

**Analysis of the MIT Research Reactor
Fission Product and Actinide Radioactivity Inventories**

by

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Submitted to the Department of Nuclear Engineering
In Partial Fulfillment of the Requirements for the
Degree of

Bachelor of Science

at the

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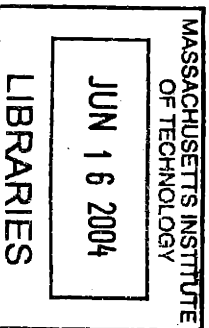
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1 ARCHIVES

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ABSTRACT

The current analysis of the MITR core radioactivity inventory eliminates unnecessary assumptions made in previous estimates of the inventory, and revises the list of contributory isotopes to include all actinide and fission product isotopes necessary for a proper accident source term calculation. The result is a power-history-dependent inventory that increases with burn-up, and comprises 41 actinide isotopes and 596 fission product isotopes.

The analysis uses the ORIGEN2 depletion code to calculate the activity of actinide and fission product isotopes for eight MITR input models at 32 intervals over a period of 5376MWD. The input models simulate a MITR core loaded with high-enrichment, U-Alx cermet fuel or low-enrichment, monolithic U-Mo fuel, and operated at 6MW with a continuous-burn-up or cyclic-burn-up-and-decay power history. Reorganization of the ORIGEN2 output file, and application of an element reduction criterion creates the condensed matrix file for each MITR input model. This file lists the contribution of each isotope to the core radioactivity inventory at each output interval, and is the basis for all inventory analysis.

The inventory analysis yields three important conclusions. First, the assumption of an equilibrium inventory of isotopes in the fuel is accurate to within 3% for all time after 10% fuel burn-up, and conservative over the entire fuel cycle. The equilibrium fuel assumption is invalid for the actinides due to a slow rate of inventory growth. Second, the cyclic-burn-up-and-decay power history yields a lower core inventory than the continuous-burn-up power history for both fuel enrichments. The difference is minimized by increasing the ratio of irradiation time to decay time. Finally, the analysis indicates that conversion to a U-Mo fuel will produce an actinide inventory 18 times greater than that of the current U-Alx fuel, with no significant change in the fission product inventory. However, the actinide inventory is a small fraction of the fission product inventory. The worst-case core inventory available for release is $2.91\text{E}+7\text{Ci}$ for the high-enrichment fuel, and $2.94\text{E}+7\text{Ci}$ for the low-enrichment fuel, with a core loading of 24 elements in each case. The best-estimate core inventory available for release is $2.83\text{E}+7\text{Ci}$, and $2.82\text{E}+7\text{Ci}$ respectively, and accounts for typical cyclic operation of the MITR.

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CHAPTER 1

INTRODUCTION

1.1 Goals for the Thesis

The primary goal of this thesis is to create an accurate model of the actinide and fission product isotope radioactivity inventory of the MIT research reactor core at the end of the fuel cycle. This is accomplished using the ORIGEN2 computer code to simulate the burn-up of high enrichment and low enrichment uranium fuels for a reactor power of 6MW and two distinct power histories. This thesis has three additional goals. The first is to formulate a worst-case and best-estimate value for the radioactivity inventory available for release. This is accomplished using analysis of the evolution of the core inventory for the various model scenarios. The second goal is to re-evaluate the currently accepted fission product inventory for the MITR-II core, with special attention being paid to the assumption of an equilibrium fuel inventory. This is accomplished using analysis of the behavior of each isotope over the life of the core. The third additional goal is to forecast the radiological implications of a conversion from high enrichment fuel to low enrichment fuel. This is accomplished using analysis of the actinide and fission product components of the core inventory. Each of these goals requires successful completion of the primary goal.

1.2 Background Information

1.2.1 MITR-II Design and Operation

The MITR-II is a 5MW, light-water-moderated and cooled research reactor. The core normally consists of 24 aluminum-clad, high enrichment uranium (HEU) fuel elements arranged in a hexagonal aluminum support structure [1]. Each element contains

15 finned fuel plates separated by channels for coolant flow. The plates have a core of UAl_x cement, that is sandwiched between Al alloy cladding. Specific core loading depends on the presence of in-core experiments and reactivity requirements. A heavy-water reflector tank surrounds the core tank and serves as a neutron reflector. Seven moveable neutron absorbers located at the periphery of the core allow coarse and fine control of the reactor power.

The MITR-II currently operates at a thermal power of 4.9MW. Under normal circumstances, the reactor remains at this power level for approximately 4 weeks, followed by a 1 week shutdown period for scheduled maintenance. Unanticipated shutdowns usually last no longer than a few hours. During operation, the reactor power is adjusted to accommodate specific experiments. Refueling occurs periodically, and involves the addition of fresh elements to the core, as well as the repositioning of the existing elements. The refueling strategy results in 35%-40% U235 burn-up upon discharge.

The current reactor, the second operated at the facility, was constructed in the early 1970's [2]. Future upgrades to the facility may include a conversion to lower enrichment uranium (LEU), and/or an increase in the maximum power level. The specifics of converting to low enrichment fuel, including operational limits and design characteristics, are currently under investigation by members of the MIT Nuclear Reactor Laboratory and the Department of Nuclear Engineering. Development of high-density, low-enrichment monolithic U-Mo fuel is being conducted at Argonne National Laboratory under the Reduced Enrichment for Research and Test Reactors Program [3]. This fuel has a density of up to 17.5g/cm³ compared to the current fuel density of 3.75g/cm³. The LEU U235 content in the total core can be similar to that of the HEU fuel, but the U238 content is fifty times that of the current MITR-II fuel [7,10]. The analysis in this thesis attempts to duplicate the best, currently-available estimates of the LEU fuel data and LEU core operating parameters. This includes the normal operating power, power history, core loading, and fuel design.

1.2.2 Previous Work

The MITR fission product inventory referenced in the MITR-II Safety Analysis Report was calculated by Mull for a reactor power of 5MW [4]. This estimated inventory is composed of the saturation activities of 47 isotopes. The saturation activity for each isotope was calculated analytically assuming a balance of production from fission and parent nuclides, and destruction due to radioactive decay. The equation is dependent only on the reactor power, P (MW), and the cumulative yield percentage from fission and parent decay for each isotope, Y_i (%).

$$Q_s^i = \frac{N_s^i \lambda_i}{3.7 \times 10^{10}} = \frac{Y_i P (3.2 \times 10^{16})}{3.7 \times 10^{10}} = 8.65 \times 10^5 Y_i P \quad (\text{Eq 1.2.1})$$

where Q_s^i is the saturation activity, N_s^i is the number of nuclei of isotope i , λ_i is the decay constant, and 8.65×10^5 is a constant of proportionality which was derived assuming a constant fuel inventory and fission cross-section. This calculation does not account for neutron absorption by fission products or fuel depletion. The resultant inaccuracy in the saturation activity values varies from a few percent to an order of magnitude. In addition, Eq 1.2.1 is independent of time, whereas an isotope requires a finite amount of time to reach the saturation activity. An expanded analysis of the fission product inventory performed by Li determined the saturation activities of the 47 isotopes at 1MW increments for 5MW-10MW reactor power [5]. However, the analysis did not attempt to improve Eq 1.2.1 to account for absorption or depletion.

1.3 Motivation for the Thesis

The motivation for this thesis is the need to update the core inventory estimate to include more isotopes, and reflect current modeling techniques and nuclear data. The previous fission product inventory estimate is based on 47 *isotopes*, whereas the NRC now requires inclusion of 31 *elements* in a complete inventory analysis [9]. The analysis in this thesis includes 596 fission product isotopes and 41 actinide isotopes. The latter

group was neglected in previous works because of the use of HEU fuel. The actinide isotopes are especially important due to their more harmful biological effects. The previous fission product inventory was calculated using now-outdated nuclear data. The nuclear data libraries used in this thesis are specific to BWR or PWR reactors, and some actinide cross-sections have been generated with MCNP to reflect the specific neutron spectrum and operating conditions of the MITR core for both HEU and LEU fuels.

The analytical technique used to formulate the previous inventory estimate has been made obsolete by the advent of widely available computer codes, such as the ORIGEN2 code used for this analysis. The previous inventory estimate is largely disconnected from the operational parameters and design characteristics of the MITR due to the simplicity of the analytical saturation activity calculation. The ORIGEN2 depletion code is an excellent tool for incorporating facility-specific details into the core inventory analysis.

CHAPTER 2

METHODOLOGY

2.1 ORIGEN2 Computer Code

ORIGEN2 is a revised version of the ORIGEN computer code created at Oak Ridge National Laboratory to model nuclear systems. The code is intended to provide detailed output regarding the accumulation and decay of the complete library of activation product, fission product, and actinide isotopes. ORIGEN2 uses one-group calculations, internal cross-section and decay libraries, and user-specified initial material compositions to simulate a variety of reactor models. The input file allows the user to tailor the simulation to represent very specific scenarios, and to control the type of data contained in the output file. ORIGEN2 generates an extensive output file which can include the spectrum of useful nuclear material data [6].

2.2 MITTR Input Models

2.2.1 Input Model Construction

The input models used to supply ORIGEN2 with user-specified instructions all have the same basic structure. First, two commands specify the internal library of cross-section data relevant to the case, and add a set of substitute cross-sections to this library. Next, the code reads the initial masses of fuel and structural material isotopes and transfers this data into a storage vector. The following commands control the ORIGEN2 output file by specifying the isotopes to be included, the type of data for each group of isotopes, and the units for all values. The only difference between the structures of the input models occurs in the section governing irradiation and decay, referred to as the burn-up section, and will be treated shortly. Finally, the results of the irradiation and decay commands are moved into sequentially-numbered output vectors and printed to the

output file. An end instruction completes the simulation process. The fuel and structural material isotopes and masses are listed after the end command. The standardized structure of the input models simplifies data analysis by providing output at identical time intervals for all models, and facilitating the identification and correction of input errors. Sections A.1.1-A.1.8 contain the input models in their entirety.

2.2.2 Variable Model Parameters

The differences between the input models result from the initialization data, initial conditions, and the structure of the burn-up section. These constitute the three variable parameters of a model. The initialization data refers to the internal cross-section library and the substitute cross-section data. The internal library, corresponding to a BWR or PWR, is the first variable input parameter in a model. Substitute cross-section library data, specific to the operating characteristics of the MITR, was generated by Newton using MCNP for high enrichment and low enrichment fuel [10]. The substitute data includes (n, γ) , $(n, 2n)$, $(n, 3n)$, and $(n, \text{fission})$ effective, one-group cross-sections for 17 actinides. This data constitutes the first link between the ORIGEN2 simulation and the MITR core. The BWR and PWR cross-section libraries are necessary as an input parameter due to the limited number of isotopes included in the substitute data. The substitute cross-sections are manually entered to match the fuel enrichment and base cross-section library used in each model. The substitute cross-section files are shown in sections A.2.1 and A.2.2.

The initial conditions consist of the isotopes and masses associated with HEU or LEU fuel, and constitute the second variable input parameter in a model. The initial amounts of fuel and structural material are specified in grams of each isotope. All models have U235 and U238 as fuel material and Al as structural material. The LEU fuel also contains natural Mo. Both fuels can contain similar quantities of U235, but the LEU fuel contains over fifty times more U238 [7,10]. The LEU fuel data represents the closest available approximation to a possible future MITR core. A summary of the initial conditions is given in Table 2.2.2a.

Table 2.2.2a Summary of Input Values for HEU and LEU Fuel

Fuel Type	HEU	HEU	HEU	LEU	LEU	LEU
Basis	Core	Element	Plate	Core	Element	Plate
U235 (kg)	12.13	0.51	0.03	12.40	0.52	0.03
U238 (kg)	8.89	0.37	0.02	49.70	2.07	0.14
Al (kg)	91.90	3.83	0.26	57.90	2.41	0.16
Mo (kg)	0.00	0.00	0.00	4.40	0.18	0.01

The reactor power history is the third variable input parameter. The power history is defined by the structure of the burn-up section of the input model. The burn-up section corresponding to a continuous-burn-up power history contains 4 groups of 8 irradiation commands. The continuous-burn-up power history implies full power operation until fuel discharge. Each irradiation command specifies a reactor power of 6MW for an interval of 28 days. The burn-up section corresponding to a cyclic-burn-up power history includes a decay command between each irradiation command. The irradiation commands are identical to the continuous-burn-up case, and the decay commands specify 5 days of decay following each irradiation interval. The cyclic-burn-up power history approximates the current operation of the MITR reactor, while the continuous-burn-up power history is a conservative assumption used for the analysis. Despite the difference between input model structure, both power history models contain the same total irradiation time, and result in equal MW/D of power production.

2.3 Test Matrix

2.3.1 Model Designation

Due to the extensive amount of data generated for this thesis, a system for regularizing model names was devised to keep track of the parameters used to create each input model. Model names appear as [M] [B,P] [L,H] [R,S] where M indicates the use of MITR-specific replacement cross-section data, B,P refer to BWR, or PWR base cross-section library, L,H to LEU or HEU fuel, and R,S to the cyclic burn-up power history or

the continuous-burn-up power history. As an example, the MBHR model corresponds to a BWR base cross-section library including MITR replacement cross-section data applied to HEU fuel elements irradiated using the cyclic-burn-up power history. Given that there are three variable input parameters and two possible choices for each, the final data set will consist of eight output files. These files are grouped according to the fuel enrichment, and sub-grouped according to the base cross-section library. This system separates the variables in order of decreasing relevance to neutron physics.

2.3.2 The Test Matrix

The test matrix is a storage location for data relevant to all models included in the final data set. Table 2.3.2a shows a portion of the test matrix, which can be viewed in full in section B.4. This matrix lists the file designation and variable input parameters for each model. The test matrix contains the data used for validation and benchmarking and the results of the relevant calculations. The data is taken from the ORIGEN2 output file before any file manipulation occurs. Side-by-side comparison of the validation and benchmarking data reveals any gross errors in the construction of the input files or the specification of the variable input parameters. Without this comparison, the magnitude of data contained in each output file could obscure flaws in the model until late in the data manipulation process. Output files that do not show any erratic or strange trends in the data are cleared for conversion into a finalized form. A checklist of intermediate output forms and final data files is located at the bottom of the test matrix to help track the conversion process. Results that can be expressed concisely are added to the test matrix as they become available. The actinide and fission product components of the total core inventory are examples of this type of results data.

Table 2.3.2a Partial Listing of the Test Matrix (note: the entire test matrix appears in section B.4)

MODEL	TEST MATRIX												
	MBHR	MBHS	MPHR	MPHS	MBLR	MBLS	MPLR	MPLS	MBHR	MBHS	MPHR	MPHS	
INPUT PARAMETERS													
Cross-section library	BWR	BWR	PWR	PWR	BWR	BWR	PWR	PWR	BWR	BWR	PWR	PWR	PWR
Fuel enrichment	HEU	HEU	HEU	HEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU
Power history	cyclic	continuous	cyclic	continuous	cyclic	continuous	cyclic	continuous	cyclic	continuous	cyclic	continuous	continuous
VALIDATION DATA													
Total MWD	3864	3864	3864	3864	4032	4032	4032	4032	4032	4032	4032	4032	4032
End-of-cycle burn-up %	40.6%	40.6%	40.6%	40.6%	39.8%	39.8%	39.7%	39.7%	39.8%	39.8%	39.7%	39.7%	39.7%
Initial U235 (g)	12132	12132	12132	12132	12400	12400	12400	12400	12400	12400	12400	12400	12400
Final U235 (g)	7202	7202	7205	7205	7466	7464	7479	7477	7464	7464	7479	7477	7477
MWD/gU235 (Modeled)	0.78	0.78	0.78	0.78	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
MWD/gU235 (analytical)	0.79	0.79	0.79	0.79	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
BENCHMARK DATA													
(saturation activity) (Ci)													
131 (1.50E+05)	1.383E+05	1.432E+05	1.384E+05	1.433E+05	1.406E+05	1.457E+05	1.409E+05	1.459E+05	1.383E+05	1.432E+05	1.384E+05	1.433E+05	1.406E+05
Kr6m (7.79E+04)	6.333E+04	6.333E+04	6.333E+04	6.333E+04	6.314E+04	6.314E+04	6.312E+04	6.312E+04	6.333E+04	6.333E+04	6.333E+04	6.333E+04	6.312E+04
Nd147 (1.34E+05)	1.078E+05	1.138E+05	1.078E+05	1.138E+05	1.078E+05	1.138E+05	1.077E+05	1.138E+05	1.078E+05	1.138E+05	1.078E+05	1.138E+05	1.078E+05
Xe138 (2.86E+05)	3.109E+05	3.109E+05	3.109E+05	3.109E+05	3.107E+05	3.107E+05	3.107E+05	3.107E+05	3.109E+05	3.109E+05	3.109E+05	3.107E+05	3.107E+05
CORE INVENTORIES													
COMPLETE LIST													
ACT inventory (Ci)	2.468E+04	2.466E+04	2.498E+04	2.497E+04	5.609E+05	5.613E+05	5.934E+05	5.938E+05	2.829E+07	2.863E+07	2.827E+07	2.862E+07	2.818E+07
FP inventory (Ci)	2.829E+07	2.863E+07	2.827E+07	2.862E+07	2.819E+07	2.856E+07	2.818E+07	2.854E+07	2.830E+07	2.865E+07	2.829E+07	2.864E+07	2.875E+07
TOTAL inventory (Ci)	2.830E+07	2.865E+07	2.829E+07	2.864E+07	2.875E+07	2.912E+07	2.877E+07	2.910E+07	2.830E+07	2.865E+07	2.829E+07	2.864E+07	2.910E+07
REDUCED LIST													
ACT inventory (Ci)	2.466E+04	2.465E+04	2.497E+04	2.496E+04	5.609E+05	5.613E+05	5.934E+05	5.938E+05	1.545E+07	1.581E+07	1.544E+07	1.579E+07	1.539E+07
FP inventory (Ci)	1.545E+07	1.581E+07	1.544E+07	1.579E+07	1.540E+07	1.576E+07	1.539E+07	1.575E+07	1.548E+07	1.583E+07	1.547E+07	1.582E+07	1.598E+07
TOTAL inventory (Ci)	1.548E+07	1.583E+07	1.547E+07	1.582E+07	1.597E+07	1.632E+07	1.598E+07	1.634E+07	1.548E+07	1.583E+07	1.547E+07	1.582E+07	1.634E+07

2.4 Model Validation and Benchmarking

2.4.1 Validation

Validation ensures consistency between models with common input parameters, and verifies that the burn-up data makes physical sense. This analysis defines burn-up as mass-depletion of U235, via fission, absorption, and decay. The validation data consists of the initial masses of U235 and U238, and the masses of U235, U236, U238, and Pu239 at the end of the fuel cycle. The U235 data is used to check that burn-up percentages are consistent for input models with a common fuel enrichment. The HEU models all reach 40.6% U235 burn-up after 644 days of irradiation. After 672 days of irradiation, the LEU models with a BWR base cross-section library reach 39.8% U235 burn-up, and the LEU models with a PWR base cross-section library reach 39.7% U235 burn-up. These values

show that the input models are functioning properly. Any deviation from the group trend indicates the presence of an error in the burn-up section of the deviant input model. Errors in the substitute cross-section data can also cause inconsistent U235 burn-up percentages.

The difference in the time it takes for the HEU and LEU models to reach approximately 40% U235 burn-up is a consequence of the initial fuel composition. The ratio of MWD of energy production to grams of U235 consumed gives an equivalent measure of the time difference. A comparison of analytically-calculated values of this ratio with the values generated by the input models verifies that the burn-up data makes physical sense. The ratio should be approximately constant for a given fuel enrichment because it is largely dependent upon the relative amounts of U235 and U238. The values generated for this ratio by the input models are approximately 0.78 for all HEU models and 0.82 for all LEU models. The analytical calculation involves several steps beginning with the minimum value of the ratio as given by the following equation.

$$\frac{\text{MWD}}{\text{gU235}} = \frac{\text{MW}}{1 \times 10^6 \text{ W}} \cdot \frac{1 \text{ D}}{86400 \text{ s}} \cdot \frac{E_{\text{avg}}}{{}^{235}\text{U}(n, \gamma)} \cdot \frac{{}^{235}\text{U}(n, \gamma)}{3.90 \times 10^{-22} \text{ gU235}} = \frac{0.95 \text{ MWD}}{\text{gU235}} \quad (\text{Eq 2.4.1})$$

where ${}^{235}\text{U}(n, \gamma)$ is a neutron absorption reaction that results in the nuclide, radiation, or process y . The value 0.95MWD/gU235 assumes all reactions are U235(n, f) with $E_{\text{avg}}=200\text{MeV}$. However, over the life of the core, both the HEU and LEU fuels generate approximately 870g of U236 via radiative capture, U235(n, γ), with $E_{\text{avg}}=6\text{MeV}$. The average energy released per U235(n, γ) reaction becomes,

$$E_{\text{avg, cap}} = 200\text{MeV} - 194\text{MeV} \cdot \frac{\text{gU236}_{\text{fm}} \cdot \left(\frac{235.04 \text{ amu U235}}{236.05 \text{ amu U236}} \right)}{\left(\text{gU235}_{\text{int}} - \text{gU235}_{\text{fm}} \right)} = 166\text{MeV} \quad (\text{Eq 2.4.2})$$

with the given result corresponding to the MBHR model. Substitution of $E_{\text{avg, cap}}$ into Eq 2.4.1 yields a value of 0.79MWD/gU235, which is within 0.7% of the value generated by the MBHR input model.

The values generated by the LEU input models are higher due to the much larger initial mass of U238. Radiative capture followed by two successive beta decays converts fertile U238 to fissile Pu239 [8]. Based on the fission and radiative capture cross-sections for U238, the depletion of the U238 inventory is due almost entirely to conversion to Pu239. The same cross-section data for Pu239 shows that 70% of the depletion of the Pu239 inventory is due to fission [11]. Coupling this value with the mass data for U238 and Pu239 yields the total number of Pu239 fission reactions.

$$N_{\text{Pu239}} = 0.7 \cdot \left((g\text{U238}_{\text{init}} - g\text{U238}_{\text{fin}}) \cdot \frac{2.53 \times 10^{21}}{\text{g}} - g\text{Pu239}_{\text{fin}} \cdot \frac{2.52 \times 10^{21}}{\text{g}} \right) \quad (\text{Eq 2.4.3})$$

The result of Eq 2.4.3 and the U235 mass data completes the formulation of the average energy released per U235(n,y) reaction.

$$E_{\text{avg, tot}} = E_{\text{avg, cap}} + 207\text{MeV} \cdot \frac{N_{\text{Pu239}}}{(g\text{U235}_{\text{init}} - g\text{U235}_{\text{fin}}) \cdot \frac{2.56 \times 10^{21}}{\text{g}}} = 173\text{MeV} \quad (\text{Eq 2.4.4})$$

The result is shown for input model MBLR. The value of 207MeV represents the total energy released by the conversion of U238 to Pu239 and the fission of Pu239 [8]. Substitution of Eq 2.4.4 into Eq 2.4.1 completes the analytical calculation used to validate the input models. Table 2.4.1a is a summary of the analytically-calculated and model-generated values for the MWD of power output per gram of U235 consumed. The excellent agreement between the values indicates that the input models generate meaningful and verifiable physics calculations.

Table 2.4.1a Summary of Power Output Per Gram U235 Consumed

MODEL	MBHR	MBHS	MPhR	MPhS	MBLR	MBlS	MPLR	MPLS
MWD/gU235								
Analytical value	0.79	0.79	0.79	0.79	0.82	0.82	0.82	0.82
Modeled value	0.78	0.78	0.78	0.78	0.82	0.82	0.82	0.82
Comparison	1.01	1.01	1.00	1.00	1.00	1.01	1.00	1.00

2.4.2 Model Benchmarking

Benchmarking the output data against analytical calculations ensures that the models produce realistic values for the isotope activities. The data required for this process is taken from the ORIGEN2 output prior to any in-depth file manipulation. The maximum activities of I131, Kr85m, Nd147, and Xe138 attained over the burn-up interval from 0%-40% are compared with their saturation activities. The saturation activities are taken from the current estimate of the fission product inventory as calculated by Li for a reactor power of 6MW [5]. The benchmark isotopes were chosen because they quickly reach maximum activity, and they represent a range of end-of-cycle activities. General agreement between the output value and the saturation activity indicates that the model generates meaningful data. Precise agreement is not expected due to the inaccuracies in the saturation values stated in section 1.2.2. Figure 2.4.2a is a graphical representation of the benchmark isotope activity comparison for the MBHR model.

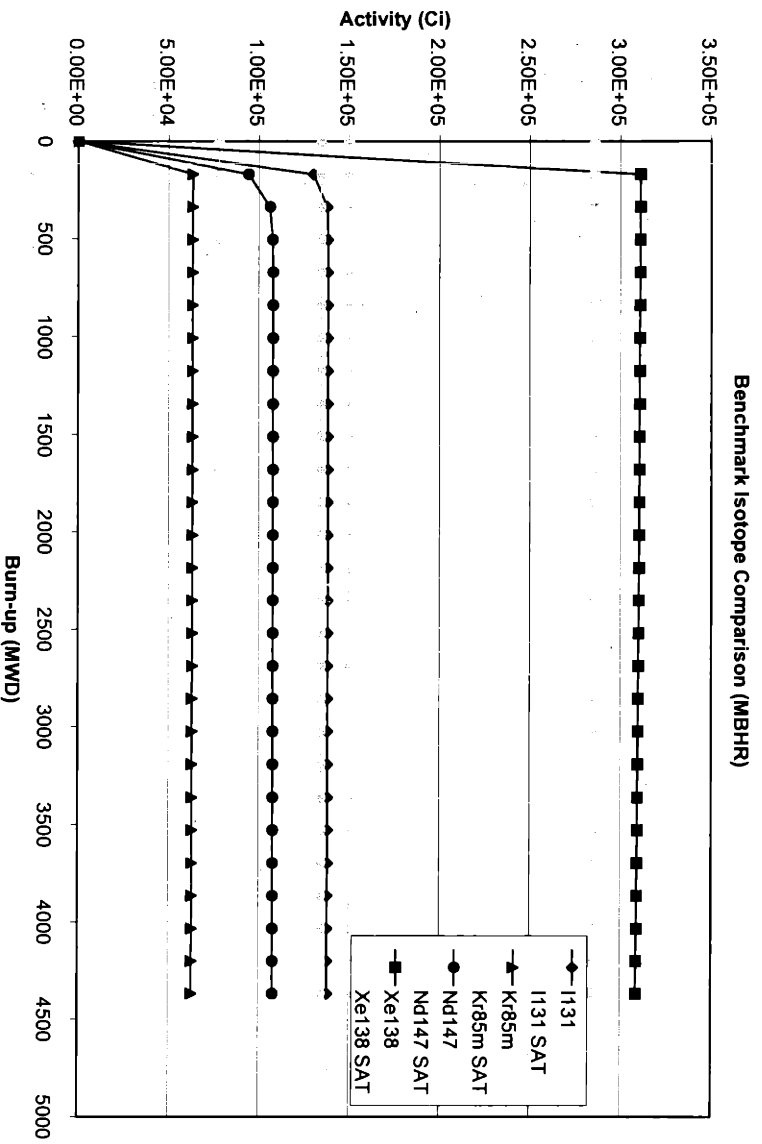


Figure 2.4.2a Benchmark Isotope Activity Comparison for the MBHR Model. (note: the saturation activities calculated for 6MW are designated by the suffix “sat”)

2.5 Output Files

2.5.1 Data Intervals

Each ORIGEN2 output file consists of about 100 pages of data covering an irradiation period of 896 days in 28-day intervals. Each output interval corresponds to 168MWD, or approximately 1.7% U235 burn-up. The output data represents the activity at the end of each irradiation interval, and does not include the subsequent 5-day decay period in the cyclic-burn-up power history models. The decay period only serves to decrease the activity of the core inventory prior to the next irradiation interval. The output scheme ensures that the difference in core inventory for the two power histories is not over-exaggerated in the output data. This would be the result if the output data represented the activity at a time near the beginning of each irradiation interval. If this

was the case, the core inventories of the cyclic-burn-up power history models would be significantly lower than those of the continuous-burn-up power history models due to transient behavior as isotopes build up to their equilibrium activities. The length of the output interval creates 24 data points between 0% and 40% burn-up for HEU fuel models, and 25 data points for LEU fuel models. This number of data points ensures sufficient resolution for detailed investigation of core inventory evolution, and growth behaviors of individual isotopes and groups of isotopes.

ORIGEN2 organizes the output data into four blocks. Each block corresponds to one of the four groups of eight irradiation commands in the burn-up section of the input model. This is equivalent to 224 days of irradiation. The data blocks are arranged sequentially, with data block 1 appearing at the top of the output file and data block 4 at the bottom. This arrangement is cumbersome because it divides the activity data for any single isotope into four lines that are each separated by about 20 pages of output data. Figure 2.5.3a illustrates the arrangement under the heading "ORIGEN2 Output Format."

2.5.2 Output Data Types

Three types of data most relevant to core inventory analysis constitute the ORIGEN2 output files. These data types are average irradiation parameters(time, thermal neutron flux, burn-up, k_{eff} , etc.), actinide isotope masses, and actinide and fission product isotope activities. All masses are given in grams, and activities in curies. The data contained in the output files is referred to as raw data because it includes a mixture of useful and extraneous information. The block heading lists the average irradiation parameters for each interval, and for the entire data block. Section 1 of each block is a summary table of the masses of actinide isotopes. The summary table only includes isotopes that contribute 1/1000th of the total mass of the actinide isotopes. The block heading and section 1 contain the validation data. Section 2 of each data block provides activity data for the complete list of actinide isotopes. Section 3 provides activity data for the complete list of fission product isotopes, and the benchmarking data for each model. The raw output data set for each input model consists of section 2 and section 3 of all four data blocks.

2.5.3 Output File Conversion

The ORIGEN2 output file is converted to a matrix form to eliminate the cumbersome block format. This is accomplished by dividing the file into four smaller pieces, each containing one block of data. The pieces are arranged horizontally, thus eliminating the difficulties caused by the vertical arrangement of blocks in the output file.

Figure 2.5.3a illustrates the process.

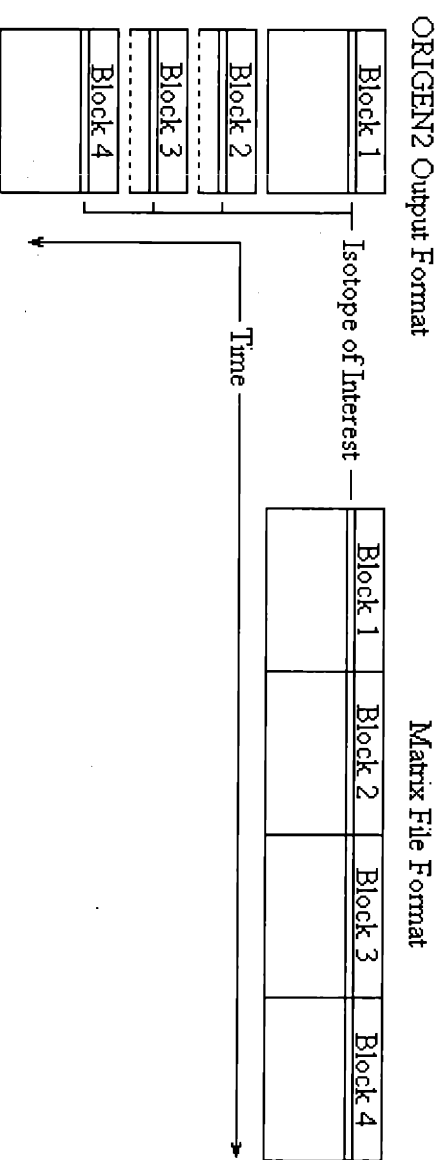


Figure 2.5.3a ORIGEN2 Output File Format Conversion

The matrix file consists of two matrices of isotopes. The upper matrix contains the actinide isotope data from section 2 of the data blocks, and the lower matrix contains the fission product isotope data from section 3 of the data blocks. The first column of each matrix contains the isotopes, and the following 33 columns contain the activity of the isotopes at the end of each 28-day time interval. The matrix file ordering of actinides above fission products persists throughout the data analysis to ease manipulation of the fission product data. The format of the matrix file is especially conducive to core inventory and individual isotope inventory analysis because each row reads from left to right as an activity timeline from 0%-55% burn-up.

2.6 Output Data Reduction

2.6.1 Element Reduction Criterion

Section 3.4 of NRC Regulatory Guide 1.183 lists the elements that need to be included in a proper analysis of a power reactor accident source term [9]. This list of elements serves as the first criterion for reducing the volume of output data, and is given in section B.5. Use of the 31-element list is warranted because the power density in the MITR core is comparable to that found in a commercial reactor, and it ensures the completeness of the final data tables. The resultant list for each input model contains 596 fission products and 41 actinides with respective total activities of $2.83\text{E}+7$ Ci and $2.47\text{E}+4$ Ci for the MBHR model, and $2.88\text{E}+7$ Ci and $5.61\text{E}+5$ Ci for the MBLR model. The matrix files formed from these isotope lists constitute the total core inventory data files, and will henceforth be referred to as the **condensed matrix files**.

2.6.2 Half-Life Reduction Criterion

The second criterion for reduction is that an isotope have a half-life greater than 5 minutes. This value was chosen based on the characteristic release time and release fractions for PWR and BWR accidents. Sections 3.2 and 3.3 of NRC Regulatory Guide 1.183 state that only 5% of noble gases, halogens, and alkali metals are released during the first 30 minutes of a fuel damage accident [9]. The remainder of the available core inventory is released at a linear rate over the next 90 minutes. According to the radioactive decay equation, isotopes with a half-life of 5 minutes experience a 98.4% reduction in activity by the end of the first release phase, and a 99.9% reduction by the end of the second release phase. This ensures that a half-life of 5 minutes is a fairly conservative cut-off value. The second reduction criterion leaves 265 fission product isotopes with a total activity of $1.55\text{E}+7$ Ci for the MBHR model, and $1.54\text{E}+7$ Ci for the MBLR model. The actinide and daughter product isotopes are neglected during this stage of the output reduction process.

2.6.3 Activity Reduction Criterion

The third criterion for output reduction is that the activity of a fission product isotope be greater than 100 Ci at the end of the fuel cycle. Given that the remaining core inventory is on the order of $1.6\text{E}+7$ Ci, this cut-off value does not eliminate a significant amount of activity. Application of the activity reduction criterion results in a list of 135 fission product isotopes with an inventory of $1.55\text{E}+7$ Ci for the MBHR model, and 136 fission product isotopes with an inventory of $1.54\text{E}+7$ Ci for the MBLR model. The cut-off activity for the actinide isotopes is 10 Ci. The actinide cut-off activity is lower than that of the fission products due to the greater biological effect of alpha emitters, and the lower actinide inventory. The result is a unique actinide isotope list for each fuel enrichment. The HEU list contains 6 isotopes with a total activity of $2.47\text{E}+4$ Ci for the MBHR model, and the LEU list contains 9 isotopes with a total activity of $5.61\text{E}+5$ Ci for the MBLR model. The matrix files composed of the reduced fission product and actinide isotope lists serve as the basis for the all of the equilibrium-state analysis and a portion of the core inventory evolution analysis, and will henceforth be referred to as the **final matrix files**.

2.6.4 Consequences of Data Reduction

The output reduction process is not intended to modify the total data set required for a complete core inventory. Instead, its purpose is to ease analysis of important trends in core inventory evolution by focusing on the isotopes with the greatest impact on the final core inventory. As an illustration, $1\text{E}+7$ Ci of the decrease in total activity caused by the half-life reduction criterion is accounted for by isotopes with half-lives shorter than 60s. An activity growth analysis may track a group of elements with a maximum total activity of only $1.5\text{E}+5$ Ci. The $1\text{E}+7$ Ci of activity associated with the short-lived group can obscure subtle variations in the behavior of the group of interest. As a final note, it is important to keep in mind that the condensed matrix files provide the core inventory at any given U235 burn-up percentage. The final matrix files are used only as tools for

focusing the analysis on specific isotopes or groups of isotopes. A summary of the reduction process is given in table 2.6.4a.

Table 2.6.4a Data Reduction Summary (all values are in Ci)

MODEL	MBHR	MBHS	MPHR	MPHS	MBLR	MBLS	MPLR	MPLS
1st criterion	Member of list of 31 elements from NRC Regulatory Guide 1.183							
Condensed Matrix	Forms the basis for the core inventory estimate.							
ACT	2.468E+04	2.466E+04	2.498E+04	2.497E+04	5.609E+05	5.613E+05	5.934E+05	5.938E+05
FP	2.828E+07	2.863E+07	2.827E+07	2.862E+07	2.819E+07	2.856E+07	2.818E+07	2.854E+07
TOTAL	2.830E+07	2.865E+07	2.829E+07	2.864E+07	2.875E+07	2.912E+07	2.877E+07	2.914E+07
2nd criterion	Half-life greater than 300 seconds (actinides are exempt)							
ACT	2.468E+04	2.466E+04	2.498E+04	2.497E+04	5.609E+05	5.613E+05	5.934E+05	5.938E+05
FP	1.546E+07	1.581E+07	1.544E+07	1.580E+07	1.541E+07	1.576E+07	1.539E+07	1.575E+07
TOTAL	1.548E+07	1.583E+07	1.547E+07	1.582E+07	1.597E+07	1.632E+07	1.598E+07	1.634E+07
3rd criterion	End-of-cycle activity greater than 100 Ci (10 Ci for actinides)							
Final Matrix	Forms the basis for core inventory evolution and individual isotope analysis.							
ACT	2.466E+04	2.466E+04	2.497E+04	2.496E+04	5.609E+05	5.613E+05	5.934E+05	5.938E+05
FP	1.545E+07	1.581E+07	1.544E+07	1.579E+07	1.540E+07	1.576E+07	1.539E+07	1.575E+07
TOTAL	1.548E+07	1.583E+07	1.547E+07	1.582E+07	1.597E+07	1.632E+07	1.598E+07	1.634E+07

CHAPTER 3

RESULTS

3.1 Terminology and Isotope Classification

3.1.1 Terminology

It is important to define the general terminology that will appear throughout the discussion of results and analysis. The scope of the data and the variety of results make the use of acronyms especially convenient in tables and figures. Some acronyms are fixed, e.g. saturation activity (SAT), while others have a general format containing specific references. The latter is analogous to the method of model designation described in section 2.3.1. The general format is [model][component][quantity], where [model] is the input model designation without the “M” prefix, [component] is the group of isotopes of interest, e.g. actinides (ACT), and [quantity] is the quantity the acronym represents, e.g. end-of-cycle activity (EOC). The quantity of interest is usually an inventory, in which case the [quantity] field of the acronym is left blank. As a complete example, BHRNQMAX is the maximum activity of the non-equilibrium inventory for the MBHR model. This system may seem awkward, but it greatly reduces confusion in the analysis and presentation of results. Section B.7 is a summary of the general acronym format and the possible entries for each of the three fields.

