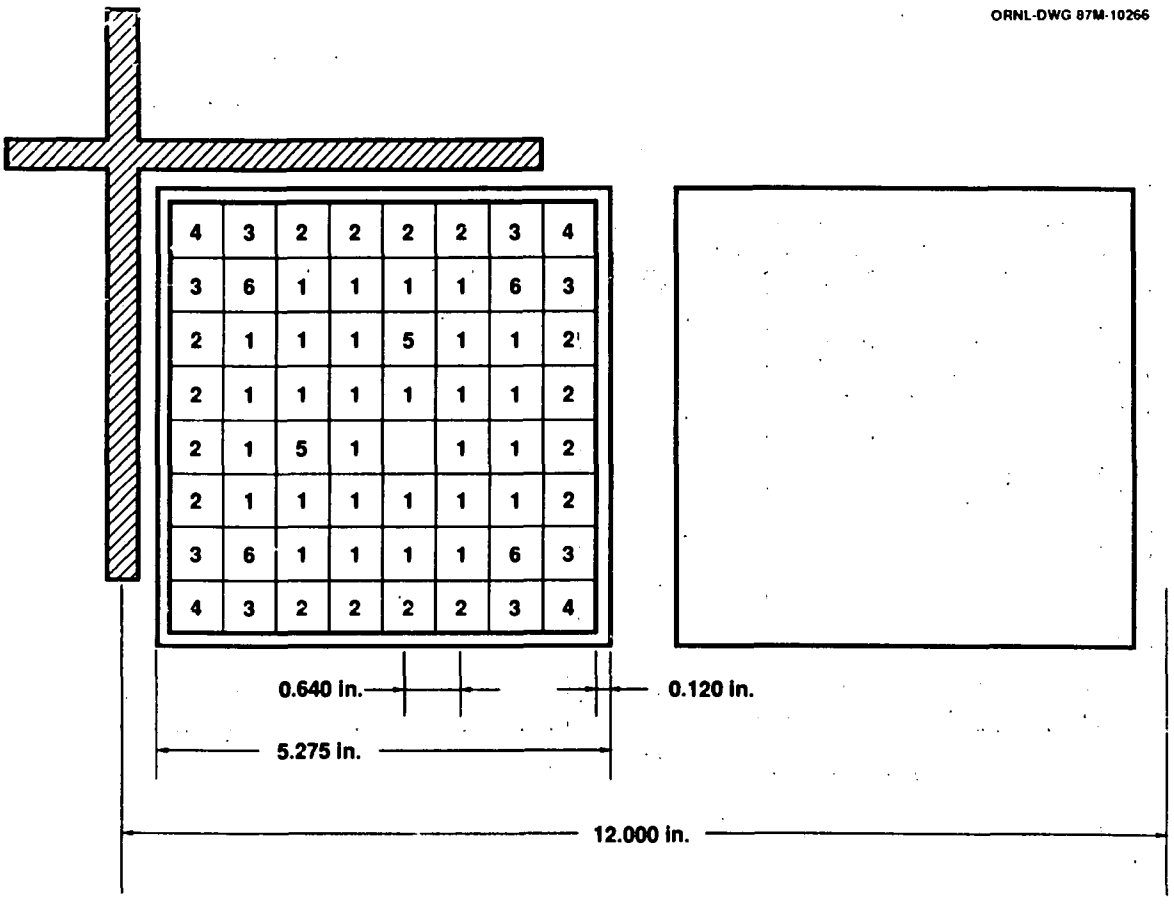

Fig. 3. BWR assembly schematic, 40-GWd/MTU case.

3.6. SUMMARY OF FUEL AND BURNUP DATA OF CASES

A summary of the fuel and burnup data for all reactor cases is shown in Table 8. In this project, it was agreed that each code use the same at. % fission and exposure time in a case. Thus, slightly different values of energy per fission between codes caused small variations from exposures and specific powers listed.

Table 8. Fuel exposure and burnup characteristics of cases

Data type	Exposure cases			
Reactor type	PWR	PWR	BWR	BWR
Exposure, GWd/MTU	33	50	27.5	40
Specific power, MW/MTU	37.5	37.5	25.9	25.9
At. % fission	3.443	5.206	2.866	4.172
Total exposure, d	880.0	1333.33	1061.78	1544.4
Wt % ^{234}U	0.0275	0.04	0.0234	0.0368
Wt % ^{235}U	3.1	4.5	2.64	4.15
Wt % ^{238}U	96.8725	95.46	97.3366	95.8132
Initial ^{234}U, mol	1.175	1.709	1.000	1.573
Initial ^{235}U, mol	131.9	191.5	112.3	176.6
Initial ^{238}U, mol	4070.0	4011.0	4090.0	4026.0

4. METHOD OF ILLUSTRATING CODE RESULT COMPARISONS

The results computed by ORIGEN2, ORIGEN-S, and CINDER-2 were produced both as printout and as computer data sets. In order to examine these results in an organized manner, the COMPO2SC code was written to automatically read requested results from the data sets produced by the three codes and to consolidate and compare the results in a logical tabulation. The tables produced by the comparison are presented in Appendices C through G.

Two types of tables were developed for this analysis: comparative ratio tables and nuclide distribution summary tables. The comparative ratio tables contain a more detailed comparison of results. For example, all of the requested results (excluding photon and neutron sources) for the 52 nuclides and total decay heats are listed. Also, the ratios in code results of all of these calculations are tabulated. The nuclide distribution summary tables present an overview type of comparative analyses. The nuclides in these tables are separated into a distribution dependent on percentage differences representing code-result-ratios minus unity. A more detailed description of both types of tables is presented in this section. The comparative ratio tables are given in Appendices C through F, and the nuclide distribution summary tables are given in Appendix G. Also, two summary tables and five plots are discussed in the next section.

4.1. COMPARATIVE RATIO TABLES

The complete set of comparative ratio tables are divided into four major sets and 20 subsets. All tables within a major set contain results having the same units: nuclide gram-atoms, nuclide curies, nuclide watts, or total watts. Within each major set are five subsets of tables corresponding to the five cases described in Sect. 3. Finally, within each subset are nine tables having the results for the nine spent fuel cooling times of each case.

The individual tables may contain data for either nuclides or totals. For the first eight cooling times there are two time steps given per page. After the list of nuclide names, nine columns are shown in each table. The results for the nuclides, as computed by each code, are listed first. The next three columns contain the ratios of each code's result to the average of the three (or the average of the nonzero values if one is zero). The names ORIGEN2, ORIGEN-S, and CINDER-2 are abbreviated to OR2, ORS and CIN, respectively. The last three columns in the table contain the ratios of results between each combination of two codes. In the tables having units in total watts, in place of results by individual nuclides are results of the total of all fission products, all actinides (heavy metals), and all fission products plus actinides.

In addition to the tabulation described above, summary-type information is printed at the bottom of the table. These lines pertain to average percentage deviations from unity of each column of ratios. The exact details of computing each of these averages follow. The absolute value of the difference of each nonzero ratio and unity is calculated. These values are simply "absolute-deviations." Then, the average of the absolute-deviations for all nonzero ratios are computed. Finally, this average is multiplied by 100 to convert the fractional value to the "average-absolute-deviation, as %." This type of average is calculated for all of the tabulated columns of comparison ratios.

There are additional types of averages computed for data tabulated by nuclides. A special method is used for excluding either one or two of the largest ratio deviations for each code in calculating the averages. First, in this process, the nuclide having the maximum deviation for each code is selected from only those nuclides having a deviation for that code which exceeds the deviations for both of the other two codes. Then all three of the selected nuclides for the three codes are excluded from the six calculated averages and listed as "av-abs-dev excluding largest one, %." Also, the nuclides with the

next-to-maximum deviations are excluded following a similar process, and the averages are listed on the next line. The final line contains the names of the excluded nuclides, from left to right, for ORIGEN2, ORIGEN-S, and CINDER-2. The names of nuclides exhibiting the maximum deviations are to the left of the slash and those for the next-to-maximum deviation are to the right.

This method used for comparisons of code results should be considered as only one arbitrary method and may not necessarily be the best. For example, there is probably a difference in the importance of nuclide results so that some type of weighting could be used in deriving effective averages. However, the method displays code results and their ratios, which are usually needed in examining the data. The average absolute deviations from unity appeared to be useful quantities to present. Also, it was seen that it might be helpful to determine the changes in these averages upon exclusion of the largest deviations. While this method could be improved, it certainly had the tendency to indicate both the poor and high quality of results from the codes in the variety of cases presented.

One of the advantages to the comparison method used here is that all data were read from data sets and did not have to be transcribed. Thus, once it was coded correctly, human error was avoided. One exception, however, was made to this rule of unaltered data: Due to a definition misunderstanding, there was one case in which data had to be removed. It was intended that the data computed for nuclides in watts be only the energy rate produced by the nuclide as it decays to its first daughter nuclide. However, when results were not tabulated separately for the daughters in the CINDER-2 data, the energy rates produced by the daughter were added to that of the parent nuclide. Thus, in order to avoid incorrect or misleading comparison ratios, the results for nuclides derived differently by CINDER-2 were set to zero and skipped in the analysis. In order to refrain from skipping numerous nuclides that would have meaningful comparisons, only nuclides for which the inclusion of daughter decay heats increased that of the nuclide by more than 0.1% were included in the group being skipped. Note that the above difficulty was not present in the comparisons using gram-atoms, curies, or total watts.

4.2. NUCLIDE DISTRIBUTION SUMMARY TABLES

The nuclide distribution summary tables display the variations between the results of any set of two codes. In this comparison process between any two codes, a percentage variation for each nuclide is determined by multiplying 100% by the difference in the ratio of the code results minus one. If the larger result is in the numerator, a positive percentage is produced. Or, if the smaller result is in the numerator, a negative percentage is computed. The nuclides are finally grouped into percentage difference ranges, or deltas, having the following boundaries: 30, 20, 10, 5, 1, -1, -5, -10, -20, and -30%.

Nuclide distribution tables are grouped into subsets similar to those used for the comparative ratio tables. The major division is by the units of gram-atoms, curies, and watts. Then, for tables in gram-atoms, tables are given for each of the five cases. However, the tables in curies and watts are limited to the decay-only case. Finally, there are tables for each of the nine decay times, with three per page. The reason for excluding tables in curies and watts for the reactor exposure cases is that nuclide distribution variations between tables in gram-atoms and those using the other units is demonstrated for the decay-only case, while the major variations in nuclide distributions for the reactor exposure cases appear to be illustrated sufficiently in the tables for gram-atoms.

5. EXAMINATION OF COMPARISONS IN CODE RESULTS

In comparing the results from the three codes it is not always possible to determine the chief reasons for differences in nuclide results. The depletion models used by each code in computing cross sections treated various aspects of the reactor physics analysis somewhat differently. In the decay-only case, where the calculation in all three codes began with the same discharge inventory, any reason for differences was limited to the mathematical decay model, decay paths in the library, half lives, and nuclide decay heats. Thus, usually the reasons for differences in results in the decay-only case could be determined. Also, in assessing the importance of the difference in results for any particular nuclide, consideration should be given to the impact the result of that nuclide has on the intended applications of the results.

First, a more general discussion of the comparisons for each case is presented. Then, an endeavor to reconcile some of the major differences is given.

5.1. GENERAL COMMENT ON ENTIRE SET OF COMPARISONS

Some of the differences between nuclide results computed by the three codes appear to be somewhat large. However, in relation to similar previous comparisons and the substantial differences in the cross-section processing models used by the codes, the nuclide differences are not considered greater than expected by most experienced reactor physics analysts. Also, expanding the comparisons to BWR cases and extended burnups put a further strain on the effects of some of the approximations in the models that may have been somewhat minor in the typical PWR case. Note that for most of the nuclides that contribute the greatest consequences there are relatively good agreements. While not without defects, each of the codes in the comparison appears to produce respectable results.

A summary assessment of the code comparisons can be seen in the plots in Figs. 4–8 and the tabulations in Tables 9 and 10. The plots show the percentage differences in the total decay heat rate predictions for each set of two codes. The comparisons in Fig. 4 pertain to the decay-only case. Since the input for each code was the same inventory, the decay-only case provides a good method of comparing the decay libraries used by each code. The comparisons in Figs. 5–8 pertain to predictions computed in the four reactor exposure cases, as noted in the figure captions. They show significantly more percentage differences than that of the decay-only case, particularly after a 50-year decay time.

Tables 9 and 10 are special types of summaries of the nuclide distribution summary tables described in Sect. 4.2 and given in Appendix G, in which the percentage differences between each pair of code results are distributed by percentage-difference deltas. There is a large number (i.e., 405) of these tables, since they are given for each of the three pairs of codes, the nine decay times, the five cases, and the three types of units. In order to summarize the large number of tables, a count (for each nuclide) was made of the number of times the percentage difference fell within each percentage-difference delta as each of the 405 tables were being determined. The distribution of these total counts for each nuclide was tabulated in Table 9. Observations of this table indicates for each nuclide how well the three code predictions agree.

Even though Table 9 is a useful summary, it can be misleading to assess similar distributions for two different nuclides in the table as having similar impacts upon intended applications. For example, the percentage difference for both ^{246}Cm and ^{241}Am falls within the same -10 to -20% delta for all three units at 1000 years for one of the pair of code comparisons. However, ^{246}Cm has a decay heat rate of only 5×10^{-4} W, while that for ^{241}Am is 25 W and the total decay heat rate at the same decay time is 47 W. Thus, it appeared reasonable for identifying nuclides that may require an improved computation, from the standpoint of total decay heat rates or photon sources, to determine a distribution including only the number of percentage-difference cases where the decay heat rate exceeds an appropriate minor fraction of the total decay heat rate. Since almost all of the percentage

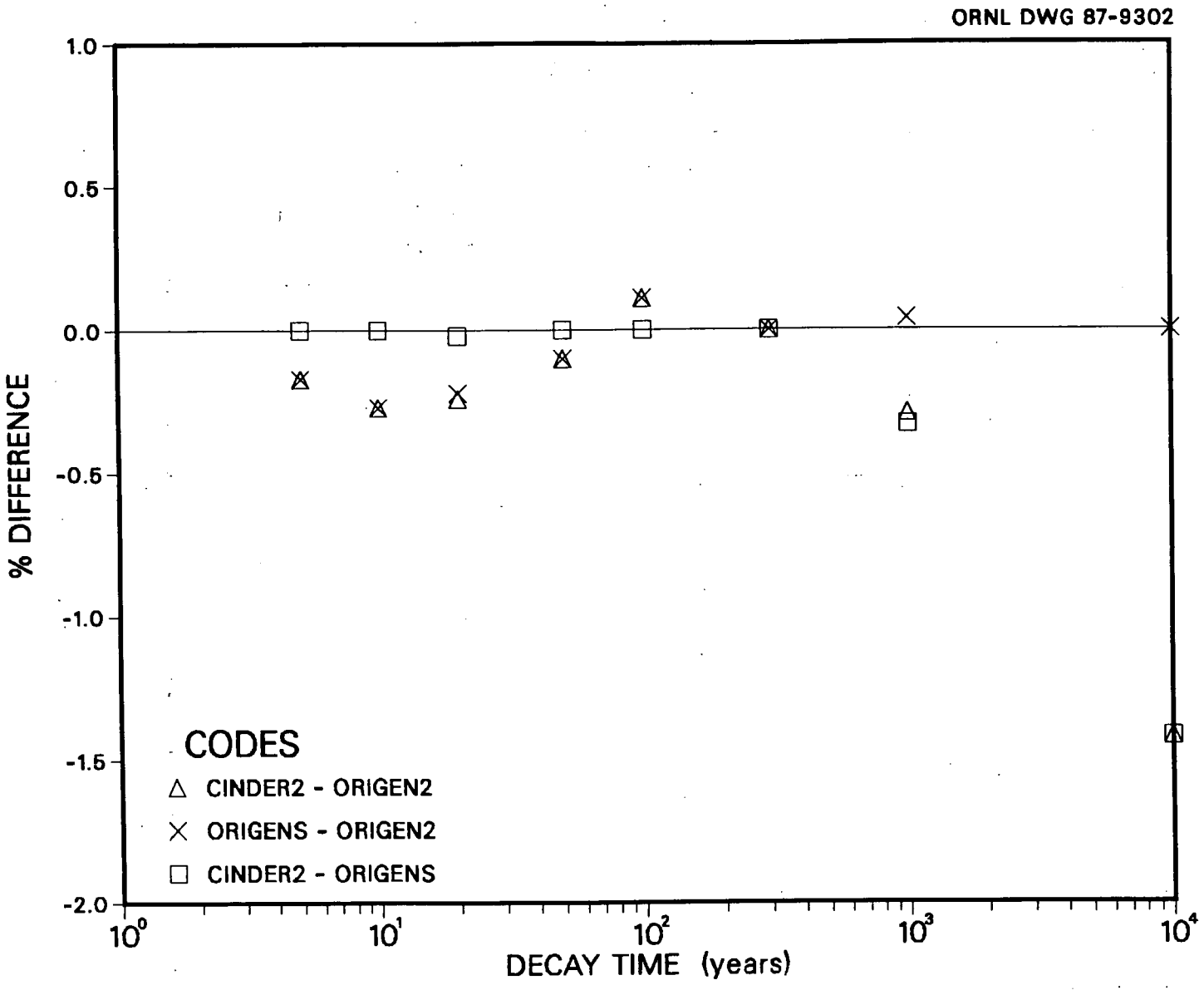

Fig. 4. Decay-only case comparison of the predictions of the codes for total decay heat rate.

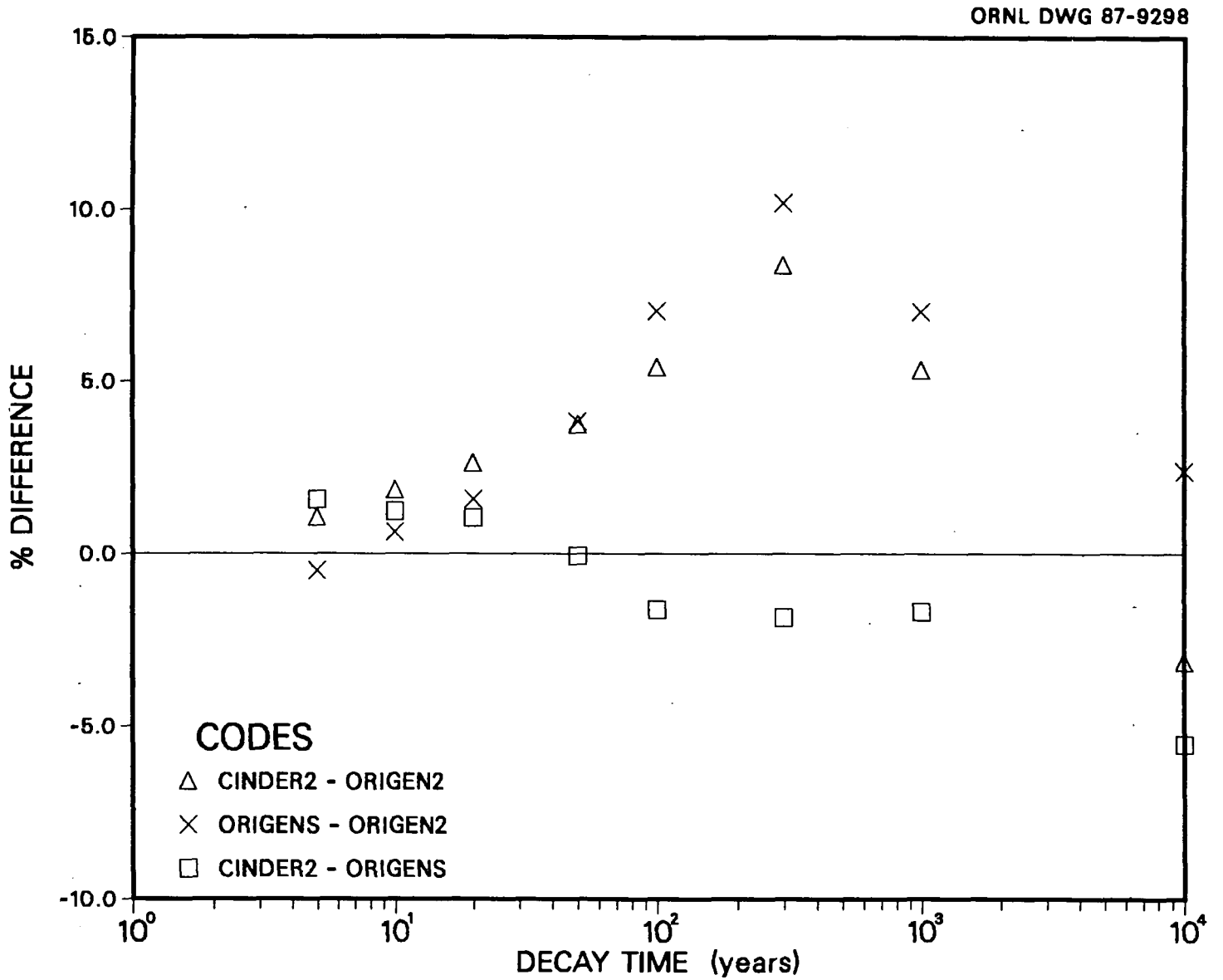

Fig. 5. Comparison of the predictions of the codes for total decay heat rate as generated by fuel from a 33-GWd/MTU PWR.

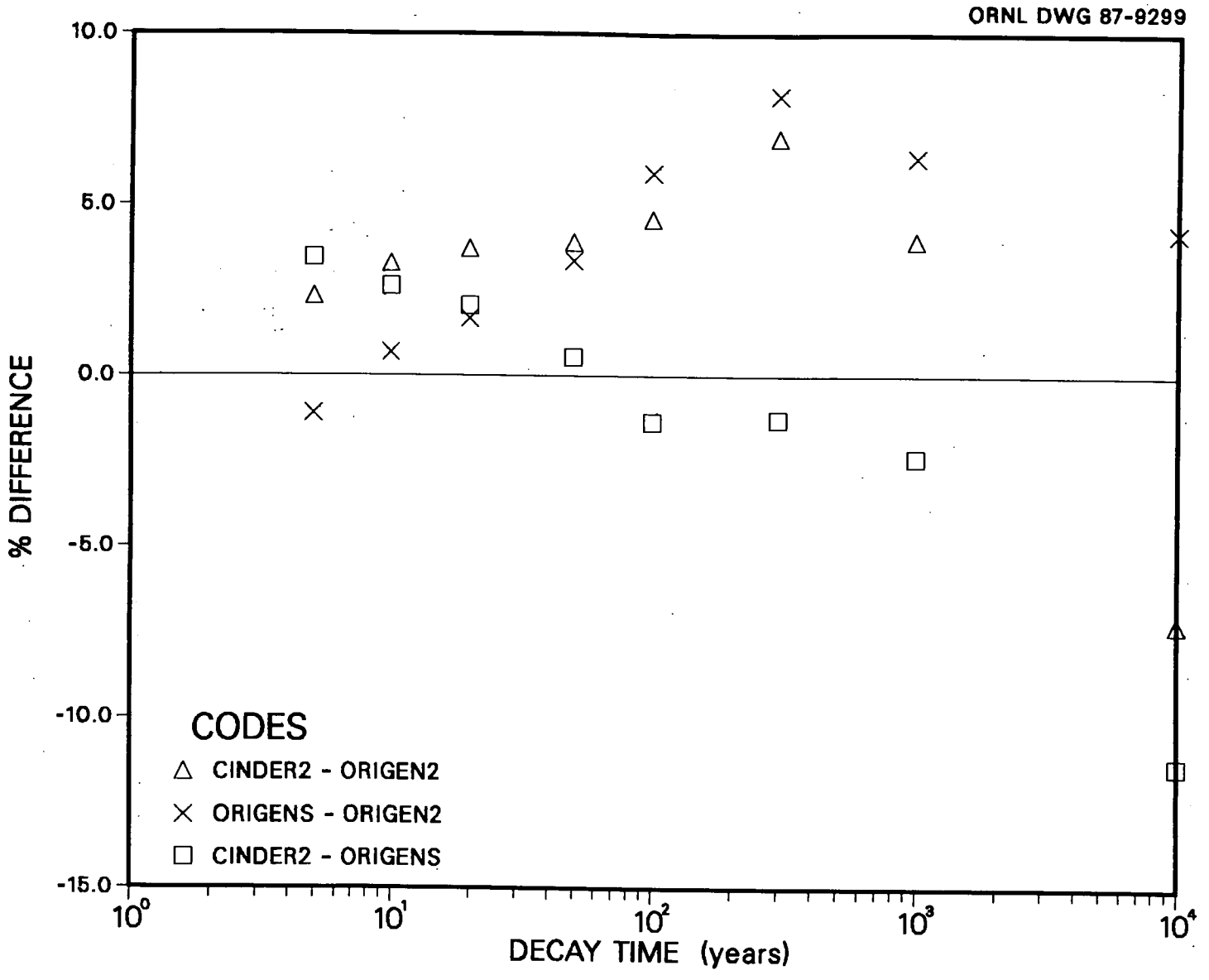

Fig. 6. Comparison of the predictions of the codes for total decay heat rate as generated by fuel from a 50-GWd/MTU PWR.

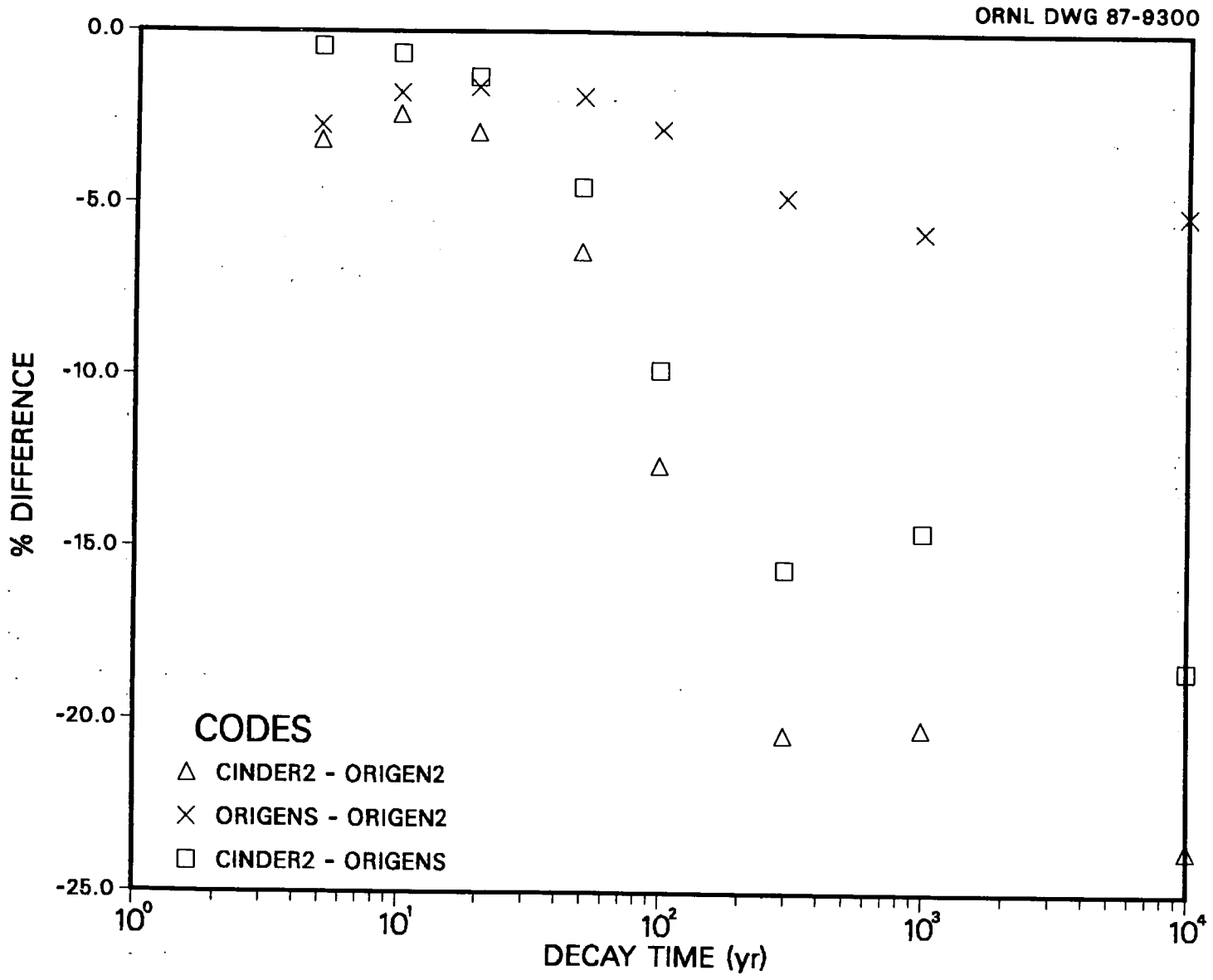

Fig. 7. Comparison of the predictions of the codes for total decay heat rate as generated by fuel from a 27.5-GWd/MTU BWR.

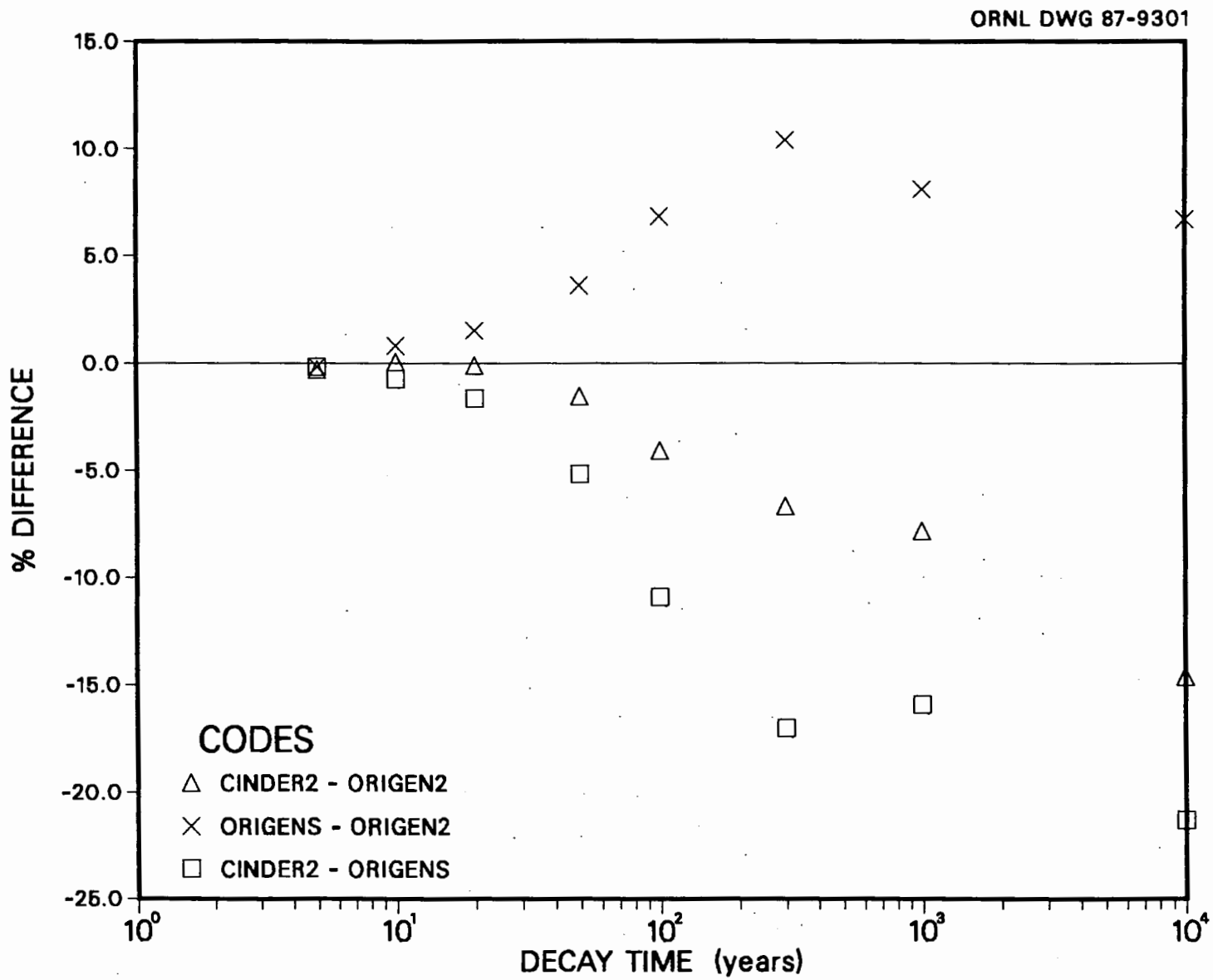

Fig. 8. Comparison of the predictions of the codes for total decay heat rate as generated by fuel from a 40-GWd/MTU BWR.

Table 9. Tabulation of % differences in nuclide gram-atoms, curie, and decay heat predictions between codes into a frequency distribution

DELTAS, %	SE79	KR85	SR89	SR90	Y90	Y91	ZR93	ZR95	NB95	TC99	RU106	PD107	SN126	SB125	I129	CS133	CS134	CS135
>30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 TO 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 TO 20	0	0	0	0	0	0	0	23	23	0	12	54	56	0	0	0	0	108
5 TO 10	0	0	0	24	24	0	0	32	30	0	12	54	16	0	54	0	0	27
1 TO 5	0	117	60	192	192	77	27	58	59	162	36	36	0	0	90	36	18	27
-1 TO 1	63	264	326	165	165	328	252	283	283	243	243	81	153	189	81	333	225	108
-5 TO -1	0	24	19	24	24	0	126	9	10	0	18	0	0	0	117	36	108	54
-10 TO -5	180	0	0	0	0	0	0	0	0	0	72	117	0	0	63	0	54	81
-20 TO -10	72	0	0	0	0	0	0	0	0	0	12	63	72	72	0	0	0	0
-30 TO -20	54	0	0	0	0	0	0	0	0	0	0	0	108	18	0	0	0	0
<-30	36	0	0	0	0	0	0	0	0	0	0	0	0	126	0	0	0	0

DELTAS, %	CS137	CE144	ND143	ND144	ND145	ND146	PM147	SM147	SM148	SM149	SM150	SM151	SM152	EU153	EU154	EU155	U234	U235
>30	0	0	0	0	0	0	90	23	0	0	0	0	0	0	0	0	0	0
20 TO 30	0	0	0	0	0	0	54	169	0	54	0	25	0	0	0	0	0	0
10 TO 20	25	0	0	0	0	0	0	20	36	18	0	50	0	18	0	21	0	70
5 TO 10	8	8	36	18	0	0	0	13	0	36	18	0	9	54	0	42	12	80
1 TO 5	135	74	18	72	45	36	12	42	36	0	36	0	18	18	39	1	39	68
-1 TO 1	237	323	306	225	324	342	177	90	153	153	324	97	306	306	177	153	111	55
-5 TO -1	0	0	35	90	36	27	30	48	0	18	27	0	0	9	0	62	75	26
-10 TO -5	0	0	10	0	0	0	42	0	0	0	0	79	0	0	21	28	36	70
-20 TO -10	0	0	0	0	0	0	0	0	0	72	0	27	45	0	147	42	36	31
-30 TO -20	0	0	0	0	0	0	0	0	99	54	0	127	27	0	21	56	36	5
<-30	0	0	0	0	0	0	0	0	81	0	0	0	0	0	0	0	60	0

DELTAS, %	U236	U238	NP237	PU238	PU239	PU240	PU241	PU242	AM241	AM242	AM243	CM242	CM243	CM244	CM245	CM246
>30	0	0	0	9	0	0	2	0	0	81	27	66	96	45	135	108
20 TO 30	0	0	0	3	0	0	27	135	9	0	54	0	0	66	27	54
10 TO 20	0	0	6	51	81	0	82	81	99	27	137	30	0	24	27	54
5 TO 10	0	0	44	21	8	0	23	34	27	0	52	3	0	45	54	54
1 TO 5	35	0	13	3	19	0	35	56	27	18	0	6	0	0	27	0
-1 TO 1	273	405	49	81	119	89	80	46	75	63	99	93	117	113	81	79
-5 TO -1	55	0	64	39	16	100	29	44	51	0	9	6	0	40	0	2
-10 TO -5	12	0	25	25	41	43	9	9	12	0	27	12	32	0	0	0
-20 TO -10	0	0	37	80	40	173	52	0	67	54	0	54	40	21	0	54
-30 TO -20	30	0	55	69	79	0	6	0	8	24	0	27	0	21	54	0
<-30	0	0	112	24	2	0	60	0	30	138	0	108	120	30	0	0

Table 10. Tabulation of % difference frequency distribution if nuclide watts exceeds 0.01% of total watts

DELTAS, %	SE79	KR85	SR89	SR90	Y90	Y91	ZR93	ZR95	NB95	TC99	RU106	PD107	SN126	SB125	I129	CS133	CS134	CS135
>30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 TO 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 TO 20	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
5 TO 10	0	0	0	21	21	0	0	0	0	0	4	0	0	0	0	0	0	0
1 TO 5	0	75	18	168	168	21	0	14	13	36	16	0	0	0	0	0	12	0
-1 TO 1	63	264	326	165	165	328	252	283	283	243	243	81	153	189	81	333	225	108
-5 TO -1	0	15	9	21	21	0	0	9	10	0	4	0	0	0	0	0	72	0
-10 TO -5	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	36	0
-20 TO -10	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0
-30 TO -20	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0
<-30	0	0	0	0	0	0	0	0	0	0	0	0	0	84	0	0	0	0

DELTAS, %	CS137	CE144	ND143	ND144	ND145	ND146	PM147	SM147	SM148	SM149	SM150	SM151	SM152	EU153	EU154	EU155	U234	U235
>30	0	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0
20 TO 30	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0
10 TO 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0
5 TO 10	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	12	0
1 TO 5	127	18	0	0	0	0	8	0	0	0	0	0	0	0	36	0	21	0
-1 TO 1	237	323	306	225	324	342	177	90	153	153	324	97	306	306	177	153	111	55
-5 TO -1	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	33	12	0
-10 TO -5	0	0	0	0	0	0	28	0	0	0	0	0	0	0	15	15	0	0
-20 TO -10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	123	22	6	0
-30 TO -20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	32	30	0
<-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0

DELTAS, %	U236	U238	NP237	PU238	PU239	PU240	PU241	PU242	AM241	AM242	AM243	CM242	CM243	CM244	CM245	CM246
>30	0	0	0	0	0	0	0	0	0	0	24	48	60	36	30	0
20 TO 30	0	0	0	3	0	0	17	69	6	0	48	0	0	54	6	0
10 TO 20	0	0	6	48	81	0	62	45	96	0	122	24	0	18	6	0
5 TO 10	0	0	18	21	8	0	13	16	24	0	46	3	0	36	12	0
1 TO 5	0	0	3	3	19	0	27	27	27	0	0	6	0	0	3	0
-1 TO 1	273	405	49	81	119	89	80	46	75	63	99	93	117	113	81	79
-5 TO -1	27	0	9	39	16	100	23	24	51	0	9	6	0	34	0	0
-10 TO -5	12	0	0	25	41	43	7	5	12	0	24	12	20	0	0	0
-20 TO -10	0	0	0	74	40	173	46	0	67	0	0	42	25	18	0	0
-30 TO -20	30	0	0	69	79	0	0	0	8	0	0	24	0	18	6	0
<-30	0	0	90	6	2	0	0	0	30	0	0	75	75	0	0	0

differences in code predictions of total decay heat rates are >0.1%, all nuclide percentage-difference cases were excluded from the distribution if the average code results for the nuclide in watts are <0.01% of the average total watts and the percentage difference was outside the -1 to +1% delta. The frequency distribution determined on this basis is shown in Table 10. Note that the code agreement depicted by this table appears to be better than that in Table 9, in particular, for the fission products. However, since cases are excluded in Table 10 from the standpoint of decay heat, the table should not be used for evaluating comparisons for some of the other purposes, such as sorption predictions during long-term disposal or criticality during storage and transportation.

5.2. THE DECAY-ONLY CASE

The decay-only case was intended to show differences in nuclide decay constants and decay heat rates in addition to total decay heat rates. Within the first 100 years all average deviations were <1%. Even at 10,000 years these averages are in the 2 to 6% range or about 1% when excluding the two maximum deviations. The agreement between ORIGEN2 and ORIGEN-S was very good, with average differences <1% (except at 1,000 years) for all units except nuclide watts, for which the maximum average was 2.1%. In the comparisons of total watts of each code to the average, the differences were <1.1% throughout all time steps and <0.3% for all cooling times through 1,000 years.

The major differences in nuclide results start at 100 years, with ^{237}Np computed by CINDER-2 about 82% of the three-code average. Then, at 300 years the comparisons to the average for ^{241}Pu is 132% for ORIGEN-S and 50% for CINDER-2. At 1,000 years ^{244}Cm has gross differences, and at 10,000 years ^{241}Am results are greatly different. However, these discrepancies (except for ^{244}Cm), as discussed below, are due to the absence of a decay link between two nuclides of a decay chain in CINDER-2 and are not due to errors in decay constants.

The comparisons to the code average result are within a few percent for all fission products except ^{95}Zr, ^{95}Nb and ^{137}Cs, which differ <10% from the averages only after being greatly diminished.

The differences in results for radioactivity are almost identical to results in gram-atoms. Usually this is also the case for individual nuclide decay heat. Two exceptions to this finding are the watts for ^{79}Se and ^{107}Pd.

5.3. THE TYPICAL PWR EXPOSURE CASE

The comparisons of results for the PWR 33-GWd/MTU case are a mixture of good, poor, and fair. The ^{239}Pu content compares with the average at 30 d as 95, 106, and 99% for ORIGEN2, ORIGEN-S and CINDER-2, respectively. For ^{244}Cm, which is important for its neutron (mainly), photon, and decay heat production, the same type of comparisons are 93, 91 and 116% (for the respective codes). As for ^{235}U, the comparisons (same order) are 97, 99 and 103%. Most of the important fission products, ^{90}Sr, ^{90}Y, ^{106}Ru, ^{134}Cs, ^{137}Cs, ^{144}Ce, ^{154}Eu, and ^{155}Eu, were in fair-to-good agreement. Other fission products, ^{125}Sb, ^{126}Sn, and ^{148}Sm, have relatively poor agreement. The agreement for two important actinides at long cooling times, ^{240}Pu and ^{241}Am, is fair at 30 d, while that for the relatively unimportant, ^{242}Am and ^{243}Cm, is poor. The same discrepancies discussed for the decay-only case at long times are present in this and all remaining cases.

The total decay heat does not vary from the average by more than 6.1% (300 years) for all times or more than 1.4% for the first 20 years. The fission-product decay heat for the first 50 years varies from the average within 0.9% for ORIGEN2 and ORIGEN-S and within 1.5% for CINDER-2.

5.4. THE EXTENDED PWR EXPOSURE CASE

As expected, there is somewhat less agreement in the extended PWR exposure case than the typical burnup case. The comparisons of code results to the average of the major actinides at 30 d, for ORIGEN2, ORIGEN-S and CINDER-2, respectively, are the following: 97, 107, and 96% for ^{239}Pu; 90, 89, and 121% for ^{244}Cm; and 94, 100, and 106% for ^{235}U. For the fission products and actinides listed in the other PWR case, the agreements were about the same or slightly better.

The total decay-heat agreement, also, is about the same as in the other PWR case. The maximum variation from the average of total heats was 6.2% (10,000 years), and the agreement for the first 20 years remained within 2.3%. The maximum difference from the average for fission products during the 5- to 100-year period, inclusive, was 1.7%.

5.5. THE TYPICAL BWR EXPOSURE CASE

The BWR has more variation in moderation density, both axially and radially, than the PWR. Thus, it is difficult to simulate the BWR without using a three-dimensional depletion model. This problem was indicated, also, in some of the nuclide content comparisons of the typical BWR exposure case. The comparisons of code results to the average of the major actinides at 30 d, for ORIGEN2, ORIGEN-S, and CINDER-2, respectively, are the following: 109, 110, and 80% for ^{239}Pu; 115, 88, and 97% for ^{244}Cm and 107, 101, and 92% for ^{235}U. The averages of these comparisons change from 4 to 13% for ^{239}Pu, 11 to 10% for ^{244}Cm, and 2 to 5% for ^{235}U between the typical PWR and BWR cases, respectively. These comparisons of the average of the results at 30 d are somewhat misleading, particularly for ^{244}Cm. They suggest that the differences among the codes in the prediction of ^{244}Cm content for the typical PWR case and that for the BWR are small. The percentages given are average changes between the PWR and BWR typical exposure cases in comparison of the individual code result to the average result at 30 d. Although this "average" does not change much, the comparison of the ORIGEN2 results to the 30-d average increases dramatically (+23%), and the ratio of the CINDER-2 results to the same 30-d average decreases almost equally (−17%). Thus, the average of these changes appears nearly constant, as does the ratio of the ORIGEN-S results to the average (−3%). Similar trends are seen for ^{239}Pu and ^{235}U, with the individual changes being less dramatic than those observed in the case of ^{244}Cm.

Even though the agreement for most of the more important fission products is not significantly different than in the PWR case, the differences in the results for ^{134}Cs, ^{154}Eu, and ^{155}Eu are substantially larger.

The total decay heat does not vary from the average by more than 14% (10,000 years) for all times, or more than 2.0% for the first 20 years. The fission- product decay heat for the first 50 years varies from the average within 1.5% for ORIGEN2 and ORIGEN-S and within 2.4% for CINDER-2.

5.6. THE EXTENDED BWR EXPOSURE CASE

There was somewhat less agreement between results of the three codes for the extended exposure case than that of the typical exposure BWR case. The comparisons of code results to the average of major actinides at 30 d, for ORIGEN2, ORIGEN-S, and CINDER-2, respectively, are the following: 99, 118, and 83% for ^{239}Pu; 92, 97, and 111% for ^{244}Cm; and 95, 106, and 99% for ^{235}U. The averages of these comparisons change from 5 to 12% for ^{239}Pu, 14 to 7% for ^{244}Cm, and 3 to 4% for ^{235}U between the extended exposure PWR and BWR cases, respectively. These percentages are based on gross averages and as in the typical exposure cases, may cause the results to appear to be in better agreement than is evident from the individual comparisons.

For most of the important fission products, the agreement was not substantially different than that of the typical BWR case. However, there was a marked improvement in the comparisons of results for ^{106}Ru and ^{134}Cs.

The total decay heat does not vary from the average by more than 12% (10,000 years) for all times, or more than 1.1% for the first 20 years. The fission-product decay heat for the first 50 years varies from the average within 0.5% for ORIGEN2 and within 1.9% for ORIGEN-S and CINDER-2.

6. RECONCILING SIGNIFICANT DIFFERENCES IN RESULTS

First, the differences in results of the decay-only case are discussed. Most of these variations can be reconciled. All reasons for results to differ in the decay-only case cause similar differences in the other cases, also. Because it appears that no benefit is gained from repeating the same reasons, the discussion for the four reactor exposure cases will be limited to differences caused by cross sections or the depletion models, only. In general, the order in which nuclides are discussed will simply follow that of increasing mass number instead of relative significance.

6.1. RECONCILING DECAY-ONLY CASE VARIATIONS

First the nuclide having significant percentage differences (>5% from average at <10,000 years) is stated, followed by any reconcilable reason for the large percentage differences in code results. In many cases, the nuclide concentration is so extremely small that there probably is a relatively low impact from the quantity on most likely applications. A test for fractional content of the nuclide is used to help detect such cases. If the percentage of the nuclide decay heat <0.01% of the total decay heat at cooling times where a result differs >5% from the average, it is said to fall below the "minor content" test. While the values are arbitrarily selected, the test may be helpful when considered as reasonable.

^{79}Se: The Q-value used by ORIGEN2 was taken from ENDF/B-IV and that used by the others was taken from ENDF/B-V. (However, the quantities are below the minor content test.)

^{95}Zr: The half-life used by CINDER-2 was taken from ENDF/B-V and that used by the others was taken from ENSDF. There is a 0.2% difference in the half-lives. (The quantities are below the minor content test.)

^{95}Nb: The half-life of ^{95}Nb and the branching fractions of ^{95}Zr used by CINDER-2 were taken from ENDF/B-V and those used by the others were taken from ENSDF. Percentage differences were as much as 10% at 20 years. (The quantities are below the minor content test.)

^{107}Pd: The Q-value used by ORIGEN2 was taken from ENDF/B-IV and that used by the others was taken from ENDF/B-V. (The quantities are below the minor content test.)

^{137}Cs: The half-life used by ORIGEN2 was taken from ENSDF and that used by the others was taken from ENDF/B-V. (The quantities are below the minor content test.)

^{237}Np: The α decay of ^{241}Am to ^{237}Np is not present in the CINDER-2 library. While the quantities are not large (0.02 W, with a total of 126 W at 300 years), they exceed that of the minor content test.

^{241}Pu: Two different causes changed these results at various time steps. The reason at 50 to 100 years was that ORIGEN2 used a half-life taken from ENSDF and that used by the others was taken from ENDF/B-V. Then, at ≥300 years the large reductions in CINDER-2 results were due to the omission of the ^{245}Cm decay to ^{241}Pu in the library. (The quantities slightly exceed that of the minor content test.)

^{241}Am: The results through 1000 years were in good agreement, but the fraction of ^{241}Am from ^{245}Cm (produced in the ^{245}Cm-^{241}Pu-^{241}Am chain) was relatively small. Then, at 10,000 years the omission of ^{245}Cm to ^{241}Pu in the CINDER-2 library becomes significant. The decay heat from ^{241}Am can be a significant fraction of the decay heat at long times, such as 100 to 10,000 years.

^{244}Cm: The results agreed through 300 years, after which a small amount was computed by ORIGEN2 and the other code results decreased to zero (or below the IBM machine word size) at 10,000 years. The branching fractions for the α decay plus spontaneous fission of ^{244}Pu are 0.9999 in the ORIGEN2 library, and the remaining 10^{-4} is treated as β decay. This small amount feeding ^{244}Am and finally ^{244}Cm incorrectly caused the very small ^{244}Cm content. (The amounts are below the minor content test.)

6.2. VARIATIONS IN EXPOSURE CASES

The depletion models from which cross sections are derived from the ORIGEN2, ORIGEN-S, and CINDER-2 are similar in that they all use a lattice of unit cells in at least part of the calculation. In regard to most multidimensional effects within the core, substantial differences in techniques are used in their simulation. It may be concluded from the descriptions of each of these models that there are good features in the methods used by each code. Since the simulation of all aspects of the depletion analysis cannot be perfect, there are also reasons why results from the codes can vary.

An explanation of why results from the three codes differ for each particular nuclide computed during depletion requires a careful study of various contributing factors. Also, precisely quantifying the effects of the different reasons would require a more complex analysis program than that used for these comparisons. A more simplified qualitative analysis is attempted in order to partially reconcile the additional nuclide differences in the exposure cases. Most of the significantly different methods applied in computing cross sections for the three codes are discussed below (with no meaning attached to the order):

1. Different cross-section data are used as sources to the computational models of each code. The data sources[6] for ORIGEN2 were ENDF/B-IV,[11] the Livermore Laboratory LENDL library,[12] and Savannah River Laboratory data.[13] The data source for CINDER-2 was ENDF/B-V.[11] For ORIGEN-S the data source of fission products was ENDF/B-V and that of actinides and light elements was ENDF/B-IV. For nuclides of lesser importance the ORIGEN library was a data source for ORIGEN2 and ORIGEN-S. Also, the input library, ENDF/B, does not model thermal reactors well unless an empirical adjustment is made. Savannah River Laboratory has supplied ORNL with such a factor and it is used in ORIGEN2's version of ENDF/B. Such changes result in lower values in ORIGEN2's prediction for the plutonium radionuclides.

2. The geometry description and material content of the fuel, clad, moderator and structure (spacers) were taken from the specific problems described in Sect. 3 for ORIGEN-S and CINDER-2, whereas for ORIGEN2 the data for typical PWR and BWR reactors were used in producing the PWR and BWR libraries, respectively.

3. The EPRI-CELL/CINDER-2 model allows for two fractional contributions of nonuniform lattice Dancoff calculations in the resonance self-shielding cross-section calculation. A uniform lattice Dancoff factor of the fuel pin geometry was used by ORIGEN-S. A uniform Dancoff factor of the fuel pin geometry was used only for the inner rods of the assembly in producing the ORIGEN2 libraries. The space between assemblies was used in computing the Dancoff factors for the pins on the edge of the assembly. The additional space between assemblies is significantly large for the BWR and small for the PWR. In ORIGEN2, water holes in the guide tubes of PWR control rod assemblies were not accounted for in the calculation of Dancoff factors. In analyzing the significance of the Dancoff factor by computing PWR cases by SAS2, it was determined that a decrease in the Dancoff factor by 20% caused the ^{239}Pu discharged to increase by 3.5%.

4. Flux from adjacent core zones of different ^{235}U enrichment and burnup were accounted for in ORIGEN2. In order to produce this effect, the flux was forced to be flat and have the same spectrum over the three or four zones by using the small plate model, which is effectively a zero-dimensional model. EPRI-CELL and SAS2(H) do not include this process. It is not easy to quantify the effects from this process.

5. The EPRI-CELL/CINDER-2 model used four separate space points radially or regions within the fuel of the pin for four separate depletion calculations, followed by the final combination of the four compositions. This process was not included in the ORIGEN-S or ORIGEN2 models. EPRI-CELL cases, applying both one and four depletion regions, have been computed in order to better evaluate the significance of using four separate depletion calculations. Comparisons for the PWR were performed at LANL. Cases for comparing the BWR type of fuel pin, using a BWR type of unit cell in a uniformly spaced lattice, were computed at ORNL. In both comparisons, the comparable differences did not exceed 0.5% for concentrations of ^{234}U, ^{235}U, ^{236}U, ^{238}U, ^{239}Pu, ^{240}Pu, ^{241}Pu, and ^{242}Pu.

6. The extra moderator, burnable poison, and structural materials are simulated in the ORIGEN2 and EPRI-CELL models as an extra region surrounding the unit pin-cell. In the SAS2(H) model, the extra moderator, guide tubes, and burnable poison rods, if present, are simulated more exactly. First, in this process, the infinite lattice of the unit pin-cell is computed (with no extra region) and the cell-weighted cross sections are saved. Then, a second transport calculation is performed as an infinite lattice of an expanded cell representing the volume in and around each burnable poison rod or guide tube and "water hole" in the assembly. For example, in control rod assemblies, the water hole and guide tube are placed at the center of the cell, surrounded by a fuel cell region having the size which conserves the ratio of fuel cell volume to water hole volume of the assembly. The fuel cell region has the cell-averaged densities and cell-weighted cross sections of the unit pin-cell. In the BWR, a fuel rod containing gadolinium poison is at the center, the unit cell material is next, and the outer region is composed of the higher-density moderator from the channel between assemblies (approximately half the water mass).

7. In the BWR cases, no gadolinium was used in the ORIGEN2 and EPRI-CELL/CINDER-2 models. Separate volume-power weighting techniques were used by each of the three models to simulate the moderator density of the BWR cases.

8. EPRI-CELL applies the GAM and THERMOS codes and Bondarenko factors produced from the NJOY code, while the resonance treatment and transport calculations for ORIGEN2 and SAS2H were performed by the NITAWL and XSDRNPM codes. Even though these codes have similarities, the differences could affect results.

The differences in the nuclide contents for ^{239}Pu, ^{235}U, and ^{244}Cm can be caused by the above variations in the depletion models of the three codes. There appears to be a marked increase in these differences in the BWR cases, which could be due to increased significance of some of the methods and assumptions of the three cross-section production procedures. There was an important difference in the models used in the BWR cases, which required a calculation of an assembly containing gadolinium poison. Since gadolinium could not be used by the EPRI-CELL/CINDER-2 calculation, it was omitted. The ORIGEN2 library was also produced using a simulation of boron. For the ORIGEN-S case, the gadolinium pins were described precisely, using the predetermined ^{155}Gd and ^{157}Gd letdown curves (i.e., the pronounced depletion in their densities during exposure).

The agreements for ^{242}Am and ^{243}Cm are very poor, due primarily to the difference between the ORIGEN-S results and that from the other codes. This situation is due to the fact that the cross sections for these nuclides were not updated by SAS2(H) for ORIGEN-S, because the data in ENDF/B-IV were incomplete.

Fair agreement was reached between the results of most of the other actinides. The larger differences starting at 300 years are due to reasons given in the discussion of the decay-only case.

As noted above, it appears that all of the more important fission products (from the standpoint of sources and decay heats) were in good agreement, particularly in the PWR cases, except those differences illustrated in the decay-only case. The three fission products with greatest disagreement were ^{125}Sb, ^{126}Sn, and ^{148}Sm. The main reason the ORIGEN-S result for ^{125}Sb and ^{148}Sm differs is because the large ^{124}Sb and ^{147}Sm cross sections were not updated in the library production process for the cases. The reason for the large differences in results (17% from the average) for ^{126}Sn was due to substantially different fission fraction yields for nuclides in the decay chain producing ^{126}Sn. While, in general, there is not much difference in the effect of using ENDF/B-IV fission yields in ORIGEN-S, this is one case where the difference can be seen. The decay heat from ^{126}Sn contributes a maximum of 5% to the fission-product decay heat (at 10,000 years) but <0.01% of the total decay heat at all times.

In the BWR cases, the differences in code results for important fission products were substantially larger for ^{134}Cs, ^{154}Eu and ^{155}Eu. These nuclides, and several that are considered to be less important nuclides, are highly dependent on cross sections that would tend to have increased variations between codes for the BWR cases.

7. CONCLUSIONS AND RECOMMENDATIONS

The objectives of this study were to assess the predictive capabilities and features of three source-term codes that will be of use to DOE/OCRWM. This goal was accomplished through a series of comparisons of their output for several LWR reactor models at nine decay times. The benchmark computations were designed to test the data-base libraries and methodologies used by each of the codes in predicting the radionuclide content and decay heat of generic LWR spent fuel, specifically irradiated UO_2.

This report summarizes the comparisons in results for individual nuclides in various units and the actinide, fission product, and total decay heat rates. A supplementary report[14] presents comparisons of total photon and neutron emission rates, photon and neutron spectra, and photon and neutron dose rates from a typical rail shipping cask.

The number of radionuclides that DOE/OCRWM needs to have well characterized is a small set of those available in the three codes compared in this study. Kelmers et al.[15] have assessed radionuclide generation and depletion codes as to their capabilities in addressing the requirements associated with the transportation, storage, and geologic disposal of HLW. In their report, they identified certain specific radionuclides that are important in the calculation of gamma dose (shielding), decay heat, criticality, and long-term disposal. Of the 36 radionuclides identified in their report and listed in Table 11, 24 were examined in this three-code comparison study. Three of the isotopes (^{14}C, ^{59}Ni, and ^{60}Co) are long-lived activation products and were not considered because this examination was limited to irradiated UO_2 containing no impurities. Other radionuclides (^{106}Rh, ^{144}Pr, and ^{230}Th) were not included in the output from CINDER-2; therefore, they were not included in this report. Most of the remaining radionuclides are minor contributors to each of the categories and were deleted from the comparison list. Additionally, only one radionuclide of three parent-daughter pairs (^{106}Ru – ^{106}Rh, ^{137}Cs – ^{137m}Ba, and ^{144}Ce – ^{144}Pr) were included because comparison of one isotope in each pair should be sufficient to verify the other member. Note that several of the isotopes appear in more than one category.

7.1. FISSION PRODUCTS

The major contributors to decay heat and radiation hazards for transportation and storage of spent fuel and other HLW are the short-lived fission products. Among the three codes, excellent agreement (within 5%) was obtained for ^{85}Kr, ^{90}Sr, and its daughter ^{90}Y. Greater variability was noted among the codes when comparing the predictions for the remaining five fission products listed in Table 11 for which comparisons were made. Figure 9 is a set of pie charts illustrating the cumulative percentage agreement among the three codes for the computed composition (in gram-atoms) for each of these five fission product nuclides. The five values given for each pie chart represent the ratio, expressed as a percentage, of the number of comparisons that are within the indicated percentage agreement (as given in the legend in Fig. 9 and tabulated in Table 9) to the total number (405) of comparisons for each radionuclide. This number was derived from the product of the three-pair comparisons (ORGEN2 vs ORIGEN-S, ORIGEN2 vs CINDER-2, and ORIGENS vs CINDER-2) times the nine decay periods times the five cases times the three types of information (composition, radioactivity, and decay heat). For example, 54% of the ^{154}Eu comparison pairs agree to within 5%, 5% within 5 to 10%, 36% within 10 to 20%, 5% within 20 to 30%, and there are no pairs with an agreement worse than 30%. The ranges are the same as those given in Table 9, except they were converted to absolute values. Nearly identical results are obtained if the radioactivity (curies) or decay heat (watts) are substituted for composition (gram-atoms). Of the five radionuclides given in Fig. 9, ^{125}Sb, and ^{147}Pm yield the poorest agreement.

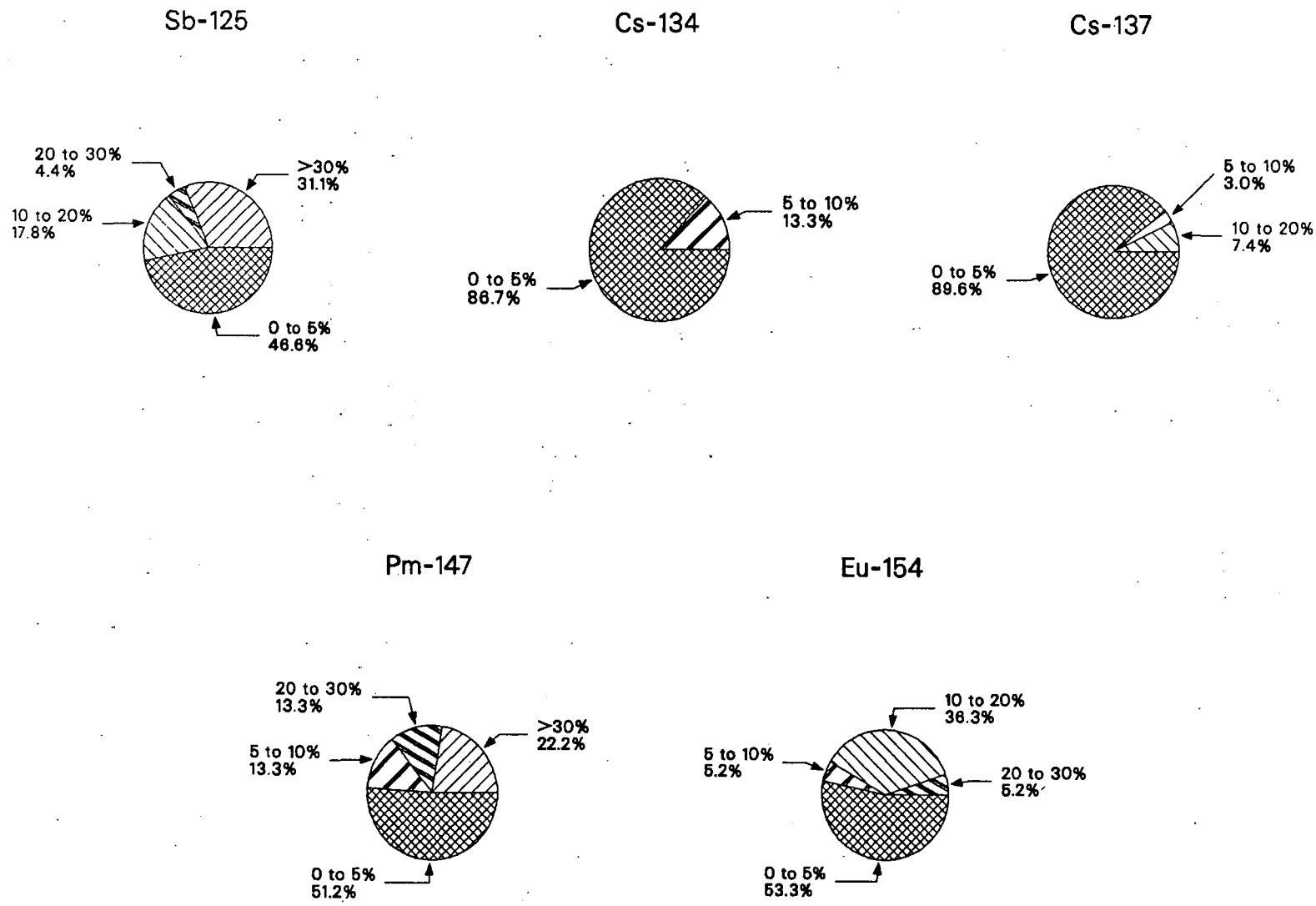

Fig. 9. Measure of agreement among the three codes, taken two at a time, when predicting the composition of selected fission products.

Table 11. Significant radionuclides[a] in the specified categories of a Federal Waste Management System[14]

Decay heat and gamma dose	Criticality	Long-term disposal
^{90}Y	^{239}Pu	^{241}Am
^{134}Cs	^{238}U	^{240}Pu
^{137m}Ba	^{235}U	^{239}Pu
^{106}Rh	^{240}Pu	^{243}Am
^{238}Pu	^{241}Pu	^{234}U
^{244}Cm	^{241}Am	^{242}Pu
^{137}Cs	^{149}Sm	^{239}Np
^{144}Pr	^{155}Gd	^{14}C
^{154}Eu	^{103}Rh	^{237}Np
^{90}Sr	^{143}Nd	^{238}Pu
^{60}Co	^{236}U	^{59}Ni
^{241}Am	^{131}Xe	^{238}U
^{240}Pu	^{133}Cs	^{230}Th
^{147}Pm	^{151}Sm	
^{85}Kr		
^{125}Sb		

[a]Radionuclides are given in descending order of importance in each category.

Source:
A. D. Kelmers, A. G. Croff, L. B. Shappert, J. W. Roddy, O. W. Hermann, and C. V. Parks, *Identification and Evaluation of Preliminary Selection or Short-Listing of Radionuclide Generation/Depletion Codes for Enhancement and Utilization in Activities Associated With the Transportation, Storage, and Geologic Disposal of High-Level Radioactive Wastes,* ORNL/TM-10404, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab. (to be published).

A proper criticality analysis of high-level radioactive wastes such as LWR spent fuel requires knowledge of the concentration of the neutron absorbers. Although minor contributors, several fission products absorb neutrons. Four of those listed in Table 11 were included in this study. Excellent agreement was obtained for ^{133}Cs, moderately good agreement for ^{143}Nd, and fair agreement for ^{149}Sm and ^{151}Sm.

7.2. ACTINIDES

These radionuclides exhibit a significant impact on each of the categories listed in Table 11. The pie charts given in Figs. 10 and 11 show that there is a significant disparity in the results predicted by the three codes. Two of the actinides, ^{238}Pu and ^{244}Cm, contribute a measurable amount to the decay heat of spent fuel at 5 years following discharge, and the agreement among the codes for these radionuclides, in many of the comparisons, is less satisfactory than the comparative agreement desired.

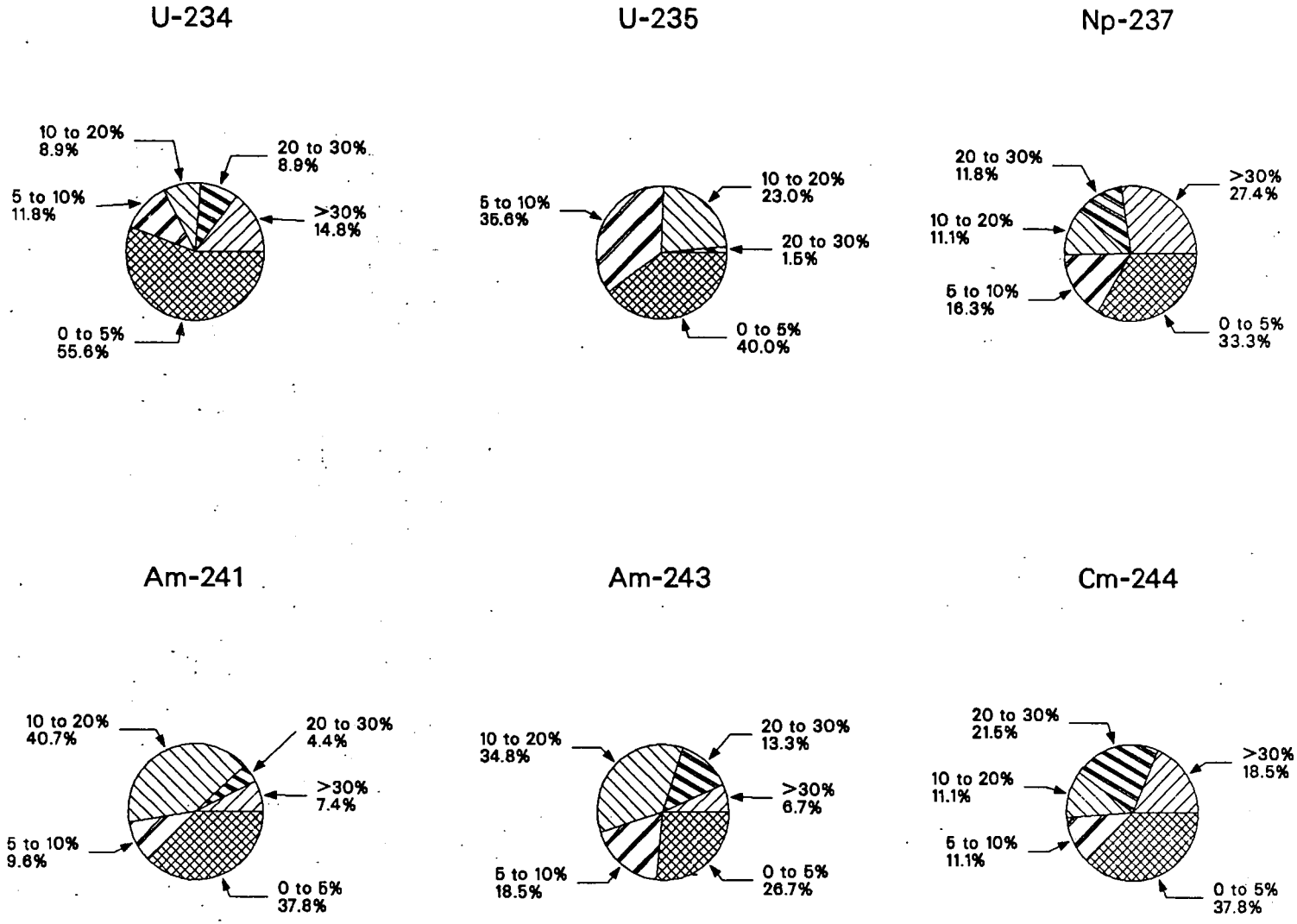

Fig. 10. Measure of agreement among the three codes, taken two at a time, when predicting the composition of selected actinides.

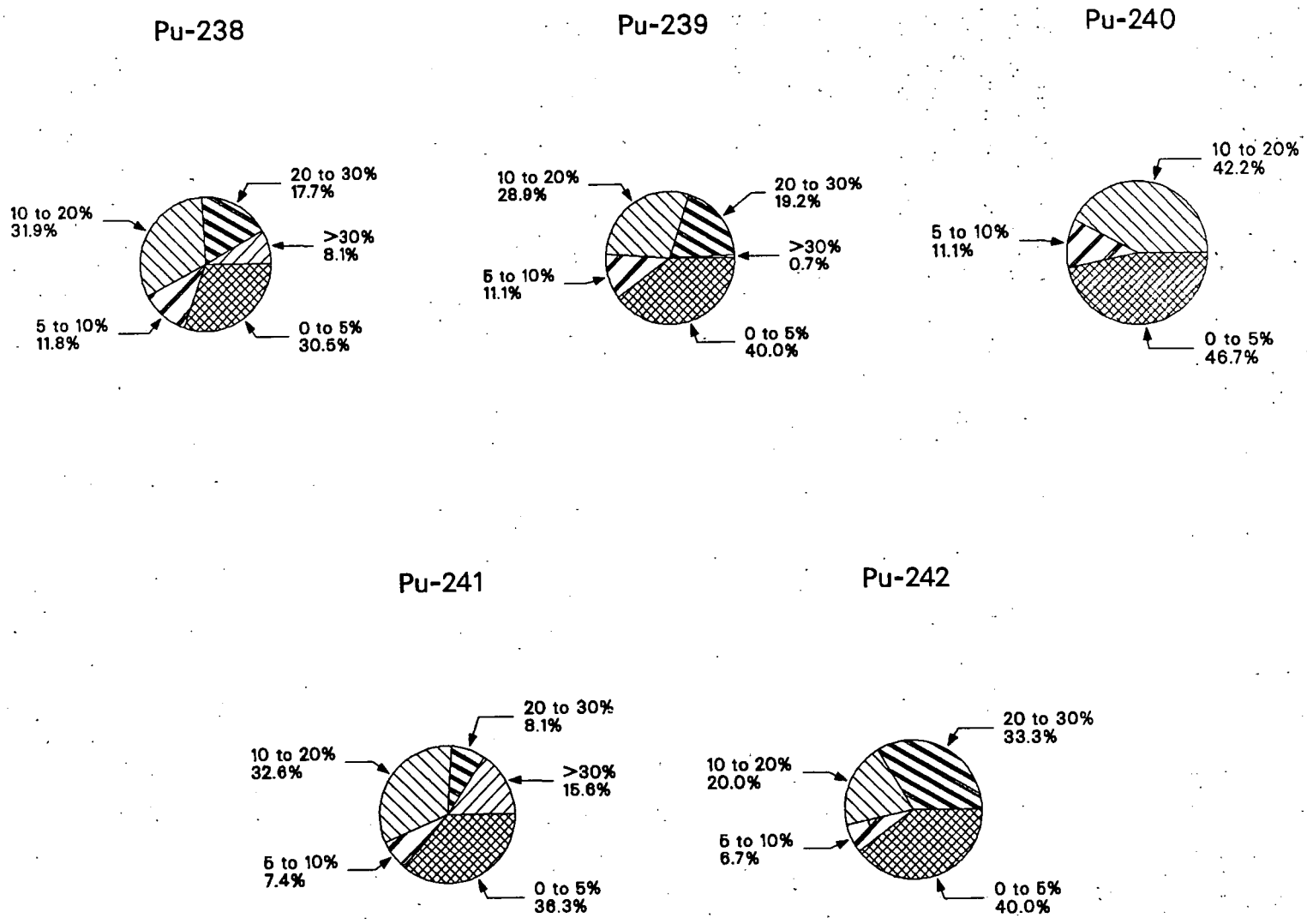

Fig. 11. Measure of agreement among the three codes, taken two at a time, when predicting the composition of the plutonium radionuclides.

Most of the radionuclides important in the assessment of criticality and in the long-term disposal of high-level radioactive wastes are actinides. As expected, all three codes agree to within 1% for the ^{238}U concentration in all cases and decay times. Somewhat greater than half of the comparisons fall within the 5% range for ^{234}U, but 15% of the comparisons disagree by more than 30%. The plutonium isotopes exhibit a much greater range of variability in their comparison statistics (Fig. 11). Because these radionuclides appear near the top of the list in each category in Table 11, an accurate prediction of their concentration is important.

7.3. SUMMARY

Benchmarking of computer codes has proven useful in verifying their data bases and methodologies. However, the true worth of a code is not determined until it has been through a complete validation effort. This test requires the availability of suitable experimental data for detailed comparisons. Specific output quantities of importance are used as indicators for determining whether a code provides satisfactory agreement with experimental results. These indicators can serve to measure a code's level of validation. Although some data are available in the literature, it is insufficient to be used to validate any of the three codes examined in this study.

This benchmarking study has demonstrated that the predictions by the three computer codes of the radionuclide content and the resulting decay heat of irradiated UO_2 show a wide disparity in many of the radionuclides that are of importance in the Federal Waste Management System (FWMS) for DOE/OCRWM. The differences among the codes are the result of differences in the various data base libraries each of the codes are using and not in their methodology.

7.4. RECOMMENDATIONS

This comparison study indicates the need to resolve the disparity in radionuclide production predicted by ORIGEN2, ORIGEN-S, and CINDER-2. Resolution is obtained only by validation against experimental data. The comparison study has also pointed out the different analysis features provided by the three codes. Prior to (or in conjunction with) validation, it is recommended that one code be enhanced to provide desirable attributes found in the individual codes. This code system should have the interfacing capability for performing shielding and criticality analyses for each component of the FWMS and the versatility to be expanded to meet the additional needs of DOE/OCRWM. Major features should include the following:

a. user-friendly, free-form input, requiring both minimal data specifications and convenient choices of data defaults;

b. "execution time" variable dimensioning;

c. generic reactor cross-section libraries, easily accessible;

d. alternative-conditions libraries, produced readily either by a single case separately or by a companion module during the job execution, for parameters different from that of the generic reactors.

e. Production of total photon source spectra and neutron source spectra in any energy group structure for use in subsequent shielding analysis. As part of the validations of shipping cask analyses, it is necessary to compare dose rates computed from one group structure with those computed from significantly more groups. At present, there are features in ORIGEN-S (and SAS2) for supplying photon or neutron group structures as user input (or from the cross-section library specified). For CINDER-2 spectra, the computations are performed by a separate code. The photon spectra are computed in a single built-in energy group structure in ORIGEN2. Even though the total neutron emission rate for spontaneous fission plus (α,n) reactions are computed by ORIGEN2, there is no feature for calculating neutron spectra. Thus, it is recommended that these features should be included in the final source code that is developed. A companion report to compare the relative performance of the photon and neutron source spectra predicted by the point depletion codes in a typical shipping cask analysis has been published.[14]

f. Calculations of (α,n) contributions to neutron spectra for material other than UO_2, such as borosilicate glass. The borosilicate (α,n) source is much more important than that from UO_2. (It has been computed[16] to be 0.7 times the spontaneous fission source.) Also, (α,n) emission rates and spectral data have recently been measured for almost all important light elements. A stopping power model has also been developed for computing the (α,n) source of mixtures.[2,16]

Once assembled, the source-term module must be validated against well-characterized extended-burnup LWR spent fuel, the material expected to comprise the major inventory of a geologic repository. Each of the outputs, radionuclide composition, decay heat, neutron production, and photon generation, must be compared with experimental data. All nonfuel components must also be examined and compared. The data-base libraries must be checked and evaluated to use the most acceptable decay constants, Q-values, and branching fractions.

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8. O. W. Hermann, "SAS2: A Coupled One-Dimensional Depletion and Shielding Analysis Module," as described in Sect. S2 of *SCALE: A Modular Code System for Performing Standardized Computer Analyses for Licensing Evaluation,* NUREG/CR-0200, Vol. 2, U.S. Nuclear Regulatory Commission (originally issued July 1980, reissued January 1982, Rev. 1 issued July 1982, Rev. 2 issued June 1983, Rev. 3 issued December 1984).

9. T. R. England, *CINDER - A One-Point Depletion and Fission Product Program,* WAPD-TM-334, Westinghouse Electric Corp. (1962, Rev. 1964).

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11. Evaluated Nuclear Data File, Versons IV and V (ENDF/B-IV, -V), available from and maintained by the National Nuclear Data Center (NNDC) at the Brookhaven Natl. Lab.

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13. R. W. Benjamin, F. J. McCrosson, and P. L. Roggenkamp, *Conversion of* ^{238}Pu *and* ^{252}Cf *Production Chain Cross-Section Data to ENDF/B-IV Format,* EPRI-NP-161 (December 1975).

14. M. C. Brady, O. W. Hermann, and W. B. Wilson, *Comparison of Radiation Spectra from Selected Source-Term Computer Codes,* ORNL/CSD/TM-259, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab. (1989).

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APPENDIX A

SUMMARY DESCRIPTIONS OF ORIGEN2, ORIGEN-S, AND CINDER-2

ORIGEN2

CODE IDENTIFICATION:

ORIGEN2, developed by:
Chemical Technology Division
Oak Ridge National Laboratory,
Martin Marietta Energy Systems, Inc.,
Oak Ridge, Tennessee

SUMMARY:

Using a point depletion analysis for various (generic) reactor types, the ORIGEN2 code calculates time-dependent concentrations of a large number of nuclides and their associated photon spectra and total neutron emission rates. The applicable reactor types include the PWR, the BWR, the LMFBR, the FFTF, and the CANDU, with specific types of fuel, such as typically enriched ^{235}U, plutonium, uranium-plutonium mixtures, ^{233}U enriched thorium and ^{235}U enriched for extended burnup. Reactor core models, applying transport and diffusion neutronics theory, have been used in producing data for the reactor and fuel types.

MAIN PREDICTED VARIABLES:

Spent fuel concentrations of a large number of nuclides and their associated decay heat rates and photon spectra and neutron emission rates at specified irradiation and cooling times.

OTHER PREDICTED VARIABLES:

Other concentration units: g-atoms, grams, curies, total watts, toxicity (air and water), total gamma emission rates in photons/s or MeV/watt-s, and (α,n) reaction and spontaneous fission neutron emission rates. Also, continuous feed or removal rates may be used, and the amounts following fractional reprocessing separations may be computed.

EQUATION SOLVED:

The main equation used in ORIGEN2 is the following matrix equation:

$$\underline{N}(t) = \underline{N}(o)e^{At} ,$$

where

$\underline{N}$ = the vector of N_i atom concentrations,

A = the transition matrix of rate constants a_{ij} for producing N_i from N_j,

t = time.

As a supplement, when $a_{ij}t$ is excessive, a computation by the Bateman equation is used.

FEATURES AND LIMITATIONS:

- Photon sources are produced only in the energy group structure of the FCXSEC cross-section library. Neutron emission rates are predicted as total neutron sources, but not distributed into a source spectrum.
- Nuclides in ORIGEN2 transition libraries:
  700 activation products (clad and light elements)
  132 actinides
  880 fission products
- Nuclides in ORNL Master Photon Data Base (γ-line, x-ray, Bremsstrahlung, etc.): 427
- Number of reactor-type/fuel-type libraries: 14
- The code may be compiled for smaller size transition libraries, also.
- Burnup-dependent cross sections are included within each reactor and fuel-type ORIGEN2 library. No provision has been made for reactor problems where either the burnup exceeds the library maximum, or the fuel composition or lattice geometry (e.g., the unit cell) does not correspond to one of the specified reactor designs. However, new reactor physics analyses may be performed to produce such libraries.

ANALYTICAL METHOD:

Analytical method common to both ORIGEN-S and ORIGEN2: The generation and depletion of nuclides is evaluated by solving the nuclide rate of change balance equations,

$$\dot{N}_i = \sum_{j=1}^{M} a_{ij} N_j \ , \text{ for M nuclides} ,$$

where

$\dot{N}_i = dN_i(t)/dt$, the rate of change of N_i,
a_{ij} = the transition rate constant for producing N_i from N_j.

Or, casting the balance equations in matrix notation,

$$\dot{N}(t) = A\underline{N}(t) \ ,$$

where

$\underline{N}$ = the vector of elements N_i

A = the matrix of elements a_{ij}.

The solution to this equation is applied,

$$\underline{N}(t) = \underline{N}(o)e^{At} \ .$$

First, the exponential is expanded into the series notation,

$$\underline{N}(t) = \left[1 + At + \frac{(At)^2}{2!} + \frac{(At)^3}{3!} + \cdots\right]\underline{N}(o) \ .$$

Then, after multiplying each term by $\underline{N}(o)$, it is seen that there is a common recursion relation between successive terms. Let the nth term be defined by $\underline{C}^n$, where $\underline{C}^o = \underline{N}(o)$. Then, each term is computed by:

$$\underline{C}^{n+1} = A\underline{C}^n \; t/(n+1) \; .$$

The sum of all terms is the final vector $\underline{N}(t)$,

$$\underline{N}(t) = \sum_{n=0}^{k} \underline{C}^n \; ,$$

where k is derived internally to limit errors from roundoff to 0.1%. Also, k may be input (in ORIGEN-S) for special cases.

Excessive word roundoff error on an IBM/360 computer occurs (>0.1%) if $a_{ij}t > 6.9$. This situation happens when the half-life is about 10% of the time interval. In such cases, the element a_{ij}, its row and column, are removed from A, and an adjusted A is applied. Then, $N_i(t)$ and the production of other nuclides from the ith nuclide are computed by the widely used Bateman equations.

In addition to nuclide output in various units, ORIGEN2 computes photon spectra for the activation produces the actinides and the fission products using a built-in energy group structure. Bremsstrahlung may be included for either a UO_2 or H_2O medium or may be excluded from the spectra. Both spontaneous fission and (α,n) reaction neutron intensities may be computed for the actinides.

OTHER APPROPRIATE USES:

1. Predicting nuclide concentrations of discharged fuel for typical reactor designs and operating conditions of various current reactor types.
2. Projecting the composition and characteristics of radioactive waste.
3. Determining fuel material compositions in reprocessing, separation or waste treatment plants.
4. Predicting decay heat of spent fuel for storage facilities, reprocessing plants, and waste repositories.
5. Calculating the radionuclide source composition terms of a specified process or facility for risk assessments, using given released element fractions.

FUTURE DEVELOPMENT:

New extended burnup and other (typical) reactor libraries are being produced, applying multidimensional reactor physics analyses (using GPRCYCLE code system at ORNL). ORIGEN2 has been implemented on an IBM PC. Documentation and final testing is required prior to dissemination through RSIC.

LANGUAGE:

FORTRAN IV (IBM version distributed by RSIC)
FORTRAN 77 (version for VAX)

INPUT DATA LIBRARIES:

Reactor (fuel)-type ORIGEN2 libraries
ORIGEN2 decay library
ORNL master photon data base

FORM OF OUTPUT:

Printed output from ORIGEN2, which may be plotted by ORMANG.

GRAPHIC OUTPUT:

Using the ORMANG code (not publicly distributed) concentrations in 22 different units (including 10 fractional units) may be plotted against time (8 different units) for principal contributing nuclides or elements.

COMPUTERS AND OPERATING SYSTEM USED:

IBM 360/370
IBM PC
CDC 7600
VAX 11/780
PRIME 400

CORE AND DISK REQUIREMENTS:

175 to 576 kilobytes (KB), range of core size, depending on libraries used. Requires unit nos. 7, 12, 13, 15, and 16 when optional output (of various types) is requested. Usually these data sets have a small size.

TYPICAL RUNNING TIME:

A typical irradiation plus decay case for a total of 22 time steps is about 2.2 CPU min on the IBM 3033, or 6 s/step.

DOCUMENTATION:

- M. J. Bell, *ORIGEN - The ORNL Isotope Generation and Depletion Code,* ORNL-4628, Union Carbide Corp. Nuclear Div., Oak Ridge Natl. Lab., 1973.
- A. G. Croff, *A User's Manual for the ORIGEN2 Computer Code,* ORNL/TM-7175, Union Carbide Corp. Nuclear Div., Oak Ridge Natl. Lab., 1980.
- A. G. Croff, *ORIGEN2 - A Revised and Updated Version of the Oak Ridge Isotope Generation and Depletion Code,* ORNL-5621, Union Carbide Corp. Nuclear Div., Oak Ridge Natl. Lab., 1981.
- A. G. Croff, M. A. Bjerke, G. W. Morrison, and L. M. Petrie, *Revised Uranium-Plutonium Cycle PWR and BWR Models for the ORIGEN Computer Code,* ORNL/TM-6051, Union Carbide Corp. Nuclear Div., Oak Ridge Natl. Lab., 1978.

- A. G. Croff and M. A. Bjerke, *Alternative Fuel Cycle PWR Models for the ORIGEN Computer Code,* ORNL/TM-7005, Union Carbide Corp. Nuclear Div., Oak Ridge Natl. Lab., 1980.
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- A. G. Croff and M. A. Bjerke, *CANDU Models for the ORIGEN Computer Code,* ORNL/TM-7177, Union Carbide Corp. Nuclear Div., Oak Ridge Natl. Lab., 1980.
- A. G. Croff, J. W. McAdoo, and M. A. Bjerke, *LMFBR Models for the ORIGEN2 Computer Code,* ORNL/TM-7176, Union Carbide Corp. Nuclear Div., Oak Ridge Natl. Lab., 1981.
- A. G. Croff and M. A. Bjerke, *An ORIGEN2 Model and Results for the Clinch River Breeder Reactor,* NUREG/CR-2762, U.S. Nuclear Regulatory Commission, 1982.
- C. W. Forsberg, C. W. Alexander, G. W. Morrison, and O. W. Hermann, *Integrated Data Base Program: An Overview of Data Handling and Projection Modeling,* ORNL/NFW-83/08, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab., 1983.
- Allen G. Croff, "ORIGEN2: A Versatile Computer Code for Calculating the Nuclide Compositions and Characteristics of Nuclear Materials," *Nucl. Technol.* **62**, 335 (1983).
- W. E. Ford, III, et al., *FCXSEC: Multigroup Cross-Section Libraries for Nuclear Fuel Cycle Shielding Calculations,* ORNL/TM-7038, Union Carbide Corp. Nuclear Div., Oak Ridge Natl. Lab., May 1980.

PROGRAM AVAILABILITY

The ORIGEN2 code and associated libraries are packaged by RSIC as CCC-371. Requests for the ORIGEN2 code and libraries can be mailed to:

Radiation Shielding Information Center
Oak Ridge National Laboratory
P. O. Box 2008
Oak Ridge, TN 37831

or telephoned to:

615/574-6176 or to FTS 624-6176.

SAS2(H)/ORIGEN-S

CODE IDENTIFICATION:

SAS2(H)/ORIGEN-S, developed by:
Nuclear Engineering Applications Department
Computing and Telecommunications Division
Oak Ridge National Laboratory
Martin Marietta Energy Systems, Inc.
Oak Ridge, Tennessee

SUMMARY:

ORIGEN-S performs point depletion and decay analyses to obtain isotopic concentrations, decay heat source terms, and radiation source spectra and strengths for use in subsequent system analyses. ORIGEN-S is an updated version of the original ORIGEN code with flexible dimensioning and free-form input processing. The main transition model in ORIGEN-S is essentially that developed for the original ORIGEN code. One of the primary objectives in developing ORIGEN-S was that the calculations be able to utilize multi-energy-group neutron flux and cross sections in any group structure. Utilization of the multigroup data is automated via the COUPLE code.

The ORIGEN-S code computes time-dependent photon and neutron source spectra in any requested energy group structure. These spectra are determined from the point depletion and decay calculation of concentrations of a large number of nuclides and their energy-dependent emission rate data for photons and both (α,n) reaction and spontaneous fission neutrons.

ORIGEN-S may be run stand-alone or as one of the six codes applied in the execution of the SAS2 control module within the SCALE computational system. The SAS2 control module consists of two analytic sequences called SAS2 and SAS2H which allow different models for the assembly lattice. The control module calls SCALE functional modules in the proper sequence to: (1) process resonance cross sections (BONAMI-S, NITAWL-S), (2) compute the neutron flux spectrum in an infinite lattice representation of a fuel assembly and collapse a multigroup set of cross sections to three groups (XSDRNPM-S), (3) update an ORIGEN-S nuclear data library using the collapsed cross sections and modify THERM, RES, and FAST based on the burnup-dependent flux (COUPLE), and (4) perform a depletion calculation using the updated nuclear data (ORIGEN-S). It can repeat steps 1 through 4 as many times as requested during simulation of the operating history of a fuel assembly. A flow diagram of the SAS2 sequence is provided in Fig. A.1. The shielding analysis portion of the sequence will not be discussed here. The sequence can be easily halted after the depletion analysis is performed and later restarted to perform a shielding analysis.

MAIN PREDICTED VARIABLES:

ORIGEN-S: Spent fuel densities of numerous individual nuclides and their associated decay heat rates and photon and neutron source spectra at specified irradiation and cooling times.

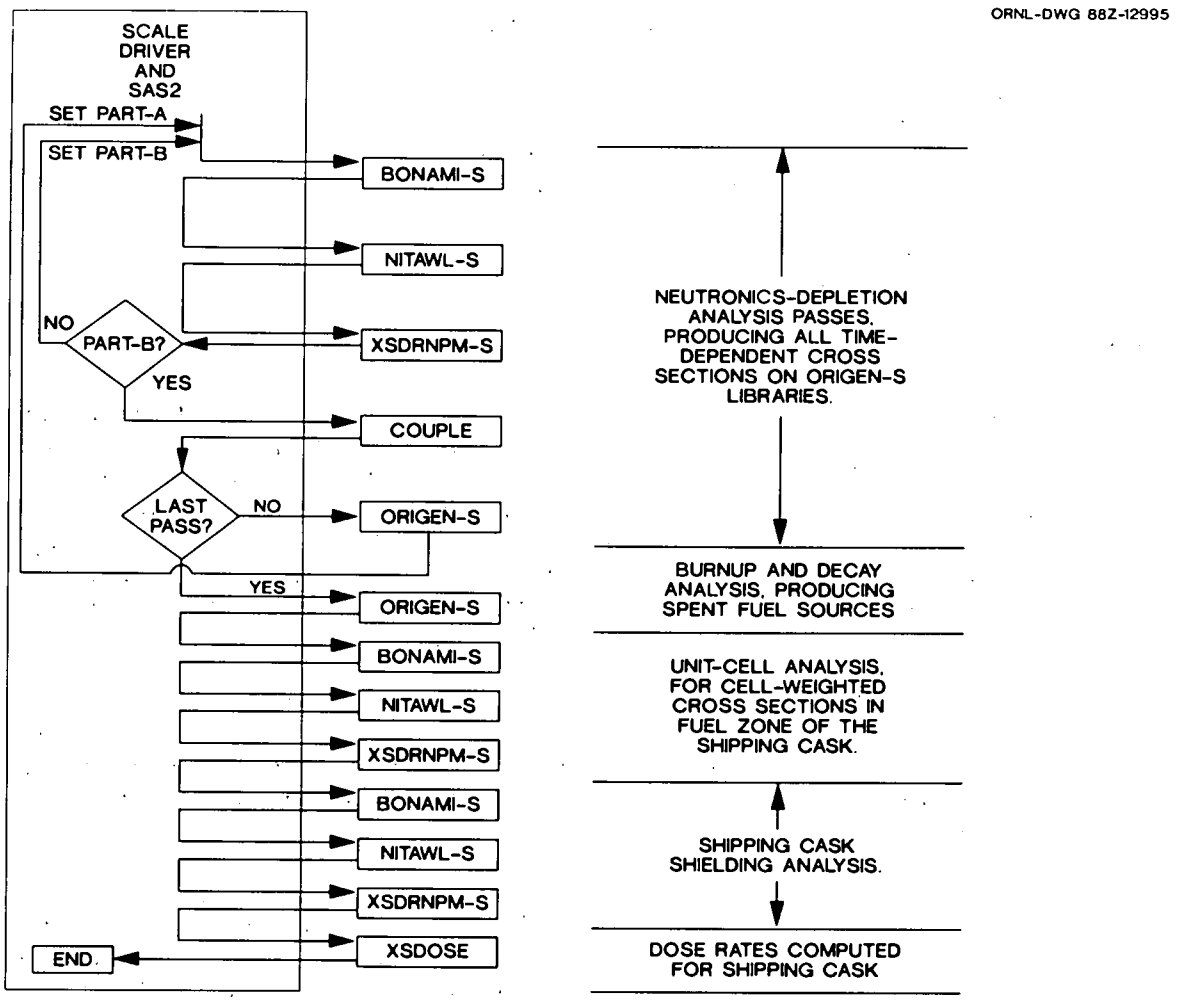

Fig. A.1. Computation flow path invoked by SAS2 module.

OTHER PREDICTED VARIABLES:

SAS2(H): Burnup-dependent values for k_∞, neutron flux spectra and cross sections.

ORIGEN-S: For nuclides, elements and/or totals: g-atoms, grams, curies, gamma watts, total watts, fractional neutron absorption rates, toxicity (air and water), total gamma emission rates in photons/s and MeV/W-s, and (α,n) reaction and spontaneous fission total neutron emission rates. Also, continuous feed and removal rates may be used, and the amounts following fractional reprocessing separations may be computed.

EQUATION SOLVED:

SAS2(H): Effective burnup-dependent cross sections of significant nuclides are calculated together with the lattice-cell flux spectrum via a one-dimensional solution to the Boltzmann transport equation. The Nordheim Integral Treatment and Bondarenko Factor Method are available to account for resonance self-shielding.

ORIGEN-S: Primarily, the following matrix equation is applied:

$$\underline{N}(t) = \underline{N}(o)e^{At} ,$$

where

$\underline{N}$ = the vector of N_i atom concentrations,
A = the transition matrix of rate constants a_{ij} for producing N_i from N_j,
t = time.

As a supplement, when $a_{ij}t$ is excessive, a computation by the Bateman equations is used.

FEATURES AND LIMITATIONS:

- The SAS2(H) control module is designed to provide burnup-dependent cross-section libraries and flux spectral data based on an infinite lattice-cell model of a fuel assembly. However, the nuclear data used by ORIGEN-S are not restricted to that produced and updated by SAS2.
- The fission product yield data in the ORIGEN-S libraries are currently ENDF/B-IV.
- The COUPLE program is available to easily update any nuclear data value on an ORIGEN-S binary library.
- Depletion energy groups: Flexible dimensioning permits any size to the gamma and neutron energy groups of the input libraries. The multigroup neutron libraries, issued with SCALE, are easily selected by keywords.
- Nuclides (or elements/mixtures) in cross-section libraries: 249
- Nuclides in ORIGEN-S transition libraries:
  687 clad (light element), 101 actinides, 821 fission products
- Nuclides in ORNL Master Photon Data Base (γ-line, x-ray, Bremsstrahlung, etc.): 427

Other than computer time and cost, in general there are no other size limitations. The number of time-dependent (burnup-dependent) libraries should probably be limited to 12 to 18, with 3 to 6 recommended.

ANALYTICAL METHOD:

SAS2(H): The sets of codes, BONAMI-S, NITAWL-S, and XSDRNPM-S, are repeatedly invoked by the driver at the request of SAS2. These codes produce a one-dimensional, discrete-ordinates solution to the Boltzmann neutron transport equation, weighting cross sections for the fuel region of the unit cell describing the reactor fuel rods. SAS2 uses these codes to produce libraries input to ORIGEN-S, which in turn depletes and generates isotopes to their densities at the time required in the neutronics calculation producing the next library. Once the reactor irradiation period is completed, ORIGEN-S calculates the decay of the fuel, clad, and other light elements to a given cooling time and computes the gamma-ray and neutron energy spectra. (See this topic under ORIGEN2 for analytical method common to ORIGEN-S and ORIGEN2.)

In addition to nuclide output in various units, ORIGEN-S computes both gamma-ray spectra and neutron spectra produced from spontaneous fission and (α-n) reactions. The photon spectra may include the total from all nuclides or may be broken into light elements, actinides, and fission products. Either the built-in energy group structure for photon spectra may be used or it may be input by the user. The neutron energy group structure may be input or taken from a specified SCALE library. The nuclide (α,n) reaction intensities and total neutron spectrum may be computed for the UO_2 medium. The in-house version of ORIGEN-S (not yet publicly distributed) allows the (α,n) spectrum to be computed for borosilicate glass, or for almost any medium.

OTHER APPROPRIATE USES:

1. Predicting nuclide concentrations of discharged fuel for typical reactor designs and operating conditions of various current reactor types.
2. Predicting nuclide concentrations of discharged fuel, where the design and operating conditions are significantly different from that of the generic or typical reactor or where a completely new reactor design is being evaluated.
3. Projecting the composition and characteristics of radioactive wastes.
4. Determining fuel material compositions in reprocessing, separation, or waste treatment plants.
5. Predicting and tabulating tables of decay heat of spent fuel for storage facilities, reprocessing plants, and waste repositories.
6. Computing either instantaneous or time integrals of fission product activity or energy per fission of a given fissionable isotope.
7. Calculating the radionuclide source composition, terms of a specified process, or facility for risk assessments, using given released element fractions.
8. Determining, by SAS2(H), the criticality burnup credit of fuel in terms of both the significant nuclide densities and the multiplication constant, k_∞, as a function of initial enrichment, burnup, and cooling time.

FUTURE DEVELOPMENT:

Significant enhancements have recently been made to the SAS2 and ORIGEN-S programs available in-house at ORNL. These enhancements are described briefly below. Plans call for these developments to be implemented and documented as part of the distributed code package in the near future. Easy-to-use input specifications also need to be formed for SAS2H.

SAS2H Control Module: Even though SAS2 accounts for the basic fuel-rod lattice of the reactor fuel element, SAS2H extends the model to include both fuel pins and other types of pins or regions within the assembly. The other types may be burnable poison pins or guide-tube-water "holes" contained in control rod assemblies.

The general procedure applied by SAS2, with one major exception, is used in SAS2H. The difference is in the production of the burnup-dependent libraries. There are two parts to the cross-section calculation in place of the one done by SAS2. First, the unit cell describing the fuel rods, as for SAS2, is used by the neutronics codes. Then, a second (larger) unit cell is set up as a guide-tube-water "hole" region surrounded by the fuel region in the volumetric fuel-to-hole region ratio equaling the ratio of fuel rods to control rods in the assembly. The cell-averaged densities and cell-weighted cross sections of the first computation are used in the fuel region of the final calculation. Also, the same method is used with a corresponding change in the cell description for burnable poison, oriface, or any other type of assembly. This method accounts for all of the water moderator and other materials that could not be included as properly in the SAS2 method. The remaining decay and shielding analysis is identical to that used in SAS2.

ORIGEN-S: The (α,n) source of neutrons from high-level radioactive waste can significantly increase when the waste contains large quantities of light element target materials (besides ^{17}O or ^{18}O) for the high-energy alphas. The in-house version of ORIGEN-S at ORNL has been updated to compute neutron intensities for (α,n) reactions on the light elements, Li through Si, inclusive. The effect of the weighted stopping powers of alpha particles by all elements is computed as a function of nuclide concentrations. This enhancement is very important for waste vitrified in mediums such as borosilicate glass.

HOW PROGRAMS ARE COUPLED:

As a control module in the SCALE system of codes, SAS2(H) invokes the following codes: BONAMI-S, NITAWL-S, XSDRNPM-S, COUPLE, ORIGEN-S, and XSDOSE.

LANGUAGE:

FORTRAN 77 for SAS2/ORIGEN-S (SCALE-4 version)
FORTRAN IV (SCALE-3 version)

INPUT DATA LIBRARIES:

SAS2(H):
- SCALE master cross-section libraries
- ORIGEN-S nuclear data binary libraries
- ORNL master photon data base

ORIGEN-S:
- ORIGEN-S nuclear data card image and binary libraries
- ORNL master photon data base

FORM OF OUTPUT:

Printed output only from these codes. However, output saved in a binary data set may be plotted with PLORIGEN.

GRAPHIC OUTPUT:

Using the PLORIGEN code, concentrations in 14 different units may be plotted against time (6 different units) for selected or principal contributing nuclides or elements. Case comparisons may be plotted. Also, the gamma-ray or neutron spectra may be plotted.

COMPUTERS AND OPERATING SYSTEM USED:

IBM 360/370
CRAY X-MP
IBM PC/370, ORIGEN-S, only
FACON (in Japan)
VAX, ORIGEN-S, only

CORE AND DISK REQUIREMENTS:

Both the core size and number and size of data sets are problem-dependent. The I/O requirements for SAS2 may be seen in the document on each code. A summary of the disk space required for SAS2 is given in the SAS2 document.

SAS2(H): 600 to 1000 KB, range of core size
ORIGEN-S: 250 to 500 KB, core size dependent on libraries, time steps, etc., used. Requires unit Nos. 11 and 13 (small sizes) as scratch units and unit No. 71 (small size) to save results.

TYPICAL RUNNING TIME:

SAS2/SAS2H (IBM 3033 CPU time):
Can vary greatly with cases and options such as resonances treated, convergence criteria, total energy groups, mesh intervals, and number of irradiation cycles. Note that the number of irradiation passes through the set of codes in SAS2 equals the number of cycles plus one. The range of typical CPU times per irradiation pass is 2.5 to 3.5 min. About 1 min per irradiation pass is added for SAS2H. IBM(3033)/CRAY X-MP time ratio is in 2.5 to 3.5 range.

ORIGEN-S:
Uses 1.5 to 2 CPU (IBM 3033) seconds/time-step average (dependent on output units requested).

DOCUMENTATION:

- O. W. Hermann, "SAS2: A Coupled One-Dimensional Depletion and Shielding Analysis Module," as described in Sect. S2 of *SCALE: A Modular Code System for Performing Standardized Computer Analyses for Licensing Evaluation, Vols. 1-3*, NUREG/CR-0200, U.S. Nuclear Regulatory Commission (originally issued July 1980, reissued January 1982, Rev. 1 issued July 1982, Rev. 2 issued June 1983, Rev. 3 issued December 1984).

- O. W. Hermann and R. M. Westfall, "ORIGEN-S: SCALE System Module to Calculate Fuel Depletion, Actinide Transmutation, Fission Product Buildup and Decay, and Associated Radiation Source Terms," as described in Sect. F6 of *SCALE: A Modular Code System for Performing Standardized Computer Analyses for Licensing Evaluation, Vols. 1-3*, NUREG/CR-0200, U.S. Nuclear Regulatory Commission (originally issued July 1980, reissued January 1982, Rev. 1 issued July 1982, Rev. 2 issued June 1983, Rev. 3 issued December 1984).
- J. C. Ryman, "ORIGEN-S Data Libraries," as described in Sect. M6 of *SCALE: A Modular Code System for Performing Standardized Computer Analyses for Licensing Evaluation, Vols. 1-3*, NUREG/CR-0200, U.S. Nuclear Regulatory Commission (originally issued July 1980, reissued January 1982, Rev. 1 issued July 1982, Rev. 2 issued June 1983, Rev. 3 issued December 1984).
- C. V. Parks, O. W. Hermann, and J. R. Knight, *Parametric Study of Radiation Dose Rates from Rail and Truck Spent Fuel Transport Casks,* ORNL/CSD/TM-227, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab., 1985.
- O. W. Hermann and C. W. Alexander, "Spent Fuel Photon and Neutron Spectra," *Trans. Am. Nucl. Soc.* **44**, 474 (1983).
- O. W. Hermann and C. W. Alexander, *A Review of Spent Fuel Photon and Neutron Source Spectra,* ORNL/CSD/TM-205, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab., 1986.
- M. J. Bell, *ORIGEN - The ORNL Isotope Generation and Depletion Code,* ORNL-4628, Union Carbide Corp. Nuclear Div., Oak Ridge Natl. Lab., 1973.
- O. W. Hermann, "PLORIGEN: A Plotting Program for ORIGEN-S Output, to be published as Sect. F15 of *SCALE: A Modular Code System for Performing Standardized Computer Analyses for Licensing Evaluation, Vols. 1-3*, NUREG/CR-0200, U.S. Nuclear Regulatory Commission (originally issued July 1980, reissued January 1982, Rev. 1 issued July 1982, Rev. 2 issued June 1983, Rev. 3 issued December 1984).
- J. C. Ryman et al., *Fuel Inventory and Afterheat Power Studies of Uranium-Fueled Pressurized Water Reactor Fuel Assemblies Using the SAS2 and ORIGEN-S Modules of SCALE with an ENDF/B-V Updated Cross-Section Library*, NUREG/CRF-2397 (ORNL/CSD-90), Union Carbide Corp. Nuclear Div., Oak Ridge Natl. Lab., June 1982.

PROGRAM AVAILABILITY:

Requests for the CCC-466/SCALE-3 code package containing SAS2, ORIGEN-S, and needed libraries can be mailed to:

Radiation Shielding Information Center
Oak Ridge National Laboratory
P. O. Box 2008
Oak Ridge, TN 37831

or telephoned to:

615/574-6176 or to FTS 624-6176.

EPRI-CELL/CINDER-2

CODE IDENTIFICATION:

CINDER-2, developed by:
Theoretical Division
Los Alamos National Laboratory
University of California
Los Alamos, New Mexico

EPRI-CELL, developed by:
Nuclear Associates International Corp.
Rockville, Maryland
Sponsored by:
Electric Power Research Institute
Palo Alto, California

SUMMARY:

The EPRI-CELL code is a cell-depletion neutron transport code producing the cross sections and flux used by CINDER-2. It performs a neutron spectrum calculation using a THERMOS code-type space-energy-dependent solution to the integral transport equation at thermal energies. In the epithermal range, the integral slowing down theory of the GAM-1 code is used, deriving resonance cross sections from tables of groupwise resonance shielding factors for each isotope produced by the NJOY code. Depletion is computed with a CINDER code-type model using four radial space points within the fuel rod in the thermal depletion.

The CINDER-2 code computes, for any specified initial fuel composition and flux or power history and decay time, the fuel and fission product isotopic contents and associated properties. CINDER-2, or associated utility codes, produce results in moles, curies, and watts for nuclides, and total material characterized by decay heat in watts, photon source spectra, and neutron source spectra.

The CINDER-2 code is one of the code versions developed, through various stages of improvement, from the original CINDER code written by T. R. England while associated with Westinghouse Electric Corporation. Other CINDER versions are the EPRI-CINDER, CINDER3, CINDER7, and CINDER10 codes. Even though these code versions primarily use the same model, their main differences concern: the use of ENDF/B-IV or -V cross-section data; energy group structures available to the code and cross-section collapsing capabilities; number of nuclides applied; the ENDF source of fission product yield data; and procedures or codes with which they are interfaced (e.g., DANDE and EPRI-CELL which produce burnup-dependent cross-section libraries).

PREDICTED VARIABLES

1. For each nuclide: moles, number densities, activities, barns/fission per energy group, and macroscopic absorption cross sections per energy group.

2. Totals are predicted for: fission, fissions per nuclide in power, thermal flux-time product, flux levels per energy group, barns/fission per energy group, macroscopic absorption cross sections per energy group, effective cross section, resonance integral, infinite multiplication constant (k_∞), reactivity, beta energy release rate, gamma line energy release rate, beta plus gamma line energy release rates, MeV/fission and total radiation activity.

EQUATION SOLVED

The CINDER codes use the Bateman equation solution of the rate of change balance equations for each chain of nuclides coupled through the decay or neutron transmutation processes. The explicit equations are given in the Analytical Method section.

FEATURES AND LIMITATIONS

The primary purpose of EPRI-CELL/CINDER-2 and the other versions of CINDER is to perform a cell depletion analysis during the irradiation period of the reactor and extending to various cooling times. Spent fuel characteristics as isotopic number densities and even activities and energy release rates may be computed by CINDER codes, but the total photon and neutron spectra cannot be directly computed. The SPEC5 code or other codes may be applied to compute individual nuclide spectra from ENDF/B-V photon energy-intensity data (using interval sizes of 0.01 and 0.05 MeV). In order to complete the shielding analysis photon spectrum, the user may manually calculate or write coding to compute the combination of CINDER nuclide densities and SPEC5 spectra, account for significant bremsstrahlung from UO_2, and add gamma rays from spontaneous fission or (α,n) reactions as needed. The neutron spectrum may also be produced from CINDER nuclide densities, neutron emission rate yields and spontaneous fission and (α,n) reaction neutron spectra data available to the user.

Another limitation is that light-element libraries are not available. Thus, potential radiation sources arising from activation of light elements (^{59}Co) must be evaluated in some alternate fashion.

Array dimensions in EPRI-CINDER require the following limits:

525 nuclides total
40 actinides
450 fission product chains
17 nuclides per chain
75 time steps
5 yield sets applied to 7 fissionable nuclides
3 time-dependent g-factors
4 neutron energy groups
3 energy groups per decay

ANALYTICAL METHOD[3]

In terms of a few-energy-group structure, the concentration of the ith nuclide in a linear chain is determined by the following coupled differential equations:

$$\frac{dN_i}{dt} = \sum_k y_i^k S^k + \alpha_{i-1}\gamma_{i-1}N_{i-1} - (\lambda_i + A_i^a)N_i , \tag{1}$$

$$i = 1, 2, 3, \ldots$$

where

y_i^k = yield fraction/fission from fissionable nuclide k,

S^k = fission rate of k_{th} fissionable nuclide,

λ_i = decay constant, for i^{th} nuclide,

$A_i^a = \sum_{j=1}^{4} g_i^j \sigma_{a_i}^j \phi^j$ = neutron absorption rate per unit nuclide density,

$\sigma_{a_i}^j$ = total absorption cross section of the ith nuclide in the energy group j.

g_i^j = shielding factor of the ith nuclide in the energy group j.

A_{i-1}^c = capture rate, $A^c = A^a - A^f$, where A^f is the fission rate analogous to A^a. In lieu of branching fractions, fictitious fission cross sections may be specified for the fission products in order to achieve the correct activation cross sections leading to more than one daughter isomer.

γ_{i-1} = either λ_{i-1} or $A_{i-1}^{a,c}$ depending on coupling from precursor i-1.

α_{i-1} = fraction of specified coupling directly feeding nuclide i (the branching fraction in radioactive decay); this is used for λ_{i-1} and A_{i-1}^a but not normally for A_{i-1}^c.

This set of equations can describe equally well the nuclides in the depletion chains (in which case y = 0) and in the fission-product chains.

The general solution of Eq. 1 for the nth nuclide in a chain, assuming constant flux and fission rate during time increment Δt, is

$$N_n(t+\Delta t) = \sum_{m=1}^{n} \frac{1}{\alpha_n\gamma_n} \prod_{k=m}^{n} \alpha_k\gamma_k \left\{ \overline{y_m S} \left[\frac{1}{\prod_{\ell=m}^{n} (\lambda_\ell + A_\ell^a)} - \sum_{j=m}^{n} \frac{\exp[-(\lambda_j + A_j^a)]\Delta t}{(\lambda_j + A_j^a) \prod_{i=m}^{n} (\lambda_i + A_i^a - \lambda_j - A_j^a)} \right] + N_m(t) \left(\sum_{j=m}^{n} \frac{\exp[-(\lambda_j + A_j^a)]\Delta t}{\sum_{\substack{i=m \\ \neq j}}^{n} (\lambda_i + A_i^a - \lambda_j - A_j^a)} \right) \right\} . \tag{2}$$

Here, $y_m S$ = average fission yield rate of nuclide m from all fissionable nuclides.

The CINDER-2 code is based on this general solution that can be written in other forms more suitable for computation. N_n is actually a partial concentration of the nth nuclide. If any nuclide has more than one source, there will be a concentration resulting from each source; these are added by the code, as specified by the user, in all aggregate summations. In Eq. 2, if two nuclides happen to have identical removal rates, $\lambda + A^a$, the equation indicates a division by zero. In the actual coding, this presents no problem and the same nuclide can, in fact, appear more than once in any chain.

Equation 2 could be coded for any number of neutron groups. In the present version of the code, up to four groups are permitted. Users requiring more groups for any other libraries can collapse to a four-group structure and unfold the results using N_n. There are other equations and methods associated with the above analytical method. Isotopic number densities may be converted to energy release rates and activity densities. Also, various explicit neutronics variables (e.g., k_∞) and cross sections are computed and may be printed. Also, by applying both neutron emission rate values and available spectral data to the CINDER actinide densities, the user can then determine neutron spectra. These sources may be used in a cask shielding analysis.

APPROPRIATE USES

1. Predicting isotopic densities of discharged fuel for typical reactor designs (e.g., LWR) and operating conditions.
2. Determining the composition and characteristics of radioactive wastes.
3. Predicting decay heat of spent fuel for storage facilities, reprocessing plants, and waste repositories.
4. Computing energy per fission of a given fissionable isotope.
5. Calculating the radionuclide source composition terms of a specified process or facility for risk assessment, before released element fractions applied.
6. Determining neutron multiplication constants (k_∞ and, possibly, k_{eff}), aggregate cross sections, and other neutronics variables.
7. Applying fission product decay gamma spectra in calculation of photoneutron spectra from $D(\gamma,n)$ reactions in the moderator of PWR fuel.

HOW PROGRAMS ARE COUPLED

CINDER-2:

CINDER-2 can be interfaced with the EPRI-CELL cell-depletion code. The EPRI-CELL results provide the neutron flux spectra and actinide cross sections as a function of burnup.

OTHER CINDER VERSIONS:

The DANDE code system controls three computation modules: the data processing module or the TRANSX code; the core neutronics module using the DIF3D, TWODANT, and TWOHEX codes; and the depletion module or CINDER3 code. CINDER3 and EPRI-CINDER can also be interfaced with EPRI-CELL.

LANGUAGE

FORTRAN IV

INPUT DATA LIBRARIES

Included with CINDER-2 are both an 84-chain library and a 12-chain library. Fission product yields are available in either thermal or fast yield sets. The libraries are simply read from the input data stream.

FORM OF OUTPUT

Printed output is the only direct output.