The terminology found in the text attempts to be as descriptive as possible while maintaining sufficient generality. Two widely used reference times are the **end-of-cycle**, referring to 40% U235 burn-up, and **maximum burn-up**, referring to 45% U235 burn-up for HEU fuel and 55% U235 burn-up for LEU fuel. End-of-cycle is independent of the power history, and should not be confused with the cycles of irradiation and decay in the cyclic-burn-up power history input models. The **core lifetime** is defined as the time period beginning at 0% U235 burn-up and ending at 40% U235 burn-up. The core

lifetime is 644 days, or 3864MWD, for HEU fuel models, and 672 days, or 4032MWD, for LEU fuel models. The **core inventory** is the sum of the activities of the isotopes contained in the condensed matrix file at a specific time. Likewise, the **actinide inventory** and **fission product inventory** are the sum of the activities of the isotopes contained in each group. In general, the **inventory** of a group of isotopes is the sum of their activities. Isotopes are labeled according to their equilibrium-state. **Equilibrium isotopes** maintain an approximately constant level of activity over the core lifetime. **Non-equilibrium isotopes** have transient activity over the core lifetime. **SAT isotopes** are isotopes included in the current estimate of the MITR-II fission product inventory. These labels will be explained in greater detail in the following sections.

3.1.2 Classification by End-of-Cycle Activity

Individual fission product isotopes are classified using two criteria to separate the final matrix file into five groups. The first criterion is an end-of-cycle activity of $1\text{E}+4$ Ci. This separates the isotopes into a high activity ($>1\text{E}+4$ Ci) group, and a low activity group ($<1\text{E}+4$ Ci). This is done to make the most important characteristic of an isotope, its relative impact on the end-of-cycle core inventory, immediately apparent. The high activity group retains more than 99% of the fission product inventory for both fuel enrichments. Grouping by activity is largely transparent in the analysis, as it serves as a “behind-the-scenes” aid for examining underlying mechanisms of inventory evolution.

3.1.3 Classification by Equilibrium-State

The second classification criterion is the equilibrium-state of an isotope. The **equilibrium-state** is determined according to the change in activity over an interval corresponding to approximately 10% burn-up. A change of at least $\pm 10\%$ qualifies an isotope as being in a state of **non-equilibrium**. A smaller change in activity qualifies an isotope as being in a state of **equilibrium**. The change in activity is checked for the intervals from 10%-20% burn-up, 20%-30% burn-up, and 30%-40% burn-up. Isotopes that remain in a state of non-equilibrium for all three intervals are referred to as **non-**

equilibrium isotopes. All other isotopes are referred to as **equilibrium isotopes**. The respective shorthand notation is **NQ** and **EQ**. The actinide isotopes are omitted from the classification process. Figure 2.7.2a illustrates the behavioral difference between the equilibrium-states.

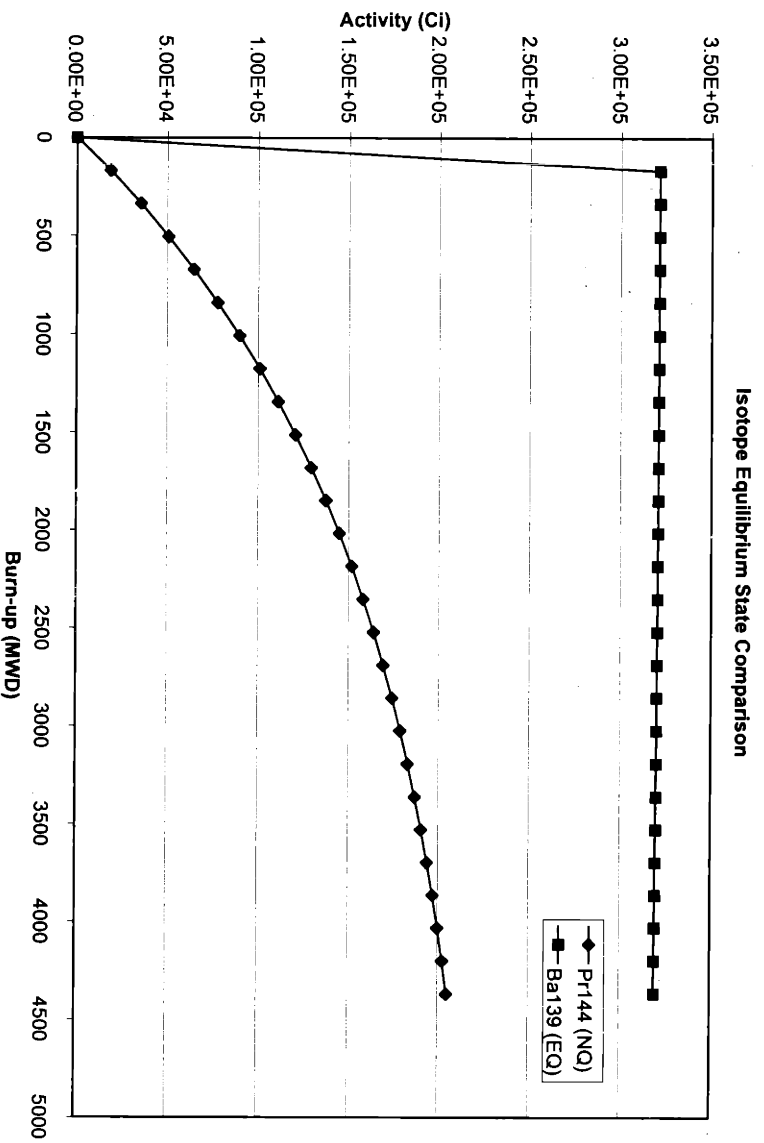


Figure 2.7.2a Comparison of Equilibrium-States of Ba139 (equilibrium isotope) and Pr144 (non-equilibrium isotope) for the MBHR Input Model

Exceptions to the equilibrium criterion are made for four reasons. First, the interval spacing for the HEU fuel models is slightly uneven, resulting in lower activity changes over the 20%-30% burn-up interval. Second, it is desirable to keep the list of equilibrium and non-equilibrium isotopes consistent for each fuel enrichment. This allows for comparison of the effects of the base cross-section library and power history on the equilibrium-state. Third, isotopes that have a high relative activity, but an activity change less than 10% are included in the non-equilibrium group. This aids comparison between the equilibrium and non-equilibrium groups by decreasing the difference

between their inventories. Finally, the large relative U238 content of the LEU fuel creates distinct non-equilibrium behavior that is only captured by setting the equilibrium-state criterion at approximately a 3% change in activity. This behavior is discussed in length in section 3.2.2. As a final note, it is important to remember that the activity of an equilibrium isotope is only relatively stable, and is not truly in a state of equilibrium.

3.1.4 Classification by Inclusion in Previous Work

The fission product inventory that is referenced in the MITR-II Safety Analysis Report was calculated by Mull for a reactor power of 5MW.[4] This inventory is composed of the saturation activities of 47 isotopes. These 47 isotopes are classified as **SAT isotopes**. A list of the SAT isotopes is given in section B.6. These isotopes are only used for comparison and benchmarking.

3.1.5 Classification Results

The isotope classification process results in two new matrix files. The first highlights the equilibrium-state classification, and is referred to by the name of the input model, e.g. MBHR, or generically as the **equilibrium-state file (EQS file)**. These matrix files contain five separate matrices. One matrix contains the actinides, two matrices contain the high and low activity equilibrium isotopes, and two matrices contain the high and low activity non-equilibrium isotopes. All equilibrium-state analysis is based on these files. The second new matrix file contains the 47 SAT isotopes, and is referred to generically as the **SAT file**, and specifically according to the input model, e.g. MBHRSAT. This file consists of two separate matrices. The first contains non-equilibrium isotopes, and the second contains equilibrium isotopes. The data for the SAT file is copied from the EQS file. This matrix file is used only for comparing the current fission product inventory with the respective inventory generated by each input model.

3.2 Isotope Equilibrium-States

3.2.1 Equilibrium-State Inventories

This section provides an overview of the general properties of the equilibrium-states and their inventories for all input models. The specific effects caused by the variable input parameters are discussed at length in section 3.2.2, regarding fuel enrichment effects, and section 3.2.3, regarding power history effects. The topics are treated on the scales of individual isotopes and total equilibrium-state inventories. The effect of the base cross-section library is negligible, and not discussed in regard to equilibrium states.

The majority of the fission product inventory is composed of equilibrium isotopes. Besides there being a larger number of equilibrium isotopes, the reason is immediately apparent from the definition of the saturation activity and the equilibrium-state classification criterion. The saturation activity is the maximum activity an isotope can have during irradiation at a given power level. The criterion for classification as an equilibrium isotope is that the isotope has reached a steady level of activity, i.e. the saturation activity. The equilibrium isotope inventory grows to maximum over the first half of the core lifetime, remains constant for the next 140 days of irradiation, and slowly decreases over the final 10% U235 burn-up. The evolution of the equilibrium inventory dominates the core inventory growth pattern due to the large fraction of the fission product inventory represented by equilibrium isotopes.

The non-equilibrium isotopes account for a small percentage of the total fission product inventory. The non-equilibrium inventory includes fewer isotopes than the equilibrium inventory, and these isotopes do not reach the saturation activity. By definition, the non-equilibrium inventory continues to grow over the entire core lifetime. The rapidity of this growth compensates for the decrease in the equilibrium isotope inventory late in the fuel cycle, and creates positive core inventory growth over the entire core lifetime. Figure 3.2.1a shows the evolution of the equilibrium and non-equilibrium

components, and total fission product inventory. Table 3.2.1a lists the equilibrium and non-equilibrium components of the fission product inventory.

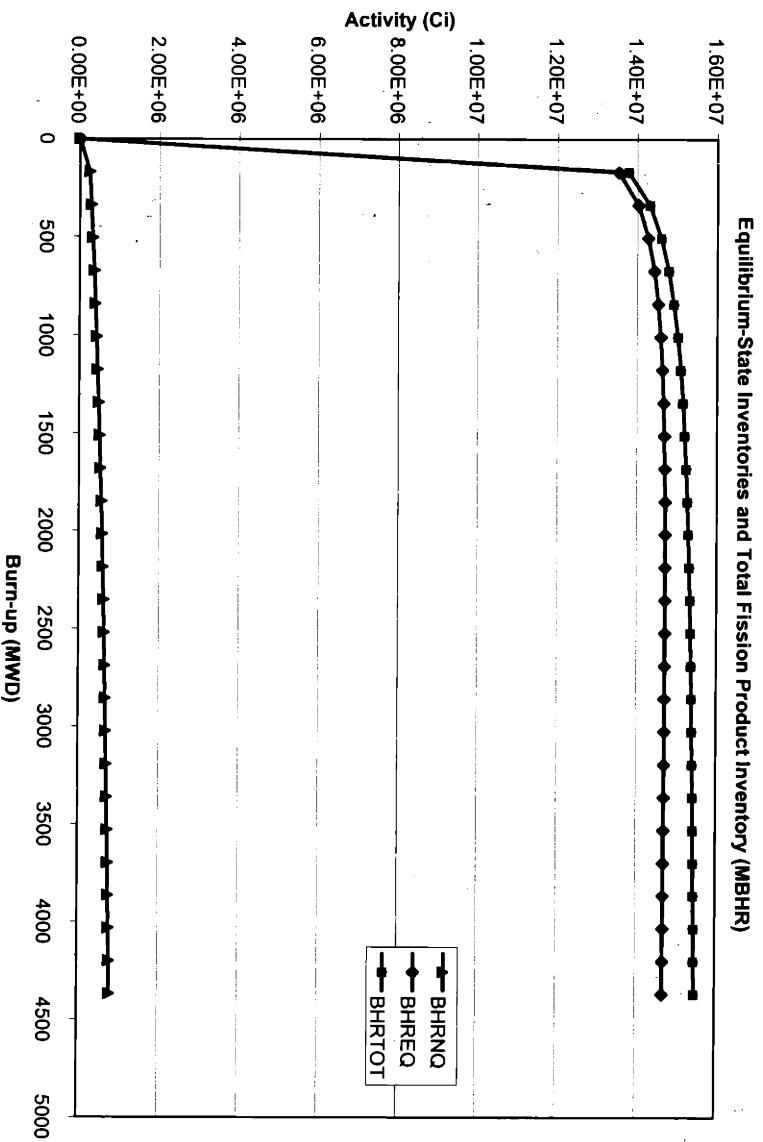


Figure 3.2.1a Evolution of the Equilibrium-State Inventories and the Total Fission Product Inventory for the MBHR Input Model

Table 3.2.1a Equilibrium-State Summary for Each Input Model

MODEL	MBHR	MBHS	MPHR	MPHS	MBLR	MBLS	MPLR	MPLS
EQ isotopes	98	98	98	98	83	83	83	83
EQ inventory	1.470E+07	1.500E+07	1.469E+07	1.499E+07	1.401E+07	1.428E+07	1.399E+07	1.426E+07
NQ isotopes	36	36	36	36	52	52	52	52
NQ inventory	7.590E+05	8.045E+05	7.564E+05	8.019E+05	1.393E+06	1.479E+06	1.398E+06	1.484E+06
TOT inventory	1.545E+07	1.581E+07	1.544E+07	1.579E+07	1.540E+07	1.576E+07	1.539E+07	1.575E+07

3.2.2 Fuel Enrichment Effects

The fuel enrichment affects the number of isotopes in each equilibrium-state and the evolution of the activity of each isotope. The underlying mechanism is the conversion of U238 to Pu239 and subsequent fission of Pu239. The result, shown above in table 3.2.1a, is that the HEU fuel models have a greater number of equilibrium isotopes than the LEU fuel models. The quantitative details of the effect of the fuel enrichment on each isotope are determined from material properties and inter-related rates of change.

The cumulative yield percentage for an isotope, Y_i , is a combination of the yield from fission, parent nuclide decay, and neutron capture reactions. The HEU and LEU model inventories contain fission products generated primarily by the fission of U235 and Pu239. Neglecting the other fissile nuclei, the total yield percentage is the sum of the yield percentages from U235 and Pu239, normalized to account for their fission fractions. The fission fraction of each is determined by the weighted ratio of their macroscopic thermal-fission cross-sections. [8] The macroscopic thermal-fission cross-sections change over time in proportion to the change in the relative number of U235 and Pu239 nuclei. The result is a time-varying, effective yield percentage.

$$Y(t)_{i,\text{eff}} = Y_{i,U235} \cdot \left(\frac{\Sigma(t)_f^{U235}}{\Sigma(t)_f^{\text{tot}}} \right) + Y_{i,Pu239} \cdot \left(\frac{\Sigma(t)_f^{Pu239}}{\Sigma(t)_f^{\text{tot}}} \right) \quad \text{Eq 3.2.1}$$

The growth rate of the number of Pu239 nuclei depends on the conversion rate of U238 to Pu239, the conversion rate of U235 to U236, the fission rate of Pu239, and the fission rate of U235 (note: these conversion processes are described in section 2.4.1). At any time during irradiation, these four inter-related rates are dependent upon the relative concentrations of U235, U238, and Pu239 nuclei at some previous time. Since the initial concentration of Pu239 nuclei is defined as zero in the input models, the fuel enrichment ultimately determines the possible values of the fission fractions, and consequently $Y(t)_{i,\text{eff}}$. The sensitivity of the effective yield percentage to the fuel enrichment is determined by the relative magnitudes of the individual Y_{ij} , where j denotes the fissile

nucleus. Notice that when $Y_{i,U235} \approx Y_{i,Pu239}$, the effect of the fuel enrichment on $Y(t)_{i,eff}$ is minimized and the sensitivity approaches zero. In the present analysis, the sensitivity is maximized when $Y_{i,U235} \rightarrow 0$. This is true because the Pu239 fission fraction increases from 0 to an end-of-cycle maximum of 6.2E-4 for the HEU fuel and 3.1E-2 for the LEU fuel. In the case of the HEU fuel, the maximum is prohibitively small, and $Y(t)_{i,eff} \approx Y_{i,U235}$. In the case of the LEU fuel, $Y(t)_{i,eff}$ increases from 0 to $.031 Y_{i,Pu239}$ over the life of the core.

The connection between the effective yield percentage and isotope equilibrium-states is the effective saturation activity, $Q(t)_{s,eff}^i$. The effective saturation activity is approximated using a modified version of eq 1.2.1, with P defined as the reactor power in MW.

$$Q(t)_{s,eff}^i \approx 8.65 \times 10^5 Y(t)_{i,eff} P \quad \text{Eq 3.2.2}$$

where 8.65×10^5 is a derived constant of proportionality that assumes constant fission cross-sections and no fuel depletion. (note: Eq 3.2.2 is an approximation because it does not account for the change in flux over the core lifetime, and it assumes U235 and Pu239 fission reactions result in the same energy release and neutron yield. This equation is used only for illustration, and not for any inventory calculations.) The effective saturation activity retains the time-dependency of the effective yield percentage. The result is steady, positive growth of the effective saturation activity of isotopes generated primarily from the fission of Pu239, and steady, negative growth of the effective saturation activity of isotopes generated primarily from the fission of U235. If the $Y_{i,j}$ are sufficiently different, an isotope may satisfy the 3% activity change criterion for non-equilibrium isotopes by remaining at the time-varying saturation activity. Consequently, the LEU fuel models should have a greater number of non-equilibrium isotopes than the respective HEU fuel input models, and this is exactly what the model output data shows. The effect of fuel enrichment on the effective saturation activity and equilibrium-state of individual isotopes is illustrated in figure 3.2.2a.

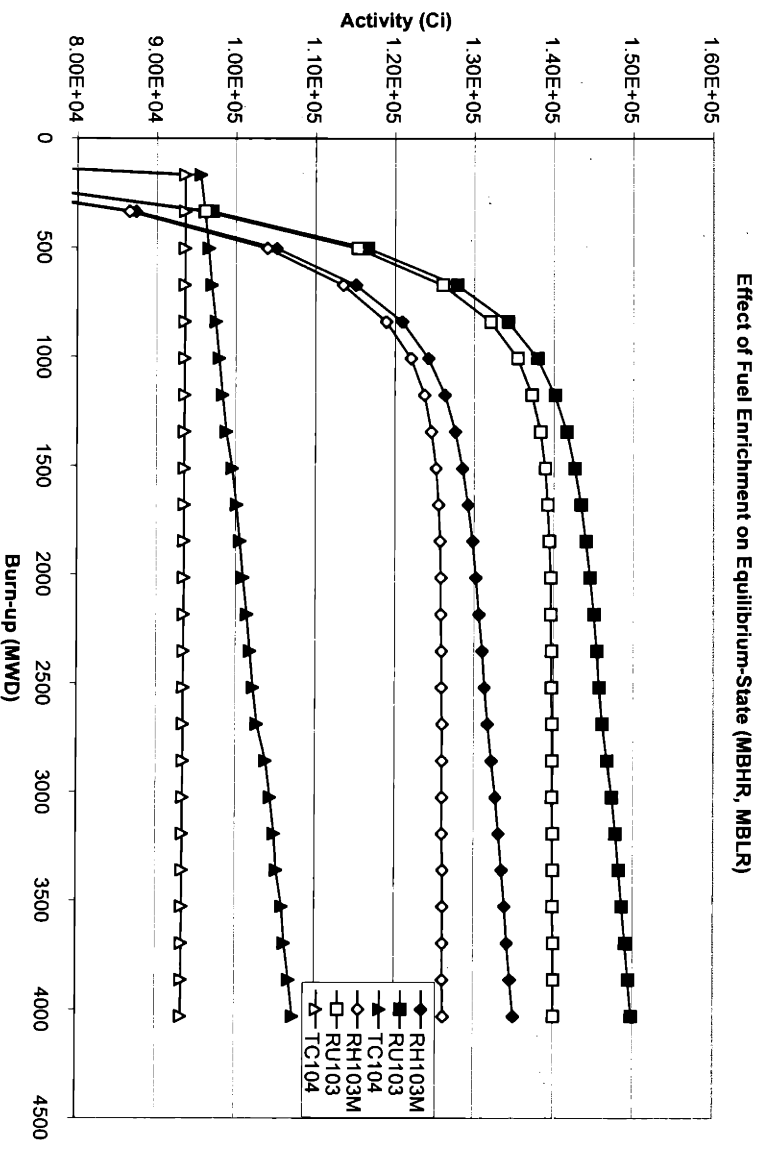


Figure 3.2.2a The Effect of Fuel Enrichment on the Equilibrium-State of Rh103m, Ru103, and Tc104 (note: the solid data points represent the MBLR model, and the hollow data points represent the MBHR model)

The increase in the LEU activity of each isotope beyond the HEU activity is due to values of $Y_{i,Pu239}$ that are a factor of approximately 2 higher than $Y_{i,U238}$ [12,13,14]. The increase is linear, with the slope depending upon the relative magnitude of the Y_{ij} , and the growth rate of the relative concentration of Pu239 nuclei in the core. The isotope Tc104 shows the extreme case where the HEU model reaches the saturation activity immediately, and the LEU model continues to grow in activity over the core lifetime in accordance with the growth of the effective saturation activity. Although not shown in figure 3.2.2a, an isotope will experience negative growth below the HEU fuel saturation activity if the value of $Y_{i,Pu239}$ is less than the value of $Y_{i,U235}$.

In a more general sense, the fuel enrichment has a limited effect upon the equilibrium state inventories. As was previously mentioned, the LEU fuel models have greater non-equilibrium isotope inventories than the respective HEU fuel models.

However, the equilibrium-state inventory growth patterns, described in section 3.2.1, hold true for both equilibrium and non-equilibrium isotopes, regardless of fuel enrichment. The equilibrium isotope inventory peaks earlier for the LEU fuel models, but the effect on the fission product inventory is negated by a higher non-equilibrium inventory growth rate. The cumulative result is that the growth rates of the fission product inventories of the HEU and LEU fuel input models differ by only 0.1% at the end of the fuel cycle.

3.2.3 Power History Effects

The power history affects the rate of evolution of the equilibrium-state inventories. The continuous-burn-up power history yields higher rates of equilibrium-state inventory evolution than the cyclic-burn-up power history for a given fuel enrichment and base cross-section library. The effect of the increased evolution rate is a higher end-of-cycle radioactivity inventory. The equilibrium isotope inventories of the continuous-burn-up power history models are approximately 2% greater than those of the respective cyclic-burn-up power history models for both fuel enrichments. This percentage is approximately 6% for the non-equilibrium isotope inventory. Although the cumulative effect of the power history is immediately apparent, the underlying mechanisms are best illustrated by examining the behavior individual isotopes. In the context of this discussion, the dependence of an isotope on the power history refers to the total decrease in the effective saturation activity of the isotope. Also, for the purpose of the following analysis, the effective fission yield and the yield from parent decay are kept separate, but the yield from parent decay retains the normal dependence upon the relative macroscopic cross-sections of U235 and Pu239.

The sensitivity of an isotope to the effect of the power history is determined by the rate at which the isotope initially reaches the effective saturation activity. This is termed the **saturation rate**. Isotopes which reach the effective saturation activity during the first irradiation interval must reach the effective saturation activity during every irradiation interval. This is mandated by each fission product isotope having zero initial activity. These isotopes are termed **immediately-saturated isotopes**. An isotope with

this behavior will be unaffected by the decay intervals of the cyclic-burn-up power history, and consequently have an equal activity for both power history models. No further treatment of the immediately-saturated isotopes is necessary. However, it should be noted that the instantaneous activity of these isotopes affects the activities of their daughter products and neutron capture products. The cumulative importance of these processes is expanded upon later in this section. Figure 3.2.3a illustrates the power history dependence of isotopes with different saturation rates, with I134 having zero dependence, Ru103 having low dependence, and Nb95 having high dependence.

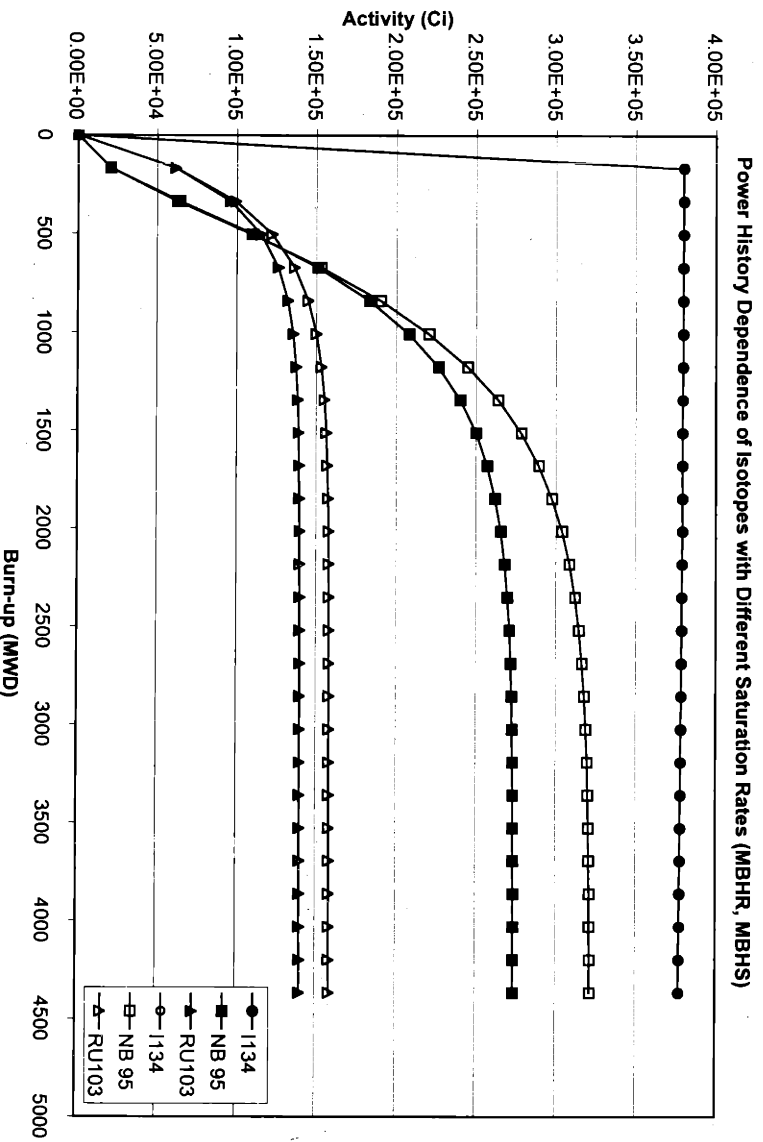


Figure 3.2.3a Power History Dependence of Isotopes with Different Saturation Rates for the MBHR and MBHS Input Models (note: the solid data points represent the MBHR model, and the hollow data points represent the MBHS model, and the I134 data points overlap)

Every isotope that does not reach the effective saturation activity during the first irradiation interval is permanently affected by the power history. Isotopes which initially reach the effective saturation activity during the second irradiation interval will show the least dependence on the power history. The trend continues, with isotopes that never reach the effective saturation activity, the non-equilibrium isotopes, being the most dependent on the power history.

The magnitude of the effect the power history has on the activity of an isotope is determined by the decay constant, the yield from parent decay, and the effective fission yield percentage. The 5-day decay intervals contained in the cyclic-burn-up power history result in a change in the activity of an isotope equal to the sum of the destruction due to radioactive decay and the production from parent isotope decay. The magnitude of the change in activity relative to the initial activity is termed the **decay factor**. The 5-day decay interval is the only portion of the power history with zero neutron flux. This eliminates all thermal fission reactions. An isotope with a large decay constant and low production from parent decay has a high decay factor. An isotope with a small decay constant and high production from parent decay has a low decay factor. The latter isotopes are essentially sheltered from the absence of the effective yield from fission, and strong neutron absorbers may experience positive changes in activity early in the decay interval. Xe135 exhibits this behavior (see section 3.2.4).

Following the 5-day decay interval, an isotope must spend a finite portion of the irradiation interval recovering the lost activity. This period is termed the **recovery time**, and it is a measure of the resiliency of an isotope to the decay factor. Isotopes with short recovery times and high decay factors are most resilient, and consequently their daughter products have increased resiliency. In general, isotopes with the greatest resiliency have high saturation-rates, large effective fission yields, high yields from parent decay, and parent nuclides with high saturation rates. This list does not explicitly include the decay constant because it appears implicitly in the saturation rate.

The **growth time** is defined as the portion of the irradiation interval for which the activity of an isotope is at or above its previous maximum value. The growth time is a measure of the cumulative effect of the power history on the activity growth of an

isotope. Equivalently, the growth time is a measure of the relative magnitudes of the decay factor and the recovery time.

The equilibrium isotopes are characterized by high saturation rates. A sizeable portion of the equilibrium isotopes are immediately saturated. As a result, the growth rate of the equilibrium isotope inventory is only affected by the power history early in the fuel cycle. Most of the 2% difference between the end-of-cycle equilibrium isotope inventories of the two power history models is created during the first 10% U235 burn-up. This implies that at 10% U235 burn-up, the majority of the isotopes have reached the effective saturation activity. At 20% U235 burn-up, the difference between the two inventories is 1.8%. Figure 3.2.3b shows the effect of the power history on the evolution of the equilibrium isotope inventories of the MBHR and MBHS input models.

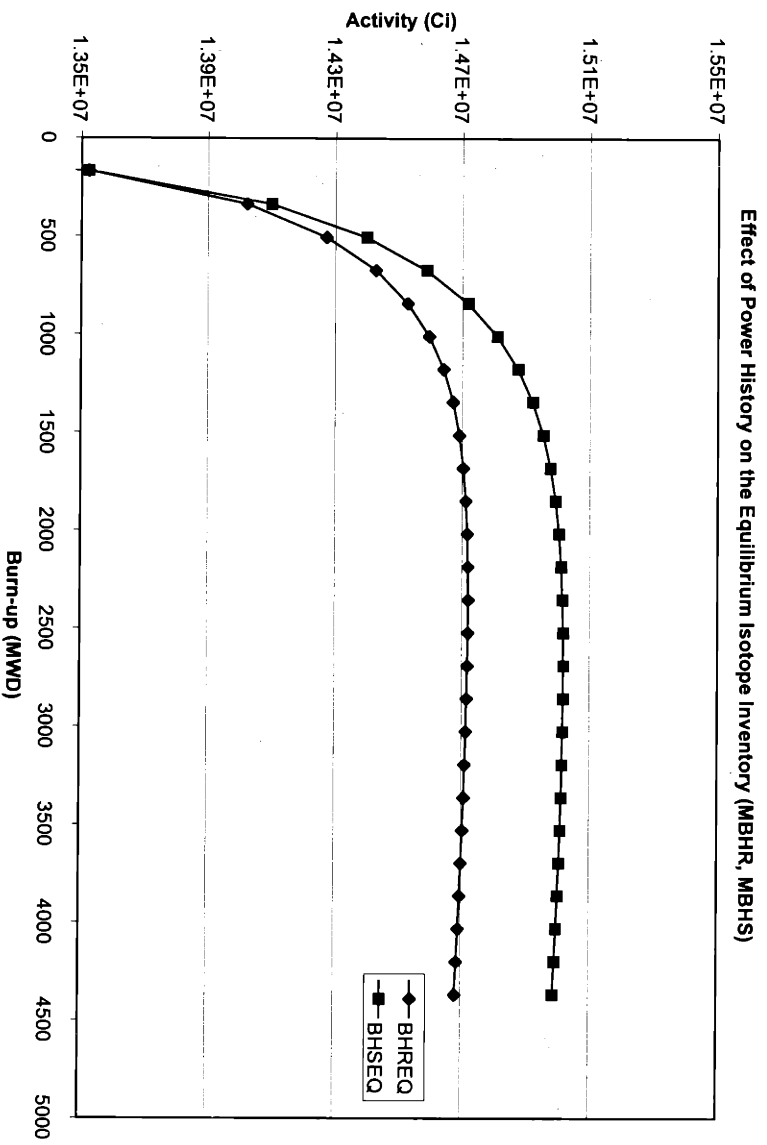


Figure 3.2.3b The Effect of the Power History on the Equilibrium Isotope Inventory Evolution to the Maximum Burn-Up for the MBHR and MBHS Input Models

(Aside: The first interval sampled in the classification process for isotope equilibrium-states, described in section 3.1.3, is the interval from 10% to 20% U235 burn-up. Thus, the classification process seems to have been successful from the standpoint of capturing the behavioral difference between equilibrium-states.)

The non-equilibrium isotopes are characterized by saturation rates of zero. The evolution of the non-equilibrium isotope inventories is significantly decreased by the cyclic-burn-up power history model. At the end of the fuel cycle, the difference reaches 6%. The continual divergence between the two inventories is linear. The slope of this line is approximately $2.2E+3Ci/irr$.interval. This means that for each irradiation interval, the continuous-burn-up power history model generates $2.2E+3Ci$ more activity than the respective cyclic-burn-up power history model. The results is a growth time of approximately 24.5 days for the cyclic-burn-up power history models. The corresponding recovery time is 3.5 days. Figure 3.2.3c shows the effect of the power history on the evolution of the non-equilibrium isotope inventories of the MBHR and MBHS input models.

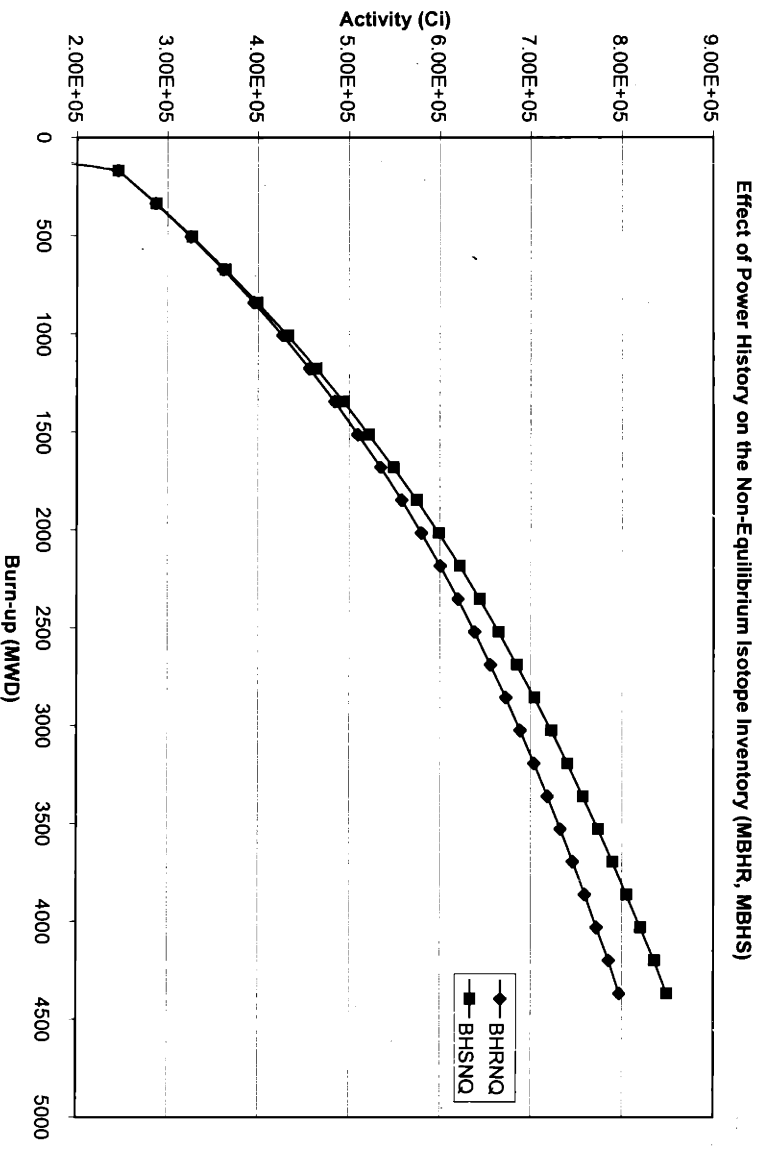


Figure 3.2.3c The Effect of the Power History on the Non-Equilibrium Isotope Inventory Evolution to the Maximum Burn-Up for the MBHR and MBHS Input Models

3.2.4 Xe135

Xenon 135 is the only non-equilibrium isotope with a negative growth rate. This behavior is valid for all input models. The dominant production mechanism of Xe135 is the decay of I135. The negative growth rate is similar to the burn-up rate, meaning that xenon activity relates to the amount of U235 present in the core. The connection between the two is the thermal neutron flux, which increases over the core lifetime. Given that the production from fission and I135 decay decrease only slightly during this time, the negative growth rate of Xe135 is due to its large neutron absorption cross-section. In the MITR-II core, Xe135 is the most important neutron poison. Upon shutdown, the Xe135 inventory grows due to I135 decay, reaching a maximum value in approximately 6 hours. The additional poisoning effect can result in Xe135 preclusion, a situation in which the

reactor can not be restarted until the Xe135 inventory has had sufficient time to decay. Xenon preclusion becomes increasingly likely at high U235 burn-up percentages because the negative reactivity associated with the fuel burn-up is much greater than the positive reactivity associated with the decrease in the Xe135 inventory. The refueling schedule is partially determined by the need to avoid xenon-preclusion. In practice, the reactor is refueled often enough that the saturation activity of the Xe135 inventory is assumed constant. Figure 3.2.4a shows the evolution of the Xe135 and I135 inventories.