GRAPHIC OUTPUT

Results are commonly input for plots with the MAPPER program.

COMPUTERS USED

EPRI-CELL/CINDER-2: CRAY, IBM, CDC-6600
EPRI-CINDER: CDC-6600
DANDE-CINDER3: CRAY

TYPICAL RUNNING TIMES

Using the 84-chain library on a CDC-6600 CINDER-2 requires about 30 CPU s to compile code and store input data, approximately 2 s per irradiation time step, and about 1 s per decay time step.

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- G. E. Bosler et al., *Production of Actinide Isotopes in Simulated PWR Fuel and Their Influence on Inherent Neutron Emission,* LA-9343, Los Alamos Natl. Lab., University of California, July 1982.

APPENDIX B

DATA FOR DECAY-ONLY CASE

The data to be input by all three codes for the decay-only case were produced by ORIGEN2 and are shown in Table B.1. The first column is used to show the library type for the nuclide data on the same line: a 2 specifies the actinide library, and a 3 indicates a fission product library. This is followed by four pairs of data. The first group of numbers in each pair identifies the radionuclide (first one or two columns give the mass number), its mass (next three columns), and its stability (last column, where 0 represents stable). For example, U-235 is denoted by 922350. Its concentration is 3.3866E+1 gram-atoms.

Table B.1. Data for decay-only case

2	20040	5.6532E-02	812070	6.5145E-18	812080	9.0121E-15	812090	8.3121E-20
2	822060	1.1576E-15	822070	3.7293E-13	822080	1.8910E-09	822090	3.4689E-16
2	822100	1.3524E-13	822110	4.9441E-17	822120	5.2153E-12	822140	1.9740E-18
2	832080	1.2340E-18	832090	3.8773E-13	832101	6.6219E-18	832100	8.3644E-17
2	832110	2.9172E-18	832120	4.9471E-13	832130	7.9850E-17	832140	1.4658E-18
2	842100	1.2056E-15	842110	3.5793E-23	842120	2.6173E-23	842130	1.1980E-25
2	842140	1.4741E-24	842150	4.0624E-23	842160	2.0425E-17	842180	2.2470E-19
2	852170	9.4164E-22	862180	2.7107E-22	862190	9.0378E-20	862200	7.5711E-15
2	862220	4.0569E-16	872210	8.3961E-18	872230	4.6021E-19	882220	2.9431E-19
2	882230	2.2547E-14	882240	4.3057E-11	882250	3.8895E-14	882260	6.1936E-11
2	882280	2.8660E-17	892250	2.5188E-14	892270	1.7518E-11	892280	9.9975E-15
2	902260	1.4406E-17	902270	3.7946E-14	902280	8.1626E-09	902290	1.9360E-09
2	902300	4.9689E-06	902310	6.0042E-09	902320	7.1204E-07	902330	1.5720E-12
2	902340	5.8631E-08	912310	1.1310E-06	912320	4.6835E-09	912330	6.0843E-08
2	912341	2.0057E-12	912340	1.0726E-11	912350	3.4854E-17	922300	1.3918E-14
2	922310	6.8610E-13	922320	1.6796E-06	922330	5.8925E-06	922340	7.6762E-01
2	922350	3.3866E+01	922360	1.6781E+01	922370	4.6861E-02	922380	3.9669E+03
2	922390	2.7659E-03	922400	2.8527E-07	922410	8.4805E-17	932350	1.9255E-08
2	932361	6.3647E-08	932360	1.7502E-06	932370	1.8219E+00	932380	5.9064E-03
2	932390	3.9800E-01	932401	2.7745E-07	932400	9.6065E-06	932410	8.1413E-14
2	942360	5.0380E-06	942370	2.1427E-07	942380	5.3864E-01	942390	2.0665E+01
2	942400	9.6327E+00	942410	5.0735E+00	942420	1.8697E+00	942430	5.7298E-04
2	942440	9.8104E-05	942450	2.4407E-09	942460	2.0164E-11	952390	4.2683E-12
2	952400	3.9428E-09	952410	1.1894E-01	952421	2.5945E-03	952420	4.0661E-04
2	952430	3.5321E-01	952441	1.4400E-05	952440	1.7602E-05	952450	4.7663E-10
2	952460	3.2265E-14	962410	3.8849E-09	962420	4.9619E-02	962430	1.3516E-03
2	962440	9.8458E-02	962450	3.5106E-03	962460	4.1825E-04	962470	3.7239E-06
2	962480	1.8148E-07	962490	2.4086E-12	962500	9.3105E-16	972490	1.6723E-09
2	972500	2.4387E-12	972510	4.0189E-16	982490	1.8863E-10	982500	3.5082E-10
2	982510	1.3348E-10	982520	7.4643E-11	982530	1.2043E-13	982540	5.6019E-15
2	982550	1.5197E-19	992530	8.2802E-14	992541	5.8029E-16	992540	1.2627E-14
2	992550	9.2201E-17	162500	5.5312E-09	0	0.0	0	0.0
3	10030	1.9143E-02	30060	2.9087E-05	30070	1.4455E-06	40090	2.1636E-06
3	40100	1.3000E-05	60140	1.8774E-06	290660	2.1496E-15	300660	5.5096E-10
3	290670	3.2449E-18	300670	2.2695E-11	300680	3.4288E-13	300690	1.0744E-19
3	300691	1.0457E-19	310690	5.0932E-16	310700	1.8289E-22	320700	1.7109E-18
3	310710	1.2466E-08	270720	1.8006E-14	280720	6.8034E-12	290720	3.3198E-11
3	300720	1.0916E-06	310720	3.3212E-07	320720	2.9711E-04	270730	5.4658E-15
3	280730	9.1806E-13	290730	2.8578E-11	300730	2.8433E-10	310730	2.2404E-07
3	320730	6.0930E-04	320731	6.7635E-12	270740	9.8674E-16	280740	9.1147E-13
3	290740	5.4945E-12	300740	2.1504E-09	310740	1.1783E-08	320740	1.3036E-03
3	270750	9.7169E-17	280750	1.0181E-13	290750	7.2199E-12	300750	3.7149E-10
3	310750	5.6803E-09	320750	2.5077E-07	320751	1.1265E-10	330750	2.6671E-03
3	280760	3.9068E-14	290760	1.5510E-12	300760	3.7362E-10	310760	2.8603E-09
3	320760	6.5476E-03	330760	3.0051E-07	340760	7.0752E-05	280770	2.5482E-15
3	290770	9.5134E-13	300770	1.0609E-10	310770	2.4477E-09	320770	3.5039E-06
3	320771	1.0199E-08	330770	3.2895E-05	340770	1.3219E-02	340771	1.1569E-11
3	280780	3.9607E-16	290780	1.3899E-13	300780	1.7806E-10	310780	1.5910E-09
3	320780	2.7483E-06	330780	2.9523E-06	340780	3.1014E-02	290790	5.0234E-14
3	300790	1.8523E-11	310790	1.0540E-09	320790	4.7140E-08	330790	6.9355E-07
3	340790	7.4310E-02	340791	3.0072E-07	350790	1.0561E-06	350791	8.6933E-15
3	360790	1.1794E-14	290800	3.2614E-15	300800	1.2301E-11	310800	6.1170E-10
3	320800	5.0550E-08	330800	4.5543E-08	340800	1.6711E-01	350800	8.5357E-11
3	350801	8.5571E-10	360800	2.8053E-06	290810	1.9725E-16	300810	5.1634E-13
3	310810	1.4884E-10	320810	2.5026E-08	330810	1.3749E-07	340810	5.1404E-06
3	340811	4.2775E-07	350810	2.6760E-01	360810	2.7488E-07	360811	4.5110E-14
3	300820	7.0786E-14	310820	1.2088E-11	320820	9.7413E-09	330820	7.6790E-08
3	330821	1.9959E-08	340820	4.1026E-01	350820	6.3088E-05	350821	7.4847E-08
3	360820	1.1837E-02	300830	4.1057E-15	310830	3.2156E-12	320830	2.8735E-09
3	330830	8.6574E-08	340830	5.4820E-06	340831	4.1890E-07	350830	8.8494E-05
3	360830	4.9334E-01	360831	6.7910E-05	310840	2.8193E-13	320840	5.9349E-10
3	330840	3.0193E-08	340840	3.3290E-06	350840	3.3353E-05	350841	2.4836E-07
3	360840	1.3491E+00	320850	2.8383E-11	330850	6.0931E-09	340850	3.7418E-07
3	340851	1.3552E-07	350850	3.5924E-06	360850	2.8348E-01	360851	3.4153E-04
3	370850	1.1447E+00	320860	5.9471E-12	330860	1.4277E-09	340860	3.0751E-07
3	350860	8.1343E-07	350861	6.6825E-08	360860	2.2075E+00	370860	2.8387E-04
3	370861	1.3066E-09	380860	4.3882E-03	320870	3.9572E-13	330870	2.3094E-10
3	340870	8.4638E-08	350870	1.8798E-06	360870	1.8325E-04	370870	2.8006E+00
3	380870	3.6054E-05	380871	6.0242E-09	320880	1.8292E-14	330880	8.5262E-12
3	340880	8.5370E-09	350880	5.7391E-07	360880	5.7453E-04	370880	6.1117E-05
3	380880	3.9727E+00	330890	9.0419E-13	340890	6.7566E-10	350890	1.0806E-07
3	360890	1.2873E-05	370890	6.6565E-05	380890	3.3838E-01	390890	4.7867E+00
3	390891	8.0477E-13	340900	2.7342E-10	350900	2.4113E-08	360900	2.1590E-06
3	370900	1.0769E-05	370901	4.4018E-06	380900	5.9549E+00	390900	1.5745E-03
3	390901	1.8530E-08	400900	2.0237E-01	400901	3.7915E-16	340910	1.3770E-11
3	350910	3.1752E-09	360910	4.3201E-07	370910	5.1796E-06	380910	3.2903E-03
3	390910	5.1492E-01	390911	1.6660E-04	400910	5.9659E+00	340920	1.0391E-12
3	350920	1.8674E-10	360920	4.5849E-08	370920	3.5155E-07	380920	1.0336E-03
3	390920	1.3567E-03	400920	6.9494E+00	410920	1.0961E-13	350930	2.1873E-11
3	360930	1.1765E-08	370930	3.4793E-07	380930	5.4919E-05	390930	4.5592E-03
3	400930	7.7218E+00	410930	5.1562E-07	410931	4.1707E-06	350940	1.0186E-12
3	360940	6.6874E-10	370940	8.5492E-08	380940	8.7631E-06	390940	1.4647E-04

Table B.1 (continued)

3	400940	7.8820E+00	410940	7.9773E-06	410941	4.2057E-11	350950	8.9626E-14
3	360950	2.2761E-10	370950	5.6530E-09	380950	2.8001E-06	390950	8.7552E-05
3	400950	8.0783E-01	410950	4.4880E-01	410951	3.3013E-04	420950	6.7207E+00
3	350960	3.3961E-15	360960	3.0777E-11	370960	9.6184E-10	380960	2.9874E-07
3	390960	1.8249E-05	400960	8.3246E+00	410960	2.5879E-05	420960	3.4231E-01
3	360970	6.2979E-13	370970	1.5253E-10	380970	7.9168E-09	390970	1.2697E-07
3	400970	8.8884E-03	410970	6.3809E-04	410971	8.3139E-06	420970	8.1455E+00
3	360980	1.0933E-13	370980	2.8141E-11	380980	1.3327E-08	390980	2.4358E-08
3	400980	4.5958E-06	410980	4.2279E-07	410981	4.9210E-06	420980	8.4196E+00
3	430980	6.4203E-05	370990	1.5306E-12	380990	2.4391E-09	390990	3.7183E-08
3	400990	3.5264E-07	410990	2.1924E-06	410991	1.0115E-06	420990	3.8287E-02
3	430990	7.7435E+00	430991	3.0572E-03	440990	3.0551E-05	371000	1.7792E-13
3	381000	9.0012E-10	391000	1.5777E-08	401000	9.5958E-07	411000	2.0568E-07
3	411001	2.0654E-07	421000	9.2962E+00	431000	6.1011E-07	441000	9.5067E-01
3	381010	3.0649E-11	391010	6.6155E-09	401010	2.8479E-07	411010	9.9399E-07
3	421010	1.3370E-04	431010	1.2990E-04	441010	7.6409E+00	381020	4.6696E-12
3	391020	4.6006E-10	401020	1.4042E-06	411020	3.6378E-07	421020	9.7699E-05
3	431020	7.7556E-07	431021	4.7428E-08	441020	7.5478E+00	451020	1.0055E-05
3	381030	5.2611E-14	391030	9.0580E-11	401030	3.2430E-08	411030	1.3319E-06
3	421030	8.6038E-06	431030	7.2868E-06	441030	4.9558E-01	451030	4.0399E+00
3	451031	4.4287E-04	381040	3.0397E-15	391040	3.2620E-12	401040	1.6616E-08
3	411040	4.1317E-08	421040	1.1160E-05	431040	1.3596E-04	441040	5.2085E+00
3	451040	3.7007E-06	451041	1.6495E-06	461040	2.0909E+00	391050	1.9859E-13
3	401050	3.3322E-10	411050	2.5375E-08	421050	4.4950E-06	431050	4.9437E-05
3	441050	1.6745E-03	451050	1.2076E-02	451051	1.3203E-06	461050	3.5597E+00
3	401060	6.5880E-11	411060	1.9957E-09	421060	4.0714E-07	431060	2.7132E-06
3	441060	1.6405E+00	451060	1.7430E-06	451061	2.5870E-05	461060	1.7683E+00
3	471060	3.4931E-14	391070	6.8859E-17	401070	7.5684E-13	411070	3.8453E-10
3	421070	1.0662E-07	431070	1.1844E-06	441070	1.5693E-05	451070	8.1494E-05
3	461070	2.0381E+00	461071	1.4973E-10	471070	1.9624E-07	401080	3.5826E-13
3	411080	2.6002E-11	421080	7.0329E-09	431080	1.2320E-07	441080	1.1642E-05
3	451080	7.3127E-07	451081	1.4491E-07	461080	1.3900E+00	471080	2.6705E-11
3	471081	1.0288E-08	481080	3.6483E-06	401090	8.9635E-15	411090	6.4993E-12
3	421090	1.5120E-09	431090	5.5413E-07	441090	9.2885E-07	451090	2.4891E-06
3	451091	6.9141E-07	461090	1.6057E-03	461091	3.9177E-06	471090	6.9811E-01
3	471091	1.3115E-06	481090	4.3009E-09	411100	3.2227E-13	421100	5.4155E-10
3	431100	2.2181E-09	441100	1.8519E-07	451100	3.6186E-07	451101	2.7132E-09
3	461100	4.4724E-01	471100	3.6454E-07	471101	8.3932E-03	481100	2.9580E-01
3	411110	3.3957E-14	421110	2.2813E-11	431110	1.1318E-09	441110	7.7549E-08
3	451110	4.3301E-07	461110	9.3076E-06	461111	2.1104E-06	471110	4.6029E-03
3	471111	4.5913E-07	481110	2.4345E-01	481111	8.0431E-09	421120	7.3187E-12
3	431120	9.9600E-11	441120	1.4905E-09	451120	1.6049E-08	461120	2.6475E-04
3	471120	4.1366E-05	481120	1.4645E-01	421130	1.4875E-13	431130	3.3849E-11
3	441130	3.1066E-09	451130	2.1362E-09	461130	2.5771E-07	471130	4.9249E-05
3	471131	1.9166E-08	481130	1.3029E-03	481131	2.3074E-03	491130	9.9317E-05
3	491131	2.6543E-15	421140	2.4779E-14	431140	2.8632E-12	441140	2.5179E-09
3	451140	2.2886E-09	461140	2.8067E-07	471140	8.9349E-09	481140	1.9423E-01
3	491140	4.3277E-11	491141	9.8691E-07	501140	8.5738E-06	421150	5.9850E-16
3	431150	7.7325E-13	441150	1.6927E-10	451150	6.0549E-09	461150	7.0119E-08
3	471150	1.6603E-06	471151	9.0684E-09	481150	3.4933E-04	481151	6.6675E-04
3	491150	1.9793E-02	491151	2.8147E-05	501150	2.7268E-03	431160	2.2871E-14
3	441160	7.2678E-11	451160	3.9656E-10	461160	1.9399E-08	471160	1.2460E-07
3	471161	8.0587E-09	481160	7.0207E-02	491160	1.4645E-08	491161	2.6609E-06
3	501160	6.1823E-02	431170	1.2369E-15	441170	2.3662E-12	451170	2.7725E-10
3	461170	6.0847E-09	471170	5.5533E-08	471171	4.0197E-09	481170	9.4171E-06
3	481171	6.6926E-06	491170	2.4540E-06	491171	8.2154E-06	501170	7.0164E-02
3	501171	1.0663E-05	441180	3.1227E-11	451180	1.1688E-10	461180	3.1225E-09
3	471180	3.7202E-09	471181	1.9448E-09	481180	4.6162E-06	491180	7.6511E-09
3	491181	1.7584E-10	501180	7.0428E-02	451190	1.4456E-11	461190	1.2706E-09
3	471190	8.3821E-09	481190	4.3015E-07	481191	1.4643E-07	491190	6.5872E-08
3	491191	1.2362E-06	501190	6.9042E-02	501191	4.7330E-04	441200	3.1106E-15
3	451200	7.8492E-13	461200	1.1782E-09	471200	1.1182E-09	481200	7.6210E-08
3	491200	3.4010E-08	491201	2.3592E-09	501200	7.0315E-02	451210	1.6866E-13
3	461210	6.6974E-11	471210	1.9885E-09	481210	1.8967E-08	491210	3.5338E-08
3	491211	6.2325E-08	501210	1.5246E-04	501211	2.8900E-05	511210	6.7836E-02
3	451220	9.7271E-15	461220	4.1886E-11	471220	4.1006E-11	481220	7.7804E-09
3	491220	1.5247E-08	491221	1.6573E-10	501220	7.6078E-02	511220	4.7426E-05
3	511221	4.4872E-10	521220	4.4113E-03	451230	1.0515E-15	461230	2.3093E-12
3	471230	1.8445E-10	481230	1.1287E-08	491230	7.4960E-09	491231	2.5423E-08
3	501230	3.9180E-03	501231	3.5657E-06	511230	7.8553E-02	521230	4.8448E-05
3	521231	1.3771E-05	461240	7.8132E-13	471240	2.6204E-11	481240	2.0999E-08
3	491240	6.4590E-09	501240	1.0137E-01	511240	6.5428E-04	511241	1.0055E-10
3	521240	2.6354E-03	471250	1.1640E-11	481250	1.4342E-09	491250	3.0346E-09
3	491251	1.1454E-08	501250	1.0727E-03	501251	1.2088E-06	511250	1.1484E-01
3	521250	3.2857E-02	521251	1.3733E-03	461260	6.0032E-15	471260	1.4732E-12
3	481260	2.4631E-09	491260	4.4111E-09	501260	2.1739E-01	511260	1.1571E-04
3	511261	5.5695E-08	521260	5.7912E-03	481270	2.4559E-10	491270	3.4250E-09
3	491271	6.2367E-09	501270	4.9583E-05	501271	7.7587E-07	511270	3.4454E-03
3	521270	3.4536E-04	521271	1.2846E-02	531270	4.2065E-01	541270	1.6617E-08
3	471280	4.0986E-14	481280	1.8272E-10	491280	1.0218E-08	501280	5.3638E-05
3	511280	4.6261E-05	511281	1.0320E-05	521280	8.6132E-01	531280	1.6697E-06
3	541280	2.2906E-02	481290	1.9566E-11	491290	1.8564E-09	501290	4.6130E-06

Table B.1 (continued)

3	501291	1.7075E-06	511290	4.6723E-04	521290	1.2350E-04	521291	1.2875E-02
3	531290	1.3723E+00	541290	1.2339E-04	541291	4.2392E-07	481300	2.6008E-11
3	491300	1.2858E-09	501300	7.1735E-06	511300	2.3592E-05	511301	1.6141E-05
3	521300	2.7231E+00	531300	1.6720E-04	531301	8.3693E-07	541300	9.2704E-02
3	481310	9.4995E-13	491310	2.6388E-10	501310	1.7434E-06	511310	1.0288E-04
3	521310	1.1968E-04	521311	1.4346E-03	531310	6.2813E-02	541310	3.1988E+00
3	541311	1.0420E-03	481320	1.0457E-13	491320	2.6406E-11	501320	5.8258E-07
3	511320	7.3172E-06	511321	7.2833E-06	521320	3.5916E-02	531320	1.0749E-03
3	541320	8.1109E+00	551320	1.5723E-05	561320	1.3877E-05	491330	2.8744E-12
3	501330	6.4039E-09	511330	7.1411E-06	521330	7.9037E-05	521331	2.1180E-04
3	531330	1.3482E-02	531331	5.2105E-08	541330	8.1610E-02	541331	1.0760E-03
3	551330	8.3726E+00	491340	1.1266E-13	501340	5.2506E-10	511340	9.3737E-08
3	511341	8.4530E-08	521340	3.6046E-04	531340	6.2102E-04	531341	4.5296E-06
3	541340	1.0961E+01	541341	4.1779E-10	551340	8.9866E-01	551341	5.1652E-05
3	561340	2.5748E-01	501350	2.0168E-11	511350	7.7973E-09	521350	1.4644E-06
3	531350	4.0137E-03	541350	1.1352E-03	541351	3.3205E-05	551350	2.2169E+00
3	551351	9.8812E-06	561350	1.6240E-03	561351	8.3891E-07	501360	2.5286E-12
3	511360	2.1003E-10	521360	8.3126E-07	531360	6.5983E-06	531361	2.1479E-06
3	541360	1.7217E+01	551360	4.9182E-03	561360	1.2047E-01	561361	2.2053E-10
3	511370	3.8881E-11	521370	3.9356E-08	531370	1.8819E-06	541370	3.6031E-05
3	551370	8.7475E+00	561370	2.4606E-01	561371	1.3415E-06	511380	2.2350E-12
3	521380	4.5668E-09	531380	2.4076E-07	541380	1.2359E-04	551380	3.1293E-04
3	551381	1.3849E-06	561380	9.2345E+00	571380	4.0801E-05	511390	2.1771E-13
3	521390	2.2993E-10	531390	3.9792E-08	541390	4.4543E-06	551390	8.6488E-05
3	561390	7.8779E-04	571390	8.7477E+00	521400	5.0205E-11	531400	3.9505E-09
3	541400	9.8642E-07	551400	8.7977E-06	561400	1.7009E-01	571400	2.3103E-02
3	581400	8.6939E+00	591400	4.8467E-10	521410	7.1598E-13	531410	3.0484E-10
3	541410	4.3775E-08	551410	2.5442E-06	561410	1.5758E-04	571410	2.0445E-03
3	581410	4.1196E-01	591410	7.4980E+00	521420	1.6122E-13	531420	2.2084E-11
3	541420	1.0646E-08	551420	1.0368E-07	561420	8.6997E-05	571420	7.7258E-04
3	581420	7.9287E+00	591420	5.3955E-04	591421	1.4654E-06	601420	1.7931E-01
3	531430	2.4587E-12	541430	4.4617E-10	551430	4.9993E-08	561430	1.6010E-06
3	571430	1.1032E-04	581430	1.5706E-02	591430	1.5253E-01	601430	5.2715E+00
3	531440	8.1181E-14	541440	2.6178E-10	551440	8.8717E-09	561440	9.6597E-07
3	571440	4.6113E-06	581440	2.7430E+00	591440	1.1687E-04	591441	5.7958E-07
3	601440	6.4125E+00	541450	2.6154E-11	551450	1.2248E-09	561450	2.8211E-07
3	571450	2.4347E-06	581450	1.6292E-05	591450	1.9494E-03	601450	4.6340E+00
3	541460	1.7401E-12	551460	6.1062E-11	561460	3.7234E-08	571460	4.5703E-07
3	581460	6.2027E-05	591460	1.0614E-04	601460	4.6889E+00	611460	5.0244E-05
3	621460	3.1197E-05	541470	4.3384E-14	551470	2.9661E-11	561470	8.7388E-09
3	571470	2.6972E-07	581470	3.9562E-06	591470	4.1849E-05	601470	5.5998E-02
3	611470	9.5697E-01	621470	3.6192E-01	551480	6.9548E-13	561480	4.1157E-09
3	571480	1.3239E-08	581480	1.7898E-06	591480	6.4100E-06	601480	2.4974E+00
3	611480	1.1821E-02	611481	9.1920E-03	621480	1.0859E+00	561490	7.3128E-11
3	571490	7.3200E-09	581490	2.3265E-08	591490	4.5259E-06	601490	2.1546E-04
3	611490	1.0704E-02	621490	1.4276E-02	551500	4.0440E-16	561500	1.0753E-11
3	571500	3.2002E-10	581500	1.0892E-08	591500	2.7583E-07	601500	1.1768E+00
3	611500	7.7100E-06	621500	2.0968E+00	631500	1.2819E-09	571510	6.0044E-11
3	581510	3.2802E-09	591510	4.9838E-08	601510	1.3764E-05	611510	1.8915E-03
3	621510	8.8694E-02	631510	5.5562E-05	561520	1.1999E-14	571520	2.1879E-12
3	581520	1.0130E-08	591520	4.6154E-08	601520	8.9335E-06	611520	3.2728E-06
3	611521	1.1285E-07	621520	8.7537E-01	631520	2.0687E-04	631521	3.0195E-07
3	641520	7.0190E-05	571530	3.1955E-13	581530	2.1842E-10	591530	1.3724E-08
3	601530	5.1833E-07	611530	2.8292E-06	621530	7.5169E-03	631530	7.0310E-01
3	641530	8.8315E-05	571540	5.9245E-15	581540	5.2592E-11	591540	5.6123E-10
3	601540	1.6241E-07	611540	8.4061E-07	611541	9.2660E-08	621540	2.4241E-01
3	631540	2.5410E-01	641540	1.5017E-02	581550	1.1928E-12	591550	1.6190E-10
3	601550	4.1266E-08	611550	1.1691E-07	621550	5.0312E-06	631550	9.0373E-02
3	641551	1.7927E-15	641550	4.7690E-04	581560	1.8325E-13	591560	8.1861E-12
3	601560	3.3707E-08	611560	2.3661E-08	621560	8.1597E-05	631560	2.4517E-02
3	641560	3.7627E-01	581570	4.4155E-15	591570	1.6391E-12	601570	6.7288E-10
3	611570	5.9984E-08	621570	7.6935E-07	631570	1.4329E-04	641570	5.3049E-04
3	591580	4.6101E-14	601580	1.9406E-10	611580	1.0975E-09	621580	2.3170E-06
3	631580	2.5913E-06	641580	1.1667E-01	591590	2.1320E-15	601590	3.3687E-12
3	611590	2.7847E-10	621590	6.7512E-08	631590	5.4782E-07	641590	4.2758E-05
3	651590	1.6192E-02	601600	3.7314E-13	611600	1.0668E-11	621600	5.2562E-08
3	631600	1.1745E-08	641600	7.8403E-03	651600	5.6034E-04	661600	1.1511E-03
3	601610	6.7531E-15	611610	1.4683E-12	621610	5.2780E-10	631610	4.1925E-09
3	641610	2.5766E-08	651610	8.2576E-05	661610	2.4951E-03	611620	2.0991E-14
3	621620	1.0111E-10	631620	7.7763E-09	641620	3.1649E-08	651620	2.3412E-08
3	651621	1.2845E-08	661620	2.2671E-03	621630	1.4535E-12	631630	9.8517E-11
3	641630	1.9462E-09	651630	2.6518E-08	661630	1.7685E-03	621640	2.0538E-13
3	631640	2.8422E-12	641640	1.0695E-08	651640	1.8390E-09	661640	2.5920E-04
3	621650	2.7485E-15	631650	5.1462E-13	641650	2.7368E-10	651650	1.4641E-10
3	661650	4.4367E-07	661651	1.7067E-09	671650	8.5912E-04	661660	9.3142E-07
3	671660	1.4615E-06	671661	8.5921E-06	681660	2.7077E-04	681670	1.8184E-05
3	681671	7.7097E-13	681680	4.8302E-05	681690	2.1561E-08	691690	3.0510E-07
3	681700	7.0090E-11	691700	4.9113E-08	691701	2.3655E-21	701700	4.6342E-08
3	681710	9.8657E-16	691710	4.4966E-09	701710	2.3525E-09	681720	2.4458E-18
3	691720	1.8401E-12	701720	1.8120E-10	0	0.0	0	0.0
0		3.30000E+04	3.24089E+14	3.75E+01				

APPENDIX C

COMPARATIVE RATIO TABLES IN GRAM-ATOMS

(See table descriptions in Sect. 4.1)

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU G-ATOMS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	7.431E-02	7.431E-02	7.431E-02	1.000	1.000	1.000	1.00	1.00	1.00	7.431E-02	7.431E-02	7.431E-02	1.000	1.000	1.000	1.00	1.00	1.00
KR 85	2.821E-01	2.821E-01	2.820E-01	1.000	1.000	1.000	1.00	1.00	1.00	2.052E-01	2.052E-01	2.052E-01	1.000	1.000	1.000	1.00	1.00	1.00
SR 89	2.242E-01	2.242E-01	2.242E-01	1.000	1.000	1.000	1.00	1.00	1.00	4.397E-12	4.391E-12	4.398E-12	1.000	0.999	1.001	1.00	1.00	1.00
SR 90	5.943E+00	5.943E+00	5.943E+00	1.000	1.000	1.000	1.00	1.00	1.00	5.287E+00	5.287E+00	5.287E+00	1.000	1.000	1.000	1.00	1.00	1.00
Y 90	1.491E-03	1.490E-03	1.491E-03	1.000	1.000	1.000	1.00	1.00	1.00	1.326E-03	1.326E-03	1.326E-03	1.000	1.000	1.000	1.00	1.00	1.00
Y 91	3.633E-01	3.633E-01	3.632E-01	1.000	1.000	1.000	1.00	1.00	1.00	2.081E-10	2.081E-10	2.083E-10	1.000	1.000	1.001	1.00	1.00	1.00
ZR 93	7.726E+00	7.726E+00	7.726E+00	1.000	1.000	1.000	1.00	1.00	1.00	7.726E+00	7.726E+00	7.726E+00	1.000	1.000	1.000	1.00	1.00	1.00
ZR 95	5.837E-01	5.837E-01	5.840E-01	1.000	1.000	1.000	1.00	1.00	1.00	2.065E-09	2.062E-09	2.142E-09	0.988	0.987	1.025	1.00	0.96	0.96
NB 95	4.150E-01	4.150E-01	4.144E-01	1.000	1.000	0.999	1.00	1.00	1.00	2.519E-09	2.515E-09	2.593E-09	0.991	0.989	1.020	1.00	0.97	0.97
TC 99	7.785E+00	7.785E+00	7.785E+00	1.000	1.000	1.000	1.00	1.00	1.00	7.785E+00	7.785E+00	7.785E+00	1.000	1.000	1.000	1.00	1.00	1.00
RU106	1.550E+00	1.550E+00	1.550E+00	1.000	1.000	1.000	1.00	1.00	1.00	5.270E-02	5.269E-02	5.271E-02	1.000	1.000	1.000	1.00	1.00	1.00
PD107	2.038E+00	2.038E+00	2.038E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.038E+00	2.038E+00	2.038E+00	1.000	1.000	1.000	1.00	1.00	1.00
SN126	2.174E-01	2.174E-01	2.174E-01	1.000	1.000	1.000	1.00	1.00	1.00	2.174E-01	2.174E-01	2.174E-01	1.000	1.000	1.000	1.00	1.00	1.00
SB125	1.134E-01	1.134E-01	1.134E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.317E-02	3.317E-02	3.317E-02	1.000	1.000	1.000	1.00	1.00	1.00
I129	1.379E+00	1.379E+00	1.381E+00	1.000	1.000	1.001	1.00	1.00	1.00	1.386E+00	1.386E+00	1.390E+00	0.999	0.999	1.002	1.00	1.00	1.00
CS133	8.471E+00	8.470E+00	8.467E+00	1.000	1.000	1.000	1.00	1.00	1.00	8.473E+00	8.472E+00	8.469E+00	1.000	1.000	1.000	1.00	1.00	1.00
CS134	8.742E-01	8.742E-01	8.742E-01	1.000	1.000	1.000	1.00	1.00	1.00	1.674E-01	1.674E-01	1.674E-01	1.000	1.000	1.000	1.00	1.00	1.00
CS135	2.222E+00	2.222E+00	2.222E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.222E+00	2.222E+00	2.222E+00	1.000	1.000	1.000	1.00	1.00	1.00
CS137	8.731E+00	8.731E+00	8.731E+00	1.000	1.000	1.000	1.00	1.00	1.00	7.793E+00	7.798E+00	7.798E+00	1.000	1.000	1.000	1.00	1.00	1.00
CE144	2.549E+00	2.550E+00	2.550E+00	1.000	1.000	1.000	1.00	1.00	1.00	3.193E-02	3.195E-02	3.200E-02	0.999	1.000	1.001	1.00	1.00	1.00
ND143	5.405E+00	5.403E+00	5.403E+00	1.000	1.000	1.000	1.00	1.00	1.00	5.442E+00	5.440E+00	5.440E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND144	6.606E+00	6.606E+00	6.606E+00	1.000	1.000	1.000	1.00	1.00	1.00	9.124E+00	9.124E+00	9.123E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND145	4.636E+00	4.636E+00	4.636E+00	1.000	1.000	1.000	1.00	1.00	1.00	4.636E+00	4.636E+00	4.636E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND146	4.689E+00	4.689E+00	4.689E+00	1.000	1.000	1.000	1.00	1.00	1.00	4.689E+00	4.689E+00	4.689E+00	1.000	1.000	1.000	1.00	1.00	1.00
PM147	9.833E-01	9.833E-01	9.832E-01	1.000	1.000	1.000	1.00	1.00	1.00	2.705E-01	2.705E-01	2.705E-01	1.000	1.000	1.000	1.00	1.00	1.00
SM147	3.831E-01	3.831E-01	3.831E-01	1.000	1.000	1.000	1.00	1.00	1.00	1.104E+00	1.104E+00	1.104E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM148	1.101E+00	1.101E+00	1.101E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.107E+00	1.107E+00	1.107E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM149	2.520E-02	2.521E-02	2.498E-02	1.003	1.003	0.994	1.00	1.01	1.01	2.520E-02	2.521E-02	2.498E-02	1.003	1.003	0.994	1.00	1.01	1.01
SM150	2.097E+00	2.097E+00	2.097E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.097E+00	2.097E+00	2.097E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM151	9.054E-02	9.054E-02	9.053E-02	1.000	1.000	1.000	1.00	1.00	1.00	8.718E-02	8.718E-02	8.716E-02	1.000	1.000	1.000	1.00	1.00	1.00
SM152	8.754E-01	8.754E-01	8.754E-01	1.000	1.000	1.000	1.00	1.00	1.00	8.754E-01	8.754E-01	8.754E-01	1.000	1.000	1.000	1.00	1.00	1.00
EU153	7.106E-01	7.106E-01	7.106E-01	1.000	1.000	1.000	1.00	1.00	1.00	7.107E-01	7.107E-01	7.106E-01	1.000	1.000	1.000	1.00	1.00	1.00
EU154	2.524E-01	2.524E-01	2.524E-01	1.000	1.000	1.000	1.00	1.00	1.00	1.698E-01	1.698E-01	1.698E-01	1.000	1.000	1.000	1.00	1.00	1.00
EU155	8.935E-02	8.935E-02	8.934E-02	1.000	1.000	1.000	1.00	1.00	1.00	4.493E-02	4.494E-02	4.493E-02	1.000	1.000	1.000	1.00	1.00	1.00
U234	7.680E-01	7.680E-01	7.680E-01	1.000	1.000	1.000	1.00	1.00	1.00	7.904E-01	7.904E-01	7.902E-01	1.000	1.000	1.000	1.00	1.00	1.00
U235	3.387E+01	3.387E+01	3.387E+01	1.000	1.000	1.000	1.00	1.00	1.00	3.387E+01	3.387E+01	3.387E+01	1.000	1.000	1.000	1.00	1.00	1.00
U236	1.678E+01	1.678E+01	1.678E+01	1.000	1.000	1.000	1.00	1.00	1.00	1.679E+01	1.679E+01	1.678E+01	1.000	1.000	1.000	1.00	1.00	1.00
U238	3.967E+03	3.967E+03	3.967E+03	1.000	1.000	1.000	1.00	1.00	1.00	3.967E+03	3.967E+03	3.967E+03	1.000	1.000	1.000	1.00	1.00	1.00
NP237	1.867E+00	1.867E+00	1.867E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.874E+00	1.874E+00	1.869E+00	1.001	1.001	0.998	1.00	1.00	1.00
PU238	5.502E-01	5.502E-01	5.502E-01	1.000	1.000	1.000	1.00	1.00	1.00	5.717E-01	5.717E-01	5.717E-01	1.000	1.000	1.000	1.00	1.00	1.00
PU239	2.107E+01	2.107E+01	2.107E+01	1.000	1.000	1.000	1.00	1.00	1.00	2.106E+01	2.106E+01	2.106E+01	1.000	1.000	1.000	1.00	1.00	1.00
PU240	9.633E+00	9.633E+00	9.633E+00	1.000	1.000	1.000	1.00	1.00	1.00	9.645E+00	9.645E+00	9.628E+00	1.001	1.001	0.999	1.00	1.00	1.00
PU241	5.053E+00	5.054E+00	5.054E+00	1.000	1.000	1.000	1.00	1.00	1.00	3.988E+00	4.008E+00	4.008E+00	0.997	1.002	1.002	1.00	1.00	1.00
PU242	1.870E+00	1.870E+00	1.870E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.870E+00	1.870E+00	1.870E+00	1.000	1.000	1.000	1.00	1.00	1.00
AM241	1.389E-01	1.385E-01	1.385E-01	1.002	0.999	0.999	1.00	1.00	1.00	1.199E+00	1.179E+00	1.179E+00	1.011	0.994	0.994	1.02	1.02	1.00
AM242	3.102E-08	3.103E-08	3.116E-08	0.998	0.999	1.003	1.00	1.00	1.00	3.034E-08	3.034E-08	3.047E-08	0.999	0.999	1.003	1.00	1.00	1.00
AM243	3.538E-01	3.538E-01	3.538E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.536E-01	3.536E-01	3.536E-01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	4.398E-02	4.398E-02	4.397E-02	1.000	1.000	1.000	1.00	1.00	1.00	2.751E-05	2.751E-05	2.725E-05	1.003	1.003	0.994	1.00	1.01	1.01
CM243	1.349E-03	1.349E-03	1.349E-03	1.000	1.000	1.000	1.00	1.00	1.00	1.197E-03	1.197E-03	1.197E-03	1.000	1.000	1.000	1.00	1.00	1.00
CM244	9.818E-02	9.817E-02	9.818E-02	1.000	1.000	1.000	1.00	1.00	1.00	8.134E-02	8.132E-02	8.134E-02	1.000	1.000	1.000	1.00	1.00	1.00
CM245	3.511E-03	3.511E-03	3.511E-03	1.000	1.000	1.000	1.00	1.00	1.00	3.509E-03	3.509E-03	3.509E-03	1.000	1.000	1.000	1.00	1.00	1.00
CM246	4.182E-04	4.182E-04	4.182E-04	1.000	1.000	1.000	1.00	1.00	1.00	4.179E-04	4.179E-04	4.179E-04	1.000	1.000	1.000	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.02	0.02	0.03	0.0	0.0	0.0				0.09	0.09	0.15	0.1	0.2	0.2
AV-ABS-DEV EXCLUDING LARGEST ONE, %				0.01	0.01	0.01	0.0	0.0	0.0				0.05	0.05	0.09	0.0	0.1	0.1
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.00	0.00	0.01	0.0	0.0	0.0				0.03	0.03	0.05	0.0	0.1	0.1
NUCS EXCLUDED, 1ST/2ND:		AM241	Y 90		SM149 / CE144		CM244		AM242		AM241	SR 89	ZR 95 / PU241		CM244		NB 95	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU G-ATOMS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	7.430E-02	7.430E-02	7.430E-02	1.000	1.000	1.000	1.00	1.00	1.00	7.429E-02	7.429E-02	7.429E-02	1.000	1.000	1.000	1.00	1.00	1.00
KR 85	1.485E-01	1.485E-01	1.485E-01	1.000	1.000	1.000	1.00	1.00	1.00	7.781E-02	7.780E-02	7.780E-02	1.000	1.000	1.000	1.00	1.00	1.00
SR 89	5.707E-23	5.694E-23	5.715E-23	1.000	0.998	1.002	1.00	1.00	1.00	0.0	0.0	9.649E-45	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	4.694E+00	4.693E+00	4.694E+00	1.000	1.000	1.000	1.00	1.00	1.00	3.699E+00	3.699E+00	3.699E+00	1.000	1.000	1.000	1.00	1.00	1.00
Y 90	1.177E-03	1.177E-03	1.177E-03	1.000	1.000	1.000	1.00	1.00	1.00	9.277E-04	9.277E-04	9.277E-04	1.000	1.000	1.000	1.00	1.00	1.00
Y 91	8.354E-20	8.348E-20	8.371E-20	1.000	0.999	1.002	1.00	1.00	1.00	1.346E-38	1.344E-38	1.352E-38	0.999	0.998	1.003	1.00	1.00	0.99
ZR 93	7.726E+00	7.726E+00	7.726E+00	1.000	1.000	1.000	1.00	1.00	1.00	7.726E+00	7.726E+00	7.726E+00	1.000	1.000	1.000	1.00	1.00	1.00
ZR 95	5.279E-18	5.260E-18	5.677E-18	0.977	0.973	1.050	1.00	0.93	0.93	3.449E-35	3.423E-35	3.990E-35	0.953	0.945	1.102	1.01	0.86	0.86
NB 95	6.439E-18	6.416E-18	6.874E-18	0.979	0.976	1.045	1.00	0.94	0.93	4.207E-35	4.175E-35	4.831E-35	0.955	0.948	1.097	1.01	0.87	0.86
TC 99	7.785E+00	7.785E+00	7.785E+00	1.000	1.000	1.000	1.00	1.00	1.00	7.784E+00	7.784E+00	7.784E+00	1.000	1.000	1.000	1.00	1.00	1.00
RU106	1.693E-03	1.693E-03	1.693E-03	1.000	1.000	1.000	1.00	1.00	1.00	1.742E-06	1.746E-06	1.748E-06	0.998	1.000	1.002	1.00	1.00	1.00
PD107	2.038E+00	2.038E+00	2.038E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.038E+00	2.038E+00	2.038E+00	1.000	1.000	1.000	1.00	1.00	1.00
SN126	2.174E-01	2.174E-01	2.174E-01	1.000	1.000	1.000	1.00	1.00	1.00	2.174E-01	2.174E-01	2.174E-01	1.000	1.000	1.000	1.00	1.00	1.00
SB125	9.492E-03	9.492E-03	9.493E-03	1.000	1.000	1.000	1.00	1.00	1.00	7.772E-04	7.772E-04	7.774E-04	1.000	1.000	1.000	1.00	1.00	1.00
I129	1.386E+00	1.386E+00	1.390E+00	0.999	0.999	1.002	1.00	1.00	1.00	1.386E+00	1.386E+00	1.390E+00	0.999	0.999	1.002	1.00	1.00	1.00
CS133	8.473E+00	8.472E+00	8.469E+00	1.000	1.000	1.000	1.00	1.00	1.00	8.473E+00	8.472E+00	8.469E+00	1.000	1.000	1.000	1.00	1.00	1.00
CS134	3.117E-02	3.116E-02	3.116E-02	1.000	1.000	1.000	1.00	1.00	1.00	1.081E-03	1.080E-03	1.081E-03	1.000	0.999	1.000	1.00	1.00	1.00
CS135	2.222E+00	2.222E+00	2.222E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.222E+00	2.222E+00	2.222E+00	1.000	1.000	1.000	1.00	1.00	1.00
CS137	6.943E+00	6.952E+00	6.952E+00	0.999	1.000	1.000	1.00	1.00	1.00	5.511E+00	5.525E+00	5.525E+00	0.998	1.001	1.001	1.00	1.00	1.00
CE144	3.717E-04	3.720E-04	3.734E-04	0.998	0.999	1.003	1.00	1.00	1.00	5.037E-08	5.046E-08	5.082E-08	0.996	0.998	1.005	1.00	0.99	0.99
ND143	5.442E+00	5.440E+00	5.440E+00	1.000	1.000	1.000	1.00	1.00	1.00	5.442E+00	5.440E+00	5.440E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND144	9.155E+00	9.155E+00	9.155E+00	1.000	1.000	1.000	1.00	1.00	1.00	9.156E+00	9.156E+00	9.156E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND145	4.636E+00	4.636E+00	4.636E+00	1.000	1.000	1.000	1.00	1.00	1.00	4.636E+00	4.636E+00	4.636E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND146	4.689E+00	4.689E+00	4.689E+00	1.000	1.000	1.000	1.00	1.00	1.00	4.689E+00	4.689E+00	4.689E+00	1.000	1.000	1.000	1.00	1.00	1.00
PM147	7.218E-02	7.217E-02	7.217E-02	1.000	1.000	1.000	1.00	1.00	1.00	5.140E-03	5.138E-03	5.139E-03	1.000	1.000	1.000	1.00	1.00	1.00
SM147	1.303E+00	1.303E+00	1.303E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.370E+00	1.370E+00	1.370E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM148	1.107E+00	1.107E+00	1.107E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.107E+00	1.107E+00	1.107E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM149	2.520E-02	2.521E-02	2.498E-02	1.003	1.003	0.994	1.00	1.01	1.01	2.520E-02	2.521E-02	2.498E-02	1.003	1.003	0.994	1.00	1.01	1.01
SM150	2.097E+00	2.097E+00	2.097E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.097E+00	2.097E+00	2.097E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM151	8.388E-02	8.388E-02	8.387E-02	1.000	1.000	1.000	1.00	1.00	1.00	7.766E-02	7.766E-02	7.765E-02	1.000	1.000	1.000	1.00	1.00	1.00
SM152	8.754E-01	8.754E-01	8.754E-01	1.000	1.000	1.000	1.00	1.00	1.00	8.755E-01	8.755E-01	8.754E-01	1.000	1.000	1.000	1.00	1.00	1.00
EU153	7.107E-01	7.107E-01	7.106E-01	1.000	1.000	1.000	1.00	1.00	1.00	7.107E-01	7.107E-01	7.106E-01	1.000	1.000	1.000	1.00	1.00	1.00
EU154	1.135E-01	1.135E-01	1.135E-01	1.000	1.000	1.000	1.00	1.00	1.00	5.069E-02	5.069E-02	5.069E-02	1.000	1.000	1.000	1.00	1.00	1.00
EU155	2.234E-02	2.234E-02	2.234E-02	1.000	1.000	1.000	1.00	1.00	1.00	5.521E-03	5.523E-03	5.523E-03	1.000	1.000	1.000	1.00	1.00	1.00
U234	8.125E-01	8.125E-01	8.121E-01	1.000	1.000	1.000	1.00	1.00	1.00	8.543E-01	8.543E-01	8.534E-01	1.000	1.000	0.999	1.00	1.00	1.00
U235	3.387E+01	3.387E+01	3.387E+01	1.000	1.000	1.000	1.00	1.00	1.00	3.388E+01	3.388E+01	3.387E+01	1.000	1.000	1.000	1.00	1.00	1.00
U236	1.679E+01	1.679E+01	1.678E+01	1.000	1.000	1.000	1.00	1.00	1.00	1.680E+01	1.680E+01	1.678E+01	1.000	1.000	0.999	1.00	1.00	1.00
U238	3.967E+03	3.967E+03	3.967E+03	1.000	1.000	1.000	1.00	1.00	1.00	3.967E+03	3.967E+03	3.967E+03	1.000	1.000	1.000	1.00	1.00	1.00
NP237	1.887E+00	1.887E+00	1.869E+00	1.003	1.003	0.994	1.00	1.01	1.01	1.930E+00	1.929E+00	1.869E+00	1.011	1.010	0.979	1.00	1.03	1.03
PU238	5.497E-01	5.497E-01	5.497E-01	1.000	1.000	1.000	1.00	1.00	1.00	5.080E-01	5.080E-01	5.080E-01	1.000	1.000	1.000	1.00	1.00	1.00
PU239	2.106E+01	2.106E+01	2.106E+01	1.000	1.000	1.000	1.00	1.00	1.00	2.105E+01	2.105E+01	2.105E+01	1.000	1.000	1.000	1.00	1.00	1.00
PU240	9.654E+00	9.654E+00	9.623E+00	1.001	1.001	0.998	1.00	1.00	1.00	9.665E+00	9.665E+00	9.612E+00	1.002	1.002	0.996	1.00	1.01	1.01
PU241	3.135E+00	3.166E+00	3.166E+00	0.993	1.003	1.003	0.99	0.99	1.00	1.937E+00	1.976E+00	1.976E+00	0.987	1.007	1.007	0.98	0.98	1.00
PU242	1.870E+00	1.870E+00	1.870E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.870E+00	1.870E+00	1.870E+00	1.000	1.000	1.000	1.00	1.00	1.00
AM241	2.039E+00	2.008E+00	2.008E+00	1.010	0.995	0.995	1.02	1.02	1.00	3.194E+00	3.156E+00	3.156E+00	1.008	0.996	0.996	1.01	1.01	1.00
AM242	2.965E-08	2.966E-08	2.979E-08	0.998	0.999	1.003	1.00	1.00	1.00	2.833E-08	2.834E-08	2.846E-08	0.998	0.999	1.003	1.00	1.00	1.00
AM243	3.535E-01	3.535E-01	3.535E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.531E-01	3.531E-01	3.531E-01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	6.007E-06	6.009E-06	6.042E-06	0.998	0.998	1.004	1.00	0.99	0.99	5.728E-06	5.730E-06	5.764E-06	0.998	0.998	1.004	1.00	0.99	0.99
CM243	1.060E-03	1.060E-03	1.060E-03	1.000	1.000	1.000	1.00	1.00	1.00	8.310E-04	8.310E-04	8.310E-04	1.000	1.000	1.000	1.00	1.00	1.00
CM244	6.717E-02	6.716E-02	6.717E-02	1.000	1.000	1.000	1.00	1.00	1.00	4.581E-02	4.580E-02	4.581E-02	1.000	1.000	1.000	1.00	1.00	1.00
CM245	3.508E-03	3.508E-03	3.508E-03	1.000	1.000	1.000	1.00	1.00	1.00	3.505E-03	3.505E-03	3.505E-03	1.000	1.000	1.000	1.00	1.00	1.00
CM246	4.176E-04	4.176E-04	4.176E-04	1.000	1.000	1.000	1.00	1.00	1.00	4.170E-04	4.170E-04	4.170E-04	1.000	1.000	1.000	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.15	0.15	0.26	0.1	0.4	0.4				0.28	0.28	0.52	0.1	0.7	0.7
AV-ABS-DEV EXCLUDING LARGEST ONE, %				0.09	0.09	0.16	0.0	0.2	0.2				0.17	0.17	0.32	0.1	0.5	0.4
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.04	0.03	0.06	0.0	0.1	0.1				0.07	0.06	0.12	0.0	0.2	0.2
NUCS EXCLUDED, 1ST/2ND:				AM241	SR 89	ZR 95 / PU241	SR 90	NB 95			PU241	CS134	ZR 95 / AM241	CM244	NB 95			

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU G-ATOMS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	7.427E-02	7.427E-02	7.427E-02	1.000	1.000	1.000	1.00	1.00	1.00	7.423E-02	7.423E-02	7.423E-02	1.000	1.000	1.000	1.00	1.00	1.00
KR 85	1.118E-02	1.118E-02	1.118E-02	1.000	1.000	1.000	1.00	1.00	1.00	4.411E-04	4.409E-04	4.410E-04	1.000	1.000	1.000	1.00	1.00	1.00
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	1.811E+00	1.811E+00	1.811E+00	1.000	1.000	1.000	1.00	1.00	1.00	5.510E-01	5.509E-01	5.509E-01	1.000	1.000	1.000	1.00	1.00	1.00
Y 90	4.543E-04	4.542E-04	4.542E-04	1.000	1.000	1.000	1.00	1.00	1.00	1.382E-04	1.381E-04	1.382E-04	1.000	1.000	1.000	1.00	1.00	1.00
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	7.726E+00	7.726E+00	7.726E+00	1.000	1.000	1.000	1.00	1.00	1.00	7.726E+00	7.726E+00	7.726E+00	1.000	1.000	1.000	1.00	1.00	1.00
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	7.784E+00	7.784E+00	7.784E+00	1.000	1.000	1.000	1.00	1.00	1.00	7.782E+00	7.782E+00	7.782E+00	1.000	1.000	1.000	1.00	1.00	1.00
RU106	1.913E-15	1.917E-15	1.922E-15	0.998	1.000	1.002	1.00	1.00	1.00	2.237E-30	2.240E-30	2.253E-30	0.997	0.999	1.004	1.00	0.99	0.99
PD107	2.038E+00	2.038E+00	2.038E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.038E+00	2.038E+00	2.038E+00	1.000	1.000	1.000	1.00	1.00	1.00
SN126	2.173E-01	2.173E-01	2.173E-01	1.000	1.000	1.000	1.00	1.00	1.00	2.172E-01	2.172E-01	2.172E-01	1.000	1.000	1.000	1.00	1.00	1.00
SB125	4.267E-07	4.266E-07	4.269E-07	1.000	1.000	1.000	1.00	1.00	1.00	1.571E-12	1.570E-12	1.572E-12	1.000	0.999	1.001	1.00	1.00	1.00
I129	1.386E+00	1.386E+00	1.390E+00	0.999	0.999	1.002	1.00	1.00	1.00	1.386E+00	1.386E+00	1.390E+00	0.999	0.999	1.002	1.00	1.00	1.00
CS133	8.473E+00	8.472E+00	8.469E+00	1.000	1.000	1.000	1.00	1.00	1.00	8.473E+00	8.472E+00	8.469E+00	1.000	1.000	1.000	1.00	1.00	1.00
CS134	4.508E-08	4.504E-08	4.507E-08	1.000	0.999	1.000	1.00	1.00	1.00	2.261E-15	2.257E-15	2.261E-15	1.001	0.999	1.001	1.00	1.00	1.00
CS135	2.222E+00	2.222E+00	2.222E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.222E+00	2.222E+00	2.222E+00	1.000	1.000	1.000	1.00	1.00	1.00
CS137	2.755E+00	2.773E+00	2.773E+00	0.996	1.002	1.002	0.99	0.99	1.00	8.678E-01	8.790E-01	8.792E-01	0.991	1.004	1.004	0.99	0.99	1.00
CE144	1.254E-19	1.259E-19	1.282E-19	0.991	0.995	1.013	1.00	0.98	0.98	5.732E-39	5.775E-39	5.987E-39	0.983	0.990	1.027	0.99	0.96	0.96
ND143	5.442E+00	5.440E+00	5.440E+00	1.000	1.000	1.000	1.00	1.00	1.00	5.442E+00	5.440E+00	5.440E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND144	9.156E+00	9.156E+00	9.156E+00	1.000	1.000	1.000	1.00	1.00	1.00	9.156E+00	9.156E+00	9.156E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND145	4.636E+00	4.636E+00	4.636E+00	1.000	1.000	1.000	1.00	1.00	1.00	4.636E+00	4.636E+00	4.636E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND146	4.689E+00	4.689E+00	4.689E+00	1.000	1.000	1.000	1.00	1.00	1.00	4.689E+00	4.689E+00	4.689E+00	1.000	1.000	1.000	1.00	1.00	1.00
PM147	1.856E-06	1.854E-06	1.855E-06	1.001	0.999	1.000	1.00	1.00	1.00	3.399E-12	3.390E-12	3.394E-12	1.001	0.999	1.000	1.00	1.00	1.00
SM147	1.375E+00	1.375E+00	1.375E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.375E+00	1.375E+00	1.375E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM148	1.107E+00	1.107E+00	1.107E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.107E+00	1.107E+00	1.107E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM149	2.520E-02	2.521E-02	2.498E-02	1.003	1.003	0.994	1.00	1.01	1.01	2.520E-02	2.521E-02	2.498E-02	1.003	1.003	0.994	1.00	1.01	1.01
SM150	2.097E+00	2.097E+00	2.097E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.097E+00	2.097E+00	2.097E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM151	6.164E-02	6.164E-02	6.163E-02	1.000	1.000	1.000	1.00	1.00	1.00	4.194E-02	4.194E-02	4.193E-02	1.000	1.000	1.000	1.00	1.00	1.00
SM152	8.755E-01	8.755E-01	8.754E-01	1.000	1.000	1.000	1.00	1.00	1.00	8.755E-01	8.755E-01	8.754E-01	1.000	1.000	1.000	1.00	1.00	1.00
EU153	7.107E-01	7.107E-01	7.106E-01	1.000	1.000	1.000	1.00	1.00	1.00	7.107E-01	7.107E-01	7.106E-01	1.000	1.000	1.000	1.00	1.00	1.00
EU154	4.517E-03	4.516E-03	4.516E-03	1.000	1.000	1.000	1.00	1.00	1.00	8.031E-05	8.025E-05	8.028E-05	1.000	1.000	1.000	1.00	1.00	1.00
EU155	8.338E-05	8.343E-05	8.344E-05	1.000	1.000	1.000	1.00	1.00	1.00	7.691E-08	7.702E-08	7.703E-08	0.999	1.000	1.001	1.00	1.00	1.00
U234	9.614E-01	9.614E-01	9.595E-01	1.001	1.001	0.999	1.00	1.00	1.00	1.092E+00	1.092E+00	1.089E+00	1.001	1.001	0.998	1.00	1.00	1.00
U235	3.390E+01	3.390E+01	3.387E+01	1.000	1.000	0.999	1.00	1.00	1.00	3.393E+01	3.393E+01	3.387E+01	1.001	1.001	0.999	1.00	1.00	1.00
U236	1.683E+01	1.683E+01	1.678E+01	1.001	1.001	0.998	1.00	1.00	1.00	1.688E+01	1.688E+01	1.678E+01	1.002	1.002	0.996	1.00	1.01	1.01
U238	3.967E+03	3.967E+03	3.967E+03	1.000	1.000	1.000	1.00	1.00	1.00	3.967E+03	3.967E+03	3.967E+03	1.000	1.000	1.000	1.00	1.00	1.00
NP237	2.123E+00	2.121E+00	1.869E+00	1.042	1.041	0.917	1.00	1.14	1.13	2.491E+00	2.488E+00	1.869E+00	1.091	1.090	0.819	1.00	1.33	1.33
PU238	4.010E-01	4.010E-01	4.010E-01	1.000	1.000	1.000	1.00	1.00	1.00	2.705E-01	2.705E-01	2.705E-01	1.000	1.000	1.000	1.00	1.00	1.00
PU239	2.104E+01	2.104E+01	2.104E+01	1.000	1.000	1.000	1.00	1.00	1.00	2.101E+01	2.101E+01	2.101E+01	1.000	1.000	1.000	1.00	1.00	1.00
PU240	9.665E+00	9.665E+00	9.582E+00	1.003	1.003	0.994	1.00	1.01	1.01	9.627E+00	9.627E+00	9.531E+00	1.003	1.003	0.993	1.00	1.01	1.01
PU241	4.571E-01	4.801E-01	4.802E-01	0.967	1.016	1.016	0.95	0.95	1.00	4.119E-02	4.543E-02	4.544E-02	0.936	1.032	1.032	0.91	0.91	1.00
PU242	1.870E+00	1.870E+00	1.870E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.870E+00	1.870E+00	1.870E+00	1.000	1.000	1.000	1.00	1.00	1.00
AM241	4.481E+00	4.460E+00	4.460E+00	1.003	0.998	0.998	1.00	1.00	1.00	4.529E+00	4.528E+00	4.528E+00	1.000	1.000	1.000	1.00	1.00	1.00
AM242	2.471E-08	2.471E-08	2.482E-08	0.999	0.999	1.003	1.00	1.00	1.00	1.967E-08	1.968E-08	1.976E-08	0.998	0.999	1.003	1.00	1.00	1.00
AM243	3.521E-01	3.521E-01	3.521E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.505E-01	3.505E-01	3.505E-01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	4.996E-06	4.997E-06	5.027E-06	0.998	0.998	1.004	1.00	0.99	0.99	3.977E-06	3.978E-06	4.002E-06	0.998	0.998	1.004	1.00	0.99	0.99
CM243	4.006E-04	4.006E-04	4.006E-04	1.000	1.000	1.000	1.00	1.00	1.00	1.187E-04	1.187E-04	1.187E-04	1.000	1.000	1.000	1.00	1.00	1.00
CM244	1.453E-02	1.453E-02	1.453E-02	1.000	1.000	1.000	1.00	1.00	1.00	2.144E-03	2.143E-03	2.144E-03	1.000	1.000	1.000	1.00	1.00	1.00
CM245	3.496E-03	3.496E-03	3.496E-03	1.000	1.000	1.000	1.00	1.00	1.00	3.482E-03	3.482E-03	3.482E-03	1.000	1.000	1.000	1.00	1.00	1.00
CM246	4.152E-04	4.152E-04	4.152E-04	1.000	1.000	1.000	1.00	1.00	1.00	4.122E-04	4.122E-04	4.122E-04	1.000	1.000	1.000	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.22	0.17	0.30	0.1	0.5	0.4				0.42	0.33	0.58	0.3	1.1	0.9
AV-ABS-DEV EXCLUDING LARGEST ONE, %				0.07	0.05	0.10	0.0	0.2	0.1				0.10	0.07	0.15	0.1	0.2	0.2
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.05	0.04	0.07	0.0	0.1	0.1				0.05	0.05	0.08	0.0	0.1	0.1
NUCS EXCLUDED, 1ST/2ND:		PU241	PM147	NP237 / CS137		CS134		CE144			PU241	CS134	NP237 / CS137		SB125		CE144	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU G-ATOMS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	7.407E-02	7.407E-02	7.407E-02	1.000	1.000	1.000	1.00	1.00	1.00	7.352E-02	7.352E-02	7.352E-02	1.000	1.000	1.000	1.00	1.00	1.00
KR 85	1.067E-09	1.066E-09	1.067E-09	1.000	0.999	1.000	1.00	1.00	1.00	2.353E-29	2.349E-29	2.349E-29	1.001	0.999	0.999	1.00	1.00	1.00
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	4.717E-03	4.714E-03	4.716E-03	1.000	1.000	1.000	1.00	1.00	1.00	2.740E-10	2.736E-10	2.736E-10	1.001	1.000	1.000	1.00	1.00	1.00
Y 90	1.183E-06	1.182E-06	1.183E-06	1.000	0.999	1.000	1.00	1.00	1.00	6.871E-14	6.861E-14	6.861E-14	1.001	1.000	1.000	1.00	1.00	1.00
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	7.725E+00	7.725E+00	7.725E+00	1.000	1.000	1.000	1.00	1.00	1.00	7.723E+00	7.723E+00	7.723E+00	1.000	1.000	1.000	1.00	1.00	1.00
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	7.777E+00	7.777E+00	7.777E+00	1.000	1.000	1.000	1.00	1.00	1.00	7.760E+00	7.760E+00	7.760E+00	1.000	1.000	1.000	1.00	1.00	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	2.038E+00	2.038E+00	2.038E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.038E+00	2.038E+00	2.038E+00	1.000	1.000	1.000	1.00	1.00	1.00
SN126	2.169E-01	2.169E-01	2.169E-01	1.000	1.000	1.000	1.00	1.00	1.00	2.159E-01	2.159E-01	2.159E-01	1.000	1.000	1.000	1.00	1.00	1.00
SB125	0.0	0.0	2.891E-34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.386E+00	1.386E+00	1.390E+00	0.999	0.999	1.002	1.00	1.00	1.00	1.386E+00	1.386E+00	1.390E+00	0.999	0.999	1.002	1.00	1.00	1.00
CS133	8.473E+00	8.472E+00	8.469E+00	1.000	1.000	1.000	1.00	1.00	1.00	8.473E+00	8.472E+00	8.469E+00	1.000	1.000	1.000	1.00	1.00	1.00
CS134	0.0	0.0	1.431E-44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	2.222E+00	2.222E+00	2.222E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.221E+00	2.221E+00	2.221E+00	1.000	1.000	1.000	1.00	1.00	1.00
CS137	8.548E-03	8.876E-03	8.881E-03	0.975	1.012	1.013	0.96	0.96	1.00	8.084E-10	9.196E-10	9.201E-10	0.916	1.042	1.042	0.88	0.88	1.00
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	5.442E+00	5.440E+00	5.440E+00	1.000	1.000	1.000	1.00	1.00	1.00	5.442E+00	5.440E+00	5.440E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND144	9.156E+00	9.156E+00	9.156E+00	1.000	1.000	1.000	1.00	1.00	1.00	9.156E+00	9.156E+00	9.156E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND145	4.636E+00	4.636E+00	4.636E+00	1.000	1.000	1.000	1.00	1.00	1.00	4.636E+00	4.636E+00	4.636E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND146	4.689E+00	4.689E+00	4.689E+00	1.000	1.000	1.000	1.00	1.00	1.00	4.689E+00	4.689E+00	4.689E+00	1.000	1.000	1.000	1.00	1.00	1.00
PM147	0.0	0.0	3.807E-35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	1.375E+00	1.375E+00	1.375E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.375E+00	1.375E+00	1.375E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM148	1.107E+00	1.107E+00	1.107E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.107E+00	1.107E+00	1.107E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM149	2.520E-02	2.521E-02	2.498E-02	1.003	1.003	0.994	1.00	1.01	1.01	2.520E-02	2.521E-02	2.498E-02	1.003	1.003	0.994	1.00	1.01	1.01
SM150	2.097E+00	2.097E+00	2.097E+00	1.000	1.000	1.000	1.00	1.00	1.00	2.097E+00	2.097E+00	2.097E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM151	8.987E-03	8.987E-03	8.987E-03	1.000	1.000	1.000	1.00	1.00	1.00	4.094E-05	4.095E-05	4.094E-05	1.000	1.000	1.000	1.00	1.00	1.00
SM152	8.755E-01	8.755E-01	8.754E-01	1.000	1.000	1.000	1.00	1.00	1.00	8.755E-01	8.755E-01	8.754E-01	1.000	1.000	1.000	1.00	1.00	1.00
EU153	7.107E-01	7.107E-01	7.106E-01	1.000	1.000	1.000	1.00	1.00	1.00	7.107E-01	7.107E-01	7.106E-01	1.000	1.000	1.000	1.00	1.00	1.00
EU154	8.020E-12	8.004E-12	8.012E-12	1.001	0.999	1.000	1.00	1.00	1.00	0.0	0.0	2.517E-36	0.0	0.0	0.0	0.0	0.0	0.0
EU155	5.568E-20	5.593E-20	5.597E-20	0.997	1.001	1.002	1.00	0.99	1.00	0.0	0.0	1.829E-62	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.307E+00	1.307E+00	1.301E+00	1.002	1.002	0.997	1.00	1.00	1.00	1.361E+00	1.361E+00	1.354E+00	1.002	1.002	0.997	1.00	1.01	1.01
U235	3.405E+01	3.405E+01	3.387E+01	1.002	1.002	0.996	1.00	1.01	1.01	3.446E+01	3.446E+01	3.387E+01	1.006	1.006	0.989	1.00	1.02	1.02
U236	1.709E+01	1.709E+01	1.678E+01	1.006	1.006	0.988	1.00	1.02	1.02	1.776E+01	1.776E+01	1.678E+01	1.019	1.019	0.963	1.00	1.06	1.06
U238	3.967E+03	3.967E+03	3.967E+03	1.000	1.000	1.000	1.00	1.00	1.00	3.967E+03	3.967E+03	3.967E+03	1.000	1.000	1.000	1.00	1.00	1.00
NP237	3.745E+00	3.743E+00	1.869E+00	1.201	1.200	0.599	1.00	2.00	2.00	5.982E+00	5.981E+00	1.868E+00	1.298	1.297	0.405	1.00	3.20	3.20
PU238	5.608E-02	5.608E-02	5.609E-02	1.000	1.000	1.000	1.00	1.00	1.00	2.506E-04	2.503E-04	2.506E-04	1.000	0.999	1.000	1.00	1.00	1.00
PU239	2.090E+01	2.090E+01	2.088E+01	1.000	1.000	0.999	1.00	1.00	1.00	2.050E+01	2.050E+01	2.047E+01	1.000	1.000	0.999	1.00	1.00	1.00
PU240	9.427E+00	9.427E+00	9.332E+00	1.003	1.003	0.993	1.00	1.01	1.01	8.752E+00	8.752E+00	8.665E+00	1.003	1.003	0.993	1.00	1.01	1.01
PU241	8.527E-06	9.577E-06	3.645E-06	1.176	1.321	0.503	0.89	2.34	2.63	5.491E-06	5.605E-06	1.686E-20	1.485	1.515	0.000	0.98	****	****
PU242	1.869E+00	1.869E+00	1.869E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.867E+00	1.867E+00	1.867E+00	1.000	1.000	1.000	1.00	1.00	1.00
AM241	3.317E+00	3.320E+00	3.320E+00	0.999	1.000	1.000	1.00	1.00	1.00	1.080E+00	1.080E+00	1.080E+00	1.000	1.000	1.000	1.00	1.00	1.00
AM242	7.902E-09	7.903E-09	7.937E-09	0.998	0.999	1.003	1.00	1.00	1.00	3.247E-10	3.247E-10	3.261E-10	0.999	0.999	1.003	1.00	1.00	1.00
AM243	3.440E-01	3.440E-01	3.440E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.221E-01	3.221E-01	3.221E-01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	1.598E-06	1.598E-06	1.608E-06	0.998	0.998	1.004	1.00	0.99	0.99	6.566E-08	6.565E-08	6.605E-08	0.998	0.998	1.004	1.00	0.99	0.99
CM243	9.166E-07	9.159E-07	9.163E-07	1.000	1.000	1.000	1.00	1.00	1.00	3.703E-14	3.699E-14	3.699E-14	1.001	1.000	1.000	1.00	1.00	1.00
CM244	1.015E-06	1.015E-06	1.015E-06	1.000	1.000	1.000	1.00	1.00	1.00	2.155E-15	2.348E-18	2.349E-18	2.993	0.003	0.003	****	****	1.00
CM245	3.426E-03	3.426E-03	3.426E-03	1.000	1.000	1.000	1.00	1.00	1.00	3.236E-03	3.236E-03	3.235E-03	1.000	1.000	1.000	1.00	1.00	1.00
CM246	4.003E-04	4.003E-04	4.003E-04	1.000	1.000	1.000	1.00	1.00	1.00	3.612E-04	3.612E-04	3.612E-04	1.000	1.000	1.000	1.00	1.00	1.00

AVERAGE-ABSOLUTE-DEVIATION, AS %	1.00	1.30	2.22	0.4	5.7	6.3				7.08	4.62	6.61	****	****	****		
AV-ABS-DEV EXCLUDING LARGEST ONE, %	0.57	0.56	1.11	0.1	2.6	2.5				1.11	1.00	1.88	0.3	6.3	5.9		
AV-ABS-DEV EXCLUDING LARGEST TWO, %	0.06	0.06	0.11	0.0	0.2	0.2				0.12	0.11	0.22	0.0	0.3	0.3		
NUCS EXCLUDED, 1ST/2ND:	CS137	KR 85	PU241 / EU155	Y 90	NP237		CM244	PU238	PU241 / CS137	SM151	NP237						

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU G-ATOMS PER MTU

	**********		10 KYR			**********			
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	6.679E-02	6.679E-02	6.679E-02	1.000	1.000	1.000	1.00	1.00	1.00
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	7.692E+00	7.691E+00	7.691E+00	1.000	1.000	1.000	1.00	1.00	1.00
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	7.536E+00	7.536E+00	7.536E+00	1.000	1.000	1.000	1.00	1.00	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	2.036E+00	2.036E+00	2.036E+00	1.000	1.000	1.000	1.00	1.00	1.00
SN126	2.028E-01	2.028E-01	2.028E-01	1.000	1.000	1.000	1.00	1.00	1.00
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.385E+00	1.385E+00	1.390E+00	0.999	0.999	1.002	1.00	1.00	1.00
CS133	8.473E+00	8.472E+00	8.469E+00	1.000	1.000	1.000	1.00	1.00	1.00
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	2.215E+00	2.215E+00	2.215E+00	1.000	1.000	1.000	1.00	1.00	1.00
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	5.442E+00	5.440E+00	5.440E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND144	9.156E+00	9.156E+00	9.156E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND145	4.636E+00	4.636E+00	4.636E+00	1.000	1.000	1.000	1.00	1.00	1.00
ND146	4.689E+00	4.689E+00	4.689E+00	1.000	1.000	1.000	1.00	1.00	1.00
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	1.375E+00	1.375E+00	1.375E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM148	1.107E+00	1.107E+00	1.107E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM149	2.520E-02	2.521E-02	2.498E-02	1.003	1.003	0.994	1.00	1.01	1.01
SM150	2.097E+00	2.097E+00	2.097E+00	1.000	1.000	1.000	1.00	1.00	1.00
SM151	3.216E-35	3.231E-35	3.223E-35	0.998	1.002	1.000	1.00	1.00	1.00
SM152	8.755E-01	8.755E-01	8.754E-01	1.000	1.000	1.000	1.00	1.00	1.00
EU153	7.107E-01	7.107E-01	7.106E-01	1.000	1.000	1.000	1.00	1.00	1.00
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.332E+00	1.332E+00	1.321E+00	1.003	1.003	0.994	1.00	1.01	1.01
U235	3.917E+01	3.917E+01	3.387E+01	1.047	1.047	0.906	1.00	1.16	1.16
U236	2.314E+01	2.314E+01	1.678E+01	1.101	1.101	0.798	1.00	1.38	1.38
U238	3.967E+03	3.967E+03	3.967E+03	1.000	1.000	1.000	1.00	1.00	1.00
NP237	7.043E+00	7.043E+00	1.863E+00	1.325	1.325	0.350	1.00	3.78	3.78
PU238	4.623E-23	4.614E-23	4.659E-23	0.998	0.996	1.006	1.00	0.99	0.99
PU239	1.598E+01	1.598E+01	1.580E+01	1.004	1.004	0.992	1.00	1.01	1.01
PU240	3.371E+00	3.370E+00	3.343E+00	1.003	1.003	0.995	1.00	1.01	1.01
PU241	2.636E-06	2.691E-06	0.0	0.990	1.010	0.0	0.98	0.0	0.0
PU242	1.837E+00	1.836E+00	1.836E+00	1.000	1.000	1.000	1.00	1.00	1.00
AM241	7.974E-05	8.311E-05	5.820E-07	1.464	1.526	0.011	0.96	****	****
AM242	4.878E-28	4.869E-28	4.886E-28	1.000	0.998	1.002	1.00	1.00	1.00
AM243	1.383E-01	1.383E-01	1.383E-01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	9.893E-26	9.874E-26	9.897E-26	1.001	0.999	1.001	1.00	1.00	1.00
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	2.152E-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	1.553E-03	1.553E-03	1.549E-03	1.001	1.001	0.998	1.00	1.00	1.00
CM246	9.664E-05	9.661E-05	9.660E-05	1.000	1.000	1.000	1.00	1.00	1.00

AVERAGE-ABSOLUTE-DEVIATION, AS %	2.76	2.95	5.80	0.2	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	1.57	1.58	3.17	0.1	10.2	10.2
AV-ABS-DEV EXCLUDING LARGEST TWO, %	0.61	0.61	1.19	0.0	1.9	1.9

NUCS EXCLUDED, 1ST/2ND: PU242 SM151 AM241 / ND143 AM242 NP237

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	7.415E-02	6.809E-02	6.278E-02	1.085	0.996	0.919	1.09	1.18	1.08	7.414E-02	6.809E-02	6.277E-02	1.085	0.996	0.919	1.09	1.18	1.08
KR 85	2.795E-01	2.780E-01	2.801E-01	1.001	0.996	1.003	1.01	1.00	0.99	2.034E-01	2.023E-01	2.038E-01	1.001	0.996	1.003	1.01	1.00	0.99
SR 89	2.205E-01	2.226E-01	2.178E-01	1.001	1.010	0.989	0.99	1.01	1.02	4.320E-12	4.358E-12	4.272E-12	1.001	1.010	0.990	0.99	1.01	1.02
SR 90	5.877E+00	5.846E+00	5.977E+00	0.996	0.991	1.013	1.01	0.98	0.98	5.228E+00	5.200E+00	5.316E+00	0.996	0.991	1.013	1.01	0.98	0.98
Y 90	1.474E-03	1.466E-03	1.499E-03	0.996	0.991	1.013	1.01	0.98	0.98	1.311E-03	1.304E-03	1.333E-03	0.996	0.991	1.013	1.01	0.98	0.98
Y 91	3.583E-01	3.606E-01	3.579E-01	0.998	1.005	0.997	0.99	1.00	1.01	2.052E-10	2.065E-10	2.053E-10	0.998	1.004	0.998	0.99	1.00	1.01
ZR 93	7.675E+00	7.748E+00	7.571E+00	1.001	1.011	0.988	0.99	1.01	1.02	7.675E+00	7.748E+00	7.571E+00	1.001	1.011	0.988	0.99	1.01	1.02
ZR 95	5.807E-01	5.861E-01	5.777E-01	0.999	1.008	0.993	0.99	1.01	1.01	2.054E-09	2.070E-09	2.118E-09	0.987	0.995	1.018	0.99	0.97	0.98
NB 95	4.128E-01	4.165E-01	4.086E-01	1.000	1.009	0.990	0.99	1.01	1.02	2.506E-09	2.525E-09	2.565E-09	0.990	0.997	1.013	0.99	0.98	0.98
TC 99	7.767E+00	7.925E+00	7.904E+00	0.987	1.008	1.005	0.98	0.98	1.00	7.767E+00	7.925E+00	7.904E+00	0.987	1.008	1.005	0.98	0.98	1.00
RU106	1.587E+00	1.503E+00	1.617E+00	1.011	0.958	1.031	1.06	0.98	0.93	5.395E-02	5.108E-02	5.497E-02	1.012	0.958	1.031	1.06	0.98	0.93
PD107	2.094E+00	1.928E+00	2.147E+00	1.018	0.938	1.044	1.09	0.98	0.90	2.094E+00	1.928E+00	2.147E+00	1.018	0.938	1.044	1.09	0.98	0.90
SN126	2.202E-01	1.561E-01	1.794E-01	1.189	0.843	0.969	1.41	1.23	0.87	2.202E-01	1.561E-01	1.794E-01	1.189	0.843	0.969	1.41	1.23	0.87
SB125	1.151E-01	7.561E-02	6.296E-02	1.361	0.894	0.745	1.52	1.83	1.20	3.366E-02	2.211E-02	1.841E-02	1.361	0.894	0.745	1.52	1.83	1.20
I129	1.388E+00	1.443E+00	1.390E+00	0.986	1.026	0.988	0.96	1.00	1.04	1.395E+00	1.450E+00	1.399E+00	0.986	1.025	0.989	0.96	1.00	1.04
CS133	8.448E+00	8.625E+00	8.453E+00	0.993	1.014	0.993	0.98	1.00	1.02	8.449E+00	8.627E+00	8.455E+00	0.993	1.014	0.993	0.98	1.00	1.02
CS134	8.861E-01	8.737E-01	8.769E-01	1.008	0.994	0.998	1.01	1.01	1.00	1.696E-01	1.673E-01	1.679E-01	1.008	0.994	0.998	1.01	1.01	1.00
CS135	2.196E+00	2.466E+00	2.434E+00	0.928	1.043	1.029	0.89	0.90	1.01	2.196E+00	2.466E+00	2.434E+00	0.928	1.043	1.029	0.89	0.90	1.01
CS137	8.733E+00	8.743E+00	8.981E+00	0.990	0.991	1.018	1.00	0.97	0.97	7.795E+00	7.809E+00	8.021E+00	0.990	0.992	1.019	1.00	0.97	0.97
CE144	2.537E+00	2.551E+00	2.546E+00	0.997	1.002	1.001	0.99	1.00	1.00	3.177E-02	3.196E-02	3.196E-02	0.996	1.002	1.002	0.99	0.99	1.00
ND143	5.350E+00	5.651E+00	5.551E+00	0.970	1.024	1.006	0.95	0.96	1.02	5.387E+00	5.688E+00	5.588E+00	0.970	1.024	1.006	0.95	0.96	1.02
ND144	6.614E+00	6.446E+00	6.442E+00	1.017	0.992	0.991	1.03	1.03	1.00	9.119E+00	8.965E+00	8.956E+00	1.012	0.995	0.994	1.02	1.02	1.00
ND145	4.612E+00	4.712E+00	4.617E+00	0.992	1.014	0.994	0.98	1.00	1.02	4.612E+00	4.712E+00	4.617E+00	0.992	1.014	0.994	0.98	1.00	1.02
ND146	4.690E+00	4.625E+00	4.693E+00	1.004	0.991	1.005	1.01	1.00	0.99	4.690E+00	4.625E+00	4.693E+00	1.004	0.991	1.005	1.01	1.00	0.99
PM147	9.699E-01	1.292E+00	1.215E+00	0.837	1.115	1.048	0.75	0.80	1.06	2.669E-01	3.548E-01	3.336E-01	0.838	1.114	1.048	0.75	0.80	1.06
SM147	3.772E-01	4.119E-01	4.393E-01	0.921	1.006	1.073	0.92	0.86	0.94	1.089E+00	1.358E+00	1.329E+00	0.865	1.079	1.056	0.80	0.82	1.02
SM148	1.105E+00	7.359E-01	8.318E-01	1.240	0.826	0.934	1.50	1.33	0.88	1.111E+00	7.417E-01	8.395E-01	1.238	0.826	0.935	1.50	1.32	0.88
SM149	2.509E-02	3.106E-02	2.704E-02	0.905	1.120	0.975	0.81	0.93	1.15	2.510E-02	3.106E-02	2.704E-02	0.905	1.120	0.975	0.81	0.93	1.15
SM150	2.104E+00	2.151E+00	2.140E+00	0.987	1.009	1.004	0.98	0.98	1.01	2.104E+00	2.151E+00	2.140E+00	0.987	1.009	1.004	0.98	0.98	1.01
SM151	9.038E-02	1.069E-01	8.520E-02	0.960	1.135	0.905	0.85	1.06	1.25	8.702E-02	1.030E-01	8.203E-02	0.960	1.136	0.905	0.84	1.06	1.26
SM152	8.775E-01	8.818E-01	7.074E-01	1.067	1.072	0.860	1.00	1.24	1.25	8.775E-01	8.818E-01	7.074E-01	1.067	1.072	0.860	1.00	1.24	1.25
EU153	7.179E-01	7.332E-01	8.036E-01	0.955	0.976	1.069	0.98	0.89	0.91	7.180E-01	7.332E-01	8.036E-01	0.955	0.976	1.069	0.98	0.89	0.91
EU154	2.573E-01	2.587E-01	2.275E-01	1.038	1.044	0.918	0.99	1.13	1.14	1.731E-01	1.740E-01	1.530E-01	1.038	1.044	0.918	0.99	1.13	1.14
EU155	9.114E-02	9.795E-02	8.787E-02	0.987	1.061	0.952	0.93	1.04	1.11	4.584E-02	4.926E-02	4.419E-02	0.987	1.061	0.952	0.93	1.04	1.11
U234	7.212E-01	6.962E-01	6.826E-01	1.030	0.995	0.975	1.04	1.06	1.02	7.441E-01	7.209E-01	6.905E-01	1.036	1.003	0.961	1.03	1.08	1.04
U235	3.186E+01	3.258E+01	3.381E+01	0.973	0.995	1.032	0.98	0.94	0.96	3.186E+01	3.259E+01	3.381E+01	0.973	0.995	1.032	0.98	0.94	0.96
U236	1.637E+01	1.638E+01	1.630E+01	1.001	1.002	0.997	1.00	1.00	1.00	1.637E+01	1.639E+01	1.630E+01	1.001	1.002	0.997	1.00	1.00	1.01
U238	3.969E+03	3.965E+03	3.966E+03	1.001	1.000	1.000	1.00	1.00	1.00	3.969E+03	3.965E+03	3.966E+03	1.001	1.000	1.000	1.00	1.00	1.00
NP237	1.863E+00	1.957E+00	1.802E+00	0.994	1.044	0.962	0.95	1.03	1.09	1.871E+00	1.965E+00	1.804E+00	0.995	1.045	0.960	0.95	1.04	1.09
PU238	5.614E-01	6.097E-01	5.053E-01	1.005	1.091	0.904	0.92	1.11	1.21	5.843E-01	6.308E-01	5.302E-01	1.004	1.084	0.911	0.93	1.10	1.19
PU239	2.111E+01	2.369E+01	2.214E+01	0.946	1.062	0.992	0.89	0.95	1.07	2.111E+01	2.369E+01	2.214E+01	0.946	1.062	0.992	0.89	0.95	1.07
PU240	9.734E+00	8.717E+00	8.661E+00	1.077	0.965	0.958	1.12	1.12	1.01	9.747E+00	8.730E+00	8.656E+00	1.078	0.965	0.957	1.12	1.13	1.01
PU241	5.151E+00	5.892E+00	5.877E+00	0.913	1.045	1.042	0.87	0.88	1.00	4.065E+00	4.672E+00	4.661E+00	0.910	1.046	1.044	0.87	0.87	1.00
PU242	1.954E+00	1.993E+00	2.357E+00	0.930	0.948	1.122	0.98	0.83	0.85	1.954E+00	1.993E+00	2.357E+00	0.930	0.948	1.122	0.98	0.83	0.85
AM241	1.412E-01	1.635E-01	1.764E-01	0.880	1.020	1.100	0.86	0.80	0.93	1.221E+00	1.377E+00	1.383E+00	0.920	1.038	1.042	0.89	0.88	1.00
AM242	3.164E-08	5.225E-08	2.557E-08	0.867	1.432	0.701	0.61	1.24	2.04	3.093E-08	5.109E-08	2.501E-08	0.867	1.432	0.701	0.61	1.24	2.04
AM243	3.778E-01	4.160E-01	4.826E-01	0.888	0.978	1.134	0.91	0.78	0.86	3.776E-01	4.158E-01	4.823E-01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	4.573E-02	4.586E-02	4.564E-02	1.000	1.003	0.998	1.00	1.00	1.00	2.848E-05	3.262E-05	2.694E-05	0.970	1.112	0.918	0.87	1.06	1.21
CM243	1.431E-03	3.836E-04	1.284E-03	1.385	0.371	1.243	3.73	1.11	0.30	1.270E-03	3.403E-04	1.139E-03	1.386	0.371	1.243	3.73	1.12	0.30
CM244	1.075E-01	1.047E-01	1.335E-01	0.933	0.909	1.159	1.03	0.81	0.78	8.908E-02	8.671E-02	1.106E-01	0.933	0.908	1.159	1.03	0.81	0.78
CM245	3.897E-03	4.175E-03	6.037E-03	0.829	0.888	1.284	0.93	0.65	0.69	3.896E-03	4.173E-03	6.034E-03	0.829	0.888	1.284	0.93	0.65	0.69
CM246	4.763E-04	5.014E-04	6.462E-04	0.880	0.926	1.194	0.95	0.74	0.78	4.760E-04	5.010E-04	6.457E-04	0.880	0.926	1.194	0.95	0.74	0.78
AVERAGE-ABSOLUTE-DEVIATION, AS %				6.01	5.93	5.94	13.3	10.1	10.4				6.14	6.27	5.99	13.7	10.2	10.6
AV-ABS-DEV EXCLUDING LARGEST ONE, %				4.50	4.57	4.71	6.7	8.3	7.1				4.64	4.93	4.76	7.0	8.4	7.3
AV-ABS-DEV EXCLUDING LARGEST TWO, %				3.72	3.39	3.80	6.7	7.7	6.6				3.87	3.77	3.86	7.1	7.8	6.8
NUCS EXCLUDED, 1ST/2ND:				SB125	CM243	CM245 / SM148		AM242	CM246		SB125	CM243	CM245 / SM148		AM242		CM246	

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	ORIGEN2	ORIGEN-S	CINDER	10 YR OR2 AVG	10 YR ORS AVG	10 YR CIN AVG	10 YR OR2 ORS	10 YR OR2 CIN	10 YR ORS CIN	ORIGEN2	ORIGEN-S	CINDER	20 YR OR2 AVG	20 YR ORS AVG	20 YR CIN AVG	20 YR OR2 ORS	20 YR OR2 CIN	20 YR ORS CIN
SE 79	7.414E-02	6.809E-02	6.277E-02	1.085	0.996	0.919	1.09	1.18	1.08	7.413E-02	6.808E-02	6.276E-02	1.085	0.996	0.919	1.09	1.18	1.08
KR 85	1.472E-01	1.464E-01	1.475E-01	1.001	0.996	1.003	1.01	1.00	0.99	7.710E-02	7.669E-02	7.728E-02	1.001	0.996	1.003	1.01	1.00	0.99
SR 89	5.607E-23	5.652E-23	5.551E-23	1.001	1.009	0.991	0.99	1.01	1.02	0.0	0.0	9.373E-45	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	4.641E+00	4.617E+00	4.720E+00	0.996	0.991	1.013	1.01	0.98	0.98	3.658E+00	3.639E+00	3.720E+00	0.996	0.991	1.013	1.01	0.98	0.98
Y 90	1.164E-03	1.158E-03	1.184E-03	0.996	0.991	1.013	1.01	0.98	0.98	9.174E-04	9.125E-04	9.329E-04	0.996	0.991	1.013	1.01	0.98	0.98
Y 91	8.237E-20	8.285E-20	8.250E-20	0.998	1.003	0.999	0.99	1.00	1.00	1.327E-38	1.334E-38	1.333E-38	0.997	1.002	1.001	0.99	1.00	1.00
ZR 93	7.675E+00	7.748E+00	7.571E+00	1.001	1.011	0.988	0.99	1.01	1.02	7.675E+00	7.748E+00	7.571E+00	1.001	1.011	0.988	0.99	1.01	1.02
ZR 95	5.252E-18	5.281E-18	5.616E-18	0.976	0.981	1.043	0.99	0.94	0.94	3.431E-35	3.437E-35	3.946E-35	0.952	0.953	1.095	1.00	0.87	0.87
NB 95	6.405E-18	6.441E-18	6.800E-18	0.978	0.984	1.038	0.99	0.94	0.95	4.185E-35	4.192E-35	4.779E-35	0.954	0.956	1.090	1.00	0.88	0.88
TC 99	7.767E+00	7.925E+00	7.904E+00	0.987	1.008	1.005	0.98	0.98	1.00	7.767E+00	7.925E+00	7.903E+00	0.988	1.008	1.005	0.98	0.98	1.00
RU106	1.733E-03	1.641E-03	1.766E-03	1.011	0.958	1.031	1.06	0.98	0.93	1.859E-06	1.693E-06	1.823E-06	1.038	0.945	1.017	1.10	1.02	0.93
PD107	2.094E+00	1.928E+00	2.147E+00	1.018	0.938	1.044	1.09	0.98	0.90	2.094E+00	1.928E+00	2.147E+00	1.018	0.938	1.044	1.09	0.98	0.90
SN126	2.202E-01	1.561E-01	1.794E-01	1.189	0.843	0.969	1.41	1.23	0.87	2.202E-01	1.561E-01	1.794E-01	1.189	0.843	0.969	1.41	1.23	0.87
SB125	9.633E-03	6.327E-03	5.268E-03	1.361	0.894	0.744	1.52	1.83	1.20	7.888E-04	5.180E-04	4.314E-04	1.361	0.894	0.745	1.52	1.83	1.20
I129	1.395E+00	1.450E+00	1.399E+00	0.986	1.025	0.989	0.96	1.00	1.04	1.395E+00	1.450E+00	1.399E+00	0.986	1.025	0.989	0.96	1.00	1.04
CS133	8.449E+00	8.627E+00	8.455E+00	0.993	1.014	0.993	0.98	1.00	1.02	8.449E+00	8.627E+00	8.455E+00	0.993	1.014	0.993	0.98	1.00	1.02
CS134	3.159E-02	3.114E-02	3.126E-02	1.008	0.994	0.998	1.01	1.01	1.00	1.096E-03	1.080E-03	1.084E-03	1.009	0.994	0.998	1.01	1.01	1.00
CS135	2.196E+00	2.466E+00	2.434E+00	0.928	1.043	1.029	0.89	0.90	1.01	2.196E+00	2.466E+00	2.434E+00	0.928	1.043	1.029	0.89	0.90	1.01
CS137	6.944E+00	6.961E+00	7.151E+00	0.989	0.992	1.019	1.00	0.97	0.97	5.512E+00	5.532E+00	5.683E+00	0.989	0.992	1.019	1.00	0.97	0.97
CE144	3.699E-04	3.722E-04	3.729E-04	0.995	1.001	1.003	0.99	0.99	1.00	5.013E-08	5.048E-08	5.076E-08	0.994	1.000	1.006	0.99	0.99	0.99
ND143	5.387E+00	5.688E+00	5.588E+00	0.970	1.024	1.006	0.95	0.96	1.02	5.387E+00	5.688E+00	5.588E+00	0.970	1.024	1.006	0.95	0.96	1.02
ND144	9.151E+00	8.997E+00	8.988E+00	1.012	0.995	0.994	1.02	1.02	1.00	9.151E+00	8.997E+00	8.988E+00	1.012	0.995	0.994	1.02	1.02	1.00
ND145	4.612E+00	4.712E+00	4.617E+00	0.992	1.014	0.994	0.98	1.00	1.02	4.612E+00	4.712E+00	4.617E+00	0.992	1.014	0.994	0.98	1.00	1.02
ND146	4.690E+00	4.625E+00	4.693E+00	1.004	0.991	1.005	1.01	1.00	0.99	4.690E+00	4.625E+00	4.693E+00	1.004	0.991	1.005	1.01	1.00	0.99
PM147	7.121E-02	9.467E-02	8.902E-02	0.838	1.114	1.048	0.75	0.80	1.06	5.071E-03	6.740E-03	6.339E-03	0.838	1.114	1.048	0.75	0.80	1.06
SM147	1.284E+00	1.618E+00	1.574E+00	0.861	1.084	1.055	0.79	0.82	1.03	1.351E+00	1.706E+00	1.656E+00	0.860	1.086	1.054	0.79	0.82	1.03
SM148	1.111E+00	7.417E-01	8.395E-01	1.238	0.826	0.935	1.50	1.32	0.88	1.111E+00	7.417E-01	8.395E-01	1.238	0.826	0.935	1.50	1.32	0.88
SM149	2.510E-02	3.106E-02	2.704E-02	0.905	1.120	0.975	0.81	0.93	1.15	2.510E-02	3.106E-02	2.704E-02	0.905	1.120	0.975	0.81	0.93	1.15
SM150	2.104E+00	2.151E+00	2.140E+00	0.987	1.009	1.004	0.98	0.98	1.01	2.104E+00	2.151E+00	2.140E+00	0.987	1.009	1.004	0.98	0.98	1.01
SM151	8.373E-02	9.908E-02	7.893E-02	0.960	1.136	0.905	0.85	1.06	1.26	7.753E-02	9.173E-02	7.308E-02	0.960	1.136	0.905	0.85	1.06	1.26
SM152	8.776E-01	8.819E-01	7.074E-01	1.067	1.072	0.860	1.00	1.24	1.25	8.776E-01	8.819E-01	7.074E-01	1.067	1.072	0.860	1.00	1.24	1.25
EU153	7.180E-01	7.332E-01	8.036E-01	0.955	0.976	1.069	0.98	0.89	0.91	7.180E-01	7.332E-01	8.036E-01	0.955	0.976	1.069	0.98	0.89	0.91
EU154	1.157E-01	1.163E-01	1.023E-01	1.038	1.044	0.918	0.99	1.13	1.14	5.168E-02	5.195E-02	4.568E-02	1.038	1.044	0.918	0.99	1.13	1.14
EU155	2.279E-02	2.449E-02	2.197E-02	0.987	1.061	0.952	0.93	1.04	1.11	5.632E-03	6.055E-03	5.432E-03	0.987	1.061	0.952	0.93	1.04	1.11
U234	7.667E-01	7.453E-01	6.986E-01	1.040	1.011	0.948	1.03	1.10	1.07	8.094E-01	7.914E-01	7.137E-01	1.049	1.026	0.925	1.02	1.13	1.11
U235	3.187E+01	3.259E+01	3.381E+01	0.973	0.995	1.032	0.98	0.94	0.96	3.187E+01	3.260E+01	3.381E+01	0.973	0.995	1.032	0.98	0.94	0.96
U236	1.638E+01	1.639E+01	1.630E+01	1.001	1.002	0.997	1.00	1.00	1.01	1.639E+01	1.640E+01	1.630E+01	1.002	1.002	0.996	1.00	1.01	1.01
U238	3.969E+03	3.965E+03	3.966E+03	1.001	1.000	1.000	1.00	1.00	1.00	3.969E+03	3.965E+03	3.966E+03	1.001	1.000	1.000	1.00	1.00	1.00
NP237	1.884E+00	1.980E+00	1.804E+00	0.997	1.048	0.955	0.95	1.04	1.10	1.928E+00	2.029E+00	1.804E+00	1.004	1.057	0.939	0.95	1.07	1.12
PU238	5.617E-01	6.065E-01	5.097E-01	1.004	1.084	0.911	0.93	1.10	1.19	5.191E-01	5.606E-01	4.711E-01	1.004	1.084	0.911	0.93	1.10	1.19
PU239	2.111E+01	2.369E+01	2.214E+01	0.946	1.062	0.992	0.89	0.95	1.07	2.110E+01	2.368E+01	2.213E+01	0.946	1.062	0.992	0.89	0.95	1.07
PU240	9.757E+00	8.741E+00	8.652E+00	1.078	0.966	0.956	1.12	1.13	1.01	9.770E+00	8.754E+00	8.643E+00	1.079	0.967	0.954	1.12	1.13	1.01
PU241	3.195E+00	3.691E+00	3.682E+00	0.907	1.048	1.045	0.87	0.87	1.00	1.975E+00	2.303E+00	2.298E+00	0.901	1.051	1.048	0.86	0.86	1.00
PU242	1.954E+00	1.993E+00	2.357E+00	0.930	0.948	1.122	0.98	0.83	0.85	1.954E+00	1.993E+00	2.357E+00	0.930	0.948	1.122	0.98	0.83	0.85
AM241	2.078E+00	2.343E+00	2.344E+00	0.922	1.039	1.039	0.89	0.89	1.00	3.255E+00	3.681E+00	3.675E+00	0.920	1.041	1.039	0.88	0.89	1.00
AM242	3.024E-08	4.994E-08	2.444E-08	0.867	1.432	0.701	0.61	1.24	2.04	2.889E-08	4.771E-08	2.335E-08	0.867	1.432	0.701	0.61	1.24	2.04
AM243	3.774E-01	4.156E-01	4.821E-01	0.888	0.978	1.134	0.91	0.78	0.86	3.771E-01	4.152E-01	4.817E-01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	6.126E-06	1.011E-05	4.960E-06	0.867	1.431	0.702	0.61	1.24	2.04	5.841E-06	9.647E-06	4.730E-06	0.867	1.431	0.702	0.61	1.23	2.04
CM243	1.124E-03	3.014E-04	1.009E-03	1.385	0.371	1.243	3.73	1.11	0.30	8.816E-04	2.363E-04	7.910E-04	1.386	0.371	1.243	3.73	1.11	0.30
CM244	7.356E-02	7.161E-02	9.132E-02	0.933	0.908	1.158	1.03	0.81	0.78	5.017E-02	4.883E-02	6.228E-02	0.933	0.908	1.158	1.03	0.81	0.78
CM245	3.894E-03	4.172E-03	6.032E-03	0.829	0.888	1.284	0.93	0.65	0.69	3.891E-03	4.168E-03	6.027E-03	0.829	0.888	1.284	0.93	0.65	0.69
CM246	4.756E-04	5.007E-04	6.453E-04	0.880	0.926	1.194	0.95	0.74	0.78	4.749E-04	4.999E-04	6.443E-04	0.880	0.926	1.194	0.95	0.74	0.78
AVERAGE-ABSOLUTE-DEVIATION, AS %				6.40	6.97	6.53	14.2	10.7	12.4				6.72	7.28	6.91	14.5	11.3	13.1
AV-ABS-DEV EXCLUDING LARGEST ONE, %				4.92	5.67	5.34	7.6	9.0	9.2				5.22	5.97	5.71	7.8	9.6	9.8
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.18	4.56	4.47	6.9	8.1	6.7				4.48	4.85	4.85	7.2	8.7	7.3
NUCS EXCLUDED, 1ST/2ND:				SB125	CM243	CM245 / SM148		AM242	CM246			SB125	CM243	CM245 / SM148		AM242	CM246	

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
SE 79	7.411E-02	6.806E-02	6.274E-02	1.085	0.996	0.919	1.09	1.18	1.08	7.407E-02	6.802E-02	6.271E-02	1.085	0.996	0.919	1.09	1.18	1.08
KR 85	1.108E-02	1.102E-02	1.111E-02	1.001	0.995	1.004	1.01	1.00	0.99	4.371E-04	4.346E-04	4.380E-04	1.001	0.995	1.003	1.01	1.00	0.99
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	1.791E+00	1.782E+00	1.821E+00	0.996	0.991	1.013	1.01	0.98	0.98	5.449E-01	5.418E-01	5.540E-01	0.996	0.991	1.013	1.01	0.98	0.98
Y 90	4.492E-04	4.468E-04	4.568E-04	0.996	0.991	1.013	1.01	0.98	0.98	1.366E-04	1.359E-04	1.389E-04	0.996	0.991	1.013	1.01	0.98	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	7.674E+00	7.748E+00	7.571E+00	1.001	1.011	0.988	0.99	1.01	1.02	7.674E+00	7.748E+00	7.571E+00	1.001	1.011	0.988	0.99	1.01	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	7.766E+00	7.924E+00	7.902E+00	0.988	1.008	1.005	0.98	0.98	1.00	7.765E+00	7.923E+00	7.901E+00	0.988	1.008	1.005	0.98	0.98	1.00
RU106	2.042E-15	1.858E-15	2.005E-15	1.037	0.944	1.019	1.10	1.02	0.93	2.388E-30	2.172E-30	2.350E-30	1.037	0.943	1.020	1.10	1.02	0.92
PD107	2.094E+00	1.928E+00	2.147E+00	1.018	0.938	1.044	1.09	0.98	0.90	2.094E+00	1.928E+00	2.147E+00	1.018	0.938	1.044	1.09	0.98	0.90
SN126	2.201E-01	1.561E-01	1.793E-01	1.189	0.843	0.968	1.41	1.23	0.87	2.201E-01	1.560E-01	1.793E-01	1.189	0.843	0.968	1.41	1.23	0.87
SB125	4.331E-07	2.844E-07	2.369E-07	1.361	0.894	0.745	1.52	1.83	1.20	1.594E-12	1.046E-12	8.724E-13	1.361	0.893	0.745	1.52	1.83	1.20
I129	1.395E+00	1.450E+00	1.399E+00	0.986	1.025	0.989	0.96	1.00	1.04	1.395E+00	1.450E+00	1.399E+00	0.986	1.025	0.989	0.96	1.00	1.04
CS133	8.449E+00	8.627E+00	8.455E+00	0.993	1.014	0.993	0.98	1.00	1.02	8.449E+00	8.627E+00	8.455E+00	0.993	1.014	0.993	0.98	1.00	1.02
CS134	4.569E-08	4.501E-08	4.521E-08	1.009	0.994	0.998	1.02	1.01	1.00	2.292E-15	2.256E-15	2.268E-15	1.009	0.993	0.998	1.02	1.01	0.99
CS135	2.196E+00	2.466E+00	2.434E+00	0.928	1.043	1.029	0.89	0.90	1.01	2.196E+00	2.466E+00	2.434E+00	0.928	1.043	1.029	0.89	0.90	1.01
CS137	2.756E+00	2.777E+00	2.853E+00	0.986	0.993	1.021	0.99	0.97	0.97	8.680E-01	8.802E-01	9.044E-01	0.982	0.995	1.023	0.99	0.96	0.97
CE144	1.248E-19	1.259E-19	1.280E-19	0.989	0.997	1.014	0.99	0.97	0.98	5.704E-39	5.778E-39	5.980E-39	0.980	0.993	1.027	0.99	0.95	0.97
ND143	5.387E+00	5.688E+00	5.588E+00	0.970	1.024	1.006	0.95	0.96	1.02	5.387E+00	5.688E+00	5.588E+00	0.970	1.024	1.006	0.95	0.96	1.02
ND144	9.151E+00	8.997E+00	8.988E+00	1.012	0.995	0.994	1.02	1.02	1.00	9.151E+00	8.997E+00	8.988E+00	1.012	0.995	0.994	1.02	1.02	1.00
ND145	4.612E+00	4.712E+00	4.617E+00	0.992	1.014	0.994	0.98	1.00	1.02	4.612E+00	4.712E+00	4.617E+00	0.992	1.014	0.994	0.98	1.00	1.02
ND146	4.690E+00	4.625E+00	4.693E+00	1.004	0.991	1.005	1.01	1.00	0.99	4.690E+00	4.625E+00	4.693E+00	1.004	0.991	1.005	1.01	1.00	0.99
PM147	1.831E-06	2.432E-06	2.288E-06	0.838	1.114	1.048	0.75	0.80	1.06	3.353E-12	4.447E-12	4.187E-12	0.839	1.113	1.048	0.75	0.80	1.06
SM147	1.356E+00	1.713E+00	1.663E+00	0.860	1.086	1.054	0.79	0.82	1.03	1.356E+00	1.713E+00	1.663E+00	0.860	1.086	1.054	0.79	0.82	1.03
SM148	1.111E+00	7.417E-01	8.395E-01	1.238	0.826	0.935	1.50	1.32	0.88	1.111E+00	7.417E-01	8.395E-01	1.238	0.826	0.935	1.50	1.32	0.88
SM149	2.510E-02	3.106E-02	2.704E-02	0.905	1.120	0.975	0.81	0.93	1.15	2.510E-02	3.106E-02	2.704E-02	0.905	1.120	0.975	0.81	0.93	1.15
SM150	2.104E+00	2.151E+00	2.140E+00	0.987	1.009	1.004	0.98	0.98	1.01	2.104E+00	2.151E+00	2.140E+00	0.987	1.009	1.004	0.98	0.98	1.01
SM151	6.153E-02	7.281E-02	5.800E-02	0.960	1.136	0.905	0.85	1.06	1.26	4.187E-02	4.954E-02	3.946E-02	0.960	1.136	0.905	0.85	1.06	1.26
SM152	8.776E-01	8.819E-01	7.074E-01	1.067	1.072	0.860	1.00	1.24	1.25	8.777E-01	8.819E-01	7.074E-01	1.067	1.072	0.860	1.00	1.24	1.25
EU153	7.180E-01	7.332E-01	8.036E-01	0.955	0.976	1.069	0.98	0.89	0.91	7.180E-01	7.332E-01	8.036E-01	0.955	0.976	1.069	0.98	0.89	0.91
EU154	4.605E-03	4.628E-03	4.070E-03	1.038	1.044	0.918	1.00	1.13	1.14	8.187E-05	8.224E-05	7.234E-05	1.039	1.043	0.918	1.00	1.13	1.14
EU155	8.507E-05	9.146E-05	8.206E-05	0.987	1.061	0.952	0.93	1.04	1.11	7.847E-08	8.443E-08	7.576E-08	0.986	1.061	0.952	0.93	1.04	1.11
U234	9.189E-01	9.097E-01	7.525E-01	1.068	1.057	0.875	1.01	1.22	1.21	1.053E+00	1.054E+00	7.999E-01	1.087	1.088	0.826	1.00	1.32	1.32
U235	3.189E+01	3.262E+01	3.381E+01	0.973	0.995	1.032	0.98	0.94	0.96	3.192E+01	3.265E+01	3.381E+01	0.973	0.996	1.031	0.98	0.94	0.97
U236	1.642E+01	1.643E+01	1.630E+01	1.002	1.003	0.995	1.00	1.01	1.01	1.647E+01	1.648E+01	1.630E+01	1.003	1.004	0.993	1.00	1.01	1.01
U238	3.969E+03	3.965E+03	3.966E+03	1.001	1.000	1.000	1.00	1.00	1.00	3.969E+03	3.965E+03	3.966E+03	1.001	1.000	1.000	1.00	1.00	1.00
NP237	2.125E+00	2.253E+00	1.804E+00	1.031	1.093	0.875	0.94	1.18	1.25	2.499E+00	2.681E+00	1.804E+00	1.073	1.152	0.775	0.93	1.39	1.49
PU238	4.098E-01	4.427E-01	3.719E-01	1.004	1.085	0.911	0.93	1.10	1.19	2.764E-01	2.987E-01	2.508E-01	1.004	1.085	0.911	0.93	1.10	1.19
PU239	2.109E+01	2.366E+01	2.211E+01	0.946	1.062	0.992	0.89	0.95	1.07	2.106E+01	2.363E+01	2.208E+01	0.946	1.062	0.992	0.89	0.95	1.07
PU240	9.774E+00	8.760E+00	8.615E+00	1.080	0.968	0.952	1.12	1.13	1.02	9.735E+00	8.727E+00	8.570E+00	1.080	0.969	0.951	1.12	1.14	1.02
PU241	4.659E-01	5.596E-01	5.583E-01	0.882	1.060	1.058	0.83	0.83	1.00	4.198E-02	5.296E-02	5.284E-02	0.852	1.075	1.073	0.79	0.79	1.00
PU242	1.954E+00	1.993E+00	2.357E+00	0.930	0.948	1.122	0.98	0.83	0.85	1.954E+00	1.993E+00	2.356E+00	0.930	0.949	1.121	0.98	0.83	0.85
AM241	4.567E+00	5.201E+00	5.186E+00	0.916	1.043	1.040	0.88	0.88	1.00	4.616E+00	5.280E+00	5.264E+00	0.913	1.045	1.042	0.87	0.88	1.00
AM242	2.520E-08	4.161E-08	2.037E-08	0.867	1.432	0.701	0.61	1.24	2.04	2.006E-08	3.313E-08	1.621E-08	0.867	1.432	0.701	0.61	1.24	2.04
AM243	3.760E-01	4.140E-01	4.803E-01	0.888	0.978	1.134	0.91	0.78	0.86	3.743E-01	4.121E-01	4.780E-01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	5.094E-06	8.414E-06	4.125E-06	0.867	1.432	0.702	0.61	1.23	2.04	4.056E-06	6.698E-06	3.284E-06	0.867	1.431	0.702	0.61	1.24	2.04
CM243	4.250E-04	1.139E-04	3.813E-04	1.386	0.371	1.243	3.73	1.11	0.30	1.260E-04	3.376E-05	1.130E-04	1.386	0.371	1.243	3.73	1.12	0.30
CM244	1.591E-02	1.549E-02	1.976E-02	0.933	0.908	1.159	1.03	0.81	0.78	2.348E-03	2.285E-03	2.914E-03	0.933	0.908	1.158	1.03	0.81	0.78
CM245	3.881E-03	4.158E-03	6.012E-03	0.829	0.888	1.284	0.93	0.65	0.69	3.866E-03	4.141E-03	5.988E-03	0.829	0.888	1.284	0.93	0.65	0.69
CM246	4.729E-04	4.977E-04	6.415E-04	0.880	0.926	1.194	0.95	0.74	0.78	4.694E-04	4.941E-04	6.368E-04	0.880	0.926	1.194	0.95	0.74	0.78
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.09	7.71	7.24	15.5	12.0	13.9				7.32	7.94	7.63	15.6	12.8	14.6
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.53	6.34	5.99	8.4	10.2	10.5				5.77	6.58	6.40	8.5	11.0	11.3
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.75	5.17	5.09	7.7	9.3	7.8				5.12	5.25	5.45	7.9	10.1	8.3
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / SM148		AM242	CM246				SB125	CM243	CM245 / SM148		AM242	NP237		

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	********** 300 YR									********** 1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
SE 79	7.391E-02	6.788E-02	6.258E-02	1.085	0.996	0.919	1.09	1.18	1.08	7.336E-02	6.737E-02	6.211E-02	1.085	0.996	0.919	1.09	1.18	1.08
KR 85	1.058E-09	1.051E-09	1.060E-09	1.002	0.995	1.003	1.01	1.00	0.99	2.332E-29	2.316E-29	2.333E-29	1.002	0.995	1.003	1.01	1.00	0.99
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	4.669E-03	4.637E-03	4.742E-03	0.997	0.990	1.013	1.01	0.98	0.98	2.712E-10	2.691E-10	2.751E-10	0.998	0.990	1.012	1.01	0.99	0.98
Y 90	1.171E-06	1.163E-06	1.189E-06	0.997	0.990	1.012	1.01	0.98	0.98	6.800E-14	6.748E-14	6.900E-14	0.998	0.990	1.012	1.01	0.99	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	7.674E+00	7.747E+00	7.570E+00	1.001	1.011	0.988	0.99	1.01	1.02	7.671E+00	7.744E+00	7.568E+00	1.001	1.011	0.988	0.99	1.01	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	7.760E+00	7.918E+00	7.896E+00	0.988	1.008	1.005	0.98	0.98	1.00	7.742E+00	7.900E+00	7.878E+00	0.988	1.008	1.005	0.98	0.98	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	2.094E+00	1.928E+00	2.147E+00	1.018	0.938	1.044	1.09	0.98	0.90	2.093E+00	1.928E+00	2.147E+00	1.018	0.938	1.044	1.09	0.97	0.90
SN126	2.198E-01	1.558E-01	1.790E-01	1.189	0.843	0.968	1.41	1.23	0.87	2.187E-01	1.551E-01	1.782E-01	1.189	0.843	0.968	1.41	1.23	0.87
SB125	0.0	0.0	1.604E-34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.395E+00	1.450E+00	1.399E+00	0.986	1.025	0.989	0.96	1.00	1.04	1.395E+00	1.450E+00	1.399E+00	0.986	1.025	0.989	0.96	1.00	1.04
CS133	8.449E+00	8.627E+00	8.455E+00	0.993	1.014	0.993	0.98	1.00	1.02	8.449E+00	8.627E+00	8.455E+00	0.993	1.014	0.993	0.98	1.00	1.02
CS134	0.0	0.0	1.435E-44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	2.196E+00	2.466E+00	2.434E+00	0.928	1.043	1.029	0.89	0.90	1.01	2.195E+00	2.466E+00	2.434E+00	0.928	1.043	1.029	0.89	0.90	1.01
CS137	8.547E-03	8.888E-03	9.136E-03	0.965	1.003	1.031	0.96	0.94	0.97	8.083E-10	9.208E-10	9.465E-10	0.906	1.032	1.061	0.88	0.85	0.97
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	5.387E+00	5.688E+00	5.588E+00	0.970	1.024	1.006	0.95	0.96	1.02	5.387E+00	5.688E+00	5.588E+00	0.970	1.024	1.006	0.95	0.96	1.02
ND144	9.151E+00	8.997E+00	8.988E+00	1.012	0.995	0.994	1.02	1.02	1.00	9.151E+00	8.997E+00	8.988E+00	1.012	0.995	0.994	1.02	1.02	1.00
ND145	4.612E+00	4.712E+00	4.617E+00	0.992	1.014	0.994	0.98	1.00	1.02	4.612E+00	4.712E+00	4.617E+00	0.992	1.014	0.994	0.98	1.00	1.02
ND146	4.690E+00	4.625E+00	4.693E+00	1.004	0.991	1.005	1.01	1.00	0.99	4.690E+00	4.625E+00	4.693E+00	1.004	0.991	1.005	1.01	1.00	0.99
PM147	0.0	0.0	4.696E-35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	1.356E+00	1.713E+00	1.663E+00	0.860	1.086	1.054	0.79	0.82	1.03	1.356E+00	1.713E+00	1.663E+00	0.860	1.086	1.054	0.79	0.82	1.03
SM148	1.111E+00	7.417E-01	8.395E-01	1.238	0.826	0.935	1.50	1.32	0.88	1.111E+00	7.417E-01	8.395E-01	1.238	0.826	0.935	1.50	1.32	0.88
SM149	2.510E-02	3.106E-02	2.704E-02	0.905	1.120	0.975	0.81	0.93	1.15	2.510E-02	3.106E-02	2.704E-02	0.905	1.120	0.975	0.81	0.93	1.15
SM150	2.104E+00	2.151E+00	2.140E+00	0.987	1.009	1.004	0.98	0.98	1.01	2.104E+00	2.151E+00	2.140E+00	0.987	1.009	1.004	0.98	0.98	1.01
SM151	8.971E-03	1.061E-02	8.457E-03	0.960	1.135	0.905	0.85	1.06	1.25	4.082E-05	4.837E-05	3.853E-05	0.959	1.136	0.905	0.84	1.06	1.26
SM152	8.777E-01	8.819E-01	7.074E-01	1.067	1.072	0.860	1.00	1.24	1.25	8.777E-01	8.819E-01	7.074E-01	1.067	1.072	0.860	1.00	1.24	1.25
EU153	7.180E-01	7.332E-01	8.036E-01	0.955	0.976	1.069	0.98	0.89	0.91	7.180E-01	7.332E-01	8.036E-01	0.955	0.976	1.069	0.98	0.89	0.91
EU154	8.176E-12	8.203E-12	7.220E-12	1.039	1.043	0.918	1.00	1.13	1.14	0.0	0.0	2.268E-36	0.0	0.0	0.0	0.0	0.0	0.0
EU155	5.681E-20	6.132E-20	5.505E-20	0.984	1.062	0.954	0.93	1.03	1.11	0.0	0.0	1.799E-62	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.272E+00	1.292E+00	8.777E-01	1.109	1.126	0.765	0.98	1.45	1.47	1.327E+00	1.352E+00	8.968E-01	1.113	1.134	0.752	0.98	1.48	1.51
U235	3.204E+01	3.279E+01	3.381E+01	0.974	0.997	1.028	0.98	0.95	0.97	3.246E+01	3.326E+01	3.381E+01	0.978	1.003	1.019	0.98	0.96	0.98
U236	1.667E+01	1.666E+01	1.630E+01	1.008	1.007	0.985	1.00	1.02	1.02	1.735E+01	1.727E+01	1.630E+01	1.022	1.017	0.960	1.00	1.06	1.06
U238	3.969E+03	3.965E+03	3.966E+03	1.001	1.000	1.000	1.00	1.00	1.00	3.969E+03	3.965E+03	3.966E+03	1.001	1.000	1.000	1.00	1.00	1.00
NP237	3.777E+00	4.145E+00	1.804E+00	1.165	1.279	0.556	0.91	2.09	2.30	6.057E+00	6.755E+00	1.804E+00	1.243	1.386	0.370	0.90	3.36	3.74
PU238	5.730E-02	6.214E-02	5.196E-02	1.003	1.088	0.909	0.92	1.10	1.20	2.553E-04	2.933E-04	2.291E-04	0.985	1.131	0.884	0.87	1.11	1.28
PU239	2.094E+01	2.350E+01	2.195E+01	0.946	1.062	0.992	0.89	0.95	1.07	2.055E+01	2.306E+01	2.152E+01	0.947	1.062	0.991	0.89	0.95	1.07
PU240	9.533E+00	8.546E+00	8.390E+00	1.080	0.969	0.951	1.12	1.14	1.02	8.851E+00	7.934E+00	7.791E+00	1.080	0.969	0.951	1.12	1.14	1.02
PU241	9.220E-06	1.130E-05	4.239E-06	1.117	1.369	0.514	0.82	2.18	2.67	6.096E-06	6.666E-06	1.960E-20	1.433	1.567	0.000	0.91	****	****
PU242	1.953E+00	1.992E+00	2.356E+00	0.930	0.948	1.122	0.98	0.83	0.85	1.951E+00	1.990E+00	2.353E+00	0.930	0.949	1.122	0.98	0.83	0.85
AM241	3.381E+00	3.871E+00	3.859E+00	0.913	1.045	1.042	0.87	0.88	1.00	1.100E+00	1.260E+00	1.256E+00	0.913	1.045	1.042	0.87	0.88	1.00
AM242	8.058E-09	1.331E-08	6.513E-09	0.867	1.432	0.701	0.61	1.24	2.04	3.311E-10	5.467E-10	2.676E-10	0.867	1.432	0.701	0.61	1.24	2.04
AM243	3.673E-01	4.044E-01	4.692E-01	0.888	0.978	1.134	0.91	0.78	0.86	3.439E-01	3.787E-01	4.393E-01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	1.629E-06	2.691E-06	1.319E-06	0.867	1.432	0.702	0.61	1.24	2.04	6.695E-08	1.105E-07	5.420E-08	0.867	1.431	0.702	0.61	1.24	2.04
CM243	9.723E-07	2.604E-07	8.723E-07	1.386	0.371	1.243	3.73	1.11	0.30	3.928E-14	1.052E-14	3.522E-14	1.386	0.371	1.243	3.73	1.12	0.30
CM244	1.112E-06	1.082E-06	1.381E-06	0.933	0.908	1.159	1.03	0.81	0.78	2.359E-15	2.503E-18	3.193E-18	2.993	0.003	0.004	****	****	0.78
CM245	3.803E-03	4.074E-03	5.890E-03	0.829	0.888	1.284	0.93	0.65	0.69	3.592E-03	3.848E-03	5.563E-03	0.829	0.888	1.283	0.93	0.65	0.69
CM246	4.558E-04	4.798E-04	6.184E-04	0.880	0.926	1.194	0.95	0.74	0.78	4.114E-04	4.330E-04	5.581E-04	0.880	0.926	1.194	0.95	0.74	0.78

AVERAGE-ABSOLUTE-DEVIATION, AS %	7.05	9.27	9.34	15.5	16.0	21.6			13.12	12.64	13.43	****	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	5.72	7.03	8.05	9.1	13.6	16.9			6.76	7.86	8.60	16.7	17.3	22.4
AV-ABS-DEV EXCLUDING LARGEST TWO, %	4.87	5.26	6.61	8.1	10.7	14.1			5.58	5.70	6.50	9.9	11.6	14.3

NUCS EXCLUDED, 1ST/2ND: SM148 CM243 PU241 / SN126 AM242 NP237 CM244 CM243 PU241 / SM148 AM242 NP237

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	ORIGEN2	ORIGEN-S	CINDER	10 KYR OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	6.664E-02	6.120E-02	5.642E-02	1.085	0.996	0.919	1.09	1.18	1.08
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	7.640E+00	7.713E+00	7.537E+00	1.001	1.011	0.988	0.99	1.01	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	7.519E+00	7.672E+00	7.651E+00	0.988	1.008	1.005	0.98	0.98	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	2.091E+00	1.926E+00	2.145E+00	1.018	0.938	1.044	1.09	0.97	0.90
SN126	2.055E-01	1.457E-01	1.674E-01	1.189	0.843	0.968	1.41	1.23	0.87
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.394E+00	1.449E+00	1.398E+00	0.986	1.025	0.989	0.96	1.00	1.04
CS133	8.449E+00	8.627E+00	8.455E+00	0.993	1.014	0.993	0.98	1.00	1.02
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	2.189E+00	2.459E+00	2.427E+00	0.928	1.043	1.029	0.89	0.90	1.01
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	5.387E+00	5.688E+00	5.588E+00	0.970	1.024	1.006	0.95	0.96	1.02
ND144	9.151E+00	8.997E+00	8.988E+00	1.012	0.995	0.994	1.02	1.02	1.00
ND145	4.612E+00	4.712E+00	4.617E+00	0.992	1.014	0.994	0.98	1.00	1.02
ND146	4.690E+00	4.625E+00	4.693E+00	1.004	0.991	1.005	1.01	1.00	0.99
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	1.356E+00	1.713E+00	1.663E+00	0.860	1.086	1.054	0.79	0.82	1.03
SM148	1.111E+00	7.417E-01	8.395E-01	1.238	0.826	0.935	1.50	1.32	0.88
SM149	2.510E-02	3.106E-02	2.704E-02	0.905	1.120	0.975	0.81	0.93	1.15
SM150	2.104E+00	2.151E+00	2.140E+00	0.987	1.009	1.004	0.98	0.98	1.01
SM151	3.206E-35	3.816E-35	3.033E-35	0.957	1.139	0.905	0.84	1.06	1.26
SM152	8.777E-01	8.819E-01	7.074E-01	1.067	1.072	0.860	1.00	1.24	1.25
EU153	7.180E-01	7.332E-01	8.036E-01	0.955	0.976	1.069	0.98	0.89	0.91
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.300E+00	1.324E+00	8.743E-01	1.115	1.135	0.750	0.98	1.49	1.51
U235	3.718E+01	3.855E+01	3.381E+01	1.018	1.056	0.926	0.96	1.10	1.14
U236	2.279E+01	2.214E+01	1.630E+01	1.117	1.085	0.799	1.03	1.40	1.36
U238	3.969E+03	3.965E+03	3.966E+03	1.001	1.000	1.000	1.00	1.00	1.00
NP237	7.139E+00	7.993E+00	1.799E+00	1.265	1.416	0.319	0.89	3.97	4.44
PU238	4.716E-23	7.769E-23	3.802E-23	0.869	1.431	0.700	0.61	1.24	2.04
PU239	1.603E+01	1.798E+01	1.661E+01	0.950	1.066	0.984	0.89	0.97	1.08
PU240	3.409E+00	3.055E+00	3.006E+00	1.080	0.968	0.952	1.12	1.13	1.02
PU241	2.926E-06	3.200E-06	0.0	0.955	1.045	0.0	0.91	0.0	0.0
PU242	1.920E+00	1.958E+00	2.314E+00	0.930	0.949	1.121	0.98	0.83	0.85
AM241	8.847E-05	9.883E-05	6.765E-07	1.412	1.577	0.011	0.90	****	****
AM242	4.977E-28	8.198E-28	4.010E-28	0.869	1.431	0.700	0.61	1.24	2.04
AM243	1.477E-01	1.626E-01	1.886E-01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	1.009E-25	1.663E-25	8.122E-26	0.869	1.432	0.699	0.61	1.24	2.05
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	2.357E-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	1.724E-03	1.847E-03	2.664E-03	0.830	0.889	1.282	0.93	0.65	0.69
CM246	1.101E-04	1.158E-04	1.493E-04	0.880	0.926	1.194	0.95	0.74	0.78

AVERAGE-ABSOLUTE-DEVIATION, AS %	8.75	11.33	13.49	11.4	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	7.13	8.70	10.43	10.3	22.3	30.5
AV-ABS-DEV EXCLUDING LARGEST TWO, %	5.85	6.13	7.93	9.3	13.2	20.6

NUCS EXCLUDED, 1ST/2ND: SM148 CM242 AM241 / SN126 AM242 NP237

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.116E-01	1.032E-01	9.435E-02	1.083	1.001	0.916	1.08	1.18	1.09	1.116E-01	1.032E-01	9.434E-02	1.083	1.001	0.916	1.08	1.18	1.09
KR 85	4.099E-01	4.075E-01	4.094E-01	1.002	0.996	1.001	1.01	1.00	1.00	2.983E-01	2.965E-01	2.979E-01	1.002	0.996	1.001	1.01	1.00	1.00
SR 89	2.120E-01	2.170E-01	2.190E-01	0.981	1.005	1.014	0.98	0.97	0.99	4.154E-12	4.250E-12	4.296E-12	0.981	1.004	1.015	0.98	0.97	0.99
SR 90	8.845E+00	8.783E+00	8.969E+00	0.998	0.991	1.012	1.01	0.99	0.98	7.868E+00	7.813E+00	7.978E+00	0.998	0.991	1.012	1.01	0.99	0.98
Y 90	2.219E-03	2.203E-03	2.249E-03	0.998	0.991	1.011	1.01	0.99	0.98	1.973E-03	1.959E-03	2.001E-03	0.998	0.991	1.012	1.01	0.99	0.98
Y 91	3.458E-01	3.525E-01	3.607E-01	0.980	0.999	1.022	0.98	0.96	0.98	1.980E-10	2.019E-10	2.068E-10	0.979	0.998	1.023	0.98	0.96	0.98
ZR 93	1.161E+01	1.168E+01	1.140E+01	1.004	1.010	0.986	0.99	1.02	1.02	1.161E+01	1.168E+01	1.140E+01	1.004	1.010	0.986	0.99	1.02	1.02
ZR 95	5.692E-01	5.790E-01	5.872E-01	0.984	1.001	1.015	0.98	0.97	0.99	2.014E-09	2.045E-09	2.153E-09	0.973	0.988	1.040	0.98	0.94	0.95
NB 95	4.048E-01	4.110E-01	4.147E-01	0.987	1.002	1.011	0.98	0.98	0.99	2.456E-09	2.494E-09	2.607E-09	0.975	0.990	1.035	0.98	0.94	0.96
TC 99	1.114E+01	1.145E+01	1.137E+01	0.984	1.011	1.004	0.97	0.98	1.01	1.114E+01	1.145E+01	1.137E+01	0.984	1.011	1.004	0.97	0.98	1.01
RU106	1.902E+00	1.769E+00	1.966E+00	1.012	0.941	1.046	1.08	0.97	0.90	6.464E-02	6.014E-02	6.683E-02	1.012	0.942	1.046	1.07	0.97	0.90
PD107	3.099E+00	2.824E+00	3.180E+00	1.021	0.931	1.048	1.10	0.97	0.89	3.099E+00	2.824E+00	3.180E+00	1.021	0.931	1.048	1.10	0.97	0.89
SN126	3.191E-01	2.332E-01	2.635E-01	1.173	0.858	0.969	1.37	1.21	0.89	3.190E-01	2.332E-01	2.635E-01	1.173	0.858	0.969	1.37	1.21	0.89
SB125	1.461E-01	1.019E-01	8.302E-02	1.324	0.924	0.752	1.43	1.76	1.23	4.271E-02	2.979E-02	2.427E-02	1.324	0.924	0.752	1.43	1.76	1.23
I129	2.034E+00	2.168E+00	2.056E+00	0.975	1.039	0.986	0.94	0.99	1.05	2.041E+00	2.175E+00	2.065E+00	0.975	1.039	0.986	0.94	0.99	1.05
CS133	1.196E+01	1.239E+01	1.204E+01	0.986	1.021	0.993	0.97	0.99	1.03	1.196E+01	1.239E+01	1.204E+01	0.986	1.021	0.993	0.97	0.99	1.03
CS134	1.623E+00	1.527E+00	1.598E+00	1.025	0.965	1.010	1.06	1.02	0.96	3.107E-01	2.924E-01	3.060E-01	1.025	0.965	1.010	1.06	1.02	0.96
CS135	4.197E+00	4.635E+00	4.534E+00	0.942	1.040	1.018	0.91	0.93	1.02	4.197E+00	4.635E+00	4.534E+00	0.942	1.040	1.018	0.91	0.93	1.02
CS137	1.302E+01	1.303E+01	1.339E+01	0.990	0.991	1.019	1.00	0.97	0.97	1.163E+01	1.164E+01	1.196E+01	0.990	0.991	1.018	1.00	0.97	0.97
CE144	2.723E+00	2.728E+00	2.807E+00	0.989	0.991	1.020	1.00	0.97	0.97	3.410E-02	3.418E-02	3.523E-02	0.988	0.991	1.021	1.00	0.97	0.97
ND143	7.466E+00	8.045E+00	7.912E+00	0.956	1.030	1.013	0.93	0.94	1.02	7.502E+00	8.081E+00	7.950E+00	0.956	1.030	1.013	0.93	0.94	1.02
ND144	1.183E+01	1.142E+01	1.134E+01	1.026	0.990	0.984	1.04	1.04	1.01	1.452E+01	1.412E+01	1.411E+01	1.019	0.991	0.990	1.03	1.03	1.00
ND145	6.731E+00	6.918E+00	6.716E+00	0.992	1.019	0.989	0.97	1.00	1.03	6.731E+00	6.918E+00	6.716E+00	0.992	1.019	0.989	0.97	1.00	1.03
ND146	7.397E+00	7.216E+00	7.403E+00	1.008	0.983	1.009	1.03	1.00	0.97	7.397E+00	7.216E+00	7.403E+00	1.008	0.983	1.009	1.03	1.00	0.97
PM147	1.014E+00	1.488E+00	1.355E+00	0.789	1.157	1.054	0.68	0.75	1.10	2.788E-01	4.082E-01	3.720E-01	0.790	1.156	1.054	0.68	0.75	1.10
SM147	6.218E-01	6.632E-01	7.076E-01	0.936	0.998	1.065	0.94	0.88	0.94	1.365E+00	1.752E+00	1.700E+00	0.850	1.091	1.059	0.78	0.80	1.03
SM148	2.075E+00	1.434E+00	1.600E+00	1.218	0.842	0.940	1.45	1.30	0.90	2.081E+00	1.441E+00	1.610E+00	1.216	0.842	0.941	1.44	1.29	0.90
SM149	2.858E-02	3.697E-02	3.194E-02	0.879	1.138	0.983	0.77	0.89	1.16	2.858E-02	3.697E-02	3.195E-02	0.879	1.138	0.983	0.77	0.89	1.16
SM150	3.073E+00	3.238E+00	3.261E+00	0.963	1.015	1.022	0.95	0.94	0.99	3.073E+00	3.238E+00	3.261E+00	0.963	1.015	1.022	0.95	0.94	0.99
SM151	1.261E-01	1.566E-01	1.149E-01	0.951	1.182	0.867	0.81	1.10	1.36	1.214E-01	1.508E-01	1.107E-01	0.951	1.182	0.867	0.81	1.10	1.36
SM152	1.120E+00	1.230E+00	8.790E-01	1.041	1.143	0.817	0.91	1.27	1.40	1.120E+00	1.230E+00	8.790E-01	1.041	1.143	0.817	0.91	1.27	1.40
EU153	1.142E+00	1.124E+00	1.203E+00	0.988	0.972	1.040	1.02	0.95	0.93	1.142E+00	1.124E+00	1.203E+00	0.988	0.972	1.040	1.02	0.95	0.93
EU154	4.499E-01	4.581E-01	4.028E-01	1.030	1.048	0.922	0.98	1.12	1.14	3.027E-01	3.082E-01	2.710E-01	1.030	1.048	0.922	0.98	1.12	1.14
EU155	1.649E-01	1.772E-01	1.619E-01	0.982	1.055	0.964	0.93	1.02	1.09	8.291E-02	8.911E-02	8.143E-02	0.981	1.055	0.964	0.93	1.02	1.09
U234	8.505E-01	8.619E-01	8.419E-01	0.999	1.012	0.989	0.99	1.01	1.02	9.007E-01	9.176E-01	8.575E-01	1.010	1.029	0.961	0.98	1.05	1.07
U235	3.444E+01	3.669E+01	3.904E+01	0.938	0.999	1.063	0.94	0.88	0.94	3.444E+01	3.670E+01	3.904E+01	0.938	0.999	1.063	0.94	0.88	0.94
U236	2.551E+01	2.557E+01	2.538E+01	1.001	1.003	0.996	1.00	1.01	1.01	2.552E+01	2.557E+01	2.538E+01	1.001	1.003	0.996	1.00	1.01	1.01
U238	3.873E+03	3.867E+03	3.869E+03	1.001	0.999	1.000	1.00	1.00	1.00	3.873E+03	3.867E+03	3.869E+03	1.001	0.999	1.000	1.00	1.00	1.00
NP237	3.241E+00	3.401E+00	3.241E+00	0.984	1.032	0.984	0.95	1.00	1.05	3.251E+00	3.412E+00	3.244E+00	0.984	1.033	0.982	0.95	1.00	1.05
PU238	1.246E+00	1.388E+00	1.180E+00	0.980	1.092	0.928	0.90	1.06	1.18	1.278E+00	1.418E+00	1.219E+00	0.979	1.087	0.934	0.90	1.05	1.16
PU239	2.441E+01	2.687E+01	2.421E+01	0.970	1.068	0.962	0.91	1.01	1.11	2.441E+01	2.687E+01	2.421E+01	0.970	1.068	0.962	0.91	1.01	1.11
PU240	1.112E+01	1.073E+01	9.862E+00	1.052	1.015	0.933	1.04	1.13	1.09	1.116E+01	1.077E+01	9.857E+00	1.053	1.016	0.930	1.04	1.13	1.09
PU241	6.941E+00	7.631E+00	7.806E+00	0.931	1.023	1.046	0.91	0.89	0.98	5.478E+00	6.051E+00	6.190E+00	0.927	1.024	1.048	0.91	0.88	0.98
PU242	3.226E+00	3.101E+00	3.747E+00	0.961	0.923	1.116	1.04	0.86	0.83	3.226E+00	3.101E+00	3.747E+00	0.961	0.923	1.116	1.04	0.86	0.83
AM241	2.609E-01	2.713E-01	3.020E-01	0.938	0.976	1.086	0.96	0.86	0.90	1.716E+00	1.842E+00	1.905E+00	0.942	1.012	1.046	0.93	0.90	0.97
AM242	5.977E-08	1.012E-07	4.847E-08	0.856	1.450	0.694	0.59	1.23	2.09	5.845E-08	9.895E-08	4.740E-08	0.856	1.449	0.694	0.59	1.23	2.09
AM243	7.602E-01	8.437E-01	1.010E+00	0.872	0.968	1.159	0.90	0.75	0.84	7.599E-01	8.433E-01	1.009E+00	0.873	0.968	1.159	0.90	0.75	0.84
CM242	8.184E-02	8.574E-02	8.638E-02	0.967	1.013	1.020	0.95	0.95	0.99	5.163E-05	6.168E-05	5.101E-05	0.943	1.126	0.931	0.84	1.01	1.21
CM243	3.527E-03	7.509E-04	3.183E-03	1.418	0.302	1.280	4.70	1.11	0.24	3.130E-03	6.663E-04	2.825E-03	1.418	0.302	1.280	4.70	1.11	0.24
CM244	2.989E-01	2.958E-01	4.018E-01	0.900	0.891	1.210	1.01	0.74	0.74	2.476E-01	2.450E-01	3.329E-01	0.900	0.890	1.210	1.01	0.74	0.74
CM245	1.400E-02	1.501E-02	2.443E-02	0.786	0.843	1.371	0.93	0.57	0.61	1.399E-02	1.500E-02	2.442E-02	0.786	0.843	1.372	0.93	0.57	0.61
CM246	2.065E-03	2.348E-03	3.325E-03	0.801	0.910	1.289	0.88	0.62	0.71	2.063E-03	2.346E-03	3.323E-03	0.800	0.910	1.289	0.88	0.62	0.71
AVERAGE-ABSOLUTE-DEVIATION, AS %				6.40	6.64	6.82	15.5	10.5	12.2				6.66	7.06	6.95	16.1	10.7	12.6
AV-ABS-DEV EXCLUDING LARGEST ONE, %				4.84	5.14	5.40	7.2	8.9	8.7				5.12	5.60	5.54	7.8	9.1	9.1
AV-ABS-DEV EXCLUDING LARGEST TWO, %				3.94	3.96	4.33	6.4	7.8	8.0				4.23	4.45	4.48	7.0	8.0	8.4
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / SM148		AM242		CM246			SB125	CM243	CM245 / SM148		AM242		CM246	

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.115E-01	1.032E-01	9.434E-02	1.082	1.002	0.916	1.08	1.18	1.09	1.115E-01	1.031E-01	9.433E-02	1.083	1.001	0.916	1.08	1.18	1.09
KR 85	2.159E-01	2.146E-01	2.156E-01	1.002	0.996	1.001	1.01	1.00	1.00	1.131E-01	1.124E-01	1.129E-01	1.003	0.996	1.001	1.01	1.00	1.00
SR 89	5.392E-23	5.511E-23	5.582E-23	0.981	1.003	1.016	0.98	0.97	0.99	0.0	0.0	9.424E-45	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	6.985E+00	6.936E+00	7.083E+00	0.998	0.991	1.012	1.01	0.99	0.98	5.506E+00	5.467E+00	5.582E+00	0.998	0.991	1.012	1.01	0.99	0.98
Y 90	1.752E-03	1.739E-03	1.776E-03	0.998	0.991	1.012	1.01	0.99	0.98	1.381E-03	1.371E-03	1.400E-03	0.998	0.991	1.012	1.01	0.99	0.98
Y 91	7.949E-20	8.100E-20	8.313E-20	0.979	0.997	1.024	0.98	0.96	0.97	1.281E-38	1.304E-38	1.343E-38	0.978	0.996	1.026	0.98	0.95	0.97
ZR 93	1.161E+01	1.168E+01	1.140E+01	1.004	1.010	0.986	0.99	1.02	1.02	1.161E+01	1.168E+01	1.140E+01	1.004	1.010	0.986	0.99	1.02	1.02
ZR 95	5.147E-18	5.217E-18	5.708E-18	0.961	0.974	1.065	0.99	0.90	0.91	3.363E-35	3.395E-35	4.011E-35	0.937	0.946	1.117	0.99	0.84	0.85
NB 95	6.278E-18	6.364E-18	6.911E-18	0.963	0.976	1.060	0.99	0.91	0.92	4.102E-35	4.142E-35	4.857E-35	0.939	0.948	1.112	0.99	0.84	0.85
TC 99	1.114E+01	1.145E+01	1.137E+01	0.984	1.011	1.004	0.97	0.98	1.01	1.114E+01	1.145E+01	1.137E+01	0.984	1.011	1.004	0.97	0.98	1.01
RU106	2.076E-03	1.932E-03	2.147E-03	1.012	0.942	1.046	1.07	0.97	0.90	2.211E-06	1.993E-06	2.216E-06	1.033	0.931	1.036	1.11	1.00	0.90
PD107	3.099E+00	2.824E+00	3.180E+00	1.021	0.931	1.048	1.10	0.97	0.89	3.099E+00	2.824E+00	3.180E+00	1.021	0.931	1.048	1.10	0.97	0.89
SN126	3.190E-01	2.332E-01	2.635E-01	1.173	0.858	0.969	1.37	1.21	0.89	3.190E-01	2.332E-01	2.635E-01	1.173	0.858	0.969	1.37	1.21	0.89
SB125	1.222E-02	8.523E-03	6.945E-03	1.324	0.923	0.752	1.43	1.76	1.23	1.001E-03	6.978E-04	5.687E-04	1.324	0.923	0.752	1.43	1.76	1.23
I129	2.041E+00	2.175E+00	2.065E+00	0.975	1.039	0.986	0.94	0.99	1.05	2.041E+00	2.175E+00	2.065E+00	0.975	1.039	0.986	0.94	0.99	1.05
CS133	1.196E+01	1.239E+01	1.204E+01	0.986	1.021	0.993	0.97	0.99	1.03	1.196E+01	1.239E+01	1.204E+01	0.986	1.021	0.993	0.97	0.99	1.03
CS134	5.786E-02	5.444E-02	5.698E-02	1.025	0.965	1.010	1.06	1.02	0.96	2.006E-03	1.888E-03	1.976E-03	1.025	0.965	1.010	1.06	1.02	0.96
CS135	4.197E+00	4.635E+00	4.534E+00	0.942	1.040	1.018	0.91	0.93	1.02	4.197E+00	4.635E+00	4.534E+00	0.942	1.040	1.018	0.91	0.93	1.02
CS137	1.036E+01	1.037E+01	1.066E+01	0.990	0.991	1.019	1.00	0.97	0.97	8.221E+00	8.243E+00	8.473E+00	0.989	0.992	1.019	1.00	0.97	0.97
CE144	3.970E-04	3.981E-04	4.111E-04	0.987	0.990	1.022	1.00	0.97	0.97	5.380E-08	5.399E-08	5.595E-08	0.986	0.989	1.025	1.00	0.96	0.96
ND143	7.502E+00	8.081E+00	7.950E+00	0.956	1.030	1.013	0.93	0.94	1.02	7.502E+00	8.081E+00	7.950E+00	0.956	1.030	1.013	0.93	0.94	1.02
ND144	1.455E+01	1.415E+01	1.414E+01	1.019	0.991	0.990	1.03	1.03	1.00	1.455E+01	1.415E+01	1.414E+01	1.019	0.991	0.990	1.03	1.03	1.00
ND145	6.731E+00	6.918E+00	6.716E+00	0.992	1.019	0.989	0.97	1.00	1.03	6.731E+00	6.918E+00	6.716E+00	0.992	1.019	0.989	0.97	1.00	1.03
ND146	7.397E+00	7.216E+00	7.403E+00	1.008	0.983	1.009	1.03	1.00	0.97	7.397E+00	7.216E+00	7.403E+00	1.008	0.983	1.009	1.03	1.00	0.97
PM147	7.439E-02	1.089E-01	9.926E-02	0.790	1.156	1.054	0.68	0.75	1.10	5.298E-03	7.753E-03	7.067E-03	0.790	1.156	1.054	0.68	0.75	1.10
SM147	1.570E+00	2.051E+00	1.972E+00	0.842	1.100	1.058	0.77	0.80	1.04	1.639E+00	2.152E+00	2.065E+00	0.840	1.102	1.058	0.76	0.79	1.04
SM148	2.081E+00	1.441E+00	1.610E+00	1.216	0.842	0.941	1.44	1.29	0.90	2.081E+00	1.441E+00	1.610E+00	1.216	0.842	0.941	1.44	1.29	0.90
SM149	2.858E-02	3.697E-02	3.195E-02	0.879	1.138	0.983	0.77	0.89	1.16	2.858E-02	3.697E-02	3.195E-02	0.879	1.138	0.983	0.77	0.89	1.16
SM150	3.073E+00	3.238E+00	3.261E+00	0.963	1.015	1.022	0.95	0.94	0.99	3.073E+00	3.238E+00	3.261E+00	0.963	1.015	1.022	0.95	0.94	0.99
SM151	1.168E-01	1.451E-01	1.065E-01	0.951	1.182	0.867	0.80	1.10	1.36	1.081E-01	1.343E-01	9.858E-02	0.951	1.182	0.867	0.80	1.10	1.36
SM152	1.120E+00	1.230E+00	8.790E-01	1.041	1.143	0.817	0.91	1.27	1.40	1.120E+00	1.230E+00	8.790E-01	1.041	1.143	0.817	0.91	1.27	1.40
EU153	1.142E+00	1.124E+00	1.203E+00	0.988	0.972	1.040	1.02	0.95	0.93	1.142E+00	1.124E+00	1.203E+00	0.988	0.972	1.040	1.02	0.95	0.93
EU154	2.023E-01	2.059E-01	1.811E-01	1.030	1.048	0.922	0.98	1.12	1.14	9.035E-02	9.198E-02	8.088E-02	1.030	1.048	0.922	0.98	1.12	1.14
EU155	4.122E-02	4.430E-02	4.049E-02	0.981	1.055	0.964	0.93	1.02	1.09	1.019E-02	1.095E-02	1.001E-02	0.981	1.055	0.964	0.93	1.02	1.09
U234	9.501E-01	9.726E-01	8.732E-01	1.019	1.044	0.937	0.98	1.09	1.11	1.043E+00	1.076E+00	9.028E-01	1.035	1.068	0.896	0.97	1.16	1.19
U235	3.444E+01	3.670E+01	3.904E+01	0.938	0.999	1.063	0.94	0.88	0.94	3.445E+01	3.671E+01	3.904E+01	0.938	0.999	1.063	0.94	0.88	0.94
U236	2.553E+01	2.558E+01	2.538E+01	1.001	1.003	0.995	1.00	1.01	1.01	2.554E+01	2.559E+01	2.538E+01	1.001	1.003	0.995	1.00	1.01	1.01
U238	3.873E+03	3.867E+03	3.869E+03	1.001	0.999	1.000	1.00	1.00	1.00	3.873E+03	3.867E+03	3.869E+03	1.001	0.999	1.000	1.00	1.00	1.00
NP237	3.270E+00	3.432E+00	3.244E+00	0.986	1.035	0.978	0.95	1.01	1.06	3.330E+00	3.497E+00	3.244E+00	0.992	1.042	0.966	0.95	1.03	1.08
PU238	1.229E+00	1.364E+00	1.172E+00	0.979	1.087	0.934	0.90	1.05	1.16	1.135E+00	1.260E+00	1.083E+00	0.979	1.087	0.934	0.90	1.05	1.16
PU239	2.440E+01	2.687E+01	2.421E+01	0.970	1.068	0.962	0.91	1.01	1.11	2.440E+01	2.686E+01	2.420E+01	0.970	1.068	0.962	0.91	1.01	1.11
PU240	1.120E+01	1.081E+01	9.852E+00	1.055	1.018	0.928	1.04	1.14	1.10	1.125E+01	1.086E+01	9.842E+00	1.056	1.020	0.924	1.04	1.14	1.10
PU241	4.306E+00	4.780E+00	4.890E+00	0.924	1.026	1.050	0.90	0.88	0.98	2.661E+00	2.983E+00	3.052E+00	0.918	1.029	1.053	0.89	0.87	0.98
PU242	3.226E+00	3.101E+00	3.747E+00	0.961	0.923	1.116	1.04	0.86	0.83	3.226E+00	3.101E+00	3.747E+00	0.961	0.923	1.116	1.04	0.86	0.83
AM241	2.869E+00	3.093E+00	3.181E+00	0.941	1.015	1.044	0.93	0.90	0.97	4.455E+00	4.826E+00	4.948E+00	0.939	1.017	1.043	0.92	0.90	0.98
AM242	5.713E-08	9.672E-08	4.633E-08	0.856	1.449	0.694	0.59	1.23	2.09	5.458E-08	9.240E-08	4.426E-08	0.856	1.449	0.694	0.59	1.23	2.09
AM243	7.595E-01	8.429E-01	1.009E+00	0.873	0.968	1.159	0.90	0.75	0.84	7.588E-01	8.421E-01	1.008E+00	0.873	0.968	1.159	0.90	0.75	0.84
CM242	1.157E-05	1.958E-05	9.401E-06	0.856	1.449	0.695	0.59	1.23	2.08	1.104E-05	1.868E-05	8.965E-06	0.856	1.449	0.695	0.59	1.23	2.08
CM243	2.771E-03	5.900E-04	2.501E-03	1.418	0.302	1.280	4.70	1.11	0.24	2.173E-03	4.626E-04	1.961E-03	1.418	0.302	1.280	4.70	1.11	0.24
CM244	2.045E-01	2.023E-01	2.749E-01	0.900	0.890	1.210	1.01	0.74	0.74	1.394E-01	1.380E-01	1.875E-01	0.900	0.891	1.210	1.01	0.74	0.74
CM245	1.399E-02	1.499E-02	2.441E-02	0.786	0.842	1.372	0.93	0.57	0.61	1.398E-02	1.498E-02	2.439E-02	0.786	0.842	1.372	0.93	0.57	0.61
CM246	2.062E-03	2.344E-03	3.320E-03	0.801	0.910	1.289	0.88	0.62	0.71	2.058E-03	2.341E-03	3.316E-03	0.800	0.910	1.289	0.88	0.62	0.71
AVERAGE-ABSOLUTE-DEVIATION, AS %				6.91	7.80	7.57	16.6	11.4	14.5				7.20	8.16	7.99	17.0	12.0	15.3
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.39	6.38	6.20	8.4	9.8	11.2				5.66	6.73	6.62	8.6	10.4	11.9
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.52	5.28	5.18	6.9	8.4	8.5				4.79	5.63	5.61	7.1	9.0	9.2
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / SM148		AM242	CM246				SB125	CM243	CM245 / SM148		AM242	CM246		

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.115E-01	1.031E-01	9.430E-02	1.083	1.001	0.916	1.08	1.18	1.09	1.114E-01	1.031E-01	9.425E-02	1.082	1.002	0.916	1.08	1.18	1.09
KR 85	1.625E-02	1.615E-02	1.623E-02	1.002	0.996	1.001	1.01	1.00	1.00	6.411E-04	6.369E-04	6.402E-04	1.003	0.996	1.001	1.01	1.00	0.99
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	2.696E+00	2.677E+00	2.733E+00	0.998	0.991	1.011	1.01	0.99	0.98	8.200E-01	8.141E-01	8.314E-01	0.998	0.991	1.012	1.01	0.99	0.98
Y 90	6.760E-04	6.712E-04	6.855E-04	0.998	0.991	1.012	1.01	0.99	0.98	2.056E-04	2.042E-04	2.085E-04	0.998	0.991	1.012	1.01	0.99	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.161E+01	1.168E+01	1.140E+01	1.004	1.010	0.986	0.99	1.02	1.02	1.161E+01	1.168E+01	1.140E+01	1.004	1.010	0.986	0.99	1.02	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.114E+01	1.145E+01	1.137E+01	0.984	1.011	1.004	0.97	0.98	1.01	1.113E+01	1.145E+01	1.136E+01	0.984	1.012	1.004	0.97	0.98	1.01
RU106	2.428E-15	2.188E-15	2.438E-15	1.033	0.931	1.037	1.11	1.00	0.90	2.840E-30	2.557E-30	2.856E-30	1.032	0.929	1.038	1.11	0.99	0.90
PD107	3.099E+00	2.824E+00	3.179E+00	1.021	0.931	1.048	1.10	0.97	0.89	3.099E+00	2.824E+00	3.179E+00	1.021	0.931	1.048	1.10	0.97	0.89
SN126	3.189E-01	2.331E-01	2.634E-01	1.173	0.858	0.969	1.37	1.21	0.88	3.188E-01	2.330E-01	2.633E-01	1.173	0.858	0.969	1.37	1.21	0.88
SB125	5.494E-07	3.831E-07	3.123E-07	1.324	0.923	0.753	1.43	1.76	1.23	2.022E-12	1.410E-12	1.150E-12	1.324	0.923	0.753	1.43	1.76	1.23
I129	2.041E+00	2.175E+00	2.065E+00	0.975	1.039	0.986	0.94	0.99	1.05	2.041E+00	2.175E+00	2.065E+00	0.975	1.039	0.986	0.94	0.99	1.05
CS133	1.196E+01	1.239E+01	1.204E+01	0.986	1.021	0.993	0.97	0.99	1.03	1.196E+01	1.239E+01	1.204E+01	0.986	1.021	0.993	0.97	0.99	1.03
CS134	8.368E-08	7.869E-08	8.242E-08	1.026	0.964	1.010	1.06	1.02	0.95	4.197E-15	3.944E-15	4.134E-15	1.026	0.964	1.010	1.06	1.02	0.95
CS135	4.197E+00	4.635E+00	4.534E+00	0.942	1.040	1.018	0.91	0.93	1.02	4.197E+00	4.635E+00	4.534E+00	0.942	1.040	1.018	0.91	0.93	1.02
CS137	4.110E+00	4.137E+00	4.253E+00	0.986	0.993	1.021	0.99	0.97	0.97	1.295E+00	1.312E+00	1.348E+00	0.982	0.995	1.023	0.99	0.96	0.97
CE144	1.339E-19	1.347E-19	1.411E-19	0.980	0.986	1.033	0.99	0.95	0.95	6.122E-39	6.179E-39	6.592E-39	0.972	0.981	1.047	0.99	0.93	0.94
ND143	7.502E+00	8.081E+00	7.950E+00	0.956	1.030	1.013	0.93	0.94	1.02	7.502E+00	8.081E+00	7.950E+00	0.956	1.030	1.013	0.93	0.94	1.02
ND144	1.455E+01	1.415E+01	1.414E+01	1.019	0.991	0.990	1.03	1.03	1.00	1.455E+01	1.415E+01	1.414E+01	1.019	0.991	0.990	1.03	1.03	1.00
ND145	6.731E+00	6.918E+00	6.716E+00	0.992	1.019	0.989	0.97	1.00	1.03	6.731E+00	6.918E+00	6.716E+00	0.992	1.019	0.989	0.97	1.00	1.03
ND146	7.397E+00	7.216E+00	7.403E+00	1.008	0.983	1.009	1.03	1.00	0.97	7.397E+00	7.216E+00	7.403E+00	1.008	0.983	1.009	1.03	1.00	0.97
PM147	1.913E-06	2.798E-06	2.551E-06	0.790	1.156	1.054	0.68	0.75	1.10	3.503E-12	5.116E-12	4.668E-12	0.791	1.155	1.054	0.68	0.75	1.10
SM147	1.644E+00	2.160E+00	2.072E+00	0.839	1.103	1.058	0.76	0.79	1.04	1.644E+00	2.160E+00	2.072E+00	0.839	1.103	1.058	0.76	0.79	1.04
SM148	2.081E+00	1.441E+00	1.610E+00	1.216	0.842	0.941	1.44	1.29	0.90	2.081E+00	1.441E+00	1.610E+00	1.216	0.842	0.941	1.44	1.29	0.90
SM149	2.858E-02	3.697E-02	3.195E-02	0.879	1.138	0.983	0.77	0.89	1.16	2.858E-02	3.697E-02	3.195E-02	0.879	1.138	0.983	0.77	0.89	1.16
SM150	3.073E+00	3.238E+00	3.261E+00	0.963	1.015	1.022	0.95	0.94	0.99	3.073E+00	3.238E+00	3.261E+00	0.963	1.015	1.022	0.95	0.94	0.99
SM151	8.582E-02	1.066E-01	7.824E-02	0.951	1.182	0.867	0.81	1.10	1.36	5.839E-02	7.254E-02	5.324E-02	0.951	1.182	0.867	0.80	1.10	1.36
SM152	1.120E+00	1.230E+00	8.790E-01	1.041	1.143	0.817	0.91	1.27	1.40	1.120E+00	1.230E+00	8.790E-01	1.041	1.143	0.817	0.91	1.27	1.40
EU153	1.142E+00	1.124E+00	1.203E+00	0.988	0.972	1.040	1.02	0.95	0.93	1.142E+00	1.124E+00	1.203E+00	0.988	0.972	1.040	1.02	0.95	0.93
EU154	8.051E-03	8.195E-03	7.206E-03	1.030	1.048	0.922	0.98	1.12	1.14	1.432E-04	1.456E-04	1.281E-04	1.030	1.048	0.922	0.98	1.12	1.14
EU155	1.539E-04	1.654E-04	1.512E-04	0.981	1.055	0.964	0.93	1.02	1.09	1.419E-07	1.527E-07	1.396E-07	0.980	1.055	0.965	0.93	1.02	1.09
U234	1.283E+00	1.342E+00	9.788E-01	1.068	1.117	0.815	0.96	1.31	1.37	1.575E+00	1.667E+00	1.072E+00	1.095	1.159	0.745	0.94	1.47	1.56
U235	3.447E+01	3.673E+01	3.904E+01	0.938	1.000	1.062	0.94	0.88	0.94	3.451E+01	3.677E+01	3.904E+01	0.938	1.000	1.062	0.94	0.88	0.94
U236	2.557E+01	2.563E+01	2.538E+01	1.002	1.004	0.994	1.00	1.01	1.01	2.563E+01	2.568E+01	2.538E+01	1.003	1.005	0.993	1.00	1.01	1.01
U238	3.873E+03	3.867E+03	3.869E+03	1.001	0.999	1.000	1.00	1.00	1.00	3.873E+03	3.867E+03	3.869E+03	1.001	0.999	1.000	1.00	1.00	1.00
NP237	3.598E+00	3.789E+00	3.244E+00	1.015	1.069	0.915	0.95	1.11	1.17	4.108E+00	4.347E+00	3.244E+00	1.053	1.115	0.832	0.95	1.27	1.34
PU238	8.963E-01	9.951E-01	8.547E-01	0.979	1.087	0.934	0.90	1.05	1.16	6.044E-01	6.713E-01	5.763E-01	0.979	1.087	0.934	0.90	1.05	1.16
PU239	2.438E+01	2.684E+01	2.418E+01	0.970	1.068	0.962	0.91	1.01	1.11	2.435E+01	2.680E+01	2.414E+01	0.970	1.068	0.962	0.91	1.01	1.11
PU240	1.131E+01	1.092E+01	9.810E+00	1.059	1.022	0.919	1.04	1.15	1.11	1.129E+01	1.090E+01	9.759E+00	1.060	1.024	0.916	1.04	1.16	1.12
PU241	6.278E-01	7.249E-01	7.416E-01	0.899	1.038	1.062	0.87	0.85	0.98	5.659E-02	6.861E-02	7.019E-02	0.869	1.053	1.078	0.82	0.81	0.98
PU242	3.226E+00	3.101E+00	3.746E+00	0.961	0.924	1.116	1.04	0.86	0.83	3.226E+00	3.101E+00	3.746E+00	0.961	0.924	1.116	1.04	0.86	0.83
AM241	6.219E+00	6.792E+00	6.953E+00	0.935	1.021	1.045	0.92	0.89	0.98	6.281E+00	6.890E+00	7.052E+00	0.932	1.022	1.046	0.91	0.89	0.98
AM242	4.760E-08	8.059E-08	3.860E-08	0.856	1.450	0.694	0.59	1.23	2.09	3.790E-08	6.416E-08	3.073E-08	0.856	1.450	0.694	0.59	1.23	2.09
AM243	7.567E-01	8.398E-01	1.005E+00	0.873	0.968	1.159	0.90	0.75	0.84	7.531E-01	8.358E-01	1.000E+00	0.873	0.969	1.159	0.90	0.75	0.84
CM242	9.625E-06	1.629E-05	7.819E-06	0.856	1.449	0.695	0.59	1.23	2.08	7.663E-06	1.297E-05	6.225E-06	0.856	1.449	0.695	0.59	1.23	2.08
CM243	1.048E-03	2.230E-04	9.454E-04	1.419	0.302	1.280	4.70	1.11	0.24	3.105E-04	6.609E-05	2.802E-04	1.418	0.302	1.280	4.70	1.11	0.24
CM244	4.423E-02	4.377E-02	5.947E-02	0.900	0.890	1.210	1.01	0.74	0.74	6.525E-03	6.456E-03	8.773E-03	0.900	0.890	1.210	1.01	0.74	0.74
CM245	1.394E-02	1.494E-02	2.433E-02	0.786	0.842	1.372	0.93	0.57	0.61	1.389E-02	1.488E-02	2.423E-02	0.786	0.842	1.372	0.93	0.57	0.61
CM246	2.049E-03	2.331E-03	3.301E-03	0.800	0.910	1.289	0.88	0.62	0.71	2.035E-03	2.314E-03	3.277E-03	0.801	0.910	1.289	0.88	0.62	0.71
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.50	8.64	8.30	18.1	12.6	16.1				7.74	8.87	8.69	18.2	13.4	16.9
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.88	7.15	6.85	9.2	11.0	12.6				6.13	7.39	7.27	9.4	11.8	13.4
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.96	6.00	5.78	7.7	9.5	9.7				5.23	6.26	6.23	7.9	10.3	10.3
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / SM148		AM242	CM246				SB125	CM243	CM245 / SM148		AM242	CM246		

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.112E-01	1.028E-01	9.405E-02	1.083	1.001	0.916	1.08	1.18	1.09	1.104E-01	1.021E-01	9.335E-02	1.083	1.001	0.916	1.08	1.18	1.09
KR 85	1.551E-09	1.540E-09	1.549E-09	1.003	0.996	1.002	1.01	1.00	0.99	3.420E-29	3.394E-29	3.410E-29	1.004	0.996	1.001	1.01	1.00	1.00
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	7.022E-03	6.966E-03	7.116E-03	0.998	0.990	1.012	1.01	0.99	0.98	4.078E-10	4.043E-10	4.129E-10	0.999	0.990	1.011	1.01	0.99	0.98
Y 90	1.761E-06	1.747E-06	1.785E-06	0.998	0.990	1.012	1.01	0.99	0.98	1.023E-13	1.014E-13	1.035E-13	0.999	0.990	1.011	1.01	0.99	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.160E+01	1.168E+01	1.140E+01	1.003	1.010	0.986	0.99	1.02	1.02	1.160E+01	1.167E+01	1.140E+01	1.004	1.010	0.986	0.99	1.02	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.113E+01	1.144E+01	1.136E+01	0.984	1.011	1.004	0.97	0.98	1.01	1.110E+01	1.141E+01	1.133E+01	0.984	1.012	1.004	0.97	0.98	1.01
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	3.099E+00	2.824E+00	3.179E+00	1.021	0.931	1.048	1.10	0.97	0.89	3.098E+00	2.824E+00	3.179E+00	1.021	0.931	1.048	1.10	0.97	0.89
SN126	3.184E-01	2.327E-01	2.630E-01	1.173	0.858	0.969	1.37	1.21	0.88	3.169E-01	2.316E-01	2.617E-01	1.173	0.858	0.969	1.37	1.21	0.88
SB125	0.0	0.0	2.115E-34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	2.041E+00	2.175E+00	2.065E+00	0.975	1.039	0.986	0.94	0.99	1.05	2.041E+00	2.175E+00	2.065E+00	0.975	1.039	0.986	0.94	0.99	1.05
CS133	1.196E+01	1.239E+01	1.204E+01	0.986	1.021	0.993	0.97	0.99	1.03	1.196E+01	1.239E+01	1.204E+01	0.986	1.021	0.993	0.97	0.99	1.03
CS134	0.0	0.0	2.616E-44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	4.197E+00	4.635E+00	4.534E+00	0.942	1.040	1.018	0.91	0.93	1.02	4.196E+00	4.634E+00	4.533E+00	0.942	1.040	1.018	0.91	0.93	1.02
CS137	1.274E-02	1.324E-02	1.362E-02	0.965	1.003	1.032	0.96	0.94	0.97	1.205E-09	1.372E-09	1.411E-09	0.906	1.032	1.061	0.88	0.85	0.97
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	7.502E+00	8.081E+00	7.950E+00	0.956	1.030	1.013	0.93	0.94	1.02	7.502E+00	8.081E+00	7.950E+00	0.956	1.030	1.013	0.93	0.94	1.02
ND144	1.455E+01	1.415E+01	1.414E+01	1.019	0.991	0.990	1.03	1.03	1.00	1.455E+01	1.415E+01	1.414E+01	1.019	0.991	0.990	1.03	1.03	1.00
ND145	6.731E+00	6.918E+00	6.716E+00	0.992	1.019	0.989	0.97	1.00	1.03	6.731E+00	6.918E+00	6.716E+00	0.992	1.019	0.989	0.97	1.00	1.03
ND146	7.397E+00	7.216E+00	7.403E+00	1.008	0.983	1.009	1.03	1.00	0.97	7.397E+00	7.216E+00	7.403E+00	1.008	0.983	1.009	1.03	1.00	0.97
PM147	0.0	0.0	5.235E-35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	1.644E+00	2.160E+00	2.072E+00	0.839	1.103	1.058	0.76	0.79	1.04	1.644E+00	2.160E+00	2.072E+00	0.839	1.103	1.058	0.76	0.79	1.04
SM148	2.081E+00	1.441E+00	1.610E+00	1.216	0.842	0.941	1.44	1.29	0.90	2.081E+00	1.441E+00	1.610E+00	1.216	0.842	0.941	1.44	1.29	0.90
SM149	2.858E-02	3.697E-02	3.195E-02	0.879	1.138	0.983	0.77	0.89	1.16	2.858E-02	3.697E-02	3.195E-02	0.879	1.138	0.983	0.77	0.89	1.16
SM150	3.073E+00	3.238E+00	3.261E+00	0.963	1.015	1.022	0.95	0.94	0.99	3.073E+00	3.238E+00	3.261E+00	0.963	1.015	1.022	0.95	0.94	0.99
SM151	1.251E-02	1.554E-02	1.141E-02	0.951	1.181	0.867	0.81	1.10	1.36	5.695E-05	7.083E-05	5.198E-05	0.950	1.182	0.867	0.80	1.10	1.36
SM152	1.120E+00	1.230E+00	8.790E-01	1.041	1.143	0.817	0.91	1.27	1.40	1.120E+00	1.230E+00	8.790E-01	1.041	1.143	0.817	0.91	1.27	1.40
EU153	1.142E+00	1.124E+00	1.203E+00	0.988	0.972	1.040	1.02	0.95	0.93	1.142E+00	1.124E+00	1.203E+00	0.988	0.972	1.040	1.02	0.95	0.93
EU154	1.430E-11	1.452E-11	1.278E-11	1.031	1.047	0.922	0.98	1.12	1.14	0.0	0.0	4.015E-36	0.0	0.0	0.0	0.0	0.0	0.0
EU155	1.028E-19	1.109E-19	1.014E-19	0.979	1.056	0.965	0.93	1.01	1.09	0.0	0.0	3.315E-62	0.0	0.0	0.0	0.0	0.0	0.0
U234	2.055E+00	2.200E+00	1.224E+00	1.125	1.205	0.670	0.93	1.68	1.80	2.177E+00	2.337E+00	1.263E+00	1.131	1.214	0.656	0.93	1.72	1.85
U235	3.465E+01	3.693E+01	3.904E+01	0.940	1.002	1.059	0.94	0.89	0.95	3.513E+01	3.746E+01	3.904E+01	0.944	1.007	1.049	0.94	0.90	0.96
U236	2.587E+01	2.591E+01	2.538E+01	1.006	1.007	0.987	1.00	1.02	1.02	2.666E+01	2.668E+01	2.538E+01	1.016	1.017	0.967	1.00	1.05	1.05
U238	3.873E+03	3.867E+03	3.869E+03	1.001	0.999	1.000	1.00	1.00	1.00	3.873E+03	3.867E+03	3.869E+03	1.001	0.999	1.000	1.00	1.00	1.00
NP237	5.847E+00	6.257E+00	3.244E+00	1.143	1.223	0.634	0.93	1.80	1.93	8.949E+00	9.663E+00	3.243E+00	1.228	1.326	0.445	0.93	2.76	2.98
PU238	1.252E-01	1.395E-01	1.193E-01	0.978	1.090	0.932	0.90	1.05	1.17	5.500E-04	6.439E-04	5.168E-04	0.965	1.129	0.906	0.85	1.06	1.25
PU239	2.422E+01	2.667E+01	2.400E+01	0.970	1.068	0.961	0.91	1.01	1.11	2.379E+01	2.618E+01	2.353E+01	0.971	1.069	0.960	0.91	1.01	1.11
PU240	1.106E+01	1.068E+01	9.554E+00	1.060	1.024	0.916	1.04	1.16	1.12	1.027E+01	9.914E+00	8.872E+00	1.060	1.024	0.916	1.04	1.16	1.12
PU241	2.691E-05	3.087E-05	5.630E-06	1.273	1.460	0.266	0.87	4.78	5.48	2.190E-05	2.396E-05	2.604E-20	1.433	1.567	0.000	0.91	****	****
PU242	3.225E+00	3.101E+00	3.745E+00	0.961	0.924	1.116	1.04	0.86	0.83	3.221E+00	3.097E+00	3.740E+00	0.961	0.924	1.116	1.04	0.86	0.83
AM241	4.600E+00	5.051E+00	5.169E+00	0.931	1.022	1.046	0.91	0.89	0.98	1.498E+00	1.644E+00	1.682E+00	0.932	1.022	1.046	0.91	0.89	0.98
AM242	1.522E-08	2.577E-08	1.234E-08	0.856	1.450	0.694	0.59	1.23	2.09	6.256E-10	1.059E-09	5.072E-10	0.856	1.449	0.694	0.59	1.23	2.09
AM243	7.391E-01	8.203E-01	9.816E-01	0.873	0.968	1.159	0.90	0.75	0.84	6.921E-01	7.681E-01	9.192E-01	0.873	0.968	1.159	0.90	0.75	0.84
CM242	3.078E-06	5.211E-06	2.501E-06	0.856	1.449	0.695	0.59	1.23	2.08	1.265E-07	2.141E-07	1.027E-07	0.856	1.449	0.695	0.59	1.23	2.08
CM243	2.397E-06	5.099E-07	2.163E-06	1.418	0.302	1.280	4.70	1.11	0.24	9.685E-14	2.059E-14	8.731E-14	1.419	0.302	1.279	4.70	1.11	0.24
CM244	3.091E-06	3.057E-06	4.156E-06	0.900	0.890	1.210	1.01	0.74	0.74	5.482E-15	7.074E-18	9.613E-18	2.991	0.004	0.005	****	****	0.74
CM245	1.366E-02	1.464E-02	2.383E-02	0.786	0.843	1.371	0.93	0.57	0.61	1.290E-02	1.383E-02	2.251E-02	0.786	0.843	1.371	0.93	0.57	0.61
CM246	1.976E-03	2.247E-03	3.182E-03	0.801	0.910	1.289	0.88	0.62	0.71	1.783E-03	2.028E-03	2.872E-03	0.800	0.910	1.289	0.88	0.62	0.71
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.86	10.39	10.97	18.2	22.5	30.0				13.53	13.55	14.45	****	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %				6.18	7.88	9.11	9.8	14.1	18.7				7.11	8.67	9.60	19.9	17.0	23.4
AV-ABS-DEV EXCLUDING LARGEST TWO, %				5.24	6.50	7.94	8.1	11.8	14.5				6.04	6.74	7.80	10.7	12.9	17.2
NUCS EXCLUDED, 1ST/2ND:		SM148	CM243	PU241 / SN126			AM242	CM245			CM244	CM243	PU241 / SM148			AM242	NP237	

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
	**********		10 KYR	**********					
SE 79	1.003E-01	9.272E-02	8.480E-02	1.083	1.001	0.916	1.08	1.18	1.09
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.155E+01	1.163E+01	1.135E+01	1.003	1.010	0.986	0.99	1.02	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.078E+01	1.109E+01	1.100E+01	0.984	1.012	1.004	0.97	0.98	1.01
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	3.095E+00	2.821E+00	3.176E+00	1.021	0.931	1.048	1.10	0.97	0.89
SN126	2.977E-01	2.176E-01	2.459E-01	1.173	0.858	0.969	1.37	1.21	0.88
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	2.040E+00	2.174E+00	2.064E+00	0.975	1.039	0.986	0.94	0.99	1.05
CS133	1.196E+01	1.239E+01	1.204E+01	0.986	1.021	0.993	0.97	0.99	1.03
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	4.185E+00	4.621E+00	4.521E+00	0.942	1.040	1.018	0.91	0.93	1.02
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	7.502E+00	8.081E+00	7.950E+00	0.956	1.030	1.013	0.93	0.94	1.02
ND144	1.455E+01	1.415E+01	1.414E+01	1.019	0.991	0.990	1.03	1.03	1.00
ND145	6.731E+00	6.918E+00	6.716E+00	0.992	1.019	0.989	0.97	1.00	1.03
ND146	7.397E+00	7.216E+00	7.403E+00	1.008	0.983	1.009	1.03	1.00	0.97
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	1.644E+00	2.160E+00	2.072E+00	0.839	1.103	1.058	0.76	0.79	1.04
SM148	2.081E+00	1.441E+00	1.610E+00	1.216	0.842	0.941	1.44	1.29	0.90
SM149	2.858E-02	3.697E-02	3.195E-02	0.879	1.138	0.983	0.77	0.89	1.16
SM150	3.073E+00	3.238E+00	3.261E+00	0.963	1.015	1.022	0.95	0.94	0.99
SM151	4.473E-35	5.589E-35	4.092E-35	0.948	1.185	0.867	0.80	1.09	1.37
SM152	1.120E+00	1.230E+00	8.790E-01	1.041	1.143	0.817	0.91	1.27	1.40
EU153	1.142E+00	1.124E+00	1.203E+00	0.988	0.972	1.040	1.02	0.95	0.93
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	2.128E+00	2.284E+00	1.231E+00	1.131	1.214	0.654	0.93	1.73	1.86
U235	4.062E+01	4.350E+01	3.904E+01	0.989	1.060	0.951	0.93	1.04	1.11
U236	3.297E+01	3.276E+01	2.538E+01	1.086	1.079	0.836	1.01	1.30	1.29
U238	3.873E+03	3.867E+03	3.869E+03	1.001	0.999	1.000	1.00	1.00	1.00
NP237	1.042E+01	1.128E+01	3.234E+00	1.254	1.357	0.389	0.92	3.22	3.49
PU238	8.911E-23	1.505E-22	7.206E-23	0.858	1.449	0.694	0.59	1.24	2.09
PU239	1.870E+01	2.058E+01	1.816E+01	0.977	1.075	0.948	0.91	1.03	1.13
PU240	3.955E+00	3.818E+00	3.423E+00	1.060	1.023	0.917	1.04	1.16	1.12
PU241	1.051E-05	1.150E-05	0.0	0.955	1.045	0.0	0.91	0.0	0.0
PU242	3.171E+00	3.048E+00	3.679E+00	0.961	0.924	1.115	1.04	0.86	0.83
AM241	3.165E-04	3.537E-04	9.062E-07	1.415	1.581	0.004	0.89	****	****
AM242	9.403E-28	1.588E-27	7.600E-28	0.858	1.449	0.693	0.59	1.24	2.09
AM243	2.972E-01	3.298E-01	3.947E-01	0.873	0.968	1.159	0.90	0.75	0.84
CM242	1.907E-25	3.220E-25	1.539E-25	0.858	1.449	0.693	0.59	1.24	2.09
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	5.475E-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	6.193E-03	6.639E-03	1.078E-02	0.787	0.844	1.370	0.93	0.57	0.62
CM246	4.770E-04	5.423E-04	7.680E-04	0.801	0.910	1.289	0.88	0.62	0.71

AVERAGE-ABSOLUTE-DEVIATION, AS %	8.98	12.33	14.49	12.2	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	7.40	9.77	11.50	11.3	21.3	30.8
AV-ABS-DEV EXCLUDING LARGEST TWO, %	6.21	7.51	9.35	10.5	14.5	20.9

NUCS EXCLUDED, 1ST/2ND: SM148 CM242 AM241 / SN126 AM242 NP237

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) G-ATOMS PER MTU

	********** 30 DAY									********** 5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	6.124E-02	5.695E-02	5.266E-02	1.075	1.000	0.925	1.08	1.16	1.08	6.123E-02	5.694E-02	5.266E-02	1.075	1.000	0.925	1.08	1.16	1.08
KR 85	2.273E-01	2.301E-01	2.362E-01	0.983	0.995	1.022	0.99	0.96	0.97	1.654E-01	1.674E-01	1.719E-01	0.983	0.995	1.022	0.99	0.96	0.97
SR 89	1.506E-01	1.560E-01	1.544E-01	0.980	1.015	1.005	0.97	0.98	1.01	2.949E-12	3.054E-12	3.028E-12	0.980	1.015	1.006	0.97	0.97	1.01
SR 90	4.832E+00	4.901E+00	5.113E+00	0.976	0.990	1.033	0.99	0.95	0.96	4.298E+00	4.359E+00	4.548E+00	0.976	0.990	1.033	0.99	0.95	0.96
Y 90	1.212E-03	1.229E-03	1.282E-03	0.977	0.990	1.033	0.99	0.95	0.96	1.078E-03	1.093E-03	1.141E-03	0.976	0.990	1.034	0.99	0.94	0.96
Y 91	2.445E-01	2.518E-01	2.521E-01	0.980	1.009	1.011	0.97	0.97	1.00	1.401E-10	1.442E-10	1.445E-10	0.980	1.009	1.011	0.97	0.97	1.00
ZR 93	6.377E+00	6.519E+00	6.431E+00	0.990	1.012	0.998	0.98	0.99	1.01	6.377E+00	6.519E+00	6.431E+00	0.990	1.012	0.998	0.98	0.99	1.01
ZR 95	3.994E-01	4.063E-01	4.017E-01	0.992	1.010	0.998	0.98	0.99	1.01	1.413E-09	1.435E-09	1.473E-09	0.981	0.996	1.023	0.98	0.96	0.97
NB 95	2.836E-01	2.886E-01	2.839E-01	0.994	1.011	0.995	0.98	1.00	1.02	1.724E-09	1.750E-09	1.783E-09	0.984	0.999	1.018	0.99	0.97	0.98
TC 99	6.618E+00	6.715E+00	6.722E+00	0.990	1.004	1.006	0.99	0.98	1.00	6.618E+00	6.715E+00	6.722E+00	0.990	1.004	1.006	0.99	0.98	1.00
RU106	1.214E+00	1.104E+00	1.145E+00	1.052	0.956	0.992	1.10	1.06	0.96	4.125E-02	3.751E-02	3.893E-02	1.051	0.956	0.992	1.10	1.06	0.96
PD107	1.781E+00	1.566E+00	1.661E+00	1.067	0.938	0.995	1.14	1.07	0.94	1.781E+00	1.566E+00	1.661E+00	1.067	0.938	0.995	1.14	1.07	0.94
SN126	1.776E-01	1.282E-01	1.440E-01	1.185	0.855	0.960	1.39	1.23	0.89	1.776E-01	1.282E-01	1.440E-01	1.185	0.855	0.960	1.39	1.23	0.89
SB125	8.713E-02	5.863E-02	4.818E-02	1.348	0.907	0.745	1.49	1.81	1.22	2.547E-02	1.714E-02	1.409E-02	1.348	0.907	0.746	1.49	1.81	1.22
I129	1.166E+00	1.190E+00	1.134E+00	1.002	1.023	0.975	0.98	1.03	1.05	1.171E+00	1.195E+00	1.140E+00	1.002	1.023	0.975	0.98	1.03	1.05
CS133	7.163E+00	7.316E+00	7.213E+00	0.991	1.012	0.998	0.98	0.99	1.01	7.164E+00	7.317E+00	7.215E+00	0.991	1.012	0.998	0.98	0.99	1.01
CS134	6.452E-01	6.121E-01	5.881E-01	1.049	0.995	0.956	1.05	1.10	1.04	1.235E-01	1.172E-01	1.126E-01	1.049	0.995	0.956	1.05	1.10	1.04
CS135	2.276E+00	2.265E+00	2.057E+00	1.035	1.030	0.935	1.00	1.11	1.10	2.276E+00	2.265E+00	2.057E+00	1.035	1.030	0.935	1.00	1.11	1.10
CS137	7.246E+00	7.243E+00	7.422E+00	0.992	0.992	1.016	1.00	0.98	0.98	6.468E+00	6.469E+00	6.629E+00	0.992	0.992	1.016	1.00	0.98	0.98
CE144	1.822E+00	1.846E+00	1.850E+00	0.991	1.004	1.006	0.99	0.98	1.00	2.282E-02	2.313E-02	2.322E-02	0.990	1.003	1.007	0.99	0.98	1.00
ND143	4.663E+00	4.710E+00	4.464E+00	1.011	1.021	0.968	0.99	1.04	1.06	4.688E+00	4.735E+00	4.490E+00	1.011	1.021	0.968	0.99	1.04	1.05
ND144	5.583E+00	5.707E+00	5.933E+00	0.972	0.994	1.033	0.98	0.94	0.96	7.383E+00	7.530E+00	7.759E+00	0.977	0.996	1.027	0.98	0.95	0.97
ND145	3.884E+00	3.986E+00	3.924E+00	0.988	1.014	0.998	0.97	0.99	1.02	3.884E+00	3.986E+00	3.924E+00	0.988	1.014	0.998	0.97	0.99	1.02
ND146	3.841E+00	3.823E+00	3.862E+00	1.000	0.995	1.005	1.00	0.99	0.99	3.841E+00	3.823E+00	3.862E+00	1.000	0.995	1.005	1.00	0.99	0.99
PM147	8.383E-01	1.103E+00	1.060E+00	0.838	1.103	1.060	0.76	0.79	1.04	2.302E-01	3.025E-01	2.907E-01	0.839	1.102	1.059	0.76	0.79	1.04
SM147	3.960E-01	4.386E-01	4.775E-01	0.905	1.003	1.092	0.90	0.83	0.92	1.010E+00	1.246E+00	1.253E+00	0.863	1.065	1.071	0.81	0.81	0.99
SM148	9.184E-01	6.298E-01	6.442E-01	1.257	0.862	0.882	1.46	1.43	0.98	9.233E-01	6.342E-01	6.487E-01	1.256	0.862	0.882	1.46	1.42	0.98
SM149	1.997E-02	2.140E-02	1.685E-02	1.029	1.103	0.868	0.93	1.19	1.27	1.997E-02	2.140E-02	1.686E-02	1.029	1.103	0.869	0.93	1.18	1.27
SM150	1.685E+00	1.696E+00	1.660E+00	1.003	1.009	0.988	0.99	1.02	1.02	1.685E+00	1.696E+00	1.660E+00	1.003	1.009	0.988	0.99	1.02	1.02
SM151	8.131E-02	7.425E-02	5.810E-02	1.142	1.043	0.816	1.10	1.40	1.28	7.829E-02	7.149E-02	5.594E-02	1.142	1.043	0.816	1.10	1.40	1.28
SM152	7.524E-01	7.684E-01	6.568E-01	1.037	1.059	0.905	0.98	1.15	1.17	7.525E-01	7.684E-01	6.568E-01	1.037	1.059	0.905	0.98	1.15	1.17
EU153	5.825E-01	5.849E-01	6.368E-01	0.969	0.973	1.059	1.00	0.91	0.92	5.825E-01	5.849E-01	6.368E-01	0.969	0.973	1.059	1.00	0.91	0.92
EU154	2.005E-01	1.902E-01	1.591E-01	1.094	1.038	0.868	1.05	1.26	1.20	1.349E-01	1.279E-01	1.070E-01	1.094	1.038	0.868	1.05	1.26	1.20
EU155	7.229E-02	6.985E-02	5.415E-02	1.105	1.068	0.828	1.03	1.33	1.29	3.636E-02	3.513E-02	2.724E-02	1.105	1.067	0.828	1.04	1.33	1.29
U234	6.298E-01	6.255E-01	6.295E-01	1.002	0.996	1.002	1.01	1.00	0.99	6.469E-01	6.423E-01	6.350E-01	1.009	1.001	0.990	1.01	1.02	1.01
U235	2.972E+01	2.796E+01	2.553E+01	1.072	1.008	0.920	1.06	1.16	1.10	2.972E+01	2.796E+01	2.553E+01	1.072	1.008	0.920	1.06	1.16	1.10
U236	1.360E+01	1.374E+01	1.390E+01	0.989	1.000	1.011	0.99	0.98	0.99	1.361E+01	1.374E+01	1.390E+01	0.990	0.999	1.011	0.99	0.98	0.99
U238	4.001E+03	4.003E+03	4.013E+03	0.999	0.999	1.002	1.00	1.00	1.00	4.001E+03	4.003E+03	4.013E+03	0.999	0.999	1.002	1.00	1.00	1.00
NP237	1.449E+00	1.427E+00	1.117E+00	1.089	1.072	0.839	1.02	1.30	1.28	1.456E+00	1.433E+00	1.118E+00	1.090	1.073	0.837	1.02	1.30	1.28
PU238	4.150E-01	4.106E-01	3.077E-01	1.099	1.087	0.815	1.01	1.35	1.33	4.388E-01	4.292E-01	3.296E-01	1.099	1.075	0.826	1.02	1.33	1.30
PU239	2.028E+01	2.044E+01	1.488E+01	1.094	1.103	0.803	0.99	1.36	1.37	2.027E+01	2.044E+01	1.488E+01	1.094	1.103	0.803	0.99	1.36	1.37
PU240	8.850E+00	7.730E+00	7.726E+00	1.092	0.954	0.954	1.14	1.15	1.00	8.859E+00	7.735E+00	7.722E+00	1.093	0.954	0.953	1.15	1.15	1.00
PU241	4.651E+00	4.458E+00	3.809E+00	1.080	1.035	0.885	1.04	1.22	1.17	3.670E+00	3.535E+00	3.020E+00	1.077	1.037	0.886	1.04	1.22	1.17
PU242	1.632E+00	1.523E+00	1.868E+00	0.975	0.910	1.116	1.07	0.87	0.82	1.632E+00	1.523E+00	1.868E+00	0.975	0.910	1.116	1.07	0.87	0.82
AM241	1.618E-01	1.521E-01	1.268E-01	1.101	1.035	0.863	1.06	1.28	1.20	1.137E+00	1.070E+00	9.093E-01	1.095	1.030	0.875	1.06	1.25	1.18
AM242	3.574E-08	4.261E-08	1.749E-08	1.119	1.334	0.547	0.84	2.04	2.44	3.495E-08	4.167E-08	1.710E-08	1.119	1.334	0.547	0.84	2.04	2.44
AM243	2.909E-01	2.629E-01	2.882E-01	1.036	0.937	1.027	1.11	1.01	0.91	2.908E-01	2.628E-01	2.880E-01	1.037	0.937	1.027	1.11	1.01	0.91
CM242	4.096E-02	3.534E-02	3.468E-02	1.107	0.955	0.937	1.16	1.18	1.02	2.698E-05	2.560E-05	2.009E-05	1.114	1.057	0.829	1.05	1.34	1.27
CM243	1.198E-03	3.306E-04	8.223E-04	1.529	0.422	1.049	3.62	1.46	0.40	1.063E-03	2.933E-04	7.296E-04	1.529	0.422	1.049	3.62	1.46	0.40
CM244	7.390E-02	5.657E-02	6.202E-02	1.152	0.882	0.967	1.31	1.19	0.91	6.122E-02	4.687E-02	5.138E-02	1.152	0.882	0.967	1.31	1.19	0.91
CM245	2.529E-03	1.872E-03	1.919E-03	1.200	0.889	0.911	1.35	1.32	0.98	2.528E-03	1.872E-03	1.918E-03	1.200	0.889	0.911	1.35	1.32	0.98
CM246	2.719E-04	2.269E-04	2.407E-04	1.103	0.920	0.976	1.20	1.13	0.94	2.717E-04	2.267E-04	2.405E-04	1.103	0.920	0.976	1.20	1.13	0.94
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.49	5.69	6.88	13.4	16.3	12.4				7.61	5.76	7.07	13.3	16.8	12.6
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.92	3.99	5.76	8.3	14.0	8.8				6.04	4.06	5.96	8.3	14.4	9.1
AV-ABS-DEV EXCLUDING LARGEST TWO, %				5.46	3.58	5.39	7.5	12.6	8.5				5.60	3.66	5.61	7.5	13.1	8.8
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	AM242 / SM148		AM243	PU239				SB125	CM243	AM242 / SM148		AM243	PU239		

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) G-ATOMS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
SE 79	6.123E-02	5.694E-02	5.266E-02	1.075	1.000	0.925	1.08	1.16	1.08	6.122E-02	5.693E-02	5.265E-02	1.075	1.000	0.925	1.08	1.16	1.08
KR 85	1.197E-01	1.212E-01	1.244E-01	0.983	0.995	1.022	0.99	0.96	0.97	6.271E-02	6.346E-02	6.516E-02	0.983	0.995	1.022	0.99	0.96	0.97
SR 89	3.827E-23	3.961E-23	3.934E-23	0.979	1.014	1.007	0.97	0.97	1.01	0.0	0.0	6.643E-45	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	3.816E+00	3.870E+00	4.038E+00	0.976	0.990	1.033	0.99	0.95	0.96	3.008E+00	3.050E+00	3.183E+00	0.977	0.990	1.033	0.99	0.95	0.96
Y 90	9.570E-04	9.706E-04	1.013E-03	0.976	0.990	1.033	0.99	0.94	0.96	7.543E-04	7.650E-04	7.982E-04	0.976	0.990	1.033	0.99	0.95	0.96
Y 91	5.623E-20	5.785E-20	5.809E-20	0.980	1.008	1.012	0.97	0.97	1.00	9.059E-39	9.313E-39	9.384E-39	0.979	1.007	1.014	0.97	0.97	0.99
ZR 93	6.377E+00	6.519E+00	6.431E+00	0.990	1.012	0.998	0.98	0.99	1.01	6.377E+00	6.519E+00	6.431E+00	0.990	1.012	0.998	0.98	0.99	1.01
ZR 95	3.612E-18	3.661E-18	3.904E-18	0.969	0.983	1.048	0.99	0.93	0.94	2.360E-35	2.383E-35	2.744E-35	0.946	0.955	1.100	0.99	0.86	0.87
NB 95	4.406E-18	4.465E-18	4.728E-18	0.972	0.985	1.043	0.99	0.93	0.94	2.878E-35	2.906E-35	3.322E-35	0.948	0.957	1.094	0.99	0.87	0.87
TC 99	6.618E+00	6.714E+00	6.722E+00	0.990	1.004	1.006	0.99	0.98	1.00	6.617E+00	6.714E+00	6.722E+00	0.990	1.004	1.006	0.99	0.98	1.00
RU106	1.325E-03	1.205E-03	1.251E-03	1.051	0.956	0.993	1.10	1.06	0.96	1.396E-06	1.243E-06	1.291E-06	1.066	0.949	0.985	1.12	1.08	0.96
PD107	1.781E+00	1.566E+00	1.661E+00	1.067	0.938	0.995	1.14	1.07	0.94	1.781E+00	1.566E+00	1.661E+00	1.067	0.938	0.995	1.14	1.07	0.94
SN126	1.776E-01	1.282E-01	1.440E-01	1.185	0.855	0.960	1.39	1.23	0.89	1.776E-01	1.282E-01	1.439E-01	1.185	0.855	0.960	1.39	1.23	0.89
SB125	7.289E-03	4.906E-03	4.031E-03	1.348	0.907	0.745	1.49	1.81	1.22	5.969E-04	4.017E-04	3.301E-04	1.348	0.907	0.745	1.49	1.81	1.22
I129	1.171E+00	1.195E+00	1.140E+00	1.002	1.023	0.975	0.98	1.03	1.05	1.171E+00	1.195E+00	1.140E+00	1.002	1.023	0.975	0.98	1.03	1.05
CS133	7.164E+00	7.317E+00	7.215E+00	0.991	1.012	0.998	0.98	0.99	1.01	7.164E+00	7.317E+00	7.215E+00	0.991	1.012	0.998	0.98	0.99	1.01
CS134	2.300E-02	2.182E-02	2.097E-02	1.049	0.995	0.956	1.05	1.10	1.04	7.977E-04	7.565E-04	7.271E-04	1.049	0.995	0.956	1.05	1.10	1.04
CS135	2.276E+00	2.265E+00	2.057E+00	1.035	1.030	0.935	1.00	1.11	1.10	2.276E+00	2.265E+00	2.057E+00	1.035	1.030	0.935	1.00	1.11	1.10
CS137	5.762E+00	5.767E+00	5.910E+00	0.991	0.992	1.017	1.00	0.97	0.98	4.573E+00	4.583E+00	4.697E+00	0.990	0.992	1.017	1.00	0.97	0.98
CE144	2.658E-04	2.693E-04	2.709E-04	0.989	1.002	1.008	0.99	0.98	0.99	3.602E-08	3.653E-08	3.687E-08	0.988	1.002	1.011	0.99	0.98	0.99
ND143	4.688E+00	4.735E+00	4.490E+00	1.011	1.021	0.968	0.99	1.04	1.05	4.688E+00	4.735E+00	4.490E+00	1.011	1.021	0.968	0.99	1.04	1.05
ND144	7.405E+00	7.553E+00	7.782E+00	0.977	0.996	1.027	0.98	0.95	0.97	7.405E+00	7.553E+00	7.783E+00	0.977	0.996	1.027	0.98	0.95	0.97
ND145	3.884E+00	3.986E+00	3.924E+00	0.988	1.014	0.998	0.97	0.99	1.02	3.884E+00	3.986E+00	3.924E+00	0.988	1.014	0.998	0.97	0.99	1.02
ND146	3.841E+00	3.823E+00	3.862E+00	1.000	0.995	1.005	1.00	0.99	0.99	3.841E+00	3.823E+00	3.862E+00	1.000	0.995	1.005	1.00	0.99	0.99
PM147	6.144E-02	8.072E-02	7.756E-02	0.839	1.102	1.059	0.76	0.79	1.04	4.375E-03	5.747E-03	5.522E-03	0.839	1.102	1.059	0.76	0.79	1.04
SM147	1.179E+00	1.467E+00	1.466E+00	0.860	1.070	1.070	0.80	0.80	1.00	1.236E+00	1.542E+00	1.538E+00	0.859	1.072	1.069	0.80	0.80	1.00
SM148	9.233E-01	6.342E-01	6.487E-01	1.256	0.862	0.882	1.46	1.42	0.98	9.233E-01	6.342E-01	6.487E-01	1.256	0.862	0.882	1.46	1.42	0.98
SM149	1.997E-02	2.140E-02	1.686E-02	1.029	1.103	0.869	0.93	1.18	1.27	1.997E-02	2.140E-02	1.686E-02	1.029	1.103	0.869	0.93	1.18	1.27
SM150	1.685E+00	1.696E+00	1.660E+00	1.003	1.009	0.988	0.99	1.02	1.02	1.685E+00	1.696E+00	1.660E+00	1.003	1.009	0.988	0.99	1.02	1.02
SM151	7.533E-02	6.879E-02	5.383E-02	1.142	1.043	0.816	1.10	1.40	1.28	6.975E-02	6.369E-02	4.984E-02	1.142	1.043	0.816	1.10	1.40	1.28
SM152	7.525E-01	7.684E-01	6.568E-01	1.037	1.059	0.905	0.98	1.15	1.17	7.526E-01	7.684E-01	6.568E-01	1.037	1.058	0.905	0.98	1.15	1.17
EU153	5.825E-01	5.849E-01	6.368E-01	0.969	0.973	1.059	1.00	0.91	0.92	5.825E-01	5.849E-01	6.368E-01	0.969	0.973	1.059	1.00	0.91	0.92
EU154	9.017E-02	8.550E-02	7.153E-02	1.094	1.038	0.868	1.05	1.26	1.20	4.027E-02	3.819E-02	3.195E-02	1.094	1.038	0.868	1.05	1.26	1.20
EU155	1.807E-02	1.747E-02	1.354E-02	1.105	1.068	0.828	1.03	1.33	1.29	4.467E-03	4.318E-03	3.348E-03	1.105	1.068	0.828	1.03	1.33	1.29
U234	6.639E-01	6.589E-01	6.406E-01	1.014	1.007	0.979	1.01	1.04	1.03	6.960E-01	6.903E-01	6.511E-01	1.025	1.016	0.959	1.01	1.07	1.06
U235	2.972E+01	2.796E+01	2.553E+01	1.072	1.008	0.920	1.06	1.16	1.10	2.973E+01	2.797E+01	2.553E+01	1.072	1.008	0.920	1.06	1.16	1.10
U236	1.361E+01	1.374E+01	1.390E+01	0.990	0.999	1.011	0.99	0.98	0.99	1.362E+01	1.375E+01	1.390E+01	0.990	1.000	1.010	0.99	0.98	0.99
U238	4.001E+03	4.003E+03	4.013E+03	0.999	0.999	1.002	1.00	1.00	1.00	4.001E+03	4.003E+03	4.013E+03	0.999	0.999	1.002	1.00	1.00	1.00
NP237	1.468E+00	1.444E+00	1.118E+00	1.093	1.075	0.832	1.02	1.31	1.29	1.508E+00	1.482E+00	1.118E+00	1.101	1.082	0.816	1.02	1.35	1.33
PU238	4.219E-01	4.126E-01	3.168E-01	1.099	1.075	0.826	1.02	1.33	1.30	3.899E-01	3.814E-01	2.928E-01	1.099	1.075	0.825	1.02	1.33	1.30
PU239	2.027E+01	2.043E+01	1.488E+01	1.094	1.103	0.803	0.99	1.36	1.37	2.027E+01	2.043E+01	1.487E+01	1.094	1.103	0.803	0.99	1.36	1.37
PU240	8.864E+00	7.739E+00	7.718E+00	1.093	0.955	0.952	1.15	1.15	1.00	8.871E+00	7.744E+00	7.710E+00	1.094	0.955	0.951	1.15	1.15	1.00
PU241	2.885E+00	2.793E+00	2.386E+00	1.073	1.039	0.888	1.03	1.21	1.17	1.783E+00	1.743E+00	1.489E+00	1.067	1.043	0.891	1.02	1.20	1.17
PU242	1.632E+00	1.523E+00	1.868E+00	0.975	0.910	1.116	1.07	0.87	0.82	1.632E+00	1.523E+00	1.868E+00	0.975	0.910	1.116	1.07	0.87	0.82
AM241	1.910E+00	1.801E+00	1.533E+00	1.093	1.030	0.877	1.06	1.25	1.17	2.972E+00	2.813E+00	2.396E+00	1.090	1.032	0.879	1.06	1.24	1.17
AM242	3.416E-08	4.073E-08	1.672E-08	1.119	1.334	0.548	0.84	2.04	2.44	3.264E-08	3.891E-08	1.597E-08	1.119	1.334	0.547	0.84	2.04	2.44
AM243	2.907E-01	2.626E-01	2.879E-01	1.037	0.937	1.027	1.11	1.01	0.91	2.904E-01	2.624E-01	2.876E-01	1.037	0.937	1.027	1.11	1.01	0.91
CM242	6.919E-06	8.246E-06	3.394E-06	1.118	1.333	0.549	0.84	2.04	2.43	6.599E-06	7.868E-06	3.236E-06	1.118	1.333	0.548	0.84	2.04	2.43
CM243	9.416E-04	2.597E-04	6.461E-04	1.529	0.422	1.049	3.63	1.46	0.40	7.383E-04	2.036E-04	5.066E-04	1.529	0.422	1.049	3.63	1.46	0.40
CM244	5.055E-02	3.870E-02	4.243E-02	1.152	0.882	0.967	1.31	1.19	0.91	3.448E-02	2.639E-02	2.893E-02	1.152	0.882	0.966	1.31	1.19	0.91
CM245	2.527E-03	1.871E-03	1.917E-03	1.200	0.889	0.911	1.35	1.32	0.98	2.525E-03	1.869E-03	1.916E-03	1.200	0.889	0.911	1.35	1.32	0.98
CM246	2.715E-04	2.266E-04	2.403E-04	1.103	0.921	0.976	1.20	1.13	0.94	2.711E-04	2.262E-04	2.400E-04	1.103	0.920	0.977	1.20	1.13	0.94
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.68	6.36	7.74	13.5	18.3	15.1				7.94	6.63	8.17	13.8	19.0	15.8
AV-ABS-DEV EXCLUDING LARGEST ONE, %				6.12	4.70	6.67	8.5	16.0	11.6				6.36	4.95	7.10	8.6	16.7	12.3
AV-ABS-DEV EXCLUDING LARGEST TWO, %				5.62	3.85	5.81	7.5	12.8	8.6				5.87	4.09	6.25	7.6	13.5	9.3
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	AM242 / SM148		AM243	CM242				SB125	CM243	AM242 / SM148		AM243	CM242		

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) G-ATOMS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
SE 79	6.121E-02	5.692E-02	5.263E-02	1.075	1.000	0.925	1.08	1.16	1.08	6.117E-02	5.689E-02	5.261E-02	1.075	1.000	0.925	1.08	1.16	1.08
KR 85	9.014E-03	9.120E-03	9.366E-03	0.983	0.995	1.022	0.99	0.96	0.97	3.555E-04	3.596E-04	3.694E-04	0.983	0.995	1.022	0.99	0.96	0.97
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	1.473E+00	1.493E+00	1.558E+00	0.977	0.990	1.033	0.99	0.95	0.96	4.480E-01	4.542E-01	4.740E-01	0.977	0.990	1.033	0.99	0.95	0.96
Y 90	3.693E-04	3.745E-04	3.908E-04	0.976	0.990	1.033	0.99	0.94	0.96	1.123E-04	1.139E-04	1.189E-04	0.976	0.990	1.034	0.99	0.94	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	6.376E+00	6.519E+00	6.431E+00	0.990	1.012	0.998	0.98	0.99	1.01	6.376E+00	6.519E+00	6.431E+00	0.990	1.012	0.998	0.98	0.99	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	6.617E+00	6.714E+00	6.721E+00	0.990	1.004	1.006	0.99	0.98	1.00	6.616E+00	6.712E+00	6.720E+00	0.990	1.004	1.006	0.99	0.98	1.00
RU106	1.534E-15	1.365E-15	1.420E-15	1.066	0.948	0.986	1.12	1.08	0.96	1.793E-30	1.595E-30	1.664E-30	1.065	0.947	0.988	1.12	1.08	0.96
PD107	1.781E+00	1.566E+00	1.661E+00	1.067	0.938	0.995	1.14	1.07	0.94	1.781E+00	1.566E+00	1.661E+00	1.067	0.938	0.995	1.14	1.07	0.94
SN126	1.775E-01	1.282E-01	1.439E-01	1.184	0.855	0.960	1.38	1.23	0.89	1.775E-01	1.281E-01	1.439E-01	1.185	0.855	0.960	1.39	1.23	0.89
SB125	3.277E-07	2.205E-07	1.813E-07	1.348	0.907	0.746	1.49	1.81	1.22	1.206E-12	8.114E-13	6.676E-13	1.347	0.907	0.746	1.49	1.81	1.22
I129	1.171E+00	1.195E+00	1.140E+00	1.002	1.023	0.975	0.98	1.03	1.05	1.171E+00	1.195E+00	1.140E+00	1.002	1.023	0.975	0.98	1.03	1.05
CS133	7.164E+00	7.317E+00	7.215E+00	0.991	1.012	0.998	0.98	0.99	1.01	7.164E+00	7.317E+00	7.215E+00	0.991	1.012	0.998	0.98	0.99	1.01
CS134	3.327E-08	3.154E-08	3.032E-08	1.049	0.995	0.956	1.05	1.10	1.04	1.669E-15	1.580E-15	1.521E-15	1.050	0.994	0.957	1.06	1.10	1.04
CS135	2.276E+00	2.265E+00	2.057E+00	1.035	1.030	0.935	1.00	1.11	1.10	2.276E+00	2.265E+00	2.057E+00	1.035	1.030	0.935	1.00	1.11	1.10
CS137	2.287E+00	2.300E+00	2.357E+00	0.988	0.994	1.018	0.99	0.97	0.98	7.202E-01	7.292E-01	7.474E-01	0.984	0.996	1.021	0.99	0.96	0.98
CE144	8.965E-20	9.111E-20	9.297E-20	0.983	0.999	1.019	0.98	0.96	0.98	4.098E-39	4.181E-39	4.344E-39	0.974	0.994	1.032	0.98	0.94	0.96
ND143	4.688E+00	4.735E+00	4.490E+00	1.011	1.021	0.968	0.99	1.04	1.05	4.688E+00	4.735E+00	4.490E+00	1.011	1.021	0.968	0.99	1.04	1.05
ND144	7.405E+00	7.553E+00	7.783E+00	0.977	0.996	1.027	0.98	0.95	0.97	7.405E+00	7.553E+00	7.783E+00	0.977	0.996	1.027	0.98	0.95	0.97
ND145	3.884E+00	3.986E+00	3.924E+00	0.988	1.014	0.998	0.97	0.99	1.02	3.884E+00	3.986E+00	3.924E+00	0.988	1.014	0.998	0.97	0.99	1.02
ND146	3.841E+00	3.823E+00	3.862E+00	1.000	0.995	1.005	1.00	0.99	0.99	3.841E+00	3.823E+00	3.862E+00	1.000	0.995	1.005	1.00	0.99	0.99
PM147	1.580E-06	2.073E-06	1.993E-06	0.840	1.101	1.059	0.76	0.79	1.04	2.893E-12	3.792E-12	3.648E-12	0.840	1.101	1.059	0.76	0.79	1.04
SM147	1.240E+00	1.548E+00	1.543E+00	0.859	1.072	1.069	0.80	0.80	1.00	1.240E+00	1.548E+00	1.543E+00	0.859	1.072	1.069	0.80	0.80	1.00
SM148	9.233E-01	6.342E-01	6.487E-01	1.256	0.862	0.882	1.46	1.42	0.98	9.233E-01	6.342E-01	6.487E-01	1.256	0.862	0.882	1.46	1.42	0.98
SM149	1.997E-02	2.140E-02	1.686E-02	1.029	1.103	0.869	0.93	1.18	1.27	1.997E-02	2.140E-02	1.686E-02	1.029	1.103	0.869	0.93	1.18	1.27
SM150	1.685E+00	1.696E+00	1.660E+00	1.003	1.009	0.988	0.99	1.02	1.02	1.685E+00	1.696E+00	1.660E+00	1.003	1.009	0.988	0.99	1.02	1.02
SM151	5.536E-02	5.055E-02	3.956E-02	1.142	1.042	0.816	1.10	1.40	1.28	3.766E-02	3.439E-02	2.691E-02	1.142	1.043	0.816	1.10	1.40	1.28
SM152	7.526E-01	7.685E-01	6.568E-01	1.037	1.059	0.905	0.98	1.15	1.17	7.526E-01	7.685E-01	6.568E-01	1.037	1.059	0.905	0.98	1.15	1.17
EU153	5.825E-01	5.849E-01	6.368E-01	0.969	0.973	1.059	1.00	0.91	0.92	5.825E-01	5.849E-01	6.368E-01	0.969	0.973	1.059	1.00	0.91	0.92
EU154	3.589E-03	3.402E-03	2.846E-03	1.095	1.038	0.868	1.05	1.26	1.20	6.380E-05	6.046E-05	5.059E-05	1.095	1.037	0.868	1.06	1.26	1.20
EU155	6.746E-05	6.522E-05	5.057E-05	1.104	1.068	0.828	1.03	1.33	1.29	6.222E-08	6.021E-08	4.669E-08	1.104	1.068	0.828	1.03	1.33	1.29
U234	7.782E-01	7.708E-01	6.780E-01	1.048	1.038	0.913	1.01	1.15	1.14	8.787E-01	8.691E-01	7.110E-01	1.072	1.060	0.867	1.01	1.24	1.22
U235	2.975E+01	2.799E+01	2.553E+01	1.072	1.008	0.920	1.06	1.17	1.10	2.978E+01	2.802E+01	2.553E+01	1.072	1.009	0.919	1.06	1.17	1.10
U236	1.365E+01	1.378E+01	1.390E+01	0.991	1.000	1.009	0.99	0.98	0.99	1.370E+01	1.382E+01	1.390E+01	0.992	1.001	1.007	0.99	0.99	0.99
U238	4.001E+03	4.003E+03	4.013E+03	0.999	0.999	1.002	1.00	1.00	1.00	4.001E+03	4.003E+03	4.013E+03	0.999	0.999	1.002	1.00	1.00	1.00
NP237	1.687E+00	1.653E+00	1.118E+00	1.135	1.112	0.752	1.02	1.51	1.48	2.028E+00	1.978E+00	1.118E+00	1.187	1.158	0.655	1.03	1.81	1.77
PU238	3.079E-01	3.012E-01	2.312E-01	1.099	1.075	0.825	1.02	1.33	1.30	2.078E-01	2.033E-01	1.559E-01	1.099	1.076	0.825	1.02	1.33	1.30
PU239	2.025E+01	2.041E+01	1.486E+01	1.094	1.103	0.803	0.99	1.36	1.37	2.022E+01	2.038E+01	1.484E+01	1.094	1.103	0.803	0.99	1.36	1.37
PU240	8.866E+00	7.737E+00	7.686E+00	1.095	0.956	0.949	1.15	1.15	1.01	8.829E+00	7.703E+00	7.645E+00	1.096	0.956	0.949	1.15	1.15	1.01
PU241	4.207E-01	4.234E-01	3.619E-01	1.047	1.053	0.900	0.99	1.16	1.17	3.790E-02	4.007E-02	3.425E-02	1.013	1.071	0.916	0.95	1.11	1.17
PU242	1.632E+00	1.523E+00	1.868E+00	0.975	0.910	1.116	1.07	0.87	0.82	1.632E+00	1.523E+00	1.867E+00	0.975	0.910	1.115	1.07	0.87	0.82
AM241	4.155E+00	3.962E+00	3.375E+00	1.085	1.034	0.881	1.05	1.23	1.17	4.197E+00	4.019E+00	3.425E+00	1.082	1.036	0.883	1.04	1.23	1.17
AM242	2.846E-08	3.394E-08	1.393E-08	1.119	1.334	0.547	0.84	2.04	2.44	2.266E-08	2.702E-08	1.109E-08	1.119	1.334	0.547	0.84	2.04	2.44
AM243	2.896E-01	2.617E-01	2.868E-01	1.037	0.937	1.027	1.11	1.01	0.91	2.882E-01	2.604E-01	2.855E-01	1.037	0.937	1.027	1.11	1.01	0.91
CM242	5.755E-06	6.862E-06	2.822E-06	1.118	1.333	0.548	0.84	2.04	2.43	4.582E-06	5.463E-06	2.247E-06	1.118	1.333	0.548	0.84	2.04	2.43
CM243	3.559E-04	9.817E-05	2.442E-04	1.529	0.422	1.049	3.63	1.46	0.40	1.055E-04	2.909E-05	7.238E-05	1.529	0.422	1.049	3.63	1.46	0.40
CM244	1.094E-02	8.371E-03	9.178E-03	1.152	0.881	0.966	1.31	1.19	0.91	1.613E-03	1.235E-03	1.354E-03	1.152	0.882	0.967	1.31	1.19	0.91
CM245	2.519E-03	1.865E-03	1.911E-03	1.200	0.889	0.911	1.35	1.32	0.98	2.508E-03	1.857E-03	1.903E-03	1.200	0.889	0.911	1.35	1.32	0.98
CM246	2.699E-04	2.252E-04	2.389E-04	1.103	0.920	0.976	1.20	1.13	0.94	2.679E-04	2.236E-04	2.372E-04	1.103	0.921	0.977	1.20	1.13	0.94
AVERAGE-ABSOLUTE-DEVIATION, AS %				8.25	6.98	8.46	14.5	20.0	16.7				8.36	7.17	8.75	14.6	20.7	17.5
AV-ABS-DEV EXCLUDING LARGEST ONE, %				6.59	5.21	7.35	9.1	17.6	13.0				6.70	5.41	7.66	9.2	18.4	13.9
AV-ABS-DEV EXCLUDING LARGEST TWO, %				6.08	4.31	6.45	8.0	14.2	9.8				6.20	4.53	6.78	8.1	15.0	10.7
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	AM242 / SM148		AM243		CM242			SB125	CM243	AM242 / SM148		AM243		CM242	

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) G-ATOMS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	6.104E-02	5.676E-02	5.249E-02	1.075	1.000	0.925	1.08	1.16	1.08	6.059E-02	5.634E-02	5.210E-02	1.075	1.000	0.925	1.08	1.16	1.08
KR 85	8.603E-10	8.694E-10	8.935E-10	0.984	0.994	1.022	0.99	0.96	0.97	1.897E-29	1.916E-29	1.967E-29	0.985	0.994	1.021	0.99	0.96	0.97
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	3.836E-03	3.887E-03	4.057E-03	0.977	0.990	1.033	0.99	0.95	0.96	2.228E-10	2.256E-10	2.354E-10	0.977	0.990	1.033	0.99	0.95	0.96
Y 90	9.620E-07	9.748E-07	1.017E-06	0.977	0.990	1.033	0.99	0.95	0.96	5.587E-14	5.657E-14	5.903E-14	0.977	0.990	1.033	0.99	0.95	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	6.376E+00	6.518E+00	6.430E+00	0.990	1.012	0.998	0.98	0.99	1.01	6.374E+00	6.516E+00	6.428E+00	0.990	1.012	0.998	0.98	0.99	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	6.611E+00	6.708E+00	6.715E+00	0.990	1.004	1.006	0.99	0.98	1.00	6.596E+00	6.693E+00	6.700E+00	0.990	1.005	1.006	0.99	0.98	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.781E+00	1.566E+00	1.661E+00	1.067	0.938	0.995	1.14	1.07	0.94	1.781E+00	1.566E+00	1.661E+00	1.067	0.938	0.995	1.14	1.07	0.94
SN126	1.772E-01	1.280E-01	1.437E-01	1.184	0.855	0.960	1.38	1.23	0.89	1.764E-01	1.273E-01	1.430E-01	1.185	0.855	0.960	1.39	1.23	0.89
SB125	0.0	0.0	1.228E-34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.171E+00	1.195E+00	1.140E+00	1.002	1.023	0.975	0.98	1.03	1.05	1.171E+00	1.195E+00	1.140E+00	1.002	1.023	0.975	0.98	1.03	1.05
CS133	7.164E+00	7.317E+00	7.215E+00	0.991	1.012	0.998	0.98	0.99	1.01	7.164E+00	7.317E+00	7.215E+00	0.991	1.012	0.998	0.98	0.99	1.01
CS134	0.0	0.0	9.626E-45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	2.276E+00	2.265E+00	2.057E+00	1.035	1.030	0.935	1.00	1.11	1.10	2.276E+00	2.264E+00	2.056E+00	1.035	1.030	0.935	1.01	1.11	1.10
CS137	7.091E-03	7.364E-03	7.550E-03	0.967	1.004	1.029	0.96	0.94	0.98	6.706E-10	7.629E-10	7.822E-10	0.908	1.033	1.059	0.88	0.86	0.98
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	4.688E+00	4.735E+00	4.490E+00	1.011	1.021	0.968	0.99	1.04	1.05	4.688E+00	4.735E+00	4.490E+00	1.011	1.021	0.968	0.99	1.04	1.05
ND144	7.405E+00	7.553E+00	7.783E+00	0.977	0.996	1.027	0.98	0.95	0.97	7.405E+00	7.553E+00	7.783E+00	0.977	0.996	1.027	0.98	0.95	0.97
ND145	3.884E+00	3.986E+00	3.924E+00	0.988	1.014	0.998	0.97	0.99	1.02	3.884E+00	3.986E+00	3.924E+00	0.988	1.014	0.998	0.97	0.99	1.02
ND146	3.841E+00	3.823E+00	3.862E+00	1.000	0.995	1.005	1.00	0.99	0.99	3.841E+00	3.823E+00	3.862E+00	1.000	0.995	1.005	1.00	0.99	0.99
PM147	0.0	0.0	4.091E-35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	1.240E+00	1.548E+00	1.543E+00	0.859	1.072	1.069	0.80	0.80	1.00	1.240E+00	1.548E+00	1.543E+00	0.859	1.072	1.069	0.80	0.80	1.00
SM148	9.233E-01	6.342E-01	6.487E-01	1.256	0.862	0.882	1.46	1.42	0.98	9.233E-01	6.342E-01	6.487E-01	1.256	0.862	0.882	1.46	1.42	0.98
SM149	1.997E-02	2.140E-02	1.686E-02	1.029	1.103	0.869	0.93	1.18	1.27	1.997E-02	2.140E-02	1.686E-02	1.029	1.103	0.869	0.93	1.18	1.27
SM150	1.685E+00	1.696E+00	1.660E+00	1.003	1.009	0.988	0.99	1.02	1.02	1.685E+00	1.696E+00	1.660E+00	1.003	1.009	0.988	0.99	1.02	1.02
SM151	8.071E-03	7.370E-03	5.768E-03	1.142	1.042	0.816	1.10	1.40	1.28	3.671E-05	3.358E-05	2.628E-05	1.140	1.043	0.816	1.09	1.40	1.28
SM152	7.526E-01	7.685E-01	6.568E-01	1.037	1.059	0.905	0.98	1.15	1.17	7.526E-01	7.685E-01	6.568E-01	1.037	1.059	0.905	0.98	1.15	1.17
EU153	5.825E-01	5.849E-01	6.368E-01	0.969	0.973	1.059	1.00	0.91	0.92	5.825E-01	5.849E-01	6.368E-01	0.969	0.973	1.059	1.00	0.91	0.92
EU154	6.372E-12	6.030E-12	5.050E-12	1.095	1.037	0.868	1.06	1.26	1.19	0.0	0.0	1.586E-36	0.0	0.0	0.0	0.0	0.0	0.0
EU155	4.505E-20	4.373E-20	3.392E-20	1.101	1.069	0.829	1.03	1.33	1.29	0.0	0.0	1.109E-62	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.044E+00	1.031E+00	7.650E-01	1.103	1.089	0.808	1.01	1.36	1.35	1.086E+00	1.072E+00	7.779E-01	1.110	1.095	0.795	1.01	1.40	1.38
U235	2.989E+01	2.813E+01	2.553E+01	1.073	1.010	0.917	1.06	1.17	1.10	3.030E+01	2.854E+01	2.553E+01	1.077	1.015	0.908	1.06	1.19	1.12
U236	1.388E+01	1.398E+01	1.390E+01	0.997	1.004	0.999	0.99	1.00	1.01	1.450E+01	1.452E+01	1.390E+01	1.014	1.015	0.972	1.00	1.04	1.04
U238	4.001E+03	4.003E+03	4.013E+03	0.999	0.999	1.002	1.00	1.00	1.00	4.001E+03	4.003E+03	4.013E+03	0.999	0.999	1.002	1.00	1.00	1.00
NP237	3.190E+00	3.092E+00	1.118E+00	1.293	1.254	0.453	1.03	2.85	2.77	5.263E+00	5.079E+00	1.118E+00	1.378	1.330	0.293	1.04	4.71	4.54
PU238	4.322E-02	4.238E-02	3.232E-02	1.100	1.078	0.822	1.02	1.34	1.31	2.026E-04	2.063E-04	1.439E-04	1.099	1.120	0.781	0.98	1.41	1.43
PU239	2.011E+01	2.027E+01	1.475E+01	1.094	1.103	0.803	0.99	1.36	1.37	1.973E+01	1.988E+01	1.446E+01	1.095	1.103	0.802	0.99	1.36	1.37
PU240	8.645E+00	7.543E+00	7.485E+00	1.096	0.956	0.949	1.15	1.15	1.01	8.027E+00	7.003E+00	6.951E+00	1.096	0.956	0.949	1.15	1.15	1.01
PU241	6.685E-06	6.377E-06	2.747E-06	1.269	1.210	0.521	1.05	2.43	2.32	3.956E-06	2.990E-06	1.270E-20	1.709	1.291	0.000	1.32	****	****
PU242	1.632E+00	1.522E+00	1.867E+00	0.975	0.909	1.116	1.07	0.87	0.82	1.630E+00	1.521E+00	1.865E+00	0.975	0.910	1.115	1.07	0.87	0.82
AM241	3.074E+00	2.947E+00	2.511E+00	1.081	1.036	0.883	1.04	1.22	1.17	1.001E+00	9.589E-01	8.170E-01	1.081	1.036	0.883	1.04	1.23	1.17
AM242	9.103E-09	1.085E-08	4.455E-09	1.119	1.334	0.548	0.84	2.04	2.44	3.741E-10	4.459E-10	1.830E-10	1.119	1.334	0.547	0.84	2.04	2.44
AM243	2.829E-01	2.556E-01	2.802E-01	1.037	0.937	1.027	1.11	1.01	0.91	2.649E-01	2.393E-01	2.623E-01	1.037	0.937	1.027	1.11	1.01	0.91
CM242	1.841E-06	2.194E-06	9.024E-07	1.119	1.333	0.548	0.84	2.04	2.43	7.564E-08	9.015E-08	3.707E-08	1.119	1.333	0.548	0.84	2.04	2.43
CM243	8.151E-07	2.245E-07	5.586E-07	1.530	0.421	1.049	3.63	1.46	0.40	3.293E-14	9.065E-15	2.255E-14	1.531	0.421	1.048	3.63	1.46	0.40
CM244	7.642E-07	5.847E-07	6.414E-07	1.152	0.881	0.967	1.31	1.19	0.91	1.434E-15	1.353E-18	1.484E-18	2.994	0.003	0.003	****	****	0.91
CM245	2.468E-03	1.827E-03	1.872E-03	1.201	0.889	0.911	1.35	1.32	0.98	2.331E-03	1.726E-03	1.768E-03	1.201	0.889	0.911	1.35	1.32	0.98
CM246	2.602E-04	2.171E-04	2.303E-04	1.103	0.920	0.976	1.20	1.13	0.94	2.348E-04	1.960E-04	2.079E-04	1.103	0.921	0.977	1.20	1.13	0.94

AVERAGE-ABSOLUTE-DEVIATION, AS %	8.76	8.03	10.38	14.2	26.1	24.0				14.67	10.92	14.45	****	****	****		
AV-ABS-DEV EXCLUDING LARGEST ONE, %	6.72	6.21	9.37	8.4	21.7	19.4				7.32	6.87	10.20	14.8	28.4	26.7		
AV-ABS-DEV EXCLUDING LARGEST TWO, %	5.90	5.68	8.52	7.3	15.8	13.6				6.04	5.94	8.65	8.3	18.7	16.9		
NUCS EXCLUDED, 1ST/2ND:	SM148	CM243	NP237 / CM245	AM243	PU241					CM244	CM243	PU241 / SM148	AM243	NP237			

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) G-ATOMS PER MTU

	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
	**********		10 KYR	**********					
SE 79	5.504E-02	5.118E-02	4.733E-02	1.075	1.000	0.925	1.08	1.16	1.08
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	6.348E+00	6.490E+00	6.402E+00	0.990	1.012	0.998	0.98	0.99	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	6.406E+00	6.500E+00	6.507E+00	0.990	1.004	1.006	0.99	0.98	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.779E+00	1.564E+00	1.659E+00	1.067	0.938	0.995	1.14	1.07	0.94
SN126	1.657E-01	1.196E-01	1.343E-01	1.185	0.855	0.960	1.39	1.23	0.89
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.170E+00	1.194E+00	1.140E+00	1.002	1.022	0.976	0.98	1.03	1.05
CS133	7.164E+00	7.317E+00	7.215E+00	0.991	1.012	0.998	0.98	0.99	1.01
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	2.270E+00	2.258E+00	2.051E+00	1.035	1.030	0.935	1.01	1.11	1.10
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	4.688E+00	4.735E+00	4.490E+00	1.011	1.021	0.968	0.99	1.04	1.05
ND144	7.405E+00	7.553E+00	7.783E+00	0.977	0.996	1.027	0.98	0.95	0.97
ND145	3.884E+00	3.986E+00	3.924E+00	0.988	1.014	0.998	0.97	0.99	1.02
ND146	3.841E+00	3.823E+00	3.862E+00	1.000	0.995	1.005	1.00	0.99	0.99
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	1.240E+00	1.548E+00	1.543E+00	0.859	1.072	1.069	0.80	0.80	1.00
SM148	9.233E-01	6.342E-01	6.487E-01	1.256	0.862	0.882	1.46	1.42	0.98
SM149	1.997E-02	2.140E-02	1.686E-02	1.029	1.103	0.869	0.93	1.18	1.27
SM150	1.685E+00	1.696E+00	1.660E+00	1.003	1.009	0.988	0.99	1.02	1.02
SM151	2.883E-35	2.650E-35	2.069E-35	1.138	1.046	0.816	1.09	1.39	1.28
SM152	7.526E-01	7.685E-01	6.568E-01	1.037	1.059	0.905	0.98	1.15	1.17
EU153	5.825E-01	5.849E-01	6.368E-01	0.969	0.973	1.059	1.00	0.91	0.92
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.064E+00	1.051E+00	7.584E-01	1.111	1.097	0.792	1.01	1.40	1.39
U235	3.482E+01	3.310E+01	2.553E+01	1.118	1.063	0.820	1.05	1.36	1.30
U236	1.943E+01	1.882E+01	1.390E+01	1.118	1.083	0.800	1.03	1.40	1.35
U238	4.001E+03	4.003E+03	4.013E+03	0.999	0.999	1.002	1.00	1.00	1.00
NP237	6.246E+00	6.022E+00	1.115E+00	1.400	1.350	0.250	1.04	5.60	5.40
PU238	5.327E-23	6.336E-23	2.601E-23	1.120	1.333	0.547	0.84	2.05	2.44
PU239	1.535E+01	1.546E+01	1.116E+01	1.097	1.105	0.798	0.99	1.38	1.39
PU240	3.091E+00	2.697E+00	2.682E+00	1.095	0.955	0.950	1.15	1.15	1.01
PU241	1.899E-06	1.435E-06	0.0	1.139	0.861	0.0	1.32	0.0	0.0
PU242	1.604E+00	1.496E+00	1.834E+00	0.975	0.910	1.115	1.07	0.87	0.82
AM241	5.756E-05	4.453E-05	4.402E-07	1.684	1.303	0.013	1.29	****	****
AM242	5.621E-28	6.686E-28	2.743E-28	1.120	1.333	0.547	0.84	2.05	2.44
AM243	1.137E-01	1.028E-01	1.127E-01	1.036	0.937	1.027	1.11	1.01	0.91
CM242	1.140E-25	1.356E-25	5.556E-26	1.121	1.333	0.546	0.84	2.05	2.44
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	1.432E-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	1.119E-03	8.284E-04	8.469E-04	1.201	0.889	0.909	1.35	1.32	0.98
CM246	6.282E-05	5.241E-05	5.559E-05	1.103	0.920	0.976	1.20	1.13	0.94

AVERAGE-ABSOLUTE-DEVIATION, AS %	10.18	9.46	15.14	10.5	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	8.09	8.77	12.96	8.9	36.9	37.1
AV-ABS-DEV EXCLUDING LARGEST TWO, %	6.62	7.82	10.95	8.1	23.2	24.5