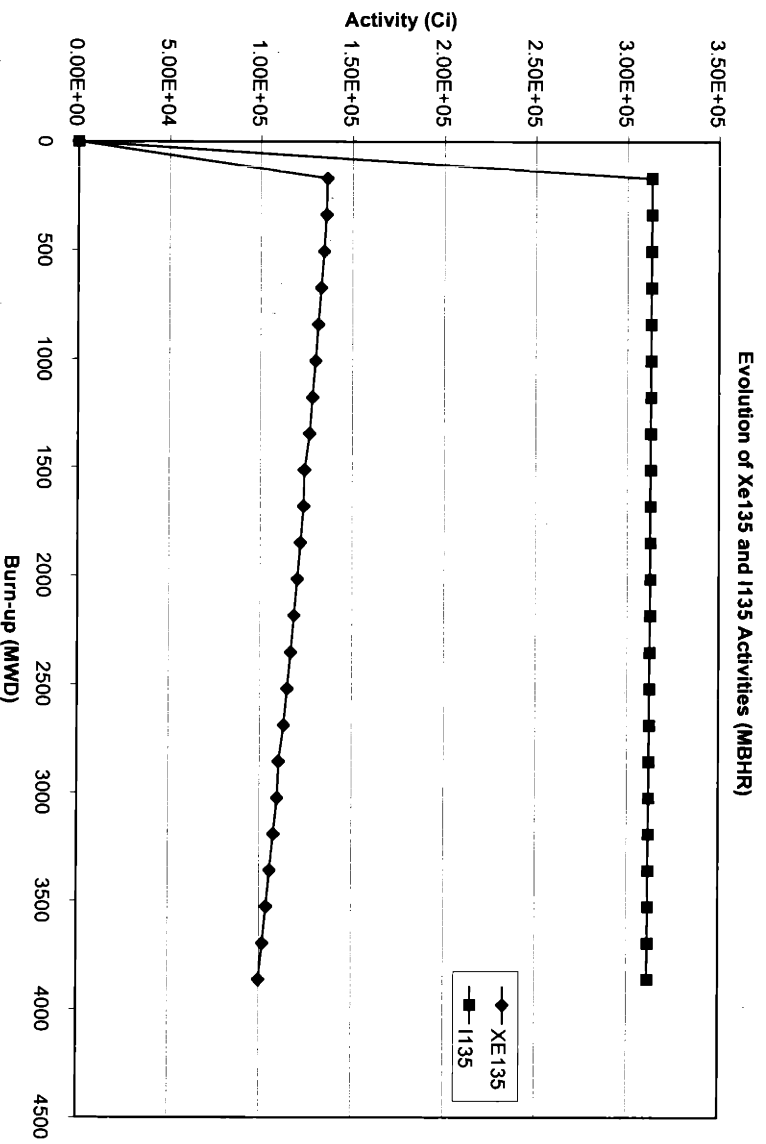


Figure 3.2.4a The Evolution of the Activities of Xe135 and I135 for the MBHR Model

3.3 Core Inventory Evolution

3.3.1 Total Core Inventory Evolution

The majority of the core radioactivity inventory is generated during the first month of irradiation. The initial jump in activity is followed by an approximately 300-day period of exponential growth. Growth over the final half of the core lifetime is nearly linear with a rate of approximately $1.4E+4\text{Ci/month}$. Growth up to the maximum burn-up percentage follows a similar trend. Figure 3.3.1a shows the core radioactivity inventory evolution for the MBHR and MBLR input models to the point of maximum U235 burn-up, as defined in section 3.1.1.

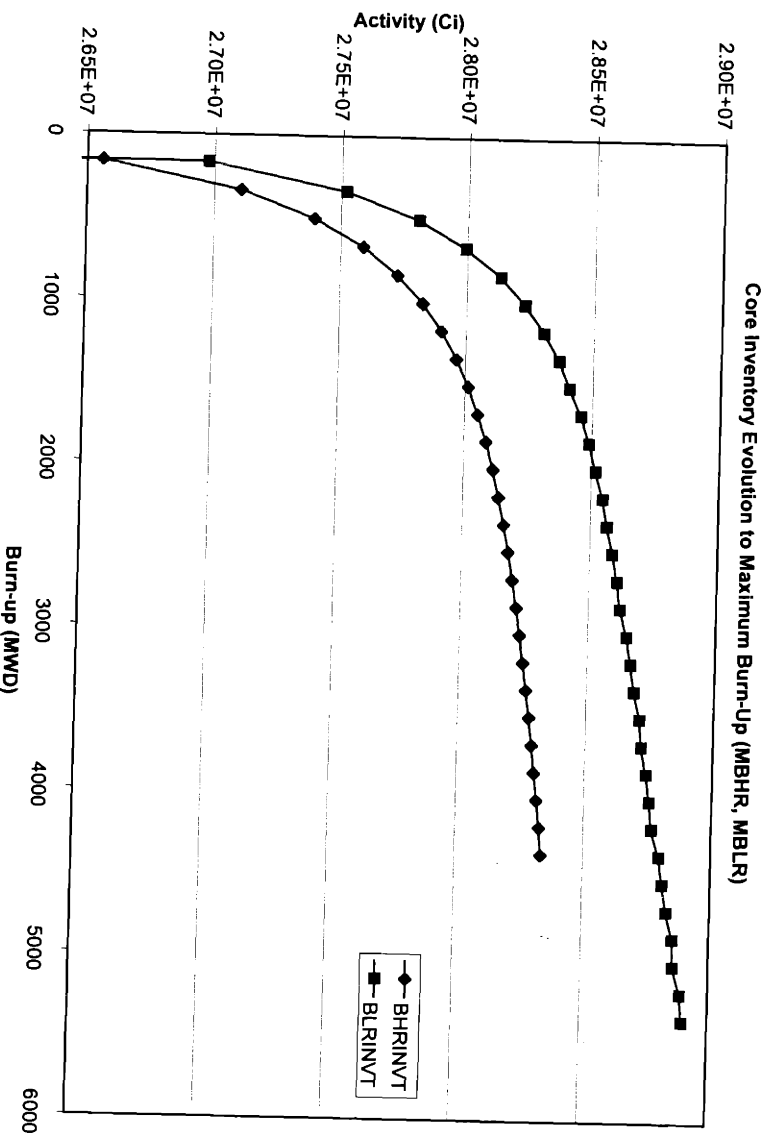


Figure 3.3.1a The Total Core Inventory Evolution to Maximum Burn-Up for the MBHR and MBLR Input Models

The fission product inventory contributes the vast majority of the core inventory for all output intervals. Consequently, the fission product isotopes dominate the evolution of the core inventory over the entire core lifetime. The LEU fuel input models initially have higher fission product inventories than the respective HEU fuel input models due to the differences between the effective saturation activities, $Q(t)_{s,eff}^i$, for each fuel enrichment, as described in section 3.2.2. The inventories equalize at approximately 15% U235 burn-up. After this point, the LEU and HEU fuel input model inventories diverge. The divergence is governed by U235 burn-up effects and the steady increase in the Pu239 fission fraction of the LEU fuel models. The increase in the fission fraction has two important effects. First, it increases the ratio of the MWD of power output to the mass of U235 consumed, effectively slowing the growth rate of the non-equilibrium inventory. Second, it decreases the majority of the values of $Q(t)_{s,eff}^i$, essentially lowering the saturation *inventory* of the fission product isotopes. The potential impact of these processes is inversely proportional to the fuel enrichment, and for the HEU fuel input models, the effects are indistinguishable from the effects of burn-up alone. Burn-up causes the U235 macroscopic fission cross-section to decrease. In order to maintain a given level of reactor power, the thermal neutron flux must increase. The result is a change in the yield of neutron capture reactions, and consequently the saturation activities of the fission products. Figure 3.3.1b shows the evolution of the fission product isotope radioactivity inventory for the MBHR and MBLR input models to the point of maximum burn-up.

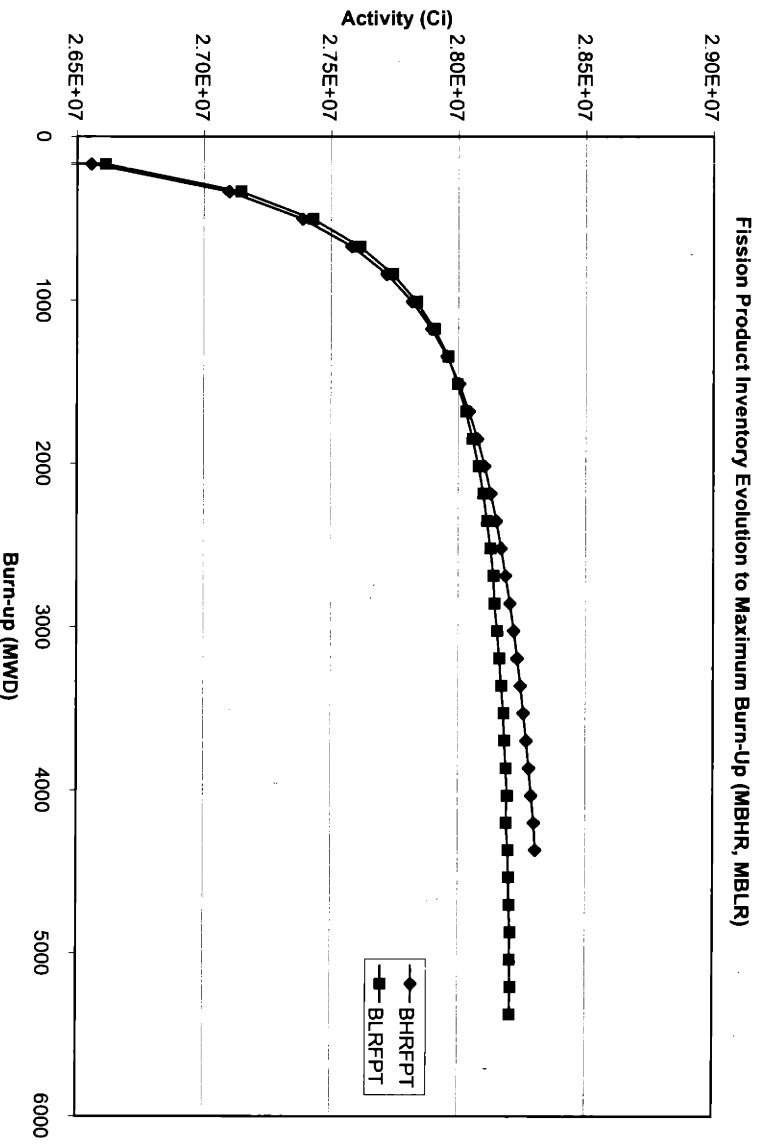


Figure 3.3.1b The Total Fission Product Inventory Evolution to Maximum Burn-Up for the MBHR and MBLR Input Models

The actinide inventory grows exponentially over the entire core lifetime. Approximately 25% of the end-of-cycle inventory is generated during the first month of irradiation for HEU fuel models. This value is approximately 60% for the LEU fuel models. The actinide inventory evolution is determined by the fuel enrichment. The actinide isotopes present in the core all descend from U235 and U238 neutron capture reactions, except for an extremely small fraction that result directly from decay. As time progresses, the variety of actinide isotopes increases, while the total number of actinide nuclei decreases due to fission reactions. The increase in the actinide inventory is the result of the build-up of isotopes with higher specific activities. The LEU fuel generates much higher actinide inventories due to the much larger initial mass of U238. The difference between the actinide inventories of the HEU and LEU fuel input models has a sizeable effect on the core inventory evolution. This effect is immediately apparent upon

comparing figure 3.3.1a and figure 3.3.1b. Figure 3.3.1c shows the evolution of the actinide isotope radioactivity inventory for the MBHR and MBLR input models to the maximum burn-up.

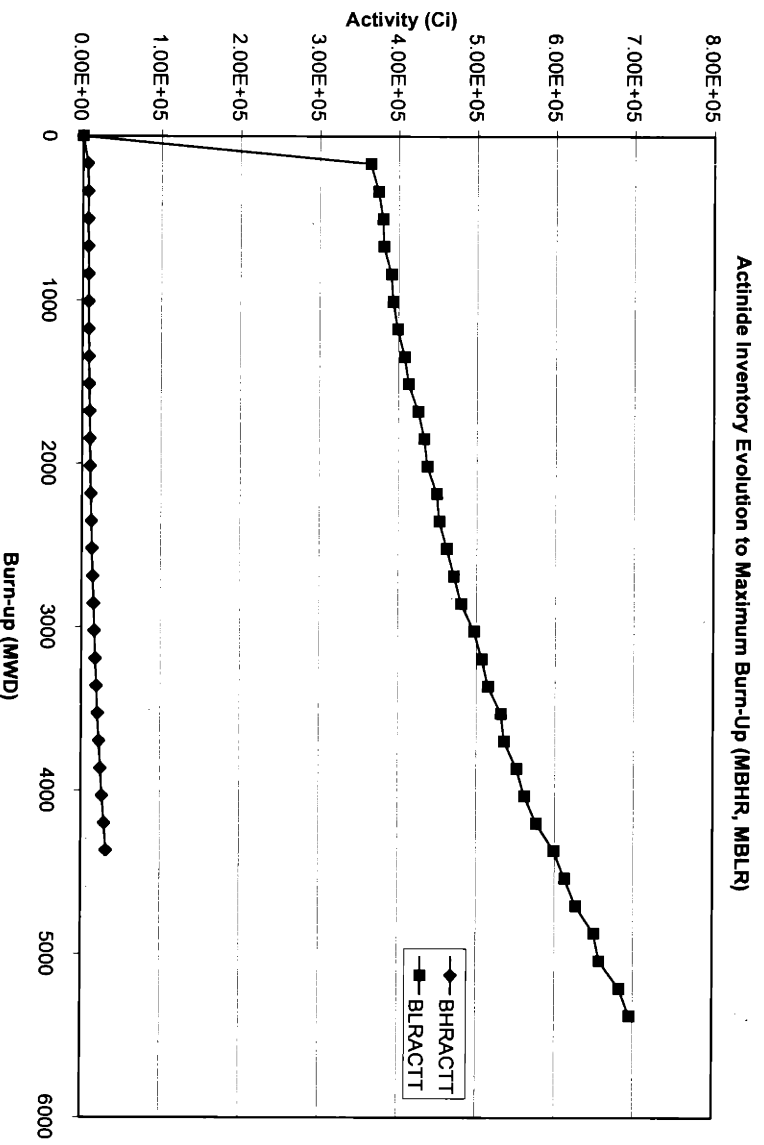


Figure 3.3.1c Total Actinide Inventory Evolution to Maximum Burn-Up for the MBHR and MBLR Input Model

3.3.2 Power History Effects

The total fission product inventory is primarily composed of equilibrium isotopes. Consequently, the power history has a minimal effect on the evolution of the total fission product inventory. This result is due to the lower sensitivity of the equilibrium isotopes to the power history, as described in section 3.2.3. However, the cumulative effects of the cyclic-burn-up power history models result in total fission product inventories that are 1.3% less than the respective continuous-burn-up power history models, regardless of

fuel enrichment and base cross-section library. The effect of the power history is summarized as the presence of decay intervals yielding marginally lower fission product inventory growth rates.

The total actinide inventory evolution is independent of the power history. There are two reasons for this behavior. First, the average half-life of the actinides considered in the analysis is greater than the length of the decay interval. Consequently, the differentiation of the actinide isotopes proceeds at a prohibitively low rate in the absence of the neutron flux. Second, neglecting spontaneous fission, the decay of an actinide produces another actinide, presumably also having a half-life much greater than the decay interval. The result is a relatively static actinide inventory during the decay intervals.

The combination of the fission product inventory and actinide inventory power history dependencies yields a core inventory evolution rate that is noticeably dependent on the power history. However, the total core inventory evolution is well approximated by either power history input model. Figure 3.3.2a shows the dependence of the total core inventory on the power history for the BWR base cross-section library.

3.3.3 Cross-Section Effects

The evolution of the total fission product inventory is essentially independent of the base cross-section library. The BWR base cross-section library input models yield fission product inventories that are approximately $1\text{E}+4\text{Ci}$ greater than the respective PWR input models for both fuel enrichments. The end-of-cycle, total fission product inventories for the PWR and BWR input models differ by .03%. This difference is negligible over the entire core lifetime.

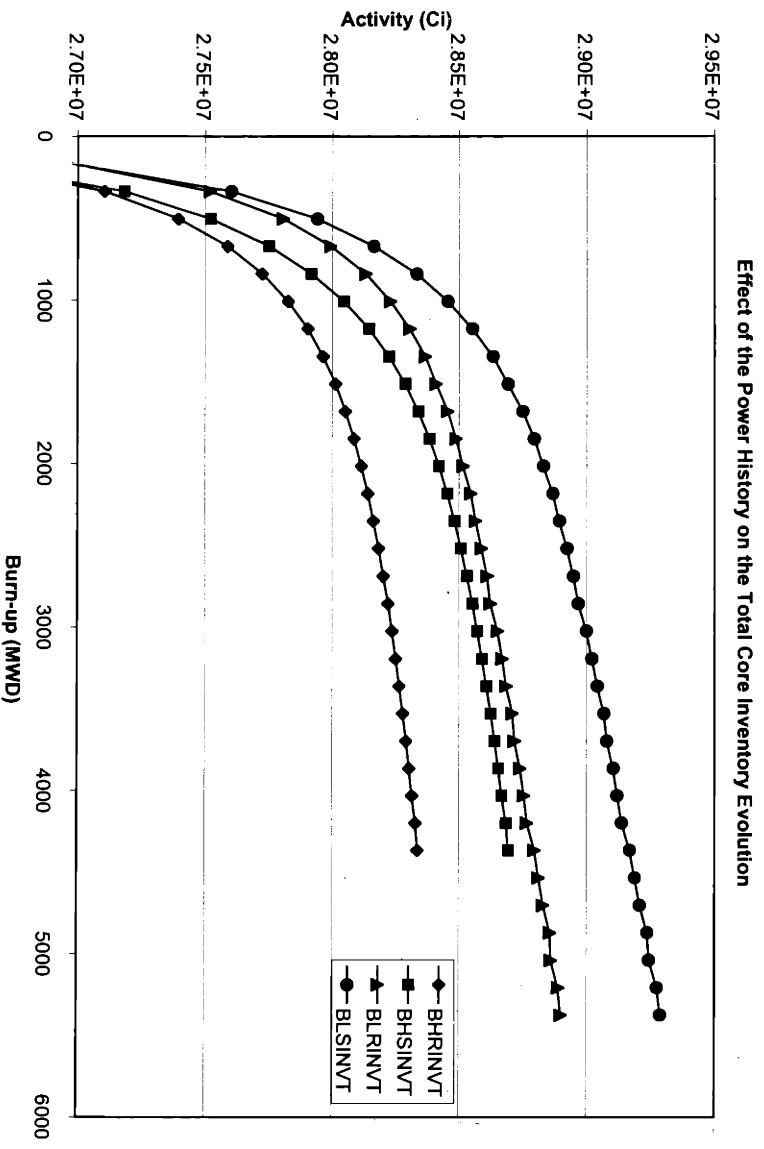


Figure 3.3.2a The Effect of the Power History on the Total Core Inventory Evolution to Maximum Burn-Up for the MBH and MBL Input Models

The total actinide inventory evolution of the LEU fuel models depends on the base cross-section library. The PWR input models have a thermal neutron flux that is 7% higher than the BWR input models at the end of the fuel cycle. This causes a proportional increase in the rate of U238 radiative capture. U238 radiative capture is the dominant mechanism for the creation of Pu239 in the fuel. Np239 is the precursor to Pu239 in the U238 conversion process described in section 2.4.1. The activity of Np239 accounts for 97% of the actinide inventory of the PWR and BWR input models. Thus, the difference between the evolution of the actinide inventories of the PWR and BWR input models is proportional to the difference in the neutron flux. Figure 3.3.3a shows the effect of the base cross-section library on the evolution of the total actinide inventory.

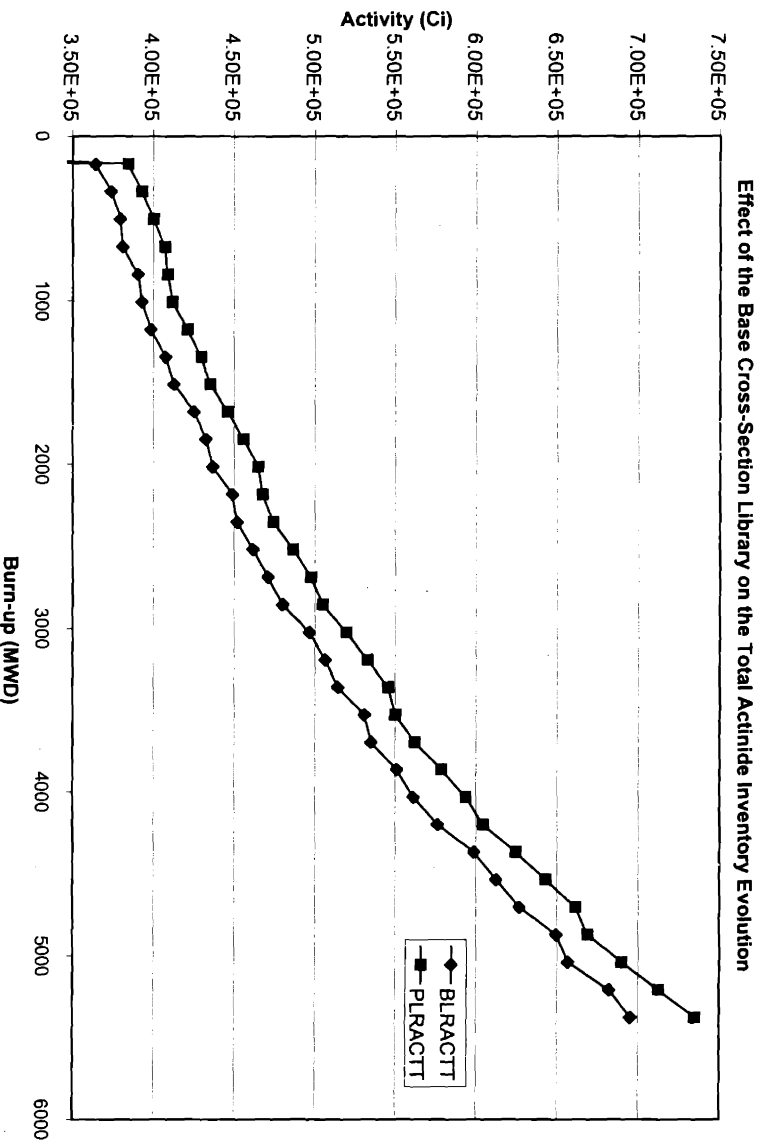


Figure 3.3.3a Effect of the Base Cross-Section Library on the Total Actinide Inventory Evolution to Maximum Burn-Up for the MBLR and MPLR Input Models

3.4 Core Inventories

3.4.1 HEU Core Inventories

The end-of-cycle core inventory of each HEU MITR input model is dependent on the power history of the input model, and is approximately independent of the base cross-section library of the input model. The maximum inventory results from a continuous-burn-up power history and the BWR base cross-section library. Section B.1 contains the activity of each isotope listed in the condensed matrix file at the end-of-cycle and at the maximum U235 burn-up percentage of 45%.

3.4.2. LEU Core Inventories

The end-of-cycle core inventory of each LEU MITR input model depends on the power history and the base cross-section library of the input model. The maximum inventory results from a continuous-burn-up power history and the PWR base cross-section library. Section B.2 contains the activity of each isotope listed in the condensed matrix file at the end-of-cycle and at the maximum U235 burn-up percentage of 55%.

CHAPTER 4

CONCLUSIONS

4.1 Inventory Available for Release

4.1.1 Worst-Case Scenario

The inventory available for release in the worst-case scenario is based on the maximum activity of an isotope, $A_{i,max}$, attained over the range of burn-up from 0% to the maximum burn-up percentage for the specific fuel enrichment. The value of $A_{i,max}$ that contributes to the worst-case scenario is the maximum activity of the isotope for any model with the same fuel enrichment. Consequently, the total core inventory available for release is a compilation of the maximum effective saturation activities. This inventory is conservative with respect to the fission product inventory because it does not account for the decrease in the saturation activities due to fuel depletion. Also, the maximum burn-up percentage for LEU may be unrealistic. The available inventory for release is conservative with respect to the actinide inventory. The actinide inventory is in a state of exponential growth at the end of the fuel cycle. Values of $A_{i,max}$ for the actinides taken at 45% or 55% U235 burn-up are significantly higher than the values that would ever be encountered. The worst-case fission product radioactivity inventory available for release is 2.91E+7Ci for 24 high-enrichment fuel elements, and 2.94E+7Ci for 24 low-enrichment fuel elements. The respective actinide inventories are 5.55E+4Ci and 7.35E+5Ci. The complete listings appear in sections B.3.1 and B.3.2.

4.1.2 Best-Estimate

The best estimate of the inventory available for release for a specific fuel enrichment is based on the end-of-cycle activity of an isotope, calculated using the

cyclic-burn-up power history. The maximum end-of-cycle value of the activity is used, regardless of the base cross-section library of the input model. The best estimate of the inventory available for release attempts to capture the actual operating characteristics of the MIT reactor, and avoid over-conservatism. The cyclic-burn-up power history is a good approximation of the actual MITR power history, although it is the less conservative of the power histories modeled. The end-of-cycle activities used to create the best-estimate of the inventory available for release are somewhat conservative, given that individual fuel elements are periodically shuffled and cycled in and out of the core. The best-estimate fission product radioactivity inventory available for release is $2.83\text{E}+7\text{Ci}$ for 24 high-enrichment fuel elements, and $2.82\text{E}+7\text{Ci}$ for 24 low-enrichment fuel element. The respective actinide inventories are $2.51\text{E}+4\text{Ci}$ and $5.93\text{E}+5\text{Ci}$. The complete listings appear in sections B.3.1 and B.3.2.

4.2 Equilibrium Fuel Assumption

The equilibrium fuel assumption is very reasonable for estimating the fission product inventory over the entire core lifetime. The fission product inventory reaches a value within 6.5% of the equilibrium value after only 1.5% fuel burn-up. The discrepancy drops to 1% for 20% fuel burn-up. The close agreement early in the fuel cycle is due to the dominant behavior of the equilibrium isotopes. The growth of the non-equilibrium isotope inventory with burn-up, explains the improvement in accuracy. The continuous-burn-up power history best approximates the equilibrium fuel assumption. The equilibrium fuel assumption is invalid for the actinide isotope inventory, regardless of fuel enrichment. The actinide inventory grows exponentially over the entire core lifetime.

The equilibrium fuel assumption used in previous analyses of the MITR fission product inventory is inadequate. The primary reason is the small number of isotopes included in the inventory. Additionally, the analyses did not account for fuel burn-up and neutron absorption by fission products. Neutron absorption can severely alter the saturation activity of an isotope, and lead to a decrease in the saturation activity of daughter products. The previous analyses yielded fission product inventories that are lower than the current analysis by a factor of 3.

4.3 Radiological Significance of a Conversion to LEU fuel

The most important radiological consequence of a proposed conversion to the LEU, high-density U-Mo fuel is the much larger actinide radioactivity inventory. The LEU input models yield actinide inventories that are 18 times larger than the HEU actinide inventories (5.94E+5Ci for the MPLR model vs. 2.50E+4Ci for the MPHR model). The LEU end-of-cycle Pu inventory is 24 times that for the HEU. The LEU input models produce fission product inventories that are only 0.3% less than the respective HEU inventories (1.575E+7Ci for the MPLR model vs. 1.579E+7Ci for the MPHR model). Due to the increased biological significance of alpha-emitting nuclides, the LEU fuel is potentially much more dangerous in an accident scenario.

4.4 Suggestions for Future Work

This thesis offers an improvement upon previous analyses of the MITR core radioactivity inventory. Future work could further improve the completeness of the analysis, and potentially lead to a system of dynamically cataloging the total on-site inventory.

--This analysis neglects the refueling schedule. The impact of the refueling schedule on the fission product inventory should be relatively minor due to the rapid build-up of fission products over the first month of irradiation. However, the actinide inventory may be more sensitive.

--This analysis used only a limited number of MITR-specific cross-sections. The use of a complete library of MITR cross-sections would improve the validity of the worst-case and best-estimate values for the inventory available for release.

--The analysis of the LEU fuel needs revision if an LEU core is constructed. This analysis uses the most current data, but may not accurately model the final core design. Revision of the model is a straightforward process that involves modifying the variable input parameters.

- This analysis does not account for the change in neutron spectrum and flux profile that results from fuel depletion.
- Tracking the inventory evolution of individual fuel elements from the time they arrive on-site to the time of discharge, has the potential to facilitate efficient radioactivity inventory management of spent and partially-spent elements. This would require a massive data set and the creation of a simple user interface. It is possible that linking ORIGEN2 to reactor flux instrumentation could facilitate the simulation of the power history.

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APPENDIX A

ORIGEN2 INPUT

IRP 490 6 8 8 4 0
 DEC 495 8 9 4 0
 IRP 523 6 9 9 4 0
 DEC 528 9 10 4 0
 BUP

9 1 1 0
 10 1 0 1.0

PREVIOUS
 DATA BLOCK 3 DATA BLOCK 3 DATA BLOCK 3

IRP 556 6 1 2 4 0
 DEC 561 2 3 4 0
 IRP 589 6 3 3 4 0
 DEC 594 3 4 4 0
 IRP 622 6 4 4 4 0
 DEC 627 4 5 4 0
 IRP 655 6 5 5 4 0
 DEC 660 5 6 4 0
 IRP 688 6 6 6 4 0
 DEC 693 6 7 4 0
 IRP 721 6 7 7 4 0
 DEC 726 7 8 4 0
 IRP 754 6 8 8 4 0
 DEC 759 8 9 4 0
 IRP 787 6 9 9 4 0
 DEC 792 9 10 4 0
 BUP

9 1 1 0
 10 1 0 1.0

PREVIOUS
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 DEC 825 2 3 4 0
 IRP 853 6 3 3 4 0
 DEC 858 3 4 4 0
 IRP 886 6 4 4 4 0
 DEC 891 4 5 4 0
 IRP 919 6 5 5 4 0
 DEC 924 5 6 4 0
 IRP 952 6 6 6 4 0
 DEC 957 6 7 4 0
 IRP 985 6 7 7 4 0
 DEC 990 7 8 4 0
 IRP 1018 6 8 8 4 0
 DEC 1023 8 9 4 0
 IRP 1051 6 9 9 4 0
 DEC 1056 9 10 4 0
 BUP

9 1 1 0

2 922350 12132.0 922380 889.0 0 0.0 FUEL ACTINIDES
 4 130000 91910.0 0 0.0 STRUCTURAL MAT'L
 0

IRP	523	6	9	9	4	4	0				
DEC	528		9	10	4	0					
BUP											
OUT			9	1	1	0					
MOV			10	1	0	1.0					
HED							PREVIOUS				
TIT							DATA BLOCK 3	DATA BLOCK 3	DATA BLOCK 3	DATA BLOCK 3	
BUP											
IRP	556	6	1	2	4	0					
DEC	561		2	3	4	0					
IRP	589	6	3	3	4	0					
DEC	594		3	4	4	0					
IRP	622	6	4	4	4	0					
DEC	627		4	5	4	0					
IRP	655	6	5	5	4	0					
DEC	660		5	6	4	0					
IRP	688	6	6	6	4	0					
DEC	693		6	7	4	0					
IRP	721	6	7	7	4	0					
DEC	726		7	8	4	0					
IRP	754	6	8	8	4	0					
DEC	759		8	9	4	0					
IRP	787	6	9	9	4	0					
DEC	792		9	10	4	0					
BUP											
OUT			9	1	1	0					
MOV			10	1	0	1.0					
HED							PREVIOUS				
TIT							DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4	
BUP											
IRP	820	6	1	2	4	0					
DEC	825		2	3	4	0					
IRP	853	6	3	3	4	0					
DEC	858		3	4	4	0					
IRP	886	6	4	4	4	0					
DEC	891		4	5	4	0					
IRP	919	6	5	5	4	0					
DEC	924		5	6	4	0					
IRP	952	6	6	6	4	0					
DEC	957		6	7	4	0					
IRP	985	6	7	7	4	0					
DEC	990		7	8	4	0					
IRP	1018	6	8	8	4	0					
DEC	1023		8	9	4	0					
IRP	1051	6	9	9	4	0					
DEC	1056		9	10	4	0					
BUP											
OUT			9	1	1	0					
END											
2	922350	12132.0	922380	889.0	0	0.0		FUEL	ACTINIDES		
4	130000	91910.0	0	0.0				STRUCTURAL	MAT'L		
0											

A.1.4 MPHHS

```

-1
-1
-1
LIP      0 0 0
LPU      902320, 912310, 912330, 922320, 922330, 922340, 922350,
          922360, 922380, 932370, 932380, 932390, 942380, 942390,
          942400, 942410, 942420, -1
LIB      0 1 2 3 204 -205 -206 9 3 0 1 1
BAS      MPHHS MODEL OF 5376MWD BURNUP OF 24 HEU
INP      -1 1 -1 -1 1 1
MOV      -1 1 0 1.0
HED      1 INITIAL
OPTL     8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
OPTA     8 8 8 7 8 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
OPTF     8 8 8 8 8 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
TITT     DATA BLOCK 1 DATA BLOCK 1 DATA BLOCK 1 DATA BLOCK 1
BUP      28 6 1 2 4 2
IRP      56 6 2 3 4 0
IRP      84 6 3 4 4 0
IRP      112 6 4 5 4 0
IRP      140 6 5 6 4 0
IRP      168 6 6 7 4 0
IRP      196 6 7 8 4 0
IRP      224 6 8 9 4 0
BUP
OUT      9 1 0 0
MOV      9 1 0 1.0
HED      1 PREVIOUS
TITT     DATA BLOCK 2 DATA BLOCK 2 DATA BLOCK 2 DATA BLOCK 2
BUP      252 6 1 2 4 0
IRP      280 6 2 3 4 0
IRP      308 6 3 4 4 0
IRP      336 6 4 5 4 0
IRP      364 6 5 6 4 0
IRP      392 6 6 7 4 0
IRP      420 6 7 8 4 0
IRP      448 6 8 9 4 0
BUP
OUT      9 1 0 0
MOV      9 1 0 1.0
HED      1 PREVIOUS
TITT     DATA BLOCK 3 DATA BLOCK 3 DATA BLOCK 3 DATA BLOCK 3
BUP      476 6 1 2 4 0
IRP      504 6 2 3 4 0
IRP      532 6 3 4 4 0
IRP      560 6 4 5 4 0
IRP      588 6 5 6 4 0
IRP      616 6 6 7 4 0
IRP      644 6 7 8 4 0
IRP      672 6 8 9 4 0

```

	DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4
BUP							
OUT	9 1 0 0						
MOV	9 1 0 1.0						
HED	1	PREVIOUS					
TIT	DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4	DATA BLOCK 4
BUP							
IRP	700	6 1 2 4 0					
IRP	728	6 2 3 4 0					
IRP	756	6 3 4 4 0					
IRP	784	6 4 5 4 0					
IRP	812	6 5 6 4 0					
IRP	840	6 6 7 4 0					
IRP	868	6 7 8 4 0					
IRP	896	6 8 9 4 0					
BUP							
OUT	9 1 0 0						
END							
2	922350	12132.0	922380	889.0	0 0.0	FUEL ACTINIDES	
4	130000	91910.0	0	0.0		STRUCTURAL MAT'L	
0							

A.1.5 MBLR

-1
-1
-1
LTP 0 0 0
LEU 902320, 912310, 912330, 922320, 922330, 922340, 922350,
922360, 922380, 932370, 932380, 932390, 942380, 942390,
942400, 942410, 942420, -1
0 1 2 3 251 -252 -253 9 3 0 1 4
MBLR MODEL OF 5376MWD BURRUP OF 24 LEU
-1 1 -1 -1 1 1
-1 1 0 1.0
HED 1 INITIAL
OPTL 8
OPTA 8 8 8 8 7 8 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
OPTF 8 8 8 8 8 8 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
TTTT DATA BLOCK 1 DATA BLOCK 1 DATA BLOCK 1 DATA BLOCK 1
BUP 28 6 1 2 4 2
IRP 33 2 3 4 0
DEC 61 6 3 3 4 0
DEC 66 6 3 4 4 0
IRP 94 6 4 4 4 0
DEC 99 4 5 4 4 0
IRP 127 6 5 5 4 0
DEC 132 5 6 4 4 0
IRP 160 6 6 6 4 0
DEC 165 6 6 7 4 0
IRP 193 6 7 7 4 0
DEC 198 7 8 4 4 0
IRP 226 6 8 8 4 0
DEC 231 8 9 4 4 0
IRP 259 6 9 9 4 0
DEC 264 9 10 4 0
BUP 9 1 1 0
OVT 10 1 0 1.0
MOV
HED
TTTT DATA BLOCK 2 PREVIOUS DATA BLOCK 2 DATA BLOCK 2 DATA BLOCK 2
BUP 292 6 1 2 4 0
IRP 297 2 3 4 0
DEC 325 6 3 3 4 0
DEC 330 6 3 4 4 0
IRP 358 6 4 4 4 0
DEC 363 4 5 4 4 0
IRP 391 6 5 5 4 0
DEC 396 5 6 4 4 0
IRP 424 6 6 6 4 0
DEC 429 6 7 7 4 0
IRP 457 6 7 7 4 0
DEC 462 7 8 4 4 0
IRP 490 6 8 8 4 0
DEC 495 8 9 4 0

IRP	523	6	9	9	4	0				
DEC	528		9	10	4	0				
BUP										
OUT	9	1	1	0						
MOV	10	1	0	1.0						
HED					PREVIOUS					
TIT	DATA BLOCK 3				DATA BLOCK 3		DATA BLOCK 3		DATA BLOCK 3	
BUP										
IRP	556	6	1	2	4	0				
DEC	561		2	3	4	0				
IRP	589	6	3	3	4	0				
DEC	594		3	4	4	0				
IRP	622	6	4	4	4	0				
DEC	627		4	5	4	0				
IRP	655	6	5	5	4	0				
DEC	660		5	6	4	0				
IRP	688	6	6	6	4	0				
DEC	693		6	7	4	0				
IRP	721	6	7	7	4	0				
DEC	726		7	8	4	0				
IRP	754	6	8	8	4	0				
DEC	759		8	9	4	0				
IRP	787	6	9	9	4	0				
DEC	792		9	10	4	0				
BUP										
OUT	9	1	1	0						
MOV	10	1	0	1.0						
HED					PREVIOUS					
TIT	DATA BLOCK 4				DATA BLOCK 4		DATA BLOCK 4		DATA BLOCK 4	
BUP										
IRP	820	6	1	2	4	0				
DEC	825		2	3	4	0				
IRP	853	6	3	3	4	0				
DEC	858		3	4	4	0				
IRP	886	6	4	4	4	0				
DEC	891		4	5	4	0				
IRP	919	6	5	5	4	0				
DEC	924		5	6	4	0				
IRP	952	6	6	6	4	0				
DEC	957		6	7	4	0				
IRP	985	6	7	7	4	0				
DEC	990		7	8	4	0				
IRP	1018	6	8	8	4	0				
DEC	1023		8	9	4	0				
IRP	1051	6	9	9	4	0				
DEC	1056		9	10	4	0				
BUP										
OUT	9	1	1	0						
END										
2	922350	12400.0	922380	49700.0	0	0.0		FUEL	ACTINIDES	
4	130000	57900.0	420000	4400.0	0	0.0		STRUCTURAL	MAT'L	
0										

A.1.6 MBL5

-1
-1
-1

LIP 0 0 0
LPU 902320, 912310, 912330, 922320, 922330, 922340, 922350,
922360, 922380, 932370, 932380, 932390, 942380, 942390,
942400, 942410, 942420, -1

LIB 0 1 2 3 251 -252 -253 9 3 0 1 4

BAS MBL5 MODEL OF 5376MMD BURNDP OF 24 LPU

INP -1 1 -1 -1 1 1
MOV -1 1 0 1.0

HED 1 INITIAL
OPTL 8
OPTA 8 8 8 8 7 8 5 8
OPTF 8 8 8 8 8 8 5 8
TIT DATA BLOCK 1 DATA BLOCK 1 DATA BLOCK 1 DATA BLOCK 1
BUP

TRP 28 6 1 2 4 2
TRP 56 6 2 3 4 0
TRP 84 6 3 4 4 0
TRP 112 6 4 5 4 0
TRP 140 6 5 6 4 0
TRP 168 6 6 7 4 0
TRP 196 6 7 8 4 0
TRP 224 6 8 9 4 0

BUP
OUT 9 1 0 0
MOV 9 1 0 1.0

HED 1 PREVIOUS
TIT DATA BLOCK 2 DATA BLOCK 2 DATA BLOCK 2 DATA BLOCK 2
BUP

TRP 252 6 1 2 4 0
TRP 280 6 2 3 4 0
TRP 308 6 3 4 4 0
TRP 336 6 4 5 4 0
TRP 364 6 5 6 4 0
TRP 392 6 6 7 4 0
TRP 420 6 7 8 4 0
TRP 448 6 8 9 4 0

BUP
OUT 9 1 0 0
MOV 9 1 0 1.0

HED 1 PREVIOUS
TIT DATA BLOCK 3 DATA BLOCK 3 DATA BLOCK 3 DATA BLOCK 3
BUP

TRP 476 6 1 2 4 0
TRP 504 6 2 3 4 0
TRP 532 6 3 4 4 0
TRP 560 6 4 5 4 0
TRP 588 6 5 6 4 0
TRP 616 6 6 7 4 0
TRP 644 6 7 8 4 0
TRP 672 6 8 9 4 0

0													
4	1300000	57900.0	420000	4400.0	0	0.0							0
2	922350	12400.0	922380	49700.0	0	0.0							FUEL ACTINIDES
END													STRUCTURAL MAT'L
OUT		9 1 0 0											
BUY													
IRP	896	6	8 9 4 0										
IRP	868	6	7 8 4 0										
IRP	840	6	6 7 4 0										
IRP	812	6	5 6 4 0										
IRP	784	6	4 5 4 0										
IRP	756	6	3 4 4 0										
IRP	728	6	2 3 4 0										
IRP	700	6	1 2 4 0										
BUY													
TIT	1												
HED													
MOV	9 1 0 1.0												
OUT	9 1 0 0												
BUY													

A.1.7 MPLR

```

-1
-1
-1
LIP      0 0 0
LPUB     902320, 912310, 912330, 922320, 922330, 922340, 922350,
          922360, 922380, 932370, 932380, 932390, 942380, 942390,
          942400, 942410, 942420, -1
LIB      0 1 2 3 204 -205 -206 9 3 0 1 1
BAS      MPLR MODEL OF 5376MWD BURNUP OF 24 LEU
INP      -1 1 -1 -1 1 1
MOV      -1 1 0 1.0
HED      1 INITIAL
OPTL     8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
OPTA     8 8 8 7 8 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
OPTF     8 8 8 8 8 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
DATA BLOCK 1 DATA BLOCK 1 DATA BLOCK 1 DATA BLOCK 1
TIT      DATA BLOCK 1 DATA BLOCK 1 DATA BLOCK 1 DATA BLOCK 1
BU      28 6 1 2 4 2
IRP      33 2 3 4 0
DEC      61 6 3 3 4 0 0
DEC      66 3 4 4 0 0
IRP      94 6 4 4 4 0 0
DEC      99 4 5 4 0 0
IRP      127 6 5 5 4 0
DEC      132 5 6 4 0
IRP      160 6 6 6 4 0
DEC      165 6 7 4 0
IRP      193 6 7 7 4 0
DEC      198 7 8 4 0
IRP      226 6 8 8 4 0
DEC      231 8 9 4 0
IRP      259 6 9 9 4 0
DEC      264 9 10 4 0
BU      9 1 1 0
OUT      10 1 0 1.0
MOV      10 1 0 1.0
HED      PREVIOUS
TIT      DATA BLOCK 2 DATA BLOCK 2 DATA BLOCK 2 DATA BLOCK 2
BU      292 6 1 2 4 0
IRP      297 2 3 4 0
DEC      325 6 3 3 4 0
DEC      330 3 4 4 0
IRP      358 6 4 4 4 0
DEC      363 4 5 4 0
IRP      391 6 5 5 4 0
DEC      396 5 6 4 0
IRP      424 6 6 6 4 0
DEC      429 6 7 4 0
IRP      457 6 7 7 4 0
DEC      462 7 8 4 0
IRP      490 6 8 8 4 0
DEC      495 8 9 4 0

```

IRP	523	6	9	9	4	0				
DEC	528		9	10	4	0				
BUF										
OUT	9	1	1	0						
MOV	10	1	0	1.0						
HELD										
TIT	DATA BLOCK 3				PREVIOUS					
BUF					DATA BLOCK 3					
IRP	556	6	1	2	4	0				
DEC	561		2	3	4	0				
IRP	589	6	3	3	4	0				
DEC	594		3	4	4	0				
IRP	622	6	4	4	4	0				
DEC	627		4	5	4	0				
IRP	655	6	5	5	4	0				
DEC	660		5	6	4	0				
IRP	688	6	6	6	4	0				
DEC	693		6	7	4	0				
IRP	721	6	7	7	4	0				
DEC	726		7	8	4	0				
IRP	754	6	8	8	4	0				
DEC	759		8	9	4	0				
IRP	787	6	9	9	4	0				
DEC	792		9	10	4	0				
BUF										
OUT	9	1	1	0						
MOV	10	1	0	1.0						
HELD										
TIT	DATA BLOCK 4				PREVIOUS					
BUF					DATA BLOCK 4					
IRP	820	6	1	2	4	0				
DEC	825		2	3	4	0				
IRP	853	6	3	3	4	0				
DEC	858		3	4	4	0				
IRP	886	6	4	4	4	0				
DEC	891		4	5	4	0				
IRP	919	6	5	5	4	0				
DEC	924		5	6	4	0				
IRP	952	6	6	6	4	0				
DEC	957		6	7	4	0				
IRP	985	6	7	7	4	0				
DEC	990		7	8	4	0				
IRP	1018	6	8	8	4	0				
DEC	1023		8	9	4	0				
IRP	1051	6	9	9	4	0				
DEC	1056		9	10	4	0				
BUF										
OUT	9	1	1	0						
END										
2	922350	12400.0	922380	49700.0	0	0.0	FUEL	ACTINIDES		
4	130000	57900.0	420000	4400.0	0	0.0	STRUCTURAL	MAT'L		
0										

A.1.8 MPLS

```

-1
-1
-1
LIP      0 0 0
LPU      902320, 912310, 912330, 922320, 922330, 922340, 922350,
          922360, 922380, 932370, 932380, 932390, 942380, 942390,
          942400, 942410, 942420, -1
LIB      0 1 2 3 204 -205 -206 9 3 0 1 1
BAS      MPLS MODEL OF 5376MWD BURNUP OF 24 LEU
INP      -1 1 -1 -1 1 1
MOV      -1 1 0 1.0
HED      1
OPTL     8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
OPTA     8 8 8 7 8 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
OPTF     8 8 8 8 8 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
TITT     DATA BLOCK 1  DATA BLOCK 1  DATA BLOCK 1  DATA BLOCK 1
BUP      28      6  1 2 4 2
IRP      56      6  2 3 4 0
IRP      84      6  3 4 4 0
IRP      112     6  4 5 4 0
IRP      140     6  5 6 4 0
IRP      168     6  6 7 4 0
IRP      196     6  7 8 4 0
IRP      224     6  8 9 4 0
BUP      9 1 0 0
MOV      9 1 0 1.0
HED      1
TITT     DATA BLOCK 2  DATA BLOCK 2  DATA BLOCK 2  DATA BLOCK 2
BUP      252     6  1 2 4 0
IRP      280     6  2 3 4 0
IRP      308     6  3 4 4 0
IRP      336     6  4 5 4 0
IRP      364     6  5 6 4 0
IRP      392     6  6 7 4 0
IRP      420     6  7 8 4 0
IRP      448     6  8 9 4 0
BUP      9 1 0 0
OUT      9 1 0 0
MOV      9 1 0 1.0
HED      1
TITT     DATA BLOCK 3  DATA BLOCK 3  DATA BLOCK 3  DATA BLOCK 3
BUP      476     6  1 2 4 0
IRP      504     6  2 3 4 0
IRP      532     6  3 4 4 0
IRP      560     6  4 5 4 0
IRP      588     6  5 6 4 0
IRP      616     6  6 7 4 0
IRP      644     6  7 8 4 0
IRP      672     6  8 9 4 0

```


A.2 Replacement Cross-Section Data

A.2.1 HEU Replacement Cross-Sections

252	902320	2.8586E	00	5.0495E-03	3.9597E-05	2.8055E-02	0	0	-1
252	912310	4.6045E	01	3.5430E-03	3.2152E-06	4.3488E-01	0	0	-1
252	912330	2.3568E	01	1.4457E-03	1.0347E-05	1.7744E-01	0	0	-1
252	922320	1.1763E	01	2.5592E-03	5.9699E-06	1.6246E	01	0	-1
252	922330	6.4984E	00	1.8008E-03	2.8868E-07	5.2479E	01	0	-1
252	922340	2.0411E	01	5.1252E-04	4.6375E-06	5.8439E-01	0	0	-1
252	922350	9.4052E	00	2.5512E-03	1.6302E-06	4.1443E	01	0	-1
252	922360	6.5390E	00	2.6303E-03	3.0577E-05	3.1810E-01	0	0	-1
252	922380	6.0334E	00	4.6890E-03	2.5961E-05	1.1541E-01	0	0	-1
252	932370	3.3239E	01	4.6657E-04	2.9560E-06	5.8808E-01	0	0	-1
252	932380	7.8353E	00	4.8327E-03	1.7275E-05	1.7145E	02	0	-1
252	932390	1.6570E	01	1.1857E-03	1.4487E-05	6.6989E-01	0	0	-1
252	942380	3.2951E	01	1.4541E-03	1.5582E-05	2.4350E	00	0	-1
252	942390	4.7600E	01	2.0198E-03	1.0074E-06	8.9438E	01	0	-1
252	942400	2.2142E	02	7.8065E-04	1.2698E-06	6.6706E-01	0	0	-1
252	942410	3.3346E	01	6.9545E-03	1.0953E-05	9.5939E	01	0	-1
252	942420	3.3484E	01	2.0761E-03	1.2969E-05	4.9001E-01	0	0	-1

A.2.2 LEU Replacement Cross-Sections

252	902320	2.84E	00	5.25E-03	3.36E-05	2.77E-02	0	0	-1
252	912310	4.47E	01	3.67E-03	3.46E-06	4.20E-01	0	0	-1
252	912330	2.36E	01	1.50E-03	1.29E-05	1.74E-01	0	0	-1
252	922320	1.13E	01	2.64E-03	7.59E-06	1.58E	01	0	-1
252	922330	6.21E	00	1.89E-03	4.03E-07	5.02E	01	0	-1
252	922340	2.09E	01	5.25E-04	4.90E-06	5.66E-01	0	0	-1
252	922350	9.01E	00	2.70E-03	1.46E-06	3.95E	01	0	-1
252	922360	7.18E	00	2.74E-03	2.43E-05	3.21E-01	0	0	-1
252	922380	1.61E	00	4.87E-03	1.99E-05	1.13E-01	0	0	-1
252	932370	3.27E	01	4.84E-04	2.91E-06	5.68E-01	0	0	-1
252	932380	7.46E	00	5.09E-03	1.46E-05	1.63E	02	0	-1
252	932390	1.62E	01	1.24E-03	1.09E-05	6.47E-01	0	0	-1
252	942380	3.14E	01	1.51E-03	1.84E-05	2.39E	00	0	-1
252	942390	4.44E	01	2.12E-03	1.38E-06	8.38E	01	0	-1
252	942400	2.00E	02	8.04E-04	1.37E-06	6.45E-01	0	0	-1
252	942410	3.14E	01	7.44E-03	7.04E-06	9.04E	01	0	-1
252	942420	3.33E	01	2.16E-03	1.10E-05	4.74E-01	0	0	-1

A.3 Sample Input Batch Files

A.3.1 MBHR

```

echo off
echo *****
echo *****
echo **
echo **
echo **      Oak Ridge Isotope GENERation and Depletion Code
echo **      Version 2.1 (8-1-91)
echo **
echo *****
echo **
echo **      Developed by: Oak Ridge National Laboratory
echo **      Chemical Technology Division
echo **
echo **      Technical Contact: Scott B. Ludwig
echo **      (615) 574-7916    FTS 624-7916
echo **
echo **      Distributed by: Radiation Shielding Information Center(RSIC)
echo **      Oak Ridge National Laboratory
echo **      P.O. Box 2008
echo **      Oak Ridge, TN 37831
echo **      (615) 574-6176    FTS 624-6176
echo *****
echo *****
pause
echo ** Execution continuing ...
echo *****
echo *****
echo **
echo **      Version 2.1 (8-1-91) for mainframes and 80386 or 80486 PCs
echo **
echo **
copy MBHR.u5 tapes5.inp >nul
copy HEUAXS.u3 tapes3.inp >nul
copy \origen2\libs\decay.lib+\origen2\libs\bwrw.lib tapes9.inp >nul
copy \origen2\libs\gxuo2brm.lib tapes10.inp >nul
\origen2\code\origen2
rem combine and save files from run
copy tapes12.out+tapes6.out MBHR.txt >nul
copy tapes13.out+tapes11.out samp_1.u11 >nul
ren tapes7.out PUNCH.pch
ren tapes15.out DEBUG.dbg
ren tapes16.out VRBLXS.vxs
ren tapes50.out TAPES50.ech
rem cleanup files
del samp_1.u11
del PUNCH.pch
del TAPES50.ech
del tapes*.inp
del tapes*.out
echo *****
echo ***** O R I G E N 2 - Version 2.1 *****
echo ***** Execution Completed *****
echo *****

```

A.3.2 MPLS

```
echo off
echo *****
echo *****
echo **
echo **
echo ** Oak Ridge Isotope GENERation and Depletion Code
echo ** Version 2.1 (8-1-91)
echo **
echo *****
echo **
echo **
echo ** Developed by: Oak Ridge National Laboratory
echo ** Chemical Technology Division
echo **
echo ** Technical Contact: Scott B. Ludwig
echo ** (615) 574-7916 PTS 624-7916
echo **
echo **
echo ** Distributed by: Radiation Shielding Information Center (RSIC)
echo ** Oak Ridge National Laboratory
echo ** P.O. Box 2008
echo ** Oak Ridge, TN 37831
echo ** (615) 574-6176 PTS 624-6176
echo *****
echo *****
pause
echo ** Execution continuing ...
echo *****
echo *****
echo **
echo ** Version 2.1 (8-1-91) for mainframes and 80386 or 80486 PCs
echo **
echo **
echo ** MPLS.u5 tapes5.imp >nul
copy LEUAXS.u3 tapes3.imp >nul
copy \origen2\libs\decay.lib+\origen2\libs\pwru.lib tapes9.imp >nul
copy \origen2\libs\gxuo2brm.lib tapel0.imp >nul
\origen2\code\origen2
rem combine and save files from run
copy tapel2.out+tape6.out MPLS.txt >nul
copy tapel3.out+tapel1.out samp_1.u11 >nul
ren tapel7.out PUNCH.pch
ren tapel5.out DEBUG.dbg
ren tapel6.out VRBLXSEC.vxs
ren tapes0.out TAPE50.ech
rem cleanup files
del TAPE50.ech
del PUNCH.pch
del samp_1.u11
del tape*.imp
del tape*.out
echo *****
echo ***** O R I G E N 2 - Version 2.1 *****
echo ***** Execution Completed *****
echo *****
echo on
```

APPENDIX B
ANALYSIS DATA

B.1 HEU Core Inventories at End-of-Cycle and Maximum Burn-up

B.1.1 HEU Actinide Inventories

MODEL	MBHR	MBHR	MBHS	MBHS	MPHR	MPHR	MPHS	MPHS
MWD	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
AM239	8.138E-08	1.358E-07	7.035E-08	1.174E-07	1.150E-07	1.921E-07	9.947E-08	1.661E-07
AM240	2.230E-05	3.723E-05	1.928E-05	3.218E-05	2.482E-05	4.146E-05	2.145E-05	3.586E-05
AM241	1.774E-02	2.706E-02	1.534E-02	2.340E-02	1.824E-02	2.766E-02	1.577E-02	2.392E-02
AM242	7.477E+00	1.254E+01	6.463E+00	1.084E+01	8.168E+00	1.371E+01	7.062E+00	1.186E+01
AM242M	7.239E-04	1.214E-03	6.172E-04	1.035E-03	7.795E-04	1.300E-03	6.645E-04	1.109E-03
AM243	3.188E-04	6.357E-04	3.191E-04	6.364E-04	3.369E-04	6.728E-04	3.372E-04	6.734E-04
AM244	5.511E-02	1.207E-01	5.516E-02	1.209E-01	5.908E-02	1.310E-01	5.913E-02	1.311E-01
AM244M	1.049E+00	2.299E+00	1.050E+00	2.301E+00	1.124E+00	2.494E+00	1.125E+00	2.496E+00
AM245	2.714E-06	6.691E-06	2.737E-06	6.746E-06	2.964E-06	7.399E-06	2.989E-06	7.460E-06
AM246	4.350E-10	1.186E-09	4.582E-10	1.251E-09	4.836E-10	1.346E-09	5.094E-10	1.420E-09
AM241	2.972E-07	6.020E-07	2.874E-07	5.870E-07	3.532E-07	7.204E-07	3.417E-07	7.024E-07
CM242	2.203E+00	3.964E+00	1.971E+00	3.563E+00	2.416E+00	4.346E+00	2.162E+00	3.907E+00
CM243	3.172E-04	6.740E-04	2.848E-04	6.082E-04	3.492E-04	7.414E-04	3.136E-04	6.692E-04
CM244	1.045E-02	2.498E-02	1.047E-02	2.504E-02	1.125E-02	2.704E-02	1.128E-02	2.710E-02
CM245	3.435E-07	9.460E-07	3.443E-07	9.484E-07	3.760E-07	1.036E-06	3.768E-07	1.039E-06
CM246	2.135E-08	7.068E-08	2.140E-08	7.085E-08	2.418E-08	8.027E-08	2.424E-08	8.046E-08
CM247	1.925E-14	7.576E-14	1.929E-14	7.594E-14	2.206E-14	8.719E-14	2.211E-14	8.739E-14
CM248	1.362E-14	6.398E-14	1.365E-14	6.413E-14	1.597E-14	7.542E-14	1.601E-14	7.559E-14
CM249	2.755E-10	1.415E-09	2.761E-10	1.419E-09	3.255E-10	1.692E-09	3.262E-10	1.696E-09
CM250	2.215E-22	1.403E-21	2.224E-22	1.409E-21	2.704E-22	1.726E-21	2.714E-22	1.733E-21
CM251	6.616E-21	4.582E-20	6.642E-21	4.609E-20	8.228E-21	5.783E-20	8.260E-21	5.806E-20
NP235	2.155E-04	3.194E-04	2.199E-04	3.264E-04	2.191E-04	3.251E-04	2.235E-04	3.322E-04
NP236	3.518E-07	5.184E-07	3.497E-07	5.155E-07	3.566E-07	5.255E-07	3.544E-07	5.226E-07
NP236M	3.226E-04	5.230E-04	3.291E-04	5.344E-04	3.342E-04	5.463E-04	3.409E-04	5.581E-04
NP237	2.088E-02	2.767E-02	2.085E-02	2.765E-02	2.022E-02	2.683E-02	2.020E-02	2.680E-02
NP238	1.363E+04	1.981E+04	1.362E+04	1.979E+04	1.347E+04	1.970E+04	1.346E+04	1.968E+04
NP239	1.094E+04	1.194E+04	1.094E+04	1.194E+04	1.140E+04	1.249E+04	1.140E+04	1.249E+04
NP240	1.057E+01	1.261E+01	1.057E+01	1.262E+01	1.159E+01	1.397E+01	1.159E+01	1.398E+01
NP240M	1.712E-02	2.043E-02	1.712E-02	2.043E-02	1.807E-02	2.179E-02	1.807E-02	2.179E-02
NP241	1.414E-07	1.845E-07	1.414E-07	1.845E-07	1.506E-07	1.999E-07	1.506E-07	1.999E-07
PU236	5.705E-05	1.031E-04	5.755E-05	1.042E-04	5.961E-05	1.080E-04	6.013E-05	1.091E-04
PU237	2.728E-02	4.635E-02	2.863E-02	4.865E-02	2.837E-02	4.849E-02	2.977E-02	5.086E-02
PU238	4.765E+01	7.437E+01	4.736E+01	7.395E+01	4.728E+01	7.392E+01	4.699E+01	7.349E+01
PU239	2.306E-01	2.520E-01	2.307E-01	2.520E-01	2.387E-01	2.603E-01	2.388E-01	2.603E-01
PU240	1.980E-01	2.389E-01	1.982E-01	2.391E-01	2.097E-01	2.530E-01	2.099E-01	2.532E-01
PU241	2.511E+01	3.846E+01	2.520E+01	3.859E+01	2.613E+01	4.003E+01	2.622E+01	4.017E+01
PU242	9.953E-05	1.699E-04	9.976E-05	1.703E-04	1.043E-04	1.776E-04	1.045E-04	1.780E-04
PU243	1.148E+01	2.143E+01	1.151E+01	2.148E+01	1.211E+01	2.270E+01	1.214E+01	2.275E+01
PU244	2.924E-12	6.590E-12	2.948E-12	6.644E-12	3.158E-12	7.159E-12	3.184E-12	7.217E-12
PU245	2.714E-06	6.691E-06	2.737E-06	6.746E-06	2.964E-06	7.399E-06	2.989E-06	7.460E-06
PU246	4.349E-10	1.186E-09	4.581E-10	1.251E-09	4.836E-10	1.346E-09	5.093E-10	1.420E-09
Inventory	2.468E+04	3.192E+04	2.466E+04	3.189E+04	2.498E+04	3.236E+04	2.497E+04	3.234E+04

B.1.2 HEU Fission Product Inventories

MODEL	MBHR	MBHR	MBHS	MBHS	MPHR	MPHR	MPHS	MPHS
MWD	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
BA132	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA133	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA134	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA135	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA135M	2.043E+00	3.263E+00	1.803E+00	2.884E+00	2.138E+00	3.436E+00	1.887E+00	3.037E+00
BA136	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA136M	5.598E+02	6.689E+02	5.774E+02	6.896E+02	5.537E+02	6.661E+02	5.703E+02	6.858E+02
BA137	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA137M	1.157E+04	1.304E+04	1.161E+04	1.309E+04	1.158E+04	1.304E+04	1.162E+04	1.309E+04
BA138	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA139	3.195E+05	3.191E+05	3.195E+05	3.191E+05	3.195E+05	3.191E+05	3.195E+05	3.191E+05
BA140	2.917E+05	2.916E+05	3.111E+05	3.110E+05	2.912E+05	2.911E+05	3.106E+05	3.105E+05
BA141	2.914E+05	2.909E+05	2.914E+05	2.909E+05	2.909E+05	2.905E+05	2.909E+05	2.905E+05
BA142	2.859E+05	2.855E+05	2.859E+05	2.855E+05	2.859E+05	2.855E+05	2.859E+05	2.855E+05
BA143	2.614E+05	2.610E+05	2.614E+05	2.610E+05	2.614E+05	2.614E+05	2.614E+05	2.610E+05
BA144	2.105E+05	2.101E+05	2.105E+05	2.101E+05	2.100E+05	2.096E+05	2.100E+05	2.096E+05
BA145	9.835E+04	9.820E+04	9.835E+04	9.819E+04	9.835E+04	9.820E+04	9.835E+04	9.820E+04
BA146	3.342E+04	3.337E+04	3.342E+04	3.337E+04	3.342E+04	3.337E+04	3.342E+04	3.337E+04
BA147	6.463E+03	6.453E+03	6.463E+03	6.453E+03	6.463E+03	6.454E+03	6.463E+03	6.453E+03
BA148	7.548E+02	7.537E+02	7.548E+02	7.537E+02	7.547E+02	7.538E+02	7.547E+02	7.537E+02
BA149	4.620E+01	4.616E+01	4.620E+01	4.616E+01	4.621E+01	4.618E+01	4.621E+01	4.618E+01
BA150	2.163E+00	2.162E+00	2.163E+00	2.162E+00	2.168E+00	2.169E+00	2.168E+00	2.168E+00
BA151	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA152	1.034E-03	1.042E-03	1.034E-03	1.042E-03	1.037E-03	1.046E-03	1.037E-03	1.046E-03
BR 79	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 79M	7.784E-05	7.937E-05	7.785E-05	7.937E-05	7.821E-05	7.983E-05	7.821E-05	7.983E-05
BR 80	3.517E-02	3.593E-02	3.489E-02	3.554E-02	3.516E-02	3.596E-02	3.488E-02	3.556E-02
BR 80M	1.471E-02	1.487E-02	1.466E-02	1.480E-02	1.473E-02	1.489E-02	1.468E-02	1.482E-02
BR 81	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 82	3.802E+02	4.671E+02	3.802E+02	4.671E+02	3.856E+02	4.770E+02	3.856E+02	4.770E+02
BR 82M	1.650E+02	2.025E+02	1.650E+02	2.025E+02	1.669E+02	2.062E+02	1.669E+02	2.062E+02
BR 83	2.661E+04	2.657E+04	2.661E+04	2.657E+04	2.662E+04	2.658E+04	2.662E+04	2.658E+04
BR 84	5.004E+04	4.996E+04	5.004E+04	4.996E+04	5.004E+04	4.995E+04	5.004E+04	4.995E+04
BR 84M	9.407E+02	9.395E+02	9.407E+02	9.395E+02	9.408E+02	9.396E+02	9.407E+02	9.395E+02
BR 85	6.224E+04	6.213E+04	6.223E+04	6.213E+04	6.223E+04	6.213E+04	6.223E+04	6.213E+04
BR 86	4.713E+04	4.705E+04	4.713E+04	4.705E+04	4.712E+04	4.705E+04	4.712E+04	4.704E+04
BR 86M	4.753E+04	4.745E+04	4.753E+04	4.745E+04	4.753E+04	4.745E+04	4.753E+04	4.745E+04
BR 87	1.072E+05	1.070E+05	1.072E+05	1.070E+05	1.072E+05	1.070E+05	1.072E+05	1.070E+05
BR 88	1.235E+05	1.233E+05	1.235E+05	1.233E+05	1.235E+05	1.233E+05	1.235E+05	1.233E+05
BR 89	9.378E+04	9.361E+04	9.378E+04	9.361E+04	9.328E+04	9.312E+04	9.328E+04	9.312E+04
BR 90	6.285E+04	6.274E+04	6.285E+04	6.274E+04	6.284E+04	6.273E+04	6.284E+04	6.273E+04
BR 91	1.953E+04	1.949E+04	1.953E+04	1.949E+04	1.948E+04	1.944E+04	1.948E+04	1.944E+04
BR 92	9.382E+02	9.368E+02	9.382E+02	9.368E+02	9.383E+02	9.369E+02	9.383E+02	9.369E+02
BR 93	2.335E+02	2.331E+02	2.335E+02	2.331E+02	2.330E+02	2.326E+02	2.330E+02	2.326E+02
BR 94	1.619E+01	1.616E+01	1.619E+01	1.616E+01	1.619E+01	1.616E+01	1.619E+01	1.616E+01
BR 95	3.652E-01	3.650E-01	3.652E-01	3.650E-01	3.662E-01	3.664E-01	3.662E-01	3.662E-01
BR 96	1.668E-02	1.667E-02	1.668E-02	1.667E-02	1.674E-02	1.673E-02	1.674E-02	1.673E-02
CE139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE140	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE141	2.625E+05	2.624E+05	2.951E+05	2.950E+05	2.620E+05	2.620E+05	2.946E+05	2.945E+05
CE143	2.929E+05	2.925E+05	2.929E+05	2.925E+05	2.929E+05	2.925E+05	2.929E+05	2.925E+05
CE144	1.959E+05	2.037E+05	2.156E+05	2.261E+05	1.955E+05	2.033E+05	2.152E+05	2.256E+05
CE145	1.935E+05	1.932E+05	1.935E+05	1.932E+05	1.935E+05	1.932E+05	1.935E+05	1.933E+05

MODEL	MBHR	MBHR	MBHS	MBHS	MPHR	MPHR	MPHS	MPHS
MWD	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
CE146	1.469E+05	1.466E+05	1.469E+05	1.466E+05	1.468E+05	1.466E+05	1.468E+05	1.466E+05
CE147	1.102E+05	1.100E+05	1.102E+05	1.100E+05	1.102E+05	1.100E+05	1.102E+05	1.100E+05
CE148	7.554E+04	7.542E+04	7.554E+04	7.543E+04	7.554E+04	7.543E+04	7.554E+04	7.543E+04
CE149	3.865E+04	3.859E+04	3.864E+04	3.859E+04	3.865E+04	3.859E+04	3.865E+04	3.859E+04
CE150	1.471E+04	1.469E+04	1.471E+04	1.469E+04	1.471E+04	1.469E+04	1.471E+04	1.469E+04
CE151	3.794E+03	3.789E+03	3.794E+03	3.789E+03	3.799E+03	3.795E+03	3.799E+03	3.794E+03
CE152	6.769E+02	6.761E+02	6.769E+02	6.761E+02	6.770E+02	6.762E+02	6.770E+02	6.762E+02
CE153	6.537E+01	6.534E+01	6.537E+01	6.534E+01	6.539E+01	6.536E+01	6.539E+01	6.536E+01
CE154	4.075E+00	4.077E+00	4.075E+00	4.077E+00	4.077E+00	4.080E+00	4.077E+00	4.080E+00
CE155	1.733E-01	1.741E-01	1.733E-01	1.741E-01	1.736E-01	1.745E-01	1.736E-01	1.745E-01
CE156	5.015E-03	5.105E-03	5.015E-03	5.105E-03	5.045E-03	5.146E-03	5.045E-03	5.146E-03
CE157	1.610E-04	1.682E-04	1.610E-04	1.682E-04	1.635E-04	1.715E-04	1.635E-04	1.715E-04
CO 72	4.168E-02	4.168E-02	4.168E-02	4.168E-02	4.470E-02	4.471E-02	4.470E-02	4.471E-02
CO 73	4.069E-03	4.089E-03	4.069E-03	4.089E-03	4.781E-03	4.804E-03	4.781E-03	4.804E-03
CO 74	3.564E-03	3.562E-03	3.564E-03	3.562E-03	3.671E-03	3.670E-03	3.671E-03	3.670E-03
CO 75	4.731E-04	4.729E-04	4.731E-04	4.729E-04	4.825E-04	4.823E-04	4.825E-04	4.823E-04
CS132	1.583E+01	1.943E+01	1.632E+01	2.003E+01	2.172E+01	2.684E+01	2.239E+01	2.768E+01
CS133	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS134	8.186E+03	1.068E+04	8.466E+03	1.108E+04	8.441E+03	1.103E+04	8.730E+03	1.144E+04
CS134M	3.927E+03	4.810E+03	3.969E+03	4.862E+03	3.968E+03	4.891E+03	4.011E+03	4.943E+03
CS135	6.603E-02	7.308E-02	6.387E-02	7.063E-02	6.328E-02	7.001E-02	6.111E-02	6.754E-02
CS135M	1.013E+03	1.432E+03	1.046E+03	1.485E+03	1.063E+03	1.515E+03	1.098E+03	1.570E+03
CS136	3.397E+03	4.059E+03	3.504E+03	4.184E+03	3.360E+03	4.042E+03	3.461E+03	4.161E+03
CS137	1.222E+04	1.377E+04	1.226E+04	1.383E+04	1.222E+04	1.377E+04	1.227E+04	1.383E+04
CS138	3.332E+05	3.327E+05	3.332E+05	3.327E+05	3.332E+05	3.327E+05	3.332E+05	3.327E+05
CS138M	1.227E+04	1.226E+04	1.227E+04	1.226E+04	1.227E+04	1.226E+04	1.227E+04	1.226E+04
CS144	1.571E+04	1.569E+04	1.571E+04	1.569E+04	1.571E+04	1.569E+04	1.571E+04	1.569E+04
CS145	3.556E+03	3.551E+03	3.556E+03	3.550E+03	3.561E+03	3.556E+03	3.561E+03	3.556E+03
CS146	4.015E+02	4.010E+02	4.015E+02	4.010E+02	4.020E+02	4.015E+02	4.020E+02	4.015E+02
CS147	2.949E+01	2.947E+01	2.949E+01	2.947E+01	2.945E+01	2.943E+01	2.945E+01	2.943E+01
CS148	9.146E-01	9.150E-01	9.146E-01	9.150E-01	9.151E-01	9.157E-01	9.151E-01	9.157E-01
CS149	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS150	2.325E-04	2.340E-04	2.325E-04	2.340E-04	2.331E-04	2.348E-04	2.331E-04	2.348E-04
EU149	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU150	1.438E-06	1.698E-06	1.239E-06	1.465E-06	1.813E-06	2.137E-06	1.564E-06	1.846E-06
EU151	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU152	1.672E+00	1.733E+00	1.446E+00	1.502E+00	1.568E+00	1.613E+00	1.358E+00	1.401E+00
EU152M	1.998E+01	1.967E+01	1.782E+01	1.766E+01	1.835E+01	1.807E+01	1.642E+01	1.629E+01
EU153	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU154	3.967E+02	5.341E+02	3.990E+02	5.376E+02	4.049E+02	5.454E+02	4.074E+02	5.490E+02
EU155	2.503E+02	3.061E+02	2.529E+02	3.094E+02	2.500E+02	3.077E+02	2.526E+02	3.110E+02
EU156	4.179E+03	5.346E+03	4.505E+03	5.763E+03	4.383E+03	5.688E+03	4.723E+03	6.131E+03
EU157	5.027E+02	5.503E+02	5.122E+02	5.635E+02	5.165E+02	5.725E+02	5.268E+02	5.873E+02
EU158	1.968E+02	1.973E+02	1.968E+02	1.973E+02	1.986E+02	1.992E+02	1.986E+02	1.992E+02
EU159	6.607E+01	6.638E+01	6.607E+01	6.638E+01	6.665E+01	6.698E+01	6.665E+01	6.698E+01
EU160	2.608E+01	2.623E+01	2.608E+01	2.623E+01	2.643E+01	2.659E+01	2.643E+01	2.659E+01
EU161	5.986E+00	6.061E+00	5.986E+00	6.061E+00	6.128E+00	6.208E+00	6.128E+00	6.208E+00
EU162	2.036E+00	2.056E+00	2.036E+00	2.056E+00	2.098E+00	2.120E+00	2.098E+00	2.120E+00
EU163	3.291E-01	3.338E-01	3.291E-01	3.338E-01	3.426E-01	3.477E-01	3.426E-01	3.477E-01
EU164	5.026E-02	5.115E-02	5.026E-02	5.115E-02	5.300E-02	5.398E-02	5.300E-02	5.398E-02
EU165	6.718E-03	6.847E-03	6.718E-03	6.847E-03	7.083E-03	7.227E-03	7.084E-03	7.228E-03