NUCS EXCLUDED, 1ST/2ND: SM148 AM243 AM241 / CM245 NP237

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
SE 79	8.958E-02	8.340E-02	7.671E-02	1.076	1.002	0.922	1.07	1.17	1.09	8.958E-02	8.340E-02	7.670E-02	1.076	1.002	0.922	1.07	1.17	1.09
KR 85	3.352E-01	3.310E-01	3.391E-01	1.000	0.988	1.012	1.01	0.99	0.98	2.439E-01	2.408E-01	2.468E-01	1.000	0.988	1.012	1.01	0.99	0.98
SR 89	1.572E-01	1.623E-01	1.614E-01	0.981	1.012	1.007	0.97	0.97	1.01	3.079E-12	3.178E-12	3.166E-12	0.980	1.012	1.008	0.97	0.97	1.00
SR 90	7.409E+00	7.270E+00	7.589E+00	0.998	0.979	1.022	1.02	0.98	0.96	6.590E+00	6.467E+00	6.750E+00	0.998	0.980	1.022	1.02	0.98	0.96
Y 90	1.859E-03	1.823E-03	1.903E-03	0.999	0.979	1.022	1.02	0.98	0.96	1.653E-03	1.622E-03	1.693E-03	0.998	0.979	1.022	1.02	0.98	0.96
Y 91	2.535E-01	2.598E-01	2.611E-01	0.982	1.006	1.011	0.98	0.97	1.00	1.452E-10	1.488E-10	1.497E-10	0.982	1.006	1.012	0.98	0.97	0.99
ZR 93	9.625E+00	9.622E+00	9.510E+00	1.004	1.004	0.992	1.00	1.01	1.01	9.625E+00	9.622E+00	9.510E+00	1.004	1.004	0.992	1.00	1.01	1.01
ZR 95	4.025E-01	4.098E-01	4.058E-01	0.991	1.009	0.999	0.98	0.99	1.01	1.424E-09	1.447E-09	1.488E-09	0.980	0.996	1.024	0.98	0.96	0.97
NB 95	2.863E-01	2.908E-01	2.864E-01	0.995	1.010	0.995	0.98	1.00	1.02	1.737E-09	1.765E-09	1.802E-09	0.982	0.998	1.019	0.98	0.96	0.98
TC 99	9.447E+00	9.496E+00	9.491E+00	0.997	1.002	1.001	0.99	1.00	1.00	9.447E+00	9.495E+00	9.491E+00	0.997	1.002	1.001	0.99	1.00	1.00
RU106	1.233E+00	1.169E+00	1.217E+00	1.022	0.969	1.009	1.05	1.01	0.96	4.190E-02	3.973E-02	4.138E-02	1.022	0.969	1.009	1.05	1.01	0.96
PD107	2.167E+00	2.057E+00	2.170E+00	1.017	0.965	1.018	1.05	1.00	0.95	2.167E+00	2.057E+00	2.170E+00	1.017	0.965	1.018	1.05	1.00	0.95
SN126	2.308E-01	1.773E-01	1.950E-01	1.148	0.882	0.970	1.30	1.18	0.91	2.308E-01	1.772E-01	1.950E-01	1.148	0.882	0.970	1.30	1.18	0.91
SB125	9.794E-02	7.216E-02	5.808E-02	1.288	0.949	0.764	1.36	1.69	1.24	2.863E-02	2.110E-02	1.698E-02	1.288	0.949	0.764	1.36	1.69	1.24
I129	1.578E+00	1.675E+00	1.598E+00	0.976	1.036	0.988	0.94	0.99	1.05	1.582E+00	1.680E+00	1.604E+00	0.975	1.036	0.989	0.94	0.99	1.05
CS133	1.013E+01	1.031E+01	1.012E+01	0.994	1.012	0.993	0.98	1.00	1.02	1.013E+01	1.031E+01	1.013E+01	0.994	1.012	0.994	0.98	1.00	1.02
CS134	9.938E-01	9.728E-01	9.699E-01	1.015	0.994	0.991	1.02	1.02	1.00	1.903E-01	1.862E-01	1.857E-01	1.015	0.994	0.991	1.02	1.02	1.00
CS135	3.920E+00	4.375E+00	4.008E+00	0.956	1.067	0.977	0.90	0.98	1.09	3.920E+00	4.375E+00	4.008E+00	0.956	1.067	0.977	0.90	0.98	1.09
CS137	1.036E+01	1.036E+01	1.061E+01	0.992	0.992	1.016	1.00	0.98	0.98	9.250E+00	9.255E+00	9.478E+00	0.992	0.992	1.016	1.00	0.98	0.98
CE144	1.951E+00	1.956E+00	1.963E+00	0.997	1.000	1.003	1.00	0.99	1.00	2.444E-02	2.450E-02	2.464E-02	0.996	0.999	1.005	1.00	0.99	0.99
ND143	6.528E+00	6.878E+00	6.533E+00	0.982	1.035	0.983	0.95	1.00	1.05	6.553E+00	6.904E+00	6.559E+00	0.982	1.035	0.983	0.95	1.00	1.05
ND144	9.579E+00	9.230E+00	9.574E+00	1.012	0.976	1.012	1.04	1.00	0.96	1.151E+01	1.116E+01	1.151E+01	1.010	0.980	1.010	1.03	1.00	0.97
ND145	5.646E+00	5.756E+00	5.645E+00	0.994	1.013	0.993	0.98	1.00	1.02	5.646E+00	5.756E+00	5.645E+00	0.994	1.013	0.993	0.98	1.00	1.02
ND146	5.778E+00	5.699E+00	5.798E+00	1.003	0.990	1.007	1.01	1.00	0.98	5.778E+00	5.699E+00	5.798E+00	1.003	0.990	1.007	1.01	1.00	0.98
PM147	9.595E-01	1.294E+00	1.211E+00	0.831	1.121	1.049	0.74	0.79	1.07	2.633E-01	3.546E-01	3.319E-01	0.832	1.120	1.048	0.74	0.79	1.07
SM147	7.059E-01	7.145E-01	7.981E-01	0.955	0.966	1.079	0.99	0.88	0.90	1.408E+00	1.660E+00	1.683E+00	0.889	1.048	1.063	0.85	0.84	0.99
SM148	1.548E+00	1.146E+00	1.182E+00	1.198	0.887	0.915	1.35	1.31	0.97	1.554E+00	1.151E+00	1.188E+00	1.198	0.887	0.915	1.35	1.31	0.97
SM149	2.131E-02	2.767E-02	2.071E-02	0.917	1.191	0.892	0.77	1.03	1.34	2.131E-02	2.767E-02	2.071E-02	0.917	1.191	0.892	0.77	1.03	1.34
SM150	2.345E+00	2.423E+00	2.397E+00	0.982	1.015	1.004	0.97	0.98	1.01	2.345E+00	2.423E+00	2.397E+00	0.982	1.015	1.004	0.97	0.98	1.01
SM151	9.942E-02	1.145E-01	8.155E-02	1.009	1.163	0.828	0.87	1.22	1.40	9.573E-02	1.103E-01	7.852E-02	1.009	1.163	0.828	0.87	1.22	1.40
SM152	9.774E-01	1.016E+00	7.979E-01	1.050	1.092	0.858	0.96	1.22	1.27	9.775E-01	1.016E+00	7.979E-01	1.051	1.092	0.858	0.96	1.23	1.27
EU153	8.140E-01	8.513E-01	9.210E-01	0.944	0.987	1.068	0.96	0.88	0.92	8.142E-01	8.514E-01	9.210E-01	0.944	0.987	1.068	0.96	0.88	0.92
EU154	3.047E-01	3.083E-01	2.631E-01	1.043	1.056	0.901	0.99	1.16	1.17	2.050E-01	2.074E-01	1.770E-01	1.043	1.056	0.901	0.99	1.16	1.17
EU155	1.056E-01	1.165E-01	9.295E-02	1.006	1.109	0.885	0.91	1.14	1.25	5.309E-02	5.861E-02	4.675E-02	1.005	1.110	0.885	0.91	1.14	1.25
U234	9.282E-01	8.981E-01	9.114E-01	1.017	0.984	0.999	1.03	1.02	0.99	9.599E-01	9.333E-01	9.213E-01	1.023	0.995	0.982	1.03	1.04	1.01
U235	3.834E+01	4.293E+01	3.997E+01	0.949	1.062	0.989	0.89	0.96	1.07	3.834E+01	4.293E+01	3.997E+01	0.949	1.062	0.989	0.89	0.96	1.07
U236	2.233E+01	2.252E+01	2.254E+01	0.994	1.003	1.003	0.99	0.99	1.00	2.234E+01	2.252E+01	2.254E+01	0.994	1.002	1.003	0.99	0.99	1.00
U238	3.926E+03	3.916E+03	3.928E+03	1.001	0.998	1.001	1.00	1.00	1.00	3.926E+03	3.916E+03	3.928E+03	1.001	0.998	1.001	1.00	1.00	1.00
NP237	2.505E+00	2.450E+00	2.033E+00	1.075	1.052	0.873	1.02	1.23	1.21	2.513E+00	2.458E+00	2.034E+00	1.076	1.053	0.871	1.02	1.24	1.21
PU238	7.843E-01	8.700E-01	6.502E-01	1.021	1.133	0.846	0.90	1.21	1.34	8.072E-01	8.952E-01	6.794E-01	1.017	1.128	0.856	0.90	1.19	1.32
PU239	2.037E+01	2.439E+01	1.721E+01	0.986	1.181	0.833	0.84	1.18	1.42	2.037E+01	2.439E+01	1.721E+01	0.986	1.181	0.833	0.84	1.18	1.42
PU240	9.737E+00	8.871E+00	8.788E+00	1.066	0.971	0.962	1.10	1.11	1.01	9.752E+00	8.887E+00	8.783E+00	1.067	0.972	0.961	1.10	1.11	1.01
PU241	5.218E+00	5.894E+00	4.992E+00	0.972	1.098	0.930	0.89	1.05	1.18	4.118E+00	4.674E+00	3.959E+00	0.969	1.100	0.931	0.88	1.04	1.18
PU242	1.995E+00	2.048E+00	2.479E+00	0.918	0.942	1.140	0.97	0.80	0.83	1.995E+00	2.048E+00	2.479E+00	0.918	0.942	1.140	0.97	0.80	0.83
AM241	2.140E-01	2.658E-01	2.274E-01	0.908	1.128	0.965	0.81	0.94	1.17	1.308E+00	1.479E+00	1.253E+00	0.971	1.098	0.930	0.88	1.04	1.18
AM242	4.905E-08	9.013E-08	3.435E-08	0.848	1.558	0.594	0.54	1.43	2.62	4.796E-08	8.813E-08	3.358E-08	0.848	1.558	0.594	0.54	1.43	2.62
AM243	3.977E-01	4.466E-01	4.912E-01	0.893	1.003	1.103	0.89	0.81	0.91	3.975E-01	4.464E-01	4.910E-01	0.893	1.003	1.103	0.89	0.81	0.91
CM242	5.453E-02	6.021E-02	5.591E-02	0.959	1.058	0.983	0.91	0.98	1.08	3.620E-05	4.709E-05	3.360E-05	0.929	1.209	0.862	0.77	1.08	1.40
CM243	1.826E-03	5.154E-04	1.647E-03	1.373	0.388	1.239	3.54	1.11	0.31	1.621E-03	4.573E-04	1.461E-03	1.374	0.388	1.238	3.54	1.11	0.31
CM244	1.149E-01	1.215E-01	1.398E-01	0.916	0.969	1.115	0.95	0.82	0.87	9.519E-02	1.007E-01	1.158E-01	0.916	0.969	1.115	0.95	0.82	0.87
CM245	4.277E-03	5.190E-03	5.914E-03	0.834	1.012	1.154	0.82	0.72	0.88	4.275E-03	5.188E-03	5.912E-03	0.834	1.012	1.154	0.82	0.72	0.88
CM246	5.426E-04	6.778E-04	7.798E-04	0.814	1.017	1.170	0.80	0.70	0.87	5.422E-04	6.773E-04	7.793E-04	0.814	1.017	1.170	0.80	0.70	0.87
AVERAGE-ABSOLUTE-DEVIATION, AS %				5.76	6.74	6.63	13.5	10.4	13.8				5.88	6.94	6.98	13.9	10.8	14.2
AV-ABS-DEV EXCLUDING LARGEST ONE, %				4.74	5.46	5.71	7.5	8.6	9.4				4.87	5.67	6.09	7.9	8.9	9.9
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.25	4.07	4.68	7.5	8.6	9.4				4.39	4.31	5.11	7.9	8.9	9.9
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	SM151 / SM148		AM242	PU238				SB125	CM243	SM151 / SM148		AM242	PU238		

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	8.957E-02	8.339E-02	7.670E-02	1.076	1.002	0.922	1.07	1.17	1.09	8.956E-02	8.338E-02	7.669E-02	1.076	1.002	0.922	1.07	1.17	1.09
KR 85	1.765E-01	1.743E-01	1.786E-01	1.000	0.988	1.012	1.01	0.99	0.98	9.248E-02	9.130E-02	9.355E-02	1.000	0.988	1.012	1.01	0.99	0.98
SR 89	3.996E-23	4.122E-23	4.114E-23	0.980	1.011	1.009	0.97	0.97	1.00	0.0	0.0	6.946E-45	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	5.851E+00	5.741E+00	5.993E+00	0.998	0.979	1.022	1.02	0.98	0.96	4.611E+00	4.525E+00	4.724E+00	0.998	0.979	1.023	1.02	0.98	0.96
Y 90	1.467E-03	1.440E-03	1.503E-03	0.998	0.980	1.022	1.02	0.98	0.96	1.156E-03	1.135E-03	1.185E-03	0.998	0.980	1.023	1.02	0.98	0.96
Y 91	5.827E-20	5.970E-20	6.018E-20	0.981	1.005	1.013	0.98	0.97	0.99	9.388E-39	9.610E-39	9.721E-39	0.981	1.004	1.015	0.98	0.97	0.99
ZR 93	9.625E+00	9.622E+00	9.510E+00	1.004	1.004	0.992	1.00	1.01	1.01	9.625E+00	9.622E+00	9.510E+00	1.004	1.004	0.992	1.00	1.01	1.01
ZR 95	3.640E-18	3.693E-18	3.944E-18	0.968	0.982	1.049	0.99	0.92	0.94	2.378E-35	2.403E-35	2.772E-35	0.945	0.954	1.101	0.99	0.86	0.87
NB 95	4.439E-18	4.504E-18	4.776E-18	0.971	0.985	1.044	0.99	0.93	0.94	2.901E-35	2.931E-35	3.357E-35	0.947	0.957	1.096	0.99	0.86	0.87
TC 99	9.447E+00	9.495E+00	9.491E+00	0.997	1.002	1.001	0.99	1.00	1.00	9.447E+00	9.495E+00	9.491E+00	0.997	1.002	1.001	0.99	1.00	1.00
RU106	1.346E-03	1.276E-03	1.329E-03	1.022	0.969	1.009	1.05	1.01	0.96	1.418E-06	1.316E-06	1.372E-06	1.036	0.962	1.002	1.08	1.03	0.96
PD107	2.167E+00	2.057E+00	2.170E+00	1.017	0.965	1.018	1.05	1.00	0.95	2.167E+00	2.057E+00	2.170E+00	1.017	0.965	1.018	1.05	1.00	0.95
SN126	2.308E-01	1.772E-01	1.949E-01	1.148	0.882	0.970	1.30	1.18	0.91	2.308E-01	1.772E-01	1.949E-01	1.148	0.882	0.970	1.30	1.18	0.91
SB125	8.193E-03	6.037E-03	4.858E-03	1.288	0.949	0.764	1.36	1.69	1.24	6.708E-04	4.943E-04	3.978E-04	1.288	0.949	0.764	1.36	1.69	1.24
I129	1.582E+00	1.680E+00	1.604E+00	0.975	1.036	0.989	0.94	0.99	1.05	1.582E+00	1.680E+00	1.604E+00	0.975	1.036	0.989	0.94	0.99	1.05
CS133	1.013E+01	1.031E+01	1.013E+01	0.994	1.012	0.994	0.98	1.00	1.02	1.013E+01	1.031E+01	1.013E+01	0.994	1.012	0.994	0.98	1.00	1.02
CS134	3.543E-02	3.468E-02	3.458E-02	1.015	0.994	0.991	1.02	1.02	1.00	1.229E-03	1.202E-03	1.199E-03	1.016	0.993	0.991	1.02	1.03	1.00
CS135	3.920E+00	4.375E+00	4.008E+00	0.956	1.067	0.977	0.90	0.98	1.09	3.920E+00	4.375E+00	4.008E+00	0.956	1.067	0.977	0.90	0.98	1.09
CS137	8.241E+00	8.251E+00	8.449E+00	0.991	0.992	1.016	1.00	0.98	0.98	6.541E+00	6.557E+00	6.715E+00	0.990	0.993	1.017	1.00	0.97	0.98
CE144	2.846E-04	2.854E-04	2.874E-04	0.996	0.999	1.006	1.00	0.99	0.99	3.857E-08	3.870E-08	3.912E-08	0.994	0.998	1.008	1.00	0.99	0.99
ND143	6.553E+00	6.904E+00	6.559E+00	0.982	1.035	0.983	0.95	1.00	1.05	6.553E+00	6.904E+00	6.559E+00	0.982	1.035	0.983	0.95	1.00	1.05
ND144	1.153E+01	1.118E+01	1.154E+01	1.010	0.979	1.011	1.03	1.00	0.97	1.153E+01	1.119E+01	1.154E+01	1.010	0.980	1.011	1.03	1.00	0.97
ND145	5.646E+00	5.756E+00	5.645E+00	0.994	1.013	0.993	0.98	1.00	1.02	5.646E+00	5.756E+00	5.645E+00	0.994	1.013	0.993	0.98	1.00	1.02
ND146	5.778E+00	5.699E+00	5.798E+00	1.003	0.990	1.007	1.01	1.00	0.98	5.778E+00	5.699E+00	5.798E+00	1.003	0.990	1.007	1.01	1.00	0.98
PM147	7.025E-02	9.460E-02	8.856E-02	0.832	1.120	1.048	0.74	0.79	1.07	5.003E-03	6.735E-03	6.306E-03	0.832	1.120	1.048	0.74	0.79	1.07
SM147	1.601E+00	1.920E+00	1.927E+00	0.882	1.057	1.061	0.83	0.83	1.00	1.666E+00	2.008E+00	2.009E+00	0.879	1.060	1.061	0.83	0.83	1.00
SM148	1.554E+00	1.151E+00	1.188E+00	1.198	0.887	0.915	1.35	1.31	0.97	1.554E+00	1.151E+00	1.188E+00	1.198	0.887	0.915	1.35	1.31	0.97
SM149	2.131E-02	2.767E-02	2.071E-02	0.917	1.191	0.892	0.77	1.03	1.34	2.131E-02	2.767E-02	2.071E-02	0.917	1.191	0.892	0.77	1.03	1.34
SM150	2.345E+00	2.423E+00	2.397E+00	0.982	1.015	1.004	0.97	0.98	1.01	2.345E+00	2.423E+00	2.397E+00	0.982	1.015	1.004	0.97	0.98	1.01
SM151	9.211E-02	1.061E-01	7.555E-02	1.009	1.163	0.828	0.87	1.22	1.40	8.528E-02	9.824E-02	6.995E-02	1.009	1.163	0.828	0.87	1.22	1.40
SM152	9.775E-01	1.016E+00	7.979E-01	1.051	1.092	0.858	0.96	1.23	1.27	9.776E-01	1.016E+00	7.979E-01	1.051	1.092	0.857	0.96	1.23	1.27
EU153	8.142E-01	8.514E-01	9.210E-01	0.944	0.987	1.068	0.96	0.88	0.92	8.142E-01	8.514E-01	9.210E-01	0.944	0.987	1.068	0.96	0.88	0.92
EU154	1.370E-01	1.386E-01	1.183E-01	1.043	1.056	0.901	0.99	1.16	1.17	6.118E-02	6.190E-02	5.284E-02	1.043	1.056	0.901	0.99	1.16	1.17
EU155	2.639E-02	2.914E-02	2.324E-02	1.005	1.110	0.885	0.91	1.14	1.25	6.524E-03	7.204E-03	5.746E-03	1.005	1.110	0.885	0.91	1.14	1.25
U234	9.912E-01	9.679E-01	9.313E-01	1.029	1.005	0.967	1.02	1.06	1.04	1.050E+00	1.033E+00	9.501E-01	1.039	1.022	0.940	1.02	1.11	1.09
U235	3.834E+01	4.294E+01	3.997E+01	0.949	1.062	0.989	0.89	0.96	1.07	3.835E+01	4.294E+01	3.997E+01	0.949	1.062	0.989	0.89	0.96	1.07
U236	2.234E+01	2.253E+01	2.254E+01	0.994	1.003	1.003	0.99	0.99	1.00	2.235E+01	2.254E+01	2.254E+01	0.994	1.003	1.003	0.99	0.99	1.00
U238	3.926E+03	3.916E+03	3.928E+03	1.001	0.998	1.001	1.00	1.00	1.00	3.926E+03	3.916E+03	3.928E+03	1.001	0.998	1.001	1.00	1.00	1.00
NP237	2.527E+00	2.474E+00	2.034E+00	1.078	1.055	0.867	1.02	1.24	1.22	2.573E+00	2.525E+00	2.034E+00	1.082	1.062	0.856	1.02	1.26	1.24
PU238	7.760E-01	8.607E-01	6.532E-01	1.017	1.128	0.856	0.90	1.19	1.32	7.172E-01	7.955E-01	6.037E-01	1.017	1.128	0.856	0.90	1.19	1.32
PU239	2.037E+01	2.438E+01	1.721E+01	0.986	1.180	0.833	0.84	1.18	1.42	2.036E+01	2.438E+01	1.720E+01	0.986	1.181	0.833	0.84	1.18	1.42
PU240	9.763E+00	8.900E+00	8.778E+00	1.067	0.973	0.960	1.10	1.11	1.01	9.778E+00	8.917E+00	8.769E+00	1.068	0.974	0.958	1.10	1.12	1.02
PU241	3.237E+00	3.692E+00	3.127E+00	0.966	1.101	0.933	0.88	1.04	1.18	2.000E+00	2.304E+00	1.952E+00	0.959	1.105	0.936	0.87	1.02	1.18
PU242	1.995E+00	2.048E+00	2.479E+00	0.918	0.942	1.140	0.97	0.80	0.83	1.995E+00	2.048E+00	2.479E+00	0.918	0.942	1.140	0.97	0.80	0.83
AM241	2.174E+00	2.444E+00	2.070E+00	0.975	1.096	0.929	0.89	1.05	1.18	3.366E+00	3.782E+00	3.200E+00	0.976	1.096	0.928	0.89	1.05	1.18
AM242	4.688E-08	8.615E-08	3.283E-08	0.848	1.558	0.594	0.54	1.43	2.62	4.479E-08	8.231E-08	3.136E-08	0.848	1.558	0.594	0.54	1.43	2.62
AM243	3.973E-01	4.461E-01	4.907E-01	0.893	1.003	1.103	0.89	0.81	0.91	3.970E-01	4.457E-01	4.903E-01	0.893	1.003	1.103	0.89	0.81	0.91
CM242	9.495E-06	1.744E-05	6.660E-06	0.848	1.557	0.595	0.54	1.43	2.62	9.057E-06	1.664E-05	6.353E-06	0.848	1.558	0.595	0.54	1.43	2.62
CM243	1.435E-03	4.050E-04	1.294E-03	1.374	0.388	1.239	3.54	1.11	0.31	1.125E-03	3.175E-04	1.015E-03	1.373	0.388	1.239	3.54	1.11	0.31
CM244	7.861E-02	8.314E-02	9.562E-02	0.916	0.969	1.115	0.95	0.82	0.87	5.361E-02	5.670E-02	6.521E-02	0.916	0.969	1.115	0.95	0.82	0.87
CM245	4.274E-03	5.186E-03	5.909E-03	0.834	1.012	1.153	0.82	0.72	0.88	4.270E-03	5.182E-03	5.904E-03	0.834	1.012	1.153	0.82	0.72	0.88
CM246	5.418E-04	6.768E-04	7.787E-04	0.814	1.017	1.170	0.80	0.70	0.87	5.410E-04	6.758E-04	7.775E-04	0.814	1.017	1.170	0.80	0.70	0.87
AVERAGE-ABSOLUTE-DEVIATION, AS %				6.11	7.67	7.64	14.3	11.7	16.8				6.36	7.98	8.04	14.6	12.2	17.5
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.11	6.46	6.79	8.3	9.9	12.6				5.36	6.76	7.20	8.5	10.5	13.3
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.65	5.14	5.85	7.5	9.2	9.5				4.76	5.58	6.27	7.7	9.8	10.1
NUCS EXCLUDED, 1ST/2ND:				SB125	CM243	SM151 / SM148		AM242	PU238			SB125	CM243	SM151 / SM148		AM242	NP237	

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	8.953E-02	8.336E-02	7.667E-02	1.076	1.002	0.922	1.07	1.17	1.09	8.949E-02	8.331E-02	7.663E-02	1.076	1.002	0.922	1.07	1.17	1.09
KR 85	1.329E-02	1.312E-02	1.345E-02	1.000	0.987	1.012	1.01	0.99	0.98	5.243E-04	5.174E-04	5.303E-04	1.001	0.987	1.012	1.01	0.99	0.98
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	2.258E+00	2.215E+00	2.313E+00	0.998	0.979	1.023	1.02	0.98	0.96	6.869E-01	6.738E-01	7.035E-01	0.998	0.979	1.022	1.02	0.98	0.96
Y 90	5.662E-04	5.556E-04	5.800E-04	0.998	0.979	1.022	1.02	0.98	0.96	1.722E-04	1.690E-04	1.764E-04	0.998	0.980	1.022	1.02	0.98	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	9.625E+00	9.622E+00	9.510E+00	1.004	1.004	0.992	1.00	1.01	1.01	9.625E+00	9.622E+00	9.510E+00	1.004	1.004	0.992	1.00	1.01	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	9.446E+00	9.494E+00	9.490E+00	0.997	1.002	1.001	0.99	1.00	1.00	9.444E+00	9.493E+00	9.488E+00	0.997	1.002	1.001	0.99	1.00	1.00
RU106	1.558E-15	1.445E-15	1.509E-15	1.036	0.961	1.003	1.08	1.03	0.96	1.821E-30	1.689E-30	1.769E-30	1.035	0.960	1.005	1.08	1.03	0.95
PD107	2.166E+00	2.057E+00	2.170E+00	1.016	0.965	1.018	1.05	1.00	0.95	2.166E+00	2.057E+00	2.170E+00	1.016	0.965	1.018	1.05	1.00	0.95
SN126	2.307E-01	1.772E-01	1.949E-01	1.148	0.882	0.970	1.30	1.18	0.91	2.307E-01	1.771E-01	1.948E-01	1.149	0.882	0.970	1.30	1.18	0.91
SB125	3.683E-07	2.713E-07	2.185E-07	1.288	0.948	0.764	1.36	1.69	1.24	1.356E-12	9.984E-13	8.045E-13	1.288	0.948	0.764	1.36	1.69	1.24
I129	1.582E+00	1.680E+00	1.604E+00	0.975	1.036	0.989	0.94	0.99	1.05	1.582E+00	1.680E+00	1.604E+00	0.975	1.036	0.989	0.94	0.99	1.05
CS133	1.013E+01	1.031E+01	1.013E+01	0.994	1.012	0.994	0.98	1.00	1.02	1.013E+01	1.031E+01	1.013E+01	0.994	1.012	0.994	0.98	1.00	1.02
CS134	5.124E-08	5.012E-08	5.001E-08	1.016	0.993	0.991	1.02	1.02	1.00	2.570E-15	2.512E-15	2.508E-15	1.016	0.993	0.991	1.02	1.02	1.00
CS135	3.920E+00	4.375E+00	4.008E+00	0.956	1.067	0.977	0.90	0.98	1.09	3.920E+00	4.374E+00	4.008E+00	0.956	1.067	0.977	0.90	0.98	1.09
CS137	3.270E+00	3.291E+00	3.371E+00	0.988	0.994	1.018	0.99	0.97	0.98	1.030E+00	1.043E+00	1.069E+00	0.983	0.996	1.021	0.99	0.96	0.98
CE144	9.599E-20	9.655E-20	9.866E-20	0.989	0.995	1.016	0.99	0.97	0.98	4.388E-39	4.430E-39	4.609E-39	0.980	0.990	1.030	0.99	0.95	0.96
ND143	6.553E+00	6.904E+00	6.559E+00	0.982	1.035	0.983	0.95	1.00	1.05	6.553E+00	6.904E+00	6.559E+00	0.982	1.035	0.983	0.95	1.00	1.05
ND144	1.153E+01	1.119E+01	1.154E+01	1.010	0.980	1.011	1.03	1.00	0.97	1.153E+01	1.119E+01	1.154E+01	1.010	0.980	1.011	1.03	1.00	0.97
ND145	5.646E+00	5.756E+00	5.645E+00	0.994	1.013	0.993	0.98	1.00	1.02	5.646E+00	5.756E+00	5.645E+00	0.994	1.013	0.993	0.98	1.00	1.02
ND146	5.778E+00	5.699E+00	5.798E+00	1.003	0.990	1.007	1.01	1.00	0.98	5.778E+00	5.699E+00	5.798E+00	1.003	0.990	1.007	1.01	1.00	0.98
PM147	1.807E-06	2.430E-06	2.276E-06	0.832	1.119	1.048	0.74	0.79	1.07	3.308E-12	4.443E-12	4.165E-12	0.833	1.119	1.049	0.74	0.79	1.07
SM147	1.671E+00	2.015E+00	2.015E+00	0.879	1.060	1.060	0.83	0.83	1.00	1.671E+00	2.015E+00	2.015E+00	0.879	1.060	1.060	0.83	0.83	1.00
SM148	1.554E+00	1.151E+00	1.188E+00	1.198	0.887	0.915	1.35	1.31	0.97	1.554E+00	1.151E+00	1.188E+00	1.198	0.887	0.915	1.35	1.31	0.97
SM149	2.131E-02	2.767E-02	2.071E-02	0.917	1.191	0.892	0.77	1.03	1.34	2.131E-02	2.767E-02	2.071E-02	0.917	1.191	0.892	0.77	1.03	1.34
SM150	2.345E+00	2.423E+00	2.397E+00	0.982	1.015	1.004	0.97	0.98	1.01	2.345E+00	2.423E+00	2.397E+00	0.982	1.015	1.004	0.97	0.98	1.01
SM151	6.769E-02	7.798E-02	5.552E-02	1.009	1.163	0.828	0.87	1.22	1.40	4.605E-02	5.305E-02	3.778E-02	1.009	1.163	0.828	0.87	1.22	1.40
SM152	9.777E-01	1.016E+00	7.979E-01	1.051	1.092	0.857	0.96	1.23	1.27	9.777E-01	1.016E+00	7.979E-01	1.051	1.092	0.857	0.96	1.23	1.27
EU153	8.142E-01	8.514E-01	9.210E-01	0.944	0.987	1.068	0.96	0.88	0.92	8.142E-01	8.514E-01	9.210E-01	0.944	0.987	1.068	0.96	0.88	0.92
EU154	5.452E-03	5.515E-03	4.708E-03	1.043	1.056	0.901	0.99	1.16	1.17	9.693E-05	9.800E-05	8.368E-05	1.044	1.055	0.901	0.99	1.16	1.17
EU155	9.852E-05	1.088E-04	8.681E-05	1.005	1.110	0.885	0.91	1.13	1.25	9.088E-08	1.005E-07	8.014E-08	1.004	1.110	0.885	0.90	1.13	1.25
U234	1.201E+00	1.201E+00	9.983E-01	1.060	1.060	0.881	1.00	1.20	1.20	1.386E+00	1.406E+00	1.057E+00	1.080	1.096	0.824	0.99	1.31	1.33
U235	3.837E+01	4.296E+01	3.997E+01	0.949	1.062	0.989	0.89	0.96	1.07	3.839E+01	4.300E+01	3.997E+01	0.949	1.063	0.988	0.89	0.96	1.08
U236	2.239E+01	2.257E+01	2.254E+01	0.995	1.003	1.002	0.99	0.99	1.00	2.244E+01	2.261E+01	2.254E+01	0.996	1.004	1.000	0.99	1.00	1.00
U238	3.926E+03	3.916E+03	3.928E+03	1.001	0.998	1.001	1.00	1.00	1.00	3.926E+03	3.916E+03	3.928E+03	1.001	0.998	1.001	1.00	1.00	1.00
NP237	2.775E+00	2.753E+00	2.034E+00	1.101	1.092	0.807	1.01	1.36	1.35	3.160E+00	3.188E+00	2.034E+00	1.131	1.141	0.728	0.99	1.55	1.57
PU238	5.662E-01	6.283E-01	4.766E-01	1.016	1.128	0.856	0.90	1.19	1.32	3.819E-01	4.241E-01	3.214E-01	1.016	1.129	0.855	0.90	1.19	1.32
PU239	2.035E+01	2.436E+01	1.719E+01	0.986	1.181	0.833	0.84	1.18	1.42	2.032E+01	2.432E+01	1.716E+01	0.986	1.181	0.833	0.84	1.18	1.42
PU240	9.783E+00	8.928E+00	8.741E+00	1.069	0.976	0.955	1.10	1.12	1.02	9.746E+00	8.896E+00	8.695E+00	1.070	0.976	0.954	1.10	1.12	1.02
PU241	4.720E-01	5.598E-01	4.743E-01	0.940	1.115	0.945	0.84	1.00	1.18	4.253E-02	5.298E-02	4.489E-02	0.909	1.132	0.959	0.80	0.95	1.18
PU242	1.995E+00	2.048E+00	2.479E+00	0.918	0.942	1.140	0.97	0.80	0.83	1.995E+00	2.048E+00	2.479E+00	0.918	0.942	1.140	0.97	0.80	0.83
AM241	4.692E+00	5.297E+00	4.482E+00	0.973	1.098	0.929	0.89	1.05	1.18	4.737E+00	5.369E+00	4.543E+00	0.970	1.100	0.930	0.88	1.04	1.18
AM242	3.907E-08	7.178E-08	2.735E-08	0.848	1.558	0.594	0.54	1.43	2.62	3.110E-08	5.715E-08	2.178E-08	0.848	1.558	0.594	0.54	1.43	2.62
AM243	3.959E-01	4.445E-01	4.889E-01	0.893	1.003	1.103	0.89	0.81	0.91	3.940E-01	4.424E-01	4.866E-01	0.893	1.003	1.103	0.89	0.81	0.91
CM242	7.899E-06	1.451E-05	5.540E-06	0.848	1.557	0.595	0.54	1.43	2.62	6.289E-06	1.155E-05	4.411E-06	0.848	1.557	0.595	0.54	1.43	2.62
CM243	5.424E-04	1.531E-04	4.891E-04	1.374	0.388	1.239	3.54	1.11	0.31	1.608E-04	4.536E-05	1.450E-04	1.374	0.388	1.239	3.54	1.11	0.31
CM244	1.701E-02	1.798E-02	2.068E-02	0.917	0.969	1.114	0.95	0.82	0.87	2.509E-03	2.653E-03	3.051E-03	0.916	0.969	1.114	0.95	0.82	0.87
CM245	4.260E-03	5.169E-03	5.890E-03	0.834	1.012	1.153	0.82	0.72	0.88	4.242E-03	5.148E-03	5.866E-03	0.834	1.012	1.154	0.82	0.72	0.88
CM246	5.387E-04	6.729E-04	7.741E-04	0.814	1.017	1.170	0.80	0.70	0.87	5.347E-04	6.680E-04	7.685E-04	0.814	1.017	1.170	0.80	0.70	0.87
AVERAGE-ABSOLUTE-DEVIATION, AS %				6.63	8.46	8.33	15.4	12.8	18.6				6.83	8.69	8.62	15.5	13.5	19.3
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.38	7.34	7.40	8.9	10.9	14.1				5.53	7.48	7.53	9.1	11.7	15.0
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.91	5.88	6.35	8.1	10.2	10.8				4.90	6.18	6.48	8.4	10.0	10.6
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	NP237 / SM148		AM242	SM151				SB125	CM243	NP237 / SM148		AM242	U234		

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	8.930E-02	8.313E-02	7.646E-02	1.076	1.002	0.922	1.07	1.17	1.09	8.863E-02	8.251E-02	7.589E-02	1.076	1.002	0.922	1.07	1.17	1.09
KR 85	1.269E-09	1.251E-09	1.283E-09	1.001	0.987	1.012	1.01	0.99	0.98	2.797E-29	2.757E-29	2.824E-29	1.002	0.987	1.011	1.01	0.99	0.98
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	5.884E-03	5.766E-03	6.021E-03	0.999	0.979	1.022	1.02	0.98	0.96	3.418E-10	3.346E-10	3.493E-10	1.000	0.979	1.022	1.02	0.98	0.96
Y 90	1.476E-06	1.446E-06	1.510E-06	0.999	0.979	1.022	1.02	0.98	0.96	8.571E-14	8.392E-14	8.761E-14	1.000	0.979	1.022	1.02	0.98	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	9.624E+00	9.621E+00	9.509E+00	1.004	1.004	0.992	1.00	1.01	1.01	9.621E+00	9.618E+00	9.506E+00	1.004	1.004	0.992	1.00	1.01	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	9.438E+00	9.486E+00	9.482E+00	0.997	1.002	1.001	0.99	1.00	1.00	9.417E+00	9.465E+00	9.461E+00	0.997	1.002	1.001	0.99	1.00	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	2.166E+00	2.057E+00	2.169E+00	1.017	0.965	1.018	1.05	1.00	0.95	2.166E+00	2.057E+00	2.169E+00	1.017	0.965	1.018	1.05	1.00	0.95
SN126	2.303E-01	1.769E-01	1.946E-01	1.148	0.882	0.970	1.30	1.18	0.91	2.292E-01	1.760E-01	1.936E-01	1.148	0.882	0.970	1.30	1.18	0.91
SB125	0.0	0.0	1.480E-34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.582E+00	1.680E+00	1.604E+00	0.975	1.036	0.989	0.94	0.99	1.05	1.582E+00	1.680E+00	1.604E+00	0.975	1.036	0.989	0.94	0.99	1.05
CS133	1.013E+01	1.031E+01	1.013E+01	0.994	1.012	0.994	0.98	1.00	1.02	1.013E+01	1.031E+01	1.013E+01	0.994	1.012	0.994	0.98	1.00	1.02
CS134	0.0	0.0	1.587E-44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	3.920E+00	4.374E+00	4.007E+00	0.956	1.067	0.977	0.90	0.98	1.09	3.919E+00	4.373E+00	4.006E+00	0.956	1.067	0.977	0.90	0.98	1.09
CS137	1.013E-02	1.053E-02	1.079E-02	0.966	1.004	1.029	0.96	0.94	0.98	9.581E-10	1.091E-09	1.118E-09	0.908	1.033	1.059	0.88	0.86	0.98
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	6.553E+00	6.904E+00	6.559E+00	0.982	1.035	0.983	0.95	1.00	1.05	6.553E+00	6.904E+00	6.559E+00	0.982	1.035	0.983	0.95	1.00	1.05
ND144	1.153E+01	1.119E+01	1.154E+01	1.010	0.980	1.011	1.03	1.00	0.97	1.153E+01	1.119E+01	1.154E+01	1.010	0.980	1.011	1.03	1.00	0.97
ND145	5.646E+00	5.756E+00	5.645E+00	0.994	1.013	0.993	0.98	1.00	1.02	5.646E+00	5.756E+00	5.645E+00	0.994	1.013	0.993	0.98	1.00	1.02
ND146	5.778E+00	5.699E+00	5.798E+00	1.003	0.990	1.007	1.01	1.00	0.98	5.778E+00	5.699E+00	5.798E+00	1.003	0.990	1.007	1.01	1.00	0.98
PM147	0.0	0.0	4.671E-35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	1.671E+00	2.015E+00	2.015E+00	0.879	1.060	1.060	0.83	0.83	1.00	1.671E+00	2.015E+00	2.015E+00	0.879	1.060	1.060	0.83	0.83	1.00
SM148	1.554E+00	1.151E+00	1.188E+00	1.198	0.887	0.915	1.35	1.31	0.97	1.554E+00	1.151E+00	1.188E+00	1.198	0.887	0.915	1.35	1.31	0.97
SM149	2.131E-02	2.767E-02	2.071E-02	0.917	1.191	0.892	0.77	1.03	1.34	2.131E-02	2.767E-02	2.071E-02	0.917	1.191	0.892	0.77	1.03	1.34
SM150	2.345E+00	2.423E+00	2.397E+00	0.982	1.015	1.004	0.97	0.98	1.01	2.345E+00	2.423E+00	2.397E+00	0.982	1.015	1.004	0.97	0.98	1.01
SM151	9.869E-03	1.137E-02	8.095E-03	1.009	1.163	0.828	0.87	1.22	1.40	4.492E-05	5.180E-05	3.688E-05	1.009	1.163	0.828	0.87	1.22	1.40
SM152	9.777E-01	1.016E+00	7.979E-01	1.051	1.092	0.857	0.96	1.23	1.27	9.777E-01	1.016E+00	7.979E-01	1.051	1.092	0.857	0.96	1.23	1.27
EU153	8.142E-01	8.514E-01	9.210E-01	0.944	0.987	1.068	0.96	0.88	0.92	8.142E-01	8.514E-01	9.210E-01	0.944	0.987	1.068	0.96	0.88	0.92
EU154	9.680E-12	9.775E-12	8.352E-12	1.044	1.055	0.901	0.99	1.16	1.17	0.0	0.0	2.623E-36	0.0	0.0	0.0	0.0	0.0	0.0
EU155	6.580E-20	7.296E-20	5.823E-20	1.002	1.111	0.887	0.90	1.13	1.25	0.0	0.0	1.903E-62	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.689E+00	1.743E+00	1.154E+00	1.105	1.140	0.755	0.97	1.46	1.51	1.766E+00	1.830E+00	1.178E+00	1.110	1.150	0.740	0.97	1.50	1.55
U235	3.851E+01	4.314E+01	3.997E+01	0.950	1.064	0.986	0.89	0.96	1.08	3.891E+01	4.362E+01	3.997E+01	0.953	1.068	0.979	0.89	0.97	1.09
U236	2.264E+01	2.280E+01	2.254E+01	0.999	1.006	0.995	0.99	1.00	1.01	2.332E+01	2.342E+01	2.254E+01	1.010	1.014	0.976	1.00	1.03	1.04
U238	3.926E+03	3.916E+03	3.928E+03	1.001	0.998	1.001	1.00	1.00	1.00	3.926E+03	3.916E+03	3.928E+03	1.001	0.998	1.001	1.00	1.00	1.00
NP237	4.471E+00	4.677E+00	2.034E+00	1.200	1.255	0.546	0.96	2.20	2.30	6.810E+00	7.330E+00	2.034E+00	1.263	1.360	0.377	0.93	3.35	3.60
PU238	7.925E-02	8.842E-02	6.661E-02	1.015	1.132	0.853	0.90	1.19	1.33	3.582E-04	4.314E-04	2.951E-04	0.991	1.193	0.816	0.83	1.21	1.46
PU239	2.021E+01	2.419E+01	1.706E+01	0.986	1.181	0.833	0.84	1.18	1.42	1.983E+01	2.374E+01	1.672E+01	0.987	1.181	0.832	0.84	1.19	1.42
PU240	9.544E+00	8.712E+00	8.513E+00	1.070	0.976	0.954	1.10	1.12	1.02	8.861E+00	8.088E+00	7.905E+00	1.070	0.976	0.954	1.10	1.12	1.02
PU241	9.885E-06	1.302E-05	3.601E-06	1.119	1.474	0.408	0.76	2.75	3.62	6.690E-06	8.288E-06	1.665E-20	1.340	1.660	0.000	0.81	****	****
PU242	1.994E+00	2.048E+00	2.478E+00	0.917	0.942	1.140	0.97	0.80	0.83	1.992E+00	2.045E+00	2.475E+00	0.918	0.942	1.140	0.97	0.80	0.83
AM241	3.469E+00	3.936E+00	3.330E+00	0.969	1.100	0.931	0.88	1.04	1.18	1.129E+00	1.281E+00	1.084E+00	0.969	1.100	0.931	0.88	1.04	1.18
AM242	1.249E-08	2.295E-08	8.748E-09	0.848	1.558	0.594	0.54	1.43	2.62	5.134E-10	9.431E-10	3.594E-10	0.848	1.558	0.594	0.54	1.43	2.62
AM243	3.867E-01	4.342E-01	4.775E-01	0.893	1.003	1.103	0.89	0.81	0.91	3.621E-01	4.065E-01	4.472E-01	0.893	1.003	1.103	0.89	0.81	0.91
CM242	2.526E-06	4.641E-06	1.772E-06	0.848	1.558	0.595	0.54	1.43	2.62	1.038E-07	1.907E-07	7.279E-08	0.848	1.558	0.595	0.54	1.43	2.62
CM243	1.241E-06	3.500E-07	1.119E-06	1.374	0.387	1.239	3.55	1.11	0.31	5.011E-14	1.413E-14	4.517E-14	1.374	0.387	1.239	3.55	1.11	0.31
CM244	1.188E-06	1.256E-06	1.445E-06	0.916	0.969	1.115	0.95	0.82	0.87	1.997E-15	2.906E-18	3.344E-18	2.991	0.004	0.005	****	****	0.87
CM245	4.174E-03	5.065E-03	5.771E-03	0.834	1.012	1.153	0.82	0.72	0.88	3.942E-03	4.784E-03	5.450E-03	0.834	1.012	1.153	0.82	0.72	0.88
CM246	5.193E-04	6.487E-04	7.463E-04	0.814	1.017	1.170	0.80	0.70	0.87	4.687E-04	5.854E-04	6.735E-04	0.814	1.017	1.170	0.80	0.70	0.87

AVERAGE-ABSOLUTE-DEVIATION, AS %	6.71	10.35	10.76	16.0	18.6	28.5				12.42	13.79	14.58	****	****	****		
AV-ABS-DEV EXCLUDING LARGEST ONE, %	5.48	8.13	9.28	9.9	15.0	21.8				6.28	8.91	9.85	17.0	18.2	27.2		
AV-ABS-DEV EXCLUDING LARGEST TWO, %	4.48	6.55	7.25	9.2	11.6	15.5				5.07	6.73	7.51	10.9	12.5	19.8		
NUCS EXCLUDED, 1ST/2ND:	SM148	CM243	PU241 / CM246	AM242	NP237					CM244	CM243	PU241 / SM148	AM242	NP237			

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

	ORIGEN2	ORIGEN-S	CINDER	10 KYR OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	8.052E-02	7.496E-02	6.894E-02	1.076	1.002	0.922	1.07	1.17	1.09
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	9.582E+00	9.579E+00	9.467E+00	1.004	1.004	0.992	1.00	1.01	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	9.145E+00	9.192E+00	9.188E+00	0.997	1.002	1.001	0.99	1.00	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	2.164E+00	2.055E+00	2.167E+00	1.017	0.965	1.018	1.05	1.00	0.95
SN126	2.154E-01	1.654E-01	1.819E-01	1.148	0.882	0.970	1.30	1.18	0.91
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.582E+00	1.680E+00	1.603E+00	0.976	1.036	0.988	0.94	0.99	1.05
CS133	1.013E+01	1.031E+01	1.013E+01	0.994	1.012	0.994	0.98	1.00	1.02
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	3.909E+00	4.361E+00	3.996E+00	0.956	1.067	0.977	0.90	0.98	1.09
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	6.553E+00	6.904E+00	6.559E+00	0.982	1.035	0.983	0.95	1.00	1.05
ND144	1.153E+01	1.119E+01	1.154E+01	1.010	0.980	1.011	1.03	1.00	0.97
ND145	5.646E+00	5.756E+00	5.645E+00	0.994	1.013	0.993	0.98	1.00	1.02
ND146	5.778E+00	5.699E+00	5.798E+00	1.003	0.990	1.007	1.01	1.00	0.98
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	1.671E+00	2.015E+00	2.015E+00	0.879	1.060	1.060	0.83	0.83	1.00
SM148	1.554E+00	1.151E+00	1.188E+00	1.198	0.887	0.915	1.35	1.31	0.97
SM149	2.131E-02	2.767E-02	2.071E-02	0.917	1.191	0.892	0.77	1.03	1.34
SM150	2.345E+00	2.423E+00	2.397E+00	0.982	1.015	1.004	0.97	0.98	1.01
SM151	3.528E-35	4.087E-35	2.904E-35	1.006	1.166	0.828	0.86	1.21	1.41
SM152	9.777E-01	1.016E+00	7.979E-01	1.051	1.092	0.857	0.96	1.23	1.27
EU153	8.142E-01	8.514E-01	9.210E-01	0.944	0.987	1.068	0.96	0.88	0.92
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.727E+00	1.790E+00	1.148E+00	1.111	1.151	0.738	0.96	1.50	1.56
U235	4.347E+01	4.907E+01	3.997E+01	0.984	1.111	0.905	0.89	1.09	1.23
U236	2.877E+01	2.839E+01	2.253E+01	1.083	1.069	0.848	1.01	1.28	1.26
U238	3.926E+03	3.916E+03	3.928E+03	1.001	0.998	1.001	1.00	1.00	1.00
NP237	7.918E+00	8.589E+00	2.028E+00	1.282	1.390	0.328	0.92	3.90	4.24
PU238	7.318E-23	1.340E-22	5.106E-23	0.850	1.557	0.593	0.55	1.43	2.62
PU239	1.548E+01	1.852E+01	1.291E+01	0.990	1.184	0.826	0.84	1.20	1.43
PU240	3.412E+00	3.115E+00	3.050E+00	1.069	0.976	0.955	1.10	1.12	1.02
PU241	3.211E-06	3.978E-06	0.0	0.893	1.107	0.0	0.81	0.0	0.0
PU242	1.961E+00	2.012E+00	2.435E+00	0.918	0.942	1.140	0.97	0.81	0.83
AM241	9.705E-05	1.227E-04	5.837E-07	1.321	1.671	0.008	0.79	****	****
AM242	7.722E-28	1.414E-27	5.385E-28	0.850	1.557	0.593	0.55	1.43	2.63
AM243	1.555E-01	1.746E-01	1.920E-01	0.894	1.003	1.103	0.89	0.81	0.91
CM242	1.566E-25	2.868E-25	1.091E-25	0.850	1.557	0.592	0.55	1.44	2.63
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	1.994E-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	1.892E-03	2.296E-03	2.610E-03	0.835	1.013	1.152	0.82	0.72	0.88
CM246	1.254E-04	1.566E-04	1.801E-04	0.814	1.017	1.169	0.80	0.70	0.87

AVERAGE-ABSOLUTE-DEVIATION, AS %	8.23	12.78	14.81	12.9	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	6.91	9.79	11.45	11.6	23.2	31.7
AV-ABS-DEV EXCLUDING LARGEST TWO, %	5.49	7.48	8.22	10.7	13.6	17.7

NUCS EXCLUDED, 1ST/2ND: SM148 CM242 AM241 / CM246 AM242 NP237

APPENDIX D

COMPARATIVE RATIO TABLES IN CURIES
(See table descriptions in Sect. 4.1)

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU CURIES PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.091E-01	4.091E-01	4.089E-01	1.000	1.000	1.000	1.00	1.00	1.00	4.091E-01	4.091E-01	4.089E-01	1.000	1.000	1.000	1.00	1.00	1.00
KR 85	9.410E+03	9.410E+03	9.406E+03	1.000	1.000	1.000	1.00	1.00	1.00	6.847E+03	6.847E+03	6.844E+03	1.000	1.000	1.000	1.00	1.00	1.00
SR 89	5.800E+05	5.800E+05	5.797E+05	1.000	1.000	1.000	1.00	1.00	1.00	1.137E-05	1.136E-05	1.137E-05	1.000	0.999	1.000	1.00	1.00	1.00
SR 90	7.299E+04	7.299E+04	7.296E+04	1.000	1.000	1.000	1.00	1.00	1.00	6.493E+04	6.493E+04	6.490E+04	1.000	1.000	1.000	1.00	1.00	1.00
Y 90	7.304E+04	7.301E+04	7.298E+04	1.000	1.000	1.000	1.00	1.00	1.00	6.494E+04	6.495E+04	6.492E+04	1.000	1.000	1.000	1.00	1.00	1.00
Y 91	8.112E+05	8.112E+05	8.106E+05	1.000	1.000	1.000	1.00	1.00	1.00	4.647E-04	4.645E-04	4.648E-04	1.000	1.000	1.000	1.00	1.00	1.00
ZR 93	1.806E+00	1.806E+00	1.805E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.806E+00	1.806E+00	1.805E+00	1.000	1.000	1.000	1.00	1.00	1.00
ZR 95	1.192E+06	1.192E+06	1.190E+06	1.001	1.001	0.999	1.00	1.00	1.00	4.216E-03	4.210E-03	4.362E-03	0.989	0.988	1.023	1.00	0.97	0.97
NB 95	1.542E+06	1.542E+06	1.541E+06	1.000	1.000	1.000	1.00	1.00	1.00	9.361E-03	9.346E-03	9.647E-03	0.990	0.989	1.021	1.00	0.97	0.97
TC 99	1.307E+01	1.307E+01	1.307E+01	1.000	1.000	1.000	1.00	1.00	1.00	1.307E+01	1.307E+01	1.307E+01	1.000	1.000	1.000	1.00	1.00	1.00
RU106	5.501E+05	5.501E+05	5.498E+05	1.000	1.000	1.000	1.00	1.00	1.00	1.870E+04	1.870E+04	1.869E+04	1.000	1.000	1.000	1.00	1.00	1.00
PD107	1.122E-01	1.122E-01	1.121E-01	1.000	1.000	0.999	1.00	1.00	1.00	1.122E-01	1.121E-01	1.121E-01	1.001	1.000	1.000	1.00	1.00	1.00
SN126	7.774E-01	7.775E-01	7.772E-01	1.000	1.000	1.000	1.00	1.00	1.00	7.774E-01	7.775E-01	7.771E-01	1.000	1.000	1.000	1.00	1.00	1.00
SB125	1.465E+04	1.465E+04	1.464E+04	1.000	1.000	1.000	1.00	1.00	1.00	4.283E+03	4.283E+03	4.281E+03	1.000	1.000	1.000	1.00	1.00	1.00
I129	3.141E-02	3.141E-02	3.144E-02	1.000	1.000	1.001	1.00	1.00	1.00	3.157E-02	3.157E-02	3.166E-02	0.999	0.999	1.002	1.00	1.00	1.00
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.516E+05	1.516E+05	1.516E+05	1.000	1.000	1.000	1.00	1.00	1.00	2.903E+04	2.903E+04	2.901E+04	1.000	1.000	1.000	1.00	1.00	1.00
CS135	3.455E-01	3.455E-01	3.454E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.455E-01	3.455E-01	3.454E-01	1.000	1.000	1.000	1.00	1.00	1.00
CS137	1.041E+05	1.035E+05	1.035E+05	1.004	0.998	0.998	1.01	1.01	1.00	9.291E+04	9.245E+04	9.240E+04	1.003	0.999	0.998	1.00	1.01	1.00
CE144	1.172E+06	1.171E+06	1.171E+06	1.001	1.000	1.000	1.00	1.00	1.00	1.467E+04	1.468E+04	1.469E+04	0.999	1.000	1.001	1.00	1.00	1.00
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.126E-09	1.130E-09	1.129E-09	0.998	1.001	1.001	1.00	1.00	1.00	1.555E-09	1.560E-09	1.559E-09	0.998	1.001	1.001	1.00	1.00	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	1.340E+05	1.340E+05	1.340E+05	1.000	1.000	1.000	1.00	1.00	1.00	3.688E+04	3.687E+04	3.686E+04	1.000	1.000	1.000	1.00	1.00	1.00
SM147	1.280E-06	1.310E-06	1.310E-06	0.985	1.008	1.008	0.98	0.98	1.00	3.691E-06	3.778E-06	3.776E-06	0.985	1.008	1.007	0.98	0.98	1.00
M148	4.922E-11	4.971E-11	4.969E-11	0.994	1.003	1.003	0.99	0.99	1.00	4.948E-11	4.997E-11	4.995E-11	0.994	1.003	1.003	0.99	0.99	1.00
M149	9.017E-13	9.021E-13	8.936E-13	1.003	1.003	0.994	1.00	1.01	1.01	9.018E-13	9.022E-13	8.936E-13	1.003	1.003	0.994	1.00	1.01	1.01
M150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.598E+02	3.598E+02	3.596E+02	1.000	1.000	1.000	1.00	1.00	1.00	3.464E+02	3.464E+02	3.462E+02	1.000	1.000	1.000	1.00	1.00	1.00
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.050E+04	1.050E+04	1.049E+04	1.000	1.000	0.999	1.00	1.00	1.00	7.062E+03	7.062E+03	7.059E+03	1.000	1.000	1.000	1.00	1.00	1.00
EU155	6.444E+03	6.442E+03	6.439E+03	1.000	1.000	1.000	1.00	1.00	1.00	3.240E+03	3.240E+03	3.239E+03	1.000	1.000	1.000	1.00	1.00	1.00
U234	1.123E+00	1.123E+00	1.122E+00	1.000	1.000	0.999	1.00	1.00	1.00	1.156E+00	1.156E+00	1.155E+00	1.000	1.000	0.999	1.00	1.00	1.00
U235	1.721E-02	1.721E-02	1.720E-02	1.000	1.000	1.000	1.00	1.00	1.00	1.721E-02	1.721E-02	1.720E-02	1.000	1.000	1.000	1.00	1.00	1.00
U236	2.563E-01	2.563E-01	2.562E-01	1.000	1.000	1.000	1.00	1.00	1.00	2.564E-01	2.564E-01	2.562E-01	1.000	1.000	0.999	1.00	1.00	1.00
U238	3.175E-01	3.175E-01	3.174E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.175E-01	3.175E-01	3.174E-01	1.000	1.000	1.000	1.00	1.00	1.00
NP237	3.120E-01	3.120E-01	3.118E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.133E-01	3.132E-01	3.122E-01	1.001	1.001	0.998	1.00	1.00	1.00
PU238	2.243E+03	2.242E+03	2.241E+03	1.000	1.000	1.000	1.00	1.00	1.00	2.330E+03	2.330E+03	2.329E+03	1.000	1.000	1.000	1.00	1.00	1.00
PU239	3.131E+02	3.131E+02	3.124E+02	1.001	1.001	0.999	1.00	1.00	1.00	3.130E+02	3.130E+02	3.123E+02	1.001	1.001	0.999	1.00	1.00	1.00
PU240	5.270E+02	5.270E+02	5.257E+02	1.001	1.001	0.998	1.00	1.00	1.00	5.277E+02	5.277E+02	5.255E+02	1.001	1.001	0.997	1.00	1.00	1.00
PU241	1.255E+05	1.230E+05	1.229E+05	1.014	0.994	0.993	1.02	1.02	1.00	9.906E+04	9.751E+04	9.747E+04	1.011	0.995	0.994	1.02	1.02	1.00
PU242	1.728E+00	1.780E+00	1.776E+00	0.981	1.011	1.008	0.97	0.97	1.00	1.728E+00	1.780E+00	1.776E+00	0.981	1.011	1.008	0.97	0.97	1.00
AM241	1.150E+02	1.146E+02	1.146E+02	1.002	0.999	0.999	1.00	1.00	1.00	9.919E+02	9.758E+02	9.753E+02	1.011	0.995	0.994	1.02	1.02	1.00
AM242	6.072E+00	6.073E+00	6.100E+00	0.998	0.999	1.003	1.00	1.00	1.00	5.937E+00	5.938E+00	5.965E+00	0.998	0.999	1.003	1.00	1.00	1.00
AM243	1.714E+01	1.714E+01	1.714E+01	1.000	1.000	1.000	1.00	1.00	1.00	1.714E+01	1.714E+01	1.713E+01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	3.520E+04	3.521E+04	3.524E+04	1.000	1.000	1.001	1.00	1.00	1.00	2.202E+01	2.202E+01	2.184E+01	1.003	1.003	0.995	1.00	1.01	1.01
CM243	1.693E+01	1.693E+01	1.692E+01	1.000	1.000	1.000	1.00	1.00	1.00	1.502E+01	1.502E+01	1.501E+01	1.000	1.000	1.000	1.00	1.00	1.00
CM244	1.939E+03	1.939E+03	1.938E+03	1.000	1.000	1.000	1.00	1.00	1.00	1.606E+03	1.606E+03	1.606E+03	1.000	1.000	1.000	1.00	1.00	1.00
CM245	1.477E-01	1.477E-01	1.481E-01	0.999	0.999	1.002	1.00	1.00	1.00	1.477E-01	1.477E-01	1.480E-01	0.999	0.999	1.001	1.00	1.00	1.00
CM246	3.162E-02	3.162E-02	3.161E-02	1.000	1.000	1.000	1.00	1.00	1.00	3.159E-02	3.160E-02	3.159E-02	1.000	1.000	1.000	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.17	0.10	0.13	0.2	0.3	0.1				0.24	0.17	0.24	0.2	0.5	0.3
AV-ABS-DEV EXCLUDING LARGEST ONE, %				0.13	0.07	0.10	0.2	0.2	0.1				0.18	0.12	0.19	0.2	0.4	0.2
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.09	0.05	0.08	0.1	0.2	0.1				0.13	0.08	0.13	0.1	0.2	0.1
NUCS EXCLUDED, 1ST/2ND:			PU242		SM149 / SM147				AM242			PU242	SR 89	ZR 95 / SM147		Y 91	NB 95	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU CURIES PER MTU

	**********			10 YR						**********			20 YR					
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.091E-01	4.091E-01	4.089E-01	1.000	1.000	1.000	1.00	1.00	1.00	4.090E-01	4.090E-01	4.089E-01	1.000	1.000	1.000	1.00	1.00	1.00
KR 85	4.955E+03	4.955E+03	4.953E+03	1.000	1.000	1.000	1.00	1.00	1.00	2.596E+03	2.596E+03	2.595E+03	1.000	1.000	1.000	1.00	1.00	1.00
SR 89	1.476E-16	1.473E-16	1.478E-16	1.000	0.998	1.002	1.00	1.00	1.00	0.0	0.0	2.495E-38	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	5.764E+04	5.764E+04	5.762E+04	1.000	1.000	1.000	1.00	1.00	1.00	4.543E+04	4.543E+04	4.541E+04	1.000	1.000	1.000	1.00	1.00	1.00
Y 90	5.766E+04	5.766E+04	5.763E+04	1.000	1.000	1.000	1.00	1.00	1.00	4.544E+04	4.544E+04	4.543E+04	1.000	1.000	1.000	1.00	1.00	1.00
Y 91	1.865E-13	1.864E-13	1.868E-13	1.000	0.999	1.001	1.00	1.00	1.00	3.005E-32	0.0	3.018E-32	0.998	0.0	1.002	0.0	1.00	0.0
ZR 93	1.806E+00	1.806E+00	1.805E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.806E+00	1.806E+00	1.805E+00	1.000	1.000	1.000	1.00	1.00	1.00
ZR 95	1.078E-11	1.074E-11	1.156E-11	0.978	0.974	1.048	1.00	0.93	0.93	7.042E-29	0.0	8.127E-29	0.928	0.0	1.072	0.0	0.87	0.0
NB 95	2.393E-11	2.384E-11	2.557E-11	0.979	0.975	1.046	1.00	0.94	0.93	1.563E-28	0.0	1.797E-28	0.930	0.0	1.070	0.0	0.87	0.0
TC 99	1.307E+01	1.307E+01	1.307E+01	1.000	1.000	1.000	1.00	1.00	1.00	1.307E+01	1.307E+01	1.307E+01	1.000	1.000	1.000	1.00	1.00	1.00
RU106	6.005E+02	6.005E+02	6.005E+02	1.000	1.000	1.000	1.00	1.00	1.00	6.180E-01	6.195E-01	6.199E-01	0.998	1.001	1.001	1.00	1.00	1.00
PD107	1.122E-01	1.121E-01	1.121E-01	1.001	1.000	1.000	1.00	1.00	1.00	1.122E-01	1.121E-01	1.121E-01	1.001	1.000	1.000	1.00	1.00	1.00
SN126	7.774E-01	7.774E-01	7.771E-01	1.000	1.000	1.000	1.00	1.00	1.00	7.773E-01	7.774E-01	7.770E-01	1.000	1.000	1.000	1.00	1.00	1.00
SB125	1.226E+03	1.226E+03	1.225E+03	1.000	1.000	0.999	1.00	1.00	1.00	1.004E+02	1.003E+02	1.003E+02	1.001	1.000	1.000	1.00	1.00	1.00
I129	3.157E-02	3.157E-02	3.166E-02	0.999	0.999	1.002	1.00	1.00	1.00	3.157E-02	3.157E-02	3.166E-02	0.999	0.999	1.002	1.00	1.00	1.00
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	5.406E+03	5.405E+03	5.403E+03	1.000	1.000	1.000	1.00	1.00	1.00	1.875E+02	1.874E+02	1.874E+02	1.000	1.000	1.000	1.00	1.00	1.00
CS135	3.455E-01	3.455E-01	3.454E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.455E-01	3.455E-01	3.454E-01	1.000	1.000	1.000	1.00	1.00	1.00
CS137	8.277E+04	8.241E+04	8.238E+04	1.003	0.999	0.998	1.00	1.00	1.00	6.570E+04	6.549E+04	6.547E+04	1.002	0.999	0.999	1.00	1.00	1.00
CE144	1.708E+02	1.709E+02	1.714E+02	0.999	0.999	1.002	1.00	1.00	1.00	2.315E-02	2.318E-02	2.333E-02	0.997	0.998	1.005	1.00	0.99	0.99
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.560E-09	1.566E-09	1.565E-09	0.998	1.001	1.001	1.00	1.00	1.00	1.560E-09	1.566E-09	1.565E-09	0.998	1.001	1.001	1.00	1.00	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	9.841E+03	9.838E+03	9.835E+03	1.000	1.000	1.000	1.00	1.00	1.00	7.008E+02	7.004E+02	7.003E+02	1.000	1.000	1.000	1.00	1.00	1.00
SM147	4.354E-06	4.456E-06	4.454E-06	0.985	1.008	1.007	0.98	0.98	1.00	4.578E-06	4.685E-06	4.683E-06	0.985	1.008	1.007	0.98	0.98	1.00
SM148	4.948E-11	4.997E-11	4.995E-11	0.994	1.003	1.003	0.99	0.99	1.00	4.948E-11	4.997E-11	4.995E-11	0.994	1.003	1.003	0.99	0.99	1.00
SM149	9.018E-13	9.022E-13	8.936E-13	1.003	1.003	0.994	1.00	1.01	1.01	9.018E-13	9.022E-13	8.936E-13	1.003	1.003	0.994	1.00	1.01	1.01
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.334E+02	3.333E+02	3.332E+02	1.000	1.000	1.000	1.00	1.00	1.00	3.086E+02	3.086E+02	3.085E+02	1.000	1.000	1.000	1.00	1.00	1.00
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	4.720E+03	4.720E+03	4.718E+03	1.000	1.000	1.000	1.00	1.00	1.00	2.108E+03	2.108E+03	2.107E+03	1.000	1.000	1.000	1.00	1.00	1.00
EU155	1.611E+03	1.611E+03	1.610E+03	1.000	1.000	1.000	1.00	1.00	1.00	3.982E+02	3.982E+02	3.981E+02	1.000	1.000	1.000	1.00	1.00	1.00
U234	1.189E+00	1.189E+00	1.187E+00	1.001	1.001	0.999	1.00	1.00	1.00	1.250E+00	1.250E+00	1.247E+00	1.001	1.001	0.998	1.00	1.00	1.00
U235	1.721E-02	1.721E-02	1.720E-02	1.000	1.000	1.000	1.00	1.00	1.00	1.722E-02	1.722E-02	1.720E-02	1.000	1.000	0.999	1.00	1.00	1.00
U236	2.565E-01	2.565E-01	2.562E-01	1.000	1.000	0.999	1.00	1.00	1.00	2.566E-01	2.566E-01	2.562E-01	1.001	1.001	0.999	1.00	1.00	1.00
U238	3.175E-01	3.175E-01	3.174E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.175E-01	3.175E-01	3.174E-01	1.000	1.000	1.000	1.00	1.00	1.00
NP237	3.154E-01	3.154E-01	3.122E-01	1.003	1.003	0.993	1.00	1.01	1.01	3.226E-01	3.224E-01	3.122E-01	1.011	1.010	0.978	1.00	1.03	1.03
PU238	2.240E+03	2.240E+03	2.239E+03	1.000	1.000	1.000	1.00	1.00	1.00	2.071E+03	2.071E+03	2.070E+03	1.000	1.000	1.000	1.00	1.00	1.00
PU239	3.130E+02	3.130E+02	3.123E+02	1.001	1.001	0.999	1.00	1.00	1.00	3.129E+02	3.129E+02	3.122E+02	1.001	1.001	0.999	1.00	1.00	1.00
PU240	5.282E+02	5.282E+02	5.252E+02	1.002	1.002	0.996	1.00	1.01	1.01	5.288E+02	5.288E+02	5.246E+02	1.003	1.003	0.995	1.00	1.01	1.01
PU241	7.787E+04	7.703E+04	7.700E+04	1.007	0.997	0.996	1.01	1.01	1.00	4.812E+04	4.807E+04	4.805E+04	1.001	1.000	0.999	1.00	1.00	1.00
PU242	1.728E+00	1.779E+00	1.776E+00	0.981	1.010	1.009	0.97	0.97	1.00	1.728E+00	1.779E+00	1.776E+00	0.981	1.010	1.009	0.97	0.97	1.00
AM241	1.687E+03	1.662E+03	1.661E+03	1.010	0.995	0.995	1.02	1.02	1.00	2.643E+03	2.612E+03	2.611E+03	1.008	0.996	0.996	1.01	1.01	1.00
AM242	5.803E+00	5.805E+00	5.830E+00	0.998	0.999	1.003	1.00	1.00	1.00	5.545E+00	5.546E+00	5.570E+00	0.998	0.999	1.003	1.00	1.00	1.00
AM243	1.713E+01	1.713E+01	1.712E+01	1.000	1.000	1.000	1.00	1.00	1.00	1.711E+01	1.711E+01	1.711E+01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	4.809E+00	4.810E+00	4.843E+00	0.998	0.998	1.005	1.00	0.99	0.99	4.585E+00	4.586E+00	4.620E+00	0.997	0.998	1.005	1.00	0.99	0.99
CM243	1.330E+01	1.330E+01	1.329E+01	1.000	1.000	0.999	1.00	1.00	1.00	1.043E+01	1.043E+01	1.042E+01	1.000	1.000	0.999	1.00	1.00	1.00
CM244	1.327E+03	1.326E+03	1.326E+03	1.001	1.000	1.000	1.00	1.00	1.00	9.047E+02	9.045E+02	9.043E+02	1.000	1.000	1.000	1.00	1.00	1.00
CM245	1.476E-01	1.476E-01	1.480E-01	0.999	0.999	1.002	1.00	1.00	1.00	1.475E-01	1.475E-01	1.478E-01	0.999	0.999	1.001	1.00	1.00	1.00
CM246	3.157E-02	3.158E-02	3.157E-02	1.000	1.000	1.000	1.00	1.00	1.00	3.153E-02	3.153E-02	3.152E-02	1.000	1.000	1.000	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.29	0.24	0.37	0.2	0.6	0.5				0.52	0.14	0.52	0.2	1.0	0.2
AV-ABS-DEV EXCLUDING LARGEST ONE, %				0.21	0.16	0.26	0.2	0.5	0.3				0.48	0.09	0.47	0.2	0.6	0.1
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.13	0.09	0.14	0.1	0.3	0.2				0.46	0.07	0.46	0.1	0.2	0.1
NUCS EXCLUDED, 1ST/2ND:				PU242	SR 89	ZR 95 / SM147			NB 95		PU242		NP237 / SM147				SM149	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU CURIES PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.089E-01	4.089E-01	4.087E-01	1.000	1.000	1.000	1.00	1.00	1.00	4.087E-01	4.087E-01	4.085E-01	1.000	1.000	1.000	1.00	1.00	1.00
KR 85	3.731E+02	3.730E+02	3.729E+02	1.000	1.000	1.000	1.00	1.00	1.00	1.472E+01	1.471E+01	1.471E+01	1.000	1.000	1.000	1.00	1.00	1.00
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	2.225E+04	2.224E+04	2.224E+04	1.000	1.000	1.000	1.00	1.00	1.00	6.767E+03	6.766E+03	6.764E+03	1.000	1.000	1.000	1.00	1.00	1.00
Y 90	2.225E+04	2.225E+04	2.224E+04	1.000	1.000	1.000	1.00	1.00	1.00	6.769E+03	6.767E+03	6.765E+03	1.000	1.000	1.000	1.00	1.00	1.00
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.806E+00	1.806E+00	1.805E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.806E+00	1.806E+00	1.805E+00	1.000	1.000	1.000	1.00	1.00	1.00
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.307E+01	1.307E+01	1.306E+01	1.000	1.000	0.999	1.00	1.00	1.00	1.307E+01	1.307E+01	1.306E+01	1.000	1.000	0.999	1.00	1.00	1.00
RU106	6.788E-10	6.802E-10	6.817E-10	0.998	1.000	1.002	1.00	1.00	1.00	7.938E-25	7.949E-25	7.989E-25	0.997	0.999	1.004	1.00	0.99	0.99
PD107	1.122E-01	1.121E-01	1.121E-01	1.001	1.000	1.000	1.00	1.00	1.00	1.122E-01	1.121E-01	1.121E-01	1.001	1.000	1.000	1.00	1.00	1.00
SN126	7.772E-01	7.772E-01	7.769E-01	1.000	1.000	1.000	1.00	1.00	1.00	7.769E-01	7.769E-01	7.766E-01	1.000	1.000	1.000	1.00	1.00	1.00
SB125	5.510E-02	5.508E-02	5.509E-02	1.000	1.000	1.000	1.00	1.00	1.00	2.028E-07	2.027E-07	2.029E-07	1.000	1.000	1.000	1.00	1.00	1.00
I129	3.157E-02	3.157E-02	3.166E-02	0.999	0.999	1.002	1.00	1.00	1.00	3.157E-02	3.157E-02	3.166E-02	0.999	0.999	1.002	1.00	1.00	1.00
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	7.819E-03	7.812E-03	7.815E-03	1.000	1.000	1.000	1.00	1.00	1.00	3.922E-10	3.915E-10	3.920E-10	1.001	0.999	1.000	1.00	1.00	1.00
CS135	3.455E-01	3.455E-01	3.454E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.455E-01	3.455E-01	3.454E-01	1.000	1.000	1.000	1.00	1.00	1.00
CS137	3.285E+04	3.287E+04	3.286E+04	1.000	1.000	1.000	1.00	1.00	1.00	1.035E+04	1.042E+04	1.042E+04	0.996	1.002	1.002	0.99	0.99	1.00
CE144	5.762E-14	5.783E-14	5.884E-14	0.992	0.995	1.013	1.00	0.98	0.98	2.634E-33	0.0	2.749E-33	0.979	0.0	1.021	0.0	0.96	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.560E-09	1.566E-09	1.565E-09	0.998	1.001	1.001	1.00	1.00	1.00	1.560E-09	1.566E-09	1.565E-09	0.998	1.001	1.001	1.00	1.00	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	2.530E-01	2.527E-01	2.528E-01	1.001	0.999	1.000	1.00	1.00	1.00	4.634E-07	4.621E-07	4.626E-07	1.002	0.999	1.000	1.00	1.00	1.00
SM147	4.595E-06	4.703E-06	4.700E-06	0.985	1.008	1.007	0.98	0.98	1.00	4.595E-06	4.703E-06	4.700E-06	0.985	1.008	1.007	0.98	0.98	1.00
SM148	4.948E-11	4.997E-11	4.995E-11	0.994	1.003	1.003	0.99	0.99	1.00	4.948E-11	4.997E-11	4.995E-11	0.994	1.003	1.003	0.99	0.99	1.00
SM149	9.018E-13	9.022E-13	8.936E-13	1.003	1.003	0.994	1.00	1.01	1.01	9.018E-13	9.022E-13	8.936E-13	1.003	1.003	0.994	1.00	1.01	1.01
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	2.450E+02	2.450E+02	2.448E+02	1.000	1.000	0.999	1.00	1.00	1.00	1.667E+02	1.667E+02	1.666E+02	1.000	1.000	1.000	1.00	1.00	1.00
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.879E+02	1.878E+02	1.877E+02	1.001	1.000	0.999	1.00	1.00	1.00	3.340E+00	3.337E+00	3.337E+00	1.001	1.000	1.000	1.00	1.00	1.00
EU155	6.013E+00	6.016E+00	6.014E+00	1.000	1.000	1.000	1.00	1.00	1.00	5.547E-03	5.553E-03	5.552E-03	0.999	1.000	1.000	1.00	1.00	1.00
U234	1.406E+00	1.406E+00	1.402E+00	1.001	1.001	0.998	1.00	1.00	1.00	1.598E+00	1.598E+00	1.592E+00	1.001	1.001	0.997	1.00	1.00	1.00
U235	1.722E-02	1.723E-02	1.720E-02	1.000	1.001	0.999	1.00	1.00	1.00	1.724E-02	1.724E-02	1.720E-02	1.001	1.001	0.998	1.00	1.00	1.00
U236	2.571E-01	2.571E-01	2.562E-01	1.001	1.001	0.998	1.00	1.00	1.00	2.579E-01	2.579E-01	2.562E-01	1.002	1.002	0.996	1.00	1.01	1.01
U238	3.175E-01	3.175E-01	3.174E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.175E-01	3.175E-01	3.174E-01	1.000	1.000	1.000	1.00	1.00	1.00
NP237	3.549E-01	3.545E-01	3.122E-01	1.042	1.041	0.917	1.00	1.14	1.14	4.163E-01	4.158E-01	3.122E-01	1.091	1.090	0.818	1.00	1.33	1.33
PU238	1.635E+03	1.635E+03	1.634E+03	1.000	1.000	1.000	1.00	1.00	1.00	1.102E+03	1.102E+03	1.102E+03	1.000	1.000	1.000	1.00	1.00	1.00
PU239	3.127E+02	3.127E+02	3.119E+02	1.001	1.001	0.998	1.00	1.00	1.00	3.123E+02	3.122E+02	3.115E+02	1.001	1.001	0.998	1.00	1.00	1.00
PU240	5.288E+02	5.288E+02	5.230E+02	1.004	1.004	0.993	1.00	1.01	1.01	5.267E+02	5.267E+02	5.202E+02	1.004	1.004	0.992	1.00	1.01	1.01
PU241	1.135E+04	1.168E+04	1.168E+04	0.981	1.010	1.010	0.97	0.97	1.00	1.023E+03	1.105E+03	1.105E+03	0.949	1.025	1.025	0.93	0.93	1.00
PU242	1.728E+00	1.779E+00	1.776E+00	0.981	1.010	1.009	0.97	0.97	1.00	1.728E+00	1.779E+00	1.776E+00	0.981	1.010	1.009	0.97	0.97	1.00
AM241	3.708E+03	3.691E+03	3.689E+03	1.003	0.999	0.998	1.00	1.01	1.00	3.748E+03	3.747E+03	3.745E+03	1.000	1.000	1.000	1.00	1.00	1.00
AM242	4.836E+00	4.837E+00	4.858E+00	0.998	0.999	1.003	1.00	1.00	1.00	3.850E+00	3.851E+00	3.868E+00	0.998	0.999	1.003	1.00	1.00	1.00
AM243	1.706E+01	1.706E+01	1.706E+01	1.000	1.000	1.000	1.00	1.00	1.00	1.698E+01	1.698E+01	1.698E+01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	3.999E+00	4.000E+00	4.029E+00	0.997	0.998	1.005	1.00	0.99	0.99	3.184E+00	3.184E+00	3.208E+00	0.997	0.997	1.005	1.00	0.99	0.99
CM243	5.027E+00	5.027E+00	5.025E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.490E+00	1.490E+00	1.489E+00	1.000	1.000	1.000	1.00	1.00	1.00
CM244	2.870E+02	2.869E+02	2.868E+02	1.000	1.000	1.000	1.00	1.00	1.00	4.233E+01	4.232E+01	4.231E+01	1.000	1.000	1.000	1.00	1.00	1.00
CM245	1.471E-01	1.471E-01	1.475E-01	0.999	0.999	1.002	1.00	1.00	1.00	1.465E-01	1.465E-01	1.469E-01	0.999	0.999	1.002	1.00	1.00	1.00
CM246	3.139E-02	3.139E-02	3.138E-02	1.000	1.000	1.000	1.00	1.00	1.00	3.116E-02	3.116E-02	3.115E-02	1.000	1.000	1.000	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.34	0.24	0.41	0.3	0.8	0.5				0.58	0.41	0.72	0.4	1.4	1.0
AV-ABS-DEV EXCLUDING LARGEST ONE, %				0.20	0.13	0.19	0.2	0.4	0.2				0.25	0.13	0.24	0.2	0.5	0.2
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.14	0.09	0.14	0.1	0.3	0.2				0.20	0.10	0.20	0.2	0.4	0.2
NUCS EXCLUDED, 1ST/2ND:			PU241		NP237 / PU242				CE144		PU241	CS134	NP237 / PU242				PU240	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU CURIES PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.078E-01	4.078E-01	4.076E-01	1.000	1.000	1.000	1.00	1.00	1.00	4.048E-01	4.048E-01	4.046E-01	1.000	1.000	1.000	1.00	1.00	1.00
KR 85	3.561E-05	3.556E-05	3.558E-05	1.001	0.999	1.000	1.00	1.00	1.00	7.852E-25	7.838E-25	7.833E-25	1.001	1.000	0.999	1.00	1.00	1.00
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	5.794E+01	5.789E+01	5.789E+01	1.001	1.000	1.000	1.00	1.00	1.00	3.365E-06	3.360E-06	3.359E-06	1.001	1.000	0.999	1.00	1.00	1.00
Y 90	5.796E+01	5.791E+01	5.791E+01	1.001	1.000	1.000	1.00	1.00	1.00	3.366E-06	3.361E-06	3.360E-06	1.001	1.000	0.999	1.00	1.00	1.00
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.806E+00	1.806E+00	1.805E+00	1.000	1.000	1.000	1.00	1.00	1.00	1.805E+00	1.805E+00	1.805E+00	1.000	1.000	1.000	1.00	1.00	1.00
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.306E+01	1.306E+01	1.305E+01	1.000	1.000	0.999	1.00	1.00	1.00	1.303E+01	1.303E+01	1.302E+01	1.000	1.000	0.999	1.00	1.00	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.122E-01	1.121E-01	1.121E-01	1.001	1.000	1.000	1.00	1.00	1.00	1.122E-01	1.121E-01	1.121E-01	1.001	1.000	1.000	1.00	1.00	1.00
SN126	7.758E-01	7.759E-01	7.755E-01	1.000	1.000	1.000	1.00	1.00	1.00	7.721E-01	7.721E-01	7.718E-01	1.000	1.000	1.000	1.00	1.00	1.00
SB125	0.0	0.0	3.731E-29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	3.157E-02	3.157E-02	3.166E-02	0.999	0.999	1.002	1.00	1.00	1.00	3.157E-02	3.157E-02	3.166E-02	0.999	0.999	1.002	1.00	1.00	1.00
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	2.481E-39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	3.455E-01	3.455E-01	3.454E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.454E-01	3.454E-01	3.453E-01	1.000	1.000	1.000	1.00	1.00	1.00
CS137	1.019E+02	1.052E+02	1.052E+02	0.979	1.011	1.011	0.97	0.97	1.00	9.638E-06	1.090E-05	1.090E-05	0.920	1.040	1.040	0.88	0.88	1.00
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.560E-09	1.566E-09	1.565E-09	0.998	1.001	1.001	1.00	1.00	1.00	1.560E-09	1.566E-09	1.565E-09	0.998	1.001	1.001	1.00	1.00	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	5.187E-30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	4.595E-06	4.703E-06	4.700E-06	0.985	1.008	1.007	0.98	0.98	1.00	4.595E-06	4.703E-06	4.700E-06	0.985	1.008	1.007	0.98	0.98	1.00
SM148	4.948E-11	4.997E-11	4.995E-11	0.994	1.003	1.003	0.99	0.99	1.00	4.948E-11	4.997E-11	4.995E-11	0.994	1.003	1.003	0.99	0.99	1.00
SM149	9.018E-13	9.022E-13	8.936E-13	1.003	1.003	0.994	1.00	1.01	1.01	9.018E-13	9.022E-13	8.936E-13	1.003	1.003	0.994	1.00	1.01	1.01
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.572E+01	3.571E+01	3.570E+01	1.000	1.000	1.000	1.00	1.00	1.00	1.627E-01	1.627E-01	1.626E-01	1.000	1.000	1.000	1.00	1.00	1.00
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	3.335E-07	3.329E-07	3.331E-07	1.001	0.999	1.000	1.00	1.00	1.00	0.0	0.0	1.046E-31	0.0	0.0	0.0	0.0	0.0	0.0
EU155	4.016E-15	4.033E-15	4.034E-15	0.997	1.001	1.002	1.00	1.00	1.00	0.0	0.0	1.319E-57	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.912E+00	1.912E+00	1.902E+00	1.002	1.002	0.997	1.00	1.01	1.01	1.991E+00	1.991E+00	1.980E+00	1.002	1.002	0.996	1.00	1.01	1.01
U235	1.730E-02	1.730E-02	1.720E-02	1.002	1.002	0.996	1.00	1.01	1.01	1.751E-02	1.751E-02	1.720E-02	1.006	1.006	0.988	1.00	1.02	1.02
U236	2.610E-01	2.610E-01	2.562E-01	1.006	1.006	0.988	1.00	1.02	1.02	2.713E-01	2.713E-01	2.562E-01	1.019	1.019	0.962	1.00	1.06	1.06
U238	3.175E-01	3.175E-01	3.174E-01	1.000	1.000	1.000	1.00	1.00	1.00	3.175E-01	3.175E-01	3.174E-01	1.000	1.000	1.000	1.00	1.00	1.00
NP237	6.259E-01	6.256E-01	3.122E-01	1.201	1.200	0.599	1.00	2.00	2.00	9.997E-01	9.996E-01	3.121E-01	1.298	1.297	0.405	1.00	3.20	3.20
PU238	2.286E+02	2.286E+02	2.285E+02	1.000	1.000	1.000	1.00	1.00	1.00	1.021E+00	1.020E+00	1.021E+00	1.000	0.999	1.000	1.00	1.00	1.00
PU239	3.106E+02	3.105E+02	3.097E+02	1.001	1.001	0.998	1.00	1.00	1.00	3.047E+02	3.047E+02	3.035E+02	1.001	1.001	0.997	1.00	1.00	1.00
PU240	5.157E+02	5.158E+02	5.093E+02	1.004	1.004	0.992	1.00	1.01	1.01	4.788E+02	4.789E+02	4.729E+02	1.004	1.004	0.992	1.00	1.01	1.01
PU241	2.118E-01	2.330E-01	8.865E-02	1.191	1.310	0.499	0.91	2.39	2.63	1.364E-01	1.364E-01	4.099E-16	1.500	1.500	0.000	1.00	****	****
PU242	1.728E+00	1.779E+00	1.776E+00	0.981	1.010	1.009	0.97	0.97	1.00	1.726E+00	1.777E+00	1.774E+00	0.981	1.010	1.009	0.97	0.97	1.00
AM241	2.745E+03	2.747E+03	2.746E+03	1.000	1.000	1.000	1.00	1.00	1.00	8.935E+02	8.940E+02	8.935E+02	1.000	1.000	1.000	1.00	1.00	1.00
AM242	1.547E+00	1.547E+00	1.554E+00	0.998	0.998	1.003	1.00	1.00	1.00	6.355E-02	6.355E-02	6.383E-02	0.999	0.999	1.003	1.00	1.00	1.00
AM243	1.667E+01	1.667E+01	1.666E+01	1.000	1.000	1.000	1.00	1.00	1.00	1.561E+01	1.561E+01	1.560E+01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	1.279E+00	1.279E+00	1.289E+00	0.997	0.997	1.005	1.00	0.99	0.99	5.256E-02	5.255E-02	5.294E-02	0.998	0.997	1.005	1.00	0.99	0.99
CM243	1.150E-02	1.149E-02	1.149E-02	1.001	1.000	1.000	1.00	1.00	1.00	4.647E-10	4.642E-10	4.640E-10	1.001	1.000	0.999	1.00	1.00	1.00
CM244	2.005E-02	2.004E-02	2.004E-02	1.000	1.000	1.000	1.00	1.00	1.00	4.255E-11	4.636E-14	4.637E-14	2.993	0.003	0.003	****	****	1.00
CM245	1.442E-01	1.441E-01	1.445E-01	1.000	0.999	1.002	1.00	1.00	1.00	1.362E-01	1.361E-01	1.365E-01	1.000	0.999	1.002	1.00	1.00	1.00
CM246	3.026E-02	3.026E-02	3.025E-02	1.000	1.000	1.000	1.00	1.00	1.00	2.731E-02	2.731E-02	2.730E-02	1.000	1.000	1.000	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				1.36	1.60	2.74	0.6	7.2	7.5				8.71	5.60	8.06	****	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %				0.81	0.75	1.40	0.3	3.4	3.1				1.51	1.31	2.40	0.6	7.9	7.3
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.18	0.14	0.20	0.2	0.5	0.2				0.31	0.24	0.37	0.3	0.7	0.5
NUCS EXCLUDED, 1ST/2ND:			CS137			PU241 / PU242			NP237			CM244	PU238	PU241 / CS137			NP237	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU CURIES PER MTU

	**********		10 KYR			**********			
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	3.677E-01	3.677E-01	3.676E-01	1.000	1.000	1.000	1.00	1.00	1.00
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.798E+00	1.798E+00	1.797E+00	1.000	1.000	1.000	1.00	1.00	1.00
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.265E+01	1.265E+01	1.265E+01	1.000	1.000	1.000	1.00	1.00	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.121E-01	1.120E-01	1.120E-01	1.001	1.000	1.000	1.00	1.00	1.00
SN126	7.254E-01	7.254E-01	7.251E-01	1.000	1.000	1.000	1.00	1.00	1.00
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	3.156E-02	3.155E-02	3.164E-02	0.999	0.999	1.002	1.00	1.00	1.00
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	3.445E-01	3.445E-01	3.443E-01	1.000	1.000	1.000	1.00	1.00	1.00
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.560E-09	1.566E-09	1.565E-09	0.998	1.001	1.001	1.00	1.00	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	4.595E-06	4.703E-06	4.700E-06	0.985	1.008	1.007	0.98	0.98	1.00
SM148	4.948E-11	4.997E-11	4.995E-11	0.994	1.003	1.003	0.99	0.99	1.00
SM149	9.018E-13	9.022E-13	8.936E-13	1.003	1.003	0.994	1.00	1.01	1.01
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	1.278E-31	0.0	1.280E-31	0.999	0.0	1.001	0.0	1.00	0.0
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.949E+00	1.949E+00	1.930E+00	1.003	1.003	0.993	1.00	1.01	1.01
U235	1.991E-02	1.991E-02	1.720E-02	1.048	1.048	0.905	1.00	1.16	1.16
U236	3.534E-01	3.534E-01	2.561E-01	1.101	1.101	0.798	1.00	1.38	1.38
U238	3.175E-01	3.175E-01	3.174E-01	1.000	1.000	1.000	1.00	1.00	1.00
NP237	1.177E+00	1.177E+00	3.112E-01	1.325	1.325	0.350	1.00	3.78	3.78
PU238	1.884E-19	1.881E-19	1.898E-19	0.998	0.996	1.005	1.00	0.99	0.99
PU239	2.375E+02	2.375E+02	2.343E+02	1.005	1.005	0.991	1.00	1.01	1.01
PU240	1.844E+02	1.844E+02	1.825E+02	1.003	1.003	0.993	1.00	1.01	1.01
PU241	6.546E-02	6.547E-02	0.0	1.000	1.000	0.0	1.00	0.0	0.0
PU242	1.698E+00	1.748E+00	1.744E+00	0.982	1.010	1.008	0.97	0.97	1.00
AM241	6.598E-02	6.878E-02	4.814E-04	1.464	1.526	0.011	0.96	****	****
AM242	9.547E-20	9.529E-20	9.564E-20	1.000	0.998	1.002	1.00	1.00	1.00
AM243	6.702E+00	6.703E+00	6.699E+00	1.000	1.000	1.000	1.00	1.00	1.00
CM242	7.919E-20	7.904E-20	7.933E-20	1.000	0.998	1.002	1.00	1.00	1.00
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	4.250E-11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	6.535E-02	6.535E-02	6.536E-02	1.000	1.000	1.000	1.00	1.00	1.00
CM246	7.305E-03	7.305E-03	7.301E-03	1.000	1.000	1.000	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				3.57	3.88	7.40	0.4	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %				2.07	2.12	4.16	0.3	13.2	13.6
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.80	0.83	1.62	0.2	2.6	2.6

NUCS EXCLUDED, 1ST/2ND: PU242 CM242 AM241 / SM147 AM242 NP237

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) CURIES PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.082E-01	3.749E-01	3.455E-01	1.085	0.997	0.918	1.09	1.18	1.09	4.082E-01	3.749E-01	3.454E-01	1.085	0.997	0.918	1.09	1.18	1.09
KR 85	9.324E+03	9.276E+03	9.342E+03	1.001	0.996	1.003	1.01	1.00	0.99	6.784E+03	6.749E+03	6.798E+03	1.001	0.996	1.003	1.01	1.00	0.99
SR 89	5.705E+05	5.757E+05	5.632E+05	1.001	1.010	0.988	0.99	1.01	1.02	1.117E-05	1.127E-05	1.105E-05	1.001	1.010	0.990	0.99	1.01	1.02
SR 90	7.218E+04	7.180E+04	7.337E+04	0.996	0.991	1.013	1.01	0.98	0.98	6.420E+04	6.387E+04	6.527E+04	0.996	0.991	1.013	1.01	0.98	0.98
Y 90	7.223E+04	7.182E+04	7.339E+04	0.997	0.991	1.013	1.01	0.98	0.98	6.422E+04	6.388E+04	6.528E+04	0.996	0.991	1.013	1.01	0.98	0.98
Y 91	8.000E+05	8.051E+05	7.988E+05	0.998	1.005	0.997	0.99	1.00	1.01	4.582E-04	4.610E-04	4.581E-04	0.998	1.004	0.998	0.99	1.00	1.01
ZR 93	1.794E+00	1.811E+00	1.769E+00	1.001	1.011	0.988	0.99	1.01	1.02	1.794E+00	1.811E+00	1.769E+00	1.001	1.011	0.988	0.99	1.01	1.02
ZR 95	1.186E+06	1.197E+06	1.177E+06	0.999	1.009	0.992	0.99	1.01	1.02	4.195E-03	4.226E-03	4.315E-03	0.988	0.995	1.016	0.99	0.97	0.98
NB 95	1.534E+06	1.548E+06	1.520E+06	1.000	1.009	0.991	0.99	1.01	1.02	9.312E-03	9.383E-03	9.543E-03	0.989	0.997	1.014	0.99	0.98	0.98
TC 99	1.304E+01	1.331E+01	1.327E+01	0.987	1.008	1.005	0.98	0.98	1.00	1.304E+01	1.331E+01	1.327E+01	0.987	1.008	1.005	0.98	0.98	1.00
RU106	5.632E+05	5.332E+05	5.735E+05	1.012	0.958	1.030	1.06	0.98	0.93	1.914E+04	1.812E+04	1.950E+04	1.012	0.958	1.031	1.06	0.98	0.93
PD107	1.153E-01	1.061E-01	1.181E-01	1.019	0.938	1.044	1.09	0.98	0.90	1.153E-01	1.061E-01	1.181E-01	1.019	0.938	1.044	1.09	0.98	0.90
SN126	7.875E-01	5.584E-01	6.413E-01	1.189	0.843	0.968	1.41	1.23	0.87	7.875E-01	5.584E-01	6.413E-01	1.189	0.843	0.968	1.41	1.23	0.87
SB125	1.487E+04	9.762E+03	8.125E+03	1.362	0.894	0.744	1.52	1.83	1.20	4.347E+03	2.855E+03	2.376E+03	1.362	0.894	0.744	1.52	1.83	1.20
I129	3.162E-02	3.286E-02	3.166E-02	0.987	1.025	0.988	0.96	1.00	1.04	3.178E-02	3.303E-02	3.185E-02	0.986	1.025	0.989	0.96	1.00	1.04
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.537E+05	1.515E+05	1.520E+05	1.009	0.994	0.997	1.01	1.01	1.00	2.942E+04	2.901E+04	2.910E+04	1.008	0.994	0.997	1.01	1.01	1.00
CS135	3.415E-01	3.835E-01	3.784E-01	0.928	1.043	1.029	0.89	0.90	1.01	3.415E-01	3.835E-01	3.784E-01	0.928	1.043	1.029	0.89	0.90	1.01
CS137	1.041E+05	1.036E+05	1.064E+05	0.994	0.989	1.016	1.00	0.98	0.97	9.293E+04	9.257E+04	9.505E+04	0.994	0.990	1.016	1.00	0.98	0.97
CE144	1.166E+06	1.172E+06	1.169E+06	0.997	1.003	1.000	0.99	1.00	1.00	1.460E+04	1.469E+04	1.467E+04	0.996	1.003	1.001	0.99	1.00	1.00
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.127E-09	1.102E-09	1.101E-09	1.015	0.993	0.992	1.02	1.02	1.00	1.554E-09	1.533E-09	1.531E-09	1.010	0.996	0.995	1.01	1.02	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	1.322E+05	1.762E+05	1.655E+05	0.837	1.115	1.048	0.75	0.80	1.06	3.638E+04	4.837E+04	4.546E+04	0.838	1.114	1.047	0.75	0.80	1.06
SM147	1.261E-06	1.409E-06	1.502E-06	0.907	1.013	1.080	0.89	0.84	0.94	3.639E-06	4.645E-06	4.544E-06	0.851	1.086	1.063	0.78	0.80	1.02
SM148	4.938E-11	3.322E-11	3.754E-11	1.233	0.830	0.937	1.49	1.32	0.88	4.964E-11	3.349E-11	3.788E-11	1.231	0.830	0.939	1.48	1.31	0.88
SM149	8.980E-13	1.112E-12	9.672E-13	0.905	1.121	0.975	0.81	0.93	1.15	8.980E-13	1.112E-12	9.672E-13	0.905	1.121	0.975	0.81	0.93	1.15
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.592E+02	4.250E+02	3.384E+02	0.960	1.136	0.904	0.85	1.06	1.26	3.458E+02	4.092E+02	3.258E+02	0.960	1.136	0.904	0.85	1.06	1.26
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.070E+04	1.076E+04	9.456E+03	1.038	1.044	0.918	0.99	1.13	1.14	7.199E+03	7.238E+03	6.361E+03	1.038	1.044	0.918	0.99	1.13	1.14
EU155	6.573E+03	7.063E+03	6.334E+03	0.987	1.061	0.952	0.93	1.04	1.12	3.306E+03	3.552E+03	3.185E+03	0.988	1.061	0.951	0.93	1.04	1.12
U234	1.055E+00	1.018E+00	9.976E-01	1.031	0.995	0.975	1.04	1.06	1.02	1.088E+00	1.055E+00	1.009E+00	1.036	1.004	0.960	1.03	1.08	1.05
U235	1.619E-02	1.656E-02	1.717E-02	0.973	0.995	1.032	0.98	0.94	0.96	1.619E-02	1.656E-02	1.717E-02	0.973	0.995	1.032	0.98	0.94	0.96
U236	2.500E-01	2.503E-01	2.489E-01	1.001	1.002	0.997	1.00	1.00	1.01	2.501E-01	2.503E-01	2.489E-01	1.001	1.002	0.997	1.00	1.00	1.01
U238	3.177E-01	3.174E-01	3.173E-01	1.001	1.000	0.999	1.00	1.00	1.00	3.177E-01	3.174E-01	3.173E-01	1.001	1.000	0.999	1.00	1.00	1.00
NP237	3.114E-01	3.270E-01	3.011E-01	0.994	1.044	0.961	0.95	1.03	1.09	3.127E-01	3.284E-01	3.014E-01	0.995	1.045	0.959	0.95	1.04	1.09
PU238	2.288E+03	2.485E+03	2.059E+03	1.005	1.091	0.904	0.92	1.11	1.21	2.381E+03	2.571E+03	2.160E+03	1.004	1.085	0.911	0.93	1.10	1.19
PU239	3.138E+02	3.521E+02	3.283E+02	0.947	1.062	0.991	0.89	0.96	1.07	3.138E+02	3.521E+02	3.283E+02	0.947	1.062	0.991	0.89	0.96	1.07
PU240	5.325E+02	4.769E+02	4.727E+02	1.078	0.965	0.957	1.12	1.13	1.01	5.332E+02	4.777E+02	4.725E+02	1.078	0.966	0.956	1.12	1.13	1.01
PU241	1.279E+05	1.433E+05	1.429E+05	0.927	1.038	1.035	0.89	0.90	1.00	1.010E+05	1.137E+05	1.133E+05	0.924	1.040	1.036	0.89	0.89	1.00
PU242	1.806E+00	1.897E+00	2.239E+00	0.912	0.958	1.130	0.95	0.81	0.85	1.806E+00	1.897E+00	2.239E+00	0.912	0.958	1.130	0.95	0.81	0.85
AM241	1.168E+02	1.353E+02	1.459E+02	0.880	1.020	1.100	0.86	0.80	0.93	1.011E+03	1.139E+03	1.144E+03	0.921	1.037	1.042	0.89	0.88	1.00
AM242	6.191E+00	1.023E+01	5.006E+00	0.867	1.432	0.701	0.61	1.24	2.04	6.054E+00	9.999E+00	4.895E+00	0.867	1.432	0.701	0.61	1.24	2.04
AM243	1.831E+01	2.016E+01	2.338E+01	0.888	0.978	1.134	0.91	0.78	0.86	1.830E+01	2.015E+01	2.336E+01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	3.661E+04	3.671E+04	3.658E+04	0.999	1.002	0.999	1.00	1.00	1.00	2.280E+01	2.611E+01	2.160E+01	0.970	1.111	0.919	0.87	1.06	1.21
CM243	1.796E+01	4.814E+00	1.611E+01	1.386	0.371	1.243	3.73	1.11	0.30	1.593E+01	4.271E+00	1.429E+01	1.386	0.371	1.243	3.73	1.11	0.30
CM244	2.124E+03	2.067E+03	2.635E+03	0.933	0.908	1.158	1.03	0.81	0.78	1.759E+03	1.712E+03	2.183E+03	0.933	0.908	1.158	1.03	0.81	0.78
CM245	1.640E-01	1.757E-01	2.546E-01	0.828	0.887	1.285	0.93	0.64	0.69	1.639E-01	1.756E-01	2.545E-01	0.828	0.887	1.285	0.93	0.64	0.69
CM246	3.601E-02	3.791E-02	4.884E-02	0.880	0.926	1.194	0.95	0.74	0.78	3.598E-02	3.788E-02	4.881E-02	0.880	0.926	1.194	0.95	0.74	0.78
AVERAGE-ABSOLUTE-DEVIATION, AS %				6.57	6.46	6.35	15.0	10.7	11.1				6.72	6.85	6.41	15.5	10.9	11.4
AV-ABS-DEV EXCLUDING LARGEST ONE, %				4.85	4.91	4.94	7.4	8.7	7.3				5.01	5.33	5.00	7.9	8.8	7.6
AV-ABS-DEV EXCLUDING LARGEST TWO, %				3.98	3.55	3.90	7.5	8.0	6.7				4.15	4.00	3.96	7.9	8.2	7.0
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / SM148			AM242		CM246		SB125	CM243	CM245 / SM148			AM242		CM246

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) CURIES PER MTU

	**********			10 YR		**********				**********			20 YR		**********			
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.082E-01	3.749E-01	3.454E-01	1.085	0.997	0.918	1.09	1.18	1.09	4.081E-01	3.748E-01	3.454E-01	1.085	0.997	0.918	1.09	1.18	1.09
KR 85	4.910E+03	4.885E+03	4.920E+03	1.001	0.996	1.003	1.01	1.00	0.99	2.572E+03	2.559E+03	2.577E+03	1.001	0.996	1.003	1.01	1.00	0.99
SR 89	1.450E-16	1.462E-16	1.435E-16	1.001	1.009	0.990	0.99	1.01	1.02	0.0	0.0	2.423E-38	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	5.700E+04	5.670E+04	5.794E+04	0.996	0.991	1.013	1.01	0.98	0.98	4.493E+04	4.469E+04	4.567E+04	0.996	0.991	1.013	1.01	0.98	0.98
Y 90	5.701E+04	5.672E+04	5.796E+04	0.996	0.991	1.013	1.01	0.98	0.98	4.494E+04	4.470E+04	4.568E+04	0.996	0.991	1.013	1.01	0.98	0.98
Y 91	1.839E-13	1.850E-13	1.841E-13	0.998	1.004	0.999	0.99	1.00	1.00	2.963E-32	0.0	2.974E-32	0.998	0.0	1.002	0.0	1.00	0.0
ZR 93	1.794E+00	1.811E+00	1.769E+00	1.001	1.011	0.988	0.99	1.01	1.02	1.794E+00	1.811E+00	1.769E+00	1.001	1.011	0.988	0.99	1.01	1.02
ZR 95	1.072E-11	1.078E-11	1.144E-11	0.976	0.982	1.042	0.99	0.94	0.94	7.005E-29	0.0	8.039E-29	0.931	0.0	1.069	0.0	0.87	0.0
NB 95	2.380E-11	2.394E-11	2.530E-11	0.978	0.983	1.039	0.99	0.94	0.95	1.555E-28	0.0	1.778E-28	0.933	0.0	1.067	0.0	0.87	0.0
TC 99	1.304E+01	1.331E+01	1.327E+01	0.987	1.008	1.005	0.98	0.98	1.00	1.304E+01	1.331E+01	1.326E+01	0.988	1.008	1.004	0.98	0.98	1.00
RU106	6.149E+02	5.821E+02	6.263E+02	1.012	0.958	1.030	1.06	0.98	0.93	6.596E-01	6.005E-01	6.465E-01	1.038	0.945	1.017	1.10	1.02	0.93
PD107	1.153E-01	1.061E-01	1.181E-01	1.019	0.938	1.044	1.09	0.98	0.90	1.153E-01	1.061E-01	1.181E-01	1.019	0.938	1.044	1.09	0.98	0.90
SN126	7.875E-01	5.584E-01	6.413E-01	1.189	0.843	0.968	1.41	1.23	0.87	7.874E-01	5.584E-01	6.413E-01	1.189	0.843	0.968	1.41	1.23	0.87
SB125	1.244E+03	8.169E+02	6.799E+02	1.362	0.894	0.744	1.52	1.83	1.20	1.018E+02	6.689E+01	5.568E+01	1.361	0.894	0.744	1.52	1.83	1.20
I129	3.178E-02	3.303E-02	3.185E-02	0.986	1.025	0.989	0.96	1.00	1.04	3.178E-02	3.303E-02	3.185E-02	0.986	1.025	0.989	0.96	1.00	1.04
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	5.479E+03	5.402E+03	5.420E+03	1.008	0.994	0.997	1.01	1.01	1.00	1.900E+02	1.873E+02	1.880E+02	1.008	0.994	0.998	1.01	1.01	1.00
CS135	3.415E-01	3.835E-01	3.784E-01	0.928	1.043	1.029	0.89	0.90	1.01	3.415E-01	3.835E-01	3.784E-01	0.928	1.043	1.029	0.89	0.90	1.01
CS137	8.279E+04	8.252E+04	8.473E+04	0.993	0.990	1.017	1.00	0.98	0.97	6.571E+04	6.558E+04	6.734E+04	0.992	0.990	1.017	1.00	0.98	0.97
CE144	1.700E+02	1.710E+02	1.712E+02	0.996	1.002	1.003	0.99	0.99	1.00	2.304E-02	2.319E-02	2.330E-02	0.994	1.001	1.005	0.99	0.99	1.00
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.559E-09	1.539E-09	1.536E-09	1.009	0.996	0.994	1.01	1.01	1.00	1.559E-09	1.539E-09	1.536E-09	1.009	0.996	0.994	1.01	1.01	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	9.708E+03	1.291E+04	1.213E+04	0.838	1.115	1.047	0.75	0.80	1.06	6.913E+02	9.188E+02	8.638E+02	0.838	1.114	1.047	0.75	0.80	1.06
SM147	4.293E-06	5.535E-06	5.380E-06	0.847	1.092	1.061	0.78	0.80	1.03	4.514E-06	5.836E-06	5.663E-06	0.846	1.093	1.061	0.77	0.80	1.03
SM148	4.964E-11	3.349E-11	3.788E-11	1.231	0.830	0.939	1.48	1.31	0.88	4.964E-11	3.349E-11	3.788E-11	1.231	0.830	0.939	1.48	1.31	0.88
SM149	8.980E-13	1.112E-12	9.672E-13	0.905	1.121	0.975	0.81	0.93	1.15	8.980E-13	1.112E-12	9.672E-13	0.905	1.121	0.975	0.81	0.93	1.15
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.328E+02	3.937E+02	3.135E+02	0.960	1.136	0.904	0.85	1.06	1.26	3.081E+02	3.645E+02	2.903E+02	0.960	1.136	0.904	0.85	1.06	1.26
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	4.812E+03	4.837E+03	4.251E+03	1.039	1.044	0.917	0.99	1.13	1.14	2.149E+03	2.160E+03	1.899E+03	1.038	1.044	0.918	0.99	1.13	1.14
EU155	1.643E+03	1.766E+03	1.584E+03	0.987	1.061	0.952	0.93	1.04	1.11	4.062E+02	4.366E+02	3.915E+02	0.987	1.061	0.952	0.93	1.04	1.12
U234	1.122E+00	1.090E+00	1.021E+00	1.041	1.011	0.947	1.03	1.10	1.07	1.184E+00	1.158E+00	1.043E+00	1.049	1.026	0.924	1.02	1.14	1.11
U235	1.619E-02	1.656E-02	1.717E-02	0.973	0.995	1.032	0.98	0.94	0.96	1.620E-02	1.657E-02	1.717E-02	0.973	0.995	1.031	0.98	0.94	0.97
U236	2.501E-01	2.504E-01	2.489E-01	1.001	1.002	0.996	1.00	1.00	1.01	2.503E-01	2.505E-01	2.489E-01	1.002	1.002	0.996	1.00	1.01	1.01
U238	3.177E-01	3.174E-01	3.173E-01	1.001	1.000	0.999	1.00	1.00	1.00	3.177E-01	3.174E-01	3.173E-01	1.001	1.000	0.999	1.00	1.00	1.00
NP237	3.149E-01	3.310E-01	3.014E-01	0.997	1.048	0.955	0.95	1.04	1.10	3.222E-01	3.392E-01	3.014E-01	1.004	1.057	0.939	0.95	1.07	1.13
PU238	2.289E+03	2.472E+03	2.077E+03	1.004	1.085	0.911	0.93	1.10	1.19	2.116E+03	2.285E+03	1.919E+03	1.004	1.085	0.911	0.93	1.10	1.19
PU239	3.137E+02	3.520E+02	3.282E+02	0.947	1.062	0.991	0.89	0.96	1.07	3.136E+02	3.519E+02	3.281E+02	0.947	1.062	0.991	0.89	0.96	1.07
PU240	5.338E+02	4.782E+02	4.722E+02	1.079	0.967	0.954	1.12	1.13	1.01	5.345E+02	4.790E+02	4.717E+02	1.080	0.968	0.953	1.12	1.13	1.02
PU241	7.937E+04	8.980E+04	8.954E+04	0.920	1.041	1.038	0.88	0.89	1.00	4.904E+04	5.604E+04	5.587E+04	0.914	1.045	1.041	0.88	0.88	1.00
PU242	1.806E+00	1.897E+00	2.239E+00	0.912	0.958	1.130	0.95	0.81	0.85	1.806E+00	1.897E+00	2.239E+00	0.912	0.958	1.130	0.95	0.81	0.85
AM241	1.719E+03	1.939E+03	1.939E+03	0.921	1.039	1.039	0.89	0.89	1.00	2.693E+03	3.046E+03	3.040E+03	0.920	1.041	1.039	0.88	0.89	1.00
AM242	5.918E+00	9.774E+00	4.784E+00	0.867	1.432	0.701	0.61	1.24	2.04	5.654E+00	9.338E+00	4.571E+00	0.867	1.432	0.701	0.61	1.24	2.04
AM243	1.829E+01	2.014E+01	2.335E+01	0.888	0.978	1.134	0.91	0.78	0.86	1.827E+01	2.012E+01	2.333E+01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	4.904E+00	8.094E+00	3.976E+00	0.867	1.431	0.703	0.61	1.23	2.04	4.676E+00	7.722E+00	3.791E+00	0.867	1.431	0.703	0.61	1.23	2.04
CM243	1.411E+01	3.782E+00	1.265E+01	1.386	0.371	1.243	3.73	1.12	0.30	1.106E+01	2.965E+00	9.923E+00	1.386	0.371	1.243	3.73	1.11	0.30
CM244	1.453E+03	1.414E+03	1.803E+03	0.933	0.908	1.158	1.03	0.81	0.78	9.908E+02	9.644E+02	1.229E+03	0.933	0.909	1.158	1.03	0.81	0.78
CM245	1.639E-01	1.755E-01	2.544E-01	0.828	0.887	1.285	0.93	0.64	0.69	1.637E-01	1.754E-01	2.542E-01	0.828	0.887	1.285	0.93	0.64	0.69
CM246	3.596E-02	3.786E-02	4.877E-02	0.880	0.927	1.193	0.95	0.74	0.78	3.590E-02	3.780E-02	4.870E-02	0.880	0.926	1.194	0.95	0.74	0.78
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.03	7.66	7.04	16.1	11.5	13.5				7.49	8.39	7.37	17.7	12.2	14.6
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.34	6.19	5.67	8.5	9.5	9.8				5.80	6.82	6.00	9.5	10.2	10.7
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.51	4.93	4.69	7.8	8.5	6.9				4.99	5.48	5.02	8.7	9.2	7.5
NUCS EXCLUDED, 1ST/2ND:				SB125	CM243	CM245 / SM148		AM242	CM246			SB125	CM243	CM245 / SM148		AM242	CM246	

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) CURIES PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.080E-01	3.747E-01	3.453E-01	1.085	0.997	0.918	1.09	1.18	1.09	4.078E-01	3.745E-01	3.451E-01	1.085	0.997	0.918	1.09	1.18	1.09
KR 85	3.697E+02	3.677E+02	3.704E+02	1.001	0.996	1.003	1.01	1.00	0.99	1.458E+01	1.450E+01	1.461E+01	1.001	0.996	1.003	1.01	1.00	0.99
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	2.200E+04	2.188E+04	2.236E+04	0.996	0.991	1.013	1.01	0.98	0.98	6.692E+03	6.655E+03	6.802E+03	0.996	0.991	1.013	1.01	0.98	0.98
Y 90	2.200E+04	2.189E+04	2.237E+04	0.996	0.991	1.013	1.01	0.98	0.98	6.693E+03	6.657E+03	6.803E+03	0.996	0.991	1.013	1.01	0.98	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.794E+00	1.811E+00	1.769E+00	1.001	1.011	0.988	0.99	1.01	1.02	1.794E+00	1.811E+00	1.769E+00	1.001	1.011	0.988	0.99	1.01	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.304E+01	1.331E+01	1.326E+01	0.988	1.008	1.004	0.98	0.98	1.00	1.304E+01	1.330E+01	1.326E+01	0.988	1.008	1.005	0.98	0.98	1.00
RU106	7.246E-10	6.594E-10	7.111E-10	1.038	0.944	1.018	1.10	1.02	0.93	8.472E-25	7.706E-25	8.332E-25	1.037	0.943	1.020	1.10	1.02	0.92
PD107	1.153E-01	1.061E-01	1.181E-01	1.019	0.938	1.044	1.09	0.98	0.90	1.153E-01	1.061E-01	1.181E-01	1.019	0.938	1.044	1.09	0.98	0.90
SN126	7.872E-01	5.582E-01	6.411E-01	1.189	0.843	0.968	1.41	1.23	0.87	7.870E-01	5.581E-01	6.409E-01	1.189	0.843	0.968	1.41	1.23	0.87
SB125	5.592E-02	3.672E-02	3.058E-02	1.361	0.894	0.745	1.52	1.83	1.20	2.058E-07	1.351E-07	1.126E-07	1.361	0.894	0.745	1.52	1.83	1.20
I129	3.178E-02	3.303E-02	3.185E-02	0.986	1.025	0.989	0.96	1.00	1.04	3.178E-02	3.303E-02	3.185E-02	0.986	1.025	0.989	0.96	1.00	1.04
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	7.925E-03	7.808E-03	7.839E-03	1.009	0.994	0.998	1.01	1.01	1.00	3.975E-10	3.913E-10	3.932E-10	1.009	0.993	0.998	1.02	1.01	1.00
CS135	3.415E-01	3.835E-01	3.784E-01	0.928	1.043	1.029	0.89	0.90	1.01	3.415E-01	3.835E-01	3.784E-01	0.928	1.043	1.029	0.89	0.90	1.01
CS137	3.285E+04	3.292E+04	3.380E+04	0.990	0.992	1.018	1.00	0.97	0.97	1.035E+04	1.043E+04	1.072E+04	0.986	0.993	1.021	0.99	0.97	0.97
CE144	5.734E-14	5.786E-14	5.876E-14	0.989	0.998	1.013	0.99	0.98	0.98	2.621E-33	0.0	2.745E-33	0.977	0.0	1.023	0.0	0.95	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.559E-09	1.539E-09	1.536E-09	1.009	0.996	0.994	1.01	1.01	1.00	1.559E-09	1.539E-09	1.536E-09	1.009	0.996	0.994	1.01	1.01	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	2.496E-01	3.315E-01	3.118E-01	0.839	1.114	1.048	0.75	0.80	1.06	4.571E-07	6.062E-07	5.706E-07	0.839	1.113	1.048	0.75	0.80	1.06
SM147	4.531E-06	5.859E-06	5.684E-06	0.846	1.094	1.061	0.77	0.80	1.03	4.531E-06	5.859E-06	5.684E-06	0.846	1.094	1.061	0.77	0.80	1.03
SM148	4.964E-11	3.349E-11	3.788E-11	1.231	0.830	0.939	1.48	1.31	0.88	4.964E-11	3.349E-11	3.788E-11	1.231	0.830	0.939	1.48	1.31	0.88
SM149	8.980E-13	1.112E-12	9.672E-13	0.905	1.121	0.975	0.81	0.93	1.15	8.980E-13	1.112E-12	9.672E-13	0.905	1.121	0.975	0.81	0.93	1.15
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	2.445E+02	2.893E+02	2.304E+02	0.960	1.136	0.904	0.85	1.06	1.26	1.664E+02	1.968E+02	1.568E+02	0.960	1.135	0.905	0.85	1.06	1.26
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.915E+02	1.925E+02	1.692E+02	1.039	1.044	0.918	0.99	1.13	1.14	3.405E+00	3.420E+00	3.007E+00	1.039	1.044	0.918	1.00	1.13	1.14
EU155	6.135E+00	6.595E+00	5.915E+00	0.987	1.061	0.952	0.93	1.04	1.11	5.659E-03	6.088E-03	5.461E-03	0.987	1.061	0.952	0.93	1.04	1.11
U234	1.344E+00	1.331E+00	1.100E+00	1.068	1.058	0.874	1.01	1.22	1.21	1.540E+00	1.542E+00	1.169E+00	1.087	1.088	0.825	1.00	1.32	1.32
U235	1.621E-02	1.658E-02	1.717E-02	0.973	0.996	1.031	0.98	0.94	0.97	1.622E-02	1.659E-02	1.717E-02	0.974	0.996	1.031	0.98	0.94	0.97
U236	2.508E-01	2.510E-01	2.489E-01	1.002	1.003	0.995	1.00	1.01	1.01	2.516E-01	2.517E-01	2.489E-01	1.003	1.004	0.993	1.00	1.01	1.01
U238	3.177E-01	3.174E-01	3.173E-01	1.001	1.000	0.999	1.00	1.00	1.00	3.177E-01	3.174E-01	3.173E-01	1.001	1.000	0.999	1.00	1.00	1.00
NP237	3.551E-01	3.765E-01	3.014E-01	1.031	1.093	0.875	0.94	1.18	1.25	4.177E-01	4.480E-01	3.014E-01	1.074	1.152	0.775	0.93	1.39	1.49
PU238	1.670E+03	1.804E+03	1.515E+03	1.004	1.085	0.911	0.93	1.10	1.19	1.127E+03	1.217E+03	1.022E+03	1.004	1.085	0.911	0.93	1.10	1.19
PU239	3.134E+02	3.516E+02	3.279E+02	0.947	1.062	0.991	0.89	0.96	1.07	3.130E+02	3.512E+02	3.274E+02	0.947	1.063	0.991	0.89	0.96	1.07
PU240	5.347E+02	4.793E+02	4.702E+02	1.081	0.969	0.950	1.12	1.14	1.02	5.326E+02	4.775E+02	4.677E+02	1.081	0.969	0.949	1.12	1.14	1.02
PU241	1.157E+04	1.362E+04	1.358E+04	0.895	1.054	1.051	0.85	0.85	1.00	1.043E+03	1.289E+03	1.285E+03	0.865	1.069	1.066	0.81	0.81	1.00
PU242	1.806E+00	1.897E+00	2.239E+00	0.912	0.958	1.130	0.95	0.81	0.85	1.806E+00	1.897E+00	2.239E+00	0.912	0.958	1.130	0.95	0.81	0.85
AM241	3.779E+03	4.304E+03	4.290E+03	0.916	1.044	1.040	0.88	0.88	1.00	3.820E+03	4.370E+03	4.354E+03	0.914	1.045	1.041	0.87	0.88	1.00
AM242	4.931E+00	8.144E+00	3.987E+00	0.867	1.432	0.701	0.61	1.24	2.04	3.926E+00	6.483E+00	3.174E+00	0.867	1.432	0.701	0.61	1.24	2.04
AM243	1.822E+01	2.006E+01	2.327E+01	0.888	0.978	1.134	0.91	0.78	0.86	1.814E+01	1.997E+01	2.316E+01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	4.078E+00	6.735E+00	3.307E+00	0.866	1.431	0.703	0.61	1.23	2.04	3.247E+00	5.362E+00	2.632E+00	0.867	1.431	0.702	0.61	1.23	2.04
CM243	5.333E+00	1.429E+00	4.784E+00	1.386	0.371	1.243	3.73	1.11	0.30	1.581E+00	4.236E-01	1.418E+00	1.386	0.371	1.243	3.73	1.11	0.30
CM244	3.143E+02	3.059E+02	3.900E+02	0.933	0.908	1.158	1.03	0.81	0.78	4.636E+01	4.512E+01	5.753E+01	0.933	0.908	1.158	1.03	0.81	0.78
CM245	1.633E-01	1.750E-01	2.536E-01	0.828	0.887	1.285	0.93	0.64	0.69	1.627E-01	1.742E-01	2.526E-01	0.828	0.887	1.285	0.93	0.64	0.69
CM246	3.575E-02	3.763E-02	4.849E-02	0.880	0.926	1.194	0.95	0.74	0.78	3.548E-02	3.736E-02	4.813E-02	0.880	0.927	1.194	0.95	0.74	0.78
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.90	8.59	7.91	17.8	13.1	15.2				8.17	9.06	8.36	18.3	14.0	16.5
AV-ABS-DEV EXCLUDING LARGEST ONE, %				6.10	7.04	6.48	9.6	11.0	11.3				6.39	7.50	6.96	9.9	12.0	12.5
AV-ABS-DEV EXCLUDING LARGEST TWO, %				5.24	5.71	5.45	8.8	10.0	8.2				5.69	5.95	5.88	9.2	10.9	8.9
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / SM148		AM242	CM246				SB125	CM243	CM245 / SM148		AM242	NP237		