MODEL	MBHR	MBHR	MBHS	MBHS	MPHR	MPHR	MPHS	MPHS
MWID	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
I127	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I128	4.212E+02	5.207E+02	4.193E+02	5.185E+02	4.334E+02	5.393E+02	4.313E+02	5.370E+02
I129	2.695E+03	3.035E+03	2.692E+03	3.032E+03	2.702E-03	3.043E-03	2.696E-03	3.040E-03
I130	1.921E+03	2.364E+03	1.919E+03	2.362E+03	1.998E+03	2.475E+03	1.996E+03	2.472E+03
I130M	8.133E+02	1.001E+03	8.123E+02	1.000E+03	8.298E+02	1.028E+03	8.288E+02	1.027E+03
I131	1.381E+05	1.381E+05	1.430E+05	1.430E+05	1.382E+05	1.381E+05	1.431E+05	1.430E+05
I132	2.135E+05	2.133E+05	2.139E+05	2.137E+05	2.136E+05	2.134E+05	2.139E+05	2.137E+05
I133	3.336E+05	3.331E+05	3.336E+05	3.331E+05	3.336E+05	3.331E+05	3.336E+05	3.331E+05
I133M	6.391E+03	6.384E+03	6.391E+03	6.384E+03	6.392E+03	6.385E+03	6.392E+03	6.385E+03
I134	3.774E+05	3.769E+05	3.774E+05	3.769E+05	3.770E+05	3.765E+05	3.770E+05	3.765E+05
I134M	2.234E+04	2.232E+04	2.234E+04	2.232E+04	2.239E+04	2.237E+04	2.239E+04	2.237E+04
I135	3.112E+05	3.108E+05	3.112E+05	3.108E+05	3.107E+05	3.103E+05	3.107E+05	3.103E+05
I136	1.515E+05	1.512E+05	1.515E+05	1.512E+05	1.515E+05	1.512E+05	1.515E+05	1.512E+05
I136M	9.642E+04	9.627E+04	9.642E+04	9.627E+04	9.642E+04	9.627E+04	9.642E+04	9.627E+04
I137	1.612E+05	1.609E+05	1.612E+05	1.609E+05	1.612E+05	1.609E+05	1.612E+05	1.609E+05
I138	8.195E+04	8.182E+04	8.195E+04	8.182E+04	8.195E+04	8.182E+04	8.195E+04	8.182E+04
I139	3.639E+04	3.634E+04	3.639E+04	3.634E+04	3.639E+04	3.634E+04	3.639E+04	3.634E+04
I140	1.069E+04	1.067E+04	1.069E+04	1.067E+04	1.069E+04	1.067E+04	1.069E+04	1.067E+04
I141	1.526E+03	1.523E+03	1.526E+03	1.523E+03	1.526E+03	1.523E+03	1.526E+03	1.523E+03
I142	1.107E+02	1.106E+02	1.107E+02	1.106E+02	1.107E+02	1.106E+02	1.107E+02	1.106E+02
I143	4.524E+00	4.521E+00	4.524E+00	4.520E+00	4.525E+00	4.522E+00	4.525E+00	4.522E+00
I144	1.726E-01	1.726E-01	1.726E-01	1.726E-01	1.727E-01	1.727E-01	1.727E-01	1.727E-01
I145	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 79	1.614E+08	2.002E-08	1.610E+08	1.995E+08	2.215E-08	2.767E-08	2.209E-08	2.757E-08
KR 80	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 81	3.942E-09	5.283E-09	3.938E-09	5.276E-09	4.152E-09	5.598E-09	4.147E-09	5.590E-09
KR 81M	3.451E+04	4.170E+04	3.443E+04	4.157E+04	3.494E+04	4.249E+04	3.486E+04	4.236E+04
KR 82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 83M	2.661E+04	2.657E+04	2.661E+04	2.657E+04	2.662E+04	2.658E+04	2.662E+04	2.658E+04
KR 84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 85	1.453E+03	1.629E+03	1.467E+03	1.646E+03	1.453E+03	1.629E+03	1.467E+03	1.646E+03
KR 85M	6.295E+04	6.285E+04	6.294E+04	6.285E+04	6.294E+04	6.285E+04	6.294E+04	6.285E+04
KR 86	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 87	1.272E+05	1.270E+05	1.272E+05	1.270E+05	1.273E+05	1.271E+05	1.273E+05	1.271E+05
KR 88	1.798E+05	1.795E+05	1.798E+05	1.795E+05	1.798E+05	1.795E+05	1.798E+05	1.795E+05
KR 89	2.287E+05	2.283E+05	2.287E+05	2.283E+05	2.282E+05	2.278E+05	2.282E+05	2.278E+05
KR 90	2.272E+05	2.268E+05	2.272E+05	2.268E+05	2.271E+05	2.268E+05	2.271E+05	2.267E+05
KR 91	1.676E+05	1.673E+05	1.676E+05	1.673E+05	1.676E+05	1.673E+05	1.676E+05	1.673E+05
KR 92	7.334E+04	7.322E+04	7.334E+04	7.322E+04	7.334E+04	7.322E+04	7.334E+04	7.322E+04
KR 93	2.495E+04	2.491E+04	2.495E+04	2.491E+04	2.495E+04	2.491E+04	2.495E+04	2.491E+04
KR 94	1.123E+04	1.121E+04	1.123E+04	1.121E+04	1.123E+04	1.121E+04	1.123E+04	1.121E+04
KR 95	5.012E+02	5.005E+02	5.012E+02	5.005E+02	5.062E+02	5.055E+02	5.062E+02	5.055E+02
KR 96	8.231E+01	8.220E+01	8.231E+01	8.220E+01	8.282E+01	8.271E+01	8.282E+01	8.271E+01
KR 97	2.013E+00	2.011E+00	2.013E+00	2.011E+00	2.029E+00	2.028E+00	2.029E+00	2.028E+00
KR 98	2.122E-01	2.121E-01	2.122E-01	2.121E-01	2.123E-01	2.122E-01	2.123E-01	2.122E-01
LA138	2.349E-11	2.598E-11	2.349E-11	2.598E-11	2.341E-11	2.588E-11	2.341E-11	2.588E-11
LA139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA140	3.031E+05	3.038E+05	3.254E+05	3.262E+05	3.028E+05	3.036E+05	3.251E+05	3.259E+05
LA141	2.924E+05	2.919E+05	2.924E+05	2.919E+05	2.919E+05	2.914E+05	2.919E+05	2.914E+05
LA142	2.909E+05	2.904E+05	2.909E+05	2.904E+05	2.909E+05	2.904E+05	2.909E+05	2.904E+05
LA143	2.912E+05	2.907E+05	2.912E+05	2.907E+05	2.912E+05	2.907E+05	2.912E+05	2.907E+05
LA144	2.653E+05	2.649E+05	2.653E+05	2.649E+05	2.649E+05	2.644E+05	2.649E+05	2.644E+05
LA145	1.819E+05	1.816E+05	1.819E+05	1.816E+05	1.819E+05	1.816E+05	1.819E+05	1.816E+05
LA146	1.135E+05	1.134E+05	1.135E+05	1.134E+05	1.135E+05	1.134E+05	1.135E+05	1.134E+05
LA147	5.280E+04	5.272E+04	5.280E+04	5.272E+04	5.280E+04	5.272E+04	5.280E+04	5.272E+04

MODEL	MBHR	MBHR	MBHS	MBHS	MPHR	MPHR	MPHS	MPHS
NWD	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
LA148	1.767E+04	1.765E+04	1.767E+04	1.765E+04	1.767E+04	1.765E+04	1.767E+04	1.765E+04
LA149	3.522E+03	3.517E+03	3.522E+03	3.517E+03	3.522E+03	3.517E+03	3.522E+03	3.517E+03
LA150	5.029E+02	5.029E+02	5.029E+02	5.023E+02	5.030E+02	5.024E+02	5.032E+02	5.024E+02
LA151	4.449E+01	4.445E+01	4.449E+01	4.445E+01	4.450E+01	4.446E+01	4.450E+01	4.446E+01
LA152	2.499E+00	2.499E+00	2.499E+00	2.499E+00	2.500E+00	2.501E+00	2.500E+00	2.501E+00
LA153	7.659E-02	7.690E-02	7.659E-02	7.690E-02	7.673E-02	7.708E-02	7.673E-02	7.708E-02
LA154	1.660E-03	1.678E-03	1.660E-03	1.678E-03	1.666E-03	1.686E-03	1.666E-03	1.686E-03
LA155	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 95	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 96	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 97	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 98	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 99	3.003E+05	3.007E+05	3.005E+05	3.009E+05	3.009E+05	2.972E+05	2.976E+05	2.974E+05
MO100	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO101	2.521E+05	2.518E+05	2.521E+05	2.518E+05	2.521E+05	2.519E+05	2.521E+05	2.518E+05
MO102	2.097E+05	2.095E+05	2.097E+05	2.095E+05	2.098E+05	2.095E+05	2.098E+05	2.095E+05
MO103	1.553E+05	1.551E+05	1.553E+05	1.551E+05	1.553E+05	1.551E+05	1.553E+05	1.551E+05
MO104	9.040E+04	9.033E+04	9.040E+04	9.033E+04	9.091E+04	9.084E+04	9.091E+04	9.084E+04
MO105	4.644E+04	4.642E+04	4.644E+04	4.642E+04	4.645E+04	4.644E+04	4.645E+04	4.644E+04
MO106	1.819E+04	1.820E+04	1.819E+04	1.820E+04	1.825E+04	1.826E+04	1.825E+04	1.826E+04
MO107	6.685E+03	6.686E+03	6.685E+03	6.686E+03	6.741E+03	6.742E+03	6.741E+03	6.742E+03
MO108	1.659E+03	1.660E+03	1.659E+03	1.660E+03	1.675E+03	1.676E+03	1.675E+03	1.676E+03
MO109	2.029E+02	2.037E+02	2.029E+02	2.037E+02	2.088E+02	2.096E+02	2.088E+02	2.096E+02
MO110	2.928E+01	2.941E+01	2.928E+01	2.941E+01	3.043E+01	3.058E+01	3.043E+01	3.058E+01
MO111	1.971E+00	2.003E+00	1.971E+00	2.002E+00	2.069E+00	2.105E+00	2.069E+00	2.105E+00
MO112	2.252E-01	2.311E-01	2.252E-01	2.311E-01	2.421E-01	2.489E-01	2.421E-01	2.489E-01
MO113	1.524E-02	1.566E-02	1.524E-02	1.566E-02	1.596E-02	1.644E-02	1.596E-02	1.644E-02
MO114	1.048E-03	1.091E-03	1.048E-03	1.091E-03	1.121E-03	1.171E-03	1.121E-03	1.171E-03
MO115	4.462E-05	4.755E-05	4.462E-05	4.755E-05	4.783E-05	5.123E-05	4.783E-05	5.124E-05
NB 91	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB 92	7.041E-09	1.033E-08	5.937E-09	8.670E-09	6.294E-08	9.309E-08	5.307E-08	7.813E-08
NB 93	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB 93M	1.251E-02	1.591E-02	1.074E-02	1.366E-02	1.251E-02	1.591E-02	1.074E-02	1.366E-02
NB 94	2.609E-06	2.943E-06	2.609E-06	2.943E-06	2.606E-06	2.939E-06	2.606E-06	2.939E-06
NB 94M	2.219E-02	2.226E-02	2.219E-02	2.226E-02	2.217E-02	2.224E-02	2.216E-02	2.224E-02
NB 95	2.734E+05	2.734E+05	3.210E+05	3.213E+05	2.734E+05	2.734E+05	3.210E+05	3.213E+05
NB 95M	1.950E+03	1.950E+03	2.257E+03	2.258E+03	1.950E+03	1.950E+03	2.257E+03	2.258E+03
NB 96	2.420E+02	2.620E+02	2.790E+02	3.028E+02	2.458E+02	2.678E+02	2.835E+02	3.095E+02
NB 97	2.917E+05	2.915E+05	2.917E+05	2.915E+05	2.918E+05	2.915E+05	2.918E+05	2.915E+05
NB 97M	2.753E+05	2.751E+05	2.753E+05	2.751E+05	2.753E+05	2.751E+05	2.753E+05	2.751E+05
NB 98	2.880E+05	2.875E+05	2.880E+05	2.875E+05	2.880E+05	2.875E+05	2.880E+05	2.875E+05
NB 98M	1.349E+03	1.348E+03	1.349E+03	1.348E+03	1.350E+03	1.348E+03	1.350E+03	1.348E+03
NB 99	2.891E+05	2.886E+05	2.891E+05	2.886E+05	2.891E+05	2.886E+05	2.891E+05	2.886E+05
NB 99M	7.381E+03	7.373E+03	7.381E+03	7.373E+03	7.382E+03	7.373E+03	7.382E+03	7.373E+03
NB100	1.550E+05	1.548E+05	1.550E+05	1.548E+05	1.550E+05	1.548E+05	1.550E+05	1.548E+05
NB100M	1.550E+05	1.548E+05	1.550E+05	1.548E+05	1.550E+05	1.548E+05	1.550E+05	1.548E+05
NB101	2.460E+05	2.456E+05	2.460E+05	2.456E+05	2.460E+05	2.456E+05	2.460E+05	2.456E+05
NB102	1.892E+05	1.889E+05	1.892E+05	1.889E+05	1.892E+05	1.889E+05	1.892E+05	1.889E+05
NB103	1.095E+05	1.093E+05	1.095E+05	1.093E+05	1.095E+05	1.093E+05	1.095E+05	1.093E+05
NB104	4.025E+04	4.021E+04	4.025E+04	4.021E+04	4.025E+04	4.021E+04	4.025E+04	4.021E+04
NB105	1.058E+04	1.057E+04	1.058E+04	1.057E+04	1.058E+04	1.057E+04	1.058E+04	1.057E+04
NB106	3.584E+03	3.580E+03	3.584E+03	3.580E+03	3.590E+03	3.586E+03	3.590E+03	3.586E+03
NB107	5.653E+02	5.646E+02	5.653E+02	5.646E+02	5.702E+02	5.696E+02	5.702E+02	5.696E+02
NB108	4.219E+01	4.219E+01	4.219E+01	4.219E+01	4.272E+01	4.272E+01	4.272E+01	4.272E+01
NB109	1.332E+00	1.344E+00	1.332E+00	1.344E+00	1.365E+00	1.379E+00	1.365E+00	1.379E+00
NB110	6.623E-02	6.762E-02	6.623E-02	6.762E-02	6.931E-02	7.092E-02	6.931E-02	7.092E-02

MODEL	MBHR	MBHR	MBHS	MBHS	MPHR	MPHR	MPHS	MPHS
MWVD	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
NB111	2.027E-03	2.151E-03	2.027E-03	2.151E-03	2.148E-03	2.291E-03	2.148E-03	2.291E-03
NB112	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND143	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND144	1.063E-10	1.309E-10	9.900E-11	1.227E-10	1.073E-10	1.323E-10	1.000E-10	1.241E-10
ND145	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND146	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND147	1.078E+05	1.078E+05	1.138E+05	1.138E+05	1.078E+05	1.078E+05	1.138E+05	1.138E+05
ND148	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND149	5.468E+04	5.480E+04	5.468E+04	5.480E+04	5.470E+04	5.484E+04	5.470E+04	5.484E+04
ND150	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND151	2.107E+04	2.110E+04	2.107E+04	2.110E+04	2.103E+04	2.107E+04	2.103E+04	2.107E+04
ND152	1.321E+04	1.320E+04	1.321E+04	1.320E+04	1.321E+04	1.321E+04	1.320E+04	1.320E+04
ND153	7.414E+03	7.408E+03	7.414E+03	7.406E+03	7.415E+03	7.407E+03	7.415E+03	7.407E+03
ND154	2.810E+03	2.808E+03	2.810E+03	2.808E+03	2.810E+03	2.808E+03	2.810E+03	2.808E+03
ND155	8.890E+02	8.886E+02	8.890E+02	8.886E+02	8.892E+02	8.888E+02	8.892E+02	8.888E+02
ND156	1.775E+02	1.776E+02	1.775E+02	1.776E+02	1.776E+02	1.777E+02	1.776E+02	1.777E+02
ND157	3.001E+01	3.008E+01	3.001E+01	3.008E+01	3.014E+01	3.022E+01	3.014E+01	3.022E+01
ND158	3.383E+00	3.396E+00	3.383E+00	3.396E+00	3.397E+00	3.411E+00	3.397E+00	3.411E+00
ND159	1.627E-01	1.642E-01	1.627E-01	1.642E-01	1.631E-01	1.647E-01	1.631E-01	1.647E-01
ND160	4.846E-02	4.849E-02	4.846E-02	4.849E-02	4.863E-02	4.868E-02	4.863E-02	4.868E-02
ND161	1.626E-04	1.704E-04	1.627E-04	1.704E-04	1.656E-04	1.741E-04	1.656E-04	1.741E-04
PD102	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD104	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD105	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD107	1.807E-03	2.042E-03	1.807E-03	2.042E-03	1.821E-03	2.058E-03	1.821E-03	2.058E-03
PD107M	1.027E+00	1.373E+00	9.635E-01	1.292E+00	1.052E+00	1.416E+00	9.880E-01	1.334E+00
PD108	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD109	2.629E+03	2.739E+03	2.629E+03	2.739E+03	2.699E+03	2.816E+03	2.699E+03	2.816E+03
PD109M	1.131E+03	1.143E+03	1.131E+03	1.143E+03	1.161E+03	1.174E+03	1.161E+03	1.174E+03
PD110	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD111	1.291E+03	1.296E+03	1.291E+03	1.296E+03	1.330E+03	1.335E+03	1.330E+03	1.335E+03
PD111M	1.217E+01	1.242E+01	1.217E+01	1.242E+01	1.247E+01	1.273E+01	1.247E+01	1.273E+01
PD112	9.088E+02	9.100E+02	9.088E+02	9.100E+02	9.458E+02	9.471E+02	9.458E+02	9.471E+02
PD113	8.803E+02	8.808E+02	8.803E+02	8.808E+02	9.207E+02	9.213E+02	9.207E+02	9.213E+02
PD114	8.148E+02	8.147E+02	8.148E+02	8.147E+02	8.529E+02	8.528E+02	8.529E+02	8.528E+02
PD115	7.187E+02	7.186E+02	7.187E+02	7.186E+02	7.562E+02	7.562E+02	7.562E+02	7.562E+02
PD116	6.890E+02	6.887E+02	6.890E+02	6.887E+02	7.262E+02	7.259E+02	7.262E+02	7.259E+02
PD117	7.484E+02	7.478E+02	7.484E+02	7.478E+02	7.854E+02	7.848E+02	7.854E+02	7.848E+02
PD118	3.120E+02	3.121E+02	3.120E+02	3.121E+02	3.313E+02	3.314E+02	3.313E+02	3.314E+02
PD119	1.638E+02	1.640E+02	1.638E+02	1.640E+02	1.736E+02	1.738E+02	1.736E+02	1.738E+02
PD120	5.514E+01	5.521E+01	5.514E+01	5.521E+01	5.823E+01	5.831E+01	5.823E+01	5.831E+01
PD121	1.453E+01	1.457E+01	1.453E+01	1.457E+01	1.512E+01	1.516E+01	1.512E+01	1.516E+01
PD122	3.516E+00	3.529E+00	3.516E+00	3.529E+00	3.610E+00	3.625E+00	3.610E+00	3.625E+00
PD123	7.958E-01	7.987E-01	7.958E-01	7.987E-01	8.086E-01	8.122E-01	8.086E-01	8.121E-01
PD124	1.569E-01	1.574E-01	1.569E-01	1.574E-01	1.584E-01	1.590E-01	1.584E-01	1.590E-01
PD125	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD126	1.973E-03	1.983E-03	1.973E-03	1.982E-03	1.989E-03	2.000E-03	1.989E-03	2.000E-03
PM145	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM146	1.609E-01	2.031E-01	1.657E-01	2.101E-01	2.203E-01	2.780E-01	2.268E-01	2.876E-01
PM147	2.760E+04	2.838E+04	2.850E+04	2.939E+04	2.730E+04	2.800E+04	2.818E+04	2.899E+04
PM148	3.539E+04	3.936E+04	3.676E+04	4.101E+04	3.610E+04	4.028E+04	3.750E+04	4.195E+04
PM148M	5.406E+03	5.719E+03	5.652E+03	5.987E+03	5.182E+03	5.473E+03	5.410E+03	5.720E+03
PM149	7.630E+04	8.013E+04	7.736E+04	8.142E+04	7.692E+04	8.103E+04	7.798E+04	8.232E+04

MODEL	MBHR	MBHR	MBHS	MBHS	MPHR	MPHR	MPHS	MPHS
NWD	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
PM150	5.745E+02	6.561E+02	5.821E+02	6.662E+02	6.115E+02	7.053E+02	6.196E+02	7.162E+02
PM151	2.109E+04	2.112E+04	2.109E+04	2.112E+04	2.105E+04	2.108E+04	2.105E+04	2.108E+04
PM152	1.346E+04	1.345E+04	1.346E+04	1.345E+04	1.346E+04	1.345E+04	1.346E+04	1.345E+04
PM152M	1.822E+02	1.821E+02	1.822E+02	1.820E+02	1.822E+02	1.821E+02	1.822E+02	1.821E+02
PM153	8.233E+03	8.224E+03	8.233E+03	8.224E+03	8.234E+03	8.225E+03	8.234E+03	8.225E+03
PM154	3.323E+03	3.321E+03	3.323E+03	3.321E+03	3.324E+03	3.323E+03	3.324E+03	3.322E+03
PM154M	4.669E+02	4.668E+02	4.669E+02	4.667E+02	4.675E+02	4.674E+02	4.675E+02	4.674E+02
PM155	1.665E+03	1.665E+03	1.665E+03	1.665E+03	1.671E+03	1.670E+03	1.671E+03	1.670E+03
PM156	5.775E+02	5.779E+02	5.775E+02	5.779E+02	5.792E+02	5.798E+02	5.792E+02	5.798E+02
PM157	2.029E+02	2.033E+02	2.029E+02	2.033E+02	2.042E+02	2.046E+02	2.042E+02	2.046E+02
PM158	5.514E+01	5.528E+01	5.514E+01	5.528E+01	5.570E+01	5.585E+01	5.570E+01	5.585E+01
PM159	7.448E+00	7.487E+00	7.448E+00	7.487E+00	7.457E+00	7.501E+00	7.457E+00	7.501E+00
PM160	2.517E+00	2.521E+00	2.517E+00	2.521E+00	2.529E+00	2.534E+00	2.529E+00	2.534E+00
PM161	4.483E-02	4.573E-02	4.484E-02	4.573E-02	4.533E-02	4.630E-02	4.533E-02	4.630E-02
PM162	2.532E-03	2.564E-03	2.532E-03	2.564E-03	2.576E-03	2.611E-03	2.576E-03	2.611E-03
PR139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR140	1.353E+00	1.683E+00	1.341E+00	1.670E+00	1.856E+00	2.324E+00	1.840E+00	2.306E+00
PR141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR142	5.883E+03	7.318E+03	5.832E+03	7.262E+03	6.102E+03	7.642E+03	6.049E+03	7.583E+03
PR142M	1.283E+03	1.596E+03	1.272E+03	1.583E+03	1.303E+03	1.632E+03	1.292E+03	1.619E+03
PR144	2.637E+05	2.636E+05	2.846E+05	2.844E+05	2.637E+05	2.635E+05	2.846E+05	2.844E+05
PR144	1.970E+05	2.049E+05	2.168E+05	2.273E+05	1.966E+05	2.045E+05	2.164E+05	2.270E+05
PR144M	2.352E+03	2.446E+03	2.589E+03	2.714E+03	2.348E+03	2.441E+03	2.584E+03	2.709E+03
PR145	1.935E+05	1.933E+05	1.936E+05	1.933E+05	1.936E+05	1.933E+05	1.936E+05	1.933E+05
PR146	1.473E+05	1.471E+05	1.473E+05	1.471E+05	1.472E+05	1.470E+05	1.472E+05	1.470E+05
PR147	1.128E+05	1.127E+05	1.128E+05	1.127E+05	1.128E+05	1.127E+05	1.128E+05	1.127E+05
PR148	8.351E+04	8.338E+04	8.351E+04	8.338E+04	8.351E+04	8.338E+04	8.351E+04	8.338E+04
PR149	5.295E+04	5.287E+04	5.295E+04	5.287E+04	5.295E+04	5.287E+04	5.295E+04	5.287E+04
PR150	2.956E+04	2.952E+04	2.956E+04	2.952E+04	2.956E+04	2.952E+04	2.956E+04	2.952E+04
PR151	1.489E+04	1.487E+04	1.489E+04	1.487E+04	1.489E+04	1.487E+04	1.489E+04	1.487E+04
PR152	6.026E+03	6.019E+03	6.026E+03	6.019E+03	6.027E+03	6.020E+03	6.026E+03	6.020E+03
PR153	1.617E+03	1.615E+03	1.617E+03	1.615E+03	1.617E+03	1.615E+03	1.617E+03	1.615E+03
PR154	2.787E+02	2.785E+02	2.787E+02	2.785E+02	2.788E+02	2.786E+02	2.788E+02	2.786E+02
PR155	3.431E+01	3.431E+01	3.431E+01	3.431E+01	3.433E+01	3.433E+01	3.433E+01	3.433E+01
PR156	2.589E+00	2.589E+00	2.589E+00	2.589E+00	2.592E+00	2.600E+00	2.592E+00	2.600E+00
PR157	1.655E-01	1.669E-01	1.655E-01	1.669E-01	1.665E-01	1.680E-01	1.665E-01	1.680E-01
PR158	6.878E-03	6.981E-03	6.878E-03	6.981E-03	6.910E-03	7.024E-03	6.910E-03	7.024E-03
PR159	1.254E-04	1.295E-04	1.254E-04	1.295E-04	1.262E-04	1.308E-04	1.262E-04	1.308E-04
RB 85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 86	1.455E+02	1.805E+02	1.572E+02	1.951E+02	1.468E+02	1.837E+02	1.586E+02	1.985E+02
RB 86M	1.692E+01	2.030E+01	1.689E+01	2.025E+01	1.709E+01	2.064E+01	1.706E+01	2.059E+01
RB 87	3.364E-06	3.802E-06	3.364E-06	3.802E-06	3.365E-06	3.803E-06	3.365E-06	3.803E-06
RB 88	1.815E+05	1.812E+05	1.815E+05	1.812E+05	1.815E+05	1.812E+05	1.815E+05	1.812E+05
RB 89	2.371E+05	2.367E+05	2.371E+05	2.367E+05	2.366E+05	2.362E+05	2.366E+05	2.362E+05
RB 90	2.350E+05	2.346E+05	2.350E+05	2.346E+05	2.349E+05	2.345E+05	2.349E+05	2.345E+05
RB 90M	4.887E+04	4.879E+04	4.887E+04	4.879E+04	4.887E+04	4.879E+04	4.887E+04	4.879E+04
RB 91	2.779E+05	2.774E+05	2.779E+05	2.774E+05	2.778E+05	2.774E+05	2.778E+05	2.773E+05
RB 92	2.352E+05	2.348E+05	2.352E+05	2.348E+05	2.352E+05	2.348E+05	2.352E+05	2.348E+05
RB 93	1.744E+05	1.741E+05	1.744E+05	1.741E+05	1.744E+05	1.741E+05	1.744E+05	1.741E+05
RB 94	8.735E+04	8.721E+04	8.735E+04	8.721E+04	8.735E+04	8.720E+04	8.735E+04	8.720E+04
RB 95	4.478E+04	4.471E+04	4.478E+04	4.471E+04	4.479E+04	4.471E+04	4.479E+04	4.471E+04
RB 96	9.973E+03	9.957E+03	9.973E+03	9.957E+03	9.974E+03	9.958E+03	9.974E+03	9.958E+03
RB 97	1.797E+03	1.795E+03	1.797E+03	1.795E+03	1.802E+03	1.800E+03	1.802E+03	1.800E+03
RB 98	2.609E+02	2.605E+02	2.609E+02	2.605E+02	2.609E+02	2.605E+02	2.609E+02	2.605E+02
RB 99	2.015E+01	2.012E+01	2.015E+01	2.012E+01	2.015E+01	2.012E+01	2.015E+01	2.012E+01
RB100	8.493E-01	8.488E-01	8.493E-01	8.488E-01	8.497E-01	8.493E-01	8.497E-01	8.493E-01

MODEL	MBHR	MBHR	MBHS	MBHS	MPHR	MPHR	MPHS	MPHS
MWD	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
RB101	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH102	3.606E-02	4.781E-02	3.592E-02	4.789E-02	4.946E-02	6.563E-02	4.928E-02	6.575E-02
RH103	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH103M	1.261E+05	1.263E+05	1.428E+05	1.429E+05	1.262E+05	1.263E+05	1.428E+05	1.429E+05
RH104	5.454E+04	6.580E+04	5.404E+04	6.529E+04	5.635E+04	6.833E+04	5.584E+04	6.781E+04
RH104M	4.055E+03	4.892E+03	4.018E+03	4.854E+03	4.080E+03	4.947E+03	4.043E+03	4.910E+03
RH105	4.923E+04	4.905E+04	4.923E+04	4.905E+04	4.914E+04	4.893E+04	4.914E+04	4.893E+04
RH105M	1.448E+04	1.450E+04	1.448E+04	1.450E+04	1.449E+04	1.450E+04	1.449E+04	1.450E+04
RH106	1.546E+04	1.637E+04	1.660E+04	1.770E+04	1.561E+04	1.655E+04	1.675E+04	1.788E+04
RH106M	9.175E+02	9.997E+02	9.175E+02	9.996E+02	9.323E+02	1.022E+03	9.323E+02	1.022E+03
RH107	9.696E+03	9.734E+03	9.697E+03	9.735E+03	9.781E+03	9.823E+03	9.782E+03	9.824E+03
RH108	4.625E+03	4.654E+03	4.625E+03	4.655E+03	4.682E+03	4.713E+03	4.682E+03	4.713E+03
RH108M	3.892E+00	4.262E+00	3.893E+00	4.262E+00	3.990E+00	4.382E+00	3.991E+00	4.383E+00
RH109	2.250E+03	2.270E+03	2.250E+03	2.270E+03	2.310E+03	2.331E+03	2.310E+03	2.332E+03
RH109M	1.125E+03	1.135E+03	1.125E+03	1.135E+03	1.155E+03	1.166E+03	1.155E+03	1.166E+03
RH110	1.560E+03	1.567E+03	1.560E+03	1.567E+03	1.607E+03	1.615E+03	1.607E+03	1.615E+03
RH110M	5.166E+01	5.237E+01	5.166E+01	5.238E+01	5.268E+01	5.345E+01	5.269E+01	5.345E+01
RH111	1.277E+03	1.280E+03	1.277E+03	1.280E+03	1.315E+03	1.319E+03	1.315E+03	1.319E+03
RH112	8.647E+02	8.657E+02	8.647E+02	8.657E+02	9.005E+02	9.016E+02	9.005E+02	9.016E+02
RH113	7.348E+02	7.352E+02	7.348E+02	7.351E+02	7.697E+02	7.701E+02	7.697E+02	7.701E+02
RH114	5.099E+02	5.098E+02	5.099E+02	5.098E+02	5.350E+02	5.350E+02	5.350E+02	5.350E+02
RH115	2.712E+02	2.714E+02	2.712E+02	2.714E+02	2.869E+02	2.871E+02	2.869E+02	2.871E+02
RH116	1.270E+02	1.270E+02	1.270E+02	1.270E+02	1.344E+02	1.344E+02	1.344E+02	1.344E+02
RH117	2.849E+02	2.846E+02	2.849E+02	2.845E+02	3.004E+02	3.000E+02	3.004E+02	3.000E+02
RH118	1.222E+01	1.243E+01	1.222E+01	1.243E+01	1.308E+01	1.332E+01	1.308E+01	1.332E+01
RH119	2.100E+00	2.119E+00	2.100E+00	2.119E+00	2.249E+00	2.270E+00	2.249E+00	2.270E+00
RH120	2.676E-01	2.700E-01	2.676E-01	2.700E-01	2.834E-01	2.861E-01	2.834E-01	2.861E-01
RH121	2.788E-02	2.828E-02	2.788E-02	2.828E-02	2.904E-02	2.951E-02	2.904E-02	2.951E-02
RH122	2.908E-03	2.957E-03	2.908E-03	2.957E-03	2.987E-03	3.044E-03	2.987E-03	3.044E-03
RH123	2.750E-04	2.791E-04	2.750E-04	2.791E-04	2.801E-04	2.850E-04	2.801E-04	2.850E-04
RU 99	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU100	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU101	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU102	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU103	1.400E+05	1.401E+05	1.584E+05	1.586E+05	1.400E+05	1.401E+05	1.584E+05	1.586E+05
RU104	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU105	5.172E+04	5.178E+04	5.172E+04	5.178E+04	5.173E+04	5.180E+04	5.173E+04	5.180E+04
RU106	1.364E+04	1.439E+04	1.478E+04	1.572E+04	1.369E+04	1.445E+04	1.483E+04	1.577E+04
RU107	9.694E+03	9.732E+03	9.695E+03	9.733E+03	9.779E+03	9.820E+03	9.780E+03	9.822E+03
RU108	4.621E+03	4.650E+03	4.621E+03	4.650E+03	4.678E+03	4.709E+03	4.678E+03	4.709E+03
RU109	2.215E+03	2.235E+03	2.215E+03	2.235E+03	2.275E+03	2.295E+03	2.275E+03	2.295E+03
RU110	1.508E+03	1.515E+03	1.508E+03	1.515E+03	1.554E+03	1.562E+03	1.554E+03	1.562E+03
RU111	1.003E+03	1.005E+03	1.003E+03	1.005E+03	1.034E+03	1.034E+03	1.034E+03	1.037E+03
RU112	5.007E+02	5.013E+02	5.007E+02	5.013E+02	5.239E+02	5.246E+02	5.239E+02	5.246E+02
RU113	2.688E+02	2.690E+02	2.688E+02	2.690E+02	2.832E+02	2.835E+02	2.832E+02	2.835E+02
RU114	9.929E+01	9.942E+01	9.929E+01	9.941E+01	1.045E+02	1.046E+02	1.045E+02	1.046E+02
RU115	2.327E+01	2.336E+01	2.327E+01	2.336E+01	2.485E+01	2.496E+01	2.485E+01	2.496E+01
RU116	4.150E+00	4.173E+00	4.150E+00	4.173E+00	4.417E+00	4.444E+00	4.417E+00	4.444E+00
RU117	2.263E+00	2.263E+00	2.263E+00	2.263E+00	2.394E+00	2.395E+00	2.394E+00	2.395E+00
RU118	3.548E-01	3.839E-01	3.548E-01	3.839E-01	3.802E-01	4.138E-01	3.802E-01	4.138E-01
RU119	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU120	1.764E-04	1.823E-04	1.764E-04	1.823E-04	1.883E-04	1.952E-04	1.883E-04	1.952E-04
SB121	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB122	5.505E+01	6.776E+01	5.508E+01	6.779E+01	5.880E+01	7.286E+01	5.883E+01	7.289E+01
SB122M	4.875E-01	5.995E-01	4.875E-01	5.995E-01	5.138E-01	6.360E-01	5.138E-01	6.360E-01
SB123	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

MODEL	MBHR	MBHR	MBHS	MBHS	MPHR	MPHR	MPHS	MPHS
MWD	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
SB124	2.992E+01	3.759E+01	3.291E+01	4.145E+01	3.172E+01	4.007E+01	3.489E+01	4.417E+01
SB124M	4.121E-01	4.400E+01	4.110E-01	4.388E-01	4.546E-01	4.847E-01	4.835E-01	4.834E-01
SB125	6.663E+02	7.311E+02	6.896E+02	7.529E+02	6.842E+02	7.507E+02	7.081E+02	7.803E+02
SB126	5.762E+01	5.991E+01	6.168E+01	6.426E+01	5.978E+01	6.228E+01	6.399E+01	6.682E+01
SB126M	2.476E+01	2.500E+01	2.480E+01	2.506E+01	2.630E+01	2.657E+01	2.635E+01	2.663E+01
SB127	7.833E+03	7.831E+03	7.863E+03	7.861E+03	7.920E+03	7.919E+03	7.951E+03	7.950E+03
SB128	7.867E+02	7.865E+02	7.867E+02	7.865E+02	7.969E+02	7.967E+02	7.969E+02	7.967E+02
SB128M	1.888E+04	1.888E+04	1.888E+04	1.886E+04	1.896E+04	1.893E+04	1.896E+04	1.893E+04
SB129	3.402E+04	3.398E+04	3.402E+04	3.398E+04	3.412E+04	3.408E+04	3.412E+04	3.408E+04
SB130	1.075E+04	1.074E+04	1.075E+04	1.074E+04	1.080E+04	1.079E+04	1.080E+04	1.079E+04
SB130M	6.163E+04	6.155E+04	6.163E+04	6.155E+04	6.174E+04	6.165E+04	6.174E+04	6.165E+04
SB131	1.272E+05	1.270E+05	1.272E+05	1.270E+05	1.272E+05	1.270E+05	1.272E+05	1.270E+05
SB132	8.273E+04	8.260E+04	8.273E+04	8.260E+04	8.273E+04	8.260E+04	8.273E+04	8.260E+04
SB132M	5.292E+04	5.285E+04	5.292E+04	5.284E+04	5.292E+04	5.285E+04	5.292E+04	5.285E+04
SB133	1.112E+05	1.110E+05	1.112E+05	1.110E+05	1.112E+05	1.110E+05	1.112E+05	1.110E+05
SB134	1.336E+04	1.334E+04	1.336E+04	1.334E+04	1.336E+04	1.334E+04	1.336E+04	1.334E+04
SB134M	1.277E+04	1.275E+04	1.277E+04	1.275E+04	1.277E+04	1.275E+04	1.277E+04	1.275E+04
SB135	9.754E+03	9.739E+03	9.754E+03	9.739E+03	9.754E+03	9.739E+03	9.754E+03	9.738E+03
SB136	1.483E+03	1.480E+03	1.483E+03	1.480E+03	1.483E+03	1.481E+03	1.483E+03	1.480E+03
SB137	1.059E+02	1.058E+02	1.059E+02	1.058E+02	1.059E+02	1.058E+02	1.059E+02	1.058E+02
SB138	6.619E+00	6.617E+00	6.619E+00	6.617E+00	6.621E+00	6.620E+00	6.621E+00	6.620E+00
SB139	2.981E-01	2.983E-01	2.981E-01	2.983E-01	2.978E-01	2.981E-01	2.978E-01	2.981E-01
SE 76	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 77	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 77M	1.264E+00	1.270E+00	1.264E+00	1.270E+00	1.275E+00	1.282E+00	1.275E+00	1.282E+00
SE 78	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 79	5.006E-02	5.657E-02	5.006E-02	5.657E-02	5.004E-02	5.655E-02	5.004E-02	5.655E-02
SE 79M	2.626E+03	2.622E+03	2.626E+03	2.622E+03	2.625E+03	2.621E+03	2.625E+03	2.621E+03
SE 80	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 81	1.057E+04	1.055E+04	1.057E+04	1.055E+04	1.057E+04	1.055E+04	1.057E+04	1.055E+04
SE 81M	3.390E+02	3.386E+02	3.390E+02	3.386E+02	3.395E+02	3.391E+02	3.395E+02	3.391E+02
SE 82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 83	9.916E+03	9.901E+03	9.916E+03	9.901E+03	9.921E+03	9.906E+03	9.921E+03	9.905E+03
SE 83M	1.651E+04	1.649E+04	1.651E+04	1.649E+04	1.651E+04	1.649E+04	1.651E+04	1.649E+04
SE 84	4.915E+04	4.906E+04	4.914E+04	4.906E+04	4.914E+04	4.906E+04	4.914E+04	4.906E+04
SE 85	3.115E+04	3.109E+04	3.115E+04	3.109E+04	3.114E+04	3.109E+04	3.114E+04	3.109E+04
SE 85M	2.273E+04	2.269E+04	2.273E+04	2.269E+04	2.273E+04	2.269E+04	2.273E+04	2.269E+04
SE 86	6.521E+04	6.510E+04	6.521E+04	6.510E+04	6.521E+04	6.510E+04	6.521E+04	6.510E+04
SE 87	4.836E+04	4.828E+04	4.836E+04	4.828E+04	4.836E+04	4.827E+04	4.836E+04	4.827E+04
SE 88	1.767E+04	1.764E+04	1.767E+04	1.764E+04	1.767E+04	1.764E+04	1.767E+04	1.764E+04
SE 89	4.588E+03	4.588E+03	4.588E+03	4.580E+03	4.593E+03	4.585E+03	4.593E+03	4.585E+03
SE 90	1.596E+03	1.594E+03	1.596E+03	1.594E+03	1.591E+03	1.589E+03	1.591E+03	1.589E+03
SE 91	1.593E+02	1.590E+02	1.593E+02	1.590E+02	1.593E+02	1.591E+02	1.593E+02	1.590E+02
SE 92	2.378E+00	2.378E+00	2.378E+00	2.376E+00	2.380E+00	2.378E+00	2.380E+00	2.378E+00
SE 93	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM145	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM146	6.684E-09	9.808E-09	5.721E-09	8.420E-09	9.151E-09	1.344E-08	7.831E-09	1.153E-08
SM147	2.104E-07	2.510E-07	1.823E-07	2.180E-07	2.084E-07	2.481E-07	1.806E-07	2.155E-07
SM148	3.587E-12	4.592E-12	3.509E-12	4.497E-12	3.656E-12	4.680E-12	3.576E-12	4.582E-12
SM149	1.076E-13	1.035E-13	1.103E-13	1.062E-13	1.018E-13	9.763E-14	1.042E-13	1.001E-13
SM150	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM151	5.393E+01	5.339E+01	5.472E+01	5.441E+01	5.112E+01	5.057E+01	5.196E+01	5.167E+01
SM152	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM153	3.027E+04	3.504E+04	3.038E+04	3.521E+04	3.105E+04	3.613E+04	3.118E+04	3.633E+04
SM154	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM155	1.861E+03	1.876E+03	1.861E+03	1.877E+03	1.869E+03	1.885E+03	1.869E+03	1.885E+03