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) CURIES PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.069E-01	3.737E-01	3.444E-01	1.085	0.997	0.918	1.09	1.18	1.09	4.039E-01	3.709E-01	3.418E-01	1.085	0.997	0.918	1.09	1.18	1.09
KR 85	3.529E-05	3.505E-05	3.534E-05	1.002	0.995	1.003	1.01	1.00	0.99	7.780E-25	7.726E-25	7.780E-25	1.002	0.995	1.002	1.01	1.00	0.99
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	5.734E+01	5.695E+01	5.822E+01	0.997	0.990	1.012	1.01	0.98	0.98	3.330E-06	3.305E-06	3.378E-06	0.998	0.990	1.012	1.01	0.99	0.98
Y 90	5.735E+01	5.696E+01	5.823E+01	0.997	0.990	1.012	1.01	0.98	0.98	3.331E-06	3.306E-06	3.379E-06	0.998	0.990	1.012	1.01	0.99	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.794E+00	1.811E+00	1.769E+00	1.001	1.011	0.988	0.99	1.01	1.02	1.793E+00	1.810E+00	1.768E+00	1.001	1.011	0.988	0.99	1.01	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.303E+01	1.329E+01	1.325E+01	0.988	1.008	1.005	0.98	0.98	1.00	1.300E+01	1.326E+01	1.322E+01	0.988	1.008	1.005	0.98	0.98	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.153E-01	1.061E-01	1.181E-01	1.019	0.938	1.044	1.09	0.98	0.90	1.153E-01	1.061E-01	1.181E-01	1.019	0.938	1.044	1.09	0.98	0.90
SN126	7.859E-01	5.573E-01	6.400E-01	1.189	0.843	0.968	1.41	1.23	0.87	7.821E-01	5.546E-01	6.369E-01	1.189	0.843	0.968	1.41	1.23	0.87
SB125	0.0	0.0	2.071E-29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	3.178E-02	3.303E-02	3.185E-02	0.986	1.025	0.989	0.96	1.00	1.04	3.178E-02	3.303E-02	3.185E-02	0.986	1.025	0.989	0.96	1.00	1.04
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	2.489E-39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	3.414E-01	3.835E-01	3.783E-01	0.928	1.043	1.029	0.89	0.90	1.01	3.414E-01	3.834E-01	3.782E-01	0.929	1.043	1.029	0.89	0.90	1.01
CS137	1.019E+02	1.054E+02	1.083E+02	0.969	1.002	1.029	0.97	0.94	0.97	9.637E-06	1.092E-05	1.122E-05	0.910	1.031	1.059	0.88	0.86	0.97
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.559E-09	1.539E-09	1.536E-09	1.009	0.996	0.994	1.01	1.01	1.00	1.559E-09	1.539E-09	1.536E-09	1.009	0.996	0.994	1.01	1.01	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	6.399E-30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	4.531E-06	5.859E-06	5.684E-06	0.846	1.094	1.061	0.77	0.80	1.03	4.531E-06	5.859E-06	5.684E-06	0.846	1.094	1.061	0.77	0.80	1.03
SM148	4.964E-11	3.349E-11	3.788E-11	1.231	0.830	0.939	1.48	1.31	0.88	4.964E-11	3.349E-11	3.788E-11	1.231	0.830	0.939	1.48	1.31	0.88
SM149	8.980E-13	1.112E-12	9.672E-13	0.905	1.121	0.975	0.81	0.93	1.15	8.980E-13	1.112E-12	9.672E-13	0.905	1.121	0.975	0.81	0.93	1.15
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.565E+01	4.218E+01	3.359E+01	0.960	1.136	0.904	0.85	1.06	1.26	1.622E-01	1.922E-01	1.531E-01	0.959	1.136	0.905	0.84	1.06	1.26
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	3.400E-07	3.411E-07	3.001E-07	1.040	1.043	0.918	1.00	1.13	1.14	0.0	0.0	9.428E-32	0.0	0.0	0.0	0.0	0.0	0.0
EU155	4.097E-15	4.421E-15	3.967E-15	0.984	1.062	0.953	0.93	1.03	1.11	0.0	0.0	1.297E-57	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.860E+00	1.889E+00	1.283E+00	1.109	1.126	0.765	0.98	1.45	1.47	1.942E+00	1.978E+00	1.311E+00	1.114	1.134	0.752	0.98	1.48	1.51
U235	1.628E-02	1.666E-02	1.717E-02	0.975	0.997	1.028	0.98	0.95	0.97	1.649E-02	1.690E-02	1.717E-02	0.978	1.003	1.019	0.98	0.96	0.98
U236	2.547E-01	2.545E-01	2.489E-01	1.008	1.007	0.985	1.00	1.02	1.02	2.651E-01	2.638E-01	2.489E-01	1.022	1.017	0.960	1.00	1.07	1.06
U238	3.177E-01	3.174E-01	3.173E-01	1.001	1.000	0.999	1.00	1.00	1.00	3.177E-01	3.174E-01	3.173E-01	1.001	1.000	0.999	1.00	1.00	1.00
NP237	6.313E-01	6.927E-01	3.014E-01	1.165	1.279	0.556	0.91	2.09	2.30	1.012E+00	1.129E+00	3.013E-01	1.243	1.387	0.370	0.90	3.36	3.75
PU238	2.336E+02	2.533E+02	2.117E+02	1.003	1.088	0.909	0.92	1.10	1.20	1.041E+00	1.195E+00	9.333E-01	0.985	1.131	0.883	0.87	1.12	1.28
PU239	3.113E+02	3.493E+02	3.255E+02	0.947	1.063	0.990	0.89	0.96	1.07	3.054E+02	3.427E+02	3.190E+02	0.947	1.063	0.990	0.89	0.96	1.07
PU240	5.216E+02	4.676E+02	4.579E+02	1.081	0.969	0.949	1.12	1.14	1.02	4.843E+02	4.341E+02	4.252E+02	1.081	0.969	0.949	1.12	1.14	1.02
PU241	2.290E-01	2.750E-01	1.031E-01	1.132	1.359	0.509	0.83	2.22	2.67	1.514E-01	1.622E-01	4.767E-16	1.448	1.552	0.000	0.93	****	****
PU242	1.805E+00	1.896E+00	2.238E+00	0.912	0.958	1.130	0.95	0.81	0.85	1.803E+00	1.894E+00	2.235E+00	0.912	0.958	1.130	0.95	0.81	0.85
AM241	2.798E+03	3.203E+03	3.192E+03	0.913	1.045	1.042	0.87	0.88	1.00	9.106E+02	1.043E+03	1.039E+03	0.913	1.046	1.042	0.87	0.88	1.00
AM242	1.577E+00	2.604E+00	1.275E+00	0.867	1.432	0.701	0.61	1.24	2.04	6.480E-02	1.070E-01	5.238E-02	0.867	1.432	0.701	0.61	1.24	2.04
AM243	1.780E+01	1.960E+01	2.273E+01	0.888	0.978	1.134	0.91	0.78	0.86	1.667E+01	1.835E+01	2.128E+01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	1.304E+00	2.154E+00	1.057E+00	0.866	1.431	0.702	0.61	1.23	2.04	5.359E-02	8.849E-02	4.344E-02	0.867	1.431	0.702	0.61	1.23	2.04
CM243	1.220E-02	3.268E-03	1.094E-02	1.386	0.371	1.243	3.73	1.12	0.30	4.929E-10	1.320E-10	4.417E-10	1.386	0.371	1.242	3.73	1.12	0.30
CM244	2.196E-02	2.136E-02	2.725E-02	0.934	0.908	1.158	1.03	0.81	0.78	4.659E-11	4.944E-14	6.304E-14	2.993	0.003	0.004	****	****	0.78
CM245	1.600E-01	1.714E-01	2.485E-01	0.828	0.887	1.286	0.93	0.64	0.69	1.512E-01	1.619E-01	2.347E-01	0.828	0.887	1.285	0.93	0.64	0.69
CM246	3.446E-02	3.628E-02	4.674E-02	0.880	0.926	1.194	0.95	0.74	0.78	3.110E-02	3.274E-02	4.218E-02	0.880	0.926	1.194	0.95	0.74	0.78

AVERAGE-ABSOLUTE-DEVIATION, AS %	8.03	10.55	10.55	18.0	18.2	24.7				15.42	14.68	15.54	****	****	****		
AV-ABS-DEV EXCLUDING LARGEST ONE, %	6.49	8.00	9.10	10.6	15.3	19.2				7.79	9.08	9.82	19.9	19.9	26.1		
AV-ABS-DEV EXCLUDING LARGEST TWO, %	5.52	5.91	7.43	9.4	11.9	15.9				6.46	6.52	7.34	11.8	13.0	16.3		

NUCS EXCLUDED, 1ST/2ND: SM148 CM243 PU241 / SN126 AM242 NP237 CM244 CM243 PU241 / SM148 AM242 NP237

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) CURIES PER MTU

	ORIGEN2	ORIGEN-S	CINDER	10 KYR OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
SE 79	3.669E-01	3.370E-01	3.105E-01	1.085	0.997	0.918	1.09	1.18	1.09
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.786E+00	1.803E+00	1.761E+00	1.001	1.011	0.987	0.99	1.01	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.262E+01	1.288E+01	1.284E+01	0.987	1.008	1.005	0.98	0.98	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.151E-01	1.060E-01	1.180E-01	1.018	0.938	1.044	1.09	0.98	0.90
SN126	7.348E-01	5.210E-01	5.984E-01	1.189	0.843	0.968	1.41	1.23	0.87
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	3.177E-02	3.301E-02	3.184E-02	0.986	1.025	0.989	0.96	1.00	1.04
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	3.404E-01	3.824E-01	3.772E-01	0.928	1.043	1.029	0.89	0.90	1.01
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.559E-09	1.539E-09	1.536E-09	1.009	0.996	0.994	1.01	1.01	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	4.531E-06	5.859E-06	5.684E-06	0.846	1.094	1.061	0.77	0.80	1.03
SM148	4.964E-11	3.349E-11	3.788E-11	1.231	0.830	0.939	1.48	1.31	0.88
SM149	8.980E-13	1.112E-12	9.672E-13	0.905	1.121	0.975	0.81	0.93	1.15
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	1.274E-31	0.0	1.205E-31	1.028	0.0	0.972	0.0	1.06	0.0
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.901E+00	1.936E+00	1.278E+00	1.115	1.135	0.750	0.98	1.49	1.51
U235	1.889E-02	1.959E-02	1.717E-02	1.018	1.056	0.926	0.96	1.10	1.14
U236	3.481E-01	3.383E-01	2.488E-01	1.117	1.085	0.798	1.03	1.40	1.36
U238	3.177E-01	3.174E-01	3.173E-01	1.001	1.000	0.999	1.00	1.00	1.00
NP237	1.193E+00	1.336E+00	3.005E-01	1.265	1.417	0.319	0.89	3.97	4.45
PU238	1.922E-19	3.167E-19	1.549E-19	0.869	1.431	0.700	0.61	1.24	2.04
PU239	2.382E+02	2.672E+02	2.463E+02	0.951	1.066	0.983	0.89	0.97	1.08
PU240	1.865E+02	1.672E+02	1.641E+02	1.081	0.969	0.951	1.12	1.14	1.02
PU241	7.268E-02	7.786E-02	0.0	0.966	1.034	0.0	0.93	0.0	0.0
PU242	1.775E+00	1.863E+00	2.198E+00	0.912	0.958	1.130	0.95	0.81	0.85
AM241	7.321E-02	8.178E-02	5.596E-04	1.412	1.577	0.011	0.90	****	****
AM242	9.740E-20	1.604E-19	7.848E-20	0.869	1.431	0.700	0.61	1.24	2.04
AM243	7.157E+00	7.880E+00	9.138E+00	0.888	0.978	1.134	0.91	0.78	0.86
CM242	8.078E-20	1.331E-19	6.510E-20	0.869	1.431	0.700	0.61	1.24	2.04
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	4.654E-11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	7.255E-02	7.772E-02	1.124E-01	0.829	0.888	1.284	0.93	0.65	0.69
CM246	8.320E-03	8.757E-03	1.128E-02	0.880	0.926	1.193	0.95	0.74	0.78

AVERAGE-ABSOLUTE-DEVIATION, AS % 10.30 13.49 15.93 13.7 **** ****
AV-ABS-DEV EXCLUDING LARGEST ONE, % 8.44 10.27 12.29 12.4 27.2 37.9
AV-ABS-DEV EXCLUDING LARGEST TWO, % 6.94 6.95 9.22 11.3 15.6 25.1
NUCS EXCLUDED, 1ST/2ND: SM148 PU238 AM241 / SN126 CM242 NP237

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) CURIES PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	6.142E-01	5.680E-01	5.192E-01	1.083	1.002	0.915	1.08	1.18	1.09	6.142E-01	5.680E-01	5.192E-01	1.083	1.002	0.915	1.08	1.18	1.09
KR 85	1.368E+04	1.359E+04	1.365E+04	1.003	0.996	1.001	1.01	1.00	1.00	9.951E+03	9.891E+03	9.934E+03	1.003	0.997	1.001	1.01	1.00	1.00
SR 89	5.483E+05	5.614E+05	5.662E+05	0.982	1.005	1.014	0.98	0.97	0.99	1.075E-05	1.099E-05	1.111E-05	0.982	1.004	1.015	0.98	0.97	0.99
SR 90	1.086E+05	1.079E+05	1.101E+05	0.998	0.991	1.011	1.01	0.99	0.98	9.663E+04	9.596E+04	9.794E+04	0.998	0.991	1.011	1.01	0.99	0.98
Y 90	1.087E+05	1.079E+05	1.101E+05	0.998	0.991	1.011	1.01	0.99	0.98	9.665E+04	9.598E+04	9.797E+04	0.998	0.991	1.011	1.01	0.99	0.98
Y 91	7.722E+05	7.871E+05	8.050E+05	0.980	0.999	1.021	0.98	0.96	0.98	4.422E-04	4.507E-04	4.616E-04	0.979	0.998	1.022	0.98	0.96	0.98
ZR 93	2.713E+00	2.730E+00	2.665E+00	1.004	1.010	0.986	0.99	1.02	1.02	2.713E+00	2.730E+00	2.665E+00	1.004	1.010	0.986	0.99	1.02	1.02
ZR 95	1.162E+06	1.182E+06	1.196E+06	0.985	1.002	1.014	0.98	0.97	0.99	4.111E-03	4.175E-03	4.386E-03	0.973	0.988	1.038	0.98	0.94	0.95
NB 95	1.505E+06	1.527E+06	1.543E+06	0.987	1.001	1.012	0.99	0.98	0.99	9.128E-03	9.270E-03	9.699E-03	0.975	0.990	1.036	0.98	0.94	0.96
TC 99	1.870E+01	1.923E+01	1.908E+01	0.984	1.012	1.004	0.97	0.98	1.01	1.870E+01	1.923E+01	1.908E+01	0.984	1.012	1.004	0.97	0.98	1.01
RU106	6.748E+05	6.278E+05	6.972E+05	1.012	0.942	1.046	1.07	0.97	0.90	2.294E+04	2.134E+04	2.370E+04	1.012	0.942	1.046	1.07	0.97	0.90
PD107	1.706E-01	1.554E-01	1.749E-01	1.022	0.931	1.048	1.10	0.98	0.89	1.706E-01	1.554E-01	1.749E-01	1.022	0.931	1.048	1.10	0.98	0.89
SN126	1.141E+00	8.340E-01	9.421E-01	1.173	0.858	0.969	1.37	1.21	0.89	1.141E+00	8.340E-01	9.420E-01	1.173	0.858	0.969	1.37	1.21	0.89
SB125	1.886E+04	1.315E+04	1.071E+04	1.324	0.923	0.752	1.43	1.76	1.23	5.515E+03	3.846E+03	3.132E+03	1.324	0.924	0.752	1.43	1.76	1.23
I129	4.634E-02	4.938E-02	4.682E-02	0.975	1.039	0.985	0.94	0.99	1.05	4.650E-02	4.955E-02	4.702E-02	0.975	1.039	0.986	0.94	0.99	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	2.815E+05	2.649E+05	2.771E+05	1.026	0.965	1.009	1.06	1.02	0.96	5.389E+04	5.071E+04	5.305E+04	1.025	0.965	1.010	1.06	1.02	0.96
CS135	6.527E-01	7.207E-01	7.048E-01	0.942	1.040	1.017	0.91	0.93	1.02	6.527E-01	7.207E-01	7.048E-01	0.942	1.040	1.017	0.91	0.93	1.02
CS137	1.553E+05	1.544E+05	1.587E+05	0.995	0.989	1.016	1.01	0.98	0.97	1.386E+05	1.379E+05	1.417E+05	0.994	0.989	1.016	1.01	0.98	0.97
CE144	1.251E+06	1.253E+06	1.289E+06	0.989	0.991	1.020	1.00	0.97	0.97	1.567E+04	1.571E+04	1.618E+04	0.988	0.991	1.021	1.00	0.97	0.97
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	2.016E-09	1.953E-09	1.938E-09	1.024	0.992	0.984	1.03	1.04	1.01	2.475E-09	2.414E-09	2.411E-09	1.017	0.992	0.991	1.03	1.03	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	1.382E+05	2.028E+05	1.847E+05	0.789	1.157	1.054	0.68	0.75	1.10	3.800E+04	5.565E+04	5.069E+04	0.790	1.157	1.054	0.68	0.75	1.10
SM147	2.078E-06	2.268E-06	2.419E-06	0.922	1.006	1.073	0.92	0.86	0.94	4.563E-06	5.992E-06	5.810E-06	0.836	1.098	1.065	0.76	0.79	1.03
SM148	9.274E-11	6.475E-11	7.222E-11	1.211	0.846	0.943	1.43	1.28	0.90	9.303E-11	6.506E-11	7.265E-11	1.210	0.846	0.945	1.43	1.28	0.90
SM149	1.023E-12	1.323E-12	1.143E-12	0.880	1.138	0.983	0.77	0.90	1.16	1.023E-12	1.323E-12	1.143E-12	0.880	1.138	0.983	0.77	0.90	1.16
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	5.010E+02	6.223E+02	4.565E+02	0.951	1.182	0.867	0.81	1.10	1.36	4.824E+02	5.992E+02	4.395E+02	0.951	1.182	0.867	0.81	1.10	1.36
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.871E+04	1.905E+04	1.674E+04	1.030	1.049	0.921	0.98	1.12	1.14	1.259E+04	1.282E+04	1.126E+04	1.030	1.049	0.921	0.98	1.12	1.14
EU155	1.189E+04	1.278E+04	1.167E+04	0.982	1.055	0.963	0.93	1.02	1.10	5.979E+03	6.425E+03	5.869E+03	0.982	1.055	0.964	0.93	1.02	1.09
U234	1.244E+00	1.261E+00	1.230E+00	0.999	1.013	0.988	0.99	1.01	1.03	1.317E+00	1.342E+00	1.253E+00	1.010	1.029	0.961	0.98	1.05	1.07
U235	1.750E-02	1.865E-02	1.983E-02	0.938	0.999	1.063	0.94	0.88	0.94	1.750E-02	1.865E-02	1.983E-02	0.938	0.999	1.063	0.94	0.88	0.94
U236	3.897E-01	3.905E-01	3.876E-01	1.001	1.003	0.996	1.00	1.01	1.01	3.898E-01	3.906E-01	3.876E-01	1.001	1.003	0.996	1.00	1.01	1.01
U238	3.100E-01	3.095E-01	3.095E-01	1.001	0.999	0.999	1.00	1.00	1.00	3.100E-01	3.095E-01	3.095E-01	1.001	0.999	0.999	1.00	1.00	1.00
NP237	5.416E-01	5.684E-01	5.415E-01	0.984	1.033	0.984	0.95	1.00	1.05	5.434E-01	5.703E-01	5.419E-01	0.985	1.033	0.982	0.95	1.00	1.05
PU238	5.080E+03	5.658E+03	4.808E+03	0.980	1.092	0.928	0.90	1.06	1.18	5.209E+03	5.781E+03	4.966E+03	0.979	1.087	0.934	0.90	1.05	1.16
PU239	3.628E+02	3.994E+02	3.590E+02	0.971	1.069	0.961	0.91	1.01	1.11	3.627E+02	3.993E+02	3.590E+02	0.971	1.069	0.961	0.91	1.01	1.11
PU240	6.083E+02	5.869E+02	5.383E+02	1.053	1.016	0.932	1.04	1.13	1.09	6.108E+02	5.893E+02	5.380E+02	1.054	1.017	0.929	1.04	1.14	1.10
PU241	1.724E+05	1.857E+05	1.898E+05	0.944	1.017	1.039	0.93	0.91	0.98	1.361E+05	1.472E+05	1.505E+05	0.941	1.018	1.041	0.92	0.90	0.98
PU242	2.982E+00	2.951E+00	3.559E+00	0.942	0.933	1.125	1.01	0.84	0.83	2.982E+00	2.951E+00	3.559E+00	0.942	0.933	1.125	1.01	0.84	0.83
AM241	2.158E+02	2.245E+02	2.498E+02	0.938	0.976	1.086	0.96	0.86	0.90	1.420E+03	1.524E+03	1.575E+03	0.943	1.012	1.046	0.93	0.90	0.97
AM242	1.170E+01	1.980E+01	9.487E+00	0.856	1.449	0.694	0.59	1.23	2.09	1.144E+01	1.936E+01	9.277E+00	0.856	1.449	0.694	0.59	1.23	2.09
AM243	3.684E+01	4.089E+01	4.891E+01	0.873	0.969	1.159	0.90	0.75	0.84	3.682E+01	4.087E+01	4.889E+01	0.873	0.969	1.159	0.90	0.75	0.84
CM242	6.551E+04	6.863E+04	6.924E+04	0.966	1.012	1.021	0.95	0.95	0.99	4.132E+01	4.938E+01	4.089E+01	0.942	1.126	0.932	0.84	1.01	1.21
CM243	4.426E+01	9.423E+00	3.993E+01	1.418	0.302	1.280	4.70	1.11	0.24	3.927E+01	8.361E+00	3.543E+01	1.418	0.302	1.280	4.70	1.11	0.24
CM244	5.902E+03	5.841E+03	7.932E+03	0.900	0.891	1.209	1.01	0.74	0.74	4.890E+03	4.839E+03	6.571E+03	0.900	0.891	1.209	1.01	0.74	0.74
CM245	5.891E-01	6.314E-01	1.030E+00	0.785	0.842	1.373	0.93	0.57	0.61	5.889E-01	6.311E-01	1.030E+00	0.785	0.841	1.373	0.93	0.57	0.61
CM246	1.561E-01	1.775E-01	2.513E-01	0.801	0.910	1.289	0.88	0.62	0.71	1.560E-01	1.774E-01	2.511E-01	0.801	0.911	1.289	0.88	0.62	0.71
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.05	7.04	7.25	17.1	11.2	12.8				7.34	7.54	7.41	17.8	11.4	13.3
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.27	5.32	5.63	7.6	9.4	8.8				5.59	5.85	5.79	8.3	9.6	9.3
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.25	3.94	4.39	7.6	8.6	8.0				4.60	4.52	4.57	8.3	8.8	8.5
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / PM147		AM242		CM246			SB125	CM243	CM245 / PM147		AM242		CM246	

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) CURIES PER MTU

	**********			10 YR		**********				**********			20 YR		**********			
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	6.141E-01	5.679E-01	5.191E-01	1.083	1.002	0.915	1.08	1.18	1.09	6.141E-01	5.679E-01	5.191E-01	1.083	1.002	0.915	1.08	1.18	1.09
KR 85	7.202E+03	7.158E+03	7.190E+03	1.003	0.996	1.001	1.01	1.00	1.00	3.773E+03	3.750E+03	3.766E+03	1.003	0.997	1.001	1.01	1.00	1.00
SR 89	1.395E-16	1.426E-16	1.443E-16	0.981	1.003	1.015	0.98	0.97	0.99	0.0	0.0	2.437E-38	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	8.579E+04	8.519E+04	8.695E+04	0.998	0.991	1.011	1.01	0.99	0.98	6.761E+04	6.714E+04	6.853E+04	0.998	0.991	1.011	1.01	0.99	0.98
Y 90	8.581E+04	8.521E+04	8.697E+04	0.998	0.991	1.011	1.01	0.99	0.98	6.763E+04	6.716E+04	6.855E+04	0.998	0.991	1.011	1.01	0.99	0.98
Y 91	1.775E-13	1.808E-13	1.855E-13	0.979	0.997	1.023	0.98	0.96	0.97	2.860E-32	0.0	2.997E-32	0.977	0.0	1.023	0.0	0.95	0.0
ZR 93	2.713E+00	2.730E+00	2.665E+00	1.004	1.010	0.986	0.99	1.02	1.02	2.713E+00	2.730E+00	2.665E+00	1.004	1.010	0.986	0.99	1.02	1.02
ZR 95	1.051E-11	1.065E-11	1.163E-11	0.962	0.974	1.064	0.99	0.90	0.92	6.866E-29	0.0	8.170E-29	0.913	0.0	1.087	0.0	0.84	0.0
NB 95	2.333E-11	2.365E-11	2.571E-11	0.963	0.976	1.061	0.99	0.91	0.92	1.524E-28	0.0	1.807E-28	0.915	0.0	1.085	0.0	0.84	0.0
TC 99	1.870E+01	1.923E+01	1.908E+01	0.984	1.012	1.004	0.97	0.98	1.01	1.870E+01	1.923E+01	1.908E+01	0.984	1.012	1.004	0.97	0.98	1.01
RU106	7.367E+02	6.853E+02	7.614E+02	1.012	0.942	1.046	1.08	0.97	0.90	7.845E-01	7.070E-01	7.860E-01	1.033	0.931	1.035	1.11	1.00	0.90
PD107	1.706E-01	1.554E-01	1.749E-01	1.022	0.931	1.048	1.10	0.98	0.89	1.706E-01	1.554E-01	1.749E-01	1.022	0.931	1.048	1.10	0.98	0.89
SN126	1.141E+00	8.340E-01	9.420E-01	1.173	0.858	0.969	1.37	1.21	0.89	1.141E+00	8.339E-01	9.419E-01	1.174	0.858	0.969	1.37	1.21	0.89
SB125	1.578E+03	1.100E+03	8.963E+02	1.324	0.923	0.752	1.43	1.76	1.23	1.292E+02	9.010E+01	7.340E+01	1.324	0.923	0.752	1.43	1.76	1.23
I129	4.650E-02	4.955E-02	4.702E-02	0.975	1.039	0.986	0.94	0.99	1.05	4.650E-02	4.955E-02	4.702E-02	0.975	1.039	0.986	0.94	0.99	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.004E+04	9.443E+03	9.879E+03	1.026	0.965	1.009	1.06	1.02	0.96	3.480E+02	3.274E+02	3.426E+02	1.026	0.965	1.010	1.06	1.02	0.96
CS135	6.527E-01	7.207E-01	7.048E-01	0.942	1.040	1.017	0.91	0.93	1.02	6.527E-01	7.207E-01	7.048E-01	0.942	1.040	1.017	0.91	0.93	1.02
CS137	1.235E+05	1.230E+05	1.263E+05	0.994	0.990	1.016	1.00	0.98	0.97	9.800E+04	9.772E+04	1.004E+05	0.993	0.990	1.017	1.00	0.98	0.97
CE144	1.824E+02	1.829E+02	1.887E+02	0.988	0.990	1.022	1.00	0.97	0.97	2.472E-02	2.481E-02	2.569E-02	0.986	0.989	1.025	1.00	0.96	0.97
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	2.480E-09	2.420E-09	2.417E-09	1.017	0.992	0.991	1.02	1.03	1.00	2.480E-09	2.420E-09	2.417E-09	1.017	0.992	0.991	1.02	1.03	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	1.014E+04	1.485E+04	1.353E+04	0.790	1.157	1.054	0.68	0.75	1.10	7.222E+02	1.057E+03	9.631E+02	0.790	1.156	1.054	0.68	0.75	1.10
SM147	5.246E-06	7.015E-06	6.743E-06	0.828	1.107	1.064	0.75	0.78	1.04	5.477E-06	7.361E-06	7.058E-06	0.826	1.110	1.064	0.74	0.78	1.04
SM148	9.303E-11	6.506E-11	7.265E-11	1.210	0.846	0.945	1.43	1.28	0.90	9.303E-11	6.506E-11	7.265E-11	1.210	0.846	0.945	1.43	1.28	0.90
SM149	1.023E-12	1.323E-12	1.143E-12	0.880	1.138	0.983	0.77	0.90	1.16	1.023E-12	1.323E-12	1.143E-12	0.880	1.138	0.983	0.77	0.90	1.16
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	4.641E+02	5.766E+02	4.229E+02	0.951	1.182	0.867	0.80	1.10	1.36	4.297E+02	5.338E+02	3.916E+02	0.951	1.182	0.867	0.80	1.10	1.36
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	8.412E+03	8.565E+03	7.527E+03	1.030	1.049	0.922	0.98	1.12	1.14	3.757E+03	3.825E+03	3.362E+03	1.030	1.049	0.922	0.98	1.12	1.14
EU155	2.973E+03	3.195E+03	2.918E+03	0.982	1.055	0.963	0.93	1.02	1.09	7.347E+02	7.897E+02	7.214E+02	0.981	1.055	0.964	0.93	1.02	1.09
U234	1.390E+00	1.423E+00	1.276E+00	1.020	1.044	0.936	0.98	1.09	1.12	1.526E+00	1.574E+00	1.319E+00	1.036	1.069	0.895	0.97	1.16	1.19
U235	1.750E-02	1.865E-02	1.983E-02	0.938	0.999	1.063	0.94	0.88	0.94	1.751E-02	1.865E-02	1.983E-02	0.938	0.999	1.063	0.94	0.88	0.94
U236	3.899E-01	3.907E-01	3.876E-01	1.001	1.003	0.995	1.00	1.01	1.01	3.901E-01	3.909E-01	3.876E-01	1.001	1.004	0.995	1.00	1.01	1.01
U238	3.100E-01	3.095E-01	3.095E-01	1.001	0.999	0.999	1.00	1.00	1.00	3.100E-01	3.095E-01	3.095E-01	1.001	0.999	0.999	1.00	1.00	1.00
NP237	5.465E-01	5.736E-01	5.419E-01	0.986	1.035	0.978	0.95	1.01	1.06	5.565E-01	5.844E-01	5.419E-01	0.992	1.042	0.966	0.95	1.03	1.08
PU238	5.008E+03	5.558E+03	4.774E+03	0.979	1.087	0.934	0.90	1.05	1.16	4.628E+03	5.137E+03	4.412E+03	0.979	1.087	0.934	0.90	1.05	1.16
PU239	3.627E+02	3.993E+02	3.589E+02	0.971	1.069	0.961	0.91	1.01	1.11	3.626E+02	3.992E+02	3.588E+02	0.971	1.069	0.961	0.91	1.01	1.11
PU240	6.128E+02	5.914E+02	5.377E+02	1.055	1.019	0.926	1.04	1.14	1.10	6.157E+02	5.943E+02	5.371E+02	1.057	1.020	0.922	1.04	1.15	1.11
PU241	1.070E+05	1.163E+05	1.189E+05	0.938	1.020	1.042	0.92	0.90	0.98	6.609E+04	7.258E+04	7.421E+04	0.931	1.023	1.046	0.91	0.89	0.98
PU242	2.982E+00	2.951E+00	3.559E+00	0.942	0.933	1.125	1.01	0.84	0.83	2.982E+00	2.951E+00	3.559E+00	0.942	0.933	1.125	1.01	0.84	0.83
AM241	2.374E+03	2.560E+03	2.631E+03	0.941	1.015	1.043	0.93	0.90	0.97	3.686E+03	3.993E+03	4.093E+03	0.939	1.018	1.043	0.92	0.90	0.98
AM242	1.118E+01	1.893E+01	9.068E+00	0.856	1.450	0.694	0.59	1.23	2.09	1.068E+01	1.808E+01	8.664E+00	0.856	1.449	0.695	0.59	1.23	2.09
AM243	3.681E+01	4.085E+01	4.886E+01	0.873	0.969	1.159	0.90	0.75	0.84	3.677E+01	4.081E+01	4.882E+01	0.873	0.969	1.159	0.90	0.75	0.84
CM242	9.264E+00	1.567E+01	7.535E+00	0.856	1.448	0.696	0.59	1.23	2.08	8.834E+00	1.496E+01	7.186E+00	0.855	1.449	0.696	0.59	1.23	2.08
CM243	3.478E+01	7.403E+00	3.137E+01	1.419	0.302	1.279	4.70	1.11	0.24	2.727E+01	5.805E+00	2.460E+01	1.418	0.302	1.280	4.70	1.11	0.24
CM244	4.038E+03	3.996E+03	5.427E+03	0.900	0.891	1.209	1.01	0.74	0.74	2.754E+03	2.725E+03	3.701E+03	0.900	0.891	1.209	1.01	0.74	0.74
CM245	5.886E-01	6.309E-01	1.030E+00	0.785	0.841	1.374	0.93	0.57	0.61	5.881E-01	6.304E-01	1.029E+00	0.785	0.841	1.374	0.93	0.57	0.61
CM246	1.558E-01	1.773E-01	2.510E-01	0.800	0.911	1.289	0.88	0.62	0.71	1.556E-01	1.770E-01	2.506E-01	0.800	0.910	1.289	0.88	0.62	0.71

AVERAGE-ABSOLUTE-DEVIATION, AS %	7.64	8.39	8.12	18.4	12.2	15.5							8.11	9.20	8.49	20.2	12.9	16.8
AV-ABS-DEV EXCLUDING LARGEST ONE, %	5.91	6.77	6.55	8.9	10.4	11.7							6.36	7.47	6.92	9.8	11.1	12.7
AV-ABS-DEV EXCLUDING LARGEST TWO, %	4.94	5.50	5.39	8.1	9.3	8.6							5.41	6.13	5.76	9.0	10.0	9.3
NUCS EXCLUDED, 1ST/2ND:	SB125	CM243	CM245 / PM147		AM242	CM246				SB125	CM243	CM245 / PM147			AM242		CM246	

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) CURIES PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	6.139E-01	5.677E-01	5.189E-01	1.083	1.002	0.915	1.08	1.18	1.09	6.135E-01	5.674E-01	5.186E-01	1.083	1.002	0.915	1.08	1.18	1.09
KR 85	5.423E+02	5.389E+02	5.413E+02	1.003	0.996	1.001	1.01	1.00	1.00	2.139E+01	2.125E+01	2.135E+01	1.003	0.996	1.001	1.01	1.00	1.00
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	3.311E+04	3.287E+04	3.356E+04	0.998	0.991	1.011	1.01	0.99	0.98	1.007E+04	9.998E+03	1.021E+04	0.998	0.991	1.012	1.01	0.99	0.98
Y 90	3.312E+04	3.288E+04	3.356E+04	0.998	0.991	1.011	1.01	0.99	0.98	1.007E+04	1.000E+04	1.021E+04	0.998	0.991	1.012	1.01	0.99	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.713E+00	2.730E+00	2.665E+00	1.004	1.010	0.986	0.99	1.02	1.02	2.713E+00	2.730E+00	2.665E+00	1.004	1.010	0.986	0.99	1.02	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.870E+01	1.923E+01	1.908E+01	0.984	1.012	1.004	0.97	0.98	1.01	1.869E+01	1.922E+01	1.907E+01	0.984	1.012	1.004	0.97	0.98	1.01
RU106	8.616E-10	7.763E-10	8.644E-10	1.033	0.931	1.036	1.11	1.00	0.90	1.008E-24	9.072E-25	1.013E-24	1.033	0.929	1.038	1.11	1.00	0.90
PD107	1.706E-01	1.554E-01	1.749E-01	1.022	0.931	1.048	1.10	0.98	0.89	1.706E-01	1.554E-01	1.749E-01	1.022	0.931	1.048	1.10	0.98	0.89
SN126	1.141E+00	8.337E-01	9.418E-01	1.174	0.858	0.969	1.37	1.21	0.89	1.140E+00	8.334E-01	9.414E-01	1.173	0.858	0.969	1.37	1.21	0.89
SB125	7.094E-02	4.946E-02	4.031E-02	1.324	0.923	0.752	1.43	1.76	1.23	2.611E-07	1.820E-07	1.484E-07	1.324	0.923	0.753	1.43	1.76	1.23
I129	4.650E-02	4.955E-02	4.702E-02	0.975	1.039	0.986	0.94	0.99	1.05	4.650E-02	4.955E-02	4.702E-02	0.975	1.039	0.986	0.94	0.99	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.452E-02	1.365E-02	1.429E-02	1.026	0.964	1.010	1.06	1.02	0.96	7.280E-10	6.840E-10	7.167E-10	1.026	0.964	1.010	1.06	1.02	0.95
CS135	6.527E-01	7.207E-01	7.048E-01	0.942	1.040	1.017	0.91	0.93	1.02	6.527E-01	7.207E-01	7.047E-01	0.942	1.040	1.017	0.91	0.93	1.02
CS137	4.900E+04	4.905E+04	5.040E+04	0.990	0.991	1.019	1.00	0.97	0.97	1.543E+04	1.555E+04	1.598E+04	0.986	0.993	1.021	0.99	0.97	0.97
CE144	6.154E-14	6.188E-14	6.478E-14	0.981	0.986	1.033	0.99	0.95	0.96	2.813E-33	0.0	3.026E-33	0.964	0.0	1.036	0.0	0.93	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	2.480E-09	2.420E-09	2.417E-09	1.017	0.992	0.991	1.02	1.03	1.00	2.480E-09	2.420E-09	2.417E-09	1.017	0.992	0.991	1.02	1.03	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	2.608E-01	3.814E-01	3.476E-01	0.790	1.156	1.054	0.68	0.75	1.10	4.775E-07	6.974E-07	6.362E-07	0.791	1.155	1.054	0.68	0.75	1.10
SM147	5.495E-06	7.388E-06	7.082E-06	0.826	1.110	1.064	0.74	0.78	1.04	5.495E-06	7.388E-06	7.082E-06	0.826	1.110	1.064	0.74	0.78	1.04
SM148	9.303E-11	6.506E-11	7.265E-11	1.210	0.846	0.945	1.43	1.28	0.90	9.303E-11	6.506E-11	7.265E-11	1.210	0.846	0.945	1.43	1.28	0.90
SM149	1.023E-12	1.323E-12	1.143E-12	0.880	1.138	0.983	0.77	0.90	1.16	1.023E-12	1.323E-12	1.143E-12	0.880	1.138	0.983	0.77	0.90	1.16
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.411E+02	4.237E+02	3.108E+02	0.951	1.182	0.867	0.81	1.10	1.36	2.321E+02	2.883E+02	2.115E+02	0.951	1.182	0.867	0.81	1.10	1.36
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	3.348E+02	3.408E+02	2.996E+02	1.030	1.048	0.922	0.98	1.12	1.14	5.953E+00	6.056E+00	5.324E+00	1.030	1.048	0.921	0.98	1.12	1.14
EU155	1.110E+01	1.193E+01	1.090E+01	0.981	1.055	0.964	0.93	1.02	1.09	1.024E-02	1.101E-02	1.006E-02	0.981	1.055	0.964	0.93	1.02	1.09
U234	1.877E+00	1.963E+00	1.431E+00	1.068	1.117	0.814	0.96	1.31	1.37	2.304E+00	2.438E+00	1.566E+00	1.096	1.159	0.745	0.95	1.47	1.56
U235	1.752E-02	1.867E-02	1.983E-02	0.938	1.000	1.062	0.94	0.88	0.94	1.754E-02	1.869E-02	1.983E-02	0.939	1.000	1.061	0.94	0.88	0.94
U236	3.906E-01	3.914E-01	3.875E-01	1.002	1.004	0.994	1.00	1.01	1.01	3.916E-01	3.923E-01	3.875E-01	1.003	1.005	0.992	1.00	1.01	1.01
U238	3.100E-01	3.095E-01	3.095E-01	1.001	0.999	0.999	1.00	1.00	1.00	3.100E-01	3.095E-01	3.095E-01	1.001	0.999	0.999	1.00	1.00	1.00
NP237	6.014E-01	6.333E-01	5.420E-01	1.015	1.069	0.915	0.95	1.11	1.17	6.865E-01	7.265E-01	5.419E-01	1.054	1.115	0.832	0.94	1.27	1.34
PU238	3.653E+03	4.056E+03	3.482E+03	0.979	1.087	0.933	0.90	1.05	1.16	2.463E+03	2.736E+03	2.348E+03	0.979	1.088	0.933	0.90	1.05	1.17
PU239	3.623E+02	3.989E+02	3.585E+02	0.971	1.069	0.961	0.91	1.01	1.11	3.619E+02	3.984E+02	3.580E+02	0.971	1.069	0.960	0.91	1.01	1.11
PU240	6.190E+02	5.975E+02	5.354E+02	1.060	1.023	0.917	1.04	1.16	1.12	6.178E+02	5.964E+02	5.326E+02	1.061	1.024	0.915	1.04	1.16	1.12
PU241	1.559E+04	1.764E+04	1.804E+04	0.912	1.032	1.056	0.88	0.86	0.98	1.405E+03	1.669E+03	1.707E+03	0.882	1.047	1.071	0.84	0.82	0.98
PU242	2.982E+00	2.951E+00	3.559E+00	0.942	0.933	1.125	1.01	0.84	0.83	2.982E+00	2.951E+00	3.559E+00	0.942	0.933	1.125	1.01	0.84	0.83
AM241	5.146E+03	5.620E+03	5.751E+03	0.935	1.021	1.045	0.92	0.89	0.98	5.197E+03	5.701E+03	5.833E+03	0.932	1.022	1.046	0.91	0.89	0.98
AM242	9.316E+00	1.577E+01	7.556E+00	0.856	1.449	0.694	0.59	1.23	2.09	7.417E+00	1.256E+01	6.015E+00	0.856	1.450	0.694	0.59	1.23	2.09
AM243	3.667E+01	4.070E+01	4.868E+01	0.873	0.969	1.159	0.90	0.75	0.84	3.650E+01	4.050E+01	4.845E+01	0.873	0.969	1.159	0.90	0.75	0.84
CM242	7.705E+00	1.304E+01	6.267E+00	0.856	1.448	0.696	0.59	1.23	2.08	6.134E+00	1.038E+01	4.989E+00	0.856	1.448	0.696	0.59	1.23	2.08
CM243	1.315E+01	2.798E+00	1.186E+01	1.419	0.302	1.279	4.70	1.11	0.24	3.897E+00	8.293E-01	3.515E+00	1.419	0.302	1.280	4.70	1.11	0.24
CM244	8.735E+02	8.644E+02	1.174E+03	0.900	0.891	1.210	1.01	0.74	0.74	1.289E+02	1.275E+02	1.732E+02	0.900	0.890	1.209	1.01	0.74	0.74
CM245	5.867E-01	6.288E-01	1.026E+00	0.785	0.842	1.373	0.93	0.57	0.61	5.843E-01	6.263E-01	1.022E+00	0.785	0.842	1.373	0.93	0.57	0.61
CM246	1.549E-01	1.762E-01	2.495E-01	0.800	0.910	1.289	0.88	0.62	0.71	1.538E-01	1.749E-01	2.477E-01	0.800	0.910	1.289	0.88	0.62	0.71
AVERAGE-ABSOLUTE-DEVIATION, AS %				8.40	9.43	9.03	20.3	13.6	17.5				8.70	9.90	9.47	21.0	14.6	18.7
AV-ABS-DEV EXCLUDING LARGEST ONE, %				6.55	7.72	7.37	9.9	11.8	13.4				6.87	8.18	7.85	10.4	12.9	14.6
AV-ABS-DEV EXCLUDING LARGEST TWO, %				5.53	6.40	6.14	9.2	10.7	10.1				5.88	6.86	6.66	9.6	11.6	10.8
NUCS EXCLUDED, 1ST/2ND:			SB125 CM243 CM245 / SM148 AM242 CM246									SB125 CM243 CM245 / SM148 AM242 CM246						

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) CURIES PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	6.122E-01	5.662E-01	5.175E-01	1.083	1.002	0.915	1.08	1.18	1.09	6.077E-01	5.620E-01	5.137E-01	1.083	1.002	0.915	1.08	1.18	1.09
KR 85	5.176E-05	5.137E-05	5.164E-05	1.003	0.996	1.001	1.01	1.00	0.99	1.141E-24	1.132E-24	1.137E-24	1.004	0.996	1.000	1.01	1.00	1.00
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	8.624E+01	8.556E+01	8.736E+01	0.998	0.990	1.011	1.01	0.99	0.98	5.009E-06	4.965E-06	5.069E-06	0.999	0.990	1.011	1.01	0.99	0.98
Y 90	8.626E+01	8.558E+01	8.738E+01	0.998	0.990	1.011	1.01	0.99	0.98	5.010E-06	4.967E-06	5.070E-06	0.999	0.990	1.011	1.01	0.99	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.713E+00	2.730E+00	2.664E+00	1.004	1.010	0.986	0.99	1.02	1.02	2.712E+00	2.729E+00	2.663E+00	1.004	1.010	0.986	0.99	1.02	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.868E+01	1.921E+01	1.906E+01	0.984	1.012	1.004	0.97	0.98	1.01	1.864E+01	1.917E+01	1.902E+01	0.984	1.012	1.004	0.97	0.98	1.01
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.706E-01	1.554E-01	1.749E-01	1.022	0.931	1.048	1.10	0.98	0.89	1.706E-01	1.554E-01	1.749E-01	1.022	0.931	1.048	1.10	0.98	0.89
SN126	1.139E+00	8.323E-01	9.401E-01	1.174	0.858	0.969	1.37	1.21	0.89	1.133E+00	8.283E-01	9.356E-01	1.173	0.858	0.969	1.37	1.21	0.89
SB125	0.0	0.0	2.730E-29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	4.650E-02	4.955E-02	4.702E-02	0.975	1.039	0.986	0.94	0.99	1.05	4.649E-02	4.954E-02	4.702E-02	0.975	1.039	0.986	0.94	0.99	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	4.536E-39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	6.527E-01	7.207E-01	7.047E-01	0.942	1.040	1.017	0.91	0.93	1.02	6.525E-01	7.205E-01	7.046E-01	0.942	1.040	1.017	0.91	0.93	1.02
CS137	1.519E+02	1.570E+02	1.614E+02	0.969	1.001	1.030	0.97	0.94	0.97	1.436E-05	1.627E-05	1.672E-05	0.910	1.031	1.059	0.88	0.86	0.97
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	2.480E-09	2.420E-09	2.417E-09	1.017	0.992	0.991	1.02	1.03	1.00	2.480E-09	2.420E-09	2.417E-09	1.017	0.992	0.991	1.02	1.03	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	7.134E-30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	5.495E-06	7.388E-06	7.082E-06	0.826	1.110	1.064	0.74	0.78	1.04	5.495E-06	7.388E-06	7.082E-06	0.826	1.110	1.064	0.74	0.78	1.04
SM148	9.303E-11	6.506E-11	7.265E-11	1.210	0.846	0.945	1.43	1.28	0.90	9.303E-11	6.506E-11	7.265E-11	1.210	0.846	0.945	1.43	1.28	0.90
SM149	1.023E-12	1.323E-12	1.143E-12	0.880	1.138	0.983	0.77	0.90	1.16	1.023E-12	1.323E-12	1.143E-12	0.880	1.138	0.983	0.77	0.90	1.16
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	4.973E+01	6.177E+01	4.532E+01	0.951	1.182	0.867	0.81	1.10	1.36	2.263E-01	2.815E-01	2.065E-01	0.950	1.182	0.867	0.80	1.10	1.36
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	5.946E-07	6.040E-07	5.314E-07	1.031	1.047	0.922	0.98	1.12	1.14	0.0	0.0	1.669E-31	0.0	0.0	0.0	0.0	0.0	0.0
EU155	7.411E-15	7.998E-15	7.310E-15	0.979	1.056	0.965	0.93	1.01	1.09	0.0	0.0	2.390E-57	0.0	0.0	0.0	0.0	0.0	0.0
U234	3.006E+00	3.219E+00	1.790E+00	1.125	1.205	0.670	0.93	1.68	1.80	3.184E+00	3.418E+00	1.846E+00	1.131	1.214	0.656	0.93	1.72	1.85
U235	1.761E-02	1.876E-02	1.983E-02	0.940	1.001	1.059	0.94	0.89	0.95	1.785E-02	1.904E-02	1.983E-02	0.944	1.007	1.049	0.94	0.90	0.96
U236	3.952E-01	3.958E-01	3.875E-01	1.006	1.008	0.986	1.00	1.02	1.02	4.073E-01	4.075E-01	3.875E-01	1.016	1.017	0.967	1.00	1.05	1.05
U238	3.100E-01	3.095E-01	3.095E-01	1.001	0.999	0.999	1.00	1.00	1.00	3.100E-01	3.095E-01	3.095E-01	1.001	0.999	0.999	1.00	1.00	1.00
NP237	9.772E-01	1.046E+00	5.419E-01	1.143	1.223	0.634	0.93	1.80	1.93	1.496E+00	1.615E+00	5.418E-01	1.229	1.326	0.445	0.93	2.76	2.98
PU238	5.103E+02	5.685E+02	4.860E+02	0.978	1.090	0.932	0.90	1.05	1.17	2.242E+00	2.624E+00	2.105E+00	0.965	1.129	0.906	0.85	1.07	1.25
PU239	3.600E+02	3.963E+02	3.559E+02	0.971	1.069	0.960	0.91	1.01	1.11	3.535E+02	3.892E+02	3.488E+02	0.972	1.070	0.959	0.91	1.01	1.12
PU240	6.051E+02	5.842E+02	5.215E+02	1.061	1.024	0.914	1.04	1.16	1.12	5.619E+02	5.424E+02	4.842E+02	1.061	1.024	0.914	1.04	1.16	1.12
PU241	6.684E-01	7.510E-01	1.369E-01	1.288	1.448	0.264	0.89	4.88	5.49	5.439E-01	5.830E-01	6.332E-16	1.448	1.552	0.000	0.93	****	****
PU242	2.981E+00	2.951E+00	3.558E+00	0.942	0.933	1.125	1.01	0.84	0.83	2.978E+00	2.948E+00	3.553E+00	0.943	0.933	1.124	1.01	0.84	0.83
AM241	3.806E+03	4.180E+03	4.276E+03	0.931	1.023	1.046	0.91	0.89	0.98	1.239E+03	1.360E+03	1.391E+03	0.932	1.023	1.046	0.91	0.89	0.98
AM242	2.980E+00	5.043E+00	2.416E+00	0.856	1.449	0.694	0.59	1.23	2.09	1.224E-01	2.072E-01	9.927E-02	0.856	1.449	0.694	0.59	1.23	2.09
AM243	3.582E+01	3.975E+01	4.755E+01	0.873	0.969	1.159	0.90	0.75	0.84	3.354E+01	3.722E+01	4.453E+01	0.873	0.969	1.159	0.90	0.75	0.84
CM242	2.464E+00	4.171E+00	2.004E+00	0.856	1.448	0.696	0.59	1.23	2.08	1.013E-01	1.714E-01	8.234E-02	0.856	1.448	0.696	0.59	1.23	2.08
CM243	3.008E-02	6.398E-03	2.713E-02	1.419	0.302	1.280	4.70	1.11	0.24	1.215E-09	2.584E-10	1.095E-09	1.419	0.302	1.279	4.70	1.11	0.24
CM244	6.104E-02	6.037E-02	8.203E-02	0.900	0.890	1.210	1.01	0.74	0.74	1.083E-10	1.397E-13	1.898E-13	2.991	0.004	0.005	****	****	0.74
CM245	5.749E-01	6.161E-01	1.005E+00	0.785	0.842	1.373	0.93	0.57	0.61	5.430E-01	5.819E-01	9.494E-01	0.785	0.842	1.373	0.93	0.57	0.61
CM246	1.494E-01	1.699E-01	2.405E-01	0.801	0.911	1.289	0.88	0.62	0.71	1.348E-01	1.533E-01	2.171E-01	0.800	0.910	1.289	0.88	0.62	0.71
AVERAGE-ABSOLUTE-DEVIATION, AS %				9.03	11.61	12.35	20.7	26.0	34.3				15.94	15.48	16.62	****	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %				7.07	8.72	10.23	10.8	15.8	20.8				8.26	9.73	10.89	23.1	19.4	26.7
AV-ABS-DEV EXCLUDING LARGEST TWO, %				6.00	7.20	8.78	8.9	13.1	16.0				7.06	7.45	8.79	12.1	14.5	19.3
NUCS EXCLUDED, 1ST/2ND:				SM148	CM243	PU241 / SM147		AM242	CM245			CM244	CM243	PU241 / SM148			AM242	NP237

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) CURIES PER MTU

	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
	**********	**********	10 KYR	**********					
SE 79	5.520E-01	5.105E-01	4.667E-01	1.083	1.002	0.916	1.08	1.18	1.09
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.701E+00	2.718E+00	2.653E+00	1.004	1.010	0.986	0.99	1.02	1.02
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.810E+01	1.861E+01	1.847E+01	0.984	1.012	1.004	0.97	0.98	1.01
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.704E-01	1.552E-01	1.747E-01	1.022	0.931	1.048	1.10	0.98	0.89
SN126	1.065E+00	7.782E-01	8.790E-01	1.174	0.858	0.969	1.37	1.21	0.89
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	4.648E-02	4.952E-02	4.700E-02	0.975	1.039	0.986	0.94	0.99	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	6.508E-01	7.186E-01	7.026E-01	0.942	1.040	1.017	0.91	0.93	1.02
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	2.480E-09	2.420E-09	2.417E-09	1.017	0.992	0.991	1.02	1.03	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	5.494E-06	7.388E-06	7.082E-06	0.826	1.110	1.064	0.74	0.78	1.04
SM148	9.303E-11	6.506E-11	7.265E-11	1.210	0.846	0.945	1.43	1.28	0.90
SM149	1.023E-12	1.323E-12	1.143E-12	0.880	1.138	0.983	0.77	0.90	1.16
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	1.778E-31	0.0	1.625E-31	1.045	0.0	0.955	0.0	1.09	0.0
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	3.113E+00	3.341E+00	1.800E+00	1.131	1.214	0.654	0.93	1.73	1.86
U235	2.064E-02	2.210E-02	1.983E-02	0.990	1.060	0.951	0.93	1.04	1.11
U236	5.036E-01	5.005E-01	3.874E-01	1.086	1.079	0.835	1.01	1.30	1.29
U238	3.100E-01	3.095E-01	3.095E-01	1.001	0.999	0.999	1.00	1.00	1.00
NP237	1.742E+00	1.885E+00	5.402E-01	1.254	1.357	0.389	0.92	3.22	3.49
PU238	3.632E-19	6.132E-19	2.936E-19	0.858	1.449	0.694	0.59	1.24	2.09
PU239	2.779E+02	3.059E+02	2.693E+02	0.977	1.076	0.947	0.91	1.03	1.14
PU240	2.164E+02	2.089E+02	1.868E+02	1.061	1.024	0.916	1.04	1.16	1.12
PU241	2.611E-01	2.798E-01	0.0	0.965	1.035	0.0	0.93	0.0	0.0
PU242	2.931E+00	2.901E+00	3.495E+00	0.943	0.933	1.124	1.01	0.84	0.83
AM241	2.619E-01	2.927E-01	7.496E-04	1.415	1.581	0.004	0.89	****	****
AM242	1.840E-19	3.107E-19	1.488E-19	0.858	1.448	0.694	0.59	1.24	2.09
AM243	1.440E+01	1.598E+01	1.912E+01	0.873	0.968	1.159	0.90	0.75	0.84
CM242	1.526E-19	2.577E-19	1.234E-19	0.858	1.449	0.694	0.59	1.24	2.09
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	1.081E-10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	2.606E-01	2.793E-01	4.548E-01	0.786	0.842	1.372	0.93	0.57	0.61
CM246	3.606E-02	4.101E-02	5.805E-02	0.801	0.911	1.289	0.88	0.62	0.71

AVERAGE-ABSOLUTE-DEVIATION, AS %	10.67	14.23	16.93	13.8	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	8.88	11.07	13.39	12.7	25.6	37.1
AV-ABS-DEV EXCLUDING LARGEST TWO, %	7.50	8.29	10.63	11.7	17.1	24.3

NUCS EXCLUDED, 1ST/2ND: SM148 CM242 AM241 / SM147 PU238 NP237

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) CURIES PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	3.372E-01	3.135E-01	2.898E-01	1.076	1.000	0.924	1.08	1.16	1.08	3.371E-01	3.135E-01	2.898E-01	1.075	1.000	0.925	1.08	1.16	1.08
KR 85	7.584E+03	7.676E+03	7.878E+03	0.983	0.995	1.021	0.99	0.96	0.97	5.518E+03	5.585E+03	5.732E+03	0.983	0.995	1.021	0.99	0.96	0.97
SR 89	3.895E+05	4.034E+05	3.991E+05	0.980	1.015	1.004	0.97	0.98	1.01	7.627E-06	7.900E-06	7.829E-06	0.980	1.015	1.006	0.97	0.97	1.01
SR 90	5.934E+04	6.019E+04	6.277E+04	0.977	0.991	1.033	0.99	0.95	0.96	5.279E+04	5.354E+04	5.584E+04	0.977	0.990	1.033	0.99	0.95	0.96
Y 90	5.939E+04	6.021E+04	6.279E+04	0.977	0.990	1.033	0.99	0.95	0.96	5.280E+04	5.355E+04	5.585E+04	0.977	0.990	1.033	0.99	0.95	0.96
Y 91	5.458E+05	5.622E+05	5.625E+05	0.980	1.010	1.010	0.97	0.97	1.00	3.127E-04	3.219E-04	3.225E-04	0.980	1.009	1.011	0.97	0.97	1.00
ZR 93	1.491E+00	1.524E+00	1.503E+00	0.990	1.012	0.998	0.98	0.99	1.01	1.491E+00	1.524E+00	1.503E+00	0.990	1.012	0.998	0.98	0.99	1.01
ZR 95	8.154E+05	8.295E+05	8.182E+05	0.993	1.010	0.997	0.98	1.00	1.01	2.885E-03	2.930E-03	3.000E-03	0.982	0.997	1.021	0.98	0.96	0.98
NB 95	1.054E+06	1.073E+06	1.056E+06	0.993	1.011	0.995	0.98	1.00	1.02	6.405E-03	6.505E-03	6.634E-03	0.983	0.999	1.018	0.98	0.97	0.98
TC 99	1.111E+01	1.127E+01	1.128E+01	0.990	1.004	1.005	0.99	0.98	1.00	1.111E+01	1.127E+01	1.128E+01	0.990	1.004	1.005	0.99	0.98	1.00
RU106	4.306E+05	3.916E+05	4.061E+05	1.052	0.956	0.992	1.10	1.06	0.96	1.463E+04	1.331E+04	1.381E+04	1.051	0.956	0.992	1.10	1.06	0.96
PD107	9.805E-02	8.615E-02	9.135E-02	1.068	0.938	0.995	1.14	1.07	0.94	9.805E-02	8.615E-02	9.135E-02	1.068	0.938	0.995	1.14	1.07	0.94
SN126	6.351E-01	4.586E-01	5.147E-01	1.185	0.855	0.960	1.38	1.23	0.89	6.350E-01	4.586E-01	5.146E-01	1.185	0.855	0.960	1.38	1.23	0.89
SB125	1.125E+04	7.570E+03	6.218E+03	1.348	0.907	0.745	1.49	1.81	1.22	3.289E+03	2.214E+03	1.818E+03	1.348	0.907	0.745	1.49	1.81	1.22
I129	2.656E-02	2.710E-02	2.583E-02	1.002	1.023	0.975	0.98	1.03	1.05	2.667E-02	2.721E-02	2.596E-02	1.002	1.022	0.975	0.98	1.03	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.119E+05	1.062E+05	1.020E+05	1.049	0.995	0.956	1.05	1.10	1.04	2.142E+04	2.032E+04	1.952E+04	1.049	0.995	0.956	1.05	1.10	1.04
CS135	3.540E-01	3.522E-01	3.197E-01	1.035	1.030	0.935	1.01	1.11	1.10	3.540E-01	3.522E-01	3.197E-01	1.035	1.030	0.935	1.01	1.11	1.10
CS137	8.639E+04	8.586E+04	8.795E+04	0.996	0.990	1.014	1.01	0.98	0.98	7.711E+04	7.669E+04	7.855E+04	0.996	0.990	1.014	1.01	0.98	0.98
CE144	8.373E+05	8.480E+05	8.492E+05	0.991	1.004	1.005	0.99	0.99	1.00	1.049E+04	1.063E+04	1.066E+04	0.990	1.003	1.006	0.99	0.98	1.00
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	9.515E-10	9.760E-10	1.014E-09	0.970	0.995	1.034	0.97	0.94	0.96	1.258E-09	1.288E-09	1.326E-09	0.975	0.998	1.027	0.98	0.95	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	1.143E+05	1.504E+05	1.444E+05	0.838	1.103	1.059	0.76	0.79	1.04	3.139E+04	4.125E+04	3.961E+04	0.839	1.102	1.059	0.76	0.79	1.04
SM147	1.323E-06	1.500E-06	1.632E-06	0.891	1.010	1.099	0.88	0.81	0.92	3.375E-06	4.260E-06	4.282E-06	0.850	1.072	1.078	0.79	0.79	0.99
SM148	4.105E-11	2.843E-11	2.907E-11	1.250	0.865	0.885	1.44	1.41	0.98	4.127E-11	2.863E-11	2.928E-11	1.248	0.866	0.886	1.44	1.41	0.98
SM149	7.145E-13	7.659E-13	6.030E-13	1.029	1.103	0.868	0.93	1.18	1.27	7.145E-13	7.660E-13	6.030E-13	1.029	1.103	0.868	0.93	1.18	1.27
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.231E+02	2.951E+02	2.308E+02	1.142	1.043	0.816	1.09	1.40	1.28	3.111E+02	2.841E+02	2.222E+02	1.142	1.043	0.816	1.10	1.40	1.28
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	8.340E+03	7.909E+03	6.613E+03	1.094	1.038	0.868	1.05	1.26	1.20	5.611E+03	5.320E+03	4.449E+03	1.094	1.038	0.868	1.05	1.26	1.20
EU155	5.214E+03	5.036E+03	3.903E+03	1.105	1.067	0.827	1.04	1.34	1.29	2.622E+03	2.533E+03	1.963E+03	1.105	1.068	0.827	1.04	1.34	1.29
U234	9.212E-01	9.150E-01	9.201E-01	1.003	0.996	1.001	1.01	1.00	0.99	9.463E-01	9.396E-01	9.281E-01	1.009	1.002	0.989	1.01	1.02	1.01
U235	1.510E-02	1.421E-02	1.297E-02	1.071	1.008	0.920	1.06	1.16	1.10	1.510E-02	1.421E-02	1.297E-02	1.071	1.008	0.920	1.06	1.16	1.10
U236	2.078E-01	2.098E-01	2.122E-01	0.990	0.999	1.011	0.99	0.98	0.99	2.079E-01	2.099E-01	2.122E-01	0.990	1.000	1.010	0.99	0.98	0.99
U238	3.203E-01	3.204E-01	3.210E-01	0.999	0.999	1.001	1.00	1.00	1.00	3.203E-01	3.204E-01	3.210E-01	0.999	0.999	1.001	1.00	1.00	1.00
NP237	2.422E-01	2.384E-01	1.866E-01	1.089	1.072	0.839	1.02	1.30	1.28	2.433E-01	2.395E-01	1.868E-01	1.090	1.073	0.837	1.02	1.30	1.28
PU238	1.691E+03	1.674E+03	1.254E+03	1.098	1.087	0.814	1.01	1.35	1.33	1.789E+03	1.749E+03	1.343E+03	1.100	1.075	0.825	1.02	1.33	1.30
PU239	3.014E+02	3.038E+02	2.207E+02	1.095	1.104	0.802	0.99	1.37	1.38	3.013E+02	3.037E+02	2.206E+02	1.095	1.104	0.802	0.99	1.37	1.38
PU240	4.842E+02	4.229E+02	4.217E+02	1.093	0.955	0.952	1.14	1.15	1.00	4.846E+02	4.232E+02	4.215E+02	1.094	0.955	0.951	1.15	1.15	1.00
PU241	1.155E+05	1.085E+05	9.263E+04	1.094	1.028	0.878	1.06	1.25	1.17	9.117E+04	8.601E+04	7.346E+04	1.091	1.029	0.879	1.06	1.24	1.17
PU242	1.509E+00	1.449E+00	1.774E+00	0.957	0.919	1.125	1.04	0.85	0.82	1.509E+00	1.449E+00	1.774E+00	0.957	0.919	1.125	1.04	0.85	0.82
AM241	1.338E+02	1.259E+02	1.049E+02	1.101	1.036	0.863	1.06	1.28	1.20	9.407E+02	8.853E+02	7.521E+02	1.095	1.030	0.875	1.06	1.25	1.18
AM242	6.995E+00	8.340E+00	3.424E+00	1.119	1.334	0.548	0.84	2.04	2.44	6.839E+00	8.155E+00	3.348E+00	1.119	1.334	0.548	0.84	2.04	2.44
AM243	1.410E+01	1.274E+01	1.396E+01	1.037	0.937	1.026	1.11	1.01	0.91	1.409E+01	1.273E+01	1.395E+01	1.037	0.937	1.026	1.11	1.01	0.91
CM242	3.279E+04	2.829E+04	2.779E+04	1.107	0.955	0.938	1.16	1.18	1.02	2.160E+01	2.049E+01	1.610E+01	1.114	1.056	0.830	1.05	1.34	1.27
CM243	1.504E+01	4.148E+00	1.031E+01	1.530	0.422	1.049	3.63	1.46	0.40	1.334E+01	3.681E+00	9.152E+00	1.529	0.422	1.049	3.62	1.46	0.40
CM244	1.459E+03	1.117E+03	1.224E+03	1.152	0.882	0.966	1.31	1.19	0.91	1.209E+03	9.255E+02	1.014E+03	1.152	0.882	0.966	1.31	1.19	0.91
CM245	1.064E-01	7.878E-02	8.094E-02	1.199	0.888	0.912	1.35	1.31	0.97	1.064E-01	7.875E-02	8.091E-02	1.200	0.888	0.912	1.35	1.32	0.97
CM246	2.055E-02	1.716E-02	1.819E-02	1.103	0.921	0.976	1.20	1.13	0.94	2.054E-02	1.714E-02	1.818E-02	1.103	0.921	0.976	1.20	1.13	0.94
AVERAGE-ABSOLUTE-DEVIATION, AS %				8.51	6.22	7.53	15.3	18.3	13.5				8.65	6.30	7.75	15.2	18.8	13.8
AV-ABS-DEV EXCLUDING LARGEST ONE, %				6.74	4.27	6.27	9.5	15.7	9.4				6.90	4.35	6.50	9.5	16.2	9.7
AV-ABS-DEV EXCLUDING LARGEST TWO, %				6.28	3.83	5.88	8.6	14.1	9.1				6.45	3.92	6.13	8.5	14.6	9.4
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	AM242 / SM148		AM243		PU239			SB125	CM243	AM242 / SM148		AM243		PU239	

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) CURIES PER MTU

	**********			10 YR		**********				**********			20 YR		**********			
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	3.371E-01	3.135E-01	2.898E-01	1.075	1.000	0.925	1.08	1.16	1.08	3.371E-01	3.135E-01	2.897E-01	1.076	1.000	0.924	1.08	1.16	1.08
KR 85	3.994E+03	4.042E+03	4.148E+03	0.983	0.995	1.021	0.99	0.96	0.97	2.092E+03	2.117E+03	2.173E+03	0.983	0.995	1.021	0.99	0.96	0.97
SR 89	9.900E-17	1.025E-16	1.017E-16	0.980	1.014	1.006	0.97	0.97	1.01	0.0	0.0	1.718E-38	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	4.687E+04	4.753E+04	4.957E+04	0.977	0.990	1.033	0.99	0.95	0.96	3.694E+04	3.746E+04	3.907E+04	0.977	0.990	1.033	0.99	0.95	0.96
Y 90	4.688E+04	4.754E+04	4.958E+04	0.977	0.990	1.033	0.99	0.95	0.96	3.695E+04	3.747E+04	3.908E+04	0.977	0.990	1.033	0.99	0.95	0.96
Y 91	1.255E-13	1.292E-13	1.296E-13	0.980	1.009	1.012	0.97	0.97	1.00	2.023E-32	0.0	2.094E-32	0.983	0.0	1.017	0.0	0.97	0.0
ZR 93	1.491E+00	1.524E+00	1.503E+00	0.990	1.012	0.998	0.98	0.99	1.01	1.491E+00	1.524E+00	1.503E+00	0.990	1.012	0.998	0.98	0.99	1.01
ZR 95	7.375E-12	7.475E-12	7.953E-12	0.970	0.983	1.046	0.99	0.93	0.94	4.818E-29	0.0	5.589E-29	0.926	0.0	1.074	0.0	0.86	0.0
NB 95	1.637E-11	1.660E-11	1.759E-11	0.971	0.985	1.044	0.99	0.93	0.94	1.070E-28	0.0	1.236E-28	0.928	0.0	1.072	0.0	0.87	0.0
TC 99	1.111E+01	1.127E+01	1.128E+01	0.990	1.004	1.005	0.99	0.98	1.00	1.111E+01	1.127E+01	1.128E+01	0.990	1.004	1.005	0.99	0.98	1.00
RU106	4.701E+02	4.275E+02	4.436E+02	1.052	0.956	0.992	1.10	1.06	0.96	4.954E-01	4.410E-01	4.578E-01	1.066	0.949	0.985	1.12	1.08	0.96
PD107	9.805E-02	8.615E-02	9.135E-02	1.068	0.938	0.995	1.14	1.07	0.94	9.805E-02	8.615E-02	9.135E-02	1.068	0.938	0.995	1.14	1.07	0.94
SN126	6.350E-01	4.585E-01	5.146E-01	1.185	0.855	0.960	1.38	1.23	0.89	6.350E-01	4.585E-01	5.146E-01	1.185	0.855	0.960	1.38	1.23	0.89
SB125	9.412E+02	6.334E+02	5.203E+02	1.348	0.907	0.745	1.49	1.81	1.22	7.707E+01	5.186E+01	4.261E+01	1.348	0.907	0.745	1.49	1.81	1.22
I129	2.667E-02	2.721E-02	2.596E-02	1.002	1.022	0.975	0.98	1.03	1.05	2.667E-02	2.721E-02	2.596E-02	1.002	1.022	0.975	0.98	1.03	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	3.990E+03	3.784E+03	3.635E+03	1.049	0.995	0.956	1.05	1.10	1.04	1.384E+02	1.312E+02	1.261E+02	1.049	0.995	0.956	1.05	1.10	1.04
CS135	3.540E-01	3.522E-01	3.197E-01	1.035	1.030	0.935	1.01	1.11	1.10	3.540E-01	3.522E-01	3.197E-01	1.035	1.030	0.935	1.01	1.11	1.10
CS137	6.870E+04	6.837E+04	7.003E+04	0.995	0.990	1.014	1.00	0.98	0.98	5.452E+04	5.433E+04	5.565E+04	0.994	0.991	1.015	1.00	0.98	0.98
CE144	1.221E+02	1.237E+02	1.244E+02	0.989	1.002	1.008	0.99	0.98	0.99	1.655E-02	1.678E-02	1.693E-02	0.988	1.002	1.011	0.99	0.98	0.99
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.262E-09	1.292E-09	1.330E-09	0.975	0.998	1.027	0.98	0.95	0.97	1.262E-09	1.292E-09	1.330E-09	0.975	0.998	1.027	0.98	0.95	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	8.375E+03	1.100E+04	1.057E+04	0.839	1.102	1.059	0.76	0.79	1.04	5.964E+02	7.834E+02	7.525E+02	0.839	1.102	1.059	0.76	0.79	1.04
SM147	3.939E-06	5.019E-06	5.011E-06	0.846	1.078	1.076	0.78	0.79	1.00	4.130E-06	5.275E-06	5.257E-06	0.845	1.079	1.076	0.78	0.79	1.00
SM148	4.127E-11	2.863E-11	2.928E-11	1.248	0.866	0.886	1.44	1.41	0.98	4.127E-11	2.863E-11	2.928E-11	1.248	0.866	0.886	1.44	1.41	0.98
SM149	7.145E-13	7.660E-13	6.030E-13	1.029	1.103	0.868	0.93	1.18	1.27	7.145E-13	7.660E-13	6.030E-13	1.029	1.103	0.868	0.93	1.18	1.27
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	2.994E+02	2.734E+02	2.138E+02	1.142	1.043	0.815	1.10	1.40	1.28	2.772E+02	2.531E+02	1.980E+02	1.142	1.043	0.816	1.10	1.40	1.28
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	3.750E+03	3.556E+03	2.973E+03	1.094	1.038	0.868	1.05	1.26	1.20	1.675E+03	1.588E+03	1.328E+03	1.095	1.038	0.868	1.05	1.26	1.20
EU155	1.303E+03	1.259E+03	9.760E+02	1.105	1.068	0.828	1.03	1.34	1.29	3.222E+02	3.113E+02	2.413E+02	1.105	1.068	0.828	1.04	1.34	1.29
U234	9.712E-01	9.639E-01	9.363E-01	1.015	1.007	0.978	1.01	1.04	1.03	1.018E+00	1.010E+00	9.516E-01	1.025	1.017	0.958	1.01	1.07	1.06
U235	1.511E-02	1.421E-02	1.297E-02	1.072	1.008	0.920	1.06	1.16	1.10	1.511E-02	1.421E-02	1.297E-02	1.072	1.008	0.920	1.06	1.16	1.10
U236	2.079E-01	2.099E-01	2.122E-01	0.990	1.000	1.010	0.99	0.98	0.99	2.081E-01	2.101E-01	2.122E-01	0.990	1.000	1.010	0.99	0.98	0.99
U238	3.203E-01	3.204E-01	3.210E-01	0.999	0.999	1.001	1.00	1.00	1.00	3.203E-01	3.204E-01	3.210E-01	0.999	0.999	1.001	1.00	1.00	1.00
NP237	2.454E-01	2.414E-01	1.868E-01	1.093	1.075	0.832	1.02	1.31	1.29	2.520E-01	2.477E-01	1.868E-01	1.101	1.082	0.816	1.02	1.35	1.33
PU238	1.720E+03	1.682E+03	1.291E+03	1.100	1.075	0.825	1.02	1.33	1.30	1.589E+03	1.555E+03	1.193E+03	1.099	1.076	0.825	1.02	1.33	1.30
PU239	3.013E+02	3.037E+02	2.206E+02	1.095	1.104	0.802	0.99	1.37	1.38	3.012E+02	3.036E+02	2.205E+02	1.095	1.104	0.802	0.99	1.37	1.38
PU240	4.850E+02	4.234E+02	4.213E+02	1.094	0.955	0.951	1.15	1.15	1.00	4.853E+02	4.237E+02	4.208E+02	1.095	0.956	0.949	1.15	1.15	1.01
PU241	7.166E+04	6.794E+04	5.803E+04	1.088	1.031	0.881	1.05	1.23	1.17	4.428E+04	4.240E+04	3.621E+04	1.081	1.035	0.884	1.04	1.22	1.17
PU242	1.509E+00	1.449E+00	1.774E+00	0.957	0.919	1.125	1.04	0.85	0.82	1.509E+00	1.449E+00	1.774E+00	0.957	0.919	1.125	1.04	0.85	0.82
AM241	1.580E+03	1.490E+03	1.268E+03	1.093	1.030	0.877	1.06	1.25	1.18	2.459E+03	2.328E+03	1.982E+03	1.090	1.032	0.878	1.06	1.24	1.17
AM242	6.685E+00	7.971E+00	3.273E+00	1.119	1.334	0.548	0.84	2.04	2.44	6.387E+00	7.615E+00	3.127E+00	1.119	1.334	0.548	0.84	2.04	2.44
AM243	1.409E+01	1.273E+01	1.395E+01	1.037	0.937	1.026	1.11	1.01	0.91	1.407E+01	1.272E+01	1.393E+01	1.037	0.937	1.026	1.11	1.01	0.91
CM242	5.538E+00	6.601E+00	2.720E+00	1.118	1.333	0.549	0.84	2.04	2.43	5.282E+00	6.298E+00	2.593E+00	1.118	1.333	0.549	0.84	2.04	2.43
CM243	1.182E+01	3.259E+00	8.104E+00	1.530	0.422	1.049	3.63	1.46	0.40	9.265E+00	2.555E+00	6.354E+00	1.529	0.422	1.049	3.63	1.46	0.40
CM244	9.984E+02	7.643E+02	8.375E+02	1.152	0.882	0.966	1.31	1.19	0.91	6.809E+02	5.212E+02	5.712E+02	1.152	0.882	0.966	1.31	1.19	0.91
CM245	1.063E-01	7.872E-02	8.088E-02	1.199	0.888	0.913	1.35	1.31	0.97	1.062E-01	7.865E-02	8.081E-02	1.199	0.888	0.913	1.35	1.31	0.97
CM246	2.052E-02	1.713E-02	1.816E-02	1.103	0.921	0.976	1.20	1.13	0.94	2.049E-02	1.711E-02	1.814E-02	1.103	0.921	0.976	1.20	1.13	0.94
AVERAGE-ABSOLUTE-DEVIATION, AS %				8.73	7.00	8.52	15.5	20.5	16.6				9.14	7.62	8.93	16.8	21.4	18.1
AV-ABS-DEV EXCLUDING LARGEST ONE, %				6.98	5.11	7.33	9.7	18.0	12.6				7.38	5.58	7.74	10.5	18.9	13.8
AV-ABS-DEV EXCLUDING LARGEST TWO, %				6.49	4.14	6.38	8.6	14.4	9.2				6.90	4.54	6.80	9.3	15.2	10.1
NUCS EXCLUDED, 1ST/2ND:				SB125	CM243	AM242 / SM148		AM243	CM242			SB125	CM243	AM242 / SM148		AM243	CM242	

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) CURIES PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	3.370E-01	3.134E-01	2.896E-01	1.076	1.000	0.924	1.08	1.16	1.08	3.368E-01	3.132E-01	2.895E-01	1.075	1.000	0.924	1.08	1.16	1.08
KR 85	3.007E+02	3.043E+02	3.123E+02	0.983	0.995	1.021	0.99	0.96	0.97	1.186E+01	1.200E+01	1.232E+01	0.983	0.995	1.022	0.99	0.96	0.97
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	1.809E+04	1.834E+04	1.913E+04	0.977	0.990	1.033	0.99	0.95	0.96	5.502E+03	5.579E+03	5.819E+03	0.977	0.990	1.033	0.99	0.95	0.96
Y 90	1.809E+04	1.835E+04	1.914E+04	0.976	0.990	1.033	0.99	0.95	0.96	5.503E+03	5.580E+03	5.820E+03	0.977	0.990	1.033	0.99	0.95	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.491E+00	1.524E+00	1.503E+00	0.990	1.012	0.998	0.98	0.99	1.01	1.491E+00	1.524E+00	1.503E+00	0.990	1.012	0.998	0.98	0.99	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.111E+01	1.127E+01	1.128E+01	0.990	1.004	1.005	0.99	0.98	1.00	1.111E+01	1.127E+01	1.128E+01	0.990	1.004	1.005	0.99	0.98	1.00
RU106	5.442E-10	4.842E-10	5.035E-10	1.066	0.948	0.986	1.12	1.08	0.96	6.363E-25	5.659E-25	5.901E-25	1.065	0.947	0.988	1.12	1.08	0.96
PD107	9.805E-02	8.615E-02	9.135E-02	1.068	0.938	0.995	1.14	1.07	0.94	9.804E-02	8.615E-02	9.135E-02	1.067	0.938	0.995	1.14	1.07	0.94
SN126	6.348E-01	4.584E-01	5.145E-01	1.185	0.855	0.960	1.38	1.23	0.89	6.346E-01	4.583E-01	5.143E-01	1.185	0.855	0.960	1.38	1.23	0.89
SB125	4.231E-02	2.847E-02	2.340E-02	1.348	0.907	0.745	1.49	1.81	1.22	1.557E-07	1.048E-07	8.616E-08	1.347	0.907	0.746	1.49	1.81	1.22
I129	2.667E-02	2.721E-02	2.596E-02	1.002	1.022	0.975	0.98	1.03	1.05	2.667E-02	2.721E-02	2.596E-02	1.002	1.022	0.975	0.98	1.03	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	5.771E-03	5.470E-03	5.257E-03	1.049	0.995	0.956	1.06	1.10	1.04	2.894E-10	2.741E-10	2.637E-10	1.050	0.994	0.956	1.06	1.10	1.04
CS135	3.540E-01	3.522E-01	3.197E-01	1.035	1.030	0.935	1.01	1.11	1.10	3.540E-01	3.522E-01	3.197E-01	1.035	1.030	0.935	1.01	1.11	1.10
CS137	2.726E+04	2.727E+04	2.793E+04	0.992	0.992	1.016	1.00	0.98	0.98	8.586E+03	8.645E+03	8.856E+03	0.987	0.994	1.018	0.99	0.97	0.98
CE144	4.120E-14	4.187E-14	4.268E-14	0.983	0.999	1.018	0.98	0.97	0.98	1.883E-33	0.0	1.994E-33	0.971	0.0	1.029	0.0	0.94	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.262E-09	1.292E-09	1.330E-09	0.975	0.998	1.027	0.98	0.95	0.97	1.262E-09	1.292E-09	1.330E-09	0.975	0.998	1.027	0.98	0.95	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	2.154E-01	2.827E-01	2.716E-01	0.840	1.102	1.059	0.76	0.79	1.04	3.944E-07	5.169E-07	4.971E-07	0.840	1.101	1.059	0.76	0.79	1.04
SM147	4.145E-06	5.295E-06	5.276E-06	0.845	1.079	1.076	0.78	0.79	1.00	4.145E-06	5.295E-06	5.276E-06	0.845	1.079	1.076	0.78	0.79	1.00
SM148	4.127E-11	2.863E-11	2.928E-11	1.248	0.866	0.886	1.44	1.41	0.98	4.127E-11	2.863E-11	2.928E-11	1.248	0.866	0.886	1.44	1.41	0.98
SM149	7.145E-13	7.660E-13	6.030E-13	1.029	1.103	0.868	0.93	1.18	1.27	7.145E-13	7.660E-13	6.030E-13	1.029	1.103	0.868	0.93	1.18	1.27
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	2.200E+02	2.009E+02	1.571E+02	1.142	1.043	0.815	1.10	1.40	1.28	1.497E+02	1.367E+02	1.069E+02	1.142	1.043	0.815	1.10	1.40	1.28
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.492E+02	1.415E+02	1.183E+02	1.094	1.038	0.868	1.05	1.26	1.20	2.653E+00	2.514E+00	2.103E+00	1.095	1.037	0.868	1.06	1.26	1.20
EU155	4.865E+00	4.703E+00	3.645E+00	1.105	1.068	0.828	1.03	1.33	1.29	4.488E-03	4.341E-03	3.365E-03	1.104	1.068	0.828	1.03	1.33	1.29
U234	1.138E+00	1.127E+00	9.910E-01	1.049	1.038	0.913	1.01	1.15	1.14	1.285E+00	1.271E+00	1.039E+00	1.072	1.061	0.867	1.01	1.24	1.22
U235	1.512E-02	1.422E-02	1.297E-02	1.072	1.008	0.920	1.06	1.17	1.10	1.513E-02	1.424E-02	1.297E-02	1.072	1.009	0.919	1.06	1.17	1.10
U236	2.085E-01	2.104E-01	2.122E-01	0.991	1.000	1.009	0.99	0.98	0.99	2.092E-01	2.111E-01	2.122E-01	0.992	1.001	1.006	0.99	0.99	0.99
U238	3.203E-01	3.204E-01	3.210E-01	0.999	0.999	1.001	1.00	1.00	1.00	3.203E-01	3.204E-01	3.210E-01	0.999	0.999	1.001	1.00	1.00	1.00
NP237	2.820E-01	2.762E-01	1.868E-01	1.136	1.112	0.752	1.02	1.51	1.48	3.389E-01	3.306E-01	1.868E-01	1.187	1.158	0.654	1.03	1.81	1.77
PU238	1.255E+03	1.228E+03	9.418E+02	1.099	1.076	0.825	1.02	1.33	1.30	8.469E+02	8.287E+02	6.351E+02	1.100	1.076	0.825	1.02	1.33	1.30
PU239	3.010E+02	3.034E+02	2.204E+02	1.095	1.104	0.802	0.99	1.37	1.38	3.005E+02	3.029E+02	2.200E+02	1.095	1.104	0.802	0.99	1.37	1.38
PU240	4.851E+02	4.233E+02	4.195E+02	1.096	0.956	0.948	1.15	1.16	1.01	4.830E+02	4.215E+02	4.173E+02	1.096	0.957	0.947	1.15	1.16	1.01
PU241	1.045E+04	1.030E+04	8.800E+03	1.061	1.046	0.893	1.01	1.19	1.17	9.414E+02	9.749E+02	8.329E+02	1.027	1.064	0.909	0.97	1.13	1.17
PU242	1.509E+00	1.449E+00	1.774E+00	0.957	0.919	1.125	1.04	0.85	0.82	1.509E+00	1.449E+00	1.774E+00	0.957	0.919	1.125	1.04	0.85	0.82
AM241	3.438E+03	3.278E+03	2.792E+03	1.085	1.034	0.881	1.05	1.23	1.17	3.473E+03	3.326E+03	2.833E+03	1.082	1.036	0.882	1.04	1.23	1.17
AM242	5.571E+00	6.642E+00	2.727E+00	1.119	1.334	0.548	0.84	2.04	2.44	4.435E+00	5.287E+00	2.171E+00	1.119	1.334	0.548	0.84	2.04	2.44
AM243	1.403E+01	1.268E+01	1.389E+01	1.037	0.937	1.026	1.11	1.01	0.91	1.397E+01	1.262E+01	1.383E+01	1.037	0.937	1.026	1.11	1.01	0.91
CM242	4.607E+00	5.493E+00	2.262E+00	1.118	1.333	0.549	0.84	2.04	2.43	3.668E+00	4.373E+00	1.801E+00	1.118	1.333	0.549	0.84	2.04	2.43
CM243	4.467E+00	1.232E+00	3.063E+00	1.529	0.422	1.049	3.63	1.46	0.40	1.324E+00	3.651E-01	9.079E-01	1.529	0.422	1.049	3.63	1.46	0.40
CM244	2.160E+02	1.653E+02	1.812E+02	1.152	0.882	0.966	1.31	1.19	0.91	3.186E+01	2.439E+01	2.673E+01	1.152	0.882	0.966	1.31	1.19	0.91
CM245	1.060E-01	7.846E-02	8.061E-02	1.200	0.888	0.912	1.35	1.31	0.97	1.056E-01	7.814E-02	8.029E-02	1.200	0.888	0.912	1.35	1.32	0.97
CM246	2.040E-02	1.703E-02	1.806E-02	1.103	0.921	0.976	1.20	1.13	0.94	2.026E-02	1.691E-02	1.793E-02	1.103	0.921	0.976	1.20	1.13	0.94
AVERAGE-ABSOLUTE-DEVIATION, AS %				9.51	7.78	9.45	16.7	22.8	18.7				9.63	8.19	9.78	17.1	23.6	20.0
AV-ABS-DEV EXCLUDING LARGEST ONE, %				7.64	5.75	8.21	10.4	20.1	14.4				7.78	6.14	8.57	10.7	21.0	15.7
AV-ABS-DEV EXCLUDING LARGEST TWO, %				7.14	4.73	7.22	9.2	16.2	10.7				7.29	5.12	7.61	9.5	17.1	12.0
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	AM242 / SM148		AM243	CM242				SB125	CM243	AM242 / SM148		AM243	CM242		

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) CURIES PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	3.361E-01	3.125E-01	2.889E-01	1.076	1.000	0.924	1.08	1.16	1.08	3.336E-01	3.102E-01	2.867E-01	1.076	1.000	0.924	1.08	1.16	1.08
KR 85	2.870E-05	2.901E-05	2.980E-05	0.984	0.995	1.022	0.99	0.96	0.97	6.328E-25	6.393E-25	6.560E-25	0.985	0.995	1.021	0.99	0.96	0.97
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	4.711E+01	4.774E+01	4.981E+01	0.977	0.990	1.033	0.99	0.95	0.96	2.736E-06	2.771E-06	2.890E-06	0.977	0.990	1.033	0.99	0.95	0.96
Y 90	4.712E+01	4.775E+01	4.982E+01	0.977	0.990	1.033	0.99	0.95	0.96	2.737E-06	2.771E-06	2.890E-06	0.978	0.990	1.032	0.99	0.95	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.490E+00	1.524E+00	1.503E+00	0.990	1.012	0.998	0.98	0.99	1.01	1.490E+00	1.523E+00	1.502E+00	0.990	1.012	0.998	0.98	0.99	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.110E+01	1.126E+01	1.127E+01	0.990	1.004	1.005	0.99	0.98	1.00	1.108E+01	1.124E+01	1.125E+01	0.990	1.004	1.005	0.99	0.98	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	9.804E-02	8.615E-02	9.135E-02	1.067	0.938	0.995	1.14	1.07	0.94	9.804E-02	8.614E-02	9.134E-02	1.068	0.938	0.995	1.14	1.07	0.94
SN126	6.337E-01	4.576E-01	5.136E-01	1.185	0.855	0.960	1.38	1.23	0.89	6.307E-01	4.554E-01	5.111E-01	1.185	0.855	0.960	1.38	1.23	0.89
SB125	0.0	0.0	1.585E-29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	2.667E-02	2.721E-02	2.596E-02	1.002	1.022	0.975	0.98	1.03	1.05	2.667E-02	2.721E-02	2.596E-02	1.002	1.022	0.975	0.98	1.03	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	1.669E-39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	3.540E-01	3.522E-01	3.197E-01	1.035	1.030	0.935	1.01	1.11	1.10	3.539E-01	3.521E-01	3.196E-01	1.035	1.030	0.935	1.01	1.11	1.10
CS137	8.454E+01	8.729E+01	8.946E+01	0.971	1.002	1.027	0.97	0.95	0.98	7.995E-06	9.043E-06	9.268E-06	0.912	1.031	1.057	0.88	0.86	0.98
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.262E-09	1.292E-09	1.330E-09	0.975	0.998	1.027	0.98	0.95	0.97	1.262E-09	1.292E-09	1.330E-09	0.975	0.998	1.027	0.98	0.95	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	5.575E-30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	4.145E-06	5.295E-06	5.276E-06	0.845	1.079	1.076	0.78	0.79	1.00	4.145E-06	5.295E-06	5.276E-06	0.845	1.079	1.076	0.78	0.79	1.00
SM148	4.127E-11	2.863E-11	2.928E-11	1.248	0.866	0.886	1.44	1.41	0.98	4.127E-11	2.863E-11	2.928E-11	1.248	0.866	0.886	1.44	1.41	0.98
SM149	7.145E-13	7.660E-13	6.030E-13	1.029	1.103	0.868	0.93	1.18	1.27	7.145E-13	7.660E-13	6.030E-13	1.029	1.103	0.868	0.93	1.18	1.27
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.208E+01	2.929E+01	2.291E+01	1.142	1.043	0.815	1.10	1.40	1.28	1.459E-01	1.335E-01	1.044E-01	1.140	1.044	0.816	1.09	1.40	1.28
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	2.650E-07	2.508E-07	2.099E-07	1.095	1.037	0.868	1.06	1.26	1.19	0.0	0.0	6.593E-32	0.0	0.0	0.0	0.0	0.0	0.0
EU155	3.249E-15	3.153E-15	2.445E-15	1.102	1.069	0.829	1.03	1.33	1.29	0.0	0.0	7.992E-58	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.527E+00	1.508E+00	1.118E+00	1.103	1.089	0.808	1.01	1.37	1.35	1.588E+00	1.568E+00	1.137E+00	1.110	1.096	0.795	1.01	1.40	1.38
U235	1.519E-02	1.430E-02	1.297E-02	1.073	1.010	0.916	1.06	1.17	1.10	1.540E-02	1.450E-02	1.297E-02	1.078	1.015	0.908	1.06	1.19	1.12
U236	2.120E-01	2.135E-01	2.122E-01	0.997	1.004	0.998	0.99	1.00	1.01	2.215E-01	2.218E-01	2.122E-01	1.014	1.015	0.971	1.00	1.04	1.05
U238	3.203E-01	3.204E-01	3.210E-01	0.999	0.999	1.001	1.00	1.00	1.00	3.203E-01	3.204E-01	3.210E-01	0.999	0.999	1.001	1.00	1.00	1.00
NP237	5.332E-01	5.168E-01	1.868E-01	1.293	1.254	0.453	1.03	2.85	2.77	8.796E-01	8.489E-01	1.868E-01	1.378	1.330	0.293	1.04	4.71	4.54
PU238	1.762E+02	1.727E+02	1.317E+02	1.100	1.078	0.822	1.02	1.34	1.31	8.259E-01	8.407E-01	5.863E-01	1.100	1.119	0.781	0.98	1.41	1.43
PU239	2.989E+02	3.013E+02	2.188E+02	1.095	1.104	0.801	0.99	1.37	1.38	2.932E+02	2.955E+02	2.144E+02	1.095	1.104	0.801	0.99	1.37	1.38
PU240	4.730E+02	4.127E+02	4.085E+02	1.096	0.957	0.947	1.15	1.16	1.01	4.391E+02	3.832E+02	3.794E+02	1.096	0.957	0.947	1.15	1.16	1.01
PU241	1.660E-01	1.552E-01	6.681E-02	1.283	1.200	0.517	1.07	2.48	2.32	9.825E-02	7.274E-02	3.090E-16	1.724	1.276	0.000	1.35	****	****
PU242	1.508E+00	1.449E+00	1.774E+00	0.956	0.919	1.125	1.04	0.85	0.82	1.507E+00	1.447E+00	1.771E+00	0.957	0.919	1.124	1.04	0.85	0.82
AM241	2.544E+03	2.438E+03	2.077E+03	1.081	1.036	0.883	1.04	1.22	1.17	8.279E+02	7.935E+02	6.758E+02	1.081	1.036	0.883	1.04	1.23	1.17
AM242	1.782E+00	2.124E+00	8.721E-01	1.119	1.334	0.548	0.84	2.04	2.44	7.321E-02	8.726E-02	3.583E-02	1.119	1.334	0.548	0.84	2.04	2.44
AM243	1.371E+01	1.239E+01	1.357E+01	1.037	0.937	1.026	1.11	1.01	0.91	1.284E+01	1.160E+01	1.271E+01	1.037	0.937	1.026	1.11	1.01	0.91
CM242	1.473E+00	1.756E+00	7.233E-01	1.118	1.333	0.549	0.84	2.04	2.43	6.054E-02	7.216E-02	2.972E-02	1.118	1.333	0.549	0.84	2.04	2.43
CM243	1.023E-02	2.817E-03	7.007E-03	1.530	0.421	1.048	3.63	1.46	0.40	4.132E-10	1.138E-10	2.829E-10	1.531	0.422	1.048	3.63	1.46	0.40
CM244	1.509E-02	1.155E-02	1.266E-02	1.152	0.882	0.966	1.31	1.19	0.91	2.832E-11	2.672E-14	2.929E-14	2.994	0.003	0.003	****	****	0.91
CM245	1.039E-01	7.688E-02	7.898E-02	1.200	0.888	0.912	1.35	1.32	0.97	9.809E-02	7.261E-02	7.459E-02	1.200	0.888	0.912	1.35	1.32	0.97
CM246	1.967E-02	1.642E-02	1.741E-02	1.103	0.921	0.976	1.20	1.13	0.94	1.775E-02	1.482E-02	1.571E-02	1.103	0.921	0.976	1.20	1.13	0.94

AVERAGE-ABSOLUTE-DEVIATION, AS %	10.29	9.13	11.87	16.7	30.5	27.7							17.50	12.67	16.85	****	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	7.98	7.04	10.80	9.9	25.5	22.3							8.72	7.92	11.88	17.6	33.8	31.4
AV-ABS-DEV EXCLUDING LARGEST TWO, %	7.04	6.49	9.89	8.7	18.5	15.5							7.29	6.89	10.13	9.9	22.1	19.7

NUCS EXCLUDED, 1ST/2ND: SM148 CM243 NP237 / CM245 AM243 PU241 CM244 CM243 PU241 / SM148 AM243 NP237

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) CURIES PER MTU

	ORIGEN2	ORIGEN-S	CINDER	10 KYR OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	3.030E-01	2.818E-01	2.605E-01	1.075	1.000	0.925	1.08	1.16	1.08
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.484E+00	1.517E+00	1.496E+00	0.990	1.012	0.998	0.98	0.99	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.076E+01	1.091E+01	1.092E+01	0.990	1.004	1.005	0.99	0.99	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	9.794E-02	8.606E-02	9.125E-02	1.067	0.938	0.995	1.14	1.07	0.94
SN126	5.925E-01	4.279E-01	4.802E-01	1.185	0.855	0.960	1.38	1.23	0.89
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	2.666E-02	2.720E-02	2.595E-02	1.002	1.022	0.975	0.98	1.03	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	3.529E-01	3.512E-01	3.188E-01	1.035	1.030	0.935	1.00	1.11	1.10
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.262E-09	1.292E-09	1.330E-09	0.975	0.998	1.027	0.98	0.95	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	4.145E-06	5.295E-06	5.276E-06	0.845	1.079	1.076	0.78	0.79	1.00
SM148	4.127E-11	2.863E-11	2.928E-11	1.248	0.866	0.886	1.44	1.41	0.98
SM149	7.145E-13	7.660E-13	6.030E-13	1.029	1.103	0.868	0.93	1.18	1.27
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	1.146E-31	0.0	8.217E-32	1.165	0.0	0.835	0.0	1.39	0.0
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	1.556E+00	1.537E+00	1.108E+00	1.111	1.098	0.791	1.01	1.40	1.39
U235	1.769E-02	1.682E-02	1.297E-02	1.118	1.063	0.820	1.05	1.36	1.30
U236	2.968E-01	2.875E-01	2.122E-01	1.118	1.083	0.799	1.03	1.40	1.35
U238	3.203E-01	3.204E-01	3.210E-01	0.999	0.999	1.001	1.00	1.00	1.00
NP237	1.044E+00	1.006E+00	1.862E-01	1.401	1.350	0.250	1.04	5.61	5.40
PU238	2.171E-19	2.583E-19	1.059E-19	1.120	1.333	0.547	0.84	2.05	2.44
PU239	2.282E+02	2.298E+02	1.655E+02	1.098	1.106	0.796	0.99	1.38	1.39
PU240	1.691E+02	1.475E+02	1.464E+02	1.096	0.956	0.949	1.15	1.16	1.01
PU241	4.716E-02	3.492E-02	0.0	1.149	0.851	0.0	1.35	0.0	0.0
PU242	1.483E+00	1.423E+00	1.742E+00	0.957	0.918	1.124	1.04	0.85	0.82
AM241	4.763E-02	3.685E-02	3.641E-04	1.684	1.303	0.013	1.29	****	****
AM242	1.100E-19	1.308E-19	5.369E-20	1.121	1.332	0.547	0.84	2.05	2.44
AM243	5.512E+00	4.981E+00	5.457E+00	1.037	0.937	1.026	1.11	1.01	0.91
CM242	9.124E-20	1.085E-19	4.453E-20	1.121	1.333	0.547	0.84	2.05	2.44
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	2.829E-11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	4.708E-02	3.485E-02	3.573E-02	1.200	0.889	0.911	1.35	1.32	0.98
CM246	4.749E-03	3.963E-03	4.201E-03	1.103	0.921	0.976	1.20	1.13	0.94

AVERAGE-ABSOLUTE-DEVIATION, AS % 12.59 11.57 18.29 13.0 **** ****
AV-ABS-DEV EXCLUDING LARGEST ONE, % 10.23 10.93 15.88 11.1 46.1 46.7
AV-ABS-DEV EXCLUDING LARGEST TWO, % 8.50 9.83 13.51 10.2 29.1 30.5
NUCS EXCLUDED, 1ST/2ND: SM148 AM243 AM241 / CM245 NP237

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) CURIES PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.932E-01	4.592E-01	4.221E-01	1.076	1.002	0.921	1.07	1.17	1.09	4.932E-01	4.591E-01	4.221E-01	1.077	1.002	0.921	1.07	1.17	1.09
KR 85	1.118E+04	1.104E+04	1.131E+04	1.000	0.988	1.012	1.01	0.99	0.98	8.138E+03	8.035E+03	8.229E+03	1.000	0.988	1.012	1.01	0.99	0.98
SR 89	4.068E+05	4.199E+05	4.174E+05	0.981	1.013	1.007	0.97	0.97	1.01	7.964E-06	8.222E-06	8.186E-06	0.980	1.012	1.008	0.97	0.97	1.00
SR 90	9.099E+04	8.928E+04	9.316E+04	0.998	0.980	1.022	1.02	0.98	0.96	8.094E+04	7.942E+04	8.287E+04	0.998	0.980	1.022	1.02	0.98	0.96
Y 90	9.105E+04	8.931E+04	9.319E+04	0.999	0.979	1.022	1.02	0.98	0.96	8.096E+04	7.944E+04	8.289E+04	0.998	0.980	1.022	1.02	0.98	0.96
Y 91	5.660E+05	5.801E+05	5.827E+05	0.982	1.007	1.011	0.98	0.97	1.00	3.241E-04	3.322E-04	3.342E-04	0.982	1.006	1.012	0.98	0.97	0.99
ZR 93	2.250E+00	2.249E+00	2.222E+00	1.004	1.004	0.992	1.00	1.01	1.01	2.250E+00	2.249E+00	2.222E+00	1.004	1.004	0.992	1.00	1.01	1.01
ZR 95	8.217E+05	8.367E+05	8.266E+05	0.992	1.010	0.998	0.98	0.99	1.01	2.907E-03	2.955E-03	3.031E-03	0.981	0.997	1.022	0.98	0.96	0.97
NB 95	1.064E+06	1.081E+06	1.066E+06	0.994	1.010	0.996	0.98	1.00	1.01	6.454E-03	6.561E-03	6.703E-03	0.982	0.998	1.020	0.98	0.96	0.98
TC 99	1.586E+01	1.594E+01	1.593E+01	0.997	1.002	1.001	0.99	1.00	1.00	1.586E+01	1.594E+01	1.593E+01	0.997	1.002	1.001	0.99	1.00	1.00
RU106	4.374E+05	4.147E+05	4.317E+05	1.022	0.969	1.009	1.05	1.01	0.96	1.487E+04	1.409E+04	1.467E+04	1.022	0.969	1.009	1.06	1.01	0.96
PD107	1.193E-01	1.132E-01	1.193E-01	1.017	0.965	1.017	1.05	1.00	0.95	1.193E-01	1.132E-01	1.193E-01	1.017	0.965	1.017	1.05	1.00	0.95
SN126	8.255E-01	6.339E-01	6.970E-01	1.148	0.882	0.970	1.30	1.18	0.91	8.255E-01	6.339E-01	6.969E-01	1.148	0.882	0.970	1.30	1.18	0.91
SB125	1.265E+04	9.318E+03	7.495E+03	1.288	0.949	0.763	1.36	1.69	1.24	3.697E+03	2.724E+03	2.191E+03	1.288	0.949	0.763	1.36	1.69	1.24
I129	3.594E-02	3.817E-02	3.639E-02	0.976	1.036	0.988	0.94	0.99	1.05	3.605E-02	3.828E-02	3.651E-02	0.976	1.036	0.988	0.94	0.99	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.724E+05	1.687E+05	1.681E+05	1.016	0.994	0.990	1.02	1.03	1.00	3.300E+04	3.230E+04	3.219E+04	1.015	0.994	0.991	1.02	1.03	1.00
CS135	6.097E-01	6.803E-01	6.229E-01	0.956	1.067	0.977	0.90	0.98	1.09	6.097E-01	6.803E-01	6.229E-01	0.956	1.067	0.977	0.90	0.98	1.09
CS137	1.236E+05	1.228E+05	1.257E+05	0.997	0.990	1.013	1.01	0.98	0.98	1.103E+05	1.097E+05	1.123E+05	0.996	0.990	1.014	1.01	0.98	0.98
CE144	8.968E+05	8.986E+05	9.012E+05	0.998	1.000	1.003	1.00	1.00	1.00	1.123E+04	1.126E+04	1.131E+04	0.997	0.999	1.004	1.00	0.99	1.00
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.632E-09	1.578E-09	1.636E-09	1.010	0.977	1.013	1.03	1.00	0.96	1.961E-09	1.909E-09	1.968E-09	1.008	0.981	1.011	1.03	1.00	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	1.308E+05	1.764E+05	1.650E+05	0.831	1.121	1.048	0.74	0.79	1.07	3.589E+04	4.834E+04	4.523E+04	0.832	1.120	1.048	0.74	0.79	1.07
SM147	2.359E-06	2.444E-06	2.728E-06	0.940	0.974	1.087	0.97	0.86	0.90	4.706E-06	5.678E-06	5.754E-06	0.875	1.056	1.070	0.83	0.82	0.99
SM148	6.921E-11	5.174E-11	5.334E-11	1.191	0.891	0.918	1.34	1.30	0.97	6.945E-11	5.198E-11	5.362E-11	1.190	0.891	0.919	1.34	1.30	0.97
SM149	7.626E-13	9.901E-13	7.410E-13	0.917	1.191	0.891	0.77	1.03	1.34	7.626E-13	9.902E-13	7.410E-13	0.917	1.191	0.891	0.77	1.03	1.34
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.951E+02	4.551E+02	3.239E+02	1.010	1.163	0.828	0.87	1.22	1.41	3.804E+02	4.382E+02	3.119E+02	1.009	1.163	0.828	0.87	1.22	1.40
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.267E+04	1.282E+04	1.094E+04	1.043	1.056	0.901	0.99	1.16	1.17	8.524E+03	8.624E+03	7.359E+03	1.043	1.056	0.901	0.99	1.16	1.17
EU155	7.613E+03	8.403E+03	6.700E+03	1.005	1.110	0.885	0.91	1.14	1.25	3.829E+03	4.226E+03	3.370E+03	1.005	1.110	0.885	0.91	1.14	1.25
U234	1.358E+00	1.314E+00	1.332E+00	1.017	0.985	0.998	1.03	1.02	0.99	1.404E+00	1.365E+00	1.347E+00	1.023	0.995	0.982	1.03	1.04	1.01
U235	1.948E-02	2.182E-02	2.030E-02	0.949	1.063	0.989	0.89	0.96	1.07	1.948E-02	2.182E-02	2.030E-02	0.949	1.063	0.989	0.89	0.96	1.07
U236	3.411E-01	3.440E-01	3.441E-01	0.994	1.003	1.003	0.99	0.99	1.00	3.412E-01	3.440E-01	3.441E-01	0.994	1.003	1.003	0.99	0.99	1.00
U238	3.142E-01	3.134E-01	3.143E-01	1.001	0.998	1.001	1.00	1.00	1.00	3.142E-01	3.134E-01	3.143E-01	1.001	0.998	1.001	1.00	1.00	1.00
NP237	4.187E-01	4.094E-01	3.396E-01	1.076	1.052	0.872	1.02	1.23	1.21	4.201E-01	4.108E-01	3.399E-01	1.076	1.053	0.871	1.02	1.24	1.21
PU238	3.197E+03	3.546E+03	2.649E+03	1.021	1.133	0.846	0.90	1.21	1.34	3.290E+03	3.648E+03	2.768E+03	1.017	1.128	0.856	0.90	1.19	1.32
PU239	3.028E+02	3.625E+02	2.552E+02	0.987	1.181	0.832	0.84	1.19	1.42	3.028E+02	3.624E+02	2.552E+02	0.987	1.181	0.832	0.84	1.19	1.42
PU240	5.327E+02	4.854E+02	4.796E+02	1.067	0.972	0.961	1.10	1.11	1.01	5.335E+02	4.862E+02	4.794E+02	1.068	0.973	0.959	1.10	1.11	1.01
PU241	1.296E+05	1.434E+05	1.214E+05	0.986	1.091	0.923	0.90	1.07	1.18	1.023E+05	1.137E+05	9.628E+04	0.983	1.092	0.925	0.90	1.06	1.18
PU242	1.844E+00	1.949E+00	2.355E+00	0.900	0.951	1.149	0.95	0.78	0.83	1.844E+00	1.949E+00	2.355E+00	0.900	0.951	1.149	0.95	0.78	0.83
AM241	1.770E+02	2.199E+02	1.881E+02	0.908	1.128	0.965	0.80	0.94	1.17	1.082E+03	1.224E+03	1.036E+03	0.971	1.099	0.930	0.88	1.04	1.18
AM242	9.600E+00	1.764E+01	6.723E+00	0.848	1.558	0.594	0.54	1.43	2.62	9.387E+00	1.725E+01	6.574E+00	0.848	1.558	0.594	0.54	1.43	2.62
AM243	1.927E+01	2.164E+01	2.379E+01	0.894	1.003	1.103	0.89	0.81	0.91	1.926E+01	2.163E+01	2.378E+01	0.893	1.003	1.103	0.89	0.81	0.91
CM242	4.365E+04	4.820E+04	4.481E+04	0.958	1.058	0.984	0.91	0.97	1.08	2.898E+01	3.770E+01	2.693E+01	0.929	1.208	0.863	0.77	1.08	1.40
CM243	2.292E+01	6.468E+00	2.066E+01	1.374	0.388	1.238	3.54	1.11	0.31	2.034E+01	5.739E+00	1.833E+01	1.374	0.388	1.238	3.54	1.11	0.31
CM244	2.269E+03	2.400E+03	2.759E+03	0.916	0.969	1.114	0.95	0.82	0.87	1.880E+03	1.988E+03	2.286E+03	0.916	0.969	1.114	0.95	0.82	0.87
CM245	1.800E-01	2.184E-01	2.495E-01	0.833	1.011	1.155	0.82	0.72	0.88	1.799E-01	2.183E-01	2.494E-01	0.833	1.011	1.155	0.82	0.72	0.88
CM246	4.102E-02	5.125E-02	5.894E-02	0.814	1.017	1.169	0.80	0.70	0.87	4.099E-02	5.121E-02	5.890E-02	0.814	1.017	1.169	0.80	0.70	0.87
AVERAGE-ABSOLUTE-DEVIATION, AS %				6.32	7.31	7.15	15.2	11.4	14.9				6.45	7.56	7.56	15.6	11.7	15.4
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.17	5.86	6.12	8.3	9.3	9.9				5.32	6.14	6.56	8.7	9.7	10.5
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.64	4.26	4.94	8.3	9.3	9.9				4.59	4.77	5.43	8.7	9.7	10.5
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	SM151 / SM148		AM242		PU238			SB125	CM243	SM151 / SM148		AM242		PU242	

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) CURIES PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.932E-01	4.591E-01	4.221E-01	1.077	1.002	0.921	1.07	1.17	1.09	4.931E-01	4.591E-01	4.220E-01	1.076	1.002	0.921	1.07	1.17	1.09
KR 85	5.890E+03	5.815E+03	5.956E+03	1.001	0.988	1.012	1.01	0.99	0.98	3.085E+03	3.046E+03	3.120E+03	1.000	0.988	1.012	1.01	0.99	0.98
SR 89	1.034E-16	1.066E-16	1.064E-16	0.980	1.011	1.009	0.97	0.97	1.00	0.0	0.0	1.796E-38	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	7.185E+04	7.051E+04	7.357E+04	0.998	0.980	1.022	1.02	0.98	0.96	5.664E+04	5.557E+04	5.799E+04	0.998	0.979	1.022	1.02	0.98	0.96
Y 90	7.187E+04	7.053E+04	7.359E+04	0.998	0.980	1.022	1.02	0.98	0.96	5.665E+04	5.559E+04	5.800E+04	0.998	0.980	1.022	1.02	0.98	0.96
Y 91	1.301E-13	1.333E-13	1.343E-13	0.981	1.006	1.013	0.98	0.97	0.99	2.096E-32	0.0	2.169E-32	0.983	0.0	1.017	0.0	0.97	0.0
ZR 93	2.250E+00	2.249E+00	2.222E+00	1.004	1.004	0.992	1.00	1.01	1.01	2.250E+00	2.249E+00	2.222E+00	1.004	1.004	0.992	1.00	1.01	1.01
ZR 95	7.431E-12	7.539E-12	8.035E-12	0.969	0.983	1.048	0.99	0.92	0.94	4.855E-29	0.0	5.647E-29	0.925	0.0	1.075	0.0	0.86	0.0
NB 95	1.650E-11	1.674E-11	1.777E-11	0.970	0.985	1.045	0.99	0.93	0.94	1.078E-28	0.0	1.249E-28	0.927	0.0	1.073	0.0	0.86	0.0
TC 99	1.586E+01	1.594E+01	1.593E+01	0.997	1.002	1.001	0.99	1.00	1.00	1.586E+01	1.594E+01	1.593E+01	0.997	1.002	1.001	0.99	1.00	1.00
RU106	4.775E+02	4.527E+02	4.715E+02	1.022	0.969	1.009	1.05	1.01	0.96	5.031E-01	4.670E-01	4.866E-01	1.036	0.962	1.002	1.08	1.03	0.96
PD107	1.193E-01	1.132E-01	1.193E-01	1.017	0.965	1.017	1.05	1.00	0.95	1.193E-01	1.132E-01	1.193E-01	1.017	0.965	1.017	1.05	1.00	0.95
SN126	8.254E-01	6.339E-01	6.969E-01	1.148	0.882	0.970	1.30	1.18	0.91	8.254E-01	6.338E-01	6.969E-01	1.148	0.882	0.970	1.30	1.18	0.91
SB125	1.058E+03	7.794E+02	6.270E+02	1.288	0.949	0.763	1.36	1.69	1.24	8.662E+01	6.382E+01	5.134E+01	1.288	0.949	0.763	1.36	1.69	1.24
I129	3.605E-02	3.828E-02	3.651E-02	0.976	1.036	0.988	0.94	0.99	1.05	3.605E-02	3.828E-02	3.651E-02	0.976	1.036	0.988	0.94	0.99	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	6.145E+03	6.015E+03	5.994E+03	1.015	0.994	0.991	1.02	1.03	1.00	2.131E+02	2.085E+02	2.079E+02	1.016	0.994	0.991	1.02	1.03	1.00
CS135	6.097E-01	6.803E-01	6.229E-01	0.956	1.067	0.977	0.90	0.98	1.09	6.097E-01	6.803E-01	6.229E-01	0.956	1.067	0.977	0.90	0.98	1.09
CS137	9.825E+04	9.781E+04	1.001E+05	0.995	0.991	1.014	1.00	0.98	0.98	7.798E+04	7.773E+04	7.957E+04	0.994	0.991	1.015	1.00	0.98	0.98
CE144	1.308E+02	1.311E+02	1.320E+02	0.996	0.998	1.005	1.00	0.99	0.99	1.772E-02	1.778E-02	1.796E-02	0.994	0.998	1.008	1.00	0.99	0.99
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.965E-09	1.913E-09	1.972E-09	1.008	0.981	1.011	1.03	1.00	0.97	1.965E-09	1.913E-09	1.972E-09	1.008	0.981	1.011	1.03	1.00	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	9.577E+03	1.290E+04	1.207E+04	0.832	1.120	1.048	0.74	0.79	1.07	6.820E+02	9.182E+02	8.593E+02	0.832	1.120	1.048	0.74	0.79	1.07
SM147	5.351E-06	6.567E-06	6.586E-06	0.868	1.065	1.068	0.81	0.81	1.00	5.569E-06	6.868E-06	6.867E-06	0.865	1.067	1.067	0.81	0.81	1.00
SM148	6.945E-11	5.198E-11	5.362E-11	1.190	0.891	0.919	1.34	1.30	0.97	6.945E-11	5.198E-11	5.362E-11	1.190	0.891	0.919	1.34	1.30	0.97
SM149	7.626E-13	9.902E-13	7.410E-13	0.917	1.191	0.891	0.77	1.03	1.34	7.626E-13	9.902E-13	7.410E-13	0.917	1.191	0.891	0.77	1.03	1.34
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.661E+02	4.217E+02	3.001E+02	1.010	1.163	0.828	0.87	1.22	1.41	3.389E+02	3.904E+02	2.779E+02	1.009	1.163	0.828	0.87	1.22	1.40
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	5.697E+03	5.764E+03	4.918E+03	1.043	1.056	0.901	0.99	1.16	1.17	2.544E+03	2.574E+03	2.196E+03	1.043	1.056	0.901	0.99	1.16	1.17
EU155	1.903E+03	2.101E+03	1.675E+03	1.005	1.110	0.885	0.91	1.14	1.25	4.705E+02	5.194E+02	4.142E+02	1.005	1.110	0.885	0.91	1.14	1.25
U234	1.450E+00	1.416E+00	1.361E+00	1.029	1.005	0.966	1.02	1.07	1.04	1.536E+00	1.511E+00	1.389E+00	1.039	1.022	0.939	1.02	1.11	1.09
U235	1.948E-02	2.182E-02	2.030E-02	0.949	1.063	0.989	0.89	0.96	1.07	1.949E-02	2.182E-02	2.030E-02	0.949	1.062	0.988	0.89	0.96	1.07
U236	3.413E-01	3.441E-01	3.441E-01	0.995	1.003	1.003	0.99	0.99	1.00	3.415E-01	3.443E-01	3.441E-01	0.995	1.003	1.002	0.99	0.99	1.00
U238	3.142E-01	3.134E-01	3.143E-01	1.001	0.998	1.001	1.00	1.00	1.00	3.142E-01	3.134E-01	3.143E-01	1.001	0.998	1.001	1.00	1.00	1.00
NP237	4.224E-01	4.135E-01	3.399E-01	1.078	1.055	0.867	1.02	1.24	1.22	4.300E-01	4.220E-01	3.399E-01	1.082	1.062	0.856	1.02	1.27	1.24
PU238	3.163E+03	3.508E+03	2.661E+03	1.017	1.128	0.855	0.90	1.19	1.32	2.923E+03	3.242E+03	2.459E+03	1.017	1.128	0.855	0.90	1.19	1.32
PU239	3.027E+02	3.624E+02	2.551E+02	0.987	1.181	0.832	0.84	1.19	1.42	3.026E+02	3.623E+02	2.551E+02	0.987	1.181	0.832	0.84	1.19	1.42
PU240	5.341E+02	4.870E+02	4.791E+02	1.068	0.974	0.958	1.10	1.11	1.02	5.349E+02	4.879E+02	4.786E+02	1.069	0.975	0.956	1.10	1.12	1.02
PU241	8.040E+04	8.983E+04	7.606E+04	0.979	1.094	0.926	0.90	1.06	1.18	4.968E+04	5.605E+04	4.746E+04	0.973	1.098	0.929	0.89	1.05	1.18
PU242	1.844E+00	1.949E+00	2.355E+00	0.900	0.951	1.149	0.95	0.78	0.83	1.844E+00	1.949E+00	2.355E+00	0.900	0.951	1.149	0.95	0.78	0.83
AM241	1.799E+03	2.023E+03	1.712E+03	0.975	1.097	0.928	0.89	1.05	1.18	2.785E+03	3.129E+03	2.647E+03	0.976	1.096	0.928	0.89	1.05	1.18
AM242	9.175E+00	1.686E+01	6.425E+00	0.848	1.558	0.594	0.54	1.43	2.62	8.766E+00	1.611E+01	6.139E+00	0.848	1.558	0.594	0.54	1.43	2.62
AM243	1.926E+01	2.162E+01	2.377E+01	0.894	1.003	1.103	0.89	0.81	0.91	1.924E+01	2.160E+01	2.375E+01	0.894	1.003	1.103	0.89	0.81	0.91
CM242	7.600E+00	1.396E+01	5.339E+00	0.848	1.557	0.595	0.54	1.42	2.61	7.250E+00	1.332E+01	5.092E+00	0.848	1.557	0.595	0.54	1.42	2.62
CM243	1.801E+01	5.082E+00	1.623E+01	1.374	0.388	1.238	3.54	1.11	0.31	1.412E+01	3.985E+00	1.273E+01	1.374	0.388	1.239	3.54	1.11	0.31
CM244	1.552E+03	1.642E+03	1.887E+03	0.916	0.969	1.114	0.95	0.82	0.87	1.059E+03	1.120E+03	1.287E+03	0.917	0.969	1.114	0.95	0.82	0.87
CM245	1.798E-01	2.182E-01	2.493E-01	0.833	1.011	1.155	0.82	0.72	0.88	1.797E-01	2.180E-01	2.491E-01	0.833	1.011	1.155	0.82	0.72	0.88
CM246	4.096E-02	5.118E-02	5.885E-02	0.814	1.017	1.169	0.80	0.70	0.87	4.090E-02	5.110E-02	5.877E-02	0.814	1.017	1.169	0.80	0.70	0.87
AVERAGE-ABSOLUTE-DEVIATION, AS %				6.72	8.42	8.32	16.1	12.8	18.4				7.11	9.21	8.70	17.5	13.5	20.0
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.60	7.05	7.37	9.2	10.7	13.6				5.99	7.76	7.75	10.0	11.5	14.9
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.90	5.76	6.30	8.3	10.0	10.0				5.30	6.38	6.69	9.1	10.7	10.9
NUCS EXCLUDED, 1ST/2ND:				SB125	CM243	SM151 / SM148		AM242	PU242			SB125	CM243	SM151 / SM148		AM242	PU242	

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) CURIES PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.929E-01	4.589E-01	4.219E-01	1.076	1.002	0.921	1.07	1.17	1.09	4.927E-01	4.587E-01	4.217E-01	1.076	1.002	0.921	1.07	1.17	1.09
KR 85	4.435E+02	4.378E+02	4.484E+02	1.001	0.988	1.012	1.01	0.99	0.98	1.749E+01	1.726E+01	1.768E+01	1.001	0.988	1.012	1.01	0.99	0.98
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	2.773E+04	2.721E+04	2.839E+04	0.998	0.980	1.022	1.02	0.98	0.96	8.436E+03	8.275E+03	8.636E+03	0.998	0.979	1.022	1.02	0.98	0.96
Y 90	2.774E+04	2.722E+04	2.840E+04	0.998	0.980	1.022	1.02	0.98	0.96	8.438E+03	8.277E+03	8.638E+03	0.998	0.979	1.022	1.02	0.98	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.250E+00	2.249E+00	2.222E+00	1.004	1.004	0.992	1.00	1.01	1.01	2.250E+00	2.249E+00	2.222E+00	1.004	1.004	0.992	1.00	1.01	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.586E+01	1.594E+01	1.593E+01	0.997	1.002	1.001	0.99	1.00	1.00	1.586E+01	1.594E+01	1.593E+01	0.997	1.002	1.001	0.99	1.00	1.00
RU106	5.526E-10	5.128E-10	5.352E-10	1.036	0.961	1.003	1.08	1.03	0.96	6.462E-25	5.992E-25	6.272E-25	1.035	0.960	1.005	1.08	1.03	0.96
PD107	1.193E-01	1.132E-01	1.193E-01	1.017	0.965	1.017	1.05	1.00	0.95	1.193E-01	1.132E-01	1.193E-01	1.017	0.965	1.017	1.05	1.00	0.95
SN126	8.252E-01	6.337E-01	6.967E-01	1.148	0.882	0.970	1.30	1.18	0.91	8.249E-01	6.335E-01	6.965E-01	1.148	0.882	0.970	1.30	1.18	0.91
SB125	4.756E-02	3.503E-02	2.820E-02	1.288	0.949	0.764	1.36	1.69	1.24	1.750E-07	1.289E-07	1.038E-07	1.288	0.948	0.764	1.36	1.69	1.24
I129	3.605E-02	3.828E-02	3.651E-02	0.976	1.036	0.988	0.94	0.99	1.05	3.605E-02	3.828E-02	3.651E-02	0.976	1.036	0.988	0.94	0.99	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	8.888E-03	8.693E-03	8.670E-03	1.016	0.993	0.991	1.02	1.03	1.00	4.458E-10	4.357E-10	4.349E-10	1.016	0.993	0.991	1.02	1.03	1.00
CS135	6.096E-01	6.802E-01	6.229E-01	0.956	1.067	0.977	0.90	0.98	1.09	6.096E-01	6.802E-01	6.229E-01	0.956	1.067	0.977	0.90	0.98	1.09
CS137	3.899E+04	3.901E+04	3.994E+04	0.992	0.992	1.016	1.00	0.98	0.98	1.228E+04	1.237E+04	1.266E+04	0.987	0.995	1.018	0.99	0.97	0.98
CE144	4.411E-14	4.436E-14	4.530E-14	0.989	0.995	1.016	0.99	0.97	0.98	2.017E-33	0.0	2.116E-33	0.976	0.0	1.024	0.0	0.95	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.965E-09	1.913E-09	1.972E-09	1.008	0.981	1.011	1.03	1.00	0.97	1.965E-09	1.913E-09	1.972E-09	1.008	0.981	1.011	1.03	1.00	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	2.463E-01	3.313E-01	3.102E-01	0.832	1.120	1.048	0.74	0.79	1.07	4.510E-07	6.058E-07	5.676E-07	0.833	1.119	1.048	0.74	0.79	1.07
SM147	5.586E-06	6.891E-06	6.889E-06	0.865	1.067	1.067	0.81	0.81	1.00	5.586E-06	6.891E-06	6.889E-06	0.865	1.067	1.067	0.81	0.81	1.00
SM148	6.945E-11	5.198E-11	5.362E-11	1.190	0.891	0.919	1.34	1.30	0.97	6.945E-11	5.198E-11	5.362E-11	1.190	0.891	0.919	1.34	1.30	0.97
SM149	7.626E-13	9.902E-13	7.410E-13	0.917	1.191	0.891	0.77	1.03	1.34	7.626E-13	9.902E-13	7.410E-13	0.917	1.191	0.891	0.77	1.03	1.34
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	2.690E+02	3.099E+02	2.205E+02	1.010	1.163	0.827	0.87	1.22	1.41	1.830E+02	2.108E+02	1.501E+02	1.009	1.163	0.828	0.87	1.22	1.40
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	2.267E+02	2.293E+02	1.957E+02	1.044	1.056	0.901	0.99	1.16	1.17	4.031E+00	4.076E+00	3.479E+00	1.044	1.055	0.901	0.99	1.16	1.17
EU155	7.105E+00	7.847E+00	6.257E+00	1.005	1.110	0.885	0.91	1.14	1.25	6.554E-03	7.244E-03	5.777E-03	1.004	1.110	0.885	0.90	1.13	1.25
U234	1.757E+00	1.757E+00	1.459E+00	1.060	1.060	0.880	1.00	1.20	1.20	2.028E+00	2.057E+00	1.545E+00	1.081	1.096	0.823	0.99	1.31	1.33
U235	1.950E-02	2.183E-02	2.030E-02	0.949	1.063	0.988	0.89	0.96	1.08	1.951E-02	2.185E-02	2.030E-02	0.949	1.063	0.988	0.89	0.96	1.08
U236	3.419E-01	3.447E-01	3.441E-01	0.995	1.003	1.002	0.99	0.99	1.00	3.427E-01	3.454E-01	3.441E-01	0.996	1.004	1.000	0.99	1.00	1.00
U238	3.142E-01	3.134E-01	3.143E-01	1.001	0.998	1.001	1.00	1.00	1.00	3.142E-01	3.134E-01	3.143E-01	1.001	0.998	1.001	1.00	1.00	1.00
NP237	4.639E-01	4.602E-01	3.399E-01	1.101	1.092	0.807	1.01	1.36	1.35	5.281E-01	5.329E-01	3.399E-01	1.131	1.141	0.728	0.99	1.55	1.57
PU238	2.308E+03	2.561E+03	1.942E+03	1.017	1.128	0.855	0.90	1.19	1.32	1.557E+03	1.729E+03	1.309E+03	1.017	1.129	0.855	0.90	1.19	1.32
PU239	3.024E+02	3.620E+02	2.548E+02	0.987	1.181	0.832	0.84	1.19	1.42	3.020E+02	3.615E+02	2.545E+02	0.987	1.181	0.832	0.84	1.19	1.42
PU240	5.352E+02	4.884E+02	4.771E+02	1.070	0.976	0.954	1.10	1.12	1.02	5.332E+02	4.867E+02	4.746E+02	1.070	0.977	0.953	1.10	1.12	1.03
PU241	1.172E+04	1.362E+04	1.153E+04	0.954	1.108	0.938	0.86	1.02	1.18	1.056E+03	1.289E+03	1.092E+03	0.922	1.125	0.953	0.82	0.97	1.18
PU242	1.844E+00	1.949E+00	2.355E+00	0.900	0.951	1.149	0.95	0.78	0.83	1.844E+00	1.949E+00	2.355E+00	0.900	0.951	1.149	0.95	0.78	0.83
AM241	3.882E+03	4.384E+03	3.707E+03	0.973	1.098	0.929	0.89	1.05	1.18	3.920E+03	4.443E+03	3.758E+03	0.970	1.100	0.930	0.88	1.04	1.18
AM242	7.646E+00	1.405E+01	5.354E+00	0.848	1.558	0.594	0.54	1.43	2.62	6.087E+00	1.118E+01	4.262E+00	0.848	1.558	0.594	0.54	1.43	2.62
AM243	1.918E+01	2.154E+01	2.368E+01	0.893	1.003	1.103	0.89	0.81	0.91	1.909E+01	2.144E+01	2.357E+01	0.893	1.003	1.103	0.89	0.81	0.91
CM242	6.323E+00	1.162E+01	4.441E+00	0.847	1.557	0.595	0.54	1.42	2.62	5.034E+00	9.249E+00	3.535E+00	0.848	1.557	0.595	0.54	1.42	2.62
CM243	6.807E+00	1.921E+00	6.135E+00	1.374	0.388	1.238	3.54	1.11	0.31	2.018E+00	5.693E-01	1.818E+00	1.374	0.388	1.238	3.54	1.11	0.31
CM244	3.358E+02	3.551E+02	4.083E+02	0.916	0.969	1.114	0.95	0.82	0.87	4.954E+01	5.239E+01	6.024E+01	0.916	0.969	1.114	0.95	0.82	0.87
CM245	1.793E-01	2.175E-01	2.485E-01	0.834	1.011	1.155	0.82	0.72	0.88	1.785E-01	2.166E-01	2.474E-01	0.833	1.011	1.155	0.82	0.72	0.88
CM246	4.072E-02	5.088E-02	5.851E-02	0.814	1.017	1.169	0.80	0.70	0.87	4.042E-02	5.050E-02	5.808E-02	0.814	1.017	1.169	0.80	0.70	0.87
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.40	9.41	9.20	17.5	14.1	20.6				7.64	9.90	9.51	18.1	14.9	22.0
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.97	8.17	8.16	10.1	12.0	15.5				6.16	8.52	8.30	10.5	12.9	16.8
AV-ABS-DEV EXCLUDING LARGEST TWO, %				5.48	6.50	6.98	9.1	11.2	11.6				5.48	7.03	7.12	9.8	10.9	11.6
NUCS EXCLUDED, 1ST/2ND:				SB125	CM243	NP237 / SM148		AM242	SM151				SB125	CM243	NP237 / SM148		AM242	U234

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) CURIES PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	4.916E-01	4.577E-01	4.208E-01	1.076	1.002	0.921	1.07	1.17	1.09	4.880E-01	4.543E-01	4.177E-01	1.076	1.002	0.921	1.07	1.17	1.09
KR 85	4.233E-05	4.173E-05	4.278E-05	1.001	0.987	1.012	1.01	0.99	0.98	9.332E-25	9.198E-25	9.418E-25	1.002	0.987	1.011	1.01	0.99	0.98
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	7.227E+01	7.081E+01	7.392E+01	0.999	0.979	1.022	1.02	0.98	0.96	4.197E-06	4.110E-06	4.289E-06	1.000	0.979	1.022	1.02	0.98	0.96
Y 90	7.228E+01	7.083E+01	7.394E+01	0.999	0.979	1.022	1.02	0.98	0.96	4.198E-06	4.111E-06	4.290E-06	1.000	0.979	1.022	1.02	0.98	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.250E+00	2.249E+00	2.222E+00	1.004	1.004	0.992	1.00	1.01	1.01	2.249E+00	2.248E+00	2.221E+00	1.004	1.004	0.992	1.00	1.01	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.585E+01	1.593E+01	1.591E+01	0.997	1.002	1.001	0.99	1.00	1.00	1.581E+01	1.589E+01	1.588E+01	0.997	1.002	1.001	0.99	1.00	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.193E-01	1.132E-01	1.193E-01	1.017	0.965	1.017	1.05	1.00	0.95	1.193E-01	1.132E-01	1.193E-01	1.017	0.965	1.017	1.05	1.00	0.95
SN126	8.238E-01	6.326E-01	6.955E-01	1.148	0.882	0.970	1.30	1.18	0.91	8.198E-01	6.296E-01	6.921E-01	1.148	0.882	0.970	1.30	1.18	0.91
SB125	0.0	0.0	1.910E-29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	3.605E-02	3.828E-02	3.651E-02	0.976	1.036	0.988	0.94	0.99	1.05	3.605E-02	3.828E-02	3.651E-02	0.976	1.036	0.988	0.94	0.99	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	2.752E-39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	6.096E-01	6.802E-01	6.229E-01	0.956	1.067	0.977	0.90	0.98	1.09	6.095E-01	6.801E-01	6.227E-01	0.956	1.067	0.977	0.90	0.98	1.09
CS137	1.208E+02	1.249E+02	1.279E+02	0.970	1.003	1.027	0.97	0.94	0.98	1.142E-05	1.294E-05	1.325E-05	0.911	1.032	1.057	0.88	0.86	0.98
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.965E-09	1.913E-09	1.972E-09	1.008	0.981	1.011	1.03	1.00	0.97	1.965E-09	1.913E-09	1.972E-09	1.008	0.981	1.011	1.03	1.00	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	6.365E-30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	5.586E-06	6.891E-06	6.889E-06	0.865	1.067	1.067	0.81	0.81	1.00	5.586E-06	6.891E-06	6.889E-06	0.865	1.067	1.067	0.81	0.81	1.00
SM148	6.945E-11	5.198E-11	5.362E-11	1.190	0.891	0.919	1.34	1.30	0.97	6.945E-11	5.198E-11	5.362E-11	1.190	0.891	0.919	1.34	1.30	0.97
SM149	7.626E-13	9.902E-13	7.410E-13	0.917	1.191	0.891	0.77	1.03	1.34	7.626E-13	9.902E-13	7.410E-13	0.917	1.191	0.891	0.77	1.03	1.34
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.922E+01	4.518E+01	3.216E+01	1.009	1.163	0.828	0.87	1.22	1.40	1.785E-01	2.059E-01	1.465E-01	1.009	1.163	0.828	0.87	1.22	1.41
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	4.026E-07	4.065E-07	3.472E-07	1.045	1.055	0.901	0.99	1.16	1.17	0.0	0.0	1.091E-31	0.0	0.0	0.0	0.0	0.0	0.0
EU155	4.745E-15	5.260E-15	4.197E-15	1.002	1.111	0.887	0.90	1.13	1.25	0.0	0.0	1.372E-57	0.0	0.0	0.0	0.0	0.0	0.0
U234	2.471E+00	2.550E+00	1.687E+00	1.105	1.140	0.754	0.97	1.46	1.51	2.583E+00	2.677E+00	1.721E+00	1.110	1.150	0.740	0.96	1.50	1.56
U235	1.957E-02	2.192E-02	2.030E-02	0.950	1.064	0.986	0.89	0.96	1.08	1.978E-02	2.217E-02	2.030E-02	0.953	1.068	0.978	0.89	0.97	1.09
U236	3.458E-01	3.483E-01	3.441E-01	0.999	1.006	0.994	0.99	1.00	1.01	3.563E-01	3.578E-01	3.441E-01	1.010	1.014	0.976	1.00	1.04	1.04
U238	3.142E-01	3.134E-01	3.143E-01	1.001	0.998	1.001	1.00	1.00	1.00	3.142E-01	3.134E-01	3.143E-01	1.001	0.998	1.001	1.00	1.00	1.00
NP237	7.473E-01	7.816E-01	3.398E-01	1.200	1.255	0.546	0.96	2.20	2.30	1.138E+00	1.225E+00	3.398E-01	1.263	1.360	0.377	0.93	3.35	3.61
PU238	3.230E+02	3.604E+02	2.714E+02	1.015	1.132	0.853	0.90	1.19	1.33	1.460E+00	1.758E+00	1.202E+00	0.991	1.193	0.816	0.83	1.21	1.46
PU239	3.004E+02	3.596E+02	2.530E+02	0.987	1.182	0.831	0.84	1.19	1.42	2.947E+02	3.528E+02	2.480E+02	0.987	1.182	0.831	0.84	1.19	1.42
PU240	5.221E+02	4.766E+02	4.646E+02	1.070	0.977	0.953	1.10	1.12	1.03	4.848E+02	4.425E+02	4.315E+02	1.070	0.977	0.953	1.10	1.12	1.03
PU241	2.455E-01	3.168E-01	8.757E-02	1.133	1.462	0.404	0.77	2.80	3.62	1.662E-01	2.016E-01	4.049E-16	1.356	1.644	0.000	0.82	****	****
PU242	1.844E+00	1.949E+00	2.354E+00	0.900	0.951	1.149	0.95	0.78	0.83	1.842E+00	1.947E+00	2.352E+00	0.900	0.951	1.149	0.95	0.78	0.83
AM241	2.871E+03	3.257E+03	2.754E+03	0.970	1.100	0.930	0.88	1.04	1.18	9.343E+02	1.060E+03	8.963E+02	0.970	1.100	0.930	0.88	1.04	1.18
AM242	2.445E+00	4.492E+00	1.712E+00	0.848	1.558	0.594	0.54	1.43	2.62	1.005E-01	1.846E-01	7.034E-02	0.848	1.558	0.594	0.54	1.43	2.62
AM243	1.874E+01	2.104E+01	2.313E+01	0.894	1.003	1.103	0.89	0.81	0.91	1.755E+01	1.970E+01	2.166E+01	0.894	1.003	1.103	0.89	0.81	0.91
CM242	2.022E+00	3.715E+00	1.420E+00	0.848	1.557	0.595	0.54	1.42	2.62	8.309E-02	1.526E-01	5.835E-02	0.848	1.557	0.595	0.54	1.42	2.62
CM243	1.557E-02	4.392E-03	1.403E-02	1.374	0.388	1.238	3.55	1.11	0.31	6.289E-10	1.774E-10	5.666E-10	1.374	0.388	1.238	3.55	1.11	0.31
CM244	2.347E-02	2.480E-02	2.853E-02	0.917	0.969	1.114	0.95	0.82	0.87	3.943E-11	5.740E-14	6.600E-14	2.991	0.004	0.005	****	****	0.87
CM245	1.756E-01	2.131E-01	2.434E-01	0.833	1.011	1.155	0.82	0.72	0.88	1.659E-01	2.013E-01	2.299E-01	0.834	1.011	1.155	0.82	0.72	0.88
CM246	3.926E-02	4.905E-02	5.641E-02	0.814	1.017	1.169	0.80	0.70	0.87	3.543E-02	4.426E-02	5.091E-02	0.814	1.017	1.169	0.80	0.70	0.87

AVERAGE-ABSOLUTE-DEVIATION, AS %	7.67	11.79	12.21	18.5	21.4	32.8				14.62	16.00	16.89	****	****	****		
AV-ABS-DEV EXCLUDING LARGEST ONE, %	6.25	9.27	10.55	11.4	17.1	25.0				7.26	10.29	11.32	20.2	21.1	31.7		
AV-ABS-DEV EXCLUDING LARGEST TWO, %	5.08	7.43	8.17	9.5	12.1	12.8				5.87	7.72	8.57	12.8	14.3	22.9		
NUCS EXCLUDED, 1ST/2ND:	SM148	CM243	PU241 / CM246	AM242	NP237				CM244	CM243	PU241 / SM148	AM242	NP237				

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) CURIES PER MTU

	ORIGEN2	ORIGEN-S	CINDER	10 KYR OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
SE 79	4.433E-01	4.127E-01	3.794E-01	1.076	1.002	0.921	1.07	1.17	1.09
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.240E+00	2.239E+00	2.212E+00	1.004	1.004	0.992	1.00	1.01	1.01
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	1.535E+01	1.543E+01	1.542E+01	0.997	1.002	1.001	0.99	1.00	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.192E-01	1.131E-01	1.192E-01	1.017	0.965	1.017	1.05	1.00	0.95
SN126	7.702E-01	5.915E-01	6.503E-01	1.148	0.882	0.970	1.30	1.18	0.91
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	3.603E-02	3.826E-02	3.650E-02	0.976	1.036	0.988	0.94	0.99	1.05
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	6.078E-01	6.782E-01	6.210E-01	0.956	1.067	0.977	0.90	0.98	1.09
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	1.965E-09	1.913E-09	1.972E-09	1.008	0.981	1.011	1.03	1.00	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	5.586E-06	6.891E-06	6.889E-06	0.865	1.067	1.067	0.81	0.81	1.00
SM148	6.945E-11	5.198E-11	5.362E-11	1.190	0.891	0.919	1.34	1.30	0.97
SM149	7.626E-13	9.902E-13	7.410E-13	0.917	1.191	0.891	0.77	1.03	1.34
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	1.402E-31	0.0	1.153E-31	1.097	0.0	0.903	0.0	1.22	0.0
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	2.527E+00	2.618E+00	1.678E+00	1.111	1.151	0.738	0.97	1.51	1.56
U235	2.209E-02	2.494E-02	2.030E-02	0.984	1.111	0.905	0.89	1.09	1.23
U236	4.394E-01	4.336E-01	3.440E-01	1.083	1.069	0.848	1.01	1.28	1.26
U238	3.142E-01	3.134E-01	3.143E-01	1.001	0.998	1.001	1.00	1.00	1.00
NP237	1.323E+00	1.435E+00	3.388E-01	1.282	1.390	0.328	0.92	3.90	4.24
PU238	2.983E-19	5.462E-19	2.080E-19	0.850	1.557	0.593	0.55	1.43	2.63
PU239	2.301E+02	2.752E+02	1.914E+02	0.991	1.185	0.824	0.84	1.20	1.44
PU240	1.867E+02	1.704E+02	1.665E+02	1.070	0.976	0.954	1.10	1.12	1.02
PU241	7.976E-02	9.679E-02	0.0	0.904	1.096	0.0	0.82	0.0	0.0
PU242	1.812E+00	1.915E+00	2.313E+00	0.900	0.951	1.149	0.95	0.78	0.83
AM241	8.030E-02	1.015E-01	4.828E-04	1.322	1.670	0.008	0.79	****	****
AM242	1.511E-19	2.768E-19	1.054E-19	0.850	1.557	0.593	0.55	1.43	2.63
AM243	7.535E+00	8.460E+00	9.301E+00	0.894	1.003	1.103	0.89	0.81	0.91
CM242	1.253E-19	2.296E-19	8.743E-20	0.850	1.557	0.593	0.55	1.43	2.63
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	3.938E-11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	7.962E-02	9.663E-02	1.101E-01	0.834	1.012	1.153	0.82	0.72	0.88
CM246	9.478E-03	1.184E-02	1.361E-02	0.814	1.017	1.169	0.80	0.70	0.87

AVERAGE-ABSOLUTE-DEVIATION, AS %	10.10	15.19	17.51	15.4	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	8.66	11.52	13.53	14.0	28.4	38.7
AV-ABS-DEV EXCLUDING LARGEST TWO, %	7.04	8.58	9.53	12.9	16.3	20.2

NUCS EXCLUDED, 1ST/2ND: SM148 CM242 AM241 / CM246 AM242 NP237

APPENDIX E

COMPARATIVE RATIO TABLES IN WATTS
(See table descriptions in Sect. 4.1)

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU WATTS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.019E-04	7.785E-05	7.787E-05	1.187	0.907	0.907	1.31	1.31	1.00	1.019E-04	7.784E-05	7.787E-05	1.187	0.907	0.907	1.31	1.31	1.00
KR 85	1.410E+01	1.410E+01	1.410E+01	1.000	1.000	1.000	1.00	1.00	1.00	1.026E+01	1.026E+01	1.026E+01	1.000	1.000	1.000	1.00	1.00	1.00
SR 89	2.005E+03	2.005E+03	2.005E+03	1.000	1.000	1.000	1.00	1.00	1.00	3.932E-08	3.926E-08	3.934E-08	1.000	0.999	1.001	1.00	1.00	1.00
SR 90	8.472E+01	8.472E+01	8.468E+01	1.000	1.000	1.000	1.00	1.00	1.00	7.536E+01	7.536E+01	7.533E+01	1.000	1.000	1.000	1.00	1.00	1.00
Y 90	4.048E+02	4.047E+02	4.053E+02	1.000	0.999	1.001	1.00	1.00	1.00	3.599E+02	3.600E+02	3.605E+02	0.999	1.000	1.001	1.00	1.00	1.00
Y 91	2.914E+03	2.914E+03	2.911E+03	1.000	1.000	0.999	1.00	1.00	1.00	1.669E-06	1.668E-06	1.669E-06	1.000	1.000	1.000	1.00	1.00	1.00
ZR 93	2.099E-04	2.098E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	2.099E-04	2.098E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
ZR 95	6.037E+03	6.037E+03	5.998E+03	1.002	1.002	0.996	1.00	1.01	1.01	2.136E-05	2.132E-05	2.199E-05	0.991	0.989	1.020	1.00	0.97	0.97
NB 95	7.398E+03	7.398E+03	7.392E+03	1.000	1.000	0.999	1.00	1.00	1.00	4.490E-05	4.483E-05	4.626E-05	0.991	0.989	1.020	1.00	0.97	0.97
TC 99	6.555E-03	6.555E-03	6.560E-03	1.000	1.000	1.001	1.00	1.00	1.00	6.555E-03	6.555E-03	6.560E-03	1.000	1.000	1.001	1.00	1.00	1.00
RU106	3.271E+01	3.261E+01	0.0	1.002	0.998	0.0	1.00	0.0	0.0	1.112E+00	1.108E+00	0.0	1.002	0.998	0.0	1.00	0.0	0.0
PD107	6.652E-06	6.116E-06	6.113E-06	1.057	0.972	0.971	1.09	1.09	1.00	6.652E-06	6.116E-06	6.113E-06	1.057	0.972	0.971	1.09	1.09	1.00
SN126	9.696E-04	9.697E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	9.696E-04	9.696E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
SB125	4.579E+01	4.579E+01	4.604E+01	0.998	0.998	1.004	1.00	0.99	0.99	1.339E+01	1.339E+01	1.346E+01	0.998	0.998	1.004	1.00	0.99	0.99
I129	1.453E-05	1.452E-05	1.411E-05	1.010	1.009	0.981	1.00	1.03	1.03	1.460E-05	1.460E-05	1.421E-05	1.009	1.009	0.982	1.00	1.03	1.03
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.543E+03	1.543E+03	1.541E+03	1.000	1.000	0.999	1.00	1.00	1.00	2.954E+02	2.954E+02	2.950E+02	1.000	1.000	0.999	1.00	1.00	1.00
CS135	1.153E-04	1.153E-04	1.153E-04	1.000	1.000	1.000	1.00	1.00	1.00	1.153E-04	1.153E-04	1.153E-04	1.000	1.000	1.000	1.00	1.00	1.00
CS137	1.151E+02	1.145E+02	0.0	1.003	0.997	0.0	1.01	0.0	0.0	1.028E+02	1.023E+02	0.0	1.002	0.998	0.0	1.00	0.0	0.0
CE144	7.771E+02	7.770E+02	0.0	1.000	1.000	0.0	1.00	0.0	0.0	9.733E+00	9.736E+00	0.0	1.000	1.000	0.0	1.00	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.279E-11	1.279E-11	0.0	1.000	1.000	0.0	0.0	1.00	0.0	1.766E-11	1.766E-11	0.0	1.000	1.000	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	4.808E+01	4.807E+01	4.916E+01	0.993	0.992	1.015	1.00	0.98	0.98	1.323E+01	1.322E+01	1.352E+01	0.993	0.992	1.015	1.00	0.98	0.98
SM147	1.753E-08	1.795E-08	1.794E-08	0.984	1.008	1.007	0.98	0.98	1.00	5.054E-08	5.175E-08	5.171E-08	0.985	1.008	1.007	0.98	0.98	1.00
SM148	5.876E-13	5.852E-13	0.0	1.002	0.998	0.0	1.00	0.0	0.0	5.907E-13	5.883E-13	0.0	1.002	0.998	0.0	1.00	0.0	0.0
SM149	0.0	1.020E-14	1.010E-14	0.0	1.005	0.995	0.0	0.0	1.01	0.0	1.020E-14	1.010E-14	0.0	1.005	0.995	0.0	0.0	1.01
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	4.219E-02	4.223E-02	4.219E-02	1.000	1.001	1.000	1.00	1.00	1.00	4.062E-02	4.066E-02	4.062E-02	1.000	1.001	1.000	1.00	1.00	1.00
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	9.390E+01	9.390E+01	9.380E+01	1.000	1.000	0.999	1.00	1.00	1.00	6.317E+01	6.317E+01	6.310E+01	1.000	1.000	0.999	1.00	1.00	1.00
EU155	4.687E+00	4.686E+00	4.710E+00	0.998	0.998	1.003	1.00	1.00	0.99	2.357E+00	2.357E+00	2.369E+00	0.998	0.998	1.003	1.00	0.99	0.99
U234	3.236E-02	3.236E-02	3.239E-02	1.000	1.000	1.001	1.00	1.00	1.00	3.330E-02	3.330E-02	3.333E-02	1.000	1.000	1.001	1.00	1.00	1.00
U235	4.507E-04	4.507E-04	4.757E-04	0.982	0.982	1.036	1.00	0.95	0.95	4.507E-04	4.507E-04	4.757E-04	0.982	0.982	1.036	1.00	0.95	0.95
U236	6.944E-03	6.944E-03	6.957E-03	0.999	0.999	1.001	1.00	1.00	1.00	6.946E-03	6.946E-03	6.957E-03	0.999	0.999	1.001	1.00	1.00	1.00
U238	8.054E-03	8.054E-03	8.043E-03	1.000	1.000	0.999	1.00	1.00	1.00	8.054E-03	8.054E-03	8.043E-03	1.000	1.000	0.999	1.00	1.00	1.00
NP237	9.535E-03	9.535E-03	9.144E-03	1.014	1.014	0.972	1.00	1.04	1.04	9.574E-03	9.573E-03	9.155E-03	1.015	1.015	0.970	1.00	1.05	1.05
PU238	7.432E+01	7.431E+01	7.423E+01	1.000	1.000	0.999	1.00	1.00	1.00	7.723E+01	7.723E+01	7.714E+01	1.000	1.000	0.999	1.00	1.00	1.00
PU239	9.649E+00	9.650E+00	9.701E+00	0.998	0.998	1.004	1.00	0.99	0.99	9.647E+00	9.649E+00	9.700E+00	0.998	0.998	1.004	1.00	0.99	0.99
PU240	1.641E+01	1.641E+01	1.637E+01	1.001	1.001	0.998	1.00	1.00	1.00	1.643E+01	1.643E+01	1.636E+01	1.001	1.001	0.997	1.00	1.00	1.00
PU241	3.891E+00	3.936E+00	3.907E+00	0.995	1.006	0.999	0.99	1.00	1.01	3.071E+00	3.121E+00	3.098E+00	0.992	1.008	1.000	0.98	0.99	1.01
PU242	5.104E-02	5.255E-02	5.245E-02	0.981	1.010	1.008	0.97	0.97	1.00	5.104E-02	5.255E-02	5.245E-02	0.981	1.010	1.008	0.97	0.97	1.00
AM241	3.819E+00	3.808E+00	3.813E+00	1.002	0.999	1.000	1.00	1.00	1.00	3.295E+01	3.242E+01	3.245E+01	1.011	0.994	0.995	1.02	1.02	1.00
AM242	6.892E-03	6.894E-03	7.029E-03	0.993	0.994	1.013	1.00	0.98	0.98	6.739E-03	6.741E-03	6.874E-03	0.993	0.994	1.013	1.00	0.98	0.98
AM243	5.511E-01	5.511E-01	5.508E-01	1.000	1.000	1.000	1.00	1.00	1.00	5.509E-01	5.509E-01	5.506E-01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	1.297E+03	1.297E+03	1.299E+03	1.000	1.000	1.001	1.00	1.00	1.00	8.113E-01	8.113E-01	8.049E-01	1.003	1.003	0.995	1.00	1.01	1.01
CM243	6.210E-01	6.210E-01	6.178E-01	1.002	1.002	0.997	1.00	1.01	1.01	5.510E-01	5.510E-01	5.482E-01	1.002	1.002	0.997	1.00	1.01	1.01
CM244	6.782E+01	6.781E+01	6.779E+01	1.000	1.000	1.000	1.00	1.00	1.00	5.619E+01	5.618E+01	5.616E+01	1.000	1.000	1.000	1.00	1.00	1.00
CM245	4.902E-03	4.902E-03	4.905E-03	1.000	1.000	1.000	1.00	1.00	1.00	4.900E-03	4.900E-03	4.903E-03	1.000	1.000	1.000	1.00	1.00	1.00
CM246	1.035E-03	1.035E-03	1.025E-03	1.003	1.003	0.994	1.00	1.01	1.01	1.034E-03	1.035E-03	1.025E-03	1.003	1.004	0.994	1.00	1.01	1.01
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.85	0.52	0.75	1.1	1.8	0.6				0.92	0.59	0.87	1.2	2.0	0.8
AV-ABS-DEV EXCLUDING LARGEST ONE, %				0.39	0.28	0.45	0.4	0.9	0.5				0.47	0.35	0.57	0.5	1.1	0.7
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.22	0.18	0.31	0.2	0.6	0.4				0.31	0.27	0.43	0.3	0.8	0.6
NUCS EXCLUDED, 1ST/2ND:		SE 79	PU241		U235 / PD107				NP237		SE 79			U235 / PD107			NP237	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU WATTS PER MTU

	**********			10 YR						**********			20 YR					
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.018E-04	7.784E-05	7.786E-05	1.186	0.907	0.907	1.31	1.31	1.00	1.018E-04	7.783E-05	7.785E-05	1.186	0.907	0.907	1.31	1.31	1.00
KR 85	7.423E+00	7.423E+00	7.423E+00	1.000	1.000	1.000	1.00	1.00	1.00	3.888E+00	3.888E+00	3.888E+00	1.000	1.000	1.000	1.00	1.00	1.00
SR 89	5.104E-19	5.092E-19	5.111E-19	1.000	0.998	1.002	1.00	1.00	1.00	0.0	0.0	8.630E-41	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	6.690E+01	6.690E+01	6.688E+01	1.000	1.000	1.000	1.00	1.00	1.00	5.273E+01	5.273E+01	5.271E+01	1.000	1.000	1.000	1.00	1.00	1.00
Y 90	3.196E+02	3.196E+02	3.201E+02	1.000	1.000	1.001	1.00	1.00	1.00	2.519E+02	2.519E+02	2.523E+02	1.000	1.000	1.001	1.00	1.00	1.00
Y 91	6.699E-16	6.694E-16	6.710E-16	1.000	0.999	1.001	1.00	1.00	1.00	1.079E-34	0.0	1.084E-34	0.998	0.0	1.002	0.0	1.00	0.0
ZR 93	2.099E-04	2.098E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	2.098E-04	2.098E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
ZR 95	5.459E-14	5.440E-14	5.830E-14	0.979	0.976	1.045	1.00	0.94	0.93	3.567E-31	0.0	4.097E-31	0.931	0.0	1.069	0.0	0.87	0.0
NB 95	1.148E-13	1.144E-13	1.226E-13	0.979	0.975	1.046	1.00	0.94	0.93	7.499E-31	0.0	8.618E-31	0.931	0.0	1.069	0.0	0.87	0.0
TC 99	6.555E-03	6.555E-03	6.560E-03	1.000	1.000	1.000	1.00	1.00	1.00	6.554E-03	6.555E-03	6.560E-03	1.000	1.000	1.001	1.00	1.00	1.00
RU106	3.570E-02	3.559E-02	0.0	1.002	0.998	0.0	1.00	0.0	0.0	3.674E-05	3.672E-05	0.0	1.000	1.000	0.0	1.00	0.0	0.0
PD107	6.652E-06	6.116E-06	6.113E-06	1.057	0.972	0.971	1.09	1.09	1.00	6.652E-06	6.116E-06	6.113E-06	1.057	0.972	0.971	1.09	1.09	1.00
SN126	9.695E-04	9.696E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	9.695E-04	9.695E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
SB125	3.832E+00	3.831E+00	3.853E+00	0.998	0.998	1.004	1.00	0.99	0.99	3.137E-01	3.137E-01	3.155E-01	0.998	0.998	1.004	1.00	0.99	0.99
I129	1.460E-05	1.460E-05	1.421E-05	1.009	1.009	0.982	1.00	1.03	1.03	1.460E-05	1.460E-05	1.421E-05	1.009	1.009	0.982	1.00	1.03	1.03
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	5.502E+01	5.501E+01	5.493E+01	1.001	1.000	0.999	1.00	1.00	1.00	1.908E+00	1.907E+00	1.905E+00	1.001	1.000	0.999	1.00	1.00	1.00
CS135	1.153E-04	1.153E-04	1.153E-04	1.000	1.000	1.000	1.00	1.00	1.00	1.153E-04	1.153E-04	1.153E-04	1.000	1.000	1.000	1.00	1.00	1.00
CS137	9.155E+01	9.116E+01	0.0	1.002	0.998	0.0	1.00	0.0	0.0	7.267E+01	7.244E+01	0.0	1.002	0.998	0.0	1.00	0.0	0.0
CE144	1.133E-01	1.134E-01	0.0	1.000	1.000	0.0	1.00	0.0	0.0	1.536E-05	1.538E-05	0.0	0.999	1.001	0.0	1.00	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.773E-11	1.772E-11	0.0	1.000	1.000	0.0	0.0	1.00	0.0	1.773E-11	1.772E-11	0.0	1.000	1.000	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	3.530E+00	3.528E+00	3.609E+00	0.993	0.992	1.015	1.00	0.98	0.98	2.514E-01	2.512E-01	2.570E-01	0.993	0.992	1.015	1.00	0.98	0.98
SM147	5.962E-08	6.104E-08	6.099E-08	0.985	1.008	1.007	0.98	0.98	1.00	6.269E-08	6.418E-08	6.413E-08	0.985	1.008	1.007	0.98	0.98	1.00
SM148	5.907E-13	5.883E-13	0.0	1.002	0.998	0.0	1.00	0.0	0.0	5.907E-13	5.883E-13	0.0	1.002	0.998	0.0	1.00	0.0	0.0
SM149	0.0	1.020E-14	1.010E-14	0.0	1.005	0.995	0.0	0.0	1.01	0.0	1.020E-14	1.010E-14	0.0	1.005	0.995	0.0	0.0	1.01
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.909E-02	3.912E-02	3.909E-02	1.000	1.001	1.000	1.00	1.00	1.00	3.619E-02	3.622E-02	3.619E-02	1.000	1.001	1.000	1.00	1.00	1.00
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	4.222E+01	4.222E+01	4.217E+01	1.000	1.000	0.999	1.00	1.00	1.00	1.886E+01	1.885E+01	1.884E+01	1.001	1.000	0.999	1.00	1.00	1.00
EU155	1.172E+00	1.172E+00	1.178E+00	0.998	0.998	1.003	1.00	1.00	1.00	2.896E-01	2.896E-01	2.912E-01	0.998	0.998	1.004	1.00	0.99	0.99
U234	3.423E-02	3.423E-02	3.425E-02	1.000	1.000	1.000	1.00	1.00	1.00	3.599E-02	3.599E-02	3.599E-02	1.000	1.000	1.000	1.00	1.00	1.00
U235	4.508E-04	4.508E-04	4.757E-04	0.982	0.982	1.036	1.00	0.95	0.95	4.509E-04	4.509E-04	4.757E-04	0.982	0.982	1.036	1.00	0.95	0.95
U236	6.948E-03	6.948E-03	6.957E-03	1.000	1.000	1.001	1.00	1.00	1.00	6.952E-03	6.952E-03	6.957E-03	1.000	1.000	1.000	1.00	1.00	1.00
U238	8.054E-03	8.054E-03	8.043E-03	1.000	1.000	0.999	1.00	1.00	1.00	8.054E-03	8.054E-03	8.043E-03	1.000	1.000	0.999	1.00	1.00	1.00
NP237	9.641E-03	9.639E-03	9.155E-03	1.017	1.017	0.966	1.00	1.05	1.05	9.860E-03	9.855E-03	9.155E-03	1.025	1.024	0.951	1.00	1.08	1.08
PU238	7.425E+01	7.425E+01	7.417E+01	1.000	1.000	0.999	1.00	1.00	1.00	6.862E+01	6.862E+01	6.854E+01	1.000	1.000	0.999	1.00	1.00	1.00
PU239	9.646E+00	9.648E+00	9.699E+00	0.998	0.998	1.004	1.00	0.99	0.99	9.644E+00	9.645E+00	9.696E+00	0.998	0.998	1.004	1.00	0.99	0.99
PU240	1.645E+01	1.645E+01	1.635E+01	1.002	1.002	0.996	1.00	1.01	1.01	1.646E+01	1.647E+01	1.634E+01	1.002	1.003	0.995	1.00	1.01	1.01
PU241	2.414E+00	2.466E+00	2.447E+00	0.988	1.010	1.002	0.98	0.99	1.01	1.492E+00	1.539E+00	1.527E+00	0.982	1.013	1.005	0.97	0.98	1.01
PU242	5.104E-02	5.255E-02	5.245E-02	0.981	1.010	1.008	0.97	0.97	1.00	5.104E-02	5.255E-02	5.245E-02	0.981	1.010	1.008	0.97	0.97	1.00
AM241	5.604E+01	5.520E+01	5.526E+01	1.010	0.995	0.996	1.02	1.01	1.00	8.779E+01	8.676E+01	8.686E+01	1.007	0.996	0.997	1.01	1.01	1.00
AM242	6.587E-03	6.589E-03	6.719E-03	0.993	0.994	1.013	1.00	0.98	0.98	6.294E-03	6.295E-03	6.419E-03	0.993	0.994	1.013	1.00	0.98	0.98
AM243	5.506E-01	5.506E-01	5.503E-01	1.000	1.000	1.000	1.00	1.00	1.00	5.501E-01	5.501E-01	5.498E-01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	1.772E-01	1.772E-01	1.785E-01	0.998	0.998	1.005	1.00	0.99	0.99	1.690E-01	1.690E-01	1.703E-01	0.998	0.998	1.005	1.00	0.99	0.99
CM243	4.879E-01	4.879E-01	4.854E-01	1.002	1.002	0.997	1.00	1.01	1.01	3.826E-01	3.826E-01	3.806E-01	1.002	1.002	0.997	1.00	1.01	1.01
CM244	4.640E+01	4.639E+01	4.638E+01	1.000	1.000	1.000	1.00	1.00	1.00	3.164E+01	3.164E+01	3.163E+01	1.000	1.000	1.000	1.00	1.00	1.00
CM245	4.898E-03	4.898E-03	4.901E-03	1.000	1.000	1.000	1.00	1.00	1.00	4.894E-03	4.894E-03	4.897E-03	1.000	1.000	1.000	1.00	1.00	1.00
CM246	1.034E-03	1.034E-03	1.024E-03	1.003	1.003	0.993	1.00	1.01	1.01	1.032E-03	1.032E-03	1.022E-03	1.003	1.003	0.994	1.00	1.01	1.01
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.99	0.66	1.02	1.2	2.3	1.0				1.27	0.61	1.21	1.3	2.8	0.8
AV-ABS-DEV EXCLUDING LARGEST ONE, %				0.54	0.42	0.71	0.5	1.3	0.9				0.81	0.34	0.89	0.5	1.8	0.6
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.37	0.31	0.54	0.3	0.9	0.7				0.65	0.24	0.75	0.3	1.1	0.5
NUCS EXCLUDED, 1ST/2ND:		SE 79	SR 89	NB 95 / PD107					ZR 95		SE 79		NP237 / PD107				U235	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU WATTS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.018E-04	7.781E-05	7.783E-05	1.186	0.907	0.907	1.31	1.31	1.00	1.017E-04	7.776E-05	7.779E-05	1.186	0.907	0.907	1.31	1.31	1.00
KR 85	5.589E-01	5.588E-01	5.589E-01	1.000	1.000	1.000	1.00	1.00	1.00	2.204E-02	2.203E-02	2.204E-02	1.000	1.000	1.000	1.00	1.00	1.00
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	2.582E+01	2.582E+01	2.581E+01	1.000	1.000	1.000	1.00	1.00	1.00	7.854E+00	7.852E+00	7.850E+00	1.000	1.000	1.000	1.00	1.00	1.00
Y 90	1.233E+02	1.233E+02	1.235E+02	0.999	0.999	1.001	1.00	1.00	1.00	3.752E+01	3.751E+01	3.757E+01	1.000	0.999	1.001	1.00	1.00	1.00
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.098E-04	2.098E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	2.098E-04	2.098E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	6.554E-03	6.554E-03	6.559E-03	1.000	1.000	1.001	1.00	1.00	1.00	6.553E-03	6.553E-03	6.558E-03	1.000	1.000	1.001	1.00	1.00	1.00
RU106	4.036E-14	4.032E-14	0.0	1.000	1.000	0.0	1.00	0.0	0.0	4.719E-29	4.712E-29	0.0	1.001	0.999	0.0	1.00	0.0	0.0
PD107	6.652E-06	6.116E-06	6.113E-06	1.057	0.972	0.971	1.09	1.09	1.00	6.652E-06	6.116E-06	6.113E-06	1.057	0.972	0.971	1.09	1.09	1.00
SN126	9.693E-04	9.693E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	9.689E-04	9.690E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
SB125	1.722E-04	1.722E-04	1.733E-04	0.998	0.998	1.004	1.00	0.99	0.99	6.340E-10	6.337E-10	6.380E-10	0.998	0.998	1.004	1.00	0.99	0.99
I129	1.460E-05	1.460E-05	1.421E-05	1.009	1.009	0.982	1.00	1.03	1.03	1.460E-05	1.460E-05	1.421E-05	1.009	1.009	0.982	1.00	1.03	1.03
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	7.958E-05	7.951E-05	7.945E-05	1.001	1.000	0.999	1.00	1.00	1.00	3.991E-12	3.985E-12	3.985E-12	1.001	0.999	1.000	1.00	1.00	1.00
CS135	1.153E-04	1.153E-04	1.153E-04	1.000	1.000	1.000	1.00	1.00	1.00	1.153E-04	1.153E-04	1.153E-04	1.000	1.000	1.000	1.00	1.00	1.00
CS137	3.633E+01	3.636E+01	0.0	1.000	1.000	0.0	1.00	0.0	0.0	1.144E+01	1.153E+01	0.0	0.996	1.004	0.0	0.99	0.0	0.0
CE144	3.822E-17	3.836E-17	0.0	0.998	1.002	0.0	1.00	0.0	0.0	1.747E-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.773E-11	1.772E-11	0.0	1.000	1.000	0.0	0.0	1.00	0.0	1.773E-11	1.772E-11	0.0	1.000	1.000	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	9.076E-05	9.063E-05	9.275E-05	0.993	0.992	1.015	1.00	0.98	0.98	1.662E-10	1.657E-10	1.697E-10	0.994	0.991	1.015	1.00	0.98	0.98
SM147	6.292E-08	6.442E-08	6.437E-08	0.985	1.008	1.007	0.98	0.98	1.00	6.292E-08	6.442E-08	6.437E-08	0.985	1.008	1.007	0.98	0.98	1.00
SM148	5.907E-13	5.883E-13	0.0	1.002	0.998	0.0	1.00	0.0	0.0	5.907E-13	5.883E-13	0.0	1.002	0.998	0.0	1.00	0.0	0.0
SM149	0.0	1.020E-14	1.010E-14	0.0	1.005	0.995	0.0	0.0	1.01	0.0	1.020E-14	1.010E-14	0.0	1.005	0.995	0.0	0.0	1.01
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	2.872E-02	2.875E-02	2.873E-02	1.000	1.001	1.000	1.00	1.00	1.00	1.954E-02	1.956E-02	1.954E-02	1.000	1.001	1.000	1.00	1.00	1.00
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.680E+00	1.680E+00	1.678E+00	1.000	1.000	0.999	1.00	1.00	1.00	2.987E-02	2.985E-02	2.983E-02	1.001	1.000	0.999	1.00	1.00	1.00
EU155	4.374E-03	4.375E-03	4.399E-03	0.998	0.998	1.004	1.00	0.99	0.99	4.034E-06	4.039E-06	4.061E-06	0.997	0.999	1.004	1.00	0.99	0.99
U234	4.051E-02	4.051E-02	4.047E-02	1.000	1.000	0.999	1.00	1.00	1.00	4.602E-02	4.602E-02	4.593E-02	1.001	1.001	0.999	1.00	1.00	1.00
U235	4.511E-04	4.511E-04	4.757E-04	0.982	0.982	1.036	1.00	0.95	0.95	4.515E-04	4.515E-04	4.757E-04	0.982	0.982	1.035	1.00	0.95	0.95
U236	6.965E-03	6.965E-03	6.957E-03	1.000	1.000	0.999	1.00	1.00	1.00	6.986E-03	6.986E-03	6.957E-03	1.001	1.001	0.997	1.00	1.00	1.00
U238	8.054E-03	8.054E-03	8.043E-03	1.000	1.000	0.999	1.00	1.00	1.00	8.054E-03	8.054E-03	8.043E-03	1.000	1.000	0.999	1.00	1.00	1.00
NP237	1.085E-02	1.083E-02	9.155E-03	1.056	1.054	0.891	1.00	1.19	1.18	1.272E-02	1.271E-02	9.155E-03	1.103	1.103	0.794	1.00	1.39	1.39
PU238	5.417E+01	5.417E+01	5.411E+01	1.000	1.000	0.999	1.00	1.00	1.00	3.654E+01	3.653E+01	3.649E+01	1.001	1.000	0.999	1.00	1.00	1.00
PU239	9.636E+00	9.638E+00	9.687E+00	0.998	0.998	1.003	1.00	0.99	0.99	9.623E+00	9.625E+00	9.674E+00	0.998	0.998	1.003	1.00	0.99	0.99
PU240	1.647E+01	1.647E+01	1.628E+01	1.004	1.004	0.992	1.00	1.01	1.01	1.640E+01	1.640E+01	1.620E+01	1.004	1.004	0.992	1.00	1.01	1.01
PU241	3.520E-01	3.739E-01	3.712E-01	0.963	1.022	1.015	0.94	0.95	1.01	3.171E-02	3.538E-02	3.513E-02	0.931	1.038	1.031	0.90	0.90	1.01
PU242	5.104E-02	5.255E-02	5.245E-02	0.981	1.010	1.008	0.97	0.97	1.00	5.104E-02	5.255E-02	5.245E-02	0.981	1.010	1.008	0.97	0.97	1.00
AM241	1.232E+02	1.226E+02	1.227E+02	1.003	0.998	0.999	1.00	1.00	1.00	1.245E+02	1.245E+02	1.246E+02	1.000	1.000	1.001	1.00	1.00	1.00
AM242	5.489E-03	5.490E-03	5.598E-03	0.993	0.994	1.013	1.00	0.98	0.98	4.370E-03	4.371E-03	4.457E-03	0.993	0.994	1.013	1.00	0.98	0.98
AM243	5.485E-01	5.485E-01	5.483E-01	1.000	1.000	1.000	1.00	1.00	1.00	5.460E-01	5.460E-01	5.457E-01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	1.474E-01	1.474E-01	1.485E-01	0.998	0.998	1.005	1.00	0.99	0.99	1.173E-01	1.173E-01	1.182E-01	0.997	0.997	1.005	1.00	0.99	0.99
CM243	1.844E-01	1.844E-01	1.835E-01	1.002	1.002	0.997	1.00	1.01	1.01	5.467E-02	5.466E-02	5.438E-02	1.002	1.002	0.997	1.00	1.01	1.01
CM244	1.004E+01	1.003E+01	1.003E+01	1.001	1.000	1.000	1.00	1.00	1.00	1.481E+00	1.480E+00	1.480E+00	1.000	1.000	1.000	1.00	1.00	1.00
CM245	4.882E-03	4.882E-03	4.885E-03	1.000	1.000	1.000	1.00	1.00	1.00	4.862E-03	4.863E-03	4.865E-03	1.000	1.000	1.000	1.00	1.00	1.00
CM246	1.028E-03	1.028E-03	1.018E-03	1.003	1.003	0.993	1.00	1.01	1.01	1.020E-03	1.020E-03	1.010E-03	1.003	1.003	0.994	1.00	1.01	1.01
AVERAGE-ABSOLUTE-DEVIATION, AS %				1.13	0.71	1.12	1.4	2.6	1.1				1.37	0.89	1.45	1.5	3.4	1.7
AV-ABS-DEV EXCLUDING LARGEST ONE, %				0.55	0.38	0.59	0.6	1.2	0.6				0.64	0.43	0.63	0.7	1.4	0.6
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.36	0.27	0.41	0.4	0.8	0.5				0.43	0.29	0.46	0.5	1.0	0.5
NUCS EXCLUDED, 1ST/2ND:		SE 79	SM151	NP237 / PD107				U235			SE 79		NP237 / PU241				U235	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU WATTS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.015E-04	7.760E-05	7.762E-05	1.186	0.907	0.907	1.31	1.31	1.00	1.008E-04	7.702E-05	7.704E-05	1.187	0.907	0.907	1.31	1.31	1.00
KR 85	5.335E-08	5.326E-08	5.332E-08	1.001	0.999	1.000	1.00	1.00	1.00	1.176E-27	1.174E-27	1.174E-27	1.001	0.999	0.999	1.00	1.00	1.00
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	6.724E-02	6.719E-02	6.719E-02	1.000	1.000	1.000	1.00	1.00	1.00	3.906E-09	3.900E-09	3.898E-09	1.001	1.000	0.999	1.00	1.00	1.00
Y 90	3.212E-01	3.209E-01	3.216E-01	1.000	0.999	1.001	1.00	1.00	1.00	1.865E-08	1.863E-08	1.866E-08	1.000	0.999	1.001	1.00	1.00	1.00
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.098E-04	2.098E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	2.098E-04	2.097E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	6.548E-03	6.549E-03	6.554E-03	1.000	1.000	1.001	1.00	1.00	1.00	6.534E-03	6.534E-03	6.539E-03	1.000	1.000	1.000	1.00	1.00	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	6.651E-06	6.116E-06	6.113E-06	1.057	0.972	0.971	1.09	1.09	1.00	6.651E-06	6.115E-06	6.112E-06	1.057	0.972	0.971	1.09	1.09	1.00
SN126	9.676E-04	9.676E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	9.629E-04	9.630E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
SB125	0.0	0.0	1.173E-31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.460E-05	1.460E-05	1.421E-05	1.009	1.009	0.982	1.00	1.03	1.03	1.460E-05	1.460E-05	1.420E-05	1.009	1.009	0.982	1.00	1.03	1.03
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	2.522E-41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	1.153E-04	1.153E-04	1.153E-04	1.000	1.000	1.000	1.00	1.00	1.00	1.153E-04	1.153E-04	1.152E-04	1.000	1.000	1.000	1.00	1.00	1.00
CS137	1.127E-01	1.164E-01	0.0	0.984	1.016	0.0	0.97	0.0	0.0	1.066E-08	1.206E-08	0.0	0.938	1.062	0.0	0.88	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.773E-11	1.772E-11	0.0	1.000	1.000	0.0	0.0	1.00	0.0	1.773E-11	1.772E-11	0.0	1.000	1.000	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	1.904E-33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	6.292E-08	6.442E-08	6.437E-08	0.985	1.008	1.007	0.98	0.98	1.00	6.292E-08	6.442E-08	6.437E-08	0.985	1.008	1.007	0.98	0.98	1.00
SM148	5.907E-13	5.883E-13	0.0	1.002	0.998	0.0	1.00	0.0	0.0	5.907E-13	5.883E-13	0.0	1.002	0.998	0.0	1.00	0.0	0.0
SM149	0.0	1.020E-14	1.010E-14	0.0	1.005	0.995	0.0	0.0	1.01	0.0	1.020E-14	1.010E-14	0.0	1.005	0.995	0.0	0.0	1.01
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	4.188E-03	4.192E-03	4.188E-03	1.000	1.001	1.000	1.00	1.00	1.00	1.908E-05	1.910E-05	1.908E-05	1.000	1.001	1.000	1.00	1.00	1.00
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	2.983E-09	2.977E-09	2.977E-09	1.001	0.999	0.999	1.00	1.00	1.00	0.0	0.0	9.352E-34	0.0	0.0	0.0	0.0	0.0	0.0
EU155	2.921E-18	2.933E-18	2.951E-18	0.995	0.999	1.005	1.00	0.99	0.99	0.0	0.0	9.645E-61	0.0	0.0	0.0	0.0	0.0	0.0
U234	5.506E-02	5.506E-02	5.489E-02	1.001	1.001	0.998	1.00	1.00	1.00	5.734E-02	5.734E-02	5.713E-02	1.001	1.001	0.998	1.00	1.00	1.00
U235	4.531E-04	4.531E-04	4.757E-04	0.984	0.984	1.033	1.00	0.95	0.95	4.587E-04	4.587E-04	4.757E-04	0.988	0.988	1.024	1.00	0.96	0.96
U236	7.070E-03	7.069E-03	6.957E-03	1.005	1.005	0.989	1.00	1.02	1.02	7.349E-03	7.348E-03	6.957E-03	1.018	1.018	0.964	1.00	1.06	1.06
U238	8.054E-03	8.054E-03	8.043E-03	1.000	1.000	0.999	1.00	1.00	1.00	8.054E-03	8.054E-03	8.043E-03	1.000	1.000	0.999	1.00	1.00	1.00
NP237	1.913E-02	1.912E-02	9.154E-03	1.211	1.210	0.579	1.00	2.09	2.09	3.056E-02	3.055E-02	9.152E-03	1.305	1.304	0.391	1.00	3.34	3.34
PU238	7.575E+00	7.575E+00	7.568E+00	1.000	1.000	0.999	1.00	1.00	1.00	3.385E-02	3.380E-02	3.382E-02	1.001	0.999	1.000	1.00	1.00	1.00
PU239	9.571E+00	9.572E+00	9.618E+00	0.998	0.998	1.003	1.00	1.00	1.00	9.390E+00	9.391E+00	9.426E+00	0.999	0.999	1.003	1.00	1.00	1.00
PU240	1.606E+01	1.606E+01	1.586E+01	1.004	1.004	0.992	1.00	1.01	1.01	1.491E+01	1.491E+01	1.473E+01	1.004	1.004	0.992	1.00	1.01	1.01
PU241	6.566E-06	7.458E-06	2.818E-06	1.170	1.328	0.502	0.88	2.33	2.65	4.228E-06	4.365E-06	1.303E-20	1.476	1.524	0.000	0.97	****	****
PU242	5.102E-02	5.253E-02	5.243E-02	0.981	1.010	1.008	0.97	0.97	1.00	5.096E-02	5.247E-02	5.237E-02	0.981	1.010	1.008	0.97	0.97	1.00
AM241	9.119E+01	9.125E+01	9.136E+01	0.999	1.000	1.001	1.00	1.00	1.00	2.968E+01	2.970E+01	2.973E+01	0.999	1.000	1.001	1.00	1.00	1.00
AM242	1.756E-03	1.756E-03	1.790E-03	0.994	0.994	1.013	1.00	0.98	0.98	7.214E-05	7.213E-05	7.355E-05	0.994	0.993	1.013	1.00	0.98	0.98
AM243	5.358E-01	5.358E-01	5.355E-01	1.000	1.000	1.000	1.00	1.00	1.00	5.017E-01	5.017E-01	5.015E-01	1.000	1.000	1.000	1.00	1.00	1.00
CM242	4.713E-02	4.713E-02	4.749E-02	0.997	0.997	1.005	1.00	0.99	0.99	1.936E-03	1.936E-03	1.951E-03	0.997	0.997	1.005	1.00	0.99	0.99
CM243	4.220E-04	4.217E-04	4.197E-04	1.002	1.001	0.997	1.00	1.01	1.00	1.705E-11	1.703E-11	1.694E-11	1.002	1.001	0.996	1.00	1.01	1.01
CM244	7.014E-04	7.008E-04	7.011E-04	1.000	1.000	1.000	1.00	1.00	1.00	1.488E-12	1.622E-15	1.622E-15	2.993	0.003	0.003	****	****	1.00
CM245	4.784E-03	4.784E-03	4.786E-03	1.000	1.000	1.000	1.00	1.00	1.00	4.518E-03	4.519E-03	4.520E-03	1.000	1.000	1.000	1.00	1.00	1.00
CM246	9.906E-04	9.908E-04	9.812E-04	1.003	1.003	0.994	1.00	1.01	1.01	8.941E-04	8.942E-04	8.855E-04	1.003	1.003	0.994	1.00	1.01	1.01
AVERAGE-ABSOLUTE-DEVIATION, AS %				2.17	2.11	3.67	1.8	10.1	9.1				9.95	6.17	9.58	****	*****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %				1.23	1.02	2.02	0.6	5.0	4.2				2.46	1.86	3.25	1.9	11.5	9.1
AV-ABS-DEV EXCLUDING LARGEST TWO, %				0.39	0.32	0.50	0.6	1.2	0.6				0.82	0.62	0.70	1.0	1.4	0.8
NUCS EXCLUDED, 1ST/2ND:		SE 79	KR 85		PU241 / PD107				NP237		CM244	Y 90	PU241 / SE 79				NP237	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU WATTS PER MTU

	ORIGEN2	ORIGEN-S	CINDER	10 KYR OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	9.155E-05	6.997E-05	6.999E-05	1.186	0.907	0.907	1.31	1.31	1.00
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.089E-04	2.089E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	6.345E-03	6.345E-03	6.350E-03	1.000	1.000	1.001	1.00	1.00	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	6.645E-06	6.109E-06	6.106E-06	1.057	0.972	0.971	1.09	1.09	1.00
SN126	9.047E-04	9.047E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.460E-05	1.459E-05	1.420E-05	1.009	1.009	0.982	1.00	1.03	1.03
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	1.150E-04	1.150E-04	1.149E-04	1.000	1.000	1.000	1.00	1.00	1.00
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.773E-11	1.772E-11	0.0	1.000	1.000	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	6.292E-08	6.442E-08	6.437E-08	0.985	1.008	1.007	0.98	0.98	1.00
SM148	5.907E-13	5.883E-13	0.0	1.002	0.998	0.0	1.00	0.0	0.0
SM149	0.0	1.020E-14	1.010E-14	0.0	1.005	0.995	0.0	0.0	1.01
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	1.498E-35	0.0	1.502E-35	0.999	0.0	1.001	0.0	1.00	0.0
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	5.614E-02	5.614E-02	5.570E-02	1.003	1.003	0.995	1.00	1.01	1.01
U235	5.213E-04	5.213E-04	4.757E-04	1.030	1.030	0.940	1.00	1.10	1.10
U236	9.573E-03	9.573E-03	6.955E-03	1.100	1.100	0.799	1.00	1.38	1.38
U238	8.054E-03	8.054E-03	8.043E-03	1.000	1.000	0.999	1.00	1.00	1.00
NP237	3.597E-02	3.597E-02	9.125E-03	1.331	1.331	0.338	1.00	3.94	3.94
PU238	6.245E-21	6.233E-21	6.287E-21	0.998	0.997	1.005	1.00	0.99	0.99
PU239	7.318E+00	7.319E+00	7.277E+00	1.002	1.002	0.996	1.00	1.01	1.01
PU240	5.742E+00	5.742E+00	5.682E+00	1.004	1.004	0.993	1.00	1.01	1.01
PU241	2.030E-06	2.096E-06	0.0	0.984	1.016	0.0	0.97	0.0	0.0
PU242	5.015E-02	5.161E-02	5.151E-02	0.982	1.010	1.008	0.97	0.97	1.00
AM241	2.192E-03	2.285E-03	1.602E-05	1.464	1.526	0.011	0.96	****	****
AM242	1.084E-22	1.082E-22	1.102E-22	0.995	0.993	1.012	1.00	0.98	0.98
AM243	2.155E-01	2.155E-01	2.153E-01	1.000	1.000	0.999	1.00	1.00	1.00
CM242	2.918E-21	2.912E-21	2.923E-21	1.000	0.998	1.002	1.00	1.00	1.00
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	1.487E-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	2.169E-03	2.169E-03	2.165E-03	1.001	1.001	0.999	1.00	1.00	1.00
CM246	2.392E-04	2.391E-04	2.368E-04	1.003	1.003	0.993	1.00	1.01	1.01

AVERAGE-ABSOLUTE-DEVIATION, AS %	4.81	4.39	8.83	2.1	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	2.61	2.35	4.93	0.8	18.2	16.8
AV-ABS-DEV EXCLUDING LARGEST TWO, %	1.01	0.93	1.81	0.4	3.4	3.1

NUCS EXCLUDED, 1ST/2ND: SE 79 CM242 AM241 / PD107 NP237

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) WATTS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.016E-04	7.133E-05	6.578E-05	1.277	0.896	0.827	1.42	1.54	1.08	1.016E-04	7.133E-05	6.578E-05	1.277	0.896	0.827	1.42	1.54	1.08
KR 85	1.397E+01	1.390E+01	1.400E+01	1.001	0.996	1.003	1.01	1.00	0.99	1.016E+01	1.011E+01	1.019E+01	1.001	0.996	1.003	1.00	1.00	0.99
SR 89	1.972E+03	1.990E+03	1.948E+03	1.001	1.010	0.989	0.99	1.01	1.02	3.863E-08	3.897E-08	3.821E-08	1.001	1.009	0.990	0.99	1.01	1.02
SR 90	8.377E+01	8.333E+01	8.516E+01	0.996	0.991	1.013	1.01	0.98	0.98	7.452E+01	7.413E+01	7.575E+01	0.996	0.991	1.013	1.01	0.98	0.98
Y 90	4.003E+02	3.981E+02	4.076E+02	0.996	0.990	1.014	1.01	0.98	0.98	3.559E+02	3.541E+02	3.625E+02	0.995	0.990	1.014	1.01	0.98	0.98
Y 91	2.873E+03	2.892E+03	2.869E+03	0.998	1.005	0.997	0.99	1.00	1.01	1.646E-06	1.656E-06	1.645E-06	0.998	1.004	0.998	0.99	1.00	1.01
ZR 93	2.084E-04	2.104E-04	0.0	0.995	1.005	0.0	0.99	0.0	0.0	2.084E-04	2.104E-04	0.0	0.995	1.005	0.0	0.99	0.0	0.0
ZR 95	6.005E+03	6.061E+03	5.933E+03	1.001	1.010	0.989	0.99	1.01	1.02	2.125E-05	2.141E-05	2.176E-05	0.990	0.997	1.013	0.99	0.98	0.98
NB 95	7.359E+03	7.425E+03	7.289E+03	1.000	1.009	0.991	0.99	1.01	1.02	4.467E-05	4.501E-05	4.576E-05	0.989	0.997	1.014	0.99	0.98	0.98
TC 99	6.540E-03	6.673E-03	6.660E-03	0.987	1.007	1.005	0.98	0.98	1.00	6.540E-03	6.673E-03	6.660E-03	0.987	1.007	1.005	0.98	0.98	1.00
RU106	3.348E+01	3.161E+01	0.0	1.029	0.971	0.0	1.06	0.0	0.0	1.138E+00	1.074E+00	0.0	1.029	0.971	0.0	1.06	0.0	0.0
PD107	6.833E-06	5.785E-06	6.441E-06	1.076	0.911	1.014	1.18	1.06	0.90	6.833E-06	5.785E-06	6.441E-06	1.076	0.911	1.014	1.18	1.06	0.90
SN126	9.822E-04	6.965E-04	0.0	1.170	0.830	0.0	1.41	0.0	0.0	9.821E-04	6.964E-04	0.0	1.170	0.830	0.0	1.41	0.0	0.0
SB125	4.647E+01	3.052E+01	2.555E+01	1.360	0.893	0.748	1.52	1.82	1.19	1.359E+01	8.925E+00	7.472E+00	1.360	0.893	0.747	1.52	1.82	1.19
I129	1.463E-05	1.519E-05	1.421E-05	0.997	1.035	0.968	0.96	1.03	1.07	1.470E-05	1.527E-05	1.429E-05	0.996	1.035	0.969	0.96	1.03	1.07
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.564E+03	1.542E+03	1.546E+03	1.009	0.994	0.997	1.01	1.01	1.00	2.995E+02	2.953E+02	2.959E+02	1.009	0.995	0.997	1.01	1.01	1.00
CS135	1.140E-04	1.280E-04	1.263E-04	0.929	1.043	1.029	0.89	0.90	1.01	1.140E-04	1.280E-04	1.263E-04	0.929	1.043	1.029	0.89	0.90	1.01
CS137	1.152E+02	1.146E+02	0.0	1.003	0.997	0.0	1.01	0.0	0.0	1.028E+02	1.024E+02	0.0	1.002	0.998	0.0	1.00	0.0	0.0
CE144	7.733E+02	7.774E+02	0.0	0.997	1.003	0.0	0.99	0.0	0.0	9.685E+00	9.741E+00	0.0	0.997	1.003	0.0	0.99	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.248E-11	1.247E-11	0.0	1.000	1.000	0.0	0.0	1.00	0.0	1.736E-11	1.734E-11	0.0	1.001	0.999	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	4.743E+01	6.317E+01	6.075E+01	0.830	1.106	1.064	0.75	0.78	1.04	1.305E+01	1.735E+01	1.668E+01	0.832	1.105	1.063	0.75	0.78	1.04
SM147	1.726E-08	1.930E-08	2.057E-08	0.906	1.013	1.080	0.89	0.84	0.94	4.983E-08	6.364E-08	6.223E-08	0.851	1.087	1.063	0.78	0.80	1.02
SM148	5.895E-13	3.911E-13	0.0	1.202	0.798	0.0	1.51	0.0	0.0	5.926E-13	3.942E-13	0.0	1.201	0.799	0.0	1.50	0.0	0.0
SM149	0.0	1.257E-14	1.094E-14	0.0	1.069	0.931	0.0	0.0	1.15	0.0	1.257E-14	1.094E-14	0.0	1.069	0.931	0.0	0.0	1.15
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	4.211E-02	4.988E-02	3.971E-02	0.959	1.136	0.905	0.84	1.06	1.26	4.055E-02	4.802E-02	3.823E-02	0.959	1.136	0.905	0.84	1.06	1.26
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	9.572E+01	9.623E+01	8.453E+01	1.039	1.044	0.917	0.99	1.13	1.14	6.440E+01	6.474E+01	5.686E+01	1.039	1.044	0.917	0.99	1.13	1.14
EU155	4.781E+00	5.137E+00	4.633E+00	0.986	1.059	0.955	0.93	1.03	1.11	2.404E+00	2.583E+00	2.330E+00	0.986	1.059	0.955	0.93	1.03	1.11
U234	3.038E-02	2.933E-02	2.879E-02	1.030	0.994	0.976	1.04	1.06	1.02	3.135E-02	3.037E-02	2.913E-02	1.035	1.003	0.962	1.03	1.08	1.04
U235	4.240E-04	4.336E-04	4.749E-04	0.955	0.976	1.069	0.98	0.89	0.91	4.240E-04	4.337E-04	4.749E-04	0.955	0.976	1.069	0.98	0.89	0.91
U236	6.772E-03	6.780E-03	6.758E-03	1.000	1.001	0.998	1.00	1.00	1.00	6.774E-03	6.781E-03	6.758E-03	1.000	1.001	0.998	1.00	1.00	1.00
U238	8.058E-03	8.050E-03	8.041E-03	1.001	1.000	0.999	1.00	1.00	1.00	8.058E-03	8.050E-03	8.041E-03	1.001	1.000	0.999	1.00	1.00	1.00
NP237	9.517E-03	9.995E-03	8.829E-03	1.007	1.058	0.935	0.95	1.08	1.13	9.556E-03	1.004E-02	8.839E-03	1.008	1.059	0.933	0.95	1.08	1.14
PU238	7.584E+01	8.236E+01	6.818E+01	1.005	1.091	0.904	0.92	1.11	1.21	7.892E+01	8.521E+01	7.154E+01	1.005	1.085	0.911	0.93	1.10	1.19
PU239	9.671E+00	1.085E+01	1.020E+01	0.944	1.060	0.996	0.89	0.95	1.06	9.669E+00	1.085E+01	1.020E+01	0.944	1.060	0.996	0.89	0.95	1.06
PU240	1.658E+01	1.485E+01	1.472E+01	1.078	0.965	0.957	1.12	1.13	1.01	1.660E+01	1.487E+01	1.471E+01	1.078	0.966	0.956	1.12	1.13	1.01
PU241	3.966E+00	4.588E+00	4.543E+00	0.908	1.051	1.041	0.86	0.87	1.01	3.130E+00	3.639E+00	3.603E+00	0.905	1.053	1.042	0.86	0.87	1.01
PU242	5.334E-02	5.601E-02	6.611E-02	0.912	0.958	1.130	0.95	0.81	0.85	5.334E-02	5.601E-02	6.611E-02	0.912	0.958	1.130	0.95	0.81	0.85
AM241	3.881E+00	4.493E+00	4.854E+00	0.880	1.019	1.101	0.86	0.80	0.93	3.357E+01	3.784E+01	3.806E+01	0.920	1.037	1.043	0.89	0.88	0.99
AM242	7.028E-03	1.161E-02	5.768E-03	0.864	1.427	0.709	0.61	1.22	2.01	6.872E-03	1.135E-02	5.640E-03	0.864	1.427	0.709	0.61	1.22	2.01
AM243	5.885E-01	6.480E-01	7.513E-01	0.888	0.978	1.134	0.91	0.78	0.86	5.882E-01	6.477E-01	7.510E-01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	1.349E+03	1.353E+03	1.348E+03	0.999	1.002	0.999	1.00	1.00	1.00	8.400E-01	9.622E-01	7.959E-01	0.970	1.111	0.919	0.87	1.06	1.21
CM243	6.588E-01	1.766E-01	5.881E-01	1.388	0.372	1.239	3.73	1.12	0.30	5.845E-01	1.567E-01	5.218E-01	1.388	0.372	1.239	3.73	1.12	0.30
CM244	7.428E+01	7.231E+01	9.217E+01	0.933	0.909	1.158	1.03	0.81	0.78	6.153E+01	5.990E+01	7.636E+01	0.933	0.909	1.158	1.03	0.81	0.78
CM245	5.442E-03	5.830E-03	8.435E-03	0.828	0.888	1.284	0.93	0.65	0.69	5.440E-03	5.828E-03	8.432E-03	0.828	0.888	1.284	0.93	0.65	0.69
CM246	1.179E-03	1.241E-03	1.584E-03	0.883	0.930	1.187	0.95	0.74	0.78	1.178E-03	1.240E-03	1.583E-03	0.883	0.930	1.187	0.95	0.74	0.78
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.21	6.73	7.39	16.4	12.6	12.0				7.38	7.12	7.44	16.8	12.8	12.3
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.46	5.19	5.85	8.5	10.3	7.8				5.64	5.61	5.91	9.0	10.5	8.0
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.47	4.05	4.41	7.6	9.0	7.7				4.66	4.50	4.47	8.1	9.2	8.0
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / SE 79		AM242	CM246				SB125	CM243	CM245 / SE 79		AM242	CM246		

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) WATTS PER MTU

	**********			10 YR						**********			20 YR					
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.016E-04	7.133E-05	6.578E-05	1.277	0.896	0.827	1.42	1.54	1.08	1.016E-04	7.132E-05	6.577E-05	1.277	0.896	0.827	1.42	1.54	1.08
KR 85	7.355E+00	7.317E+00	7.373E+00	1.001	0.996	1.003	1.01	1.00	0.99	3.853E+00	3.833E+00	3.862E+00	1.001	0.996	1.003	1.01	1.00	0.99
SR 89	5.014E-19	5.054E-19	4.965E-19	1.001	1.009	0.991	0.99	1.01	1.02	0.0	0.0	8.383E-41	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	6.616E+01	6.581E+01	6.725E+01	0.996	0.991	1.013	1.01	0.98	0.98	5.214E+01	5.187E+01	5.301E+01	0.996	0.991	1.013	1.01	0.98	0.98
Y 90	3.160E+02	3.143E+02	3.219E+02	0.996	0.990	1.014	1.01	0.98	0.98	2.491E+02	2.477E+02	2.537E+02	0.996	0.990	1.014	1.01	0.98	0.98
Y 91	6.605E-16	6.644E-16	6.612E-16	0.998	1.004	0.999	0.99	1.00	1.00	1.064E-34	0.0	1.068E-34	0.998	0.0	1.002	0.0	1.00	0.0
ZR 93	2.084E-04	2.104E-04	0.0	0.995	1.005	0.0	0.99	0.0	0.0	2.084E-04	2.104E-04	0.0	0.995	1.005	0.0	0.99	0.0	0.0
ZR 95	5.431E-14	5.461E-14	5.767E-14	0.978	0.983	1.039	0.99	0.94	0.95	3.548E-31	0.0	4.053E-31	0.934	0.0	1.066	0.0	0.88	0.0
NB 95	1.142E-13	1.148E-13	1.213E-13	0.978	0.983	1.039	0.99	0.94	0.95	7.460E-31	0.0	8.525E-31	0.933	0.0	1.067	0.0	0.88	0.0
TC 99	6.540E-03	6.673E-03	6.660E-03	0.987	1.007	1.005	0.98	0.98	1.00	6.540E-03	6.673E-03	6.660E-03	0.987	1.007	1.005	0.98	0.98	1.00
RU106	3.656E-02	3.451E-02	0.0	1.029	0.971	0.0	1.06	0.0	0.0	3.922E-05	3.560E-05	0.0	1.048	0.952	0.0	1.10	0.0	0.0
PD107	6.833E-06	5.785E-06	6.441E-06	1.076	0.911	1.014	1.18	1.06	0.90	6.833E-06	5.785E-06	6.441E-06	1.076	0.911	1.014	1.18	1.06	0.90
SN126	9.821E-04	6.964E-04	0.0	1.170	0.830	0.0	1.41	0.0	0.0	9.820E-04	6.964E-04	0.0	1.170	0.830	0.0	1.41	0.0	0.0
SB125	3.889E+00	2.554E+00	2.138E+00	1.360	0.893	0.747	1.52	1.82	1.19	3.184E-01	2.091E-01	1.751E-01	1.360	0.893	0.748	1.52	1.82	1.19
I129	1.470E-05	1.527E-05	1.429E-05	0.996	1.035	0.969	0.96	1.03	1.07	1.470E-05	1.527E-05	1.429E-05	0.996	1.035	0.969	0.96	1.03	1.07
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	5.577E+01	5.498E+01	5.511E+01	1.009	0.994	0.997	1.01	1.01	1.00	1.934E+00	1.906E+00	1.911E+00	1.009	0.994	0.997	1.01	1.01	1.00
CS135	1.140E-04	1.280E-04	1.263E-04	0.929	1.043	1.029	0.89	0.90	1.01	1.140E-04	1.280E-04	1.263E-04	0.929	1.043	1.029	0.89	0.90	1.01
CS137	9.157E+01	9.128E+01	0.0	1.002	0.998	0.0	1.00	0.0	0.0	7.268E+01	7.254E+01	0.0	1.001	0.999	0.0	1.00	0.0	0.0
CE144	1.128E-01	1.134E-01	0.0	0.997	1.003	0.0	0.99	0.0	0.0	1.528E-05	1.538E-05	0.0	0.997	1.003	0.0	0.99	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.742E-11	1.740E-11	0.0	1.001	0.999	0.0	0.0	1.00	0.0	1.742E-11	1.740E-11	0.0	1.001	0.999	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	3.482E+00	4.629E+00	4.452E+00	0.832	1.105	1.063	0.75	0.78	1.04	2.480E-01	3.295E-01	3.170E-01	0.832	1.105	1.063	0.75	0.78	1.04
SM147	5.878E-08	7.582E-08	7.368E-08	0.847	1.092	1.061	0.78	0.80	1.03	6.181E-08	7.994E-08	7.755E-08	0.846	1.094	1.061	0.77	0.80	1.03
SM148	5.926E-13	3.942E-13	0.0	1.201	0.799	0.0	1.50	0.0	0.0	5.926E-13	3.942E-13	0.0	1.201	0.799	0.0	1.50	0.0	0.0
SM149	0.0	1.257E-14	1.094E-14	0.0	1.069	0.931	0.0	0.0	1.15	0.0	1.257E-14	1.094E-14	0.0	1.069	0.931	0.0	0.0	1.15
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.902E-02	4.621E-02	3.679E-02	0.959	1.136	0.904	0.84	1.06	1.26	3.612E-02	4.278E-02	3.406E-02	0.959	1.136	0.905	0.84	1.06	1.26
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	4.304E+01	4.327E+01	3.800E+01	1.039	1.044	0.917	0.99	1.13	1.14	1.922E+01	1.932E+01	1.697E+01	1.039	1.044	0.917	0.99	1.13	1.14
EU155	1.195E+00	1.284E+00	1.158E+00	0.986	1.059	0.955	0.93	1.03	1.11	2.954E-01	3.175E-01	2.864E-01	0.985	1.059	0.955	0.93	1.03	1.11
U234	3.230E-02	3.140E-02	2.946E-02	1.040	1.011	0.949	1.03	1.10	1.07	3.410E-02	3.334E-02	3.010E-02	1.049	1.025	0.926	1.02	1.13	1.11
U235	4.241E-04	4.337E-04	4.749E-04	0.955	0.976	1.069	0.98	0.89	0.91	4.242E-04	4.338E-04	4.749E-04	0.955	0.976	1.069	0.98	0.89	0.91
U236	6.776E-03	6.783E-03	6.758E-03	1.001	1.002	0.998	1.00	1.00	1.00	6.780E-03	6.787E-03	6.758E-03	1.001	1.002	0.997	1.00	1.00	1.00
U238	8.058E-03	8.050E-03	8.041E-03	1.001	1.000	0.999	1.00	1.00	1.00	8.058E-03	8.050E-03	8.041E-03	1.001	1.000	0.999	1.00	1.00	1.00
NP237	9.625E-03	1.011E-02	8.839E-03	1.011	1.061	0.928	0.95	1.09	1.14	9.847E-03	1.037E-02	8.839E-03	1.017	1.071	0.913	0.95	1.11	1.17
PU238	7.588E+01	8.193E+01	6.878E+01	1.005	1.085	0.911	0.93	1.10	1.19	7.013E+01	7.572E+01	6.356E+01	1.005	1.085	0.911	0.93	1.10	1.19
PU239	9.668E+00	1.085E+01	1.019E+01	0.944	1.060	0.996	0.89	0.95	1.06	9.666E+00	1.085E+01	1.019E+01	0.944	1.060	0.996	0.89	0.95	1.06
PU240	1.662E+01	1.489E+01	1.470E+01	1.079	0.967	0.954	1.12	1.13	1.01	1.664E+01	1.491E+01	1.469E+01	1.080	0.967	0.953	1.12	1.13	1.02
PU241	2.461E+00	2.874E+00	2.846E+00	0.902	1.054	1.044	0.86	0.86	1.01	1.520E+00	1.794E+00	1.776E+00	0.896	1.057	1.047	0.85	0.86	1.01
PU242	5.333E-02	5.601E-02	6.611E-02	0.912	0.958	1.130	0.95	0.81	0.85	5.333E-02	5.601E-02	6.611E-02	0.912	0.958	1.130	0.95	0.81	0.85
AM241	5.711E+01	6.440E+01	6.451E+01	0.921	1.039	1.040	0.89	0.89	1.00	8.947E+01	1.012E+02	1.011E+02	0.920	1.040	1.040	0.88	0.88	1.00
AM242	6.717E-03	1.109E-02	5.513E-03	0.864	1.427	0.709	0.61	1.22	2.01	6.418E-03	1.060E-02	5.268E-03	0.864	1.427	0.709	0.61	1.22	2.01
AM243	5.880E-01	6.474E-01	7.506E-01	0.888	0.978	1.134	0.91	0.78	0.86	5.874E-01	6.468E-01	7.499E-01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	1.807E-01	2.982E-01	1.465E-01	0.867	1.430	0.703	0.61	1.23	2.04	1.723E-01	2.845E-01	1.397E-01	0.867	1.431	0.703	0.61	1.23	2.04
CM243	5.176E-01	1.387E-01	4.621E-01	1.388	0.372	1.239	3.73	1.12	0.30	4.059E-01	1.088E-01	3.623E-01	1.388	0.372	1.239	3.73	1.12	0.30
CM244	5.082E+01	4.947E+01	6.306E+01	0.933	0.909	1.158	1.03	0.81	0.78	3.466E+01	3.373E+01	4.300E+01	0.933	0.908	1.158	1.03	0.81	0.78
CM245	5.438E-03	5.826E-03	8.428E-03	0.828	0.888	1.284	0.93	0.65	0.69	5.433E-03	5.821E-03	8.421E-03	0.828	0.888	1.284	0.93	0.65	0.69
CM246	1.177E-03	1.239E-03	1.582E-03	0.883	0.930	1.187	0.95	0.74	0.78	1.175E-03	1.238E-03	1.579E-03	0.883	0.930	1.187	0.95	0.74	0.78
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.71	7.93	8.16	17.5	13.5	14.7				8.21	8.71	8.61	19.3	14.5	16.2
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.99	6.48	6.69	9.6	11.3	10.6				6.48	7.17	7.13	10.8	12.2	11.7
AV-ABS-DEV EXCLUDING LARGEST TWO, %				5.05	5.42	5.30	8.0	9.6	8.0				5.56	6.06	5.75	9.0	10.6	8.8
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / SE 79		CM242	CM246				SB125	CM243	CM245 / SE 79		CM242	CM246		

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) WATTS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.016E-04	7.130E-05	6.575E-05	1.277	0.896	0.827	1.42	1.55	1.08	1.015E-04	7.126E-05	6.571E-05	1.277	0.896	0.827	1.42	1.54	1.08
KR 85	5.538E-01	5.508E-01	5.551E-01	1.001	0.996	1.003	1.01	1.00	0.99	2.184E-02	2.172E-02	2.189E-02	1.001	0.996	1.003	1.01	1.00	0.99
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	2.553E+01	2.540E+01	2.595E+01	0.996	0.991	1.013	1.01	0.98	0.98	7.767E+00	7.724E+00	7.894E+00	0.996	0.991	1.013	1.01	0.98	0.98
Y 90	1.220E+02	1.213E+02	1.242E+02	0.996	0.990	1.014	1.01	0.98	0.98	3.710E+01	3.689E+01	3.778E+01	0.996	0.990	1.014	1.01	0.98	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.084E-04	2.104E-04	0.0	0.995	1.005	0.0	0.99	0.0	0.0	2.084E-04	2.104E-04	0.0	0.995	1.005	0.0	0.99	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	6.539E-03	6.672E-03	6.659E-03	0.987	1.007	1.005	0.98	0.98	1.00	6.538E-03	6.671E-03	6.658E-03	0.987	1.007	1.005	0.98	0.98	1.00
RU106	4.308E-14	3.909E-14	0.0	1.049	0.951	0.0	1.10	0.0	0.0	5.037E-29	4.568E-29	0.0	1.049	0.951	0.0	1.10	0.0	0.0
PD107	6.833E-06	5.785E-06	6.441E-06	1.076	0.911	1.014	1.18	1.06	0.90	6.833E-06	5.785E-06	6.441E-06	1.076	0.911	1.014	1.18	1.06	0.90
SN126	9.818E-04	6.962E-04	0.0	1.170	0.830	0.0	1.41	0.0	0.0	9.815E-04	6.960E-04	0.0	1.170	0.830	0.0	1.41	0.0	0.0
SB125	1.748E-04	1.148E-04	9.615E-05	1.359	0.893	0.748	1.52	1.82	1.19	6.435E-10	4.224E-10	3.541E-10	1.360	0.892	0.748	1.52	1.82	1.19
I129	1.470E-05	1.527E-05	1.429E-05	0.996	1.035	0.969	0.96	1.03	1.07	1.470E-05	1.527E-05	1.429E-05	0.996	1.035	0.969	0.96	1.03	1.07
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	8.066E-05	7.946E-05	7.970E-05	1.009	0.994	0.997	1.02	1.01	1.00	4.046E-12	3.982E-12	3.998E-12	1.009	0.993	0.997	1.02	1.01	1.00
CS135	1.140E-04	1.280E-04	1.263E-04	0.929	1.043	1.029	0.89	0.90	1.01	1.140E-04	1.280E-04	1.263E-04	0.929	1.043	1.029	0.89	0.90	1.01
CS137	3.634E+01	3.641E+01	0.0	0.999	1.001	0.0	1.00	0.0	0.0	1.145E+01	1.154E+01	0.0	0.996	1.004	0.0	0.99	0.0	0.0
CE144	3.803E-17	3.838E-17	0.0	0.995	1.005	0.0	0.99	0.0	0.0	1.739E-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.742E-11	1.740E-11	0.0	1.001	0.999	0.0	0.0	1.00	0.0	1.742E-11	1.740E-11	0.0	1.001	0.999	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	8.954E-05	1.189E-04	1.144E-04	0.832	1.105	1.063	0.75	0.78	1.04	1.640E-10	2.174E-10	2.094E-10	0.833	1.104	1.063	0.75	0.78	1.04
SM147	6.204E-08	8.026E-08	7.785E-08	0.845	1.094	1.061	0.77	0.80	1.03	6.204E-08	8.026E-08	7.785E-08	0.845	1.094	1.061	0.77	0.80	1.03
SM148	5.926E-13	3.942E-13	0.0	1.201	0.799	0.0	1.50	0.0	0.0	5.926E-13	3.942E-13	0.0	1.201	0.799	0.0	1.50	0.0	0.0
SM149	0.0	1.257E-14	1.094E-14	0.0	1.069	0.931	0.0	0.0	1.15	0.0	1.257E-14	1.094E-14	0.0	1.069	0.931	0.0	0.0	1.15
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	2.867E-02	3.396E-02	2.703E-02	0.959	1.136	0.905	0.84	1.06	1.26	1.951E-02	2.310E-02	1.839E-02	0.959	1.136	0.905	0.84	1.06	1.26
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.713E+00	1.722E+00	1.512E+00	1.039	1.044	0.917	0.99	1.13	1.14	3.045E-02	3.059E-02	2.688E-02	1.039	1.044	0.917	1.00	1.13	1.14
EU155	4.462E-03	4.797E-03	4.327E-03	0.985	1.059	0.955	0.93	1.03	1.11	4.116E-06	4.428E-06	3.994E-06	0.985	1.059	0.956	0.93	1.03	1.11
U234	3.871E-02	3.833E-02	3.174E-02	1.068	1.057	0.875	1.01	1.22	1.21	4.434E-02	4.441E-02	3.374E-02	1.086	1.088	0.826	1.00	1.31	1.32
U235	4.244E-04	4.341E-04	4.749E-04	0.955	0.977	1.068	0.98	0.89	0.91	4.248E-04	4.345E-04	4.749E-04	0.955	0.977	1.068	0.98	0.89	0.91
U236	6.793E-03	6.799E-03	6.758E-03	1.001	1.002	0.996	1.00	1.01	1.01	6.814E-03	6.818E-03	6.758E-03	1.003	1.003	0.994	1.00	1.01	1.01
U238	8.058E-03	8.050E-03	8.041E-03	1.001	1.000	0.999	1.00	1.00	1.00	8.058E-03	8.050E-03	8.041E-03	1.001	1.000	0.999	1.00	1.00	1.00
NP237	1.085E-02	1.151E-02	8.839E-03	1.043	1.107	0.850	0.94	1.23	1.30	1.277E-02	1.369E-02	8.839E-03	1.085	1.163	0.751	0.93	1.44	1.55
PU238	5.536E+01	5.980E+01	5.018E+01	1.004	1.085	0.910	0.93	1.10	1.19	3.733E+01	4.035E+01	3.384E+01	1.004	1.085	0.910	0.93	1.10	1.19
PU239	9.658E+00	1.084E+01	1.018E+01	0.944	1.060	0.996	0.89	0.95	1.06	9.645E+00	1.082E+01	1.017E+01	0.945	1.060	0.996	0.89	0.95	1.06
PU240	1.665E+01	1.492E+01	1.464E+01	1.081	0.969	0.951	1.12	1.14	1.02	1.658E+01	1.487E+01	1.456E+01	1.081	0.969	0.950	1.11	1.14	1.02
PU241	3.588E-01	4.359E-01	4.316E-01	0.878	1.066	1.056	0.82	0.83	1.01	3.233E-02	4.125E-02	4.085E-02	0.848	1.081	1.071	0.78	0.79	1.01
PU242	5.333E-02	5.601E-02	6.611E-02	0.912	0.958	1.130	0.95	0.81	0.85	5.333E-02	5.601E-02	6.610E-02	0.912	0.958	1.130	0.95	0.81	0.85
AM241	1.255E+02	1.430E+02	1.427E+02	0.916	1.043	1.041	0.88	0.88	1.00	1.269E+02	1.451E+02	1.449E+02	0.913	1.044	1.043	0.87	0.88	1.00
AM242	5.597E-03	9.244E-03	4.594E-03	0.864	1.427	0.709	0.61	1.22	2.01	4.456E-03	7.360E-03	3.657E-03	0.864	1.427	0.709	0.61	1.22	2.01
AM243	5.858E-01	6.449E-01	7.478E-01	0.888	0.978	1.134	0.91	0.78	0.86	5.830E-01	6.419E-01	7.443E-01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	1.503E-01	2.482E-01	1.219E-01	0.867	1.431	0.703	0.61	1.23	2.04	1.196E-01	1.976E-01	9.701E-02	0.866	1.431	0.703	0.61	1.23	2.04
CM243	1.957E-01	5.244E-02	1.747E-01	1.389	0.372	1.239	3.73	1.12	0.30	5.799E-02	1.554E-02	5.177E-02	1.388	0.372	1.239	3.73	1.12	0.30
CM244	1.099E+01	1.070E+01	1.364E+01	0.933	0.909	1.158	1.03	0.81	0.78	1.622E+00	1.578E+00	2.012E+00	0.934	0.908	1.158	1.03	0.81	0.78
CM245	5.420E-03	5.807E-03	8.401E-03	0.828	0.888	1.284	0.93	0.65	0.69	5.398E-03	5.783E-03	8.366E-03	0.828	0.888	1.284	0.93	0.65	0.69
CM246	1.170E-03	1.232E-03	1.573E-03	0.883	0.930	1.187	0.95	0.74	0.78	1.162E-03	1.223E-03	1.561E-03	0.883	0.930	1.187	0.95	0.74	0.78
AVERAGE-ABSOLUTE-DEVIATION, AS %				8.68	8.91	9.33	19.4	15.7	16.9				9.15	9.39	9.80	20.0	16.8	17.9
AV-ABS-DEV EXCLUDING LARGEST ONE, %				6.85	7.38	7.78	10.9	13.4	12.4				7.30	7.86	8.30	11.3	14.6	13.6
AV-ABS-DEV EXCLUDING LARGEST TWO, %				5.87	6.29	6.31	9.1	11.6	9.6				6.44	6.50	6.67	9.5	12.9	10.8
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / SE 79		CM242		CM246			SB125	CM243	CM245 / SE 79		CM242		NP237	

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) WATTS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.013E-04	7.111E-05	6.557E-05	1.277	0.896	0.827	1.42	1.54	1.08	1.006E-04	7.058E-05	6.509E-05	1.277	0.896	0.826	1.43	1.55	1.08
KR 85	5.286E-08	5.251E-08	5.296E-08	1.002	0.995	1.003	1.01	1.00	0.99	1.165E-27	1.157E-27	1.166E-27	1.002	0.995	1.003	1.01	1.00	0.99
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	6.655E-02	6.609E-02	6.757E-02	0.997	0.990	1.012	1.01	0.98	0.98	3.865E-09	3.836E-09	3.920E-09	0.998	0.990	1.012	1.01	0.99	0.98
Y 90	3.179E-01	3.157E-01	3.234E-01	0.997	0.990	1.014	1.01	0.98	0.98	1.846E-08	1.832E-08	1.876E-08	0.997	0.990	1.013	1.01	0.98	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.084E-04	2.104E-04	0.0	0.995	1.005	0.0	0.99	0.0	0.0	2.083E-04	2.103E-04	0.0	0.995	1.005	0.0	0.99	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	6.534E-03	6.667E-03	6.654E-03	0.987	1.007	1.005	0.98	0.98	1.00	6.519E-03	6.652E-03	6.639E-03	0.987	1.007	1.005	0.98	0.98	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	6.833E-06	5.785E-06	6.440E-06	1.076	0.911	1.014	1.18	1.06	0.90	6.832E-06	5.785E-06	6.440E-06	1.076	0.911	1.014	1.18	1.06	0.90
SN126	9.801E-04	6.950E-04	0.0	1.170	0.830	0.0	1.41	0.0	0.0	9.754E-04	6.917E-04	0.0	1.170	0.830	0.0	1.41	0.0	0.0
SB125	0.0	0.0	6.512E-32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.470E-05	1.527E-05	1.429E-05	0.996	1.035	0.969	0.96	1.03	1.07	1.470E-05	1.527E-05	1.429E-05	0.996	1.035	0.969	0.96	1.03	1.07
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	2.530E-41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	1.139E-04	1.280E-04	1.263E-04	0.928	1.043	1.029	0.89	0.90	1.01	1.139E-04	1.280E-04	1.262E-04	0.928	1.043	1.029	0.89	0.90	1.01
CS137	1.127E-01	1.165E-01	0.0	0.983	1.017	0.0	0.97	0.0	0.0	1.066E-08	1.207E-08	0.0	0.938	1.062	0.0	0.88	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.742E-11	1.740E-11	0.0	1.001	0.999	0.0	0.0	1.00	0.0	1.742E-11	1.740E-11	0.0	1.001	0.999	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	2.348E-33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	6.204E-08	8.026E-08	7.785E-08	0.845	1.094	1.061	0.77	0.80	1.03	6.204E-08	8.026E-08	7.785E-08	0.845	1.094	1.061	0.77	0.80	1.03
SM148	5.926E-13	3.942E-13	0.0	1.201	0.799	0.0	1.50	0.0	0.0	5.926E-13	3.942E-13	0.0	1.201	0.799	0.0	1.50	0.0	0.0
SM149	0.0	1.257E-14	1.094E-14	0.0	1.069	0.931	0.0	0.0	1.15	0.0	1.257E-14	1.094E-14	0.0	1.069	0.931	0.0	0.0	1.15
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	4.180E-03	4.951E-03	3.942E-03	0.959	1.136	0.905	0.84	1.06	1.26	1.902E-05	2.256E-05	1.796E-05	0.958	1.137	0.905	0.84	1.06	1.26
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	3.041E-09	3.051E-09	2.683E-09	1.040	1.043	0.917	1.00	1.13	1.14	0.0	0.0	8.427E-34	0.0	0.0	0.0	0.0	0.0	0.0
EU155	2.980E-18	3.216E-18	2.902E-18	0.983	1.060	0.957	0.93	1.03	1.11	0.0	0.0	9.486E-61	0.0	0.0	0.0	0.0	0.0	0.0
U234	5.359E-02	5.441E-02	3.702E-02	1.109	1.126	0.766	0.98	1.45	1.47	5.592E-02	5.696E-02	3.783E-02	1.113	1.134	0.753	0.98	1.48	1.51
U235	4.264E-04	4.364E-04	4.749E-04	0.956	0.979	1.065	0.98	0.90	0.92	4.320E-04	4.426E-04	4.749E-04	0.960	0.984	1.056	0.98	0.91	0.93
U236	6.899E-03	6.894E-03	6.758E-03	1.007	1.006	0.986	1.00	1.02	1.02	7.181E-03	7.146E-03	6.757E-03	1.022	1.017	0.961	1.00	1.06	1.06
U238	8.058E-03	8.050E-03	8.041E-03	1.001	1.000	0.999	1.00	1.00	1.00	8.058E-03	8.050E-03	8.041E-03	1.001	1.000	0.999	1.00	1.00	1.00
NP237	1.930E-02	2.117E-02	8.838E-03	1.174	1.288	0.538	0.91	2.18	2.40	3.094E-02	3.450E-02	8.836E-03	1.250	1.393	0.357	0.90	3.50	3.90
PU238	7.741E+00	8.394E+00	7.011E+00	1.003	1.088	0.909	0.92	1.10	1.20	3.449E-02	3.962E-02	3.091E-02	0.985	1.132	0.883	0.87	1.12	1.28
PU239	9.593E+00	1.077E+01	1.011E+01	0.944	1.060	0.995	0.89	0.95	1.07	9.412E+00	1.056E+01	9.908E+00	0.945	1.060	0.995	0.89	0.95	1.07
PU240	1.624E+01	1.456E+01	1.426E+01	1.081	0.969	0.949	1.12	1.14	1.02	1.508E+01	1.352E+01	1.324E+01	1.081	0.969	0.949	1.12	1.14	1.02
PU241	7.100E-06	8.803E-06	3.277E-06	1.111	1.377	0.513	0.81	2.17	2.69	4.694E-06	5.192E-06	1.515E-20	1.424	1.576	0.000	0.90	****	****
PU242	5.332E-02	5.600E-02	6.608E-02	0.912	0.958	1.130	0.95	0.81	0.85	5.325E-02	5.593E-02	6.600E-02	0.912	0.958	1.130	0.95	0.81	0.85
AM241	9.294E+01	1.064E+02	1.062E+02	0.913	1.045	1.043	0.87	0.88	1.00	3.025E+01	3.463E+01	3.456E+01	0.913	1.045	1.043	0.87	0.88	1.00
AM242	1.790E-03	2.956E-03	1.469E-03	0.864	1.427	0.709	0.61	1.22	2.01	7.356E-05	1.215E-04	6.036E-05	0.864	1.427	0.709	0.61	1.22	2.01
AM243	5.722E-01	6.300E-01	7.305E-01	0.888	0.978	1.134	0.91	0.78	0.86	5.358E-01	5.899E-01	6.840E-01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	4.806E-02	7.936E-02	3.897E-02	0.867	1.431	0.703	0.61	1.23	2.04	1.975E-03	3.260E-03	1.601E-03	0.867	1.431	0.703	0.61	1.23	2.04
CM243	4.476E-04	1.199E-04	3.995E-04	1.389	0.372	1.239	3.73	1.12	0.30	1.808E-11	4.843E-12	1.613E-11	1.389	0.372	1.239	3.73	1.12	0.30
CM244	7.682E-04	7.473E-04	9.532E-04	0.934	0.908	1.158	1.03	0.81	0.78	1.630E-12	1.729E-15	2.205E-15	2.993	0.003	0.004	****	****	0.78
CM245	5.311E-03	5.690E-03	8.231E-03	0.828	0.888	1.284	0.93	0.65	0.69	5.016E-03	5.374E-03	7.773E-03	0.829	0.888	1.284	0.93	0.65	0.69
CM246	1.128E-03	1.188E-03	1.516E-03	0.883	0.930	1.187	0.95	0.74	0.78	1.018E-03	1.072E-03	1.368E-03	0.883	0.930	1.187	0.95	0.74	0.78

AVERAGE-ABSOLUTE-DEVIATION, AS %	8.76	11.02	11.90	19.9	21.1	27.3				16.59	15.22	17.55	****	****	****		
AV-ABS-DEV EXCLUDING LARGEST ONE, %	7.11	8.66	10.03	12.1	14.3	17.1				8.63	9.59	11.23	22.1	23.9	29.4		
AV-ABS-DEV EXCLUDING LARGEST TWO, %	6.22	6.81	8.03	10.8	14.3	17.1				7.09	7.31	7.99	13.5	14.9	17.8		
NUCS EXCLUDED, 1ST/2ND:	SE 79	CM243	PU241 / SM147	CM242	NP237					CM244	CM243	PU241 / SE 79	CM242	NP237			

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) WATTS PER MTU

	**********			10 KYR			**********		
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	9.135E-05	6.411E-05	5.913E-05	1.277	0.896	0.827	1.42	1.55	1.08
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.075E-04	2.095E-04	0.0	0.995	1.005	0.0	0.99	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	6.331E-03	6.460E-03	6.447E-03	0.987	1.007	1.005	0.98	0.98	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	6.825E-06	5.779E-06	6.434E-06	1.075	0.911	1.014	1.18	1.06	0.90
SN126	9.164E-04	6.498E-04	0.0	1.170	0.830	0.0	1.41	0.0	0.0
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.470E-05	1.526E-05	1.429E-05	0.997	1.035	0.969	0.96	1.03	1.07
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	1.136E-04	1.276E-04	1.259E-04	0.928	1.043	1.029	0.89	0.90	1.01
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.742E-11	1.740E-11	0.0	1.001	0.999	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	6.204E-08	8.026E-08	7.785E-08	0.845	1.094	1.061	0.77	0.80	1.03
SM148	5.926E-13	3.942E-13	0.0	1.201	0.799	0.0	1.50	0.0	0.0
SM149	0.0	1.257E-14	1.094E-14	0.0	1.069	0.931	0.0	0.0	1.15
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	1.494E-35	0.0	1.414E-35	1.028	0.0	0.972	0.0	1.06	0.0
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	5.475E-02	5.577E-02	3.688E-02	1.114	1.135	0.751	0.98	1.48	1.51
U235	4.948E-04	5.131E-04	4.749E-04	1.001	1.038	0.961	0.96	1.04	1.08
U236	9.431E-03	9.163E-03	6.756E-03	1.116	1.084	0.799	1.03	1.40	1.36
U238	8.058E-03	8.050E-03	8.041E-03	1.001	1.000	0.999	1.00	1.00	1.00
NP237	3.647E-02	4.083E-02	8.811E-03	1.271	1.422	0.307	0.89	4.14	4.63
PU238	6.371E-21	1.049E-20	5.130E-21	0.869	1.431	0.700	0.61	1.24	2.04
PU239	7.340E+00	8.236E+00	7.649E+00	0.948	1.064	0.988	0.89	0.96	1.08
PU240	5.807E+00	5.205E+00	5.108E+00	1.081	0.969	0.951	1.12	1.14	1.02
PU241	2.253E-06	2.492E-06	0.0	0.950	1.050	0.0	0.90	0.0	0.0
PU242	5.241E-02	5.502E-02	6.491E-02	0.912	0.958	1.130	0.95	0.81	0.85
AM241	2.432E-03	2.717E-03	1.862E-05	1.412	1.577	0.011	0.90	****	****
AM242	1.106E-22	1.821E-22	9.045E-23	0.866	1.426	0.708	0.61	1.22	2.01
AM243	2.301E-01	2.533E-01	2.937E-01	0.888	0.978	1.134	0.91	0.78	0.86
CM242	2.977E-21	4.903E-21	2.399E-21	0.869	1.431	0.700	0.61	1.24	2.04
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	1.628E-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	2.408E-03	2.580E-03	3.723E-03	0.829	0.889	1.282	0.93	0.65	0.69
CM246	2.724E-04	2.867E-04	3.659E-04	0.883	0.930	1.187	0.95	0.74	0.78

AVERAGE-ABSOLUTE-DEVIATION, AS %	11.46	13.91	17.79	15.9	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	9.39	11.01	13.37	14.6	33.2	41.1
AV-ABS-DEV EXCLUDING LARGEST TWO, %	8.01	8.07	9.74	13.5	17.3	26.6