MODEL	MBHR	MBHR	MBHS	MBHS	MPIHR	MPIHR	MPPHS	MPPHS
MWD	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
SM156	7.439E+02	7.446E+02	7.439E+02	7.446E+02	7.468E+02	7.476E+02	7.468E+02	7.475E+02
SM157	3.799E+02	3.796E+02	3.789E+02	3.796E+02	3.813E+02	3.820E+02	3.813E+02	3.820E+02
SM158	1.836E+02	1.841E+02	1.836E+02	1.841E+02	1.853E+02	1.857E+02	1.853E+02	1.857E+02
SM159	5.301E+01	5.327E+01	5.301E+01	5.327E+01	5.337E+01	5.365E+01	5.337E+01	5.365E+01
SM160	2.040E+01	2.050E+01	2.040E+01	2.050E+01	2.059E+01	2.069E+01	2.059E+01	2.069E+01
SM161	2.166E+00	2.197E+00	2.166E+00	2.197E+00	2.194E+00	2.227E+00	2.194E+00	2.227E+00
SM162	3.594E-01	3.627E-01	3.594E-01	3.627E-01	3.671E-01	3.707E-01	3.671E-01	3.708E-01
SM163	2.332E-02	2.368E-02	2.332E-02	2.368E-02	2.397E-02	2.438E-02	2.397E-02	2.438E-02
SM164	1.307E-03	1.337E-03	1.307E-03	1.337E-03	1.352E-03	1.386E-03	1.352E-03	1.386E-03
SM165	6.165E-05	6.342E-05	6.165E-05	6.342E-05	6.403E-05	6.605E-05	6.403E-05	6.605E-05
SR 86	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 87	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 87M	1.750E-01	2.351E-01	1.739E-01	2.335E-01	1.784E-01	2.415E-01	1.772E-01	2.398E-01
SR 88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 89	2.106E+05	2.108E+05	2.404E+05	2.404E+05	2.102E+05	2.102E+05	2.400E+05	2.399E+05
SR 90	1.177E+04	1.326E+04	1.181E+04	1.331E+04	1.177E+04	1.326E+04	1.181E+04	1.331E+04
SR 91	2.895E+05	2.890E+05	2.895E+05	2.890E+05	2.895E+05	2.891E+05	2.895E+05	2.891E+05
SR 92	2.959E+05	2.954E+05	2.959E+05	2.954E+05	2.964E+05	2.959E+05	2.964E+05	2.959E+05
SR 93	3.148E+05	3.143E+05	3.148E+05	3.142E+05	3.148E+05	3.142E+05	3.148E+05	3.142E+05
SR 94	2.914E+05	2.910E+05	2.914E+05	2.910E+05	2.909E+05	2.905E+05	2.909E+05	2.905E+05
SR 95	2.688E+05	2.684E+05	2.688E+05	2.684E+05	2.688E+05	2.684E+05	2.688E+05	2.683E+05
SR 96	1.860E+05	1.858E+05	1.860E+05	1.857E+05	1.860E+05	1.857E+05	1.860E+05	1.857E+05
SR 97	9.542E+04	9.526E+04	9.541E+04	9.526E+04	9.542E+04	9.526E+04	9.542E+04	9.526E+04
SR 98	3.471E+04	3.466E+04	3.471E+04	3.466E+04	3.472E+04	3.466E+04	3.471E+04	3.466E+04
SR 99	7.633E+03	7.621E+03	7.633E+03	7.621E+03	7.633E+03	7.622E+03	7.633E+03	7.622E+03
SR100	1.175E+03	1.173E+03	1.175E+03	1.173E+03	1.180E+03	1.178E+03	1.180E+03	1.178E+03
SR101	1.467E+02	1.465E+02	1.467E+02	1.465E+02	1.467E+02	1.465E+02	1.467E+02	1.465E+02
SR102	9.782E+00	9.771E+00	9.782E+00	9.771E+00	9.784E+00	9.773E+00	9.784E+00	9.773E+00
SR103	2.389E-01	2.387E-01	2.389E-01	2.387E-01	2.389E-01	2.388E-01	2.389E-01	2.388E-01
SR104	4.148E-03	4.151E-03	4.148E-03	4.151E-03	4.147E-03	4.150E-03	4.147E-03	4.150E-03
TC 98	1.854E-07	2.498E-07	1.854E-07	2.498E-07	2.548E-07	3.435E-07	2.548E-07	3.435E-07
TC 99	1.651E+00	1.854E+00	1.651E+00	1.854E+00	1.642E+00	1.842E+00	1.642E+00	1.842E+00
TC 99M	2.629E+05	2.633E+05	2.631E+05	2.634E+05	2.604E+05	2.602E+05	2.604E+05	2.602E+05
TC100	2.957E+04	3.631E+04	2.957E+04	3.631E+04	3.039E+04	3.754E+04	3.040E+04	3.754E+04
TC101	2.521E+05	2.518E+05	2.521E+05	2.518E+05	2.521E+05	2.519E+05	2.521E+05	2.519E+05
TC102	2.098E+05	2.095E+05	2.098E+05	2.095E+05	2.098E+05	2.095E+05	2.098E+05	2.095E+05
TC102M	6.448E+01	6.452E+01	6.448E+01	6.452E+01	6.451E+01	6.456E+01	6.451E+01	6.456E+01
TC103	1.562E+05	1.560E+05	1.562E+05	1.560E+05	1.562E+05	1.560E+05	1.562E+05	1.560E+05
TC104	9.327E+04	9.320E+04	9.327E+04	9.320E+04	9.379E+04	9.372E+04	9.378E+04	9.371E+04
TC105	5.131E+04	5.130E+04	5.131E+04	5.130E+04	5.132E+04	5.132E+04	5.132E+04	5.132E+04
TC106	2.075E+04	2.078E+04	2.075E+04	2.078E+04	2.083E+04	2.086E+04	2.083E+04	2.086E+04
TC107	9.406E+03	9.423E+03	9.406E+03	9.423E+03	9.486E+03	9.505E+03	9.486E+03	9.505E+03
TC108	3.986E+03	3.999E+03	3.986E+03	3.999E+03	4.034E+03	4.048E+03	4.034E+03	4.048E+03
TC109	1.247E+03	1.254E+03	1.247E+03	1.254E+03	1.284E+03	1.291E+03	1.284E+03	1.291E+03
TC110	4.594E+02	4.606E+02	4.594E+02	4.606E+02	4.744E+02	4.758E+02	4.744E+02	4.758E+02
TC111	1.230E+02	1.234E+02	1.230E+02	1.234E+02	1.293E+02	1.297E+02	1.293E+02	1.297E+02
TC112	2.603E+01	2.616E+01	2.603E+01	2.616E+01	2.757E+01	2.772E+01	2.757E+01	2.772E+01
TC113	5.782E+00	5.815E+00	5.782E+00	5.815E+00	6.058E+00	6.098E+00	6.058E+00	6.098E+00
TC114	8.127E-01	8.209E-01	8.127E-01	8.209E-01	8.640E-01	8.736E-01	8.640E-01	8.736E-01
TC115	7.894E-02	8.085E-02	7.894E-02	8.085E-02	8.380E-02	8.599E-02	8.380E-02	8.599E-02
TC116	4.527E-03	4.646E-03	4.527E-03	4.646E-03	4.858E-03	4.994E-03	4.858E-03	4.994E-03
TC117	5.651E-04	5.694E-04	5.651E-04	5.694E-04	5.986E-04	6.037E-04	5.986E-04	6.037E-04
TC118	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE122	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE123	1.731E-14	2.639E-14	1.713E-14	2.612E-14	1.869E-14	2.848E-14	1.850E-14	2.820E-14
TE123M	1.109E-01	1.689E-01	1.191E-01	1.822E-01	1.205E-01	1.844E-01	1.295E-01	1.989E-01

MODEL	MBHR	MBHR	MBHS	MBHS	MPHR	MPHR	MPHS	MPHS
MWD	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
TE124	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE125	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE125M	1.390E+02	1.548E+02	1.411E+02	1.582E+02	1.427E+02	1.590E+02	1.448E+02	1.625E+02
TE126	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE127	7.667E+03	7.670E+03	7.840E+03	7.846E+03	7.754E+03	7.756E+03	7.928E+03	7.935E+03
TE127M	9.384E+02	9.422E+02	1.085E+03	1.093E+03	9.490E+02	9.528E+02	1.097E+03	1.105E+03
TE128	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE129	3.325E+04	3.322E+04	3.362E+04	3.359E+04	3.337E+04	3.335E+04	3.375E+04	3.372E+04
TE129M	4.522E+03	4.522E+03	5.091E+03	5.092E+03	4.538E+03	4.539E+03	5.110E+03	5.110E+03
TE130	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE131	1.285E+05	1.283E+05	1.284E+05	1.283E+05	1.285E+05	1.283E+05	1.285E+05	1.283E+05
TE131M	1.808E+04	1.806E+04	1.808E+04	1.806E+04	1.808E+04	1.806E+04	1.808E+04	1.806E+04
TE132	2.125E+05	2.123E+05	2.129E+05	2.127E+05	2.125E+05	2.123E+05	2.129E+05	2.127E+05
TE133	1.929E+05	1.927E+05	1.929E+05	1.927E+05	1.930E+05	1.927E+05	1.929E+05	1.927E+05
TE133M	1.448E+05	1.446E+05	1.448E+05	1.446E+05	1.448E+05	1.446E+05	1.448E+05	1.446E+05
TE134	3.329E+05	3.324E+05	3.329E+05	3.324E+05	3.324E+05	3.319E+05	3.324E+05	3.319E+05
TE135	1.627E+05	1.625E+05	1.627E+05	1.625E+05	1.627E+05	1.625E+05	1.627E+05	1.625E+05
TE136	9.294E+04	9.279E+04	9.294E+04	9.279E+04	9.294E+04	9.279E+04	9.294E+04	9.279E+04
TE137	2.088E+04	2.085E+04	2.088E+04	2.085E+04	2.088E+04	2.085E+04	2.088E+04	2.085E+04
TE138	4.324E+03	4.317E+03	4.324E+03	4.317E+03	4.324E+03	4.317E+03	4.324E+03	4.317E+03
TE139	6.448E+02	6.439E+02	6.448E+02	6.439E+02	6.448E+02	6.439E+02	6.448E+02	6.439E+02
TE140	6.010E+01	6.002E+01	6.010E+01	6.002E+01	6.010E+01	6.003E+01	6.010E+01	6.003E+01
TE141	2.091E+00	2.089E+00	2.091E+00	2.089E+00	2.086E+00	2.084E+00	2.086E+00	2.084E+00
TE142	4.171E+02	4.184E+02	4.171E+02	4.183E+02	4.177E+02	4.192E+02	4.177E+02	4.191E+02
XE126	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE127	5.006E+04	7.543E+04	5.429E+04	8.200E+04	7.107E+04	1.080E+03	7.709E+04	1.174E+03
XE128	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE129	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE129M	8.584E+02	1.277E+01	8.765E+02	1.306E+01	9.005E+02	1.351E+01	9.196E+02	1.382E+01
XE130	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE131	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE131M	1.427E+03	1.427E+03	1.605E+03	1.605E+03	1.428E+03	1.428E+03	1.605E+03	1.606E+03
XE132	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE133	3.163E+05	3.160E+05	3.210E+05	3.207E+05	3.162E+05	3.160E+05	3.210E+05	3.207E+05
XE133M	9.752E+03	9.740E+03	9.754E+03	9.742E+03	9.757E+03	9.746E+03	9.759E+03	9.747E+03
XE134	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE134M	1.178E+03	1.175E+03	1.176E+03	1.175E+03	1.181E+03	1.180E+03	1.181E+03	1.180E+03
XE135	9.954E+04	9.335E+04	9.954E+04	9.335E+04	9.505E+04	8.860E+04	9.505E+04	8.860E+04
XE135M	5.631E+04	5.624E+04	5.631E+04	5.624E+04	5.629E+04	5.621E+04	5.629E+04	5.621E+04
XE136	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE137	2.966E+05	2.962E+05	2.966E+05	2.962E+05	2.966E+05	2.962E+05	2.966E+05	2.962E+05
XE138	3.090E+05	3.085E+05	3.090E+05	3.085E+05	3.090E+05	3.085E+05	3.090E+05	3.085E+05
XE139	2.512E+05	2.508E+05	2.512E+05	2.508E+05	2.512E+05	2.508E+05	2.512E+05	2.508E+05
XE140	1.760E+05	1.757E+05	1.760E+05	1.757E+05	1.755E+05	1.752E+05	1.755E+05	1.752E+05
XE141	5.869E+04	5.860E+04	5.869E+04	5.860E+04	5.820E+04	5.810E+04	5.820E+04	5.810E+04
XE142	1.890E+04	1.887E+04	1.890E+04	1.887E+04	1.890E+04	1.887E+04	1.890E+04	1.887E+04
XE143	2.577E+03	2.574E+03	2.577E+03	2.574E+03	2.578E+03	2.574E+03	2.578E+03	2.574E+03
XE144	3.258E+02	3.253E+02	3.258E+02	3.253E+02	3.258E+02	3.253E+02	3.258E+02	3.253E+02
XE145	7.425E+00	7.430E+00	7.425E+00	7.430E+00	7.480E+00	7.486E+00	7.479E+00	7.486E+00
XE146	6.873E-01	6.871E-01	6.873E-01	6.871E-01	6.925E-01	6.925E-01	6.925E-01	6.925E-01
XE147	1.255E+02	1.263E+02	1.255E+02	1.263E+02	1.258E+02	1.267E+02	1.258E+02	1.267E+02
Y 89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 89M	1.425E+02	1.426E+02	1.425E+02	1.426E+02	1.425E+02	1.428E+02	1.425E+02	1.428E+02
Y 90	1.211E+04	1.368E+04	1.215E+04	1.373E+04	1.212E+04	1.370E+04	1.216E+04	1.375E+04
Y 90M	8.662E-01	9.287E-01	8.624E-01	9.245E-01	8.705E-01	9.362E-01	8.666E-01	9.319E-01
Y 91	2.549E+05	2.549E+05	2.924E+05	2.925E+05	2.549E+05	2.549E+05	2.924E+05	2.925E+05

MODEL	MBHR	MBHR	MBHS	MBHS	MPHR	MPHR	MPHS	MPHS
MWID	3864	4368	3864	4368	3864	4368	3864	4368
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
Y 91M	1.679E+05	1.677E+05	1.679E+05	1.677E+05	1.679E+05	1.677E+05	1.679E+05	1.677E+05
Y 92	2.964E+05	2.959E+05	2.964E+05	2.959E+05	2.964E+05	2.959E+05	2.964E+05	2.959E+05
Y 93	3.196E+05	3.191E+05	3.196E+05	3.191E+05	3.196E+05	3.191E+05	3.196E+05	3.191E+05
Y 94	3.089E+05	3.084E+05	3.089E+05	3.084E+05	3.089E+05	3.084E+05	3.089E+05	3.079E+05
Y 95	3.157E+05	3.152E+05	3.157E+05	3.152E+05	3.157E+05	3.152E+05	3.157E+05	3.152E+05
Y 96	2.969E+05	2.965E+05	2.969E+05	2.965E+05	2.969E+05	2.965E+05	2.969E+05	2.965E+05
Y 97	2.498E+05	2.494E+05	2.498E+05	2.494E+05	2.498E+05	2.494E+05	2.498E+05	2.494E+05
Y 98	1.789E+05	1.786E+05	1.789E+05	1.786E+05	1.789E+05	1.786E+05	1.789E+05	1.786E+05
Y 99	9.960E+04	9.944E+04	9.960E+04	9.944E+04	9.960E+04	9.944E+04	9.960E+04	9.944E+04
Y100	4.355E+04	4.348E+04	4.355E+04	4.348E+04	4.356E+04	4.349E+04	4.356E+04	4.349E+04
Y101	1.345E+04	1.343E+04	1.345E+04	1.343E+04	1.345E+04	1.343E+04	1.345E+04	1.343E+04
Y102	2.668E+03	2.664E+03	2.667E+03	2.664E+03	2.668E+03	2.664E+03	2.668E+03	2.664E+03
Y103	2.649E+02	2.646E+02	2.649E+02	2.646E+02	2.649E+02	2.646E+02	2.649E+02	2.646E+02
Y104	1.264E+01	1.263E+01	1.264E+01	1.263E+01	1.264E+01	1.264E+01	1.264E+01	1.264E+01
Y105	1.101E+00	1.099E+00	1.101E+00	1.099E+00	1.115E+00	1.114E+00	1.115E+00	1.114E+00
Y106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y107	1.844E-03	1.841E-03	1.844E-03	1.841E-03	1.849E-03	1.845E-03	1.848E-03	1.845E-03
ZR 90	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 90M	5.146E-05	5.178E-05	5.146E-05	5.178E-05	5.155E-05	5.190E-05	5.155E-05	5.190E-05
ZR 91	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 92	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 93	2.578E-01	2.911E-01	2.578E-01	2.911E-01	2.577E-01	2.911E-01	2.577E-01	2.911E-01
ZR 94	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 95	2.799E+05	2.799E+05	3.213E+05	3.214E+05	2.799E+05	2.799E+05	3.213E+05	3.214E+05
ZR 96	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 97	2.906E+05	2.903E+05	2.906E+05	2.903E+05	2.906E+05	2.903E+05	2.906E+05	2.903E+05
ZR 98	2.857E+05	2.853E+05	2.857E+05	2.853E+05	2.858E+05	2.853E+05	2.857E+05	2.853E+05
ZR 99	2.823E+05	2.819E+05	2.823E+05	2.819E+05	2.823E+05	2.819E+05	2.823E+05	2.819E+05
ZR100	2.636E+05	2.632E+05	2.636E+05	2.632E+05	2.636E+05	2.632E+05	2.636E+05	2.632E+05
ZR101	1.717E+05	1.714E+05	1.717E+05	1.714E+05	1.717E+05	1.714E+05	1.717E+05	1.714E+05
ZR102	8.824E+04	8.811E+04	8.824E+04	8.810E+04	8.824E+04	8.811E+04	8.824E+04	8.810E+04
ZR103	2.630E+04	2.626E+04	2.630E+04	2.626E+04	2.630E+04	2.626E+04	2.630E+04	2.626E+04
ZR104	3.983E+03	3.978E+03	3.983E+03	3.978E+03	3.983E+03	3.979E+03	3.983E+03	3.979E+03
ZR105	5.068E+02	5.062E+02	5.067E+02	5.062E+02	5.118E+02	5.112E+02	5.118E+02	5.112E+02
ZR106	1.226E+02	1.224E+02	1.226E+02	1.224E+02	1.226E+02	1.224E+02	1.226E+02	1.224E+02
ZR107	5.886E+00	5.877E+00	5.886E+00	5.877E+00	5.886E+00	5.877E+00	5.886E+00	5.876E+00
ZR108	1.343E-01	1.345E-01	1.343E-01	1.345E-01	1.360E-01	1.364E-01	1.360E-01	1.364E-01
ZR109	1.053E-03	1.090E-03	1.053E-03	1.090E-03	1.087E-03	1.129E-03	1.087E-03	1.129E-03
Inventory	2.829E+07	2.832E+07	2.864E+07	2.868E+07	2.828E+07	2.831E+07	2.863E+07	2.867E+07

B.2 LEU Core Inventories at End-of-Cycle and Maximum Burn-up

B.2.1 LEU Actinide Inventories

MODEL	MBLR	MBLR	MBSLS	MBSLS	MPLR	MPLR	MPLS	MPLS
MWD	4032	5376	4032	5376	4032	5376	4032	5376
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
AM239	5.243E+06	1.543E+05	4.531E+06	1.331E+05	8.024E+06	2.323E+05	6.938E+06	2.005E+05
AM240	1.436E+03	4.233E+03	1.241E+03	3.652E+03	1.731E+03	5.018E+03	1.496E+03	4.331E+03
AM241	1.279E+00	3.108E+00	1.105E+00	2.679E+00	1.392E+00	3.325E+00	1.202E+00	2.868E+00
AM242	4.901E+02	1.442E+03	4.235E+02	1.244E+03	5.785E+02	1.673E+03	5.001E+02	1.444E+03
AM242M	5.298E+02	1.569E+01	4.520E+02	1.340E+01	6.074E+02	1.759E+01	5.183E+02	1.502E+01
AM243	2.146E+02	9.892E+02	2.152E+02	9.922E+02	2.452E+02	1.117E+01	2.459E+02	1.120E+01
AM244	3.352E+00	1.875E+01	3.363E+00	1.882E+01	3.936E+00	2.168E+01	3.949E+00	2.177E+01
AM244M	6.380E+01	3.569E+02	6.401E+01	3.583E+02	7.493E+01	4.128E+02	7.517E+01	4.145E+02
AM245	1.534E+04	1.135E+03	1.551E+04	1.148E+03	1.875E+04	1.369E+03	1.896E+04	1.385E+03
AM246	2.235E+08	2.047E+07	2.368E+08	2.176E+07	2.834E+08	2.561E+07	3.001E+08	2.719E+07
AM241	1.942E+05	8.788E+05	1.897E+05	8.785E+05	2.517E+05	1.120E+04	2.459E+05	1.120E+04
CM242	1.553E+02	5.425E+02	1.396E+02	4.945E+02	1.827E+02	6.278E+02	1.643E+02	5.725E+02
CM243	2.216E+02	1.164E+01	1.999E+02	1.065E+01	2.637E+02	1.361E+01	2.380E+02	1.245E+01
CM244	7.028E+01	4.930E+00	7.058E+01	4.956E+00	8.251E+01	5.713E+00	8.287E+01	5.744E+00
CM245	2.275E+05	2.208E+04	2.285E+05	2.221E+04	2.732E+05	2.606E+04	2.745E+05	2.622E+04
CM246	1.396E+06	2.065E+05	1.403E+06	2.078E+05	1.760E+06	2.557E+05	1.770E+06	2.573E+05
CM247	1.247E+12	2.737E+11	1.254E+12	2.755E+11	1.612E+12	3.467E+11	1.621E+12	3.491E+11
CM248	8.745E+13	2.879E+11	8.797E+13	2.899E+11	1.172E+12	3.776E+11	1.180E+12	3.804E+11
CM249	1.581E+08	6.302E+07	1.592E+08	6.352E+07	1.284E+08	8.520E+07	1.299E+08	8.590E+07
CM250	1.331E+20	7.859E+19	1.342E+20	7.940E+19	1.896E+20	1.091E+18	1.913E+20	1.103E+18
CM251	3.552E+19	2.540E+17	3.586E+19	2.568E+17	5.277E+19	3.677E+17	5.328E+19	3.720E+17
NP235	2.196E+04	5.170E+04	2.249E+04	5.319E+04	2.301E+04	5.373E+04	2.357E+04	5.527E+04
NP236	3.852E+07	8.970E+07	3.834E+07	8.939E+07	4.017E+07	9.266E+07	3.998E+07	9.235E+07
NP236M	2.937E+04	8.378E+04	3.011E+04	8.627E+04	3.209E+04	9.082E+04	3.289E+04	9.351E+04
NP237	2.192E+02	4.065E+02	2.191E+02	4.065E+02	2.166E+02	4.002E+02	2.166E+02	4.001E+02
NP238	1.291E+04	2.900E+04	1.292E+04	2.902E+04	1.319E+04	2.947E+04	1.320E+04	2.949E+04
NP239	5.445E+05	6.571E+05	5.449E+05	6.578E+05	5.762E+05	6.950E+05	5.767E+05	6.958E+05
NP240	4.598E+02	6.718E+02	4.604E+02	6.731E+02	5.235E+02	7.647E+02	5.243E+02	7.663E+02
NP240M	7.619E+01	1.113E+00	7.628E+01	1.115E+00	8.355E+01	1.127E+00	8.366E+01	1.123E+00
NP241	5.626E+06	9.953E+06	5.636E+06	9.979E+06	6.366E+06	1.127E+05	6.378E+06	1.130E+05
PU236	6.901E+05	2.574E+04	6.972E+05	2.611E+04	7.521E+05	2.784E+04	7.597E+05	2.823E+04
PU237	3.055E+02	9.466E+02	3.226E+02	9.984E+02	3.319E+02	1.021E+01	3.501E+02	1.075E+01
PU238	5.120E+01	1.379E+02	5.087E+01	1.370E+02	5.233E+01	1.403E+02	5.198E+01	1.394E+02
PU239	1.194E+01	1.358E+01	1.195E+01	1.359E+01	1.240E+01	1.405E+01	1.241E+01	1.406E+01
PU240	9.934E+00	1.471E+01	9.948E+00	1.473E+01	1.042E+01	1.522E+01	1.043E+01	1.525E+01
PU241	1.599E+03	3.169E+03	1.607E+03	3.187E+03	1.783E+03	3.499E+03	1.792E+03	3.519E+03
PU242	6.656E+03	2.051E+02	6.680E+03	2.059E+02	7.420E+03	2.260E+02	7.448E+03	2.269E+02
PU243	6.874E+02	2.557E+03	6.903E+02	2.569E+03	7.975E+02	2.942E+03	8.010E+02	2.957E+03
PU244	1.849E+10	1.130E+09	1.868E+10	1.144E+09	2.184E+10	1.317E+09	2.207E+10	1.331E+09
PU245	1.534E+04	1.135E+03	1.551E+04	1.148E+03	1.875E+04	1.369E+03	1.896E+04	1.385E+03
PU246	2.235E+08	2.047E+07	2.368E+08	2.175E+07	2.834E+08	2.561E+07	3.000E+08	2.719E+07
Inventory	5.650E+05	7.004E+05	5.653E+05	7.009E+05	5.974E+05	7.400E+05	5.979E+05	7.405E+05

B.2.2 LEU Fission Product Inventories

MODEL	MBLR	MBLR	MBLS	MBLS	MPLR	MPLR	MPLS	MPLS
MWD	4032	5376	4032	5376	4032	5376	4032	5376
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
BA132	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA133	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA134	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA135	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA135M	1.961E+00	5.679E+00	1.735E+00	5.046E+00	2.120E+00	6.126E+00	1.875E+00	5.444E+00
BA136	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA136M	5.850E+02	8.720E+02	6.064E+02	9.026E+02	5.896E+02	8.778E+02	6.101E+02	9.066E+02
BA137	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA137M	1.206E+04	1.595E+04	1.211E+04	1.603E+04	1.206E+04	1.595E+04	1.211E+04	1.603E+04
BA138	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA139	3.168E+05	3.145E+05	3.169E+05	3.147E+05	3.166E+05	3.143E+05	3.167E+05	3.145E+05
BA140	2.886E+05	2.870E+05	3.080E+05	3.063E+05	2.879E+05	2.863E+05	3.073E+05	3.056E+05
BA141	2.890E+05	2.868E+05	2.891E+05	2.870E+05	2.884E+05	2.861E+05	2.885E+05	2.863E+05
BA142	2.824E+05	2.798E+05	2.825E+05	2.800E+05	2.821E+05	2.794E+05	2.823E+05	2.796E+05
BA143	2.570E+05	2.540E+05	2.571E+05	2.542E+05	2.566E+05	2.536E+05	2.568E+05	2.538E+05
BA144	2.055E+05	2.025E+05	2.056E+05	2.027E+05	2.047E+05	2.017E+05	2.048E+05	2.018E+05
BA145	9.706E+04	9.603E+04	9.710E+04	9.609E+04	9.697E+04	9.592E+04	9.702E+04	9.598E+04
BA146	3.338E+04	3.313E+04	3.340E+04	3.315E+04	3.338E+04	3.313E+04	3.340E+04	3.316E+04
BA147	6.653E+03	6.648E+03	6.656E+03	6.652E+03	6.665E+03	6.662E+03	6.668E+03	6.667E+03
BA148	8.488E+02	8.643E+02	8.492E+02	8.649E+02	8.541E+02	8.709E+02	8.546E+02	8.716E+02
BA149	6.302E+01	6.647E+01	6.305E+01	6.652E+01	6.397E+01	6.764E+01	6.401E+01	6.770E+01
BA150	3.633E+00	3.944E+00	3.635E+00	3.947E+00	3.723E+00	4.054E+00	3.735E+00	4.057E+00
BA151	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA152	5.779E-03	6.786E-03	5.782E-03	6.792E-03	6.043E-03	7.108E-03	6.047E-03	7.115E-03
BR 79	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 79M	4.501E-04	5.938E-04	4.507E-04	5.948E-04	4.739E-04	6.239E-04	4.745E-04	6.250E-04
BR 80	4.823E-02	5.525E-02	4.799E-02	5.472E-02	4.906E-02	5.636E-02	4.881E-02	5.581E-02
BR 80M	2.448E+00	2.857E-02	2.446E-02	2.850E-02	2.509E-02	2.934E-02	2.506E-02	2.927E-02
BR 81	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 82	3.615E+02	5.711E+02	3.618E+02	5.718E+02	3.748E+02	5.923E+02	3.752E+02	5.931E+02
BR 82M	1.546E+02	2.442E+02	1.547E+02	2.445E+02	1.598E+02	2.526E+02	1.600E+02	2.529E+02
BR 83	2.592E+04	2.546E+04	2.593E+04	2.548E+04	2.587E+04	2.540E+04	2.588E+04	2.541E+04
BR 84	4.833E+04	4.733E+04	4.835E+04	4.735E+04	4.820E+04	4.716E+04	4.823E+04	4.718E+04
BR 84M	9.835E+02	9.948E+02	9.840E+02	9.956E+02	9.859E+02	9.976E+02	9.864E+02	9.984E+02
BR 85	5.991E+04	5.859E+04	5.993E+04	5.863E+04	5.974E+04	5.837E+04	5.977E+04	5.840E+04
BR 86	4.514E+04	4.406E+04	4.516E+04	4.409E+04	4.500E+04	4.387E+04	4.502E+04	4.389E+04
BR 86M	4.551E+04	4.442E+04	4.553E+04	4.445E+04	4.537E+04	4.423E+04	4.539E+04	4.425E+04
BR 87	1.027E+05	1.002E+05	1.027E+05	1.003E+05	1.024E+05	9.979E+04	1.024E+05	9.985E+04
BR 88	1.177E+05	1.145E+05	1.177E+05	1.146E+05	1.173E+05	1.140E+05	1.173E+05	1.140E+05
BR 89	8.881E+04	8.621E+04	8.885E+04	8.626E+04	8.802E+04	8.531E+04	8.806E+04	8.536E+04
BR 90	5.933E+04	5.749E+04	5.935E+04	5.752E+04	5.908E+04	5.716E+04	5.911E+04	5.719E+04
BR 91	1.862E+04	1.809E+04	1.863E+04	1.810E+04	1.852E+04	1.796E+04	1.853E+04	1.797E+04
BR 92	9.918E+02	9.923E+02	9.923E+02	9.929E+02	9.965E+02	9.979E+02	9.970E+02	9.986E+02
BR 93	2.349E+02	2.318E+02	2.350E+02	2.319E+02	2.345E+02	2.314E+02	2.347E+02	2.315E+02
BR 94	1.678E+01	1.668E+01	1.679E+01	1.669E+01	1.682E+01	1.672E+01	1.683E+01	1.673E+01
BR 95	5.424E-01	5.768E-01	5.426E-01	5.773E-01	5.579E-01	5.956E-01	5.582E-01	5.961E-01
BR 96	2.670E-02	2.862E-02	2.671E-02	2.864E-02	2.745E-02	2.952E-02	2.747E-02	2.954E-02
CE139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE140	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE141	2.599E+05	2.585E+05	2.923E+05	2.909E+05	2.592E+05	2.579E+05	2.916E+05	2.901E+05
CE142	3.563E-06	4.737E-06	3.565E-06	4.741E-06	3.561E-06	4.735E-06	3.563E-06	4.738E-06
CE143	2.879E+05	2.848E+05	2.880E+05	2.850E+05	2.876E+05	2.844E+05	2.877E+05	2.846E+05
CE144	1.956E+05	2.098E+05	2.161E+05	2.364E+05	1.950E+05	2.091E+05	2.155E+05	2.356E+05

MODEL	MBLR	MBLR	MBSL	MBSL	MPLR	MPLR	MPLS	MPLS
MWD	4032	5376	4032	5376	4032	5376	4032	5376
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
CE145	1.909E+05	1.891E+05	1.910E+05	1.892E+05	1.907E+05	1.888E+05	1.908E+05	1.890E+05
CE146	1.458E+05	1.447E+05	1.458E+05	1.448E+05	1.456E+05	1.445E+05	1.457E+05	1.446E+05
CE147	1.097E+05	1.090E+05	1.097E+05	1.091E+05	1.096E+05	1.090E+05	1.097E+05	1.090E+05
CE148	7.576E+04	7.555E+04	7.580E+04	7.560E+04	7.577E+04	7.557E+04	7.581E+04	7.563E+04
CE149	3.915E+04	3.920E+04	3.917E+04	3.923E+04	3.919E+04	3.926E+04	3.921E+04	3.929E+04
CE150	1.533E+04	1.551E+04	1.534E+04	1.553E+04	1.538E+04	1.558E+04	1.539E+04	1.559E+04
CE151	4.061E+03	4.145E+03	4.063E+03	4.148E+03	4.085E+03	4.176E+03	4.087E+03	4.179E+03
CE152	7.618E+02	7.863E+02	7.622E+02	7.869E+02	7.679E+02	7.945E+02	7.684E+02	7.952E+02
CE153	8.994E+01	9.622E+01	9.000E+01	9.631E+01	9.147E+01	9.821E+01	9.153E+01	9.831E+01
CE154	7.546E+00	8.404E+00	7.550E+00	8.412E+00	7.754E+00	8.670E+00	7.759E+00	8.679E+00
CE155	6.346E-01	7.420E-01	6.350E-01	7.427E-01	6.617E-01	7.758E-01	6.622E-01	7.766E-01
CE156	5.099E-02	6.149E-02	5.103E-02	6.155E-02	5.360E-02	6.472E-02	5.364E-02	6.478E-02
CE157	3.847E-03	4.654E-03	3.850E-03	4.658E-03	4.059E-03	4.913E-03	4.062E-03	4.918E-03
CO 72	7.880E-02	8.633E-02	7.884E-02	8.640E-02	8.529E-02	9.358E-02	8.533E-02	9.366E-02
CO 73	1.729E-02	2.013E-02	1.730E-02	2.015E-02	1.926E-02	2.238E-02	1.927E-02	2.240E-02
CO 74	5.823E-03	6.246E-03	5.826E-03	6.251E-03	6.146E-03	6.614E-03	6.149E-03	6.619E-03
CO 75	7.721E-04	8.283E-04	7.725E-04	8.288E-04	8.095E-04	8.714E-04	8.099E-04	8.721E-04
CS132	1.480E+01	2.339E+01	1.527E+01	2.416E+01	2.074E+01	3.277E+01	2.140E+01	3.384E+01
CS133	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS134	8.220E+03	1.500E+04	8.522E+03	1.567E+04	8.565E+03	1.557E+04	8.880E+03	1.627E+04
CS134M	3.668E+03	5.778E+03	3.710E+03	5.848E+03	3.788E+03	5.964E+03	3.832E+03	6.036E+03
CS135	7.123E-02	9.090E-02	6.900E-02	8.791E-02	6.788E-02	8.666E-02	6.562E-02	8.366E-02
CS135M	9.194E+02	1.988E+03	9.520E+02	2.077E+03	9.960E+02	2.149E+03	1.032E+03	2.246E+03
CS136	3.550E+03	5.291E+03	3.680E+03	5.477E+03	3.578E+03	5.326E+03	3.702E+03	5.501E+03
CS137	1.273E+04	1.684E+04	1.278E+04	1.693E+04	1.273E+04	1.684E+04	1.278E+04	1.693E+04
CS138	3.295E+05	3.269E+05	3.297E+05	3.271E+05	3.293E+05	3.266E+05	3.295E+05	3.268E+05
CS138M	1.255E+04	1.262E+04	1.256E+04	1.263E+04	1.257E+04	1.264E+04	1.257E+04	1.265E+04
CS139	3.126E+05	3.100E+05	3.127E+05	3.102E+05	3.123E+05	3.097E+05	3.125E+05	3.099E+05
CS140	2.830E+05	2.806E+05	2.831E+05	2.808E+05	2.823E+05	2.799E+05	2.824E+05	2.801E+05
CS141	2.159E+05	2.137E+05	2.160E+05	2.139E+05	2.152E+05	2.130E+05	2.153E+05	2.131E+05
CS142	1.376E+05	1.358E+05	1.377E+05	1.359E+05	1.374E+05	1.356E+05	1.375E+05	1.357E+05
CS143	7.309E+04	7.186E+04	7.313E+04	7.191E+04	7.295E+04	7.167E+04	7.298E+04	7.172E+04
CS144	1.586E+04	1.580E+04	1.587E+04	1.581E+04	1.587E+04	1.582E+04	1.588E+04	1.583E+04
CS145	3.664E+03	3.663E+03	3.665E+03	3.666E+03	3.675E+03	3.676E+03	3.677E+03	3.679E+03
CS146	4.358E+02	4.407E+02	4.360E+02	4.410E+02	4.383E+02	4.438E+02	4.385E+02	4.441E+02
CS147	4.134E+01	4.362E+01	4.136E+01	4.365E+01	4.200E+01	4.443E+01	4.202E+01	4.447E+01
CS148	1.843E+00	2.033E+00	1.844E+00	2.034E+00	1.893E+00	2.094E+00	1.894E+00	2.095E+00
CS149	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS150	1.205E-03	1.410E-03	1.206E-03	1.411E-03	1.258E-03	1.474E-03	1.259E-03	1.476E-03
EU149	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU150	1.592E-06	2.350E-06	1.371E-06	2.030E-06	2.001E-06	2.941E-06	1.725E-06	2.544E-06
EU151	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU152	1.896E+01	2.054E+01	1.637E+01	1.783E+01	1.764E+01	1.883E+01	1.525E+01	1.639E+01
EU152M	2.175E+01	2.184E+01	1.932E+01	1.968E+01	2.004E+01	2.030E+01	1.786E+01	1.838E+01
EU153	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU154	4.154E+02	8.231E+02	4.183E+02	8.304E+02	4.299E+02	8.472E+02	4.329E+02	8.549E+02
EU155	2.881E+02	4.718E+02	2.913E+02	4.780E+02	2.896E+02	4.807E+02	2.928E+02	4.869E+02
EU156	4.638E+03	8.311E+03	5.012E+03	8.991E+03	4.975E+03	9.064E+03	5.372E+03	9.796E+03
EU157	7.556E+02	1.013E+03	7.660E+02	1.036E+03	7.937E+02	1.084E+03	8.055E+02	1.110E+03
EU158	3.383E+02	4.102E+02	3.387E+02	4.109E+02	3.509E+02	4.279E+02	3.514E+02	4.287E+02
EU159	1.453E+02	1.858E+02	1.454E+02	1.862E+02	1.519E+02	1.953E+02	1.521E+02	1.958E+02
EU160	6.381E+01	8.233E+01	6.389E+01	8.250E+01	6.705E+01	8.689E+01	6.714E+01	8.707E+01
EU161	2.335E+01	3.157E+01	2.339E+01	3.164E+01	2.480E+01	3.358E+01	2.483E+01	3.365E+01
EU162	7.469E+00	9.736E+00	7.479E+00	9.754E+00	7.986E+00	1.042E+01	7.996E+00	1.044E+01
EU163	1.682E+00	2.197E+00	1.684E+00	2.201E+00	1.807E+00	2.361E+00	1.810E+00	2.365E+00
EU164	3.446E-01	4.418E-01	3.450E-01	4.425E-01	3.733E-01	4.784E-01	3.737E-01	4.792E-01