NUCS EXCLUDED, 1ST/2ND: SE 79 PU238 AM241 / SM147 CM242 NP237

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) WATTS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.529E-04	1.081E-04	9.887E-05	1.275	0.901	0.824	1.41	1.55	1.09	1.529E-04	1.081E-04	9.886E-05	1.275	0.901	0.824	1.41	1.55	1.09
KR 85	2.049E+01	2.036E+01	2.046E+01	1.003	0.996	1.001	1.01	1.00	1.00	1.491E+01	1.482E+01	1.489E+01	1.003	0.996	1.001	1.01	1.00	1.00
SR 89	1.896E+03	1.941E+03	1.959E+03	0.981	1.005	1.014	0.98	0.97	0.99	3.715E-08	3.800E-08	3.842E-08	0.981	1.004	1.015	0.98	0.97	0.99
SR 90	1.261E+02	1.252E+02	1.278E+02	0.998	0.991	1.011	1.01	0.99	0.98	1.121E+02	1.114E+02	1.137E+02	0.997	0.991	1.011	1.01	0.99	0.98
Y 90	6.025E+02	5.980E+02	6.116E+02	0.997	0.990	1.013	1.01	0.99	0.98	5.357E+02	5.320E+02	5.440E+02	0.997	0.990	1.013	1.01	0.98	0.98
Y 91	2.773E+03	2.827E+03	2.891E+03	0.980	0.999	1.021	0.98	0.96	0.98	1.588E-06	1.619E-06	1.658E-06	0.979	0.998	1.022	0.98	0.96	0.98
ZR 93	3.152E-04	3.172E-04	0.0	0.997	1.003	0.0	0.99	0.0	0.0	3.152E-04	3.172E-04	0.0	0.997	1.003	0.0	0.99	0.0	0.0
ZR 95	5.886E+03	5.988E+03	6.030E+03	0.986	1.003	1.010	0.98	0.98	0.99	2.082E-05	2.115E-05	2.211E-05	0.975	0.990	1.035	0.98	0.94	0.96
NB 95	7.217E+03	7.326E+03	7.397E+03	0.987	1.002	1.011	0.99	0.98	0.99	4.378E-05	4.447E-05	4.651E-05	0.975	0.990	1.035	0.98	0.94	0.96
TC 99	9.378E-03	9.643E-03	9.580E-03	0.984	1.011	1.005	0.97	0.98	1.01	9.378E-03	9.643E-03	9.580E-03	0.984	1.011	1.005	0.97	0.98	1.01
RU106	4.012E+01	3.721E+01	0.0	1.038	0.962	0.0	1.08	0.0	0.0	1.364E+00	1.265E+00	0.0	1.038	0.962	0.0	1.08	0.0	0.0
PD107	1.011E-05	8.474E-06	9.536E-06	1.079	0.904	1.017	1.19	1.06	0.89	1.011E-05	8.474E-06	9.536E-06	1.079	0.904	1.017	1.19	1.06	0.89
SN126	1.423E-03	1.040E-03	0.0	1.156	0.844	0.0	1.37	0.0	0.0	1.423E-03	1.040E-03	0.0	1.156	0.844	0.0	1.37	0.0	0.0
SB125	5.897E+01	4.112E+01	3.369E+01	1.322	0.922	0.756	1.43	1.75	1.22	1.724E+01	1.202E+01	9.849E+00	1.322	0.922	0.756	1.43	1.75	1.22
I129	2.144E-05	2.283E-05	2.101E-05	0.985	1.049	0.966	0.94	1.02	1.09	2.151E-05	2.291E-05	2.110E-05	0.985	1.049	0.966	0.94	1.02	1.09
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	2.865E+03	2.696E+03	2.817E+03	1.026	0.965	1.009	1.06	1.02	0.96	5.485E+02	5.161E+02	5.394E+02	1.026	0.965	1.009	1.06	1.02	0.96
CS135	2.178E-04	2.405E-04	2.352E-04	0.942	1.040	1.017	0.91	0.93	1.02	2.178E-04	2.405E-04	2.352E-04	0.942	1.040	1.017	0.91	0.93	1.02
CS137	1.718E+02	1.708E+02	0.0	1.003	0.997	0.0	1.01	0.0	0.0	1.533E+02	1.526E+02	0.0	1.002	0.998	0.0	1.00	0.0	0.0
CE144	8.299E+02	8.314E+02	0.0	0.999	1.001	0.0	1.00	0.0	0.0	1.039E+01	1.042E+01	0.0	0.999	1.001	0.0	1.00	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	2.212E-11	2.194E-11	0.0	1.004	0.996	0.0	0.0	1.01	0.0	2.733E-11	2.731E-11	0.0	1.000	1.000	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	4.957E+01	7.273E+01	6.776E+01	0.782	1.148	1.070	0.68	0.73	1.07	1.363E+01	1.996E+01	1.860E+01	0.783	1.147	1.069	0.68	0.73	1.07
SM147	2.846E-08	3.107E-08	3.313E-08	0.921	1.006	1.073	0.92	0.86	0.94	6.248E-08	8.208E-08	7.958E-08	0.836	1.099	1.065	0.76	0.79	1.03
SM148	1.107E-12	7.623E-13	0.0	1.184	0.816	0.0	1.45	0.0	0.0	1.111E-12	7.659E-13	0.0	1.184	0.816	0.0	1.45	0.0	0.0
SM149	0.0	1.496E-14	1.292E-14	0.0	1.073	0.927	0.0	0.0	1.16	0.0	1.496E-14	1.292E-14	0.0	1.073	0.927	0.0	0.0	1.16
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	5.874E-02	7.304E-02	5.357E-02	0.951	1.182	0.867	0.80	1.10	1.36	5.656E-02	7.033E-02	5.157E-02	0.951	1.182	0.867	0.80	1.10	1.36
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.674E+02	1.704E+02	1.497E+02	1.030	1.049	0.921	0.98	1.12	1.14	1.126E+02	1.146E+02	1.007E+02	1.030	1.049	0.921	0.98	1.12	1.14
EU155	8.648E+00	9.292E+00	8.536E+00	0.980	1.053	0.967	0.93	1.01	1.09	4.349E+00	4.673E+00	4.293E+00	0.980	1.053	0.967	0.93	1.01	1.09
U234	3.583E-02	3.631E-02	3.551E-02	0.999	1.012	0.990	0.99	1.01	1.02	3.795E-02	3.866E-02	3.617E-02	1.010	1.028	0.962	0.98	1.05	1.07
U235	4.583E-04	4.883E-04	5.484E-04	0.920	0.980	1.100	0.94	0.84	0.89	4.583E-04	4.884E-04	5.484E-04	0.920	0.980	1.100	0.94	0.84	0.89
U236	1.056E-02	1.058E-02	1.052E-02	1.001	1.002	0.997	1.00	1.00	1.01	1.056E-02	1.058E-02	1.052E-02	1.001	1.002	0.997	1.00	1.00	1.01
U238	7.864E-03	7.851E-03	7.844E-03	1.001	1.000	0.999	1.00	1.00	1.00	7.864E-03	7.851E-03	7.844E-03	1.001	1.000	0.999	1.00	1.00	1.00
NP237	1.655E-02	1.737E-02	1.588E-02	0.997	1.046	0.957	0.95	1.04	1.09	1.661E-02	1.743E-02	1.589E-02	0.998	1.047	0.955	0.95	1.05	1.10
PU238	1.684E+02	1.875E+02	1.592E+02	0.981	1.092	0.927	0.90	1.06	1.18	1.726E+02	1.916E+02	1.645E+02	0.979	1.087	0.933	0.90	1.05	1.17
PU239	1.118E+01	1.231E+01	1.115E+01	0.968	1.066	0.966	0.91	1.00	1.10	1.118E+01	1.231E+01	1.115E+01	0.968	1.066	0.966	0.91	1.00	1.10
PU240	1.894E+01	1.827E+01	1.676E+01	1.053	1.016	0.932	1.04	1.13	1.09	1.902E+01	1.835E+01	1.675E+01	1.054	1.017	0.929	1.04	1.14	1.10
PU241	5.345E+00	5.943E+00	6.034E+00	0.926	1.029	1.045	0.90	0.89	0.98	4.218E+00	4.713E+00	4.785E+00	0.923	1.031	1.047	0.89	0.88	0.98
PU242	8.806E-02	8.716E-02	1.051E-01	0.942	0.933	1.125	1.01	0.84	0.83	8.806E-02	8.716E-02	1.051E-01	0.942	0.933	1.125	1.01	0.84	0.83
AM241	7.170E+00	7.456E+00	8.311E+00	0.938	0.975	1.087	0.96	0.86	0.90	4.717E+01	5.064E+01	5.242E+01	0.942	1.011	1.047	0.93	0.90	0.97
AM242	1.328E-02	2.248E-02	1.093E-02	0.853	1.444	0.702	0.59	1.21	2.06	1.298E-02	2.198E-02	1.069E-02	0.853	1.444	0.703	0.59	1.21	2.06
AM243	1.184E+00	1.314E+00	1.572E+00	0.873	0.969	1.159	0.90	0.75	0.84	1.184E+00	1.314E+00	1.571E+00	0.873	0.969	1.158	0.90	0.75	0.84
CM242	2.414E+03	2.529E+03	2.552E+03	0.966	1.012	1.021	0.95	0.95	0.99	1.523E+00	1.819E+00	1.507E+00	0.942	1.125	0.932	0.84	1.01	1.21
CM243	1.624E+00	3.457E-01	1.458E+00	1.421	0.303	1.276	4.70	1.11	0.24	1.441E+00	3.067E-01	1.294E+00	1.421	0.303	1.276	4.70	1.11	0.24
CM244	2.065E+02	2.043E+02	2.775E+02	0.900	0.891	1.209	1.01	0.74	0.74	1.710E+02	1.693E+02	2.299E+02	0.900	0.891	1.209	1.01	0.74	0.74
CM245	1.955E-02	2.096E-02	3.413E-02	0.786	0.842	1.372	0.93	0.57	0.61	1.954E-02	2.095E-02	3.412E-02	0.786	0.842	1.372	0.93	0.57	0.61
CM246	5.109E-03	5.812E-03	8.151E-03	0.804	0.914	1.282	0.88	0.63	0.71	5.106E-03	5.808E-03	8.145E-03	0.804	0.914	1.282	0.88	0.63	0.71
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.60	7.24	8.35	18.5	12.9	13.8				7.93	7.72	8.54	19.2	13.2	14.4
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.77	5.53	6.57	8.5	10.9	9.3				6.13	6.05	6.77	9.2	11.2	9.9
AV-ABS-DEV EXCLUDING LARGEST TWO, %				4.57	4.34	4.88	6.7	9.6	9.3				4.96	4.90	5.10	7.5	9.9	9.9
NUCS EXCLUDED, 1ST/2ND:			SB125 CM243	CM245 / SE 79		AM242	CM246					SB125 CM243	CM245 / SE 79		AM242	CM246		

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) WATTS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.529E-04	1.081E-04	9.886E-05	1.275	0.901	0.824	1.41	1.55	1.09	1.529E-04	1.081E-04	9.885E-05	1.275	0.901	0.824	1.41	1.55	1.09
KR 85	1.079E+01	1.072E+01	1.077E+01	1.003	0.996	1.001	1.01	1.00	0.99	5.651E+00	5.617E+00	5.644E+00	1.002	0.996	1.001	1.01	1.00	1.00
SR 89	4.822E-19	4.929E-19	4.992E-19	0.981	1.003	1.016	0.98	0.97	0.99	0.0	0.0	8.429E-41	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	9.957E+01	9.887E+01	1.009E+02	0.998	0.991	1.011	1.01	0.99	0.98	7.848E+01	7.793E+01	7.954E+01	0.998	0.991	1.011	1.01	0.99	0.98
Y 90	4.756E+02	4.723E+02	4.830E+02	0.997	0.990	1.013	1.01	0.98	0.98	3.748E+02	3.722E+02	3.807E+02	0.997	0.990	1.013	1.01	0.98	0.98
Y 91	6.375E-16	6.495E-16	6.663E-16	0.979	0.998	1.023	0.98	0.96	0.97	1.027E-34	0.0	1.076E-34	0.977	0.0	1.023	0.0	0.95	0.0
ZR 93	3.152E-04	3.172E-04	0.0	0.997	1.003	0.0	0.99	0.0	0.0	3.152E-04	3.172E-04	0.0	0.997	1.003	0.0	0.99	0.0	0.0
ZR 95	5.323E-14	5.396E-14	5.861E-14	0.963	0.976	1.061	0.99	0.91	0.92	3.478E-31	0.0	4.119E-31	0.916	0.0	1.084	0.0	0.84	0.0
NB 95	1.119E-13	1.134E-13	1.233E-13	0.963	0.976	1.061	0.99	0.91	0.92	7.312E-31	0.0	8.664E-31	0.915	0.0	1.085	0.0	0.84	0.0
TC 99	9.378E-03	9.643E-03	9.580E-03	0.984	1.011	1.005	0.97	0.98	1.01	9.377E-03	9.642E-03	9.579E-03	0.984	1.011	1.005	0.97	0.98	1.01
RU106	4.380E-02	4.062E-02	0.0	1.038	0.962	0.0	1.08	0.0	0.0	4.664E-05	4.191E-05	0.0	1.053	0.947	0.0	1.11	0.0	0.0
PD107	1.011E-05	8.474E-06	9.536E-06	1.079	0.904	1.017	1.19	1.06	0.89	1.011E-05	8.474E-06	9.536E-06	1.079	0.904	1.017	1.19	1.06	0.89
SN126	1.423E-03	1.040E-03	0.0	1.156	0.844	0.0	1.37	0.0	0.0	1.423E-03	1.040E-03	0.0	1.156	0.844	0.0	1.37	0.0	0.0
SB125	4.933E+00	3.440E+00	2.819E+00	1.322	0.922	0.756	1.43	1.75	1.22	4.040E-01	2.817E-01	2.308E-01	1.322	0.922	0.756	1.43	1.75	1.22
I129	2.151E-05	2.291E-05	2.110E-05	0.985	1.049	0.966	0.94	1.02	1.09	2.151E-05	2.291E-05	2.110E-05	0.985	1.049	0.966	0.94	1.02	1.09
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.021E+02	9.610E+01	1.004E+02	1.026	0.965	1.009	1.06	1.02	0.96	3.542E+00	3.332E+00	3.483E+00	1.026	0.965	1.009	1.06	1.02	0.96
CS135	2.178E-04	2.405E-04	2.352E-04	0.942	1.040	1.017	0.91	0.93	1.02	2.178E-04	2.405E-04	2.352E-04	0.942	1.040	1.017	0.91	0.93	1.02
CS137	1.366E+02	1.360E+02	0.0	1.002	0.998	0.0	1.00	0.0	0.0	1.084E+02	1.081E+02	0.0	1.001	0.999	0.0	1.00	0.0	0.0
CE144	1.210E-01	1.213E-01	0.0	0.999	1.001	0.0	1.00	0.0	0.0	1.640E-05	1.645E-05	0.0	0.998	1.002	0.0	1.00	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	2.740E-11	2.737E-11	0.0	1.000	1.000	0.0	0.0	1.00	0.0	2.740E-11	2.737E-11	0.0	1.000	1.000	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	3.638E+00	5.325E+00	4.963E+00	0.784	1.147	1.069	0.68	0.73	1.07	2.590E-01	3.791E-01	3.534E-01	0.784	1.147	1.069	0.68	0.73	1.07
SM147	7.183E-08	9.610E-08	9.235E-08	0.828	1.108	1.064	0.75	0.78	1.04	7.499E-08	1.008E-07	9.666E-08	0.826	1.110	1.064	0.74	0.78	1.04
SM148	1.111E-12	7.659E-13	0.0	1.184	0.816	0.0	1.45	0.0	0.0	1.111E-12	7.659E-13	0.0	1.184	0.816	0.0	1.45	0.0	0.0
SM149	0.0	1.496E-14	1.292E-14	0.0	1.073	0.927	0.0	0.0	1.16	0.0	1.496E-14	1.292E-14	0.0	1.073	0.927	0.0	0.0	1.16
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	5.442E-02	6.767E-02	4.963E-02	0.951	1.182	0.867	0.80	1.10	1.36	5.039E-02	6.265E-02	4.595E-02	0.951	1.182	0.867	0.80	1.10	1.36
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	7.525E+01	7.661E+01	6.729E+01	1.030	1.049	0.921	0.98	1.12	1.14	3.361E+01	3.422E+01	3.005E+01	1.030	1.049	0.921	0.98	1.12	1.14
EU155	2.162E+00	2.323E+00	2.135E+00	0.980	1.053	0.967	0.93	1.01	1.09	5.344E-01	5.744E-01	5.277E-01	0.980	1.053	0.967	0.93	1.01	1.09
U234	4.003E-02	4.098E-02	3.683E-02	1.019	1.043	0.938	0.98	1.09	1.11	4.396E-02	4.534E-02	3.808E-02	1.035	1.068	0.897	0.97	1.15	1.19
U235	4.584E-04	4.884E-04	5.484E-04	0.920	0.980	1.100	0.94	0.84	0.89	4.585E-04	4.885E-04	5.484E-04	0.920	0.980	1.100	0.94	0.84	0.89
U236	1.056E-02	1.058E-02	1.052E-02	1.001	1.002	0.997	1.00	1.00	1.01	1.057E-02	1.059E-02	1.052E-02	1.001	1.003	0.996	1.00	1.00	1.01
U238	7.864E-03	7.851E-03	7.844E-03	1.001	1.000	0.999	1.00	1.00	1.00	7.864E-03	7.851E-03	7.844E-03	1.001	1.000	0.999	1.00	1.00	1.00
NP237	1.670E-02	1.753E-02	1.589E-02	1.000	1.049	0.951	0.95	1.05	1.10	1.701E-02	1.786E-02	1.589E-02	1.005	1.056	0.939	0.95	1.07	1.12
PU238	1.660E+02	1.842E+02	1.581E+02	0.980	1.087	0.933	0.90	1.05	1.17	1.534E+02	1.702E+02	1.461E+02	0.980	1.087	0.933	0.90	1.05	1.16
PU239	1.118E+01	1.231E+01	1.115E+01	0.968	1.066	0.965	0.91	1.00	1.10	1.117E+01	1.230E+01	1.114E+01	0.968	1.066	0.966	0.91	1.00	1.10
PU240	1.908E+01	1.841E+01	1.674E+01	1.055	1.018	0.926	1.04	1.14	1.10	1.917E+01	1.850E+01	1.673E+01	1.057	1.020	0.922	1.04	1.15	1.11
PU241	3.316E+00	3.723E+00	3.780E+00	0.919	1.032	1.048	0.89	0.88	0.98	2.049E+00	2.323E+00	2.359E+00	0.913	1.035	1.051	0.88	0.87	0.98
PU242	8.806E-02	8.716E-02	1.051E-01	0.942	0.933	1.125	1.01	0.84	0.83	8.806E-02	8.716E-02	1.051E-01	0.942	0.933	1.125	1.01	0.84	0.83
AM241	7.887E+01	8.503E+01	8.754E+01	0.941	1.014	1.044	0.93	0.90	0.97	1.224E+02	1.327E+02	1.362E+02	0.938	1.017	1.044	0.92	0.90	0.97
AM242	1.269E-02	2.149E-02	1.045E-02	0.853	1.445	0.702	0.59	1.21	2.06	1.213E-02	2.053E-02	9.984E-03	0.853	1.444	0.702	0.59	1.21	2.06
AM243	1.183E+00	1.313E+00	1.571E+00	0.873	0.969	1.159	0.90	0.75	0.84	1.182E+00	1.312E+00	1.569E+00	0.873	0.969	1.159	0.90	0.75	0.84
CM242	3.413E-01	5.775E-01	2.777E-01	0.856	1.448	0.696	0.59	1.23	2.08	3.255E-01	5.510E-01	2.648E-01	0.856	1.448	0.696	0.59	1.23	2.08
CM243	1.276E+00	2.716E-01	1.146E+00	1.421	0.303	1.276	4.70	1.11	0.24	1.000E+00	2.130E-01	8.982E-01	1.421	0.303	1.276	4.69	1.11	0.24
CM244	1.412E+02	1.398E+02	1.898E+02	0.900	0.891	1.210	1.01	0.74	0.74	9.633E+01	9.533E+01	1.295E+02	0.900	0.891	1.209	1.01	0.74	0.74
CM245	1.953E-02	2.094E-02	3.410E-02	0.786	0.842	1.372	0.93	0.57	0.61	1.952E-02	2.092E-02	3.407E-02	0.786	0.842	1.372	0.93	0.57	0.61
CM246	5.102E-03	5.803E-03	8.139E-03	0.804	0.914	1.282	0.88	0.63	0.71	5.095E-03	5.795E-03	8.127E-03	0.804	0.914	1.282	0.88	0.63	0.71
AVERAGE-ABSOLUTE-DEVIATION, AS %				8.23	8.57	9.35	19.8	14.2	16.9				8.73	9.41	9.84	21.8	15.1	18.6
AV-ABS-DEV EXCLUDING LARGEST ONE, %				6.46	6.96	7.66	9.9	12.2	12.6				6.95	7.70	8.14	11.0	13.2	13.9
AV-ABS-DEV EXCLUDING LARGEST TWO, %				5.32	5.87	6.04	7.3	10.6	10.0				5.82	6.55	6.52	8.1	11.6	11.0
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / SE 79		CM242		CM246			SB125	CM243	CM245 / SE 79		CM242		CM246	

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) WATTS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.528E-04	1.080E-04	9.881E-05	1.275	0.901	0.824	1.41	1.55	1.09	1.527E-04	1.080E-04	9.876E-05	1.274	0.901	0.824	1.41	1.55	1.09
KR 85	8.123E-01	8.072E-01	8.112E-01	1.003	0.996	1.001	1.01	1.00	1.00	3.204E-02	3.183E-02	3.199E-02	1.003	0.996	1.001	1.01	1.00	0.99
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	3.843E+01	3.815E+01	3.895E+01	0.998	0.991	1.011	1.01	0.99	0.98	1.169E+01	1.160E+01	1.185E+01	0.998	0.990	1.011	1.01	0.99	0.98
Y 90	1.835E+02	1.822E+02	1.864E+02	0.997	0.990	1.013	1.01	0.98	0.98	5.583E+01	5.543E+01	5.669E+01	0.997	0.990	1.013	1.01	0.98	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	3.152E-04	3.172E-04	0.0	0.997	1.003	0.0	0.99	0.0	0.0	3.152E-04	3.172E-04	0.0	0.997	1.003	0.0	0.99	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	9.377E-03	9.641E-03	9.578E-03	0.984	1.011	1.005	0.97	0.98	1.01	9.375E-03	9.640E-03	9.577E-03	0.984	1.011	1.005	0.97	0.98	1.01
RU106	5.123E-14	4.602E-14	0.0	1.054	0.946	0.0	1.11	0.0	0.0	5.990E-29	5.378E-29	0.0	1.054	0.946	0.0	1.11	0.0	0.0
PD107	1.011E-05	8.474E-06	9.536E-06	1.079	0.904	1.017	1.19	1.06	0.89	1.011E-05	8.474E-06	9.536E-06	1.079	0.904	1.017	1.19	1.06	0.89
SN126	1.423E-03	1.040E-03	0.0	1.156	0.844	0.0	1.37	0.0	0.0	1.422E-03	1.039E-03	0.0	1.156	0.844	0.0	1.37	0.0	0.0
SB125	2.218E-04	1.546E-04	1.268E-04	1.322	0.922	0.756	1.43	1.75	1.22	8.163E-10	5.690E-10	4.668E-10	1.322	0.922	0.756	1.43	1.75	1.22
I129	2.151E-05	2.291E-05	2.110E-05	0.985	1.049	0.966	0.94	1.02	1.09	2.151E-05	2.291E-05	2.110E-05	0.985	1.049	0.966	0.94	1.02	1.09
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.477E-04	1.389E-04	1.453E-04	1.026	0.965	1.009	1.06	1.02	0.96	7.410E-12	6.962E-12	7.287E-12	1.026	0.964	1.009	1.06	1.02	0.96
CS135	2.178E-04	2.405E-04	2.352E-04	0.942	1.040	1.017	0.91	0.93	1.02	2.178E-04	2.405E-04	2.352E-04	0.942	1.040	1.017	0.91	0.93	1.02
CS137	5.420E+01	5.425E+01	0.0	1.000	1.000	0.0	1.00	0.0	0.0	1.707E+01	1.720E+01	0.0	0.996	1.004	0.0	0.99	0.0	0.0
CE144	4.082E-17	4.105E-17	0.0	0.997	1.003	0.0	0.99	0.0	0.0	1.866E-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	2.740E-11	2.737E-11	0.0	1.000	1.000	0.0	0.0	1.00	0.0	2.740E-11	2.737E-11	0.0	1.000	1.000	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	9.354E-05	1.368E-04	1.276E-04	0.784	1.147	1.069	0.68	0.73	1.07	1.713E-10	2.501E-10	2.334E-10	0.785	1.146	1.069	0.68	0.73	1.07
SM147	7.524E-08	1.012E-07	9.700E-08	0.825	1.110	1.064	0.74	0.78	1.04	7.524E-08	1.012E-07	9.700E-08	0.825	1.110	1.064	0.74	0.78	1.04
SM148	1.111E-12	7.659E-13	0.0	1.184	0.816	0.0	1.45	0.0	0.0	1.111E-12	7.659E-13	0.0	1.184	0.816	0.0	1.45	0.0	0.0
SM149	0.0	1.496E-14	1.292E-14	0.0	1.073	0.927	0.0	0.0	1.16	0.0	1.496E-14	1.292E-14	0.0	1.073	0.927	0.0	0.0	1.16
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.999E-02	4.973E-02	3.647E-02	0.951	1.182	0.867	0.80	1.10	1.36	2.721E-02	3.383E-02	2.481E-02	0.951	1.182	0.867	0.80	1.10	1.36
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	2.995E+00	3.048E+00	2.678E+00	1.030	1.049	0.921	0.98	1.12	1.14	5.325E-02	5.417E-02	4.759E-02	1.031	1.048	0.921	0.98	1.12	1.14
EU155	8.072E-03	8.677E-03	7.972E-03	0.980	1.053	0.967	0.93	1.01	1.09	7.445E-06	8.010E-06	7.360E-06	0.979	1.053	0.968	0.93	1.01	1.09
U234	5.405E-02	5.654E-02	4.129E-02	1.068	1.117	0.816	0.96	1.31	1.37	6.637E-02	7.022E-02	4.520E-02	1.095	1.159	0.746	0.95	1.47	1.55
U235	4.588E-04	4.888E-04	5.484E-04	0.920	0.980	1.100	0.94	0.84	0.89	4.592E-04	4.894E-04	5.484E-04	0.920	0.981	1.099	0.94	0.84	0.89
U236	1.058E-02	1.060E-02	1.052E-02	1.001	1.003	0.996	1.00	1.01	1.01	1.061E-02	1.063E-02	1.052E-02	1.002	1.004	0.994	1.00	1.01	1.01
U238	7.864E-03	7.851E-03	7.844E-03	1.001	1.000	0.999	1.00	1.00	1.00	7.864E-03	7.851E-03	7.844E-03	1.001	1.000	0.999	1.00	1.00	1.00
NP237	1.838E-02	1.935E-02	1.589E-02	1.028	1.083	0.889	0.95	1.16	1.22	2.098E-02	2.221E-02	1.589E-02	1.065	1.128	0.807	0.94	1.32	1.40
PU238	1.211E+02	1.344E+02	1.153E+02	0.980	1.087	0.933	0.90	1.05	1.17	8.164E+01	9.068E+01	7.776E+01	0.979	1.088	0.933	0.90	1.05	1.17
PU239	1.117E+01	1.229E+01	1.113E+01	0.969	1.066	0.966	0.91	1.00	1.10	1.115E+01	1.228E+01	1.112E+01	0.968	1.066	0.965	0.91	1.00	1.10
PU240	1.927E+01	1.861E+01	1.667E+01	1.060	1.023	0.917	1.04	1.16	1.12	1.924E+01	1.857E+01	1.658E+01	1.061	1.024	0.915	1.04	1.16	1.12
PU241	4.835E-01	5.645E-01	5.733E-01	0.895	1.045	1.061	0.86	0.84	0.98	4.357E-02	5.343E-02	5.426E-02	0.864	1.060	1.076	0.82	0.80	0.98
PU242	8.806E-02	8.716E-02	1.051E-01	0.942	0.933	1.125	1.01	0.84	0.83	8.805E-02	8.716E-02	1.051E-01	0.942	0.933	1.125	1.01	0.84	0.83
AM241	1.709E+02	1.867E+02	1.914E+02	0.934	1.020	1.046	0.92	0.89	0.98	1.726E+02	1.894E+02	1.941E+02	0.931	1.022	1.047	0.91	0.89	0.98
AM242	1.058E-02	1.790E-02	8.707E-03	0.854	1.444	0.702	0.59	1.22	2.06	8.419E-03	1.425E-02	6.932E-03	0.853	1.444	0.703	0.59	1.21	2.06
AM243	1.179E+00	1.308E+00	1.565E+00	0.873	0.968	1.159	0.90	0.75	0.84	1.173E+00	1.302E+00	1.557E+00	0.873	0.969	1.159	0.90	0.75	0.84
CM242	2.839E-01	4.806E-01	2.310E-01	0.856	1.448	0.696	0.59	1.23	2.08	2.260E-01	3.826E-01	1.839E-01	0.856	1.448	0.696	0.59	1.23	2.08
CM243	4.823E-01	1.027E-01	4.330E-01	1.421	0.303	1.276	4.70	1.11	0.24	1.430E-01	3.043E-02	1.283E-01	1.422	0.303	1.276	4.70	1.11	0.24
CM244	3.055E+01	3.023E+01	4.106E+01	0.900	0.890	1.210	1.01	0.74	0.74	4.508E+00	4.460E+00	6.058E+00	0.900	0.890	1.209	1.01	0.74	0.74
CM245	1.947E-02	2.087E-02	3.399E-02	0.786	0.842	1.372	0.93	0.57	0.61	1.939E-02	2.079E-02	3.385E-02	0.786	0.842	1.372	0.93	0.57	0.61
CM246	5.072E-03	5.770E-03	8.092E-03	0.804	0.914	1.282	0.88	0.63	0.71	5.035E-03	5.727E-03	8.033E-03	0.804	0.914	1.282	0.88	0.63	0.71
AVERAGE-ABSOLUTE-DEVIATION, AS %				9.12	9.64	10.56	21.9	16.3	19.4				9.63	10.14	11.05	22.7	17.4	20.5
AV-ABS-DEV EXCLUDING LARGEST ONE, %				7.22	7.94	8.76	11.1	14.3	14.8				7.72	8.44	9.30	11.6	15.5	15.9
AV-ABS-DEV EXCLUDING LARGEST TWO, %				6.01	6.81	7.04	8.3	12.6	11.9				6.52	7.33	7.63	8.7	13.9	13.2
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM245 / SE 79		CM242	CM246				SB125	CM243	CM245 / SE 79		CM242	CM246		

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) WATTS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.524E-04	1.077E-04	9.855E-05	1.275	0.901	0.824	1.42	1.55	1.09	1.513E-04	1.069E-04	9.782E-05	1.275	0.901	0.824	1.42	1.55	1.09
KR 85	7.753E-08	7.695E-08	7.739E-08	1.003	0.996	1.001	1.01	1.00	0.99	1.709E-27	1.696E-27	1.704E-27	1.004	0.996	1.001	1.01	1.00	1.00
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	1.001E-01	9.930E-02	1.014E-01	0.998	0.990	1.011	1.01	0.99	0.98	5.813E-09	5.763E-09	5.883E-09	0.999	0.990	1.011	1.01	0.99	0.98
Y 90	4.781E-01	4.743E-01	4.853E-01	0.998	0.990	1.013	1.01	0.99	0.98	2.777E-08	2.753E-08	2.815E-08	0.998	0.990	1.012	1.01	0.99	0.98
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	3.152E-04	3.171E-04	0.0	0.997	1.003	0.0	0.99	0.0	0.0	3.151E-04	3.170E-04	0.0	0.997	1.003	0.0	0.99	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	9.369E-03	9.634E-03	9.571E-03	0.984	1.011	1.005	0.97	0.98	1.01	9.348E-03	9.612E-03	9.549E-03	0.984	1.011	1.005	0.97	0.98	1.01
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.011E-05	8.474E-06	9.536E-06	1.079	0.904	1.017	1.19	1.06	0.89	1.011E-05	8.473E-06	9.535E-06	1.079	0.904	1.017	1.19	1.06	0.89
SN126	1.420E-03	1.038E-03	0.0	1.155	0.845	0.0	1.37	0.0	0.0	1.413E-03	1.033E-03	0.0	1.155	0.845	0.0	1.37	0.0	0.0
SB125	0.0	0.0	8.584E-32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	2.151E-05	2.291E-05	2.110E-05	0.985	1.049	0.966	0.94	1.02	1.09	2.151E-05	2.291E-05	2.110E-05	0.985	1.049	0.966	0.94	1.02	1.09
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	4.612E-41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	2.178E-04	2.405E-04	2.352E-04	0.942	1.040	1.017	0.91	0.93	1.02	2.178E-04	2.405E-04	2.351E-04	0.942	1.040	1.017	0.91	0.93	1.02
CS137	1.680E-01	1.737E-01	0.0	0.983	1.017	0.0	0.97	0.0	0.0	1.589E-08	1.799E-08	0.0	0.938	1.062	0.0	0.88	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	2.740E-11	2.737E-11	0.0	1.000	1.000	0.0	0.0	1.00	0.0	2.740E-11	2.737E-11	0.0	1.000	1.000	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	2.618E-33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	7.524E-08	1.012E-07	9.700E-08	0.825	1.110	1.064	0.74	0.78	1.04	7.524E-08	1.012E-07	9.700E-08	0.825	1.110	1.064	0.74	0.78	1.04
SM148	1.111E-12	7.659E-13	0.0	1.184	0.816	0.0	1.45	0.0	0.0	1.111E-12	7.659E-13	0.0	1.184	0.816	0.0	1.45	0.0	0.0
SM149	0.0	1.496E-14	1.292E-14	0.0	1.073	0.927	0.0	0.0	1.16	0.0	1.496E-14	1.292E-14	0.0	1.073	0.927	0.0	0.0	1.16
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	5.830E-03	7.250E-03	5.317E-03	0.951	1.182	0.867	0.80	1.10	1.36	2.654E-05	3.304E-05	2.423E-05	0.950	1.183	0.867	0.80	1.10	1.36
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	5.318E-09	5.403E-09	4.750E-09	1.031	1.048	0.921	0.98	1.12	1.14	0.0	0.0	1.492E-33	0.0	0.0	0.0	0.0	0.0	0.0
EU155	5.390E-18	5.817E-18	5.347E-18	0.977	1.054	0.969	0.93	1.01	1.09	0.0	0.0	1.748E-60	0.0	0.0	0.0	0.0	0.0	0.0
U234	8.659E-02	9.270E-02	5.165E-02	1.125	1.204	0.671	0.93	1.68	1.79	9.172E-02	9.845E-02	5.326E-02	1.130	1.213	0.656	0.93	1.72	1.85
U235	4.611E-04	4.914E-04	5.484E-04	0.922	0.982	1.096	0.94	0.84	0.90	4.675E-04	4.985E-04	5.484E-04	0.926	0.988	1.086	0.94	0.85	0.91
U236	1.071E-02	1.072E-02	1.052E-02	1.006	1.006	0.988	1.00	1.02	1.02	1.103E-02	1.104E-02	1.052E-02	1.015	1.016	0.969	1.00	1.05	1.05
U238	7.864E-03	7.851E-03	7.844E-03	1.001	1.000	0.999	1.00	1.00	1.00	7.864E-03	7.851E-03	7.844E-03	1.001	1.000	0.999	1.00	1.00	1.00
NP237	2.987E-02	3.196E-02	1.589E-02	1.153	1.234	0.613	0.93	1.88	2.01	4.571E-02	4.936E-02	1.589E-02	1.236	1.335	0.430	0.93	2.88	3.11
PU238	1.691E+01	1.884E+01	1.610E+01	0.978	1.090	0.931	0.90	1.05	1.17	7.429E-02	8.697E-02	6.972E-02	0.965	1.130	0.906	0.85	1.07	1.25
PU239	1.109E+01	1.222E+01	1.105E+01	0.968	1.067	0.965	0.91	1.00	1.11	1.089E+01	1.200E+01	1.083E+01	0.969	1.067	0.964	0.91	1.01	1.11
PU240	1.884E+01	1.819E+01	1.624E+01	1.061	1.024	0.914	1.04	1.16	1.12	1.750E+01	1.689E+01	1.508E+01	1.061	1.024	0.914	1.04	1.16	1.12
PU241	2.072E-05	2.404E-05	4.352E-06	1.266	1.468	0.266	0.86	4.76	5.52	1.686E-05	1.866E-05	2.013E-20	1.424	1.576	0.000	0.90	****	****
PU242	8.803E-02	8.715E-02	1.051E-01	0.942	0.933	1.125	1.01	0.84	0.83	8.793E-02	8.705E-02	1.049E-01	0.942	0.933	1.125	1.01	0.84	0.83
AM241	1.264E+02	1.388E+02	1.423E+02	0.931	1.022	1.047	0.91	0.89	0.98	4.116E+01	4.519E+01	4.630E+01	0.931	1.022	1.047	0.91	0.89	0.98
AM242	3.382E-03	5.725E-03	2.785E-03	0.853	1.444	0.702	0.59	1.21	2.06	1.390E-04	2.352E-04	1.144E-04	0.853	1.444	0.702	0.59	1.22	2.06
AM243	1.151E+00	1.278E+00	1.528E+00	0.873	0.969	1.159	0.90	0.75	0.84	1.078E+00	1.197E+00	1.431E+00	0.873	0.969	1.158	0.90	0.75	0.84
CM242	9.079E-02	1.537E-01	7.386E-02	0.856	1.448	0.696	0.59	1.23	2.08	3.731E-03	6.314E-03	3.034E-03	0.856	1.448	0.696	0.59	1.23	2.08
CM243	1.104E-03	2.347E-04	9.905E-04	1.422	0.302	1.276	4.70	1.11	0.24	4.459E-11	9.480E-12	3.999E-11	1.422	0.302	1.275	4.70	1.12	0.24
CM244	2.135E-03	2.112E-03	2.870E-03	0.900	0.890	1.210	1.01	0.74	0.74	3.787E-12	4.886E-15	6.638E-15	2.991	0.004	0.005	****	****	0.74
CM245	1.908E-02	2.045E-02	3.330E-02	0.786	0.842	1.372	0.93	0.57	0.61	1.802E-02	1.931E-02	3.145E-02	0.786	0.842	1.372	0.93	0.57	0.61
CM246	4.890E-03	5.562E-03	7.801E-03	0.804	0.914	1.282	0.88	0.63	0.71	4.413E-03	5.020E-03	7.040E-03	0.804	0.914	1.282	0.88	0.63	0.71
AVERAGE-ABSOLUTE-DEVIATION, AS %				9.73	12.01	13.98	22.6	30.1	38.1				17.05	15.93	18.83	****	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %				7.57	9.27	11.34	12.0	18.5	23.1				9.03	10.15	12.51	25.3	23.0	30.1
AV-ABS-DEV EXCLUDING LARGEST TWO, %				6.69	7.55	9.75	10.1	15.6	17.2				7.55	8.08	9.70	13.7	16.6	21.4
NUCS EXCLUDED, 1ST/2ND:				SE 79	CM243	PU241 / SM147		CM242	NP237		CM244	CM243	PU241 / SE 79		CM242	NP237		

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) WATTS PER MTU

	ORIGEN2	ORIGEN-S	CINDER	10 KYR OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.374E-04	9.714E-05	8.886E-05	1.275	0.901	0.824	1.41	1.55	1.09
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	3.138E-04	3.158E-04	0.0	0.997	1.003	0.0	0.99	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	9.078E-03	9.334E-03	9.273E-03	0.984	1.011	1.005	0.97	0.98	1.01
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	1.010E-05	8.465E-06	9.526E-06	1.079	0.904	1.017	1.19	1.06	0.89
SN126	1.328E-03	9.705E-04	0.0	1.156	0.844	0.0	1.37	0.0	0.0
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	2.150E-05	2.290E-05	2.109E-05	0.985	1.049	0.966	0.94	1.02	1.09
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	2.172E-04	2.398E-04	2.345E-04	0.942	1.040	1.017	0.91	0.93	1.02
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	2.740E-11	2.737E-11	0.0	1.000	1.000	0.0	0.0	1.00
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	7.524E-08	1.012E-07	9.700E-08	0.825	1.110	1.064	0.74	0.78	1.04
SM148	1.111E-12	7.659E-13	0.0	1.184	0.816	0.0	1.45	0.0	0.0
SM149	0.0	1.496E-14	1.292E-14	0.0	1.073	0.927	0.0	0.0	1.16
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	2.084E-35	0.0	1.907E-35	1.044	0.0	0.956	0.0	1.09	0.0
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	8.966E-02	9.622E-02	5.193E-02	1.131	1.214	0.655	0.93	1.73	1.85
U235	5.405E-04	5.789E-04	5.484E-04	0.972	1.041	0.986	0.93	0.99	1.06
U236	1.364E-02	1.356E-02	1.052E-02	1.085	1.078	0.837	1.01	1.30	1.29
U238	7.864E-03	7.851E-03	7.844E-03	1.001	1.000	0.999	1.00	1.00	1.00
NP237	5.324E-02	5.762E-02	1.584E-02	1.261	1.364	0.375	0.92	3.36	3.64
PU238	1.204E-20	2.032E-20	9.722E-21	0.858	1.449	0.693	0.59	1.24	2.09
PU239	8.563E+00	9.430E+00	8.364E+00	0.975	1.073	0.952	0.91	1.02	1.13
PU240	6.737E+00	6.504E+00	5.817E+00	1.060	1.024	0.916	1.04	1.16	1.12
PU241	8.093E-06	8.957E-06	0.0	0.949	1.051	0.0	0.90	0.0	0.0
PU242	8.656E-02	8.566E-02	1.032E-01	0.943	0.933	1.124	1.01	0.84	0.83
AM241	8.698E-03	9.722E-03	2.494E-05	1.415	1.581	0.004	0.89	****	****
AM242	2.089E-22	3.527E-22	1.714E-22	0.855	1.443	0.702	0.59	1.22	2.06
AM243	4.630E-01	5.138E-01	6.146E-01	0.873	0.969	1.159	0.90	0.75	0.84
CM242	5.624E-21	9.496E-21	4.547E-21	0.858	1.449	0.694	0.59	1.24	2.09
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	3.782E-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	8.648E-03	9.271E-03	1.506E-02	0.787	0.843	1.370	0.93	0.57	0.62
CM246	1.181E-03	1.342E-03	1.883E-03	0.804	0.914	1.282	0.88	0.63	0.71

AVERAGE-ABSOLUTE-DEVIATION, AS %	11.86	14.56	18.97	15.8	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	9.79	11.68	14.64	14.7	31.1	40.2
AV-ABS-DEV EXCLUDING LARGEST TWO, %	8.37	8.95	11.55	13.8	19.0	30.6

NUCS EXCLUDED, 1ST/2ND: SE 79 PU238 AM241 / SM147 CM242 NP237

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) WATTS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	8.394E-05	5.966E-05	5.518E-05	1.267	0.900	0.833	1.41	1.52	1.08	8.393E-05	5.965E-05	5.518E-05	1.267	0.900	0.833	1.41	1.52	1.08
KR 85	1.136E+01	1.150E+01	1.181E+01	0.983	0.995	1.022	0.99	0.96	0.97	8.266E+00	8.366E+00	8.590E+00	0.983	0.995	1.022	0.99	0.96	0.97
SR 89	1.346E+03	1.395E+03	1.381E+03	0.980	1.015	1.005	0.96	0.97	1.01	2.637E-08	2.731E-08	2.708E-08	0.980	1.014	1.006	0.97	0.97	1.01
SR 90	6.888E+01	6.986E+01	7.286E+01	0.977	0.990	1.033	0.99	0.95	0.96	6.127E+01	6.214E+01	6.481E+01	0.977	0.990	1.033	0.99	0.95	0.96
Y 90	3.291E+02	3.337E+02	3.487E+02	0.976	0.990	1.034	0.99	0.94	0.96	2.927E+02	2.968E+02	3.102E+02	0.976	0.990	1.034	0.99	0.94	0.96
Y 91	1.960E+03	2.019E+03	2.020E+03	0.980	1.010	1.010	0.97	0.97	1.00	1.123E-06	1.156E-06	1.158E-06	0.980	1.009	1.011	0.97	0.97	1.00
ZR 93	1.732E-04	1.771E-04	0.0	0.989	1.011	0.0	0.98	0.0	0.0	1.732E-04	1.771E-04	0.0	0.989	1.011	0.0	0.98	0.0	0.0
ZR 95	4.130E+03	4.202E+03	4.125E+03	0.995	1.012	0.993	0.98	1.00	1.02	1.461E-05	1.484E-05	1.512E-05	0.983	0.999	1.018	0.98	0.97	0.98
NB 95	5.055E+03	5.144E+03	5.065E+03	0.994	1.011	0.995	0.98	1.00	1.02	3.072E-05	3.120E-05	3.181E-05	0.983	0.999	1.018	0.98	0.97	0.98
TC 99	5.572E-03	5.654E-03	5.664E-03	0.990	1.004	1.006	0.99	0.98	1.00	5.572E-03	5.654E-03	5.664E-03	0.990	1.004	1.006	0.99	0.98	1.00
RU106	2.560E+01	2.321E+01	0.0	1.049	0.951	0.0	1.10	0.0	0.0	8.701E-01	7.889E-01	0.0	1.049	0.951	0.0	1.10	0.0	0.0
PD107	5.812E-06	4.698E-06	4.982E-06	1.126	0.910	0.965	1.24	1.17	0.94	5.812E-06	4.698E-06	4.982E-06	1.126	0.910	0.965	1.24	1.17	0.94
SN126	7.920E-04	5.719E-04	0.0	1.161	0.839	0.0	1.38	0.0	0.0	7.920E-04	5.719E-04	0.0	1.161	0.839	0.0	1.38	0.0	0.0
SB125	3.517E+01	2.367E+01	1.955E+01	1.346	0.906	0.748	1.49	1.80	1.21	1.028E+01	6.920E+00	5.717E+00	1.346	0.906	0.748	1.49	1.80	1.21
I129	1.229E-05	1.253E-05	1.159E-05	1.013	1.032	0.955	0.98	1.06	1.08	1.234E-05	1.258E-05	1.165E-05	1.012	1.032	0.956	0.98	1.06	1.08
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.139E+03	1.081E+03	1.037E+03	1.049	0.996	0.955	1.05	1.10	1.04	2.181E+02	2.068E+02	1.984E+02	1.050	0.995	0.955	1.05	1.10	1.04
CS135	1.181E-04	1.175E-04	1.067E-04	1.035	1.030	0.935	1.01	1.11	1.10	1.181E-04	1.175E-04	1.067E-04	1.035	1.030	0.935	1.01	1.11	1.10
CS137	9.555E+01	9.497E+01	0.0	1.003	0.997	0.0	1.01	0.0	0.0	8.529E+01	8.483E+01	0.0	1.003	0.997	0.0	1.01	0.0	0.0
CE144	5.554E+02	5.625E+02	0.0	0.994	1.006	0.0	0.99	0.0	0.0	6.956E+00	7.048E+00	0.0	0.993	1.007	0.0	0.99	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.105E-11	1.148E-11	0.0	0.981	1.019	0.0	0.0	0.96	0.0	1.458E-11	1.502E-11	0.0	0.985	1.015	0.0	0.0	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	4.099E+01	5.394E+01	5.300E+01	0.831	1.094	1.075	0.76	0.77	1.02	1.126E+01	1.479E+01	1.453E+01	0.832	1.093	1.074	0.76	0.77	1.02
SM147	1.812E-08	2.055E-08	2.236E-08	0.891	1.010	1.099	0.88	0.81	0.92	4.622E-08	5.836E-08	5.865E-08	0.849	1.073	1.078	0.79	0.79	1.00
SM148	4.901E-13	3.347E-13	0.0	1.188	0.812	0.0	1.46	0.0	0.0	4.927E-13	3.370E-13	0.0	1.188	0.812	0.0	1.46	0.0	0.0
SM149	0.0	8.663E-15	6.818E-15	0.0	1.119	0.881	0.0	0.0	1.27	0.0	8.663E-15	6.818E-15	0.0	1.119	0.881	0.0	0.0	1.27
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.789E-02	3.463E-02	2.708E-02	1.141	1.043	0.816	1.09	1.40	1.28	3.648E-02	3.334E-02	2.607E-02	1.141	1.043	0.816	1.09	1.40	1.28
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	7.460E+01	7.074E+01	5.911E+01	1.095	1.038	0.867	1.05	1.26	1.20	5.019E+01	4.759E+01	3.977E+01	1.095	1.038	0.867	1.05	1.26	1.20
EU155	3.792E+00	3.663E+00	2.855E+00	1.103	1.066	0.831	1.04	1.33	1.28	1.907E+00	1.842E+00	1.436E+00	1.103	1.066	0.831	1.04	1.33	1.28
U234	2.653E-02	2.635E-02	2.655E-02	1.002	0.995	1.003	1.01	1.00	0.99	2.726E-02	2.706E-02	2.678E-02	1.008	1.001	0.991	1.01	1.02	1.01
U235	3.955E-04	3.721E-04	3.586E-04	1.054	0.991	0.955	1.06	1.10	1.04	3.955E-04	3.721E-04	3.586E-04	1.054	0.991	0.955	1.06	1.10	1.04
U236	5.629E-03	5.683E-03	5.763E-03	0.989	0.998	1.013	0.99	0.98	0.99	5.631E-03	5.685E-03	5.763E-03	0.989	0.999	1.012	0.99	0.98	0.99
U238	8.124E-03	8.127E-03	8.136E-03	0.999	1.000	1.001	1.00	1.00	1.00	8.124E-03	8.127E-03	8.136E-03	0.999	1.000	1.001	1.00	1.00	1.00
NP237	7.402E-03	7.287E-03	5.473E-03	1.101	1.084	0.814	1.02	1.35	1.33	7.436E-03	7.319E-03	5.478E-03	1.103	1.085	0.812	1.02	1.36	1.34
PU238	5.606E+01	5.546E+01	4.152E+01	1.099	1.087	0.814	1.01	1.35	1.34	5.927E+01	5.797E+01	4.447E+01	1.100	1.075	0.825	1.02	1.33	1.30
PU239	9.287E+00	9.364E+00	6.854E+00	1.092	1.101	0.806	0.99	1.36	1.37	9.286E+00	9.362E+00	6.853E+00	1.092	1.101	0.806	0.99	1.36	1.37
PU240	1.508E+01	1.317E+01	1.313E+01	1.093	0.955	0.952	1.15	1.15	1.00	1.509E+01	1.318E+01	1.312E+01	1.094	0.955	0.951	1.14	1.15	1.00
PU241	3.581E+00	3.472E+00	2.944E+00	1.075	1.042	0.884	1.03	1.22	1.18	2.826E+00	2.753E+00	2.335E+00	1.071	1.044	0.885	1.03	1.21	1.18
PU242	4.456E-02	4.280E-02	5.239E-02	0.957	0.919	1.125	1.04	0.85	0.82	4.456E-02	4.280E-02	5.239E-02	0.957	0.919	1.125	1.04	0.85	0.82
AM241	4.446E+00	4.182E+00	3.489E+00	1.101	1.035	0.864	1.06	1.27	1.20	3.125E+01	2.941E+01	2.502E+01	1.094	1.030	0.876	1.06	1.25	1.18
AM242	7.940E-03	9.467E-03	3.946E-03	1.116	1.330	0.554	0.84	2.01	2.40	7.764E-03	9.257E-03	3.858E-03	1.116	1.330	0.554	0.84	2.01	2.40
AM243	4.532E-01	4.095E-01	4.487E-01	1.037	0.937	1.026	1.11	1.01	0.91	4.530E-01	4.093E-01	4.485E-01	1.037	0.937	1.026	1.11	1.01	0.91
CM242	1.208E+03	1.042E+03	1.024E+03	1.107	0.955	0.938	1.16	1.18	1.02	7.958E-01	7.552E-01	5.934E-01	1.113	1.057	0.830	1.05	1.34	1.27
CM243	5.517E-01	1.522E-01	3.766E-01	1.532	0.423	1.046	3.62	1.46	0.40	4.895E-01	1.350E-01	3.342E-01	1.532	0.422	1.046	3.63	1.46	0.40
CM244	5.105E+01	3.908E+01	4.282E+01	1.152	0.882	0.966	1.31	1.19	0.91	4.229E+01	3.237E+01	3.547E+01	1.152	0.882	0.966	1.31	1.19	0.91
CM245	3.531E-03	2.615E-03	2.681E-03	1.200	0.889	0.911	1.35	1.32	0.98	3.530E-03	2.614E-03	2.680E-03	1.200	0.889	0.911	1.35	1.32	0.98
CM246	6.729E-04	5.617E-04	5.899E-04	1.106	0.924	0.970	1.20	1.14	0.95	6.724E-04	5.613E-04	5.895E-04	1.106	0.924	0.970	1.20	1.14	0.95
AVERAGE-ABSOLUTE-DEVIATION, AS %				9.11	6.78	8.49	16.7	20.7	14.9				9.27	6.84	8.73	16.7	21.3	15.2
AV-ABS-DEV EXCLUDING LARGEST ONE, %				7.32	4.88	7.14	10.8	17.7	10.3				7.48	4.94	7.39	10.7	18.3	10.7
AV-ABS-DEV EXCLUDING LARGEST TWO, %				6.84	4.57	6.61	9.8	15.9	10.0				7.02	4.64	6.89	9.8	16.5	10.4
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	AM242 / SE 79		AM243	PU239				SB125	CM243	AM242 / SE 79		AM243	PU239		

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) WATTS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	8.393E-05	5.965E-05	5.518E-05	1.267	0.900	0.833	1.41	1.52	1.08	8.392E-05	5.964E-05	5.517E-05	1.267	0.900	0.833	1.41	1.52	1.08
KR 85	5.982E+00	6.055E+00	6.217E+00	0.983	0.995	1.022	0.99	0.96	0.97	3.134E+00	3.171E+00	3.256E+00	0.983	0.995	1.022	0.99	0.96	0.97
SR 89	3.422E-19	3.542E-19	3.519E-19	0.979	1.014	1.007	0.97	0.97	1.01	0.0	0.0	5.942E-41	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	5.439E+01	5.517E+01	5.754E+01	0.977	0.991	1.033	0.99	0.95	0.96	4.287E+01	4.348E+01	4.535E+01	0.977	0.990	1.033	0.99	0.95	0.96
Y 90	2.598E+02	2.635E+02	2.754E+02	0.976	0.990	1.034	0.99	0.94	0.96	2.048E+02	2.077E+02	2.170E+02	0.976	0.990	1.034	0.99	0.94	0.96
Y 91	4.509E-16	4.639E-16	4.656E-16	0.980	1.008	1.012	0.97	0.97	1.00	7.265E-35	0.0	7.521E-35	0.983	0.0	1.017	0.0	0.97	0.0
ZR 93	1.732E-04	1.771E-04	0.0	0.989	1.011	0.0	0.98	0.0	0.0	1.732E-04	1.771E-04	0.0	0.989	1.011	0.0	0.98	0.0	0.0
ZR 95	3.735E-14	3.786E-14	4.010E-14	0.972	0.985	1.043	0.99	0.93	0.94	2.441E-31	0.0	2.818E-31	0.928	0.0	1.072	0.0	0.87	0.0
NB 95	7.853E-14	7.960E-14	8.433E-14	0.972	0.985	1.043	0.99	0.93	0.94	5.131E-31	0.0	5.927E-31	0.928	0.0	1.072	0.0	0.87	0.0
TC 99	5.572E-03	5.654E-03	5.664E-03	0.990	1.004	1.006	0.99	0.98	1.00	5.572E-03	5.654E-03	5.664E-03	0.990	1.004	1.006	0.99	0.98	1.00
RU106	2.795E-02	2.534E-02	0.0	1.049	0.951	0.0	1.10	0.0	0.0	2.946E-05	2.614E-05	0.0	1.060	0.940	0.0	1.13	0.0	0.0
PD107	5.812E-06	4.698E-06	4.982E-06	1.126	0.910	0.965	1.24	1.17	0.94	5.812E-06	4.698E-06	4.982E-06	1.126	0.910	0.965	1.24	1.17	0.94
SN126	7.920E-04	5.719E-04	0.0	1.161	0.839	0.0	1.38	0.0	0.0	7.919E-04	5.719E-04	0.0	1.161	0.839	0.0	1.38	0.0	0.0
SB125	2.943E+00	1.980E+00	1.636E+00	1.346	0.906	0.748	1.49	1.80	1.21	2.409E-01	1.621E-01	1.340E-01	1.346	0.906	0.749	1.49	1.80	1.21
I129	1.234E-05	1.258E-05	1.165E-05	1.012	1.032	0.956	0.98	1.06	1.08	1.234E-05	1.258E-05	1.165E-05	1.012	1.032	0.956	0.98	1.06	1.08
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	4.061E+01	3.852E+01	3.696E+01	1.049	0.995	0.955	1.05	1.10	1.04	1.408E+00	1.335E+00	1.282E+00	1.050	0.995	0.955	1.05	1.10	1.04
CS135	1.181E-04	1.175E-04	1.067E-04	1.035	1.030	0.935	1.01	1.11	1.10	1.181E-04	1.175E-04	1.067E-04	1.035	1.030	0.935	1.01	1.11	1.10
CS137	7.598E+01	7.562E+01	0.0	1.002	0.998	0.0	1.00	0.0	0.0	6.031E+01	6.010E+01	0.0	1.002	0.998	0.0	1.00	0.0	0.0
CE144	8.101E-02	8.208E-02	0.0	0.993	1.007	0.0	0.99	0.0	0.0	1.098E-05	1.113E-05	0.0	0.993	1.007	0.0	0.99	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.462E-11	1.506E-11	0.0	0.985	1.015	0.0	0.0	0.97	0.0	1.462E-11	1.506E-11	0.0	0.985	1.015	0.0	0.0	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	3.004E+00	3.947E+00	3.878E+00	0.832	1.093	1.074	0.76	0.77	1.02	2.139E-01	2.810E-01	2.761E-01	0.832	1.093	1.074	0.76	0.77	1.02
SM147	5.394E-08	6.875E-08	6.863E-08	0.846	1.078	1.076	0.78	0.79	1.00	5.655E-08	7.226E-08	7.200E-08	0.845	1.080	1.076	0.78	0.79	1.00
SM148	4.927E-13	3.370E-13	0.0	1.188	0.812	0.0	1.46	0.0	0.0	4.927E-13	3.370E-13	0.0	1.188	0.812	0.0	1.46	0.0	0.0
SM149	0.0	8.663E-15	6.818E-15	0.0	1.119	0.881	0.0	0.0	1.27	0.0	8.663E-15	6.818E-15	0.0	1.119	0.881	0.0	0.0	1.27
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.510E-02	3.208E-02	2.509E-02	1.141	1.043	0.816	1.09	1.40	1.28	3.250E-02	2.971E-02	2.323E-02	1.141	1.043	0.816	1.09	1.40	1.28
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	3.354E+01	3.180E+01	2.658E+01	1.095	1.038	0.867	1.05	1.26	1.20	1.498E+01	1.420E+01	1.187E+01	1.095	1.038	0.868	1.05	1.26	1.20
EU155	9.480E-01	9.160E-01	7.139E-01	1.103	1.066	0.831	1.03	1.33	1.28	2.343E-01	2.264E-01	1.765E-01	1.103	1.066	0.831	1.03	1.33	1.28
U234	2.797E-02	2.776E-02	2.702E-02	1.014	1.006	0.980	1.01	1.04	1.03	2.932E-02	2.908E-02	2.746E-02	1.024	1.016	0.960	1.01	1.07	1.06
U235	3.956E-04	3.722E-04	3.586E-04	1.054	0.991	0.955	1.06	1.10	1.04	3.957E-04	3.722E-04	3.586E-04	1.054	0.991	0.955	1.06	1.10	1.04
U236	5.633E-03	5.687E-03	5.763E-03	0.989	0.999	1.012	0.99	0.98	0.99	5.636E-03	5.690E-03	5.763E-03	0.989	0.999	1.012	0.99	0.98	0.99
U238	8.124E-03	8.127E-03	8.136E-03	0.999	1.000	1.001	1.00	1.00	1.00	8.124E-03	8.127E-03	8.136E-03	0.999	1.000	1.001	1.00	1.00	1.00
NP237	7.499E-03	7.378E-03	5.478E-03	1.105	1.087	0.807	1.02	1.37	1.35	7.703E-03	7.571E-03	5.479E-03	1.114	1.094	0.792	1.02	1.41	1.38
PU238	5.699E+01	5.574E+01	4.275E+01	1.100	1.076	0.825	1.02	1.33	1.30	5.267E+01	5.152E+01	3.951E+01	1.100	1.076	0.825	1.02	1.33	1.30
PU239	9.285E+00	9.361E+00	6.852E+00	1.092	1.101	0.806	0.99	1.36	1.37	9.282E+00	9.358E+00	6.850E+00	1.092	1.101	0.806	0.99	1.36	1.37
PU240	1.510E+01	1.319E+01	1.312E+01	1.094	0.956	0.950	1.14	1.15	1.01	1.511E+01	1.319E+01	1.310E+01	1.095	0.956	0.949	1.15	1.15	1.01
PU241	2.222E+00	2.175E+00	1.845E+00	1.068	1.045	0.887	1.02	1.20	1.18	1.373E+00	1.357E+00	1.151E+00	1.061	1.049	0.890	1.01	1.19	1.18
PU242	4.456E-02	4.280E-02	5.239E-02	0.957	0.919	1.125	1.04	0.85	0.82	4.456E-02	4.280E-02	5.239E-02	0.957	0.919	1.125	1.04	0.85	0.82
AM241	5.249E+01	4.950E+01	4.218E+01	1.092	1.030	0.878	1.06	1.24	1.17	8.169E+01	7.733E+01	6.593E+01	1.089	1.031	0.879	1.06	1.24	1.17
AM242	7.589E-03	9.048E-03	3.771E-03	1.116	1.330	0.554	0.84	2.01	2.40	7.251E-03	8.645E-03	3.603E-03	1.116	1.330	0.554	0.84	2.01	2.40
AM243	4.528E-01	4.091E-01	4.483E-01	1.037	0.937	1.026	1.11	1.01	0.91	4.524E-01	4.088E-01	4.478E-01	1.037	0.937	1.026	1.11	1.01	0.91
CM242	2.041E-01	2.432E-01	1.002E-01	1.118	1.333	0.549	0.84	2.04	2.43	1.946E-01	2.321E-01	9.557E-02	1.118	1.333	0.549	0.84	2.04	2.43
CM243	4.335E-01	1.196E-01	2.959E-01	1.532	0.423	1.046	3.62	1.46	0.40	3.399E-01	9.375E-02	2.320E-01	1.532	0.423	1.046	3.63	1.46	0.40
CM244	3.492E+01	2.674E+01	2.930E+01	1.152	0.882	0.966	1.31	1.19	0.91	2.382E+01	1.823E+01	1.998E+01	1.152	0.882	0.966	1.31	1.19	0.91
CM245	3.529E-03	2.613E-03	2.679E-03	1.200	0.889	0.911	1.35	1.32	0.98	3.526E-03	2.610E-03	2.677E-03	1.200	0.888	0.911	1.35	1.32	0.98
CM246	6.719E-04	5.609E-04	5.891E-04	1.106	0.924	0.970	1.20	1.14	0.95	6.710E-04	5.600E-04	5.882E-04	1.107	0.923	0.970	1.20	1.14	0.95
AVERAGE-ABSOLUTE-DEVIATION, AS %				9.35	7.54	9.62	16.9	23.5	18.4				9.78	8.23	10.10	18.5	24.6	20.4
AV-ABS-DEV EXCLUDING LARGEST ONE, %				7.56	5.69	8.34	11.0	20.5	14.0				7.97	6.24	8.82	12.0	21.6	15.5
AV-ABS-DEV EXCLUDING LARGEST TWO, %				7.04	4.86	7.16	9.9	16.3	10.2				7.48	5.37	7.65	10.8	17.3	11.3
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	CM242 / SE 79		AM243	AM242				SB125	CM243	CM242 / SE 79		AM243	AM242		

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) WATTS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	8.389E-05	5.962E-05	5.515E-05	1.267	0.900	0.833	1.41	1.52	1.08	8.385E-05	5.959E-05	5.513E-05	1.267	0.900	0.833	1.41	1.52	1.08
KR 85	4.504E-01	4.558E-01	4.680E-01	0.983	0.995	1.022	0.99	0.96	0.97	1.777E-02	1.797E-02	1.846E-02	0.984	0.995	1.022	0.99	0.96	0.97
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	2.099E+01	2.129E+01	2.220E+01	0.977	0.990	1.033	0.99	0.95	0.96	6.386E+00	6.475E+00	6.754E+00	0.977	0.990	1.033	0.99	0.95	0.96
Y 90	1.003E+02	1.017E+02	1.063E+02	0.976	0.990	1.034	0.99	0.94	0.96	3.050E+01	3.093E+01	3.232E+01	0.976	0.990	1.034	0.99	0.94	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.732E-04	1.771E-04	0.0	0.989	1.011	0.0	0.98	0.0	0.0	1.732E-04	1.770E-04	0.0	0.989	1.011	0.0	0.98	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	5.571E-03	5.653E-03	5.663E-03	0.990	1.004	1.006	0.99	0.98	1.00	5.570E-03	5.652E-03	5.663E-03	0.990	1.004	1.006	0.99	0.98	1.00
RU106	3.235E-14	2.870E-14	0.0	1.060	0.940	0.0	1.13	0.0	0.0	3.783E-29	3.354E-29	0.0	1.060	0.940	0.0	1.13	0.0	0.0
PD107	5.812E-06	4.698E-06	4.982E-06	1.126	0.910	0.965	1.24	1.17	0.94	5.812E-06	4.698E-06	4.982E-06	1.126	0.910	0.965	1.24	1.17	0.94
SN126	7.918E-04	5.717E-04	0.0	1.161	0.839	0.0	1.38	0.0	0.0	7.915E-04	5.715E-04	0.0	1.161	0.839	0.0	1.38	0.0	0.0
SB125	1.323E-04	8.900E-05	7.358E-05	1.346	0.905	0.749	1.49	1.80	1.21	4.869E-10	3.275E-10	2.709E-10	1.346	0.905	0.749	1.49	1.80	1.21
I129	1.234E-05	1.258E-05	1.165E-05	1.012	1.032	0.956	0.98	1.06	1.08	1.234E-05	1.258E-05	1.165E-05	1.012	1.032	0.956	0.98	1.06	1.08
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	5.873E-05	5.567E-05	5.345E-05	1.050	0.995	0.955	1.05	1.10	1.04	2.946E-12	2.790E-12	2.681E-12	1.050	0.994	0.956	1.06	1.10	1.04
CS135	1.181E-04	1.175E-04	1.067E-04	1.035	1.030	0.935	1.01	1.11	1.10	1.181E-04	1.175E-04	1.067E-04	1.035	1.030	0.935	1.01	1.11	1.10
CS137	3.015E+01	3.016E+01	0.0	1.000	1.000	0.0	1.00	0.0	0.0	9.497E+00	9.562E+00	0.0	0.997	1.003	0.0	0.99	0.0	0.0
CE144	2.733E-17	2.777E-17	0.0	0.992	1.008	0.0	0.98	0.0	0.0	1.249E-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.462E-11	1.506E-11	0.0	0.985	1.015	0.0	0.0	0.97	0.0	1.462E-11	1.506E-11	0.0	0.985	1.015	0.0	0.0	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	7.725E-05	1.014E-04	9.968E-05	0.833	1.093	1.074	0.76	0.78	1.02	1.415E-10	1.854E-10	1.824E-10	0.833	1.092	1.074	0.76	0.78	1.02
SM147	5.675E-08	7.253E-08	7.226E-08	0.845	1.080	1.076	0.78	0.79	1.00	5.675E-08	7.253E-08	7.226E-08	0.845	1.080	1.076	0.78	0.79	1.00
SM148	4.927E-13	3.370E-13	0.0	1.188	0.812	0.0	1.46	0.0	0.0	4.927E-13	3.370E-13	0.0	1.188	0.812	0.0	1.46	0.0	0.0
SM149	0.0	8.663E-15	6.818E-15	0.0	1.119	0.881	0.0	0.0	1.27	0.0	8.663E-15	6.818E-15	0.0	1.119	0.881	0.0	0.0	1.27
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	2.579E-02	2.358E-02	1.844E-02	1.141	1.043	0.816	1.09	1.40	1.28	1.755E-02	1.604E-02	1.254E-02	1.141	1.043	0.816	1.09	1.40	1.28
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.335E+00	1.266E+00	1.058E+00	1.095	1.038	0.867	1.05	1.26	1.20	2.373E-02	2.249E-02	1.880E-02	1.095	1.038	0.867	1.06	1.26	1.20
EU155	3.538E-03	3.421E-03	2.666E-03	1.103	1.066	0.831	1.03	1.33	1.28	3.264E-06	3.158E-06	2.462E-06	1.102	1.066	0.831	1.03	1.33	1.28
U234	3.279E-02	3.247E-02	2.860E-02	1.048	1.038	0.914	1.01	1.15	1.14	3.702E-02	3.661E-02	2.999E-02	1.072	1.060	0.868	1.01	1.23	1.22
U235	3.959E-04	3.725E-04	3.586E-04	1.054	0.992	0.955	1.06	1.10	1.04	3.963E-04	3.729E-04	3.586E-04	1.054	0.992	0.954	1.06	1.11	1.04
U236	5.648E-03	5.700E-03	5.763E-03	0.990	0.999	1.010	0.99	0.98	0.99	5.668E-03	5.717E-03	5.763E-03	0.992	1.000	1.008	0.99	0.98	0.99
U238	8.124E-03	8.127E-03	8.136E-03	0.999	1.000	1.001	1.00	1.00	1.00	8.124E-03	8.127E-03	8.136E-03	0.999	1.000	1.001	1.00	1.00	1.00
NP237	8.619E-03	8.441E-03	5.479E-03	1.147	1.124	0.729	1.02	1.57	1.54	1.036E-02	1.010E-02	5.479E-03	1.198	1.168	0.634	1.03	1.89	1.84
PU238	4.159E+01	4.069E+01	3.119E+01	1.100	1.076	0.825	1.02	1.33	1.30	2.807E+01	2.747E+01	2.103E+01	1.100	1.076	0.824	1.02	1.33	1.31
PU239	9.275E+00	9.351E+00	6.844E+00	1.092	1.101	0.806	0.99	1.36	1.37	9.262E+00	9.338E+00	6.834E+00	1.092	1.101	0.806	0.99	1.36	1.37
PU240	1.510E+01	1.318E+01	1.306E+01	1.096	0.956	0.948	1.15	1.16	1.01	1.504E+01	1.312E+01	1.299E+01	1.096	0.956	0.947	1.15	1.16	1.01
PU241	3.239E-01	3.298E-01	2.797E-01	1.041	1.060	0.899	0.98	1.16	1.18	2.919E-02	3.121E-02	2.647E-02	1.008	1.078	0.914	0.94	1.10	1.18
PU242	4.456E-02	4.280E-02	5.239E-02	0.957	0.919	1.125	1.04	0.85	0.82	4.455E-02	4.279E-02	5.238E-02	0.957	0.919	1.125	1.04	0.85	0.82
AM241	1.142E+02	1.089E+02	9.289E+01	1.084	1.034	0.882	1.05	1.23	1.17	1.154E+02	1.105E+02	9.426E+01	1.081	1.035	0.883	1.04	1.22	1.17
AM242	6.324E-03	7.539E-03	3.142E-03	1.116	1.330	0.554	0.84	2.01	2.40	5.034E-03	6.002E-03	2.502E-03	1.116	1.330	0.554	0.84	2.01	2.40
AM243	4.511E-01	4.076E-01	4.466E-01	1.037	0.937	1.026	1.11	1.01	0.91	4.490E-01	4.057E-01	4.445E-01	1.037	0.937	1.026	1.11	1.01	0.91
CM242	1.697E-01	2.024E-01	8.335E-02	1.118	1.333	0.549	0.84	2.04	2.43	1.351E-01	1.611E-01	6.636E-02	1.118	1.333	0.549	0.84	2.04	2.43
CM243	1.639E-01	4.519E-02	1.119E-01	1.532	0.422	1.046	3.63	1.47	0.40	4.857E-02	1.339E-02	3.315E-02	1.532	0.422	1.046	3.63	1.47	0.40
CM244	7.555E+00	5.783E+00	6.337E+00	1.152	0.882	0.966	1.31	1.19	0.91	1.115E+00	8.530E-01	9.349E-01	1.152	0.882	0.966	1.31	1.19	0.91
CM245	3.517E-03	2.604E-03	2.670E-03	1.200	0.889	0.911	1.35	1.32	0.98	3.503E-03	2.593E-03	2.659E-03	1.200	0.888	0.911	1.35	1.32	0.98
CM246	6.680E-04	5.576E-04	5.856E-04	1.106	0.924	0.970	1.20	1.14	0.95	6.631E-04	5.535E-04	5.814E-04	1.106	0.924	0.970	1.20	1.14	0.95
AVERAGE-ABSOLUTE-DEVIATION, AS %				10.19	8.39	10.78	18.5	26.5	21.1				10.55	8.80	11.13	19.1	27.5	22.2
AV-ABS-DEV EXCLUDING LARGEST ONE, %				8.28	6.41	9.45	12.0	23.4	16.2				8.61	6.80	9.84	12.4	24.5	17.4
AV-ABS-DEV EXCLUDING LARGEST TWO, %				7.76	5.55	8.23	10.8	18.7	12.1				8.11	5.95	8.65	11.2	19.9	13.3
NUCS EXCLUDED, 1ST/2ND:			SB125	CM243	CM242 / SE 79		AM243	AM242			SB125	CM243	CM242 / SE 79		AM243	AM242		

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) WATTS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
SE 79	8.367E-05	5.947E-05	5.501E-05	1.267	0.900	0.833	1.41	1.52	1.08	8.305E-05	5.902E-05	5.460E-05	1.267	0.900	0.833	1.41	1.52	1.08
KR 85	4.299E-08	4.345E-08	4.465E-08	0.984	0.994	1.022	0.99	0.96	0.97	9.479E-28	9.577E-28	9.831E-28	0.984	0.995	1.021	0.99	0.96	0.97
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	5.468E-02	5.541E-02	5.781E-02	0.977	0.990	1.033	0.99	0.95	0.96	3.176E-09	3.216E-09	3.354E-09	0.978	0.990	1.032	0.99	0.95	0.96
Y 90	2.612E-01	2.646E-01	2.767E-01	0.976	0.989	1.034	0.99	0.94	0.96	1.517E-08	1.536E-08	1.605E-08	0.977	0.989	1.034	0.99	0.95	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.732E-04	1.770E-04	0.0	0.989	1.011	0.0	0.98	0.0	0.0	1.731E-04	1.770E-04	0.0	0.989	1.011	0.0	0.98	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	5.567E-03	5.648E-03	5.659E-03	0.990	1.004	1.006	0.99	0.98	1.00	5.554E-03	5.636E-03	5.646E-03	0.990	1.004	1.006	0.99	0.98	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	5.812E-06	4.698E-06	4.982E-06	1.126	0.910	0.965	1.24	1.17	0.94	5.811E-06	4.698E-06	4.981E-06	1.125	0.910	0.965	1.24	1.17	0.94
SN126	7.904E-04	5.707E-04	0.0	1.161	0.839	0.0	1.38	0.0	0.0	7.866E-04	5.680E-04	0.0	1.161	0.839	0.0	1.38	0.0	0.0
SB125	0.0	0.0	4.983E-32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.234E-05	1.258E-05	1.165E-05	1.012	1.032	0.956	0.98	1.06	1.08	1.234E-05	1.258E-05	1.165E-05	1.012	1.032	0.956	0.98	1.06	1.08
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	1.697E-41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	1.181E-04	1.175E-04	1.067E-04	1.035	1.030	0.935	1.01	1.11	1.10	1.181E-04	1.175E-04	1.067E-04	1.035	1.030	0.935	1.01	1.11	1.10
CS137	9.351E-02	9.656E-02	0.0	0.984	1.016	0.0	0.97	0.0	0.0	8.843E-09	1.000E-08	0.0	0.939	1.061	0.0	0.88	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.462E-11	1.506E-11	0.0	0.985	1.015	0.0	0.0	0.97	0.0	1.462E-11	1.506E-11	0.0	0.985	1.015	0.0	0.0	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	2.046E-33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	5.675E-08	7.253E-08	7.226E-08	0.845	1.080	1.076	0.78	0.79	1.00	5.675E-08	7.253E-08	7.226E-08	0.845	1.080	1.076	0.78	0.79	1.00
SM148	4.927E-13	3.370E-13	0.0	1.188	0.812	0.0	1.46	0.0	0.0	4.927E-13	3.370E-13	0.0	1.188	0.812	0.0	1.46	0.0	0.0
SM149	0.0	8.663E-15	6.818E-15	0.0	1.119	0.881	0.0	0.0	1.27	0.0	8.663E-15	6.818E-15	0.0	1.119	0.881	0.0	0.0	1.27
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.761E-03	3.437E-03	2.688E-03	1.141	1.043	0.816	1.09	1.40	1.28	1.710E-05	1.566E-05	1.225E-05	1.140	1.044	0.816	1.09	1.40	1.28
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	2.370E-09	2.243E-09	1.876E-09	1.096	1.037	0.867	1.06	1.26	1.20	0.0	0.0	5.894E-34	0.0	0.0	0.0	0.0	0.0	0.0
EU155	2.363E-18	2.293E-18	1.788E-18	1.100	1.067	0.833	1.03	1.32	1.28	0.0	0.0	5.846E-61	0.0	0.0	0.0	0.0	0.0	0.0
U234	4.397E-02	4.343E-02	3.227E-02	1.102	1.089	0.809	1.01	1.36	1.35	4.574E-02	4.516E-02	3.281E-02	1.109	1.095	0.796	1.01	1.39	1.38
U235	3.978E-04	3.744E-04	3.586E-04	1.055	0.993	0.951	1.06	1.11	1.04	4.032E-04	3.798E-04	3.586E-04	1.060	0.998	0.942	1.06	1.12	1.06
U236	5.744E-03	5.784E-03	5.763E-03	0.997	1.004	1.000	0.99	1.00	1.00	6.000E-03	6.007E-03	5.763E-03	1.013	1.014	0.973	1.00	1.04	1.04
U238	8.124E-03	8.127E-03	8.136E-03	0.999	1.000	1.001	1.00	1.00	1.00	8.124E-03	8.127E-03	8.136E-03	0.999	1.000	1.001	1.00	1.00	1.00
NP237	1.629E-02	1.580E-02	5.478E-03	1.301	1.262	0.437	1.03	2.97	2.88	2.688E-02	2.594E-02	5.477E-03	1.383	1.335	0.282	1.04	4.91	4.74
PU238	5.838E+00	5.725E+00	4.361E+00	1.100	1.079	0.822	1.02	1.34	1.31	2.737E-02	2.786E-02	1.942E-02	1.100	1.120	0.780	0.98	1.41	1.43
PU239	9.211E+00	9.286E+00	6.795E+00	1.093	1.101	0.806	0.99	1.36	1.37	9.036E+00	9.108E+00	6.660E+00	1.093	1.102	0.805	0.99	1.36	1.37
PU240	1.473E+01	1.285E+01	1.272E+01	1.097	0.957	0.947	1.15	1.16	1.01	1.367E+01	1.193E+01	1.181E+01	1.096	0.957	0.947	1.15	1.16	1.01
PU241	5.148E-06	4.967E-06	2.124E-06	1.262	1.218	0.521	1.04	2.42	2.34	3.046E-06	2.328E-06	9.821E-21	1.700	1.300	0.000	1.31	****	****
PU242	4.454E-02	4.279E-02	5.237E-02	0.956	0.919	1.125	1.04	0.85	0.82	4.449E-02	4.274E-02	5.230E-02	0.957	0.919	1.125	1.04	0.85	0.82
AM241	8.450E+01	8.100E+01	6.910E+01	1.081	1.036	0.884	1.04	1.22	1.17	2.750E+01	2.636E+01	2.249E+01	1.081	1.036	0.884	1.04	1.22	1.17
AM242	2.022E-03	2.411E-03	1.005E-03	1.115	1.330	0.554	0.84	2.01	2.40	8.310E-05	9.905E-05	4.129E-05	1.116	1.330	0.554	0.84	2.01	2.40
AM243	4.406E-01	3.982E-01	4.362E-01	1.037	0.937	1.026	1.11	1.01	0.91	4.126E-01	3.728E-01	4.085E-01	1.037	0.937	1.026	1.11	1.01	0.91
CM242	5.429E-02	6.472E-02	2.666E-02	1.118	1.333	0.549	0.84	2.04	2.43	2.231E-03	2.659E-03	1.095E-03	1.118	1.333	0.549	0.84	2.04	2.43
CM243	3.753E-04	1.033E-04	2.558E-04	1.533	0.422	1.045	3.63	1.47	0.40	1.516E-11	4.173E-12	1.033E-11	1.533	0.422	1.045	3.63	1.47	0.40
CM244	5.279E-04	4.039E-04	4.429E-04	1.152	0.881	0.966	1.31	1.19	0.91	9.907E-13	9.346E-16	1.024E-15	2.994	0.003	0.003	****	****	0.91
CM245	3.446E-03	2.551E-03	2.616E-03	1.200	0.889	0.911	1.35	1.32	0.98	3.255E-03	2.410E-03	2.471E-03	1.200	0.889	0.911	1.35	1.32	0.98
CM246	6.440E-04	5.375E-04	5.646E-04	1.106	0.923	0.970	1.20	1.14	0.95	5.812E-04	4.851E-04	5.095E-04	1.106	0.924	0.970	1.20	1.14	0.95
AVERAGE-ABSOLUTE-DEVIATION, AS %				11.12	9.86	13.03	18.7	35.0	30.7				18.79	13.46	18.66	****	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %				8.64	7.91	11.71	11.5	28.7	24.5				9.60	8.72	13.17	20.0	39.9	35.6
AV-ABS-DEV EXCLUDING LARGEST TWO, %				7.79	7.39	10.77	10.4	21.5	16.4				8.07	7.88	11.02	11.9	25.0	21.7

NUCS EXCLUDED, 1ST/2ND: SE 79 CM243 NP237 / CM245 AM243 PU241 CM244 CM243 PU241 / SE 79 AM243 NP237

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) WATTS PER MTU

	ORIGEN2	ORIGEN-S	CINDER	10 KYR OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
SE 79	7.544E-05	5.362E-05	4.960E-05	1.267	0.900	0.833	1.41	1.52	1.08
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	1.724E-04	1.763E-04	0.0	0.989	1.011	0.0	0.98	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	5.394E-03	5.473E-03	5.483E-03	0.990	1.004	1.006	0.99	0.98	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	5.806E-06	4.693E-06	4.976E-06	1.126	0.910	0.965	1.24	1.17	0.94
SN126	7.390E-04	5.336E-04	0.0	1.161	0.839	0.0	1.38	0.0	0.0
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.233E-05	1.258E-05	1.164E-05	1.012	1.032	0.956	0.98	1.06	1.08
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	1.178E-04	1.172E-04	1.064E-04	1.035	1.030	0.935	1.01	1.11	1.10
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.462E-11	1.506E-11	0.0	0.985	1.015	0.0	0.0	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	5.675E-08	7.253E-08	7.226E-08	0.845	1.080	1.076	0.78	0.79	1.00
SM148	4.927E-13	3.370E-13	0.0	1.188	0.812	0.0	1.46	0.0	0.0
SM149	0.0	8.663E-15	6.818E-15	0.0	1.119	0.881	0.0	0.0	1.27
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	1.343E-35	0.0	9.642E-36	1.164	0.0	0.836	0.0	1.39	0.0
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	4.483E-02	4.427E-02	3.199E-02	1.111	1.097	0.793	1.01	1.40	1.38
U235	4.634E-04	4.405E-04	3.586E-04	1.101	1.047	0.852	1.05	1.29	1.23
U236	8.040E-03	7.787E-03	5.762E-03	1.117	1.082	0.801	1.03	1.40	1.35
U238	8.124E-03	8.128E-03	8.136E-03	0.999	1.000	1.001	1.00	1.00	1.00
NP237	3.191E-02	3.076E-02	5.461E-03	1.405	1.354	0.240	1.04	5.84	5.63
PU238	7.196E-21	8.559E-21	3.509E-21	1.121	1.333	0.546	0.84	2.05	2.44
PU239	7.032E+00	7.083E+00	5.141E+00	1.096	1.103	0.801	0.99	1.37	1.38
PU240	5.266E+00	4.594E+00	4.557E+00	1.096	0.956	0.948	1.15	1.16	1.01
PU241	1.462E-06	1.118E-06	0.0	1.133	0.867	0.0	1.31	0.0	0.0
PU242	4.379E-02	4.204E-02	5.144E-02	0.957	0.919	1.124	1.04	0.85	0.82
AM241	1.582E-03	1.224E-03	1.211E-05	1.684	1.303	0.013	1.29	****	****
AM242	1.249E-22	1.485E-22	6.187E-23	1.118	1.329	0.554	0.84	2.02	2.40
AM243	1.772E-01	1.601E-01	1.754E-01	1.037	0.937	1.026	1.11	1.01	0.91
CM242	3.362E-21	3.999E-21	1.641E-21	1.120	1.333	0.547	0.84	2.05	2.44
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	9.894E-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	1.562E-03	1.157E-03	1.183E-03	1.201	0.889	0.910	1.35	1.32	0.98
CM246	1.555E-04	1.297E-04	1.363E-04	1.107	0.923	0.970	1.20	1.14	0.95
AVERAGE-ABSOLUTE-DEVIATION, AS %				13.92	12.30	20.29	15.3	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %				11.44	11.90	17.56	13.4	55.6	51.0
AV-ABS-DEV EXCLUDING LARGEST TWO, %				9.65	10.86	14.94	12.5	33.2	32.6

NUCS EXCLUDED, 1ST/2ND: SE 79 AM243 AM241 / CM245 NP237

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) WATTS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.228E-04	8.737E-05	8.038E-05	1.268	0.902	0.830	1.41	1.53	1.09	1.228E-04	8.736E-05	8.038E-05	1.268	0.902	0.830	1.41	1.53	1.09
KR 85	1.675E+01	1.654E+01	1.695E+01	1.000	0.988	1.012	1.01	0.99	0.98	1.219E+01	1.204E+01	1.233E+01	1.000	0.988	1.012	1.01	0.99	0.98
SR 89	1.406E+03	1.451E+03	1.444E+03	0.981	1.012	1.007	0.97	0.97	1.01	2.753E-08	2.842E-08	2.832E-08	0.980	1.012	1.008	0.97	0.97	1.00
SR 90	1.056E+02	1.036E+02	1.081E+02	0.998	0.979	1.022	1.02	0.98	0.96	9.394E+01	9.218E+01	9.618E+01	0.998	0.980	1.022	1.02	0.98	0.96
Y 90	5.046E+02	4.950E+02	5.175E+02	0.998	0.979	1.023	1.02	0.98	0.96	4.487E+02	4.403E+02	4.603E+02	0.998	0.979	1.023	1.02	0.97	0.96
Y 91	2.033E+03	2.083E+03	2.093E+03	0.982	1.006	1.011	0.98	0.97	1.00	1.164E-06	1.193E-06	1.200E-06	0.982	1.006	1.012	0.98	0.97	0.99
ZR 93	2.614E-04	2.613E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	2.614E-04	2.613E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
ZR 95	4.162E+03	4.238E+03	4.167E+03	0.994	1.012	0.995	0.98	1.00	1.02	1.473E-05	1.497E-05	1.528E-05	0.982	0.998	1.019	0.98	0.96	0.98
NB 95	5.104E+03	5.184E+03	5.110E+03	0.994	1.010	0.996	0.98	1.00	1.01	3.096E-05	3.147E-05	3.214E-05	0.982	0.998	1.020	0.98	0.96	0.98
TC 99	7.955E-03	7.996E-03	7.998E-03	0.996	1.002	1.002	0.99	0.99	1.00	7.954E-03	7.995E-03	7.998E-03	0.996	1.002	1.002	0.99	0.99	1.00
RU106	2.600E+01	2.458E+01	0.0	1.028	0.972	0.0	1.06	0.0	0.0	8.838E-01	8.354E-01	0.0	1.028	0.972	0.0	1.06	0.0	0.0
PD107	7.070E-06	6.172E-06	6.507E-06	1.074	0.938	0.988	1.15	1.09	0.95	7.070E-06	6.172E-06	6.507E-06	1.074	0.938	0.988	1.15	1.09	0.95
SN126	1.030E-03	7.906E-04	0.0	1.131	0.869	0.0	1.30	0.0	0.0	1.029E-03	7.906E-04	0.0	1.131	0.869	0.0	1.30	0.0	0.0
SB125	3.954E+01	2.913E+01	2.357E+01	1.286	0.947	0.767	1.36	1.68	1.24	1.156E+01	8.516E+00	6.890E+00	1.286	0.947	0.767	1.36	1.68	1.24
I129	1.663E-05	1.765E-05	1.633E-05	0.986	1.046	0.968	0.94	1.02	1.08	1.668E-05	1.770E-05	1.638E-05	0.986	1.046	0.968	0.94	1.02	1.08
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	1.754E+03	1.717E+03	1.710E+03	1.016	0.994	0.990	1.02	1.03	1.00	3.359E+02	3.287E+02	3.273E+02	1.016	0.994	0.990	1.02	1.03	1.00
CS135	2.035E-04	2.270E-04	2.079E-04	0.956	1.067	0.977	0.90	0.98	1.09	2.035E-04	2.270E-04	2.079E-04	0.956	1.067	0.977	0.90	0.98	1.09
CS137	1.367E+02	1.359E+02	0.0	1.003	0.997	0.0	1.01	0.0	0.0	1.220E+02	1.214E+02	0.0	1.002	0.998	0.0	1.00	0.0	0.0
CE144	5.948E+02	5.960E+02	0.0	0.999	1.001	0.0	1.00	0.0	0.0	7.450E+00	7.468E+00	0.0	0.999	1.001	0.0	1.00	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	1.787E-11	1.853E-11	0.0	0.982	1.018	0.0	0.0	0.96	0.0	2.161E-11	2.228E-11	0.0	0.985	1.015	0.0	0.0	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	4.692E+01	6.326E+01	6.056E+01	0.824	1.112	1.064	0.74	0.77	1.04	1.287E+01	1.733E+01	1.660E+01	0.825	1.111	1.064	0.74	0.78	1.04
SM147	3.231E-08	3.347E-08	3.737E-08	0.940	0.973	1.087	0.97	0.86	0.90	6.444E-08	7.778E-08	7.881E-08	0.875	1.056	1.070	0.83	0.82	0.99
SM148	8.262E-13	6.091E-13	0.0	1.151	0.849	0.0	1.36	0.0	0.0	8.291E-13	6.120E-13	0.0	1.151	0.849	0.0	1.35	0.0	0.0
SM149	0.0	1.120E-14	8.379E-15	0.0	1.144	0.856	0.0	0.0	1.34	0.0	1.120E-14	8.379E-15	0.0	1.144	0.856	0.0	0.0	1.34
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	4.633E-02	5.342E-02	3.801E-02	1.009	1.163	0.828	0.87	1.22	1.41	4.461E-02	5.143E-02	3.660E-02	1.009	1.163	0.828	0.87	1.22	1.41
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	1.133E+02	1.147E+02	9.777E+01	1.043	1.056	0.900	0.99	1.16	1.17	7.624E+01	7.714E+01	6.578E+01	1.044	1.056	0.900	0.99	1.16	1.17
EU155	5.537E+00	6.112E+00	4.901E+00	1.004	1.108	0.888	0.91	1.13	1.25	2.785E+00	3.074E+00	2.465E+00	1.004	1.108	0.888	0.91	1.13	1.25
U234	3.911E-02	3.784E-02	3.844E-02	1.017	0.984	0.999	1.03	1.02	0.98	4.044E-02	3.932E-02	3.886E-02	1.023	0.994	0.983	1.03	1.04	1.01
U235	5.102E-04	5.713E-04	5.615E-04	0.932	1.043	1.025	0.89	0.91	1.02	5.102E-04	5.714E-04	5.615E-04	0.932	1.043	1.025	0.89	0.91	1.02
U236	9.241E-03	9.318E-03	9.343E-03	0.994	1.002	1.005	0.99	0.99	1.00	9.243E-03	9.320E-03	9.343E-03	0.994	1.002	1.004	0.99	0.99	1.00
U238	7.970E-03	7.950E-03	7.965E-03	1.001	0.999	1.000	1.00	1.00	1.00	7.970E-03	7.950E-03	7.965E-03	1.001	0.999	1.000	1.00	1.00	1.00
NP237	1.280E-02	1.251E-02	9.959E-03	1.089	1.064	0.847	1.02	1.29	1.26	1.284E-02	1.256E-02	9.966E-03	1.089	1.065	0.845	1.02	1.29	1.26
PU238	1.060E+02	1.175E+02	8.772E+01	1.022	1.133	0.846	0.90	1.21	1.34	1.090E+02	1.209E+02	9.168E+01	1.017	1.128	0.855	0.90	1.19	1.32
PU239	9.331E+00	1.117E+01	7.926E+00	0.985	1.179	0.836	0.84	1.18	1.41	9.330E+00	1.117E+01	7.925E+00	0.985	1.179	0.836	0.84	1.18	1.41
PU240	1.659E+01	1.511E+01	1.493E+01	1.067	0.972	0.961	1.10	1.11	1.01	1.661E+01	1.514E+01	1.493E+01	1.068	0.973	0.959	1.10	1.11	1.01
PU241	4.018E+00	4.590E+00	3.859E+00	0.967	1.105	0.929	0.88	1.04	1.19	3.171E+00	3.640E+00	3.060E+00	0.964	1.106	0.930	0.87	1.04	1.19
PU242	5.446E-02	5.755E-02	6.955E-02	0.900	0.951	1.149	0.95	0.78	0.83	5.446E-02	5.755E-02	6.955E-02	0.900	0.951	1.149	0.95	0.78	0.83
AM241	5.881E+00	7.306E+00	6.258E+00	0.907	1.127	0.966	0.80	0.94	1.17	3.594E+01	4.064E+01	3.448E+01	0.971	1.098	0.931	0.88	1.04	1.18
AM242	1.090E-02	2.002E-02	7.747E-03	0.846	1.553	0.601	0.54	1.41	2.58	1.066E-02	1.958E-02	7.575E-03	0.846	1.553	0.601	0.54	1.41	2.58
AM243	6.196E-01	6.957E-01	7.648E-01	0.894	1.003	1.103	0.89	0.81	0.91	6.193E-01	6.953E-01	7.644E-01	0.894	1.003	1.103	0.89	0.81	0.91
CM242	1.608E+03	1.776E+03	1.651E+03	0.958	1.058	0.984	0.91	0.97	1.08	1.068E+00	1.389E+00	9.926E-01	0.929	1.208	0.863	0.77	1.08	1.40
CM243	8.408E-01	2.373E-01	7.543E-01	1.377	0.389	1.235	3.54	1.11	0.31	7.461E-01	2.105E-01	6.693E-01	1.377	0.388	1.235	3.54	1.11	0.31
CM244	7.938E+01	8.395E+01	9.651E+01	0.917	0.969	1.114	0.95	0.82	0.87	6.576E+01	6.954E+01	7.995E+01	0.917	0.969	1.114	0.95	0.82	0.87
CM245	5.973E-03	7.248E-03	8.264E-03	0.834	1.012	1.154	0.82	0.72	0.88	5.970E-03	7.245E-03	8.260E-03	0.834	1.012	1.154	0.82	0.72	0.88
CM246	1.343E-03	1.678E-03	1.912E-03	0.817	1.021	1.163	0.80	0.70	0.88	1.342E-03	1.677E-03	1.910E-03	0.817	1.021	1.163	0.80	0.70	0.88
AVERAGE-ABSOLUTE-DEVIATION, AS %				6.95	7.57	8.32	16.4	13.7	16.5				7.09	7.82	8.76	16.8	14.1	17.1
AV-ABS-DEV EXCLUDING LARGEST ONE, %				5.79	6.14	7.23	9.2	11.3	10.9				5.94	6.41	7.71	9.7	11.8	11.6
AV-ABS-DEV EXCLUDING LARGEST TWO, %				5.06	4.60	5.70	8.4	10.1	11.0				5.04	5.06	6.22	8.9	10.6	11.7
NUCS EXCLUDED, 1ST/2ND:		SB125	CM243	SM151 / SE 79		AM242		PU238			SB125	CM243	SM151 / SE 79		AM242		NP237	

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) WATTS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.228E-04	8.736E-05	8.037E-05	1.268	0.902	0.830	1.41	1.53	1.09	1.228E-04	8.735E-05	8.037E-05	1.268	0.902	0.830	1.41	1.53	1.09
KR 85	8.822E+00	8.711E+00	8.925E+00	1.000	0.988	1.012	1.01	0.99	0.98	4.621E+00	4.563E+00	4.675E+00	1.000	0.988	1.012	1.01	0.99	0.98
SR 89	3.574E-19	3.686E-19	3.680E-19	0.980	1.011	1.009	0.97	0.97	1.00	0.0	0.0	6.213E-41	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	8.340E+01	8.183E+01	8.539E+01	0.998	0.980	1.022	1.02	0.98	0.96	6.573E+01	6.450E+01	6.730E+01	0.998	0.980	1.022	1.02	0.98	0.96
Y 90	3.983E+02	3.909E+02	4.087E+02	0.998	0.979	1.023	1.02	0.97	0.96	3.140E+02	3.081E+02	3.221E+02	0.998	0.979	1.023	1.02	0.97	0.96
Y 91	4.673E-16	4.787E-16	4.823E-16	0.981	1.005	1.013	0.98	0.97	0.99	7.529E-35	0.0	7.792E-35	0.983	0.0	1.017	0.0	0.97	0.0
ZR 93	2.614E-04	2.613E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	2.614E-04	2.613E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
ZR 95	3.764E-14	3.819E-14	4.051E-14	0.971	0.985	1.045	0.99	0.93	0.94	2.459E-31	0.0	2.847E-31	0.927	0.0	1.073	0.0	0.86	0.0
NB 95	7.914E-14	8.029E-14	8.520E-14	0.971	0.985	1.045	0.99	0.93	0.94	5.171E-31	0.0	5.988E-31	0.927	0.0	1.073	0.0	0.86	0.0
TC 99	7.954E-03	7.995E-03	7.998E-03	0.996	1.002	1.002	0.99	0.99	1.00	7.954E-03	7.995E-03	7.998E-03	0.996	1.002	1.002	0.99	0.99	1.00
RU106	2.839E-02	2.683E-02	0.0	1.028	0.972	0.0	1.06	0.0	0.0	2.991E-05	2.768E-05	0.0	1.039	0.961	0.0	1.08	0.0	0.0
PD107	7.070E-06	6.172E-06	6.507E-06	1.074	0.938	0.988	1.15	1.09	0.95	7.070E-06	6.172E-06	6.507E-06	1.074	0.938	0.988	1.15	1.09	0.95
SN126	1.029E-03	7.906E-04	0.0	1.131	0.869	0.0	1.30	0.0	0.0	1.029E-03	7.905E-04	0.0	1.131	0.869	0.0	1.30	0.0	0.0
SB125	3.307E+00	2.437E+00	1.972E+00	1.286	0.948	0.767	1.36	1.68	1.24	2.708E-01	1.995E-01	1.615E-01	1.286	0.947	0.767	1.36	1.68	1.24
I129	1.668E-05	1.770E-05	1.638E-05	0.986	1.046	0.968	0.94	1.02	1.08	1.668E-05	1.770E-05	1.638E-05	0.986	1.046	0.968	0.94	1.02	1.08
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	6.255E+01	6.121E+01	6.095E+01	1.016	0.994	0.990	1.02	1.03	1.00	2.169E+00	2.123E+00	2.114E+00	1.016	0.994	0.990	1.02	1.03	1.00
CS135	2.035E-04	2.270E-04	2.079E-04	0.956	1.067	0.977	0.90	0.98	1.09	2.035E-04	2.270E-04	2.079E-04	0.956	1.067	0.977	0.90	0.98	1.09
CS137	1.087E+02	1.082E+02	0.0	1.002	0.998	0.0	1.00	0.0	0.0	8.625E+01	8.598E+01	0.0	1.002	0.998	0.0	1.00	0.0	0.0
CE144	8.674E-02	8.697E-02	0.0	0.999	1.001	0.0	1.00	0.0	0.0	1.176E-05	1.180E-05	0.0	0.998	1.002	0.0	1.00	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	2.166E-11	2.233E-11	0.0	0.985	1.015	0.0	0.0	0.97	0.0	2.166E-11	2.233E-11	0.0	0.985	1.015	0.0	0.0	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	3.435E+00	4.625E+00	4.428E+00	0.825	1.111	1.064	0.74	0.78	1.04	2.446E-01	3.293E-01	3.153E-01	0.825	1.111	1.064	0.74	0.78	1.04
SM147	7.327E-08	8.996E-08	9.020E-08	0.867	1.065	1.068	0.81	0.81	1.00	7.625E-08	9.408E-08	9.405E-08	0.865	1.068	1.067	0.81	0.81	1.00
SM148	8.291E-13	6.120E-13	0.0	1.151	0.849	0.0	1.35	0.0	0.0	8.291E-13	6.120E-13	0.0	1.151	0.849	0.0	1.35	0.0	0.0
SM149	0.0	1.120E-14	8.379E-15	0.0	1.144	0.856	0.0	0.0	1.34	0.0	1.120E-14	8.379E-15	0.0	1.144	0.856	0.0	0.0	1.34
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	4.292E-02	4.949E-02	3.521E-02	1.009	1.163	0.828	0.87	1.22	1.41	3.974E-02	4.582E-02	3.260E-02	1.009	1.163	0.828	0.87	1.22	1.41
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	5.096E+01	5.155E+01	4.396E+01	1.044	1.056	0.900	0.99	1.16	1.17	2.276E+01	2.303E+01	1.963E+01	1.044	1.056	0.900	0.99	1.16	1.17
EU155	1.384E+00	1.528E+00	1.225E+00	1.004	1.108	0.889	0.91	1.13	1.25	3.422E-01	3.778E-01	3.029E-01	1.004	1.108	0.888	0.91	1.13	1.25
U234	4.176E-02	4.078E-02	3.928E-02	1.028	1.004	0.967	1.02	1.06	1.04	4.424E-02	4.353E-02	4.007E-02	1.038	1.021	0.940	1.02	1.10	1.09
U235	5.103E-04	5.714E-04	5.615E-04	0.932	1.043	1.025	0.89	0.91	1.02	5.103E-04	5.715E-04	5.615E-04	0.932	1.043	1.025	0.89	0.91	1.02
U236	9.245E-03	9.322E-03	9.343E-03	0.994	1.002	1.004	0.99	0.99	1.00	9.250E-03	9.326E-03	9.343E-03	0.994	1.002	1.004	0.99	0.99	1.00
U238	7.970E-03	7.950E-03	7.965E-03	1.001	0.999	1.000	1.00	1.00	1.00	7.970E-03	7.950E-03	7.965E-03	1.001	0.999	1.000	1.00	1.00	1.00
NP237	1.291E-02	1.264E-02	9.966E-03	1.090	1.068	0.842	1.02	1.30	1.27	1.314E-02	1.290E-02	9.966E-03	1.095	1.075	0.830	1.02	1.32	1.29
PU238	1.048E+02	1.163E+02	8.814E+01	1.017	1.128	0.855	0.90	1.19	1.32	9.689E+01	1.075E+02	8.145E+01	1.017	1.128	0.855	0.90	1.19	1.32
PU239	9.329E+00	1.117E+01	7.924E+00	0.985	1.179	0.836	0.84	1.18	1.41	9.327E+00	1.117E+01	7.922E+00	0.985	1.179	0.836	0.84	1.18	1.41
PU240	1.663E+01	1.516E+01	1.492E+01	1.068	0.974	0.958	1.10	1.11	1.02	1.666E+01	1.519E+01	1.490E+01	1.069	0.975	0.956	1.10	1.12	1.02
PU241	2.493E+00	2.875E+00	2.418E+00	0.961	1.108	0.932	0.87	1.03	1.19	1.540E+00	1.794E+00	1.509E+00	0.954	1.111	0.935	0.86	1.02	1.19
PU242	5.446E-02	5.755E-02	6.955E-02	0.900	0.951	1.149	0.95	0.78	0.83	5.446E-02	5.755E-02	6.955E-02	0.900	0.951	1.149	0.95	0.78	0.83
AM241	5.977E+01	6.719E+01	5.696E+01	0.975	1.096	0.929	0.89	1.05	1.18	9.252E+01	1.040E+02	8.808E+01	0.975	1.096	0.928	0.89	1.05	1.18
AM242	1.042E-02	1.914E-02	7.405E-03	0.846	1.553	0.601	0.54	1.41	2.58	9.951E-03	1.828E-02	7.075E-03	0.846	1.553	0.601	0.54	1.41	2.58
AM243	6.190E-01	6.950E-01	7.641E-01	0.894	1.003	1.103	0.89	0.81	0.91	6.184E-01	6.944E-01	7.633E-01	0.894	1.003	1.103	0.89	0.81	0.91
CM242	2.800E-01	5.143E-01	1.967E-01	0.848	1.557	0.596	0.54	1.42	2.61	2.671E-01	4.908E-01	1.876E-01	0.847	1.557	0.595	0.54	1.42	2.62
CM243	6.606E-01	1.864E-01	5.927E-01	1.377	0.388	1.235	3.54	1.11	0.31	5.180E-01	1.462E-01	4.647E-01	1.377	0.389	1.235	3.54	1.11	0.31
CM244	5.430E+01	5.743E+01	6.602E+01	0.916	0.969	1.114	0.95	0.82	0.87	3.703E+01	3.917E+01	4.503E+01	0.916	0.969	1.114	0.95	0.82	0.87
CM245	5.968E-03	7.242E-03	8.257E-03	0.834	1.012	1.154	0.82	0.72	0.88	5.963E-03	7.237E-03	8.250E-03	0.834	1.012	1.154	0.82	0.72	0.88
CM246	1.341E-03	1.675E-03	1.909E-03	0.817	1.020	1.163	0.80	0.70	0.88	1.339E-03	1.673E-03	1.906E-03	0.817	1.021	1.163	0.80	0.70	0.88
AVERAGE-ABSOLUTE-DEVIATION, AS %				7.36	8.67	9.63	17.3	15.3	20.5				7.78	9.51	10.12	18.9	16.2	22.7
AV-ABS-DEV EXCLUDING LARGEST ONE, %				6.24	7.32	8.66	10.2	13.1	15.1				6.65	8.08	9.16	11.2	14.0	16.9
AV-ABS-DEV EXCLUDING LARGEST TWO, %				5.36	6.03	7.22	8.5	11.0	11.1				5.78	6.69	7.69	9.3	11.9	12.4
NUCS EXCLUDED, 1ST/2ND:				SB125	CM243	SM151 / SE 79		CM242	NP237			SB125	CM243	SM151 / SE 79		CM242	NP237	

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) WATTS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.227E-04	8.732E-05	8.034E-05	1.268	0.902	0.830	1.41	1.53	1.09	1.227E-04	8.728E-05	8.030E-05	1.268	0.902	0.830	1.41	1.53	1.09
KR 85	6.643E-01	6.557E-01	6.719E-01	1.000	0.988	1.012	1.01	0.99	0.98	2.620E-02	2.586E-02	2.650E-02	1.001	0.988	1.012	1.01	0.99	0.98
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	3.219E+01	3.158E+01	3.295E+01	0.998	0.979	1.022	1.02	0.98	0.96	9.791E+00	9.605E+00	1.002E+01	0.998	0.979	1.022	1.02	0.98	0.96
Y 90	1.537E+02	1.508E+02	1.577E+02	0.998	0.979	1.024	1.02	0.97	0.96	4.677E+01	4.588E+01	4.797E+01	0.998	0.979	1.023	1.02	0.97	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.614E-04	2.613E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	2.614E-04	2.613E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	7.953E-03	7.994E-03	7.997E-03	0.996	1.002	1.002	0.99	0.99	1.00	7.952E-03	7.993E-03	7.996E-03	0.996	1.002	1.002	0.99	0.99	1.00
RU106	3.286E-14	3.040E-14	0.0	1.039	0.961	0.0	1.08	0.0	0.0	3.842E-29	3.552E-29	0.0	1.039	0.961	0.0	1.08	0.0	0.0
PD107	7.070E-06	6.172E-06	6.507E-06	1.074	0.938	0.988	1.15	1.09	0.95	7.070E-06	6.172E-06	6.507E-06	1.074	0.938	0.988	1.15	1.09	0.95
SN126	1.029E-03	7.904E-04	0.0	1.131	0.869	0.0	1.30	0.0	0.0	1.029E-03	7.901E-04	0.0	1.131	0.869	0.0	1.30	0.0	0.0
SB125	1.487E-04	1.095E-04	8.866E-05	1.286	0.947	0.767	1.36	1.68	1.24	5.472E-10	4.030E-10	3.265E-10	1.286	0.947	0.767	1.36	1.68	1.23
I129	1.668E-05	1.770E-05	1.638E-05	0.986	1.046	0.968	0.94	1.02	1.08	1.668E-05	1.770E-05	1.638E-05	0.986	1.046	0.968	0.94	1.02	1.08
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	9.046E-05	8.848E-05	8.815E-05	1.016	0.994	0.990	1.02	1.03	1.00	4.537E-12	4.434E-12	4.421E-12	1.016	0.993	0.990	1.02	1.03	1.00
CS135	2.035E-04	2.270E-04	2.079E-04	0.956	1.067	0.977	0.90	0.98	1.09	2.035E-04	2.270E-04	2.079E-04	0.956	1.067	0.977	0.90	0.98	1.09
CS137	4.313E+01	4.315E+01	0.0	1.000	1.000	0.0	1.00	0.0	0.0	1.358E+01	1.368E+01	0.0	0.996	1.004	0.0	0.99	0.0	0.0
CE144	2.926E-17	2.942E-17	0.0	0.997	1.003	0.0	0.99	0.0	0.0	1.338E-36	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	2.166E-11	2.233E-11	0.0	0.985	1.015	0.0	0.0	0.97	0.0	2.166E-11	2.233E-11	0.0	0.985	1.015	0.0	0.0	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	8.834E-05	1.188E-04	1.138E-04	0.826	1.110	1.064	0.74	0.78	1.04	1.618E-10	2.172E-10	2.083E-10	0.827	1.110	1.064	0.74	0.78	1.04
SM147	7.648E-08	9.439E-08	9.435E-08	0.865	1.068	1.067	0.81	0.81	1.00	7.648E-08	9.439E-08	9.435E-08	0.865	1.068	1.067	0.81	0.81	1.00
SM148	8.291E-13	6.120E-13	0.0	1.151	0.849	0.0	1.35	0.0	0.0	8.291E-13	6.120E-13	0.0	1.151	0.849	0.0	1.35	0.0	0.0
SM149	0.0	1.120E-14	8.379E-15	0.0	1.144	0.856	0.0	0.0	1.34	0.0	1.120E-14	8.379E-15	0.0	1.144	0.856	0.0	0.0	1.34
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	3.154E-02	3.637E-02	2.588E-02	1.009	1.163	0.828	0.87	1.22	1.41	2.146E-02	2.474E-02	1.761E-02	1.009	1.163	0.828	0.87	1.22	1.41
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	2.028E+00	2.051E+00	1.749E+00	1.044	1.056	0.900	0.99	1.16	1.17	3.606E-02	3.645E-02	3.109E-02	1.044	1.055	0.900	0.99	1.16	1.17
EU155	5.168E-03	5.707E-03	4.577E-03	1.003	1.108	0.889	0.91	1.13	1.25	4.767E-06	5.268E-06	4.225E-06	1.003	1.108	0.889	0.90	1.13	1.25
U234	5.061E-02	5.061E-02	4.211E-02	1.059	1.059	0.881	1.00	1.20	1.20	5.840E-02	5.925E-02	4.459E-02	1.080	1.096	0.825	0.99	1.31	1.33
U235	5.106E-04	5.718E-04	5.615E-04	0.932	1.044	1.025	0.89	0.91	1.02	5.110E-04	5.722E-04	5.615E-04	0.932	1.044	1.024	0.89	0.91	1.02
U236	9.263E-03	9.337E-03	9.343E-03	0.994	1.002	1.003	0.99	0.99	1.00	9.284E-03	9.357E-03	9.343E-03	0.995	1.003	1.002	0.99	0.99	1.00
U238	7.970E-03	7.950E-03	7.965E-03	1.001	0.999	1.000	1.00	1.00	1.00	7.970E-03	7.950E-03	7.965E-03	1.001	0.999	1.000	1.00	1.00	1.00
NP237	1.418E-02	1.406E-02	9.966E-03	1.113	1.104	0.783	1.01	1.42	1.41	1.614E-02	1.629E-02	9.966E-03	1.142	1.153	0.705	0.99	1.62	1.63
PU238	7.649E+01	8.487E+01	6.430E+01	1.017	1.128	0.855	0.90	1.19	1.32	5.159E+01	5.729E+01	4.336E+01	1.017	1.129	0.854	0.90	1.19	1.32
PU239	9.319E+00	1.116E+01	7.915E+00	0.985	1.179	0.836	0.84	1.18	1.41	9.307E+00	1.114E+01	7.904E+00	0.985	1.179	0.836	0.84	1.18	1.41
PU240	1.667E+01	1.521E+01	1.486E+01	1.070	0.976	0.954	1.10	1.12	1.02	1.660E+01	1.515E+01	1.478E+01	1.070	0.977	0.953	1.10	1.12	1.03
PU241	3.634E-01	4.360E-01	3.666E-01	0.935	1.122	0.943	0.83	0.99	1.19	3.275E-02	4.126E-02	3.470E-02	0.904	1.139	0.958	0.79	0.94	1.19
PU242	5.446E-02	5.755E-02	6.954E-02	0.900	0.951	1.149	0.95	0.78	0.83	5.446E-02	5.755E-02	6.954E-02	0.900	0.951	1.149	0.95	0.78	0.83
AM241	1.290E+02	1.456E+02	1.234E+02	0.972	1.098	0.930	0.89	1.05	1.18	1.302E+02	1.476E+02	1.250E+02	0.970	1.099	0.931	0.88	1.04	1.18
AM242	8.679E-03	1.595E-02	6.170E-03	0.845	1.554	0.601	0.54	1.41	2.59	6.909E-03	1.270E-02	4.912E-03	0.845	1.554	0.601	0.54	1.41	2.59
AM243	6.167E-01	6.924E-01	7.612E-01	0.894	1.003	1.103	0.89	0.81	0.91	6.138E-01	6.892E-01	7.576E-01	0.894	1.003	1.103	0.89	0.81	0.91
CM242	2.330E-01	4.281E-01	1.637E-01	0.848	1.557	0.595	0.54	1.42	2.62	1.855E-01	3.408E-01	1.303E-01	0.848	1.557	0.595	0.54	1.42	2.62
CM243	2.497E-01	7.047E-02	2.240E-01	1.377	0.388	1.235	3.54	1.11	0.31	7.402E-02	2.088E-02	6.640E-02	1.377	0.388	1.235	3.55	1.11	0.31
CM244	1.175E+01	1.242E+01	1.428E+01	0.917	0.969	1.114	0.95	0.82	0.87	1.733E+00	1.832E+00	2.107E+00	0.917	0.969	1.114	0.95	0.82	0.87
CM245	5.948E-03	7.219E-03	8.230E-03	0.834	1.012	1.154	0.82	0.72	0.88	5.924E-03	7.190E-03	8.196E-03	0.834	1.012	1.154	0.82	0.72	0.88
CM246	1.333E-03	1.666E-03	1.898E-03	0.817	1.021	1.163	0.80	0.70	0.88	1.323E-03	1.653E-03	1.884E-03	0.817	1.020	1.163	0.80	0.70	0.88

AVERAGE-ABSOLUTE-DEVIATION, AS %	8.11	9.70	10.80	19.0	17.3	23.4				8.54	10.20	11.14	19.6	18.4	24.4		
AV-ABS-DEV EXCLUDING LARGEST ONE, %	6.63	8.44	9.67	11.2	15.0	17.6				6.98	8.82	9.80	11.7	16.1	18.7		
AV-ABS-DEV EXCLUDING LARGEST TWO, %	5.94	6.83	8.10	9.3	12.7	13.2				6.07	7.39	8.22	11.0	13.6	12.6		
NUCS EXCLUDED, 1ST/2ND:	SB125	CM243	NP237 / SE 79	CM242	SM151					SB125	CM243	NP237 / SE 79	CM242	U234			

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) WATTS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
SE 79	1.224E-04	8.709E-05	8.013E-05	1.268	0.902	0.830	1.41	1.53	1.09	1.215E-04	8.644E-05	7.953E-05	1.268	0.902	0.830	1.41	1.53	1.09
KR 85	6.341E-08	6.251E-08	6.410E-08	1.001	0.987	1.012	1.01	0.99	0.98	1.398E-27	1.378E-27	1.411E-27	1.002	0.987	1.011	1.01	0.99	0.98
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	8.387E-02	8.219E-02	8.580E-02	0.999	0.979	1.022	1.02	0.98	0.96	4.872E-09	4.770E-09	4.978E-09	1.000	0.979	1.021	1.02	0.98	0.96
Y 90	4.006E-01	3.926E-01	4.106E-01	0.998	0.978	1.023	1.02	0.98	0.96	2.327E-08	2.278E-08	2.382E-08	0.999	0.978	1.023	1.02	0.98	0.96
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.614E-04	2.613E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0	2.613E-04	2.612E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	7.947E-03	7.988E-03	7.990E-03	0.996	1.002	1.002	0.99	0.99	1.00	7.929E-03	7.970E-03	7.972E-03	0.996	1.002	1.002	0.99	0.99	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	7.070E-06	6.172E-06	6.507E-06	1.074	0.938	0.988	1.15	1.09	0.95	7.070E-06	6.171E-06	6.507E-06	1.074	0.937	0.988	1.15	1.09	0.95
SN126	1.027E-03	7.890E-04	0.0	1.131	0.869	0.0	1.30	0.0	0.0	1.022E-03	7.852E-04	0.0	1.131	0.869	0.0	1.30	0.0	0.0
SB125	0.0	0.0	6.005E-32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.668E-05	1.770E-05	1.638E-05	0.986	1.046	0.968	0.94	1.02	1.08	1.668E-05	1.770E-05	1.638E-05	0.986	1.046	0.968	0.94	1.02	1.08
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	2.798E-41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	2.034E-04	2.270E-04	2.079E-04	0.956	1.067	0.977	0.90	0.98	1.09	2.034E-04	2.270E-04	2.078E-04	0.956	1.067	0.977	0.90	0.98	1.09
CS137	1.336E-01	1.381E-01	0.0	0.983	1.017	0.0	0.97	0.0	0.0	1.263E-08	1.431E-08	0.0	0.938	1.062	0.0	0.88	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	2.166E-11	2.233E-11	0.0	0.985	1.015	0.0	0.0	0.97	0.0	2.166E-11	2.233E-11	0.0	0.985	1.015	0.0	0.0	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	2.336E-33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	7.648E-08	9.439E-08	9.435E-08	0.865	1.068	1.067	0.81	0.81	1.00	7.648E-08	9.439E-08	9.435E-08	0.865	1.068	1.067	0.81	0.81	1.00
SM148	8.291E-13	6.120E-13	0.0	1.151	0.849	0.0	1.35	0.0	0.0	8.291E-13	6.120E-13	0.0	1.151	0.849	0.0	1.35	0.0	0.0
SM149	0.0	1.120E-14	8.379E-15	0.0	1.144	0.856	0.0	0.0	1.34	0.0	1.120E-14	8.379E-15	0.0	1.144	0.856	0.0	0.0	1.34
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	4.598E-03	5.302E-03	3.773E-03	1.009	1.163	0.828	0.87	1.22	1.41	2.093E-05	2.416E-05	1.719E-05	1.008	1.164	0.828	0.87	1.22	1.41
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	3.601E-09	3.636E-09	3.103E-09	1.045	1.055	0.900	0.99	1.16	1.17	0.0	0.0	9.748E-34	0.0	0.0	0.0	0.0	0.0	0.0
EU155	3.451E-18	3.826E-18	3.070E-18	1.001	1.109	0.890	0.90	1.12	1.25	0.0	0.0	1.003E-60	0.0	0.0	0.0	0.0	0.0	0.0
U234	7.117E-02	7.346E-02	4.868E-02	1.105	1.140	0.755	0.97	1.46	1.51	7.440E-02	7.709E-02	4.968E-02	1.110	1.150	0.741	0.97	1.50	1.55
U235	5.125E-04	5.741E-04	5.615E-04	0.933	1.045	1.022	0.89	0.91	1.02	5.179E-04	5.805E-04	5.615E-04	0.936	1.049	1.015	0.89	0.92	1.03
U236	9.369E-03	9.434E-03	9.343E-03	0.999	1.006	0.996	0.99	1.00	1.01	9.651E-03	9.692E-03	9.343E-03	1.009	1.014	0.977	1.00	1.03	1.04
U238	7.970E-03	7.950E-03	7.965E-03	1.001	0.999	1.000	1.00	1.00	1.00	7.970E-03	7.950E-03	7.965E-03	1.001	0.999	1.000	1.00	1.00	1.00
NP237	2.284E-02	2.389E-02	9.966E-03	1.209	1.264	0.527	0.96	2.29	2.40	3.479E-02	3.744E-02	9.963E-03	1.270	1.367	0.364	0.93	3.49	3.76
PU238	1.071E+01	1.194E+01	8.987E+00	1.016	1.132	0.852	0.90	1.19	1.33	4.839E-02	5.827E-02	3.981E-02	0.991	1.193	0.815	0.83	1.22	1.46
PU239	9.257E+00	1.108E+01	7.858E+00	0.985	1.179	0.836	0.84	1.18	1.41	9.083E+00	1.087E+01	7.702E+00	0.985	1.179	0.835	0.84	1.18	1.41
PU240	1.626E+01	1.484E+01	1.447E+01	1.071	0.977	0.952	1.10	1.12	1.03	1.510E+01	1.378E+01	1.343E+01	1.071	0.977	0.952	1.10	1.12	1.03
PU241	7.612E-06	1.014E-05	2.784E-06	1.112	1.481	0.407	0.75	2.73	3.64	5.152E-06	6.454E-06	1.287E-20	1.332	1.668	0.000	0.80	****	****
PU242	5.445E-02	5.755E-02	6.952E-02	0.900	0.951	1.149	0.95	0.78	0.83	5.438E-02	5.748E-02	6.943E-02	0.900	0.951	1.149	0.95	0.78	0.83
AM241	9.535E+01	1.082E+02	9.164E+01	0.969	1.100	0.931	0.88	1.04	1.18	3.104E+01	3.521E+01	2.982E+01	0.969	1.099	0.931	0.88	1.04	1.18
AM242	2.776E-03	5.099E-03	1.973E-03	0.846	1.553	0.601	0.54	1.41	2.58	1.141E-04	2.095E-04	8.106E-05	0.846	1.553	0.601	0.54	1.41	2.58
AM243	6.024E-01	6.763E-01	7.435E-01	0.894	1.003	1.103	0.89	0.81	0.91	5.640E-01	6.333E-01	6.962E-01	0.894	1.003	1.103	0.89	0.81	0.91
CM242	7.451E-02	1.369E-01	5.234E-02	0.848	1.557	0.595	0.54	1.42	2.62	3.062E-03	5.624E-03	2.150E-03	0.848	1.557	0.595	0.54	1.42	2.62
CM243	5.711E-04	1.611E-04	5.124E-04	1.377	0.388	1.235	3.55	1.11	0.31	2.307E-11	6.507E-12	2.069E-11	1.377	0.388	1.235	3.55	1.12	0.31
CM244	8.209E-04	8.676E-04	9.981E-04	0.917	0.969	1.115	0.95	0.82	0.87	1.379E-12	2.008E-15	2.309E-15	2.991	0.004	0.005	****	****	0.87
CM245	5.828E-03	7.073E-03	8.063E-03	0.834	1.012	1.154	0.82	0.72	0.88	5.505E-03	6.681E-03	7.615E-03	0.834	1.012	1.154	0.82	0.72	0.88
CM246	1.285E-03	1.606E-03	1.829E-03	0.817	1.021	1.163	0.80	0.70	0.88	1.160E-03	1.449E-03	1.651E-03	0.817	1.020	1.163	0.80	0.70	0.88

AVERAGE-ABSOLUTE-DEVIATION, AS %	8.37	12.20	13.72	20.2	25.4	36.4				15.73	16.51	18.98	****	****	****		
AV-ABS-DEV EXCLUDING LARGEST ONE, %	6.73	9.70	11.70	12.7	20.6	27.8				8.05	10.76	12.83	22.1	25.8	35.9		
AV-ABS-DEV EXCLUDING LARGEST TWO, %	5.51	7.87	9.05	11.9	15.6	19.0				6.32	8.27	9.38	14.4	17.1	25.4		
NUCS EXCLUDED, 1ST/2ND:	SE 79	CM243	PU241 / CM246	CM242	NP237					CM244	CM243	PU241 / SE 79	CM242	NP237			

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) WATTS PER MTU

	ORIGEN2	ORIGEN-S	CINDER	OR2/AVG	ORS/AVG	CIN/AVG	OR2/ORS	OR2/CIN	ORS/CIN
	**********		10 KYR	**********					
SE 79	1.104E-04	7.853E-05	7.225E-05	1.268	0.902	0.830	1.41	1.53	1.09
KR 85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SR 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Y 91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZR 93	2.602E-04	2.601E-04	0.0	1.000	1.000	0.0	1.00	0.0	0.0
ZR 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NB 95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TC 99	7.700E-03	7.740E-03	7.742E-03	0.996	1.002	1.002	0.99	0.99	1.00
RU106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PD107	7.063E-06	6.165E-06	6.500E-06	1.074	0.937	0.988	1.15	1.09	0.95
SN126	9.606E-04	7.377E-04	0.0	1.131	0.869	0.0	1.30	0.0	0.0
SB125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I129	1.667E-05	1.769E-05	1.638E-05	0.986	1.046	0.968	0.94	1.02	1.08
CS133	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS134	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CS135	2.028E-04	2.263E-04	2.073E-04	0.956	1.067	0.977	0.90	0.98	1.09
CS137	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CE144	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND143	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND144	0.0	2.166E-11	2.233E-11	0.0	0.985	1.015	0.0	0.0	0.97
ND145	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND146	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM147	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM147	7.648E-08	9.439E-08	9.435E-08	0.865	1.068	1.067	0.81	0.81	1.00
SM148	8.291E-13	6.120E-13	0.0	1.151	0.849	0.0	1.35	0.0	0.0
SM149	0.0	1.120E-14	8.379E-15	0.0	1.144	0.856	0.0	0.0	1.34
SM150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SM151	1.644E-35	0.0	1.353E-35	1.097	0.0	0.903	0.0	1.21	0.0
SM152	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU153	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU154	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EU155	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
U234	7.277E-02	7.540E-02	4.843E-02	1.110	1.151	0.739	0.97	1.50	1.56
U235	5.785E-04	6.531E-04	5.615E-04	0.968	1.093	0.939	0.89	1.03	1.16
U236	1.190E-02	1.175E-02	9.341E-03	1.082	1.068	0.849	1.01	1.27	1.26
U238	7.971E-03	7.950E-03	7.965E-03	1.001	0.998	1.000	1.00	1.00	1.00
NP237	4.045E-02	4.387E-02	9.934E-03	1.287	1.396	0.316	0.92	4.07	4.42
PU238	9.885E-21	1.810E-20	6.889E-21	0.850	1.557	0.593	0.55	1.43	2.63
PU239	7.091E+00	8.483E+00	5.946E+00	0.989	1.183	0.829	0.84	1.19	1.43
PU240	5.813E+00	5.306E+00	5.183E+00	1.070	0.976	0.954	1.10	1.12	1.02
PU241	2.473E-06	3.098E-06	0.0	0.888	1.112	0.0	0.80	0.0	0.0
PU242	5.352E-02	5.655E-02	6.829E-02	0.900	0.951	1.149	0.95	0.78	0.83
AM241	2.668E-03	3.373E-03	1.607E-05	1.321	1.671	0.008	0.79	****	****
AM242	1.715E-22	3.142E-22	1.215E-22	0.847	1.552	0.600	0.55	1.41	2.59
AM243	2.422E-01	2.720E-01	2.990E-01	0.894	1.003	1.103	0.89	0.81	0.91
CM242	4.618E-21	8.458E-21	3.222E-21	0.850	1.557	0.593	0.55	1.43	2.63
CM243	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM244	1.377E-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CM245	2.642E-03	3.207E-03	3.647E-03	0.835	1.013	1.152	0.82	0.72	0.88
CM246	3.103E-04	3.876E-04	4.415E-04	0.817	1.021	1.162	0.80	0.70	0.88

AVERAGE-ABSOLUTE-DEVIATION, AS %	11.36	15.68	19.62	17.5	****	****
AV-ABS-DEV EXCLUDING LARGEST ONE, %	9.62	12.12	14.94	16.2	35.5	44.2
AV-ABS-DEV EXCLUDING LARGEST TWO, %	7.97	9.22	10.47	15.2	20.0	22.3

NUCS EXCLUDED, 1ST/2ND: SE 79 PU238 AM241 / CM246 CM242 NP237

APPENDIX F

COMPARATIVE RATIO TABLES IN TOTAL WATTS

(See table descriptions in Sect. 4.1)

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU WATTS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	5.063E+04	5.063E+04	5.076E+04	0.999	0.999	1.002	1.00	1.00	1.00	1.581E+03	1.578E+03	1.578E+03	1.001	0.999	0.999	1.00	1.00	1.00
ACT.	1.561E+03	1.561E+03	1.561E+03	1.000	1.000	1.000	1.00	1.00	1.00	1.976E+02	1.971E+02	1.970E+02	1.002	0.999	0.999	1.00	1.00	1.00
TOTAL	5.219E+04	5.219E+04	5.232E+04	0.999	0.999	1.002	1.00	1.00	1.00	1.778E+03	1.775E+03	1.775E+03	1.001	0.999	0.999	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.06	0.06	0.12	0.0	0.2	0.2				0.15	0.06	0.09	0.2	0.2	0.0

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU WATTS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	9.062E+02	9.045E+02	9.044E+02	1.001	0.999	0.999	1.00	1.00	1.00	6.469E+02	6.460E+02	6.460E+02	1.001	1.000	1.000	1.00	1.00	1.00
ACT.	2.066E+02	2.058E+02	2.057E+02	1.003	0.999	0.998	1.00	1.00	1.00	2.169E+02	2.160E+02	2.158E+02	1.003	0.999	0.998	1.00	1.00	1.00
TOTAL	1.113E+03	1.110E+03	1.110E+03	1.002	0.999	0.999	1.00	1.00	1.00	8.639E+02	8.620E+02	8.618E+02	1.002	0.999	0.999	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.19	0.08	0.11	0.3	0.3	0.0				0.18	0.08	0.11	0.3	0.3	0.0

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU WATTS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	3.098E+02	3.099E+02	3.100E+02	1.000	1.000	1.000	1.00	1.00	1.00	9.534E+01	9.568E+01	9.571E+01	0.998	1.001	1.001	1.00	1.00	1.00
ACT.	2.149E+02	2.143E+02	2.142E+02	1.002	0.999	0.999	1.00	1.00	1.00	1.895E+02	1.894E+02	1.894E+02	1.000	1.000	1.000	1.00	1.00	1.00
TOTAL	5.247E+02	5.242E+02	5.242E+02	1.001	1.000	1.000	1.00	1.00	1.00	2.848E+02	2.851E+02	2.851E+02	0.999	1.000	1.000	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.10	0.04	0.06	0.1	0.2	0.0				0.12	0.05	0.07	0.2	0.2	0.0

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU WATTS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	9.041E-01	9.197E-01	9.203E-01	0.988	1.005	1.006	0.98	0.98	1.00	2.011E-02	2.009E-02	2.019E-02	0.999	0.998	1.003	1.00	1.00	1.00
ACT.	1.252E+02	1.252E+02	1.251E+02	1.000	1.000	1.000	1.00	1.00	1.00	5.472E+01	5.474E+01	5.456E+01	1.001	1.001	0.998	1.00	1.00	1.00
TOTAL	1.261E+02	1.261E+02	1.261E+02	1.000	1.000	1.000	1.00	1.00	1.00	5.474E+01	5.476E+01	5.458E+01	1.001	1.001	0.998	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.40	0.20	0.23	0.6	0.6	0.1				0.09	0.14	0.23	0.1	0.3	0.4

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU WATTS PER MTU

	10 KYR							
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	1.910E-02	1.908E-02	1.919E-02	0.999	0.998	1.003	1.00	1.00	0.99
ACT.	1.350E+01	1.350E+01	1.331E+01	1.005	1.005	0.990	1.00	1.01	1.01
TOTAL	1.352E+01	1.352E+01	1.333E+01	1.005	1.005	0.990	1.00	1.01	1.01
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.36	0.39	0.75	0.0	1.1	1.1

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) WATTS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	5.062E+04	5.076E+04	5.097E+04	0.997	1.000	1.004	1.00	0.99	1.00	1.585E+03	1.567E+03	1.592E+03	1.002	0.991	1.007	1.01	1.00	0.98
ACT.	1.621E+03	1.630E+03	1.620E+03	0.998	1.004	0.998	0.99	1.00	1.01	2.056E+02	2.143E+02	2.167E+02	0.969	1.010	1.021	0.96	0.95	0.99
TOTAL	5.224E+04	5.239E+04	5.259E+04	0.997	1.000	1.003	1.00	0.99	1.00	1.790E+03	1.781E+03	1.809E+03	0.998	0.993	1.009	1.00	0.99	0.98
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.27	0.15	0.31	0.4	0.5	0.5				1.17	0.86	1.22	1.9	2.2	1.4

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) WATTS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	9.037E+02	8.992E+02	9.132E+02	0.998	0.993	1.009	1.01	0.99	0.98	6.440E+02	6.418E+02	6.548E+02	0.996	0.992	1.012	1.00	0.98	0.98
ACT.	2.140E+02	2.257E+02	2.256E+02	0.965	1.018	1.017	0.95	0.95	1.00	2.234E+02	2.394E+02	2.358E+02	0.959	1.028	1.012	0.93	0.95	1.02
TOTAL	1.118E+03	1.125E+03	1.139E+03	0.992	0.998	1.010	0.99	0.98	0.99	8.674E+02	8.812E+02	8.905E+02	0.986	1.002	1.012	0.98	0.97	0.99
AVERAGE-ABSOLUTE-DEVIATION, AS %				1.50	0.89	1.21	2.1	2.7	0.9				1.97	1.25	1.23	2.9	3.2	1.5

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) WATTS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	3.082E+02	3.077E+02	3.152E+02	0.993	0.991	1.015	1.00	0.98	0.98	9.484E+01	9.501E+01	9.740E+01	0.991	0.992	1.017	1.00	0.97	0.98
ACT.	2.197E+02	2.408E+02	2.330E+02	0.950	1.042	1.008	0.91	0.94	1.03	1.931E+02	2.139E+02	2.065E+02	0.944	1.046	1.010	0.90	0.94	1.04
TOTAL	5.279E+02	5.485E+02	5.481E+02	0.975	1.013	1.012	0.96	0.96	1.00	2.879E+02	3.089E+02	3.039E+02	0.959	1.029	1.012	0.93	0.95	1.02
AVERAGE-ABSOLUTE-DEVIATION, AS %				2.72	2.10	1.19	4.2	3.9	1.9				3.55	2.75	1.31	5.6	4.8	2.6

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) WATTS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	9.001E-01	9.113E-01	9.346E-01	0.983	0.996	1.021	0.99	0.96	0.98	2.026E-02	1.661E-02	1.802E-02	1.107	0.908	0.985	1.22	1.12	0.92
ACT.	1.273E+02	1.411E+02	1.385E+02	0.939	1.040	1.021	0.90	0.92	1.02	5.552E+01	5.956E+01	5.856E+01	0.959	1.029	1.012	0.93	0.95	1.02
TOTAL	1.282E+02	1.420E+02	1.394E+02	0.939	1.040	1.021	0.90	0.92	1.02	5.554E+01	5.958E+01	5.858E+01	0.959	1.029	1.012	0.93	0.95	1.02
AVERAGE-ABSOLUTE-DEVIATION, AS %				4.64	2.82	2.11	6.9	6.6	2.1				6.29	5.01	1.29	11.8	7.6	3.7

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) WATTS PER MTU

	10 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	1.924E-02	1.582E-02	1.716E-02	1.105	0.909	0.986	1.22	1.12	0.92
ACT.	1.360E+01	1.393E+01	1.318E+01	1.002	1.026	0.971	0.98	1.03	1.06
TOTAL	1.362E+01	1.395E+01	1.320E+01	1.002	1.026	0.971	0.98	1.03	1.06
AVERAGE-ABSOLUTE-DEVIATION, AS %				3.66	4.80	2.38	8.8	6.2	6.4

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) WATTS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	5.414E+04	5.430E+04	5.609E+04	0.987	0.990	1.023	1.00	0.97	0.97	2.376E+03	2.324E+03	2.388E+03	1.006	0.984	1.011	1.02	0.99	0.97
ACT.	2.941E+03	3.077E+03	3.134E+03	0.964	1.009	1.027	0.96	0.94	0.98	4.297E+02	4.506E+02	4.840E+02	0.945	0.991	1.064	0.95	0.89	0.93
TOTAL	5.709E+04	5.738E+04	5.923E+04	0.986	0.991	1.023	0.99	0.96	0.97	2.806E+03	2.775E+03	2.872E+03	0.996	0.985	1.019	1.01	0.98	0.97
AVERAGE-ABSOLUTE-DEVIATION, AS %				2.09	0.92	2.44	1.7	4.4	2.7				2.16	1.36	3.15	2.7	4.7	4.3

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) WATTS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	1.378E+03	1.367E+03	1.390E+03	1.000	0.992	1.009	1.01	0.99	0.98	9.700E+02	9.658E+02	9.844E+02	0.996	0.992	1.011	1.00	0.99	0.98
ACT.	4.228E+02	4.459E+02	4.704E+02	0.947	0.999	1.054	0.95	0.90	0.95	4.074E+02	4.338E+02	4.449E+02	0.950	1.012	1.038	0.94	0.92	0.97
TOTAL	1.801E+03	1.813E+03	1.861E+03	0.987	0.993	1.020	0.99	0.97	0.97	1.377E+03	1.400E+03	1.429E+03	0.982	0.998	1.020	0.98	0.96	0.98
AVERAGE-ABSOLUTE-DEVIATION, AS %				2.20	0.53	2.73	2.2	4.7	3.1				2.37	0.71	2.29	2.7	4.5	2.2

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) WATTS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	4.621E+02	4.608E+02	4.718E+02	0.994	0.991	1.015	1.00	0.98	0.98	1.421E+02	1.421E+02	1.457E+02	0.992	0.992	1.017	1.00	0.98	0.98
ACT.	3.558E+02	3.850E+02	3.786E+02	0.954	1.032	1.015	0.92	0.94	1.02	2.911E+02	3.175E+02	3.078E+02	0.953	1.039	1.008	0.92	0.95	1.03
TOTAL	8.179E+02	8.458E+02	8.504E+02	0.976	1.009	1.015	0.97	0.96	0.99	4.332E+02	4.596E+02	4.534E+02	0.965	1.024	1.010	0.94	0.96	1.01
AVERAGE-ABSOLUTE-DEVIATION, AS %				2.55	1.66	1.47	3.7	4.0	1.5				3.00	2.40	1.15	4.7	4.1	2.3

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) WATTS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	1.346E+00	1.362E+00	1.396E+00	0.984	0.996	1.021	0.99	0.96	0.98	2.936E-02	2.454E-02	2.634E-02	1.098	0.918	0.985	1.20	1.11	0.93
ACT.	1.749E+02	1.899E+02	1.875E+02	0.950	1.032	1.018	0.92	0.93	1.01	7.106E+01	7.575E+01	7.394E+01	0.966	1.029	1.005	0.94	0.96	1.02
TOTAL	1.762E+02	1.913E+02	1.889E+02	0.950	1.031	1.019	0.92	0.93	1.01	7.109E+01	7.577E+01	7.397E+01	0.966	1.029	1.005	0.94	0.96	1.02
AVERAGE-ABSOLUTE-DEVIATION, AS %				3.87	2.24	1.92	5.6	5.7	1.7				5.54	4.71	0.83	10.7	6.4	3.9

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) WATTS PER MTU

	10 KYR							
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	2.787E-02	2.337E-02	2.508E-02	1.096	0.919	0.986	1.19	1.11	0.93
ACT.	1.613E+01	1.683E+01	1.500E+01	1.009	1.053	0.938	0.96	1.08	1.12
TOTAL	1.616E+01	1.685E+01	1.503E+01	1.009	1.052	0.938	0.96	1.08	1.12
AVERAGE-ABSOLUTE-DEVIATION, AS %				3.79	6.22	4.58	9.2	8.7	10.4

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) WATTS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	3.577E+04	3.579E+04	3.579E+04	1.000	1.000	1.000	1.00	1.00	1.00	1.252E+03	1.229E+03	1.241E+03	1.009	0.991	1.000	1.02	1.01	0.99
ACT.	1.403E+03	1.219E+03	1.177E+03	1.108	0.963	0.930	1.15	1.19	1.04	1.619E+02	1.465E+02	1.288E+02	1.111	1.005	0.884	1.11	1.26	1.14
TOTAL	3.717E+04	3.701E+04	3.697E+04	1.003	0.999	0.998	1.00	1.01	1.00	1.414E+03	1.376E+03	1.370E+03	1.020	0.992	0.988	1.03	1.03	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				3.71	1.29	2.42	5.2	6.6	1.2				4.66	0.76	4.29	5.1	9.9	5.1

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) WATTS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	7.382E+02	7.368E+02	7.517E+02	0.995	0.993	1.013	1.00	0.98	0.98	5.308E+02	5.325E+02	5.476E+02	0.989	0.992	1.020	1.00	0.97	0.97
ACT.	1.723E+02	1.576E+02	1.370E+02	1.107	1.013	0.880	1.09	1.26	1.15	1.851E+02	1.719E+02	1.474E+02	1.101	1.022	0.877	1.08	1.26	1.17
TOTAL	9.105E+02	8.944E+02	8.887E+02	1.014	0.996	0.990	1.02	1.02	1.01	7.159E+02	7.044E+02	6.950E+02	1.015	0.999	0.986	1.02	1.03	1.01
AVERAGE-ABSOLUTE-DEVIATION, AS %				4.22	0.79	4.76	3.8	10.0	5.9				4.26	1.06	5.25	3.2	10.5	6.9

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) WATTS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	2.545E+02	2.562E+02	2.646E+02	0.985	0.991	1.024	0.99	0.96	0.97	7.836E+01	7.914E+01	8.182E+01	0.982	0.992	1.026	0.99	0.96	0.97
ACT.	1.890E+02	1.790E+02	1.514E+02	1.092	1.034	0.874	1.06	1.25	1.18	1.697E+02	1.620E+02	1.367E+02	1.087	1.038	0.876	1.05	1.24	1.18
TOTAL	4.435E+02	4.352E+02	4.160E+02	1.028	1.008	0.964	1.02	1.07	1.05	2.480E+02	2.411E+02	2.185E+02	1.051	1.022	0.926	1.03	1.13	1.10
AVERAGE-ABSOLUTE-DEVIATION, AS %				4.49	1.70	6.19	2.7	11.8	8.7				5.19	2.26	7.45	2.9	13.9	10.7

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) WATTS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	7.439E-01	7.582E-01	7.831E-01	0.977	0.995	1.028	0.98	0.95	0.97	1.668E-02	1.383E-02	1.481E-02	1.104	0.915	0.980	1.21	1.13	0.93
ACT.	1.149E+02	1.095E+02	9.355E+01	1.084	1.033	0.883	1.05	1.23	1.17	5.082E+01	4.797E+01	4.149E+01	1.087	1.026	0.887	1.06	1.22	1.16
TOTAL	1.157E+02	1.103E+02	9.433E+01	1.084	1.033	0.884	1.05	1.23	1.17	5.084E+01	4.798E+01	4.151E+01	1.087	1.026	0.887	1.06	1.22	1.16
AVERAGE-ABSOLUTE-DEVIATION, AS %				6.38	2.35	8.73	3.9	16.8	12.4				9.26	4.54	8.16	10.8	19.2	12.6

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) WATTS PER MTU

	10 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	1.584E-02	1.318E-02	1.411E-02	1.102	0.917	0.982	1.20	1.12	0.93
ACT.	1.266E+01	1.202E+01	9.978E+00	1.096	1.040	0.864	1.05	1.27	1.20
TOTAL	1.268E+01	1.203E+01	9.992E+00	1.096	1.040	0.864	1.05	1.27	1.20
AVERAGE-ABSOLUTE-DEVIATION, AS %				9.79	5.46	9.70	10.3	22.0	15.8

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) WATTS PER MTU

	30 DAY									5 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	3.763E+04	3.790E+04	3.795E+04	0.995	1.002	1.003	0.99	0.99	1.00	1.761E+03	1.736E+03	1.762E+03	1.005	0.990	1.005	1.01	1.00	0.99
ACT.	1.905E+03	2.082E+03	1.923E+03	0.967	1.057	0.976	0.91	0.99	1.08	2.425E+02	2.636E+02	2.346E+02	0.982	1.068	0.950	0.92	1.03	1.12
TOTAL	3.953E+04	3.998E+04	3.987E+04	0.993	1.005	1.002	0.99	0.99	1.00	2.003E+03	2.000E+03	1.997E+03	1.002	1.000	0.998	1.00	1.00	1.00
AVERAGE-ABSOLUTE-DEVIATION, AS %				1.50	2.12	0.96	3.4	0.9	2.9				0.80	2.58	1.88	3.2	1.2	4.7

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) WATTS PER MTU

	10 YR									20 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	1.092E+03	1.080E+03	1.104E+03	1.000	0.989	1.011	1.01	0.99	0.98	7.862E+02	7.780E+02	8.001E+02	0.998	0.987	1.015	1.01	0.98	0.97
ACT.	2.491E+02	2.717E+02	2.381E+02	0.985	1.074	0.941	0.92	1.05	1.14	2.556E+02	2.803E+02	2.405E+02	0.988	1.083	0.929	0.91	1.06	1.17
TOTAL	1.341E+03	1.352E+03	1.342E+03	0.997	1.005	0.998	0.99	1.00	1.01	1.042E+03	1.058E+03	1.041E+03	0.995	1.011	0.994	0.98	1.00	1.02
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.61	3.00	2.40	3.4	1.9	5.7				0.65	3.56	3.07	3.8	2.7	7.0

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) WATTS PER MTU

	50 YR									100 YR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	3.766E+02	3.733E+02	3.856E+02	0.995	0.986	1.019	1.01	0.98	0.97	1.159E+02	1.152E+02	1.191E+02	0.993	0.987	1.020	1.01	0.97	0.97
ACT.	2.449E+02	2.711E+02	2.264E+02	0.990	1.096	0.915	0.90	1.08	1.20	2.106E+02	2.343E+02	1.943E+02	0.988	1.100	0.912	0.90	1.08	1.21
TOTAL	6.215E+02	6.444E+02	6.120E+02	0.993	1.029	0.978	0.96	1.02	1.05	3.264E+02	3.495E+02	3.134E+02	0.990	1.060	0.950	0.93	1.04	1.12
AVERAGE-ABSOLUTE-DEVIATION, AS %				0.75	4.62	4.21	4.7	4.0	9.4				0.97	5.75	5.26	5.8	5.1	11.8

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) WATTS PER MTU

	300 YR									1 KYR								
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	1.094E+00	1.102E+00	1.137E+00	0.985	0.992	1.023	0.99	0.96	0.97	2.254E-02	1.941E-02	2.051E-02	1.083	0.932	0.985	1.16	1.10	0.95
ACT.	1.325E+02	1.471E+02	1.239E+02	0.985	1.094	0.921	0.90	1.07	1.19	5.607E+01	6.081E+01	5.185E+01	0.997	1.081	0.922	0.92	1.08	1.17
TOTAL	1.336E+02	1.482E+02	1.250E+02	0.985	1.093	0.922	0.90	1.07	1.19	5.609E+01	6.083E+01	5.187E+01	0.997	1.081	0.922	0.92	1.08	1.17
AVERAGE-ABSOLUTE-DEVIATION, AS %				1.50	6.49	6.00	6.8	5.9	13.4				2.96	7.67	5.70	10.6	8.7	13.3

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) WATTS PER MTU

	10 KYR							
	ORIGEN2	ORIGEN-S	CINDER	OR2 AVG	ORS AVG	CIN AVG	OR2 ORS	OR2 CIN	ORS CIN
F. P.	2.144E-02	1.851E-02	1.955E-02	1.081	0.933	0.986	1.16	1.10	0.95
ACT.	1.341E+01	1.434E+01	1.158E+01	1.023	1.094	0.883	0.94	1.16	1.24
TOTAL	1.343E+01	1.436E+01	1.160E+01	1.023	1.094	0.883	0.94	1.16	1.24
AVERAGE-ABSOLUTE-DEVIATION, AS %				4.23	8.48	8.26	9.6	13.8	17.7

APPENDIX G

NUCLIDE DISTRIBUTION SUMMARY TABLES
(See table descriptions in Sect. 4.2)

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	30 DAY			5 YR			10 YR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
5 TO 10								ZR95 NB95	ZR95 NB95
1 TO 5					ZR95 NB95	ZR95 NB95			
-1 TO 1	SM149 CE144	AM242 I129	AM242 I129	PU241 CS137	PU241 AM242	AM242 I129	PU241 CS137	PU241 CM242	CM242 AM242
	AM242 PU241	ZR95 CE144	Y90 ZR95	CE144 SM149	I129 CE144	SR89 CE144	CE144 SM149	AM242 CE144	CE144 SR89
	CM242 ND146	PU241 ND144	CM244 CM245	EU155 CM242	Y91 CS137	Y91 RU106	AM242 CM242	I129 Y91	I129 Y91
	CM246 CM245	CM246 CM245	CM243 ND144	CM246 CM245	SR89 RU106	CM244 CM246	ND146 CM246	SR89 CS137	SR90 CM244
	PU242 CM243	CM244 CM243	CM246 AM241	ND146 CM243	CM246 CM243	CM243 PU242	PU242 CM243	SB125 CM243	SB125 CM243
	PU240 AM243	PU240 PU242	PU241 PU240	PU240 PU242	PU238 CM245	PU238 CM245	PU240 AM243	CM246 CM245	CM246 CM245
	PU238 CS137	PU238 CS137	PU238 NP237	PU238 NP237	PU242 CM244	U238 PU241	PU238 CM245	CM244 RU106	PU242 RU106
	U238 U236	U238 U236	U238 U236	U238 U236	U235 SM150	U235 SM150	U238 U236	U235 PU242	U235 U238
	U235 U234	U235 U234	U235 U234	U235 U234	AM243 SN126	AM243 SN126	U235 U234	AM243 SN126	AM243 SN126
	EU155 NP237	AM243 NP237	AM243 EU154	AM243 EU154	U238 SM152	AM241 SM152	EU155 NP237	U238 SM152	AM241 SM152
	EU153 SM152	EU153 SM152	EU153 PU242	EU153 SM152	SR90 ND145	SR90 ND145	EU153 SM152	SR90 SM150	PU241 SM150
	SM151 SM150	SR90 SM150	SR90 SM150	SM151 SM150	KR85 SM148	KR85 SM148	SM151 SM150	KR85 SM148	KR85 SM148
	PU239 SM148	PU239 SM148	PU239 SM148	PU239 SM148	SM147 PM147	SM147 PM147	PU239 SM148	SM147 PD107	SM147 PM147
	SM147 PM147	SM147 PD107	SM147 PD107	SM147 PM147	ND146 CS134	ND146 CS134	SM147 PD107	ND146 ND145	ND146 ND145
	RU106 ND145	ND146 ND145	ND146 ND145	CS135 ND145	TC99 EU155	TC99 ND143	RU106 ND145	ND144 EU155	ND144 ND143
	ND144 ZR95	SR89 CS135	SR89 ND143	ND144 I129	EU154 ZR93	EU154 CS137	ND144 I129	EU154 ZR93	EU154 CS137
	EU154 Y91	EU154 SN126	CE144 CS137	AM242 Y91	CS135 Y90	CS135 Y90	EU154 SN126	CS135 Y90	CS135 CS134
	CS135 CS134	CS134 TC99	CS135 CS134	PD107 CS134	SE79 PU239	ZR93 PU239	CS135 Y90	TC99 PU239	TC99 PU239
	SR89 I129	SB125 ZR93	TC99 SB125	TC99 SB125	SB125 PD107	SB125 SE79	TC99 SB125	PU238 SE79	PU238 ZR93
	SB125 SN126	RU106 SE79	SN126 RU106	SN126 Y90	ND144 EU153	PD107 ND144	ZR93 KR85	SM151 PM147	PD107 Y90
	PD107 KR85	Y90 PM147	ZR93 SM152	SR90 KR85	SM151 U234	EU153 EU155	SE79 CS133	EU153 CS134	SE79 EU155
	TC99 NB95	SM151 EU155	SE79 PM147	ZR93 SE79	ND143 CS133	SM151 U234	PM147 CM244	ND143 CS133	SM151 EU153
	ZR93 SR90	CM242 Y91	SM151 EU155	CS133 RU106	U236 PU240	CS133 U236	SR90 CS134	U234 U236	CS133 U234
	SE79 CM244	KR85 ND143	CM242 Y91	CM244 ND143	NP237 SM149	PU240 NP237	ND143 Y91	PU240 SM149	U236 PU240
	CS133 ND143	CS133 NB95	CS133 KR85	SR89 ZR95	CM242	SM149 CM242	SR89 NB95	NP237	SM149 NP237
	Y90 AM241	AM241 SM149	NB95 SM149	NB95			ZR95		
-5 TO -1				AM241	AM241		AM241	AM241	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	20 YR						50 YR						100 YR					
	ORS/OR2-1		CIN/OR2-1		CIN/ORS-1		ORS/OR2-1		CIN/OR2-1		CIN/ORS-1		ORS/OR2-1		CIN/OR2-1		CIN/ORS-1	
10 TO 20			ZR95	NB95	ZR95	NB95							PU241		PU241			
5 TO 10							PU241		PU241									
1 TO 5	PU241		PU241						CE144		CE144		CS137		CE144	CS137	CE144	
-1 TO 1	CS137	RU106	CE144	CM242	CE144	Y91	CS137	CE144	CS137	CM242	CM242	AM242	CE144	EU155	RU106	CM242	CM242	RU106
	CE144	SM149	AM242	Y91	CM242	AM242	RU106	EU155	RU106	AM242	I129	RU106	RU106	AM242	AM242	I129	AM242	I129
	EU155	AM242	RU106	I129	I129	RU106	SM149	CM242	I129	EU155	SB125	CS134	SM149	CM242	EU155	SB125	CS134	SB125
	CM242	CM246	CS137	EU155	CS134	SB125	CM243	CM245	SB125	CM243	PM147	PU241	CM243	CM246	CM243	CM245	PM147	Y90
	CM243	PU242	SB125	CM243	CM244	PM147	CM246	SN126	CM245	CM244	EU155	CM243	CM245	ND146	CM244	TC99	CM244	EU154
	PU238	CM245	CM245	CM244	CM246	PU242	CM244	U235	TC99	PU242	PU242	CM244	U235	PU242	PU242	CM246	CS137	KR85
	U238	ND146	TC99	PU242	CM243	TC99	PU242	PU238	CM246	SN126	U238	CM246	PU238	SN126	SN126	U238	PU241	EU155
	U235	U234	CM246	SN126	U238	AM243	ZR93	U238	U238	CS135	SN126	AM241	U238	SM152	Y90	CS134	CM243	SN126
	AM243	SN126	U238	Y90	SN126	AM241	SM152	SM151	SR90	SM150	Y90	TC99	SM151	PU240	SM150	PU239	PU242	TC99
	EU153	SM152	SR90	SM150	Y90	SR90	PU240	PU239	KR85	SM148	SM150	KR85	PU239	SM148	SM148	SM147	SM150	CM246
	SM151	PU240	PU239	SM148	SM150	KR85	SM148	SM147	SM147	PD107	SM148	SM147	SM147	PD107	PD107	ND146	SM148	U238
	PU239	SM148	SM147	PD107	SM148	SM147	PD107	ND146	ND146	ND145	CM245	ND146	U236	ND145	ND145	ND144	CM245	ND146
	SM147	PD107	ND146	ND145	CM245	ND146	ND145	ND144	ND144	AM243	ND145	ND144	ND144	AM243	AM243	ZR93	ND145	ND144
	U236	ND145	ND144	AM243	ND145	ND144	AM243	AM242	ZR93	SE79	AM243	EU154	ZR93	EU153	SE79	CS135	AM243	SM147
	ND144	I129	EU154	ZR93	ND143	EU154	EU153	CS135	PU239	PU238	CS137	CS135	CS135	SE79	PU238	SM152	AM241	CS135
	EU154	ZR93	CS135	CS134	CS137	CS135	SR90	SM150	SM152	EU153	SR90	ZR93	SM150	I129	EU153	SR90	SR90	ZR93
	CS135	SR90	SE79	PU238	PU241	ZR93	I129	SE79	SM151	Y90	PU239	PU238	TC99	U234	AM241	KR85	PU239	PU238
	SM150	SB125	SM152	KR85	PU239	PU238	TC99	U234	EU154	CS134	SE79	PD107	CS133	SR90	SM151	ND143	SE79	PD107
	SE79	Y90	SM151	EU153	SE79	PD107	U236	KR85	ND143	CS133	ND143	SM152	AM241	ND143	EU154	CS133	ND143	SM152
	TC99	CS133	PM147	U235	EU155	SM152	CS133	Y90	PM147	U235	EU153	SM151	KR85	CM244	PM147	U235	EU153	SM151
	KR85	CM244	ND143	CS133	SM151	EU153	EU154	SB125	U234	U236	CS133	U235	SB125	Y90	U234	U236	CS133	U235
	ND143	PM147	U234	U236	U235	CS133	ND143	CS134	AM241	PU240	U234	U236	EU154	NP237	SM149	PU240	U234	U236
	NP237	CS134	PU240	SM149	U234	U236	NP237	PM147	SM149		PU240	SM149	CS134	PM147			SM149	PU240
	Y91	ZR95			PU240	SM149	AM241											
	NB95																	
-5 TO -1	AM241		AM241	NP237	NP237													
-20 TO -10									NP237		NP237							
-30 TO -20															NP237		NP237	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	300 YR			1 KYR			10 KYR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
10 TO 20	PU241			CS137	CS137				
1 TO 5	CS137	CS137		PU241			AM241	PU241	
-1 TO 1	EU155	AM241	CM242	EU155	CM242	AM242	SM149	SM151	CM242
	SM149	AM242	AM242	I129	I129	EU154	ND145	ND146	I129
	PU242	ND145	AM241	PU238	KR85	Y90	PU242	CM246	ND146
	CM242	CM246	ND145	PU242	EU155	CS137	SN126	U238	CM246
	SN126	U238	CM246	TC99	CM243	SR90	SM152	U235	PU242
	CM244	U235	U238	CM244	PU238	CM244	ND144	PU239	SM151
	PU240	PU239	SM151	SM150	PU242	TC99	SM148	SM147	ND144
	SM148	SM147	KR85	SN126	SM150	CM246	CM245	U236	U238
	SM152	ND146	SM147	Y90	SN126	U238	PU240	U234	AM243
	TC99	ND144	ND146	ZR93	CM245	ND146	AM243	AM242	AM241
	AM243	ZR93	ND144	AM243	ND145	ND144	AM241	CS135	ZR93
	CM245	CS135	SM148	CM245	AM243	SM147	TC99	SM150	SM152
	SM151	SM150	CS135	SE79	AM241	CS135	I129	SE79	CM245
	I129	PU238	PD107	SM152	SM151	ZR93	ZR93	PD107	CS133
	SE79	PD107	EU153	SR90	PD107	SM148	EU153	CS133	Y90
	U236	U234	CM243	ND143	SE79	ND143	CM242	NP237	PU239
	EU153	CS133	CS133	PU239	SM152	EU153	ND143	CM243	U234
	ND143	NP237	EU154	U234	CS133	PU239	PU238	Y90	PU240
	SR90	CM243	U235	SM149	U234	U235	SR90	KR85	
	Y90	KR85			SM149				
	EU154								
-5 TO -1		PU240	U236	PU240	U236			U235	
-10 TO -5								U236	
-20 TO -10									
-30 TO -20									
<-30		NP237	PU241	NP237	PU241	CM244		NP237	CM244
								PU241	

DELTAS, %	300 YR			1 KYR			10 KYR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
10 TO 20									
1 TO 5									
-1 TO 1	AM242	CM242	AM242	SM151	SM149	PU238	I129	PU238	I129
	ND145	I129	PU238	NP237	U238	SM151	AM242	AM242	CM242
	TC99	CS137	CM244	U235	ND144	CM242	TC99	PU242	TC99
	SN126	CM243	CM246	SM148	SN126	CS135	SN126	SM147	SN126
	CS135	TC99	PU242	CS135	ND146	U238	PD107	U238	PD107
	PU238	Y90	SR90	SM150	SM147	ND146	SM150	ND146	SM150
	SM148	SM150	KR85	AM243	SE79	SM147	AM243	ND144	AM243
	SM147	SN126	U238	CM245	SM152	SM148	SE79	SM148	ZR93
	PD107	PD107	ND146	ND145	U234	ND145	ND144	CS135	ND145
	ND145	AM243	SM147	PU239	I129	SM152	ZR93	SE79	ND143
	AM241	EU153	CS135	TC99	PD107	EU153	ND143	CM246	SM152
	SM148	ZR93	EU153	U236	EU153	CM246	CS133	EU153	CS133
	ND143	SE79	SM152	CS133	ZR93	PU242	CM245	SM151	CM245
	CM243	ND143	EU153	PU240	CM246	U234	PU240	PU240	U234
	CS133	PU239	CM245	ND143	PU242	SM149		SM149	
	SM151	KR85	CM245	AM242	CM242				
	CS133	SM149	PU239	PU238					
	U234		SM149						
	PU240								
-5 TO -1		U235		U235			PU239		PU239
-10 TO -5		U236		U236					
-20 TO -10							U235		U235
-30 TO -20							U236		U236
<-30		NP237	PU241	NP237	PU241		NP237	AM241	NP237	AM241

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	30 DAY			5 YR			10 YR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
>30	AM242 PM147	CM245 CM246	CM243 CM245	AM242 PM147	CM245 CM246	CM243 CM245	AM242 CM242 PM147	CM245 CM246	CM243 CM245
20 TO 30	SM149	AM243 PM147 AM241 CM244 PU242	CM246 CM244	SM147 SM149	AM243 PM147 CM244 SM147 PU242	CM246 CM244	SM147 SM149	AM243 PM147 CM244 SM147 PU242	CM246 CM244
10 TO 20	SM151 AM241 PU241 CS135 PU239 AM243	SM147 PU241 EU153 CS135	PU242 AM243 SN126 SM148 PD107	SM151 PU241 CM242 AM241 CS135 PU239 AM243	PU241 AM241 EU153 CS135	PU242 AM243 SN126 SM148 PD107	SM151 PU241 AM241 CS135 PU239 AM243	PU241 AM241 EU153 CS135	PU242 AM243 SN126 SM148 PD107
5 TO 10	SM147 PU238 EU155 CM245 ND143 CM246 NP237	SM149 U235	EU153 AM241 RU106 SM147	PU238 EU155 CM245 ND143 CM246 NP237	SM149 U235	EU153 RU106	PU238 EU155 CM245 ND143 CM246 NP237	SM149 ZR95 NB95 U235	EU153 RU106 ZR95 NB95
1 TO 5	I129 U235 SM150 ND145 EU153 CS133 TC99 PU242	PU239 ND143 CS137 PD107 RU106 TC99 SM150 SR90 Y90	U235 CS137 Y90 SR90 ND146	I129 U235 SM150 ND145 EU153 CS133 TC99 PU242	PU239 ND143 ZR95 CS137 PD107 NB95 RU106 TC99 SM150 SR90 Y90	ZR95 SR90 Y90 NB95 ND146	I129 U235 SM150 ND145 EU153 CS133 TC99 PU242	PU239 ND143 CS137 PD107 RU106 TC99 Y90 SM150 SR90	U235 CS137 Y90 SR90 ND146
-1 TO 1	SR89 ZR93 ZR95 NB95 Y91 CE144 EU154 SM152 CM242 CS137 U236 U238 SR90 KR85 Y90	CE144 KR85 I129 ND145 ND146 CS133 U238 Y91 CM242 U236 ZR95	KR85 CS134 U238 ND144 CE144 PU241 TC99 CM242 U236 SM150 PU240 Y91	ZR93 SR89 ZR95 NB95 Y91 CE144 EU154 SM152 CS137 U236 U238 Y90 SR90 KR85	CE144 I129 KR85 ND145 CS133 ND146 Y91 U238 U236	AM241 CS134 U238 CE144 ND144 PU241 TC99 SM150 U236 Y91 PU240	ZR93 SR89 CE144 Y91 NB95 ZR95 EU154 SM152 CS137 U236 U238 Y90 SR90 KR85	CE144 I129 KR85 Y91 ND145 CS133 ND146 U238 U236 SR89	KR85 CS134 CE144 AM241 U238 ND144 PU241 TC99 Y91 SM150 U236
-5 TO -1	ND146 CS134 ND144 CM244 U234	NB95 CS134 SR89 ZR93 ND144 NP237 EU155	CS135 ZR95 ND143 NB95 U234 CS133 ND145 SR89 ZR93 I129	CS134 ND146 ND144 CM244 U234	CS134 SR89 ZR93 ND144 NP237 EU155	CS135 ND143 SR89 CS133 ND145 SM147 ZR93 I129 U234	ND146 CS134 ND144 CM244 U234	CS134 ZR93 ND144 EU155 NP237	PU240 CS135 ND143 SR89 CS133 ND145 ZR93 SM147 I129
-10 TO -5	RU106 PD107 SE79	U234 SM151 PU238	PM147 PU239 SE79 NP237	RU106 PD107 SE79	CM242 SM151 U234 PU238	PM147 PU239 SE79 NP237	RU106 PD107 SE79	SM151 U234 PU238	PM147 U234 PU239 SE79 NP237
-20 TO -10	PU240	CM243 PU240 EU154 SM149 SN126 AM242 SM152	EU155 EU154 SM149 SB125 PU238 SM152	PU240	CM243 PU240 EU154 SE79 SN126 AM242 SM152	EU155 EU154 SM149 PU238 SB125 CM242 SM152	PU240	CM243 PU240 EU154 SE79 SN126 CM242 AM242 SM152	EU155 EU154 SM149 PU238 SB125 SM152
-30 TO -20	SN126	SM148	SM151	SN126	SM148	SM151	SN126	SM148	SM151
<-30	SM148 SB125 CM243	SB125	AM242	SM148 SB125 CM243	SB125	AM242	SM148 SB125 CM243	SB125	CM242 AM242

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	20 YR						50 YR						100 YR					
	ORS/OR2-1		CIN/OR2-1		CIN/ORS-1		ORS/OR2-1		CIN/OR2-1		CIN/ORS-1		ORS/OR2-1		CIN/OR2-1		CIN/ORS-1	
>30	CM242	AM242	CM245	CM246	CM243	CM245	CM242	AM242	CM245	CM246	CM243	CM245	AM242	CM242	CM245	CM246	CM243	CM245
	PM147						PM147						PM147					
20 TO 30	SM147	SM149	AM243	PM147	CM246	CM244	SM147	SM149	AM243	PM147	CM246	CM244	SM147	PU241	AM243	PU241	CM246	CM244
			CM244	SM147			PU241		CM244	SM147			SM149		PM147	CM244		
			PU242						PU242						SM147	PU242		
10 TO 20	SM151	PU241	PU241	ZR95	PU242	AM243	SM151	AM241	PU241	AM241	PU242	AM243	SM151	AM241	AM241	EU153	PU242	AM243
	AM241	CS135	NB95	AM241	SN126	ZR95	CS135	PU239	EU153	CS135	SN126	SM148	CS135	PU239	CS135		SN126	SM148
	PU239	AM243	EU153	CS135	NB95	SM148	AM243				PD107		AM243				PD107	
					PD107													
5 TO 10	PU238	EU155	SM149	U235	EU153	RU106	PU238	EU155	SM149	U235	EU153	RU106	PU238	EU155	SM149	U235	EU153	RU106
	CM245	ND143					CM245	NP237					NP237	CM245				
	CM246	NP237					ND143	CM246					ND143	CM246				
1 TO 5	I129	U235	PU239	ND143	U235	CS137	I129	U235	PU239	ND143	U235	CS137	I129	U235	PU239	CE144	U235	CE144
	SM150	ND145	CS137	PD107	Y90	SR90	SM150	ND145	CS137	CE144	Y90	SR90	SM150	ND145	CS137	ND143	CS137	SR90
	EU153	CS133	TC99	SM150	ND146		EU153	CS133	PD107	TC99	CE144	ND146	EU153	CS133	PD107	TC99	Y90	ND146
	TC99	PU242	SR90	Y90			TC99	PU242	SM150	Y90			TC99	PU242	SM150	Y90		
			CE144						SR90				CS137	CE144	SR90			
-1 TO 1	ZR93	CE144	Y91	I129	KR85	CE144	ZR93	CE144	I129	KR85	KR85	CS134	ZR93	SM152	I129	KR85	KR85	CS134
	Y91	EU154	KR85	ND145	CS134	U238	CS137	EU154	ND145	CS133	U238	ND144	EU154	U234	ND145	CS133	U238	ND144
	SM152	CS137	CS133	ND146	Y91	ND144	SM152	U236	ND146	U238	PU241	TC99	U236	U238	ND146	U238	PU241	TC99
	ZR95	NB95	U238	U236	AM241	PU241	U238	SR90	U236		AM241	SM150	Y90	SR90			AM241	SM150
	U236	U238			TC99	SM150	Y90	KR85			U236		KR85					
	SR90	KR85			U236													
	Y90																	
-5 TO -1	ND146	CS134	CS134	ZR93	PU240	CS135	U234	ND146	CS134	ZR93	CS135	PU240	ND146	CS134	U236	CS134	U236	CS135
	ND144	U234	ND144	RU106	ND143	CS133	CS134	ND144	ND144	RU106	ND143	CS133	ND144	CM244	ZR93	RU106	ND143	PU240
	CM244		EU155		ND145	ZR93	CM244		EU155		ND145	ZR93			ND144	EU155	CS133	ND145
					SM147	I129					SM147	I129					ZR93	SM147
																	I129	
-10 TO -5	PD107	SE79	SM151	NP237	PM147	PU239	PD107	SE79	SM151	PU238	PM147	PU239	PD107	SE79	SM151	PU238	PM147	PU239
	RU106		PU238		SE79	U234	RU106				SE79		RU106				SE79	
-20 TO -10	PU240		CM243	PU240	EU155	NP237	PU240		CM243	EU154	EU155	EU154	PU240		CM243	EU154	EU155	EU154
			EU154	U234	EU154	SM149			PU240	NP237	SM149	PU238			PU240	SE79	SM149	PU238
			SE79	SN126	PU238	SB125			SE79	U234	SB125	U234			SN126	CM242	SB125	SM152
			CM242	AM242	SM152				SN126	CM242	SM152	NP237			AM242	SM152		
			SM152						AM242	SM152								
-30 TO -20	SN126		SM148		SM151		SN126		SM148		SM151		SN126		U234	SM148	SM151	U234
															NP237			
<-30	SM148	SB125	SB125		CM242	AM242	SM148	SB125	SB125		CM242	AM242	SM148	SB125	SB125		NP237	CM242
	CM243						CM243						CM243				AM242	

CASE: PWR, 3.10 WT % U-235, 3.443 AT % BURNUP (33.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	300 YR			1 KYR			10 KYR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
>30	CM242 AM242	CM245 CM246	CM243 CM245	AM242 CM242	CM245 CM246	CM243 CM245	CM242 PU238 AM242	CM245 CM246	CM245
20 TO 30	SM147 SM149 PU241	AM243 CM244 SM147 PU242	CM246 CM244	SM147 SM149	AM243 SM147 PU242	CM246 CM244	SM147 SM149	AM243 SM147 PU242	CM246
10 TO 20	SM151 AM241 CS135 PU239 AM243	AM241 EU153 CS135	PU242 AM243 SN126 SM148 PD107	SM151 PU238 AM241 CS137 CS135 PU239 NP237 AM243	CS137 AM241 EU153 CS135	PU242 AM243 SN126 SM148 PD107	SM151 CS135 PU239 NP237 AM241 AM243	EU153 CS135	PU242 AM243 SN126 SM148 PD107
5 TO 10	NP237 PU238 EU155 CM245 ND143 CM246	SM149 CS137 U235	EU153	PU241 CM245 ND143 CM246	SM149	EU153	PU241 CM245 ND143 CM246	SM149	EU153
1 TO 5	CS137 I129 U235 SM150 ND145 EU153 CS133 TC99 PU242 U234	PU239 ND143 PD107 TC99 SM150 SR90 Y90	U235 CS137 SR90 Y90 ND146	I129 U235 SM150 ND145 EU153 CS133 TC99 PU242 U234	PU239 U235 ND143 PD107 TC99 SM150 Y90 SR90	CS137 Y90 SR90 U235 ND146	I129 U235 SM150 ND145 EU153 CS133 TC99 PU242 U234	ND143 PU239 PD107 TC99 SM150	ND146
-1 TO 1	ZR93 SM152 EU154 U236 U238 KR85 Y90 SR90	I129 KR85 ND145 CS133 ND146 U238	KR85 U238 ND144 TC99 AM241 SM150	ZR93 SM152 U238 U236 KR85 Y90 SR90	I129 ND145 CS133 ND146 KR85 U238	KR85 U238 ND144 TC99 AM241 SM150	ZR93 SM152 U238	I129 ND145 CS133 ND146 U238	U238 ND144 TC99 SM150
-5 TO -1	ND146 ND144 CM244	ZR93 ND144 U236 EU155	CS135 ND143 PU240 CS133 ND145 U236 ZR93 SM147 I129	ND146 ND144	ZR93 ND144	CS135 ND143 PU240 CS133 ND145 ZR93 SM147 I129	ND146 ND144 U236	ZR93 ND144	CS135 PU240 ND143 CS133 ND145 ZR93 SM147 I129
-10 TO -5	PD107 SE79	SM151 PU238	PU239 SE79	PD107 SE79	SM151 U236	U236 PU239 SE79	PD107 SE79	SM151 U235	PU239 SE79
-20 TO -10	PU240	CM243 EU154 PU240 SE79 SN126 CM242 AM242 SM152	EU155 EU154 SM149 PU238 SM152	PU240	PU238 CM243 PU240 SE79 SN126 CM242 AM242 SM152	SM149 SM152	PU240	PU240 SE79 SN126 PU238 SM152 AM242 CM242	U235 SM149 SM152
-30 TO -20	SN126	SM148	SM151	SN126	SM148	SM151 PU238	SN126	SM148 U236	SM151 U236
<-30	SM148 CM243	U234 NP237 PU241	U234 CM242 AM242 NP237 PU241	SM148 CM243 CM244	U234 NP237 CM244 PU241	U234 CM242 AM242 NP237 PU241	SM148	U234 NP237 AM241	U234 PU238 AM242 CM242 NP237 AM241

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	30 DAY			5 YR			10 YR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
>30	AM242 PM147	CM245 CM246 CM244 PM147 AM243	CM243 CM245 CM246 CM244	AM242 PM147	CM245 CM246 CM244 PM147 AM243	CM243 CM245 CM246 CM244	AM242 CM242 PM147 SM147	CM245 CM246 CM244 PM147 AM243	CM243 CM245 CM246 CM244
20 TO 30	SM149 SM151		PU242	SM149 SM147 SM151	SM147	PU242	SM149 SM151	SM147	PU242
10 TO 20	CM246 PU238 AM243 CS135 PU239	PU242 AM241 SM147 U235 PU241 SM149	AM243 SN126 PD107 SM148 AM241 RU106	CM242 CM246 AM243 PU238 PU241 CS135 PU239	PU242 U235 PU241 SM149 AM241	AM243 SN126 PD107 SM148 RU106	CM246 PU241 PU238 AM243 CS135 PU239	PU242 PU241 U235 SM149 ZR95 AM241 NB95	AM243 SN126 PD107 SM148 RU106
5 TO 10	PU241 SM152 ND143 EU155 CM245 SM147 I129 U235 SM150	CS135 SM150 ND143 CM242 EU153	EU153 SM147 U235	SM152 ND143 EU155 AM241 CM245 I129 U235 SM150	CS135 ZR95 NB95 SM150 ND143 EU153	EU153 U235 ZR95	SM152 AM241 ND143 EU155 CM245 I129 U235 SM150	CS135 SM150 ND143 EU153	ZR95 NB95 EU153 U235
1 TO 5	NP237 CM242 AM241 CS133 TC99 ND145 SR89 Y91 EU154 ZR95 NB95 U234	Y91 RU106 SR89 ZR95 CE144 CS137 PD107 NB95 TC99 SR90 Y90 I129	CS134 CE144 CS137 ND146 Y91 PU241 SR90 Y90 ZR95	NP237 CS133 TC99 ND145 SR89 Y91 U234 EU154 NB95 ZR95	Y91 SR89 RU106 CE144 CS137 PD107 TC99 Y90 SR90 I129	CS134 NB95 AM241 CE144 CS137 ND146 Y91 PU241 Y90 SR89 SR90	NP237 CS133 TC99 ND145 U234 SR89 Y91 EU154 NB95 ZR95	Y91 CE144 SR89 RU106 CS137 PD107 TC99 SR90 Y90 I129	CS134 CE144 AM241 CS137 Y91 ND146 PU241 Y90 SR90 SR89
-1 TO 1	ZR93 U236 CE144 CS137 U238 KR85 SR90 Y90	CS133 ND146 NP237 U238 KR85 ND145 U236 PU239	SR89 NB95 CM242 SM150 KR85 U238 TC99 ND144 U236	ZR93 CE144 U236 CS137 U238 KR85 SR90 Y90	CS133 ND146 U238 KR85 NP237 ND145 U236 PU239	SM150 KR85 U238 ND144 TC99 U236	ZR93 CE144 U236 CS137 U238 KR85 SR90 Y90	CS133 ND146 U238 KR85 ND145 U236 PU239 NP237	SM150 KR85 U238 ND144 TC99 U236
-5 TO -1	CM244 EU153 ND146 ND144 PU240 PU242	U234 CS134 ZR93 EU155 ND144	ND143 CS135 U234 ZR93 CS133 ND145 NP237	CM244 EU153 ND146 ND144 PU240 PU242	CM242 CS134 EU155 ZR93 ND144 PU238 U234	ND143 CS135 ZR93 CS133 ND145 SM147 NP237	CM244 EU153 ND146 ND144 PU240 PU242	CS134 EU155 ZR93 ND144 PU238	ND143 CS135 ZR93 CS133 ND145 SM147
-10 TO -5	CS134 RU106 SE79 PD107	PU238 SM151 CM243	I129 PU240 SE79 EU155 PM147 PU239	CS134 RU106 SE79 PD107	SM151 CM243	I129 U234 PU240 SE79 EU155 PM147 PU239	CS134 RU106 SE79 PD107	U234 SM151 CM243	I129 NP237 SE79 EU155 PM147 PU240 PU239
-20 TO -10		EU154 PU240 SE79 SN126 AM242	EU154 SM149 PU238 SB125		EU154 PU240 SE79 SN126 AM242	EU154 SM149 PU238 CM242 SB125		EU154 PU240 SE79 SN126 CM242 AM242	U234 EU154 SM149 PU238 SB125
-30 TO -20	SN126	SM152 SM148	SM151 SM152	SN126	SM152 SM148	SM151 SM152	SN126	SM152 SM148	SM151 SM152
<-30	SB125 SM148 CM243	SB125	AM242	SB125 SM148 CM243	SB125	AM242	SB125 SM148 CM243	SB125	CM242 AM242

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	20 YR						50 YR						100 YR					
	ORS/OR2-1		CIN/OR2-1		CIN/ORS-1		ORS/OR2-1		CIN/OR2-1		CIN/ORS-1		ORS/OR2-1		CIN/OR2-1		CIN/ORS-1	
>30	AM242	CM242	CM245	CM246	CM243	CM245	AM242	CM242	CM245	CM246	CM243	CM245	AM242	CM242	CM245	CM246	CM243	CM245
	PM147	SM147	CM244	PM147	CM246	CM244	PM147	SM147	CM244	PM147	CM246	CM244	PM147	SM147	CM244	PM147	CM246	CM244
			AM243						AM243						AM243			
20 TO 30	SM149	SM151	SM147		PU242		SM149	SM151	SM147		PU242		SM149	SM151	SM147	PU241	PU242	
													PU241					
10 TO 20	CM246	PU241	ZR95	NB95	AM243	ZR95	PU241	CM246	PU241	PU242	AM243	SN126	CM246	PU238	PU242	U235	AM243	SN126
	PU238	AM243	PU242	PU241	NB95	SN126	PU238	AM243	U235	AM241	PD107	SM148	AM243	CS135	AM241	SM149	PD107	SM148
	CS135	PU239	U235	SM149	PD107	SM148	CS135	PU239	SM149		RU106		PU239				RU106	
			AM241		RU106													
5 TO 10	SM152	AM241	CS135	SM150	EU153	U235	SM152	AM241	CS135	SM150	EU153	U235	SM152	AM241	CS135	CE144	EU153	CE144
	ND143	EU155	ND143	EU153			ND143	EU155	ND143	CE144			ND143	EU155	SM150	ND143	U235	
	CM245	I129					CM245	I129	EU153				CM245	I129	EU153			
	U235	SM150					U235	SM150					U235	U234				
	NP237						NP237						NP237	SM150				
1 TO 5	CS133	U234	Y91	CE144	CS134	CE144	U234	CS133	CS137	PD107	CE144	CS134	CS133	TC99	CS137	PD107	CS134	CS137
	TC99	ND145	CS137	PD107	Y91	CS137	TC99	ND145	TC99	Y90	CS137	ND146	ND145	EU154	TC99	Y90	ND146	AM241
	EU154	Y91	TC99	SR90	ND146	AM241	EU154		SR90	I129	AM241	PU241	CS137		SR90	I129	PU241	SR90
			Y90	I129	PU241	Y90					Y90	SR90					Y90	
					SR90													
-1 TO 1	NB95	ZR95	CS133	RU106	SM150	KR85	CS137	ZR93	CS133	RU106	SM150	KR85	CE144	ZR93	CS133	RU106	SM150	KR85
	ZR93	CE144	ND146	U238	U238	ND144	CE144	U236	ND146	U238	U238	ND144	U236	U238	ND146	U238	U238	ND144
	CS137	U236	KR85	ND145	TC99	U236	U238	KR85	KR85	ND145	TC99	U236	KR85	Y90	KR85	ND145	TC99	
	U238	KR85	U236	PU239			SR90	Y90	U236	PU239			SR90		PU239	U236		
	SR90	Y90																
-5 TO -1	CM244	EU153	CS134	EU155	ND143	CS135	CM244	EU153	CS134	EU155	ND143	CS135	CM244	EU153	CS134	EU155	U236	ND143
	ND146	ND144	ZR93	NP237	ZR93	CS133	ND146	ND144	ZR93	ND144	ZR93	CS133	ND146	ND144	ZR93	ND144	CS135	ZR93
	PU240	PU242	ND144	PU238	ND145	SM147	PU240	PU242	PU238		ND145	SM147	PU240	PU242	PU238		CS133	ND145
																	SM147	
-10 TO -5	CS134	SE79	SM151	CM243	I129	NP237	CS134	SE79	SM151	CM243	I129	SE79	CS134	SE79	SM151	CM243	I129	EU155
	PD107	RU106			SE79	EU155	PD107	RU106	NP237		EU155	PM147	PD107	RU106			SE79	PM147
					PM147	PU240					PU239						PU239	
					PU239													
-20 TO -10			EU154	PU240	EU154	SM149			EU154	PU240	PU240	EU154			EU154	PU240	PU240	EU154
			U234	SE79	PU238	U234			SE79	SN126	SM149	PU238			SE79	SN126	SM149	PU238
			SN126	CM242	SB125				CM242	AM242	NP237	SB125			CM242	AM242	SB125	
			AM242															
-30 TO -20	SN126		SM152	SM148	SM151	SM152	SN126		SM152	SM148	SM151	U234	SN126		NP237	SM152	NP237	SM151
									U234		SM152				SM148		SM152	
<-30	SB125	SM148	SB125		CM242	AM242	SB125	SM148	SB125		CM242	AM242	SB125	SM148	U234	SB125	U234	CM242
	CM243						CM243						CM243				AM242	

CASE: PWR, 4.50 WT % U-235, 5.206 AT % BURNUP (50.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	300 YR			1 KYR			10 KYR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
>30	AM242 CM242 SM147	CM245 CM246 CM244 AM243	CM243 CM245 CM246 CM244	AM242 CM242 SM147	CM245 CM246 AM243	CM243 CM245 CM246 CM244	PU238 AM242 CM242 SM147	CM245 CM246 AM243	CM245 CM246
20 TO 30	SM149 SM151	SM147	PU242	SM149 SM151	SM147	PU242	SM149 SM151	SM147	PU242
10 TO 20	PU241 CM246 PU238 AM243 CS135 PU239	PU242 U235 AM241 SM149	AM243 SN126 PD107 SM148	PU238 CS137 CM246 AM243 CS135 PU239	CS137 PU242 AM241 SM149 U235	AM243 SN126 PD107 SM148	CM246 AM241 AM243 CS135 PU239	PU242 SM149	AM243 SN126 PD107 SM148
5 TO 10	SM152 AM241 EU155 ND143 CM245 U234 NP237 U235 I129 SM150	CS135 CS137 SM150 ND143 EU153	EU153 U235	SM152 AM241 PU241 NP237 ND143 U234 CM245 U235 I129 SM150	CS135 SM150 ND143 EU153	EU153	SM152 PU241 NP237 ND143 U234 CM245 U235 I129 SM150	CS135 SM150 ND143 EU153	EU153
1 TO 5	CS137 CS133 TC99 ND145 EU154	PD107 TC99 Y90 SR90 I129	CS137 ND146 AM241 Y90 SR90	CS133 TC99 ND145	PD107 TC99 SR90 I129 Y90	U235 CS137 ND146 AM241 SR90 Y90	CS133 TC99 ND145	PD107 TC99 I129	ND146
-1 TO 1	ZR93 U236 U238 KR85 Y90 SR90	CS133 ND146 U238 KR85 ND145 PU239	SM150 KR85 U238 ND144 TC99	ZR93 U236 U238 KR85 SR90 Y90	CS133 ND146 U238 ND145 KR85	SM150 KR85 U238 ND144 TC99	ZR93 U238 U236	CS133 ND146 U238 ND145	SM150 U238 ND144 TC99
-5 TO -1	CM244 EU153 ND146 ND144 PU240 PU242	EU155 ZR93 U236 ND144 PU238	ND143 U236 CS135 ZR93 CS133 ND145 SM147	EU153 ND146 ND144 PU240 PU242	PU239 ZR93 ND144 U236	ND143 CS135 ZR93 CS133 ND145 SM147 U236	EU153 ND146 ND144 PU240 PU242	ZR93 ND144 PU239 U235	ND143 CS135 ZR93 CS133 ND145 SM147
-10 TO -5	SE79 PD107	SM151 CM243	I129 SE79 EU155	SE79 PD107	PU238 SM151 CM243	I129 SE79	SE79 PD107	SM151	I129 SE79
-20 TO -10		EU154 PU240 SE79 SN126 CM242 AM242	PU239 PU240 EU154 SM149 PU238		PU240 SE79 SN126 CM242 AM242	PU239 PU240 SM149 PU238		PU240 SE79 SN126 PU238 AM242 CM242	U235 PU240 PU239 SM149
-30 TO -20	SN126	SM152 SM148	SM151 SM152	SN126	SM152 SM148	SM151 SM152	SN126	SM152 SM148 U236	U236 SM151 SM152
<-30	SM148 CM243	U234 NP237 PU241	U234 NP237 CM242 AM242 PU241	SM148 CM243 CM244	U234 NP237 CM244 PU241	U234 CM242 AM242 NP237 PU241	SM148	U234 NP237 AM241	U234 PU238 AM242 CM242 NP237 AM241

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	30 DAY ORS/OR2-1	30 DAY CIN/OR2-1	30 DAY CIN/ORS-1	5 YR ORS/OR2-1	5 YR CIN/OR2-1	5 YR CIN/ORS-1	10 YR ORS/OR2-1	10 YR CIN/OR2-1	10 YR CIN/ORS-1
>30	PM147		CM243	PM147		CM243	PM147		CM243
20 TO 30		PM147 SM147	PU242	SM147	PM147 SM147	PU242	SM147	PM147 SM147	PU242
10 TO 20	AM242 SM147	PU242	SN126	AM242	PU242	SN126	AM242 CM242	PU242	SN126
5 TO 10	SM149	EU153 ND144 SR90 Y90	CM244 AM243 EU153 SM147 CM246 PD107	SM149	EU153 Y90 SR90 ND144	CM244 AM243 EU153 CM246 PD107	SM149	EU153 ZR95 NB95 Y90 SR90 ND144	CM244 AM243 EU153 ZR95 PD107 CM246 NB95
1 TO 5	SR89 Y91 ND145 ZR93 ND144 CS133 SM152 I129 NB95 ZR95 TC99 SR90 Y90 CE144 KR85 U236 ND143	KR85 Y91 SR89 CS137 U236 TC99 CE144 ND145	SR90 Y90 ND144 RU106 KR85 CM245 CS137 SM148 U236 ND146	SR89 Y91 ND145 ZR93 CS133 SM152 I129 ND144 ZR95 NB95 TC99 SR90 Y90 CE144 KR85 ND143	ZR95 KR85 NB95 Y91 SR89 CS137 U236 CE144 TC99 ND145	Y90 SR90 RU106 ND144 KR85 ZR95 CS137 CM245 SM148 NB95 U236 ND146	SR89 Y91 ND145 ZR93 CS133 SM152 I129 ND144 TC99 Y90 SR90 ZR95 NB95 CE144 KR85 ND143	KR85 Y91 SR89 CS137 U236 CE144 TC99 ND145	Y90 SR90 RU106 ND144 KR85 CS137 CM245 SM148 U236 ND146
-1 TO 1	PU239 SM150 EU153 U238 CS137 ND146 CS135 U234	ZR93 CS133 ZR95 ND146 U238 NB95 U234 AM243	U234 U238 CE144 Y91 TC99 PU240	U236 PU239 SM150 EU153 U238 CS137 ND146 CS135 U234	ZR93 CS133 ND146 U238 AM243	SM147 CE144 U238 Y91 TC99 PU240 SR89	U236 PU239 SM150 EU153 CS137 U238 ND146 CS135 U234	ZR93 CS133 ND146 U238 AM243	CE144 Y91 U238 TC99 SM147 PU240 SR89
-5 TO -1	PU238 NP237 EU155 PU241	SM150 I129 ND143	SR89 ZR95 ZR93 CS133 ND145 NB95 CM242 SM150 PM147 CS134 I129	NP237 PU238 EU155 PU241	SM150 U234 I129 ND143	U234 ZR93 CS133 ND145 SM150 PM147 CS134 I129	NP237 PU238 PU241 EU155	SM150 I129 U234 ND143	ZR93 CS133 ND145 SM150 U234 CS134 PM147 I129
-10 TO -5	CS134 EU154 U235 AM241 PU242 SE79 SM151 RU106 AM243	RU106 PD107 CS134 CS135	ND143 SE79 U235 CS135	CS134 CM242 EU154 AM241 U235 PU242 SE79 SM151 RU106 AM243	RU106 PD107 CS134 CS135	ND143 SE79 U235 CS135	CS134 EU154 AM241 U235 PU242 SE79 SM151 RU106 AM243	RU106 PD107 CS134 CS135	ND143 SE79 U235 CS135
-20 TO -10	PD107 PU240 CM242 CM246	CM246 PU240 SM152 SE79 U235 CM242 SM149 CM244 PU241 SN126	SM152 PU241 EU154 AM241 SB125	PD107 PU240 CM246	CM246 SM152 PU240 SE79 U235 SM149 CM244 PU241 SN126	SM152 PU241 AM241 EU154 SB125	PD107 PU240 CM246	CM246 SM152 PU240 SE79 U235 SM149 CM244 PU241 SN126 AM241	SM152 PU241 AM241 EU154 SB125
-30 TO -20	CM244 CM245 SN126	EU154 AM241 NP237 CM245 EU155 PU238 PU239 SM151 SM148	SM149 NP237 SM151 EU155 PU238 PU239	CM244 CM245 SN126	AM241 EU154 NP237 CM245 PU238 EU155 CM242 PU239 SM151 SM148	SM149 CM242 SM151 NP237 EU155 PU238 PU239	CM244 CM245 SN126	EU154 NP237 CM245 PU238 EU155 PU239 SM151 SM148	SM149 SM151 EU155 NP237 PU238 PU239
<-30	SM148 SB125 CM243	CM243 SB125 AM242	AM242	SM148 SB125 CM243	CM243 SB125 AM242	AM242	SM148 SB125 CM243	CM243 SB125 CM242 AM242	CM242 AM242

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	20 YR			50 YR			100 YR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
>30	PM147		CM243	PM147		CM243	PM147		CM243
20 TO 30	SM147	PM147 SM147	PU242	SM147	PM147 SM147	PU242	SM147	PM147 SM147	PU242
10 TO 20	CM242 AM242	ZR95 NB95 PU242	ZR95 NB95 SN126	AM242 CM242	PU242	SN126	AM242 CM242	PU242	SN126
5 TO 10	SM149	EU153 Y90 SR90 ND144	CM244 AM243 EU153 CM246 PD107	SM149	EU153 Y90 SR90 ND144	CM244 AM243 EU153 CM246 PD107	SM149 PU241	EU153 CE144 Y90 SR90 ND144	AM243 CM244 EU153 CM246 PD107
1 TO 5	Y91 ND145 ZR93 CS133 SM152 I129 ND144 TC99 Y90 CE144 SR90 KR85 ND143	KR85 Y91 CS137 CE144 U236 TC99 ND145	SR90 Y90 RU106 ND144 KR85 CM245 CS137 SM148 U236 ND146	ND145 ZR93 CS133 SM152 I129 ND144 CE144 TC99 Y90 SR90 KR85 ND143	KR85 CE144 CS137 U236 TC99 ND145	SR90 Y90 RU106 ND144 KR85 CS137 CM245 SM148 CE144 ND146	ND145 ZR93 CS133 SM152 I129 CE144 ND144 TC99 Y90 SR90 CS137 KR85 ND143	KR85 CS137 TC99 U236 ND145	Y90 SR90 RU106 CE144 ND144 KR85 CS137 CM245 SM148 ND146
-1 TO 1	ZR95 NB95 U236 PU239 SM150 EU153 CS137 U238 ND146 CS135 U234	ZR93 CS133 ND146 U238 AM243	CE144 Y91 U238 TC99 SM147 PU240	U236 PU239 SM150 PU241 CS137 EU153 U238 ND146 CS135 U234	ZR93 CS133 ND146 U238 AM243	U236 U238 TC99 SM147 PU240	U236 PU239 SM150 EU153 U238 ND146 CS135	ZR93 CS133 ND146 U238 AM243	U236 U238 TC99 SM147 PU240
-5 TO -1	NP237 PU238 PU241 EU155	SM150 I129 ND143	ZR93 CS133 ND145 SM150 CS134 PM147 I129	NP237 PU238 EU155 AM241	SM150 I129 ND143	ZR93 CS133 ND145 SM150 PM147 CS134 I129	U234 PU238 NP237 EU155 AM241	SM150 I129 ND143	ZR93 CS133 ND145 SM150 CS134 PM147 I129
-10 TO -5	CS134 EU154 AM241 U235 PU242 SE79 SM151 AM243	U234 PD107 RU106 CS134 CS135	ND143 U234 SE79 U235 CS135	CS134 EU154 U235 PU242 SE79 SM151 AM243	PD107 RU106 CS134 CS135	ND143 SE79 U235 CS135	EU154 CS134 U235 PU242 SE79 SM151 AM243	PD107 RU106 CS134 CS135 PU241	ND143 SE79 U235 CS135
-20 TO -10	RU106 PD107 PU240 CM246	CM246 SM152 PU240 SE79 U235 SM149 CM244 PU241 SN126 AM241	SM152 PU241 AM241 EU154 SB125	RU106 PD107 PU240 CM246	CM246 SM152 U234 PU240 PU241 SE79 U235 SM149 CM244 AM241 SN126	U234 PU241 SM152 AM241 EU154 SB125	RU106 PD107 PU240 CM246	CM246 SM152 PU240 SE79 U235 SM149 CM244 AM241 SN126 U234	PU241 SM152 AM241 EU154 SB125 U234
-30 TO -20	CM244 CM245 SN126	EU154 CM245 PU238 EU155 NP237 PU239 SM151 SM148	SM149 SM151 EU155 PU238 NP237 PU239	CM244 CM245 SN126	EU154 CM245 PU238 EU155 PU239 SM151 SM148	SM149 SM151 EU155 PU238 PU239	CM244 CM245 SN126	EU154 CM245 EU155 PU238 PU239 SM151 SM148	SM149 SM151 EU155 PU238 PU239
<-30	SM148 SB125 CM243	CM243 SB125 CM242 AM242	CM242 AM242	SM148 SB125 CM243	CM243 NP237 SB125 CM242 AM242	NP237 CM242 AM242	SM148 SB125 CM243	CM243 SB125 NP237 CM242 AM242	NP237 CM242 AM242

CASE: BWR, 2.64 WT % U-235, 2.866 AT % BURNUP (27.5 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	300 YR			1 KYR			10 KYR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
>30			CM243			CM243			
20 TO 30	SM147	SM147	PU242	SM147	SM147	PU242	SM147	SM147	PU242
10 TO 20	AM242 CM242	PU242	SN126	AM242 CM242 CS137	CS137 PU242	SN126	CM242 AM242 PU238	PU242	SN126
5 TO 10	SM149	EU153 CS137 SR90 Y90 ND144	CM244 AM243 EU153 CM246 PD107	SM149	EU153 Y90 SR90 ND144	CM244 AM243 EU153 CM246 PD107	SM149	EU153 ND144	AM243 EU153 PD107 CM246
1 TO 5	CS137 ND145 ZR93 CS133 SM152 I129 ND144 TC99 Y90 SR90 KR85 ND143	KR85 TC99 ND145	SR90 Y90 ND144 KR85 CS137 CM245 SM148 ND146	ND145 ZR93 CS133 SM152 I129 ND144 PU238 TC99 SR90 Y90 ND143 KR85	KR85 TC99 ND145	Y90 SR90 ND144 KR85 CS137 CM245 SM148 ND146	ND145 ZR93 CS133 SM152 I129 ND144 TC99 ND143	TC99 ND145	ND144 SM148 CM245 ND146
-1 TO 1	PU239 U236 SM150 EU153 U238 ND146 CS135	ZR93 CS133 ND146 U238 U236 AM243	U238 TC99 SM147 U236 PU240	PU239 SM150 EU153 U236 U238 ND146 CS135	ZR93 CS133 ND146 U238 AM243	U238 TC99 SM147 PU240	PU239 SM150 EU153 U238 ND146 CS135	ZR93 CS133 ND146 U238 AM243	U238 TC99 SM147 PU240
-5 TO -1	U234 PU238 EU155 NP237 AM241 PU241	SM150 I129 ND143	ZR93 CS133 ND145 SM150 I129	U234 NP237 AM241	SM150 I129 U236 ND143	ZR93 CS133 ND145 SM150 U236 I129	U234 U236 NP237 U235	SM150 I129 ND143	ZR93 CS133 ND145 SM150 I129
-10 TO -5	EU154 U235 PU242 SE79 SM151 AM243	PD107 CS135	ND143 SE79 CS135 U235	U235 PU242 SE79 SM151 AM243	PD107 CS135	ND143 SE79 CS135	PU242 SE79 SM151 AM243	PD107 CS135	ND143 SE79 CS135
-20 TO -10	PD107 PU240 CM246	CM246 SM152 PU240 SE79 U235 SM149 CM244 AM241 SN126	SM152 AM241 EU154	PD107 PU240 CM246	CM246 SM152 PU240 SE79 SM149 U235 AM241 SN126	U235 SM152 AM241	PD107 PU240 CM246	CM246 SM152 PU240 SE79 SM149 SN126	SM152
-30 TO -20	CM244 CM245 SN126	EU154 CM245 EU155 PU238 PU239 U234 SM151 SM148	SM149 SM151 EU155 PU238 U234 PU239	PU241 CM245 SN126	CM245 PU239 U234 SM151 PU238 SM148	SM149 SM151 PU239 U234	AM241 PU241 CM245 SN126	CM245 U235 PU239 SM151 U236 U234 SM148	SM149 SM151 U235 U236 PU239 U234
<-30	SM148 CM243	CM243 CM242 AM242 PU241 NP237	PU241 CM242 AM242 NP237	SM148 CM243 CM244	CM243 CM242 AM242 NP237 CM244 PU241	PU238 CM242 AM242 NP237 PU241	SM148	PU238 AM242 CM242 NP237 AM241	PU238 AM242 CM242 NP237 AM241

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	30 DAY						5 YR						10 YR					
	ORS/OR2-1		CIN/OR2-1		CIN/ORS-1		ORS/OR2-1		CIN/OR2-1		CIN/ORS-1		ORS/OR2-1		CIN/OR2-1		CIN/ORS-1	
>30	AM242	PM147	CM246	CM245	CM243		AM242	PM147	CM246	CM245	CM243		AM242	CM242	CM246	CM245	CM243	
							CM242						PM147					
20 TO 30	SM149	CM246	PM147	PU242	PU242		SM149	CM246	PM147	PU242	PU242		SM149	CM246	PM147	PU242	PU242	
	AM241	CM245	AM243	CM244			CM245		AM243	CM244			CM245		AM243	CM244		
															SM147			
10 TO 20	PU239	SM151	EU153	SM147	CM244	CM246	PU239	SM147	SM147	EU153	CM246	CM244	SM147	PU239	EU153		CM246	CM244
	PU241	AM243			CM245	SM147	SM151	PU241			CM245	SN126	SM151	PU241			CM245	
	U235	CS135					AM241	AM243					AM241	AM243				
	PU238	CM242					U235	CS135					U235	CS135				
	EU155						PU238	EU155					PU238	EU155				
5 TO 10	I129	CM244	AM241		AM243	SN126	I129	CM244			AM243	EU153	I129	CM244	ZR95	NB95	AM243	SN126
	ND143				EU153	PD107	ND143				PD107		ND143				EU153	ZR95
																	NB95	PD107
1 TO 5	EU153	SM152	U235	Y91	Y90	SR90	EU153	SM152	ZR95	U235	Y90	SR90	EU153	SM152	U235	Y91	SR90	Y90
	SM150	SR89	SR89	CM242	RU106	ND144	SM150	SR89	NB95	Y91	RU106	SM148	SM150	SR89	SR89	CS137	RU106	ND144
	PU242	Y91	SR90	CS137	SM148	KR85	PU242	Y91	SR89	CS137	ND144	ZR95	PU242	Y91	Y90	SR90	SM148	KR85
	ND145	ZR95	Y90	CS135	CS137	ND146	ND145	CS133	SR90	Y90	KR85	CS137	ND145	CS133	CS135	SM150	CS137	ND146
	CS133	NB95	SM150	I129	U234		ZR95	NB95	CS135	SM150	NB95	ND146	NB95	ZR95	I129	KR85		
	SM147	EU154	KR85				EU154		I129	KR85	SM147		EU154					
-1 TO 1	U236	TC99	U236	ZR95	Y91	CE144	U236	TC99	U236	CE144	Y91	CE144	U236	TC99	CE144	U236	Y91	CE144
	CE144	CS137	CE144	TC99	U238	U236	CE144	CS137	TC99	ND146	U238	U236	CE144	CS137	TC99	ND146	SM147	U238
	ZR93	U238	ND146	PD107	TC99	CS134	ZR93	U238	PD107	ND143	TC99	CS134	ZR93	U238	PD107	ND143	U236	TC99
			ND143	U238	SR89	PU240			U238	ND144	SR89				ND144	U238	SR89	CS134
			NB95	ND145	ZR95				CS133	ND145					CS133	ND145		
			ND144	CS133														
-5 TO -1	KR85	ND146	ZR93	RU106	SM150	ZR93	KR85	ND146	ZR93	RU106	SM150	ZR93	KR85	ND146	ZR93	RU106	SM150	ZR93
	SR90	Y90	U234	CS134	NB95	CS133	SR90	Y90	CS134	SM149	PU240	U234	Y90	SR90	CS134	SM149	PU240	CS133
	CS134	NP237	SM149	PU241	ND145	I129	CS134	NP237	PU241	U234	CS133	ND145	NP237	CS134	PU241	AM241	ND145	U234
	U234	ND144					U234	ND144	AM241		I129	ND143	U234	ND144			I129	ND143
-10 TO -5	PD107	RU106	PU240	CM243	ND143	PM147	PD107	RU106	CM242	CM243	PM147	U235	PD107	RU106	U234	CM243	PM147	U235
	SE79	PU240			U235	CM242	SE79	PU240	PU240		SE79	CS135	SE79	PU240			SE79	CS135
					SE79	CS135												
-20 TO -10			EU155	EU154	AM241	EU154			EU155	EU154	EU154	AM241			PU240	EU155	EU154	AM241
			SE79	SN126	PU241	NP237			SE79	SN126	PU241	NP237			EU154	SE79	PU241	NP237
			PU239	PU238	SB125				PU239	PU238	SB125				PU239	SN126	SB125	
			SM151	SM152					SM151	SM152					PU238	SM151		
			NP237						NP237						SM152	NP237		
-30 TO -20	SN126	SM148	SM148	AM242	EU155	SM152	SN126	SM148	SM148	AM242	EU155	SM152	SN126	SM148	SM148	CM242	EU155	SM152
	SB125				SM149	PU238	SB125				PU238	SM149	SB125		AM242		PU238	SM149
					SM151	PU239					CM242	SM151					SM151	PU239
											PU239							
<-30	CM243		SB125		AM242		CM243		SB125		AM242		CM243		SB125		CM242	AM242

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	20 YR ORS/OR2-1	20 YR CIN/OR2-1	20 YR CIN/ORS-1	50 YR ORS/OR2-1	50 YR CIN/OR2-1	50 YR CIN/ORS-1	100 YR ORS/OR2-1	100 YR CIN/OR2-1	100 YR CIN/ORS-1
>30	AM242 CM242 PM147	CM246 CM245	CM243	AM242 CM242 PM147	CM246 CM245	CM243	AM242 CM242 PM147	CM246 CM245	CM243
20 TO 30	SM149 CM246 CM245 SM147	PM147 PU242 AM243 CM244 SM147	PU242	SM149 CM246 CM245 SM147	PM147 PU242 AM243 CM244 SM147	PU242	SM149 CM246 PU241 CM245 SM147	PM147 PU242 AM243 CM244 SM147	PU242
10 TO 20	PU239 PU241 SM151 AM241 AM243 U235 CS135 PU238 EU155	ZR95 NB95 EU153	ZR95 CM246 CM244 NB95 CM245 AM243	PU239 PU241 SM151 AM241 AM243 U235 CS135 PU238 EU155	EU153	CM246 CM244 CM245	PU239 SM151 AM241 AM243 U235 CS135 PU238 EU155	EU153	CM246 CM244 CM245
5 TO 10	I129 CM244 ND143		SN126 EU153 PD107	I129 CM244 ND143		AM243 SN126 EU153 PD107	I129 CM244 ND143	PU241 CE144	SN126 AM243 EU153 PD107
1 TO 5	EU153 SM152 SM150 PU242 Y91 ND145 CS133 EU154 ZR95 NB95	U235 Y91 CS137 Y90 SR90 CS135 SM150 CE144 I129 KR85	Y90 SR90 RU106 SM148 ND144 KR85 CS137 ND146 Y91 CE144	EU153 SM152 SM150 PU242 ND145 CS133 EU154	U235 CS137 CE144 Y90 SR90 CS135 SM150 I129 KR85	RU106 SR90 Y90 SM148 ND144 KR85 CS137 CE144 ND146	EU153 SM152 SM150 PU242 ND145 CS133 U234 CS137 EU154	U235 CS137 Y90 SR90 CS135 SM150 I129 KR85	RU106 SR90 Y90 CE144 SM148 ND144 KR85 CS137 ND146
-1 TO 1	U236 TC99 CE144 CS137 ZR93 U238	U236 TC99 ND146 PD107 ND143 ND144 U238 CS133 ND145	U238 SM147 U236 TC99 CS134	U236 CS137 CE144 TC99 U234 ZR93 U238 NP237	U236 PU241 TC99 ND146 PD107 ND143 ND144 U238 CS133 ND145	U238 SM147 TC99 U236 CS134	CE144 NP237 U236 TC99 ZR93 U238	TC99 U236 ND146 PD107 ND143 ND144 U238 CS133 ND145	U238 SM147 TC99 CS134 U236
-5 TO -1	KR85 ND146 U234 Y90 SR90 NP237 CS134 ND144	ZR93 PU241 CS134 SM149 RU106 AM241	SM150 ZR93 PU240 CS133 ND145 I129 ND143	KR85 ND146 Y90 SR90 CS134 ND144	ZR93 CS134 SM149 RU106 AM241	SM150 ZR93 CS133 ND145 PU240 I129 ND143	KR85 ND146 Y90 SR90 CS134 ND144	ZR93 CS134 SM149 RU106 AM241	SM150 ZR93 CS133 ND145 PU240 I129 ND143
-10 TO -5	PD107 SE79 RU106 PU240	U234 CM243	PM147 U235 SE79 U234 CS135	PD107 SE79 RU106 PU240	CM243	PM147 U235 SE79 CS135	PD107 SE79 RU106 PU240	CM243	PM147 U235 SE79 CS135
-20 TO -10		PU240 EU155 EU154 SE79 PU239 SN126 PU238 SM151 SM152	EU154 PU241 AM241 NP237 SB125		PU240 EU155 EU154 SE79 SN126 PU239 PU238 U234 SM151 SM152	EU154 PU241 AM241 U234 SB125		PU240 EU155 EU154 SE79 PU239 SN126 PU238 SM151 SM152	EU154 PU241 AM241 SB125
-30 TO -20	SN126 SM148 SB125	NP237 SM148 CM242 AM242	EU155 SM152 PU238 SM149 SM151 PU239	SN126 SM148 SB125	SM148 NP237 CM242 AM242	EU155 SM152 PU238 SM149 NP237 SM151 PU239	SN126 SM148 SB125	SM148 U234 CM242 AM242	EU155 SM152 PU238 U234 SM149 SM151 PU239
<-30	CM243	SB125	CM242 AM242	CM243	SB125	CM242 AM242	CM243	NP237 SB125	NP237 CM242 AM242

CASE: BWR, 4.15 WT % U-235, 4.172 AT % BURNUP (40.0 GWD/MTU, APPROX.) G-ATOMS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	300 YR			1 KYR			10 KYR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
>30	AM242 CM242 PU241	CM246 CM245	CM243	CM242 AM242	CM246 CM245	CM243	CM242 AM242 PU238	CM246 CM245	
20 TO 30	SM149 CM246 CM245 SM147	PU242 AM243 CM244 SM147	PU242	SM149 CM246 PU241 CM245 SM147 PU238	PU242 AM243 SM147	PU242	SM149 AM241 CM246 PU241 CM245 SM147	PU242 AM243 SM147	PU242
10 TO 20	PU239 SM151 AM241 AM243 U235 CS135 PU238 EU155	EU153	CM244 CM246 CM245 SN126	PU239 SM151 CS137 EU153 CS137 AM241 AM243 U235 CS135		CM244 CM246 CM245 AM243	PU239 SM151 U235 AM243 CS135	EU153	CM246 CM245
5 TO 10	I129 CM244 ND143	CS137	AM243 EU153 PD107	NP237 I129 ND143		SN126 EU153 PD107	NP237 I129 ND143		SN126 AM243 EU153 PD107
1 TO 5	NP237 EU153 CS137 SM152 SM150 U234 PU242 ND145 CS133	U235 SR90 Y90 CS135 SM150 I129 KR85	Y90 SR90 SM148 ND144 KR85 CS137 ND146	EU153 SM152 U234 SM150 PU242 ND145 CS133	U235 CS135 SM150 Y90 SR90 I129	Y90 SR90 SM148 ND144 CS137 KR85 ND146	EU153 SM152 U234 SM150 PU242 ND145 CS133	CS135 SM150 I129	SM148 ND144 ND146
-1 TO 1	EU154 U236 TC99 ZR93 U238	TC99 ND146 PD107 ND143 ND144 U238 CS133 ND145 U236	U238 SM147 TC99	TC99 U236 ZR93 U238	KR85 TC99 ND146 PD107 ND143 ND144 U238 CS133 ND145	U238 SM147 TC99	TC99 ZR93 U238	TC99 ND146 PD107 ND143 ND144 U238 CS133 ND145	U238 SM147 TC99
-5 TO -1	ND146 KR85 SR90 Y90 ND144	ZR93 SM149 AM241	SM150 U236 ZR93 CS133 ND145 PU240 I129 ND143	ND146 KR85 Y90 SR90 ND144	ZR93 SM149 U236 AM241	SM150 ZR93 CS133 ND145 PU240 U236 I129 ND143	U236 ND146 ND144	ZR93 SM149	SM150 ZR93 CS133 ND145 PU240 I129 ND143
-10 TO -5	PD107 SE79 PU240	CM243	U235 SE79 CS135	PD107 SE79 PU240	CM243	SE79 U235 CS135	PD107 SE79 PU240	U235	SE79 CS135
-20 TO -10		PU240 EU155 EU154 AM241 EU154 SE79 SN126 PU239 PU238 SM151 SM152			PU240 SE79 SN126 PU239 PU238 SM151 SM152	AM241		PU240 SE79 SN126 PU239 SM151 SM152	U235
-30 TO -20	SN126 SM148	SM148 CM242 AM242	EU155 SM152 PU238 SM149 SM151 PU239	SN126 SM148	SM148 CM242 AM242	SM152 SM149 SM151 PU239	SN126 SM148	U236 SM148	U236 SM152 SM149 SM151
<-30	CM243	U234 NP237 PU241	U234 NP237 CM242 AM242 PU241	CM243 CM244	U234 NP237 CM244 PU241	PU238 U234 CM242 AM242 NP237 PU241		PU238 AM242 CM242 U234 NP237 AM241	PU239 U234 PU238 AM242 CM242 NP237 AM241

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU CURIES PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	30 DAY			5 YR			10 YR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
5 TO 10								ZR95 NB95	ZR95 NB95
1 TO 5	PU242 SM147	PU242 SM147		PU242 SM147	ZR95 NB95 PU242 SM147	ZR95 NB95	PU242 SM147	PU242 SM147	
-1 TO 1	SM148 ND144	SM148 AM242	AM242 CM245	SM148 ND144	SM148 AM242	AM242 I129	SM148 ND144	SM148 CM242	CM242 AM242
	SM149 CM242	CM245 ND144	I129 CM242	CE144 SM149	I129 ND144	CM245 SR89	CE144 SM149	AM242 CE144	SR89 CE144
	AM242 SN126	CM242 I129	SM147 CS134	CM246 AM242	CM245 CE144	CE144 Y91	AM242 CM246	ND144 I129	I129 CM245
	CM245 CS134	TC99 CS134	AM243 CE144	Y90 SN126	Y91 TC99	CM244 TC99	CM242 SR90	CM245 Y91	Y91 RU106
	U235 ZR95	AM243 PM147	CS137 TC99	CS134 EU155	CM244 CM246	PD107 PM147	U235 EU155	SR89 TC99	TC99 CM244
	EU154 U238	SN126 CS135	PM147 AM241	CM245 U238	SR89 CS135	CS135 EU155	CM245 U238	CM246 RU106	PD107 CS135
	U236 SM151	U238 CM246	CS135 U238	U236 U235	Y90 EU155	U238 CM246	U236 RU106	CS135 U238	SM151 PM147
	Y91 PU239	U236 SR90	CM246 SN126	U234 PU239	U238 SN126	SM148 PU241	NP237 PU239	SR90 SN126	U238 CM246
	SB125 CM246	KR85 SE79	U236 SM148	PU238 EU154	EU154 PU238	EU154 PU238	PU238 EU154	KR85 EU154	SR90 CS137
	PM147 CM244	CM244 SR89	Y90 SR90	ZR93 SM151	KR85 SR90	KR85 Y90	SN126 CS135	PU238 SE79	CS134 SN126
	CM243 U234	RU106 ZR93	KR85 PU238	CM243 CM242	SB125 SE79	SR90 SB125	CM243 U234	Y90 ZR93	PU241 SM148
	AM243 ZR93	SM151 U235	EU155 SE79	AM243 SB125	RU106 PM147	SE79 AM241	AM243 SB125	CS134 U235	KR85 EU154
	NP237 CS135	CM243 NP237	CM244 SR89	SE79 CM244	ZR93 SM151	SN126 SM147	ZR93 I129	AM243 SM151	PU238 SM147
	SR90 PU240	NB95 SB125	RU106 ZR93	SR90 PU240	U235 AM243	RU106 CS137	Y90 PU240	PM147 EU155	SE79 Y90
	I129 SE79	Y91 EU155	SM151 U235	I129 KR85	CM243 CS134	ZR93 SM151	KR85 SE79	CM243 CM244	ZR93 U235
	TC99 PD107	Y90 CE144	CM243 NP237	TC99 RU106	U236 U234	U235 AM243	TC99 CS134	SB125 PD107	AM243 AM241
	RU106 NB95	U234 PD107	NB95 SB125	CS135 PM147	PD107 PU239	ND144 CM243	SM151 PM147	U236 U234	EU155 ND144
	KR85 SR89	PU238 EU154	Y91 PU241	NP237 Y91	NP237 PU240	CS134 U236	Y91 CM244	PU239 CS137	CM243 SB125
	EU155 Y90	ZR95 PU239	ND144 U234	SR89 PD107	CS137 CM242	U234 PU239	PD107 SR89	PU240 SM149	U236 U234
	PU238 CE144	PU240 AM241	PD107 EU154	ZR95 NB95	SM149	PU242 NP237	ZR95 NB95		PU242 PU239
	AM241 CS137	CS137 SM149	ZR95 PU239	CS137		PU240 CM242	CS137		PU240 SM149
			PU242 PU240			SM149			
			SM149						
-5 TO -1	PU241	PU241		PU241 AM241	PU241 AM241		PU241 AM241	NP237 PU241	NP237
								AM241	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU CURIES PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	20 YR			50 YR			100 YR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
10 TO 20		ZR95 NB95							
5 TO 10							PU241	PU241	
1 TO 5	PU242 SM147	PU242 SM147		PU242 PU241 SM147	PU241 PU242 SM147 CE144	CE144	PU242 SM147	CE144 PU242 SM147	
-1 TO 1	SM148 ND144 RU106 CE144 SM149 CM242 AM242 SN126 U235 CM245 SM151 U236 CM243 ZR93 AM243 EU154 PU239 CS135 Y90 TC99 I129 SE79 U235 EU155 PU240 KR85 CM244 CS134 PM147 NP237 PD107 SB125 PU241 CS137	CM242 CM242 Y91 RU106 CM245 TC99 AM243 Y90 SE79 EU155 CS135 U238 KR85 SN126 EU154 PU238 CS134 ZR93 PM147 PD107 U236 PU239 U234 SM149	CM242 AM242 ND144 I129 SB125 PD107 Y90 SE79 CS135 SM151 U238 SR90 CM244 PU238 KR85 SM148 PU241 SM147 SR90 EU154 U236 CM243 PU242 PU239 PU240 SM149	SM148 ND144 CM242 AM242 CS137 U235 EU155 SM149 CM245 CM242 AM242 EU155 CM245 SM151 SB125 U238 SN126 U238 CM246 CM246 U236 SN126 CM243 CM243 PU238 SR90 Y90 ZR93 PU239 SE79 CS134 TC99 I129 PU238 CM244 SE79 U234 TC99 PM147 AM243 PU240 SM151 PD107 KR85 CM244 EU154 U235 SB125 SR90 PU239 U234 EU154 PD107 U236 AM241 CS134 NP237 SM149 PM147 AM241	SM148 CM242 AM242 ND144 I129 RU106 CM245 RU106 CS134 SB125 EU155 AM243 SR90 AM243 PD107 PU241 KR85 CS135 CS137 U238 CM246 EU155 CM244 SN126 CM243 SE79 Y90 CM244 AM241 EU154 AM241 ZR93 PU238 SM147 ND144 TC99 SM151 PU242 U235 PU239 U234 U236 SM149		SM148 CS137 SM148 CM242 CM242 RU106 ND144 RU106 CS137 RU106 AM242 I129 EU155 SM149 AM242 ND144 CM245 CS134 AM242 U235 I129 CM245 PM147 SB125 CM245 SM151 EU155 SB125 PU241 PU238 U238 SN126 PU238 AM243 PD107 AM243 CM246 U236 CS135 U238 KR85 EU154 CM243 I129 CM246 SN126 CS137 EU155 PU238 ZR93 SR90 CM244 CM244 CS135 CM242 CS135 SE79 CS134 Y90 SR90 U234 AM243 SM151 CM243 SN126 SM148 PU240 SR90 KR85 TC99 SE79 AM241 CM244 AM241 AM241 PD107 ZR93 SM151 Y90 PU239 EU154 PM147 SM147 ND144 SB125 KR85 U235 PU239 CM243 TC99 PD107 EU154 U234 U236 PU242 PU239 NP237 CS134 SM149 U235 U234 PM147 U236 SM149		PU240	PU240
-5 TO -1	AM241	AM241 NP237 NP237		PU240	PU240				
-20 TO -10				NP237	NP237				
-30 TO -20							NP237	NP237	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU CURIES PER MTU

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10 TO 20	PU241			CS137	CS137				
1 TO 5	CS137 PU242 SM147	CS137 PU242 SM147		PU242 SM147	PU242 SM147		AM241 PU242 SM147	PU242 SM147	
-1 TO 1	SM148 EU155 ND144 AM241 SM149 PU240 SN126 U238 CM246 TC99 I129 U235 AM242 SE79 U236 PU238 CM242 ZR93 AM243 CS135 U234 SM151 PU239 NP237 CM244 CM245 Y90 SR90 CM243 PD107 KR85 EU154	SM148 CM242 AM242 EU155 ND144 I129 CM245 AM241 CS135 U238 CM246 SN126 PU238 SE79 CM244 ZR93 SM151 AM243 TC99 KR85 Y90 SR90 CM243 PD107 EU154 PU239 U234 U235 SM149	CM242 AM242 I129 CM245 EU154 KR85 EU155 CM243 SR90 Y90 CM244 PD107 CS137 SM151 CS135 U238 CM246 AM241 SM148 PU238 SE79 SN126 ZR93 AM243 SM147 ND144 TC99 PU242 PU239 U234 U235 SM149	SM148 ND144 AM241 SM149 PU240 U238 CM246 U235 TC99 PU239 SM151 AM242 ZR93 U236 PU241 U234 SN126 SE79 I129 NP237 CM242 CM245 PD107 PU238 CM243 Y90 SR90 KR85	SM148 CM242 AM242 ND144 I129 CM245 AM241 PU238 ZR93 CS135 U238 CM246 SN126 SE79 SM151 AM243 TC99 PD107 CM243 Y90 SR90 KR85 PU239 U234 SM149	CM242 AM242 CM245 I129 PU238 CM244 PD107 CS137 ZR93 CS135 SR90 Y90 U238 CM246 SN126 SM148 CM243 SE79 AM241 SM151 SM147 KR85 ND144 AM243 TC99 PU242 PU239 U234 SM149	SM148 ND144 SM149 PU241 AM243 U238 CM246 U235 CM245 NP237 ZR93 SN126 PU239 U236 U234 PU240 SE79 TC99 CS135 I129 PD107 PU238 AM242 CM242	SM148 PU238 ND144 I129 AM242 CM242 SM151 CM245 TC99 SE79 U238 SN126 AM243 CM246 ZR93 CS135 PD107 SM149 U234	PU238 AM242 CM242 I129 CM245 TC99 PD107 SE79 U238 SM148 SN126 CM246 ZR93 CS135 AM243 SM147 ND144 PU242 SM149 U234
-5 TO -1		PU240 U236	PU240 U236		PU240 U235	PU240 U235		PU240	PU239 PU240 PU239
-10 TO -5					U236	U236			
-20 TO -10								U235	U235
-30 TO -20								U236	U236
<-30		NP237 PU241	NP237 PU241	CM244	NP237 CM244 PU241	NP237 PU241		NP237	AM241 NP237 AM241

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NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	30 DAY			5 YR			10 YR		
	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1	ORS/OR2-1	CIN/OR2-1	CIN/ORS-1
5 TO 10		U235	U235		U235	U235		NB95 ZR95 U235	NB95 ZR95 U235
1 TO 5	PU242 SM147 PU241	PU242 SM147 PM147 AM242	PM147 AM242	PU242 SM147 PU241	NB95 ZR95 PU242 SM147 PM147 AM242	NB95 ZR95 PM147 AM242	PU242 SM147 PU241	PU242 SM147 PM147 AM242 PU241	PM147 AM242
-1 TO 1	SM151 AM242 PU239 SN126 CM245 U238 SB125 EU154 Y91 U236 U235 U234 ZR95 AM243 CM246 NP237 CS135 CM243 CM242 KR85 CS134 PU240 NB95 TC99 SR89 SR90 CE144 PU238 CM244 PM147 EU155 Y90 ZR93 I129 AM241 RU106 SM148 CS137	SB125 PU239 EU155 PU241 U236 CM242 Y90 U234 TC99 CM245 SR89 SM151 CS135 KR85 CM244 SR90 AM243 NB95 Y91 EU154 PU238 U238 CS134 AM241 PU240 CM243 ZR95 CM246	SB125 PU239 EU155 U236 Y90 CM242 AM241 U234 TC99 CM245 SE79 SR89 CM244 ND144 CS135 KR85 SR90 AM243 PD107 SM147 NB95 SM151 Y91 PU238 EU154 U238 CS134 PU242 PU240 CM243 ZR95 PU241 SM149 CM246	SM151 CM246 CE144 AM242 Y90 PU239 U238 PU238 SN126 U236 CM245 U234 EU155 SB125 EU154 CM242 U235 CM243 PU240 AM243 KR85 TC99 I129 CS134 SR90 CS135 NP237 CM244 ZR93 Y91 PM147 SR89 NB95 ZR95 RU106 SM148 CS137	PU241 PU239 SB125 EU155 Y90 U236 U234 TC99 CM245 SR89 Y91 SM151 CS135 KR85 SR90 CM244 AM243 EU154 PU238 U238 CS134 PU240 CM243 CM242 CM246	SB125 PU239 EU155 SR89 U236 Y90 AM241 U234 Y91 TC99 CM245 SE79 ND144 CS135 CM244 KR85 SR90 PD107 AM243 SM147 SM151 EU154 PU238 U238 CS134 PU242 PU240 CM243 PU241 CM242 SM149	CE144 SM151 AM242 PU239 SN126 U238 PU238 CM245 CM246 U236 U235 U234 EU155 AM243 EU154 CM242 CS135 CM243 PU240 I129 KR85 TC99 SR90 Y90 CS134 NP237 CM244 SB125 ZR93 PM147 Y91 SR89 RU106 ZR95 NB95 SM148 CS137	CM242 PU239 SB125 EU155 Y91 Y90 SR89 U236 TC99 CM245 U234 SM151 KR85 CS135 SR90 CM244 AM243 PU238 EU154 U238 CS134 CM243 PU240 CM246	CM242 SB125 PU239 EU155 SR89 Y91 Y90 U236 AM241 TC99 CM245 U234 SE79 KR85 CM244 CS135 SR90 PD107 AM243 ND144 SM147 SM151 PU238 EU154 U238 CS134 PU242 CM243 PU240 PU241 SM149 CM246
-5 TO -1		I129 NP237	I129 NP237	AM241	AM241 I129 NP237	CM246 I129 NP237	AM241	AM241 I129	I129
-10 TO -5	PD107	PD107		PD107	PD107		PD107	NP237 PD107	NP237
-30 TO -20	SE79	SE79		SE79	SE79		SE79	SE79	

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NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	20 YR						50 YR						100 YR					
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10 TO 20			NB95	ZR95									PU241		PU241			
5 TO 10			U235		U235		PU241		U235	PU241	U235				U235		U235	
1 TO 5	PU241	PU242	PU242	PU241	PM147	AM242	PU242	SM147	PU242	SM147	PM147	AM242	PU242	SM147	PU242	SM147	PM147	AM242
	SM147		SM147	PM147					PM147	AM242					PM147	AM242		
			AM242															
-1 TO 1	CE144	SM151	CM242	SB125	CM242	SB125	CE144	SM151	CM242	SB125	CM242	SB125	CS137	EU155	CM242	EU155	CM242	SB125
	PU240	AM242	EU155	PU239	EU155	PU239	CS137	EU155	EU155	PU239	EU155	PU239	SM151	AM242	SB125	PU239	EU155	PU239
	TC99	PU239	Y91	Y90	Y90	AM241	PU239	AM242	Y90	TC99	Y90	AM241	PU239	CM245	Y90	AM241	Y90	AM241
	CM245	U238	TC99	U236	U236	TC99	CM245	U235	CM245	SM151	TC99	CM245	SN126	U238	TC99	CM245	TC99	CM245
	U236	SN126	CM245	U234	CM245	SE79	U238	SN126	KR85	CS135	CM244	SE79	U235	CM246	SM151	KR85	KR85	SE79
	CM246	PU238	SM151	KR85	U234	KR85	CM246	U236	AM243	SR90	KR85	CS135	U236	CS135	CS135	SR90	CM244	CS134
	CM244	CM243	CM244	CS135	CM244	CS135	CS135	CM243	CM244	U234	AM243	SR90	TC99	CM242	AM243	CM244	SR90	CS135
	CM242	SB125	SR90	AM243	SR90	PD107	PU238	SB125	EU154	PU238	PD107	ND144	I129	ZR93	PU238	U238	PD107	ND144
	ZR93	U235	PU238	EU154	ND144	AM243	EU154	ZR93	U236	U238	CS134	SM147	AM241	AM243	EU154	CS134	AM243	EU154
	CS135	SR90	U238	CS134	SM147	SM151	I129	SR90	CS134	AM241	SM151	U234	U234	PU240	U234	U236	SM147	SM151
	AM243	EU155	CM243	PU240	EU154	CS134	CM242	U234	CM243	CM246	EU154	PU238	CM243	SR90	CM243	CM246	PU238	U238
	I129	Y90	CM246		PU238	U238	AM243	TC99			U236	U238	Y90	PU238			U234	PU242
	U234	KR85			PU242	CM243	PU240	Y90			PU242	CM243	KR85	SB125			U236	CM243
	NP237	CS134			PU241	PU240	KR85	CS134			PU241	SM149	EU154	CM244			PU241	SM149
	EU154	RU106			SM149	CM246	RU106	CM244			CM246		NP237	RU106			CM246	
	PM147	CS137					PM147	NP237					CS134	PM147				
	SM148						SM148	AM241					SM148					
-5 TO -1	AM241		AM241	I129	I129				PU240	I129	PU240	I129			PU240	I129	PU240	I129
-10 TO -5	PD107		NP237	PD107	NP237		PD107		PD107				PD107		PD107			
-20 TO -10									NP237		NP237							
-30 TO -20	SE79		SE79				SE79		SE79				SE79		SE79	NP237	NP237	

CASE: DECAY ONLY, OF ORIGEN2 DISCHARGE RESULTS FOR PWR, 3.2 WT % & 33 GWD/MTU WATTS PER MTU

NUCLIDE DISTRIBUTIONS BY PERCENTAGE DELTAS REPRESENTING CODE-RESULT-RATIOS MINUS UNITY

DELTAS, %	300 YR			1 KYR			10 KYR		
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10 TO 20	PU241			CS137					
1 TO 5	CS137 PU242 SM147	U235 PU242 SM147 AM242 EU155	U235 AM242	PU241 PU242 SM147	U235 PU242 SM147 AM242	U235 AM242	AM241 PU241 PU242 SM147	PU242 SM147 AM242	AM242
-1 TO 1	EU155 SM151 AM241 CM246 TC99 PU239 U238 ZR93 SN126 PU238 AM242 CM245 CS135 U235 CM242 I129 AM243 U234 PU240 U236 NP237 CM243 SR90 CM244 Y90 KR85 EU154 SM148	CM242 PU239 AM241 Y90 TC99 CM245 SM151 CS135 CM244 AM243 KR85 SR90 PU238 U238 EU154 U234 CM243 CM246	CM242 EU155 PU239 Y90 AM241 KR85 TC99 CM245 CM244 SE79 EU154 SR90 CS135 AM243 ND144 PD107 SM147 SM151 PU238 U238 PU242 U234 CM243 SM149 CM246	SM151 AM241 CM245 CM246 PU239 SN126 U235 I129 AM243 U238 CS135 TC99 CM242 U234 PU240 U236 AM242 NP237 ZR93 Y90 CM243 PU238 SR90 KR85 SM148	CM242 PU239 AM241 TC99 CM245 Y90 SM151 AM243 CS135 PU238 U238 KR85 SR90 U234 CM243 CM246	CM242 PU239 Y90 AM241 TC99 PU238 SE79 CM245 CM244 KR85 SR90 PD107 AM243 ND144 CS135 SM147 SM151 U238 PU242 U234 CM243 SM149 CM246	PU239 U238 SN126 ZR93 U235 CM245 NP237 AM243 U234 PU240 U236 TC99 CS135 CM246 I129 AM242 PU238 CM242 SM148	PU238 SM151 CM242 TC99 CS135 AM243 U238 CM245 PU239 U234	PU238 CM242 TC99 SE79 PD107 ND144 CS135 SM147 AM243 U238 CM245 PU242 PU239 U234 SM149 CM246
-5 TO -1		PU240 U236 I129	PU240 U236 I129		PU240 I129	PU240 I129		CM246 PU240 I129	PU240 I129
-10 TO -5	PD107	PD107		PD107	U236 PD107	U236	PD107	PD107 U235	U235
-30 TO -20	SE79	SE79		SE79	SE79		SE79	SE79 U236	U236
<-30		NP237 PU241	NP237 PU241	CM244	NP237 CM244 PU241	NP237 PU241		NP237 AM241	NP237 AM241

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