MODEL	MBLR	MBLR	MBSL	MBSL	MPLR	MPLR	MPLS	MPLS
MWD	4032	5376	4032	5376	4032	5376	4032	5376
Isotope	Activity (CI)	Activity (CI)	Activity (CI)	Activity (CI)	Activity (CI)	Activity (CI)	Activity (CI)	Activity (CI)
EUI65	5.614E-02	7.040E-02	5.619E-02	7.050E-02	6.101E-02	7.655E-02	6.107E-02	7.666E-02
I127	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I128	4.357E+02	7.179E+02	4.342E+02	7.163E+02	4.611E+02	7.603E+02	4.594E+02	7.586E+02
I129	2.935E-03	3.920E-03	2.933E-03	3.918E-03	2.950E-03	3.940E-03	2.948E-03	3.938E-03
I130	1.885E+03	3.037E+03	1.884E+03	3.038E+03	2.009E+03	3.239E+03	2.009E+03	3.241E+03
I131	7.951E+02	1.282E+03	7.950E+02	1.283E+03	8.317E+02	1.342E+03	8.316E+02	1.345E+03
I131	1.406E+05	1.414E+05	1.457E+05	1.465E+05	1.409E+05	1.417E+05	1.459E+05	1.468E+05
I132	2.164E+05	2.170E+05	2.169E+05	2.175E+05	2.167E+05	2.173E+05	2.172E+05	2.178E+05
I133	3.337E+05	3.325E+05	3.339E+05	3.327E+05	3.337E+05	3.325E+05	3.339E+05	3.328E+05
I133M	6.888E+03	7.059E+03	6.892E+03	7.064E+03	6.920E+03	7.099E+03	6.924E+03	7.105E+03
I134	3.759E+05	3.740E+05	3.761E+05	3.742E+05	3.754E+05	3.735E+05	3.756E+05	3.738E+05
I134M	2.401E+04	2.463E+04	2.403E+04	2.465E+04	2.417E+04	2.482E+04	2.418E+04	2.484E+04
I135	3.112E+05	3.102E+05	3.114E+05	3.104E+05	3.108E+05	3.098E+05	3.109E+05	3.100E+05
I136	1.508E+05	1.501E+05	1.509E+05	1.502E+05	1.508E+05	1.501E+05	1.509E+05	1.502E+05
I136M	9.516E+04	9.439E+04	9.521E+04	9.445E+04	9.511E+04	9.433E+04	9.516E+04	9.439E+04
I137	1.591E+05	1.576E+05	1.591E+05	1.577E+05	1.589E+05	1.574E+05	1.590E+05	1.575E+05
I138	8.081E+04	7.993E+04	8.085E+04	7.998E+04	8.074E+04	7.983E+04	8.078E+04	7.989E+04
I139	3.602E+04	3.559E+04	3.604E+04	3.561E+04	3.600E+04	3.556E+04	3.601E+04	3.558E+04
I140	1.057E+04	1.042E+04	1.058E+04	1.042E+04	1.056E+04	1.040E+04	1.057E+04	1.041E+04
I141	1.545E+03	1.529E+03	1.546E+03	1.530E+03	1.546E+03	1.530E+03	1.547E+03	1.531E+03
I142	1.295E+02	1.321E+02	1.295E+02	1.322E+02	1.305E+02	1.334E+02	1.306E+02	1.335E+02
I143	6.136E+00	6.443E+00	6.139E+00	6.447E+00	6.227E+00	6.554E+00	6.230E+00	6.559E+00
I144	3.359E-01	3.690E-01	3.361E-01	3.693E-01	3.450E-01	3.800E-01	3.452E-01	3.803E-01
I145	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 79	1.799E-08	3.092E-08	1.797E-08	3.084E-08	2.551E-08	4.395E-08	2.549E-08	4.384E-08
KR 80	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 81	7.213E-09	1.408E-08	7.216E-09	1.408E-08	7.699E-09	1.511E-08	7.703E-09	1.511E-08
KR 81M	8.284E-04	1.236E-03	8.287E-04	1.235E-03	8.725E-04	1.300E-03	8.729E-04	1.299E-03
KR 82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 83M	2.591E+04	2.547E+04	2.593E+04	2.549E+04	2.587E+04	2.541E+04	2.588E+04	2.542E+04
KR 84	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 85	1.480E+03	1.916E+03	1.495E+03	1.943E+03	1.478E+03	1.912E+03	1.493E+03	1.939E+03
KR 85M	6.059E+04	5.929E+04	6.062E+04	5.932E+04	6.043E+04	5.906E+04	6.046E+04	5.910E+04
KR 86	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 87	1.219E+05	1.190E+05	1.219E+05	1.191E+05	1.216E+05	1.185E+05	1.216E+05	1.186E+05
KR 88	1.723E+05	1.681E+05	1.723E+05	1.682E+05	1.717E+05	1.673E+05	1.717E+05	1.674E+05
KR 89	2.183E+05	2.127E+05	2.183E+05	2.128E+05	2.171E+05	2.113E+05	2.172E+05	2.114E+05
KR 90	2.167E+05	2.111E+05	2.168E+05	2.112E+05	2.159E+05	2.101E+05	2.160E+05	2.102E+05
KR 91	1.601E+05	1.560E+05	1.601E+05	1.560E+05	1.595E+05	1.552E+05	1.596E+05	1.553E+05
KR 92	7.076E+04	6.921E+04	7.079E+04	6.925E+04	7.058E+04	6.897E+04	7.062E+04	6.901E+04
KR 93	2.425E+04	2.378E+04	2.426E+04	2.380E+04	2.421E+04	2.373E+04	2.422E+04	2.374E+04
KR 94	1.071E+04	1.042E+04	1.071E+04	1.042E+04	1.067E+04	1.037E+04	1.067E+04	1.037E+04
KR 95	5.630E+02	5.718E+02	5.633E+02	5.721E+02	5.727E+02	5.825E+02	5.730E+02	5.829E+02
KR 96	9.174E+01	9.274E+01	9.178E+01	9.280E+01	9.297E+01	9.412E+01	9.302E+01	9.418E+01
KR 97	2.944E+00	3.140E+00	2.946E+00	3.143E+00	3.039E+00	3.254E+00	3.041E+00	3.256E+00
KR 98	3.309E-01	3.534E-01	3.310E-01	3.537E-01	3.394E-01	3.638E-01	3.396E-01	3.640E-01
LA138	2.378E-11	2.969E-11	2.378E-11	2.970E-11	2.361E-11	2.944E-11	2.362E-11	2.944E-11
LA139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA140	2.996E+05	3.001E+05	3.219E+05	3.223E+05	2.992E+05	2.998E+05	3.215E+05	3.220E+05
LA141	2.900E+05	2.879E+05	2.902E+05	2.881E+05	2.894E+05	2.872E+05	2.895E+05	2.874E+05
LA142	2.875E+05	2.849E+05	2.876E+05	2.851E+05	2.873E+05	2.846E+05	2.874E+05	2.848E+05
LA143	2.862E+05	2.830E+05	2.864E+05	2.832E+05	2.859E+05	2.825E+05	2.857E+05	2.827E+05
LA144	2.600E+05	2.567E+05	2.601E+05	2.568E+05	2.591E+05	2.557E+05	2.592E+05	2.559E+05
LA145	1.793E+05	1.774E+05	1.794E+05	1.775E+05	1.791E+05	1.772E+05	1.792E+05	1.773E+05
LA146	1.125E+05	1.115E+05	1.125E+05	1.116E+05	1.124E+05	1.114E+05	1.124E+05	1.115E+05

MODEL	MBLR	MBLR	MBS	MBS	MPLR	MPLR	MPLS	MPLS
isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
MWD	4032	5376	4032	5376	4032	5376	4032	5376
LA147	5.262E+04	5.228E+04	5.264E+04	5.231E+04	5.261E+04	5.227E+04	5.264E+04	5.230E+04
LA148	1.792E+04	1.789E+04	1.793E+04	1.790E+04	1.793E+04	1.791E+04	1.794E+04	1.792E+04
LA149	3.708E+03	3.740E+03	3.710E+03	3.742E+03	3.720E+03	3.756E+03	3.722E+03	3.758E+03
LA150	5.639E+02	5.776E+02	5.642E+02	5.780E+02	5.680E+02	5.829E+02	5.683E+02	5.834E+02
LA151	5.547E+01	5.803E+01	5.550E+01	5.807E+01	5.612E+01	5.886E+01	5.615E+01	5.891E+01
LA152	4.192E+00	4.570E+00	4.194E+00	4.574E+00	4.288E+00	4.691E+00	4.290E+00	4.695E+00
LA153	2.867E-01	3.324E-01	2.869E-01	3.326E-01	2.986E-01	3.469E-01	2.988E-01	3.473E-01
LA154	1.176E-02	1.394E-02	1.177E-02	1.395E-02	1.232E-02	1.462E-02	1.233E-02	1.464E-02
LA155	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 95	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 96	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 97	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 98	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 99	3.002E+05	3.011E+05	3.005E+05	3.015E+05	2.976E+05	2.970E+05	2.979E+05	2.974E+05
MO100	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO101	2.553E+05	2.560E+05	2.555E+05	2.562E+05	2.556E+05	2.564E+05	2.557E+05	2.566E+05
MO102	2.164E+05	2.184E+05	2.165E+05	2.186E+05	2.168E+05	2.191E+05	2.170E+05	2.192E+05
MO103	1.671E+05	1.715E+05	1.672E+05	1.716E+05	1.679E+05	1.726E+05	1.680E+05	1.727E+05
MO104	1.031E+05	1.084E+05	1.031E+05	1.086E+05	1.044E+05	1.102E+05	1.045E+05	1.103E+05
MO105	5.721E+04	6.201E+04	5.725E+04	6.208E+04	5.796E+04	6.307E+04	5.801E+04	6.315E+04
MO106	2.405E+04	2.708E+04	2.407E+04	2.712E+04	2.455E+04	2.781E+04	2.457E+04	2.785E+04
MO107	8.472E+03	9.633E+03	8.479E+03	9.649E+03	8.682E+03	9.945E+03	8.691E+03	9.962E+03
MO108	2.385E+03	2.691E+03	2.386E+03	2.695E+03	2.460E+03	2.791E+03	2.462E+03	2.795E+03
MO109	5.281E+02	6.291E+02	5.286E+02	6.298E+02	5.602E+02	6.682E+02	5.607E+02	6.691E+02
MO110	1.052E+02	1.231E+02	1.053E+02	1.232E+02	1.135E+02	1.330E+02	1.136E+02	1.331E+02
MO111	1.891E+01	2.257E+01	1.892E+01	2.259E+01	2.058E+01	2.457E+01	2.059E+01	2.460E+01
MO112	3.364E+00	4.030E+00	3.366E+00	4.033E+00	3.675E+00	4.404E+00	3.678E+00	4.408E+00
MO113	2.385E-01	2.857E-01	2.386E-01	2.860E-01	2.604E-01	3.122E-01	2.606E-01	3.125E-01
MO114	2.402E-02	2.885E-02	2.403E-02	2.888E-02	2.626E-02	3.155E-02	2.627E-02	3.158E-02
MO115	1.581E-03	1.904E-03	1.582E-03	1.906E-03	1.737E-03	2.092E-03	1.738E-03	2.094E-03
NB 91	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB 92	7.082E-09	1.711E-08	6.003E-09	1.433E-08	6.475E-08	1.564E-07	5.489E-08	1.309E-07
NB 93	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB 93M	1.348E-02	2.359E-02	1.158E-02	2.028E-02	1.347E-02	2.357E-02	1.158E-02	2.028E-02
NB 94	4.091E-06	6.052E-06	4.093E-06	6.057E-06	4.174E-06	6.189E-06	4.177E-06	6.193E-06
NB 94M	4.355E-02	5.173E-02	4.359E-02	5.179E-02	4.487E-02	5.341E-02	4.491E-02	5.347E-02
NB 95	2.690E+05	2.668E+05	3.163E+05	3.141E+05	2.687E+05	2.664E+05	3.159E+05	3.136E+05
NB 95M	1.918E+03	1.902E+03	2.222E+03	2.204E+03	1.916E+03	1.899E+03	2.219E+03	2.201E+03
NB 96	2.280E+02	2.730E+02	2.610E+02	3.131E+02	2.365E+02	2.835E+02	2.708E+02	3.252E+02
NB 97	2.901E+05	2.885E+05	2.903E+05	2.887E+05	2.900E+05	2.884E+05	2.902E+05	2.886E+05
NB 97M	2.736E+05	2.721E+05	2.738E+05	2.722E+05	2.736E+05	2.719E+05	2.737E+05	2.721E+05
NB 98	2.875E+05	2.860E+05	2.876E+05	2.862E+05	2.874E+05	2.859E+05	2.875E+05	2.861E+05
NB 98M	1.533E+03	1.599E+03	1.533E+03	1.601E+03	1.544E+03	1.614E+03	1.545E+03	1.615E+03
NB 99	2.886E+05	2.874E+05	2.888E+05	2.876E+05	2.886E+05	2.873E+05	2.888E+05	2.875E+05
NB 99M	7.906E+03	8.089E+03	7.911E+03	8.095E+03	7.938E+03	8.129E+03	7.943E+03	8.136E+03
NB100	1.556E+05	1.552E+05	1.556E+05	1.553E+05	1.556E+05	1.552E+05	1.557E+05	1.553E+05
NB100M	1.556E+05	1.552E+05	1.556E+05	1.553E+05	1.556E+05	1.552E+05	1.557E+05	1.553E+05
NB101	2.479E+05	2.477E+05	2.480E+05	2.479E+05	2.480E+05	2.479E+05	2.481E+05	2.481E+05
NB102	1.929E+05	1.938E+05	1.930E+05	1.939E+05	1.932E+05	1.942E+05	1.933E+05	1.943E+05
NB103	1.144E+05	1.162E+05	1.148E+05	1.163E+05	1.148E+05	1.167E+05	1.149E+05	1.168E+05
NB104	4.367E+04	4.520E+04	4.370E+04	4.524E+04	4.394E+04	4.560E+04	4.397E+04	4.565E+04
NB105	1.199E+04	1.268E+04	1.200E+04	1.269E+04	1.212E+04	1.286E+04	1.212E+04	1.287E+04
NB106	3.815E+03	3.965E+03	3.817E+03	3.969E+03	3.841E+03	4.008E+03	3.844E+03	4.012E+03
NB107	5.915E+02	6.148E+02	5.919E+02	6.154E+02	5.994E+02	6.254E+02	5.998E+02	6.261E+02
NB108	6.943E+01	7.549E+01	6.947E+01	7.555E+01	7.224E+01	7.884E+01	7.228E+01	7.891E+01
NB109	7.785E+00	9.222E+00	7.790E+00	9.230E+00	8.362E+00	9.918E+00	8.368E+00	9.928E+00

MODEL	MBLR	MBLR	MBSL	MBSL	MPLR	MPLR	MPLS	MPLS
isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
MWD	4032	5376	4032	5376	4032	5376	4032	5376
NB110	8.227E-01	9.825E-01	8.232E-01	9.833E-01	8.973E-01	1.072E+00	8.979E-01	1.073E+00
NB111	6.717E-02	8.087E-02	6.721E-02	8.094E-02	7.330E-02	8.828E-02	7.334E-02	8.836E-02
NB112	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND142	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND143	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND144	1.114E-10	1.788E-10	1.039E-10	1.692E-10	1.125E-10	1.810E-10	1.051E-10	1.715E-10
ND145	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND146	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND147	1.071E+05	1.068E+05	1.132E+05	1.129E+05	1.071E+05	1.068E+05	1.131E+05	1.128E+05
ND148	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND149	5.551E+04	5.615E+04	5.554E+04	5.619E+04	5.561E+04	5.630E+04	5.564E+04	5.635E+04
ND150	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND151	2.239E+04	2.303E+04	2.240E+04	2.305E+04	2.245E+04	2.314E+04	2.247E+04	2.316E+04
ND152	1.431E+04	1.476E+04	1.432E+04	1.477E+04	1.439E+04	1.487E+04	1.440E+04	1.488E+04
ND153	8.090E+03	8.375E+03	8.095E+03	8.383E+03	8.140E+03	8.447E+03	8.145E+03	8.455E+03
ND154	3.272E+03	3.479E+03	3.274E+03	3.483E+03	3.306E+03	3.528E+03	3.309E+03	3.532E+03
ND155	1.091E+03	1.182E+03	1.092E+03	1.183E+03	1.107E+03	1.204E+03	1.108E+03	1.205E+03
ND156	2.661E+02	3.060E+02	2.663E+02	3.065E+02	2.729E+02	3.158E+02	2.731E+02	3.162E+02
ND157	5.779E+01	6.977E+01	5.785E+01	6.988E+01	6.013E+01	7.306E+01	6.019E+01	7.319E+01
ND158	7.843E+00	9.708E+00	7.851E+00	9.725E+00	8.181E+00	1.019E+01	8.191E+00	1.021E+01
ND159	6.553E-01	8.384E-01	6.560E-01	8.399E-01	6.902E-01	8.869E-01	6.910E-01	8.885E-01
ND160	8.578E-02	9.677E-02	8.584E-02	9.688E-02	8.829E-02	1.000E-01	8.836E-02	1.002E-01
ND161	3.571E-03	4.412E-03	3.574E-03	4.417E-03	3.776E-03	4.669E-03	3.779E-03	4.675E-03
PD102	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD104	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD105	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD107	2.892E-03	4.350E-03	2.894E-03	4.354E-03	2.975E-03	4.489E-03	2.977E-03	4.493E-03
PD107M	1.233E+00	2.485E+00	1.156E+00	2.346E+00	1.309E+00	2.644E+00	1.229E+00	2.498E+00
PD108	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD109	7.552E+03	1.039E+04	7.562E+03	1.041E+04	7.997E+03	1.103E+04	8.009E+03	1.105E+04
PD109M	3.470E+03	4.617E+03	3.475E+03	4.627E+03	3.669E+03	4.891E+03	3.675E+03	4.902E+03
PD110	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD111	2.457E+03	2.987E+03	2.459E+03	2.992E+03	2.588E+03	3.157E+03	2.591E+03	3.163E+03
PD111M	2.848E+01	3.731E+01	2.852E+01	3.738E+01	3.000E+01	3.944E+01	3.004E+01	3.952E+01
PD112	1.557E+03	1.808E+03	1.558E+03	1.810E+03	1.647E+03	1.916E+03	1.648E+03	1.919E+03
PD113	1.399E+03	1.581E+03	1.400E+03	1.583E+03	1.481E+03	1.677E+03	1.482E+03	1.679E+03
PD114	1.169E+03	1.278E+03	1.169E+03	1.279E+03	1.235E+03	1.353E+03	1.236E+03	1.354E+03
PD115	1.090E+03	1.190E+03	1.091E+03	1.191E+03	1.160E+03	1.268E+03	1.161E+03	1.269E+03
PD116	9.577E+02	1.025E+03	9.582E+02	1.026E+03	1.017E+03	1.089E+03	1.018E+03	1.090E+03
PD117	9.789E+02	1.029E+03	9.794E+02	1.030E+03	1.035E+03	1.089E+03	1.035E+03	1.090E+03
PD118	5.507E+02	6.044E+02	5.510E+02	6.049E+02	5.908E+02	6.491E+02	5.911E+02	6.497E+02
PD119	3.359E+02	3.811E+02	3.361E+02	3.815E+02	3.601E+02	4.088E+02	3.604E+02	4.092E+02
PD120	1.267E+02	1.422E+02	1.267E+02	1.423E+02	1.365E+02	1.536E+02	1.366E+02	1.537E+02
PD121	4.386E+01	5.020E+01	4.388E+01	5.024E+01	4.716E+01	5.411E+01	4.719E+01	5.416E+01
PD122	1.266E+01	1.462E+01	1.266E+01	1.463E+01	1.366E+01	1.582E+01	1.367E+01	1.583E+01
PD123	2.895E+00	3.337E+00	2.896E+00	3.340E+00	3.103E+00	3.588E+00	3.105E+00	3.591E+00
PD124	5.403E-01	6.244E-01	5.406E-01	6.249E-01	5.769E-01	6.691E-01	5.773E-01	6.697E-01
PD125	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD126	7.439E-03	8.787E-03	7.444E-03	8.797E-03	7.902E-03	9.370E-03	7.908E-03	9.381E-03
PM145	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM146	1.621E-01	2.721E-01	1.673E-01	2.842E-01	2.238E-01	3.739E-01	2.310E-01	3.906E-01
PM147	2.877E+04	3.032E+04	2.975E+04	3.158E+04	2.833E+04	2.972E+04	2.930E+04	3.095E+04
PM148	3.345E+04	4.171E+04	3.484E+04	4.375E+04	3.468E+04	4.302E+04	3.612E+04	4.509E+04
PM148M	5.450E+03	6.109E+03	5.724E+03	6.437E+03	5.245E+03	5.830E+03	5.496E+03	6.130E+03

MODEL	MBLR	MBLR	MBSL	MBSL	MPLR	MPLR	MPLS	MPLS
MWD	4032	5376	4032	5376	4032	5376	4032	5376
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
PM149	7.472E+04	8.290E+04	7.580E+04	8.451E+04	7.593E+04	8.440E+04	7.703E+04	8.604E+04
PM150	5.086E+02	6.745E+02	5.158E+02	6.877E+02	5.572E+02	7.415E+02	5.652E+02	7.560E+02
PM151	2.243E+04	2.306E+04	2.244E+04	2.308E+04	2.249E+04	2.317E+04	2.250E+04	2.319E+04
PM152	1.458E+04	1.506E+04	1.459E+04	1.507E+04	1.467E+04	1.517E+04	1.468E+04	1.519E+04
PM152M	2.125E+02	2.247E+02	2.126E+02	2.249E+02	2.145E+02	2.273E+02	2.147E+02	2.276E+02
PM153	9.027E+03	9.361E+03	9.032E+03	9.370E+03	9.085E+03	9.444E+03	9.090E+03	9.453E+03
PM154	3.912E+03	4.173E+03	3.914E+03	4.178E+03	3.955E+03	4.235E+03	3.958E+03	4.240E+03
PM154M	5.811E+02	6.311E+02	5.815E+02	6.318E+02	5.895E+02	6.424E+02	5.899E+02	6.432E+02
PM155	2.088E+03	2.278E+03	2.089E+03	2.280E+03	2.123E+03	2.326E+03	2.125E+03	2.329E+03
PM156	8.468E+02	9.726E+02	8.475E+02	9.740E+02	8.682E+02	1.003E+03	8.690E+02	1.004E+03
PM157	3.388E+02	4.044E+02	3.391E+02	4.051E+02	3.503E+02	4.206E+02	3.507E+02	4.214E+02
PM158	9.866E+01	1.208E+02	9.877E+01	1.210E+02	1.028E+02	1.267E+02	1.030E+02	1.270E+02
PM159	1.801E+01	2.330E+01	1.803E+01	2.335E+01	1.887E+01	2.458E+01	1.889E+01	2.463E+01
PM160	4.243E+00	5.022E+00	4.247E+00	5.029E+00	4.387E+00	5.223E+00	4.391E+00	5.232E+00
PM161	2.987E-01	3.960E-01	2.991E-01	3.967E-01	3.178E-01	4.221E-01	3.182E-01	4.230E-01
PM162	1.468E-02	1.848E-02	1.470E-02	1.851E-02	1.575E-02	1.988E-02	1.577E-02	1.991E-02
PR139	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR140	1.259E+00	2.052E+00	1.249E+00	2.042E+00	1.765E+00	2.879E+00	1.752E+00	2.865E+00
PR141	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR142	5.473E+03	8.924E+03	5.432E+03	8.880E+03	5.804E+03	9.465E+03	5.761E+03	9.419E+03
PR142M	1.193E+03	1.946E+03	1.184E+03	1.936E+03	1.239E+03	2.021E+03	1.230E+03	2.011E+03
PR143	2.588E+05	2.565E+05	2.795E+05	2.770E+05	2.585E+05	2.559E+05	2.791E+05	2.764E+05
PR144	1.965E+05	2.109E+05	2.171E+05	2.376E+05	1.960E+05	2.103E+05	2.166E+05	2.379E+05
PR144M	2.349E+03	2.519E+03	2.595E+03	2.838E+03	2.342E+03	2.511E+03	2.588E+03	2.829E+03
PR145	1.910E+05	1.891E+05	1.911E+05	1.893E+05	1.908E+05	1.889E+05	1.909E+05	1.890E+05
PR146	1.462E+05	1.451E+05	1.463E+05	1.452E+05	1.461E+05	1.450E+05	1.461E+05	1.451E+05
PR147	1.124E+05	1.117E+05	1.124E+05	1.118E+05	1.123E+05	1.117E+05	1.124E+05	1.117E+05
PR148	8.382E+04	8.363E+04	8.386E+04	8.368E+04	8.384E+04	8.366E+04	8.389E+04	8.372E+04
PR149	5.381E+04	5.396E+04	5.383E+04	5.400E+04	5.387E+04	5.405E+04	5.390E+04	5.409E+04
PR150	3.080E+04	3.122E+04	3.082E+04	3.124E+04	3.089E+04	3.134E+04	3.091E+04	3.137E+04
PR151	1.574E+04	1.606E+04	1.575E+04	1.607E+04	1.581E+04	1.615E+04	1.582E+04	1.617E+04
PR152	6.468E+03	6.638E+03	6.472E+03	6.643E+03	6.501E+03	6.684E+03	6.504E+03	6.690E+03
PR153	1.800E+03	1.867E+03	1.801E+03	1.869E+03	1.814E+03	1.886E+03	1.815E+03	1.888E+03
PR154	3.368E+02	3.582E+02	3.371E+02	3.585E+02	3.412E+02	3.643E+02	3.415E+02	3.647E+02
PR155	4.971E+01	5.478E+01	4.975E+01	5.484E+01	5.077E+01	5.621E+01	5.080E+01	5.628E+01
PR156	6.074E+00	7.178E+00	6.079E+00	7.187E+00	6.314E+00	7.497E+00	6.319E+00	7.508E+00
PR157	7.717E-01	9.405E-01	7.723E-01	9.417E-01	8.114E-01	9.918E-01	8.121E-01	9.932E-01
PR158	5.452E-02	6.661E-02	5.456E-02	6.669E-02	5.730E-02	7.015E-02	5.734E-02	7.024E-02
PR159	2.059E-03	2.522E-03	2.061E-03	2.525E-03	2.173E-03	2.665E-03	2.174E-03	2.668E-03
RB 85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 86	1.354E+02	2.173E+02	1.466E+02	2.355E+02	1.391E+02	2.230E+02	1.505E+02	2.415E+02
RB 86M	1.674E+01	2.503E+01	1.672E+01	2.499E+01	1.725E+01	2.582E+01	1.723E+01	2.578E+01
RB 87	3.428E-06	4.532E-06	3.429E-06	4.534E-06	3.424E-06	4.524E-06	3.425E-06	4.526E-06
RB 88	1.740E+05	1.699E+05	1.740E+05	1.700E+05	1.734E+05	1.691E+05	1.735E+05	1.692E+05
RB 89	2.269E+05	2.213E+05	2.270E+05	2.215E+05	2.257E+05	2.199E+05	2.258E+05	2.201E+05
RB 90	2.244E+05	2.188E+05	2.245E+05	2.189E+05	2.236E+05	2.177E+05	2.237E+05	2.178E+05
RB 90M	4.716E+04	4.619E+04	4.718E+04	4.622E+04	4.703E+04	4.602E+04	4.705E+04	4.604E+04
RB 91	2.665E+05	2.603E+05	2.667E+05	2.605E+05	2.657E+05	2.592E+05	2.658E+05	2.594E+05
RB 92	2.261E+05	2.212E+05	2.262E+05	2.213E+05	2.255E+05	2.203E+05	2.256E+05	2.204E+05
RB 93	1.680E+05	1.644E+05	1.681E+05	1.645E+05	1.676E+05	1.639E+05	1.676E+05	1.640E+05
RB 94	8.450E+04	8.286E+04	8.454E+04	8.291E+04	8.431E+04	8.261E+04	8.435E+04	8.266E+04
RB 95	4.332E+04	4.240E+04	4.333E+04	4.243E+04	4.323E+04	4.229E+04	4.325E+04	4.231E+04
RB 96	9.939E+03	9.819E+03	9.943E+03	9.825E+03	9.941E+03	9.820E+03	9.945E+03	9.827E+03
RB 97	1.804E+03	1.786E+03	1.805E+03	1.787E+03	1.811E+03	1.794E+03	1.812E+03	1.795E+03
RB 98	2.845E+02	2.865E+02	2.847E+02	2.867E+02	2.863E+02	2.886E+02	2.864E+02	2.888E+02
RB 99	2.328E+01	2.379E+01	2.329E+01	2.377E+01	2.352E+01	2.404E+01	2.353E+01	2.405E+01

MODEL	MBLR	MBLR	MBSL	MBSL	MPLR	MPLR	MPLS	MPLS
MWD	4032	5376	4032	5376	4032	5376	4032	5376
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
RB100	1.260E+00	1.340E+00	1.260E+00	1.341E+00	1.288E+00	1.374E+00	1.288E+00	1.375E+00
RB101	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH102	3.756E-02	7.155E-02	3.751E-02	7.238E-02	5.216E-02	9.897E-02	5.209E-02	1.001E-01
RH103	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH103M	1.350E+05	1.391E+05	1.527E+05	1.574E+05	1.356E+05	1.398E+05	1.534E+05	1.582E+05
RH104	5.333E+04	8.184E+04	5.289E+04	8.144E+04	5.641E+04	8.633E+04	5.596E+04	8.592E+04
RH104M	3.965E+03	6.084E+03	3.932E+03	6.055E+03	4.084E+03	6.251E+03	4.052E+03	6.221E+03
RH105	6.325E+04	6.874E+04	6.330E+04	6.881E+04	6.401E+04	6.979E+04	6.405E+04	6.987E+04
RH105M	1.853E+04	2.034E+04	1.854E+04	2.037E+04	1.881E+04	2.073E+04	1.882E+04	2.076E+04
RH106	2.148E+04	2.724E+04	2.302E+04	2.957E+04	2.209E+04	2.813E+04	2.366E+04	3.051E+04
RH106M	1.055E+03	1.388E+03	1.057E+03	1.391E+03	1.112E+03	1.469E+03	1.114E+03	1.472E+03
RH107	1.970E+04	2.464E+04	1.972E+04	2.469E+04	2.050E+04	2.576E+04	2.053E+04	2.582E+04
RH108	1.167E+04	1.523E+04	1.169E+04	1.526E+04	1.224E+04	1.603E+04	1.226E+04	1.607E+04
RH108M	8.064E+01	1.154E+02	8.078E+01	1.157E+02	8.589E+01	1.226E+02	8.603E+01	1.229E+02
RH109	6.918E+03	9.192E+03	6.927E+03	9.212E+03	7.315E+03	9.737E+03	7.326E+03	9.759E+03
RH109M	3.459E+03	4.596E+03	3.464E+03	4.606E+03	3.657E+03	4.869E+03	3.663E+03	4.879E+03
RH110	3.621E+03	4.614E+03	3.625E+03	4.622E+03	3.822E+03	4.882E+03	3.827E+03	4.892E+03
RH110M	1.971E+02	2.742E+02	1.975E+02	2.749E+02	2.086E+02	2.906E+02	2.089E+02	2.914E+02
RH111	2.422E+03	2.936E+03	2.424E+03	2.941E+03	2.551E+03	3.103E+03	2.554E+03	3.108E+03
RH112	1.475E+03	1.706E+03	1.476E+03	1.709E+03	1.561E+03	1.810E+03	1.562E+03	1.813E+03
RH113	1.180E+03	1.328E+03	1.181E+03	1.329E+03	1.252E+03	1.411E+03	1.253E+03	1.413E+03
RH114	7.809E+02	8.548E+02	7.813E+02	8.556E+02	8.294E+02	9.095E+02	8.299E+02	9.104E+02
RH115	5.108E+02	5.666E+02	5.111E+02	5.671E+02	5.485E+02	6.094E+02	5.489E+02	6.100E+02
RH116	2.444E+02	2.702E+02	2.445E+02	2.704E+02	2.626E+02	2.908E+02	2.627E+02	2.910E+02
RH117	3.234E+02	3.271E+02	3.236E+02	3.273E+02	3.418E+02	3.458E+02	3.420E+02	3.460E+02
RH118	1.293E+02	1.539E+02	1.293E+02	1.541E+02	1.407E+02	1.676E+02	1.408E+02	1.678E+02
RH119	1.044E+01	1.262E+01	1.045E+01	1.263E+01	1.130E+01	1.364E+01	1.131E+01	1.366E+01
RH120	1.663E+00	1.961E+00	1.664E+00	1.963E+00	1.806E+00	2.132E+00	1.807E+00	2.134E+00
RH121	2.501E-01	2.975E-01	2.502E-01	2.978E-01	2.724E-01	3.245E-01	2.726E-01	3.248E-01
RH122	2.995E-02	3.572E-02	2.997E-02	3.575E-02	3.259E-02	3.891E-02	3.261E-02	3.894E-02
RH123	2.597E+03	3.087E+03	2.599E+03	3.089E+03	2.814E+03	3.350E+03	2.816E+03	3.353E+03
RU99	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU100	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU101	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU102	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU103	1.498E+05	1.543E+05	1.695E+05	1.746E+05	1.505E+05	1.552E+05	1.702E+05	1.756E+05
RU104	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU105	6.618E+04	7.265E+04	6.621E+04	7.273E+04	6.716E+04	7.404E+04	6.722E+04	7.413E+04
RU106	1.939E+04	2.449E+04	2.093E+04	2.681E+04	1.980E+04	2.511E+04	2.137E+04	2.748E+04
RU107	1.963E+04	2.454E+04	1.965E+04	2.459E+04	2.043E+04	2.566E+04	2.046E+04	2.572E+04
RU108	1.159E+04	1.511E+04	1.161E+04	1.515E+04	1.216E+04	1.591E+04	1.217E+04	1.594E+04
RU109	6.710E+03	8.887E+03	6.719E+03	8.906E+03	7.094E+03	9.412E+03	7.104E+03	9.433E+03
RU110	3.424E+03	4.340E+03	3.428E+03	4.348E+03	3.614E+03	4.592E+03	3.617E+03	4.601E+03
RU111	1.873E+03	2.238E+03	1.874E+03	2.241E+03	1.975E+03	2.368E+03	1.977E+03	2.372E+03
RU112	9.251E+02	1.064E+03	9.258E+02	1.065E+03	9.847E+02	1.135E+03	9.856E+02	1.136E+03
RU113	5.201E+02	5.879E+02	5.205E+02	5.886E+02	5.568E+02	6.304E+02	5.572E+02	6.311E+02
RU114	2.256E+02	2.544E+02	2.258E+02	2.547E+02	2.423E+02	2.738E+02	2.425E+02	2.741E+02
RU115	8.807E+01	1.020E+02	8.812E+01	1.021E+02	9.572E+01	1.109E+02	9.577E+01	1.110E+02
RU116	1.896E+01	2.209E+01	1.897E+01	2.211E+01	2.055E+01	2.397E+01	2.056E+01	2.399E+01
RU117	4.256E+00	4.641E+00	4.258E+00	4.645E+00	4.566E+00	4.986E+00	4.568E+00	4.990E+00
RU118	1.553E+01	1.871E+01	1.553E+01	1.873E+01	1.699E+01	2.048E+01	1.700E+01	2.050E+01
RU119	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU120	3.322E-03	3.988E-03	3.324E-03	3.992E-03	3.630E-03	4.359E-03	3.632E-03	4.363E-03
SB121	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB122	6.378E+01	1.044E+02	6.387E+01	1.046E+02	7.014E+01	1.148E+02	7.025E+01	1.151E+02
SB122M	5.669E-01	9.260E-01	5.674E-01	9.272E-01	6.150E-01	1.005E+00	6.156E-01	1.006E+00

MODEL	MBLR	MBLR	MBSL	MBSL	MPLR	MPLR	MPLS	MPLS
MWD	4032	5376	4032	5376	4032	5376	4032	5376
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
SB123	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB124	3.489E+01	5.911E+01	3.853E+01	6.571E+01	3.778E+01	6.388E+01	4.172E+01	7.098E+01
SB125	5.387E-01	6.665E-01	5.380E-01	6.658E-01	5.905E-01	7.257E-01	5.899E-01	7.250E-01
SB125M	8.377E+02	1.069E+03	8.677E+02	1.119E+03	8.673E+02	1.108E+03	8.984E+02	1.159E+03
SB126	6.763E+01	7.718E+01	7.242E+01	8.308E+01	7.073E+01	8.088E+01	7.574E+01	8.706E+01
SB126M	3.182E+01	3.506E+01	3.190E+01	3.519E+01	3.375E+01	3.711E+01	3.383E+01	3.725E+01
SB127	9.204E+03	9.659E+03	9.245E+03	9.705E+03	9.389E+03	9.870E+03	9.432E+03	9.917E+03
SB128	1.009E+03	1.087E+03	1.010E+03	1.088E+03	1.033E+03	1.115E+03	1.034E+03	1.116E+03
SB128M	2.040E+04	2.082E+04	2.041E+04	2.083E+04	2.058E+04	2.103E+04	2.060E+04	2.104E+04
SB129	3.664E+04	3.744E+04	3.666E+04	3.747E+04	3.692E+04	3.777E+04	3.694E+04	3.780E+04
SB130	1.160E+04	1.189E+04	1.161E+04	1.190E+04	1.171E+04	1.201E+04	1.171E+04	1.202E+04
SB130M	6.380E+04	6.431E+04	6.383E+04	6.436E+04	6.405E+04	6.461E+04	6.408E+04	6.465E+04
SB131	1.286E+05	1.286E+05	1.286E+05	1.287E+05	1.287E+05	1.287E+05	1.287E+05	1.288E+05
SB132	8.266E+04	8.223E+04	8.269E+04	8.229E+04	8.266E+04	8.224E+04	8.270E+04	8.230E+04
SB132M	5.297E+04	5.281E+04	5.300E+04	5.284E+04	5.298E+04	5.283E+04	5.301E+04	5.287E+04
SB133	1.092E+05	1.079E+05	1.093E+05	1.080E+05	1.091E+05	1.078E+05	1.092E+05	1.078E+05
SB134	1.369E+04	1.373E+04	1.369E+04	1.374E+04	1.371E+04	1.377E+04	1.372E+04	1.378E+04
SB134M	1.300E+04	1.303E+04	1.301E+04	1.304E+04	1.302E+04	1.306E+04	1.303E+04	1.307E+04
SB135	9.708E+03	9.600E+03	9.713E+03	9.606E+03	9.703E+03	9.593E+03	9.707E+03	9.600E+03
SB136	1.540E+03	1.537E+03	1.541E+03	1.538E+03	1.543E+03	1.541E+03	1.544E+03	1.542E+03
SB137	1.320E+02	1.366E+02	1.321E+02	1.367E+02	1.334E+02	1.384E+02	1.335E+02	1.385E+02
SB138	1.095E+01	1.180E+01	1.095E+01	1.181E+01	1.118E+01	1.208E+01	1.119E+01	1.209E+01
SB139	6.484E-01	7.190E-01	6.487E-01	7.195E-01	6.671E-01	7.417E-01	6.674E-01	7.423E-01
SE 76	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 77	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 77M	1.257E+00	1.266E+00	1.258E+00	1.267E+00	1.267E+00	1.278E+00	1.268E+00	1.278E+00
SE 78	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 79	5.225E-02	6.947E-02	5.227E-02	6.950E-02	5.225E-02	6.945E-02	5.226E-02	6.948E-02
SE 79M	2.620E+03	2.597E+03	2.621E+03	2.599E+03	2.620E+03	2.596E+03	2.621E+03	2.598E+03
SE 80	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 81	1.042E+04	1.028E+04	1.042E+04	1.029E+04	1.041E+04	1.027E+04	1.041E+04	1.027E+04
SE 81M	3.282E+02	3.225E+02	3.284E+02	3.226E+02	3.279E+02	3.218E+02	3.280E+02	3.220E+02
SE 82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 83	9.702E+03	9.553E+03	9.706E+03	9.559E+03	9.691E+03	9.536E+03	9.696E+03	9.542E+03
SE 83M	1.600E+04	1.568E+04	1.601E+04	1.569E+04	1.596E+04	1.563E+04	1.597E+04	1.564E+04
SE 84	4.739E+04	4.638E+04	4.741E+04	4.640E+04	4.727E+04	4.621E+04	4.729E+04	4.623E+04
SE 85	2.982E+04	2.908E+04	2.983E+04	2.910E+04	2.972E+04	2.896E+04	2.974E+04	2.898E+04
SE 85M	2.177E+04	2.125E+04	2.178E+04	2.126E+04	2.170E+04	2.116E+04	2.171E+04	2.117E+04
SE 86	6.208E+04	6.043E+04	6.211E+04	6.046E+04	6.187E+04	6.013E+04	6.189E+04	6.017E+04
SE 87	4.638E+04	4.526E+04	4.640E+04	4.528E+04	4.624E+04	4.506E+04	4.626E+04	4.509E+04
SE 88	1.705E+04	1.664E+04	1.705E+04	1.665E+04	1.700E+04	1.658E+04	1.701E+04	1.659E+04
SE 89	4.481E+03	4.385E+03	4.482E+03	4.387E+03	4.480E+03	4.380E+03	4.482E+03	4.383E+03
SE 90	1.541E+03	1.502E+03	1.542E+03	1.503E+03	1.534E+03	1.492E+03	1.534E+03	1.493E+03
SE 91	1.614E+02	1.591E+02	1.615E+02	1.591E+02	1.618E+02	1.594E+02	1.619E+02	1.595E+02
SE 92	3.304E+00	3.472E+00	3.305E+00	3.475E+00	3.384E+00	3.569E+00	3.386E+00	3.572E+00
SE 93	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM145	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM146	7.020E-09	1.681E-08	6.019E-09	1.452E-08	9.699E-09	2.311E-08	8.315E-09	1.996E-08
SM147	2.288E-07	3.410E-07	1.985E-07	2.975E-07	2.258E-07	3.351E-07	1.959E-07	2.923E-07
SM148	3.692E-12	6.468E-12	3.618E-12	6.356E-12	3.789E-12	6.607E-12	3.713E-12	6.491E-12
SM149	1.180E-13	1.085E-13	1.209E-13	1.116E-13	1.099E-13	1.013E-13	1.126E-13	1.041E-13
SM150	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM151	6.048E+01	6.114E+01	6.125E+01	6.252E+01	5.694E+01	5.806E+01	5.778E+01	5.956E+01
SM152	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM153	3.034E+04	4.261E+04	3.048E+04	4.292E+04	3.171E+04	4.460E+04	3.185E+04	4.497E+04
SM154	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

MODEL	MBLR	MBLR	MBSL	MBSL	MPLR	MPLR	MPLS	MPLS
MWD	4032	5376	4032	5376	4032	5376	4032	5376
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
SM155	2.346E+03	2.607E+03	2.348E+03	2.610E+03	2.390E+03	2.668E+03	2.392E+03	2.671E+03
SM156	1.112E+03	1.281E+03	1.113E+03	1.282E+03	1.141E+03	1.321E+03	1.142E+03	1.323E+03
SM157	6.275E+02	7.464E+02	6.281E+02	7.476E+02	6.480E+02	7.749E+02	6.487E+02	7.762E+02
SM158	3.156E+02	3.827E+02	3.159E+02	3.833E+02	3.273E+02	3.991E+02	3.277E+02	3.999E+02
SM159	1.180E+02	1.516E+02	1.182E+02	1.519E+02	1.234E+02	1.594E+02	1.236E+02	1.598E+02
SM160	4.471E+01	5.664E+01	4.476E+01	5.675E+01	4.677E+01	5.957E+01	4.683E+01	5.989E+01
SM161	9.421E+00	1.279E+01	9.434E+00	1.282E+01	1.000E+01	1.361E+01	1.002E+01	1.364E+01
SM162	1.378E+00	1.773E+00	1.380E+00	1.776E+00	1.475E+00	1.904E+00	1.477E+00	1.907E+00
SM163	1.502E-01	1.921E-01	1.503E-01	1.924E-01	1.621E-01	2.076E-01	1.623E-01	2.079E-01
SM164	1.347E-02	1.685E-02	1.348E-02	1.688E-02	1.459E-02	1.828E-02	1.461E-02	1.831E-02
SM165	8.581E-04	1.056E-03	8.588E-04	1.058E-03	9.362E-04	1.154E-03	9.369E-04	1.155E-03
SR 86	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 87	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 87M	2.005E-01	3.759E-01	1.997E-01	3.743E-01	2.097E-01	3.950E-01	2.088E-01	3.934E-01
SR 88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 89	2.019E+05	1.976E+05	2.307E+05	2.259E+05	2.009E+05	1.965E+05	2.296E+05	2.247E+05
SR 90	1.197E+04	1.568E+04	1.202E+04	1.576E+04	1.194E+04	1.564E+04	1.199E+04	1.573E+04
SR 91	2.783E+05	2.723E+05	2.784E+05	2.724E+05	2.776E+05	2.712E+05	2.777E+05	2.714E+05
SR 92	2.860E+05	2.803E+05	2.861E+05	2.805E+05	2.858E+05	2.798E+05	2.859E+05	2.800E+05
SR 93	3.061E+05	3.008E+05	3.062E+05	3.010E+05	3.054E+05	3.000E+05	3.056E+05	3.002E+05
SR 94	2.838E+05	2.792E+05	2.839E+05	2.794E+05	2.828E+05	2.780E+05	2.829E+05	2.782E+05
SR 95	2.619E+05	2.577E+05	2.620E+05	2.579E+05	2.614E+05	2.571E+05	2.616E+05	2.573E+05
SR 96	1.813E+05	1.784E+05	1.814E+05	1.785E+05	1.809E+05	1.780E+05	1.810E+05	1.781E+05
SR 97	9.331E+04	9.191E+04	9.336E+04	9.197E+04	9.319E+04	9.175E+04	9.324E+04	9.181E+04
SR 98	3.437E+04	3.393E+04	3.438E+04	3.396E+04	3.436E+04	3.392E+04	3.438E+04	3.394E+04
SR 99	7.818E+03	7.784E+03	7.822E+03	7.789E+03	7.835E+03	7.804E+03	7.839E+03	7.809E+03
SR100	1.258E+03	1.265E+03	1.258E+03	1.266E+03	1.269E+03	1.277E+03	1.269E+03	1.278E+03
SR101	1.619E+02	1.637E+02	1.620E+02	1.638E+02	1.630E+02	1.650E+02	1.631E+02	1.651E+02
SR102	1.167E+01	1.201E+01	1.168E+01	1.202E+01	1.181E+01	1.218E+01	1.182E+01	1.219E+01
SR103	3.104E-01	3.265E-01	3.106E-01	3.267E-01	3.155E-01	3.330E-01	3.157E-01	3.333E-01
SR104	7.683E-03	8.637E-03	7.688E-03	8.647E-03	7.934E-03	8.968E-03	7.940E-03	8.978E-03
TC 98	1.879E-07	3.731E-07	1.881E-07	3.735E-07	2.611E-07	5.167E-07	2.613E-07	5.172E-07
TC 99	1.723E+00	2.259E+00	1.724E+00	2.260E+00	1.713E+00	2.239E+00	1.714E+00	2.240E+00
TC 99M	2.628E+05	2.637E+05	2.631E+05	2.640E+05	2.605E+05	2.600E+05	2.608E+05	2.604E+05
TC100	2.759E+04	4.377E+04	2.761E+04	4.383E+04	2.900E+04	4.589E+04	2.903E+04	4.595E+04
TC101	2.554E+05	2.561E+05	2.555E+05	2.562E+05	2.556E+05	2.564E+05	2.557E+05	2.566E+05
TC102	2.165E+05	2.185E+05	2.166E+05	2.187E+05	2.169E+05	2.192E+05	2.171E+05	2.194E+05
TC102M	9.549E+01	1.074E+02	9.557E+01	1.075E+02	9.747E+01	1.099E+02	9.755E+01	1.101E+02
TC103	1.684E+05	1.729E+05	1.685E+05	1.731E+05	1.692E+05	1.741E+05	1.693E+05	1.742E+05
TC104	1.073E+05	1.133E+05	1.074E+05	1.134E+05	1.088E+05	1.151E+05	1.088E+05	1.152E+05
TC105	6.555E+04	7.177E+04	6.560E+04	7.185E+04	6.652E+04	7.312E+04	6.658E+04	7.321E+04
TC106	3.171E+04	3.701E+04	3.174E+04	3.706E+04	3.258E+04	3.822E+04	3.261E+04	3.829E+04
TC107	1.500E+04	1.814E+04	1.502E+04	1.817E+04	1.551E+04	1.889E+04	1.553E+04	1.893E+04
TC108	7.612E+03	9.475E+03	7.621E+03	9.493E+03	7.933E+03	9.928E+03	7.943E+03	9.948E+03
TC109	3.208E+03	4.056E+03	3.211E+03	4.063E+03	3.388E+03	4.291E+03	3.392E+03	4.299E+03
TC110	9.755E+02	1.166E+03	9.764E+02	1.167E+03	1.033E+03	1.237E+03	1.034E+03	1.239E+03
TC111	3.230E+02	3.782E+02	3.232E+02	3.786E+02	3.464E+02	4.061E+02	3.467E+02	4.066E+02
TC112	1.022E+02	1.197E+02	1.022E+02	1.198E+02	1.102E+02	1.292E+02	1.102E+02	1.294E+02
TC113	2.639E+01	3.094E+01	2.641E+01	3.097E+01	2.858E+01	3.356E+01	2.860E+01	3.360E+01
TC114	5.603E+00	6.622E+00	5.606E+00	6.627E+00	6.102E+00	7.217E+00	6.105E+00	7.223E+00
TC115	1.112E+00	1.330E+00	1.113E+00	1.331E+00	1.210E+00	1.447E+00	1.210E+00	1.449E+00
TC116	6.840E-02	8.184E-02	6.844E-02	8.191E-02	7.478E-02	8.951E-02	7.482E-02	8.959E-02
TC117	3.235E-03	3.789E-03	3.237E-03	3.792E-03	3.519E-03	4.125E-03	3.521E-03	4.129E-03
TC118	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE122	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE123	2.102E-14	5.562E-14	2.082E-14	5.515E-14	2.327E-14	6.112E-14	2.305E-14	6.061E-14

MODEL	MBLR	MBLR	MBSL	MBSL	MPLR	MPLR	MPLS	MPLS
MWD	4032	5376	4032	5376	4032	5376	4032	5376
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
TE123M	1.279E+01	3.354E-01	1.381E-01	3.655E-01	1.433E-01	3.743E-01	1.547E-01	4.079E-01
TE124	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE125	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE125M	1.742E+02	2.287E+02	1.769E+02	2.360E+02	1.803E+02	2.369E+02	1.831E+02	2.444E+02
TE126	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE127	8.987E+03	9.435E+03	9.189E+03	9.656E+03	9.166E+03	9.639E+03	9.373E+03	9.865E+03
TE127M	1.079E+03	1.136E+03	1.246E+03	1.317E+03	1.099E+03	1.158E+03	1.269E+03	1.343E+03
TE128	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE129	3.576E+04	3.656E+04	3.618E+04	3.699E+04	3.605E+04	3.690E+04	3.647E+04	3.733E+04
TE129M	4.836E+03	4.949E+03	5.445E+03	5.573E+03	4.871E+03	4.989E+03	5.485E+03	5.618E+03
TE130	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE131	1.308E+04	1.311E+05	1.308E+05	1.312E+05	1.310E+05	1.314E+05	1.310E+05	1.315E+05
TE131M	1.885E+04	1.908E+04	1.886E+04	1.909E+04	1.890E+04	1.914E+04	1.891E+04	1.916E+04
TE132	2.151E+05	2.155E+05	2.155E+05	2.160E+05	2.152E+05	2.157E+05	2.157E+05	2.162E+05
TE133	1.933E+05	1.927E+05	1.934E+05	1.929E+05	1.933E+05	1.928E+05	1.934E+05	1.929E+05
TE133M	1.420E+05	1.403E+05	1.420E+05	1.403E+05	1.418E+05	1.400E+05	1.418E+05	1.401E+05
TE134	3.254E+05	3.212E+05	3.255E+05	3.214E+05	3.244E+05	3.202E+05	3.246E+05	3.204E+05
TE135	1.602E+05	1.587E+05	1.603E+05	1.588E+05	1.600E+05	1.585E+05	1.601E+05	1.586E+05
TE136	9.089E+04	8.965E+04	9.093E+04	8.970E+04	9.075E+04	8.947E+04	9.079E+04	8.953E+04
TE137	2.107E+04	2.096E+04	2.108E+04	2.097E+04	2.107E+04	2.096E+04	2.108E+04	2.098E+04
TE138	4.529E+03	4.531E+03	4.531E+03	4.534E+03	4.540E+03	4.545E+03	4.542E+03	4.548E+03
TE139	7.173E+02	7.258E+02	7.176E+02	7.262E+02	7.210E+02	7.302E+02	7.214E+02	7.307E+02
TE140	7.219E+01	7.398E+01	7.222E+01	7.403E+01	7.286E+01	7.479E+01	7.290E+01	7.484E+01
TE141	2.737E+00	2.845E+00	2.738E+00	2.847E+00	2.769E+00	2.885E+00	2.770E+00	2.887E+00
TE142	1.375E-01	1.573E-01	1.376E-01	1.575E-01	1.427E-01	1.637E-01	1.428E-01	1.638E-01
XE126	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE127	5.032E-04	1.282E-03	5.481E-04	1.405E-03	7.380E-04	1.876E-03	8.035E-04	2.054E-03
XE128	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE129	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE129M	8.498E-02	2.117E-01	8.697E-02	2.172E-01	9.259E-02	2.304E-01	9.473E-02	2.363E-01
XE130	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE131	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE131M	1.451E+03	1.461E+03	1.632E+03	1.643E+03	1.453E+03	1.463E+03	1.635E+03	1.646E+03
XE132	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE133	3.162E+05	3.155E+05	3.211E+05	3.204E+05	3.161E+05	3.154E+05	3.210E+05	3.203E+05
XE133M	9.846E+03	9.850E+03	9.853E+03	9.859E+03	9.857E+03	9.863E+03	9.864E+03	9.872E+03
XE134	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE134M	1.346E+03	1.409E+03	1.347E+03	1.410E+03	1.362E+03	1.427E+03	1.362E+03	1.428E+03
XE135	1.082E+05	9.476E+04	1.082E+05	9.477E+04	1.019E+05	8.896E+04	1.019E+05	8.897E+04
XE135M	5.754E+04	5.782E+04	5.756E+04	5.786E+04	5.759E+04	5.789E+04	5.762E+04	5.794E+04
XE136	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE137	2.958E+05	2.945E+05	2.959E+05	2.947E+05	2.957E+05	2.944E+05	2.958E+05	2.947E+05
XE138	3.046E+05	3.017E+05	3.047E+05	3.019E+05	3.043E+05	3.013E+05	3.044E+05	3.015E+05
XE139	2.465E+05	2.437E+05	2.466E+05	2.439E+05	2.462E+05	2.433E+05	2.463E+05	2.435E+05
XE140	1.716E+05	1.691E+05	1.717E+05	1.692E+05	1.708E+05	1.682E+05	1.709E+05	1.684E+05
XE141	5.755E+04	5.681E+04	5.758E+04	5.684E+04	5.702E+04	5.627E+04	5.705E+04	5.631E+04
XE142	1.877E+04	1.855E+04	1.878E+04	1.856E+04	1.876E+04	1.854E+04	1.877E+04	1.855E+04
XE143	2.633E+03	2.625E+03	2.635E+03	2.627E+03	2.637E+03	2.630E+03	2.638E+03	2.632E+03
XE144	3.567E+02	3.604E+02	3.569E+02	3.606E+02	3.583E+02	3.624E+02	3.585E+02	3.627E+02
XE145	1.484E+01	1.651E+01	1.485E+01	1.653E+01	1.532E+01	1.709E+01	1.533E+01	1.711E+01
XE146	1.153E+00	1.247E+00	1.153E+00	1.247E+00	1.184E+00	1.284E+00	1.185E+00	1.285E+00
XE147	6.186E-02	7.214E-02	6.190E-02	7.220E-02	6.457E-02	7.543E-02	6.461E-02	7.549E-02
Y 89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 89M	2.334E-02	2.679E-02	2.336E-02	2.682E-02	2.392E-02	2.751E-02	2.394E-02	2.755E-02
Y 90	1.228E+04	1.618E+04	1.233E+04	1.626E+04	1.228E+04	1.618E+04	1.232E+04	1.626E+04
Y 90M	1.072E+00	1.303E+00	1.070E+00	1.300E+00	1.098E+00	1.338E+00	1.096E+00	1.336E+00

MODEL	MBLR	MBLR	MBSL	MBSL	MPLR	MPLR	MPLS	MPLS
MWD	4032	5376	4032	5376	4032	5376	4032	5376
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
Y 91	2.455E+05	2.411E+05	2.820E+05	2.770E+05	2.449E+05	2.402E+05	2.813E+05	2.761E+05
Y 91M	1.615E+05	1.580E+05	1.615E+05	1.580E+05	1.610E+05	1.573E+05	1.611E+05	1.574E+05
Y 92	2.866E+05	2.810E+05	2.867E+05	2.811E+05	2.864E+05	2.804E+05	2.865E+05	2.806E+05
Y 93	3.111E+05	3.059E+05	3.113E+05	3.061E+05	3.105E+05	3.051E+05	3.106E+05	3.054E+05
Y 94	3.018E+05	2.974E+05	3.019E+05	2.976E+05	3.008E+05	2.962E+05	3.010E+05	2.963E+05
Y 95	3.102E+05	3.063E+05	3.103E+05	3.065E+05	3.098E+05	3.057E+05	3.099E+05	3.060E+05
Y 96	2.919E+05	2.884E+05	2.920E+05	2.886E+05	2.915E+05	2.879E+05	2.916E+05	2.880E+05
Y 97	2.461E+05	2.434E+05	2.462E+05	2.436E+05	2.458E+05	2.431E+05	2.459E+05	2.432E+05
Y 98	1.761E+05	1.741E+05	1.762E+05	1.742E+05	1.759E+05	1.739E+05	1.760E+05	1.740E+05
Y 99	9.839E+04	9.736E+04	9.843E+04	9.742E+04	9.833E+04	9.729E+04	9.837E+04	9.735E+04
Y100	4.322E+04	4.280E+04	4.324E+04	4.283E+04	4.321E+04	4.279E+04	4.323E+04	4.282E+04
Y101	1.347E+04	1.335E+04	1.347E+04	1.336E+04	1.348E+04	1.336E+04	1.348E+04	1.337E+04
Y102	2.758E+03	2.761E+03	2.759E+03	2.762E+03	2.765E+03	2.770E+03	2.767E+03	2.772E+03
Y103	2.929E+02	2.992E+02	2.931E+02	2.994E+02	2.950E+02	3.020E+02	2.952E+02	3.023E+02
Y104	1.626E+01	1.741E+01	1.627E+01	1.743E+01	1.655E+01	1.781E+01	1.656E+01	1.783E+01
Y105	1.225E+00	1.262E+00	1.226E+00	1.264E+00	1.249E+00	1.290E+00	1.250E+00	1.291E+00
Y106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y107	1.788E-03	1.751E-03	1.789E-03	1.752E-03	1.789E-03	1.750E-03	1.790E-03	1.751E-03
ZR 90	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 90M	1.431E-04	1.782E-04	1.432E-04	1.785E-04	1.489E-04	1.856E-04	1.491E-04	1.859E-04
ZR 91	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 92	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 93	2.648E-01	3.504E-01	2.649E-01	3.505E-01	2.645E-01	3.498E-01	2.646E-01	3.499E-01
ZR 94	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 95	2.751E+05	2.726E+05	3.161E+05	3.135E+05	2.747E+05	2.722E+05	3.157E+05	3.130E+05
ZR 96	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 97	2.888E+05	2.871E+05	2.889E+05	2.873E+05	2.887E+05	2.870E+05	2.888E+05	2.872E+05
ZR 98	2.849E+05	2.833E+05	2.850E+05	2.835E+05	2.848E+05	2.832E+05	2.850E+05	2.834E+05
ZR 99	2.813E+05	2.798E+05	2.814E+05	2.800E+05	2.812E+05	2.797E+05	2.814E+05	2.799E+05
ZR100	2.623E+05	2.607E+05	2.624E+05	2.609E+05	2.622E+05	2.606E+05	2.624E+05	2.608E+05
ZR101	1.705E+05	1.693E+05	1.705E+05	1.694E+05	1.704E+05	1.692E+05	1.705E+05	1.693E+05
ZR102	8.856E+04	8.832E+04	8.860E+04	8.839E+04	8.861E+04	8.841E+04	8.865E+04	8.848E+04
ZR103	2.715E+04	2.738E+04	2.716E+04	2.740E+04	2.722E+04	2.749E+04	2.724E+04	2.751E+04
ZR104	4.403E+03	4.572E+03	4.405E+03	4.576E+03	4.439E+03	4.626E+03	4.442E+03	4.631E+03
ZR105	5.650E+02	5.898E+02	5.653E+02	5.904E+02	5.745E+02	6.018E+02	5.749E+02	6.024E+02
ZR106	1.214E+02	1.212E+02	1.215E+02	1.213E+02	1.214E+02	1.213E+02	1.215E+02	1.214E+02
ZR107	5.814E+00	5.784E+00	5.817E+00	5.788E+00	5.813E+00	5.788E+00	5.816E+00	5.793E+00
ZR108	3.819E-01	4.322E-01	3.821E-01	4.326E-01	4.046E-01	4.593E-01	4.048E-01	4.597E-01
ZR109	2.047E-02	2.456E-02	2.048E-02	2.459E-02	2.212E-02	2.656E-02	2.213E-02	2.658E-02
Inventory	2.819E+07	2.820E+07	2.856E+07	2.859E+07	2.818E+07	2.819E+07	2.854E+07	2.858E+07

B.3 Worst-Case and Best-Estimate Inventories Available for Release

B.3.1 Worst-Case and Best-Estimate Actinide Inventories Available for Release

FUEL	WORST-CASE		BEST-ESTIMATE	
	HEU	LEU	HEU	LEU
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
AM239	4.495E-07	2.323E-05	1.150E-07	8.024E-06
AM240	9.721E-05	5.018E-03	2.482E-05	1.731E-03
AM241	5.262E-02	3.325E+00	1.824E-02	1.392E+00
AM242	3.188E+01	1.673E+03	8.168E+00	5.785E+02
AM242M	2.833E-03	1.759E-01	7.795E-04	6.074E-02
AM243	2.256E-03	1.120E-01	3.369E-04	2.452E-02
AM244	5.353E-01	2.177E+01	5.908E-02	3.936E+00
AM244M	1.019E+01	4.145E+02	1.124E+00	7.493E+01
AM245	3.950E-05	1.385E-03	2.964E-06	1.875E-04
AM246	9.315E-09	2.719E-07	4.836E-10	2.834E-08
CM241	2.396E-06	1.120E-04	3.532E-07	2.517E-05
CM242	1.130E+01	6.278E+02	2.416E+00	1.827E+02
CM243	2.683E-03	1.361E-01	3.492E-04	2.637E-02
CM244	1.264E-01	5.744E+00	1.125E-02	8.251E-01
CM245	6.238E-06	2.622E-04	3.760E-07	2.732E-05
CM246	6.744E-07	2.573E-05	2.418E-08	1.760E-06
CM247	1.000E-12	3.491E-11	2.206E-14	1.612E-12
CM248	1.197E-12	3.804E-11	1.597E-14	1.172E-12
CM249	3.303E-08	8.590E-07	3.255E-10	2.184E-08
CM250	4.606E-20	1.103E-18	2.704E-22	1.896E-20
CM251	1.898E-18	3.720E-17	8.228E-21	5.277E-19
NP235	6.575E-04	5.527E-04	2.191E-04	2.301E-04
NP236	1.015E-06	9.266E-07	3.566E-07	4.017E-07
NP236M	1.359E-03	9.351E-04	3.342E-04	3.209E-04
NP237	4.507E-02	4.065E-02	2.088E-02	2.192E-02
NP238	3.976E+04	2.949E+04	1.363E+04	1.319E+04
NP239	1.537E+04	6.958E+05	1.140E+04	5.762E+05
NP240	2.115E+01	7.663E+02	1.159E+01	5.235E+02
NP240M	3.296E-02	1.223E+00	1.807E-02	8.355E-01
NP241	3.719E-07	1.130E-05	1.506E-07	6.366E-06
PU236	3.124E-04	2.823E-04	5.961E-05	7.521E-05
PU237	1.305E-01	1.075E-01	2.837E-02	3.319E-02
PU238	1.631E+02	1.403E+02	4.765E+01	5.233E+01
PU239	3.170E-01	1.406E+01	2.387E-01	1.240E+01
PU240	3.729E-01	1.525E+01	2.097E-01	1.042E+01
PU241	6.378E+01	3.519E+03	2.613E+01	1.783E+03
PU242	4.286E-04	2.269E-02	1.043E-04	7.420E-03
PU243	6.734E+01	2.957E+03	1.211E+01	7.975E+02
PU244	3.108E-11	1.331E-09	3.158E-12	2.184E-10
PU245	3.950E-05	1.385E-03	2.964E-06	1.875E-04
PU246	9.313E-09	2.719E-07	4.836E-10	2.834E-08
Inventory	5.550E+04	7.354E+05	2.514E+04	5.934E+05

B.3.2 Worst-Case and Best-Estimate Fission Product Inventories Available for Release

FUEL	WORST-CASE		BEST-ESTIMATE	
	HEU	LEU	HEU	LEU
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
BA132	0.000E+00	1.543E+05	0.000E+00	0.000E+00
BA133	0.000E+00	1.543E+05	0.000E+00	0.000E+00
BA134	0.000E+00	1.543E+05	0.000E+00	0.000E+00
BA135	0.000E+00	1.543E+05	0.000E+00	0.000E+00
BA135M	8.093E+00	6.126E+00	2.138E+00	2.120E+00
BA136	0.000E+00	1.543E+05	0.000E+00	0.000E+00
BA136M	9.781E+02	9.066E+02	5.598E+02	5.896E+02
BA137	0.000E+00	1.543E+05	0.000E+00	0.000E+00
BA137M	1.603E+04	1.603E+04	1.158E+04	1.206E+04
BA138	0.000E+00	1.543E+05	0.000E+00	0.000E+00
BA139	3.214E+05	3.212E+05	3.195E+05	3.168E+05
BA140	3.116E+05	3.100E+05	2.917E+05	2.886E+05
BA141	2.931E+05	2.929E+05	2.891E+05	2.890E+05
BA142	2.877E+05	2.874E+05	2.859E+05	2.824E+05
BA143	2.631E+05	2.628E+05	2.614E+05	2.570E+05
BA144	2.118E+05	2.117E+05	2.105E+05	2.056E+05
BA145	9.898E+04	9.938E+04	9.835E+04	9.708E+04
BA146	3.363E+04	3.413E+04	3.342E+04	3.338E+04
BA147	6.502E+03	6.747E+03	6.463E+03	6.665E+03
BA148	7.587E+02	8.716E+02	7.527E+02	8.541E+02
BA149	4.636E+01	6.770E+01	4.621E+01	6.397E+01
BA150	2.170E+00	4.057E+00	2.168E+00	3.723E+00
BA151	0.000E+00	1.543E+05	0.000E+00	0.000E+00
BA152	1.067E-03	7.115E-03	1.037E-03	6.043E-03
BR 79	0.000E+00	1.543E+05	0.000E+00	0.000E+00
BR 79M	8.458E-05	6.250E-04	7.821E-05	4.739E-04
BR 80	3.834E-02	5.636E-02	3.517E-02	4.906E-02
BR 80M	1.539E-02	2.934E-02	1.473E-02	2.509E-02
BR 81	0.000E+00	1.543E+05	0.000E+00	0.000E+00
BR 82	7.135E+02	5.931E+02	3.856E+02	3.748E+02
BR 82M	3.081E+02	2.529E+02	1.662E+02	1.598E+02
BR 83	2.679E+04	2.679E+04	2.669E+04	2.592E+04
BR 84	5.038E+04	5.031E+04	5.004E+04	4.833E+04
BR 84M	9.453E+02	9.984E+02	9.408E+02	9.859E+02
BR 85	6.265E+04	6.246E+04	6.224E+04	5.991E+04
BR 86	4.745E+04	4.729E+04	4.713E+04	4.514E+04
BR 86M	4.786E+04	4.770E+04	4.753E+04	4.551E+04
BR 87	1.079E+05	1.076E+05	1.072E+05	1.027E+05
BR 88	1.244E+05	1.240E+05	1.235E+05	1.177E+05
BR 89	9.444E+04	9.420E+04	9.378E+04	8.881E+04
BR 90	6.330E+04	6.314E+04	6.285E+04	5.933E+04
BR 91	1.967E+04	1.976E+04	1.953E+04	1.865E+04
BR 92	9.441E+02	1.013E+03	9.383E+02	9.965E+02
BR 93	2.350E+02	2.441E+02	2.335E+02	2.349E+02
BR 94	1.629E+01	1.730E+01	1.619E+01	1.682E+01
BR 95	3.674E-01	5.961E-01	3.664E-01	5.579E-01
BR 96	1.677E-02	2.954E-02	1.674E-02	2.745E-02
CE139	0.000E+00	1.543E+05	0.000E+00	0.000E+00
CE140	0.000E+00	1.543E+05	0.000E+00	0.000E+00
CE141	2.952E+05	2.930E+05	2.625E+05	2.599E+05
CE142	4.790E-06	1.543E+05	3.442E-06	3.563E-06
CE143	2.944E+05	2.939E+05	2.929E+05	2.879E+05
CE144	2.414E+05	2.356E+05	1.959E+05	1.956E+05
CE145	1.945E+05	1.945E+05	1.935E+05	1.909E+05
CE146	1.478E+05	1.480E+05	1.469E+05	1.458E+05
CE147	1.108E+05	1.110E+05	1.102E+05	1.097E+05
CE148	7.599E+04	7.630E+04	7.554E+04	7.577E+04
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
CE150	1.479E+04	1.559E+04	1.471E+04	1.538E+04
CE151	3.819E+03	4.179E+03	3.799E+03	4.085E+03
CE152	6.802E+02	7.952E+02	6.770E+02	7.679E+02
CE153	6.557E+01	9.831E+01	6.539E+01	9.147E+01
CE154	4.086E+00	8.679E+00	4.077E+00	7.754E+00
CE155	1.766E-01	7.766E-01	1.736E-01	6.617E-01
CE156	5.398E-03	6.478E-02	5.045E-03	5.360E-02
CO 157	1.917E-04	4.918E-03	1.636E-04	4.059E-03
CO 72	4.473E-02	9.366E-02	4.470E-02	8.529E-02
CO 73	4.869E-03	2.240E-02	4.781E-03	1.926E-02
CO 74	3.677E-03	6.619E-03	3.671E-03	6.146E-03
CO 75	4.832E-04	8.721E-04	4.825E-04	8.095E-04
CS132	4.091E+01	3.384E+01	2.172E+01	2.074E+01
CS133	0.000E+00	1.543E+05	0.000E+00	0.000E+00
CS134	1.826E+04	1.627E+04	8.441E+03	8.565E+03
CS134M	7.299E+03	6.036E+03	3.968E+03	3.788E+03
CS135	8.609E-02	9.090E-02	6.603E-02	7.123E-02
CS135M	3.052E+03	2.246E+03	1.063E+03	9.960E+02
CS136	5.935E+03	5.501E+03	3.397E+03	3.578E+03
CS137	1.693E+04	1.693E+04	1.222E+04	1.273E+04
CS138	3.352E+05	3.349E+05	3.332E+05	3.295E+05
CS138M	1.234E+04	1.265E+04	1.227E+04	1.257E+04
CS139	3.180E+05	3.179E+05	3.161E+05	3.126E+05
CS140	2.881E+05	2.880E+05	2.864E+05	2.830E+05
CS141	2.203E+05	2.204E+05	2.190E+05	2.159E+05
CS142	1.414E+05	1.417E+05	1.404E+05	1.376E+05
CS143	7.571E+04	7.590E+04	7.521E+04	7.309E+04
CS144	1.581E+04	1.618E+04	1.571E+04	1.587E+04
CS145	3.582E+03	3.717E+03	3.561E+03	3.675E+03
CS146	4.043E+02	4.441E+02	4.020E+02	4.383E+02
CS147	2.958E-01	4.447E+01	2.949E-01	4.200E+01
CS148	9.169E-01	2.095E+00	9.151E-01	1.893E+00
CS149	0.000E+00	1.543E+05	0.000E+00	0.000E+00
CS150	2.391E-04	1.476E-03	2.331E-04	1.258E+03
EU149	0.000E+00	1.543E+05	0.000E+00	0.000E+00
EU150	2.768E-06	1.543E-05	1.813E-06	2.001E-06
EU151	0.000E+00	1.543E+05	0.000E+00	0.000E+00
EU152	1.738E+00	2.054E+00	1.672E+00	1.896E+00
EU152M	2.003E+01	2.221E+01	1.998E+01	2.175E+01
EU153	0.000E+00	1.543E+05	0.000E+00	0.000E+00
EU154	9.147E+02	8.549E+02	4.049E+02	4.299E+02
EU155	4.816E+02	4.869E+02	2.503E+02	2.896E+02
EU156	1.086E+04	9.796E+03	4.383E+03	4.975E+03
EU157	8.233E+02	1.110E+03	5.166E+02	7.937E+02
EU158	2.009E+02	4.287E+02	1.986E+02	3.509E+02
EU159	6.790E+01	1.958E+02	6.665E+01	1.519E+02
EU160	2.703E+01	8.707E+01	2.643E+01	6.705E+01
EU161	6.427E+00	3.365E+01	6.128E+00	2.480E+01
EU162	2.179E+00	1.044E+01	2.098E+00	7.989E+00
EU163	3.612E-01	2.365E+00	3.426E-01	1.807E+00
EU164	5.655E-02	4.792E-01	5.300E-02	3.733E-01
EU165	7.600E-03	7.666E-02	7.083E-03	6.101E-02
I127	0.000E+00	1.543E+05	0.000E+00	0.000E+00
I128	8.125E+02	7.603E+02	4.334E+02	4.611E+02
I129	3.708E-03	3.940E-03	2.702E-03	2.950E-03
I130	3.703E+03	3.241E+03	1.998E+03	2.009E+03
I130M	1.538E+03	1.343E+03	8.298E+02	8.317E+02

FUEL	WORST-CASE		BEST-ESTIMATE	
	HEU	LEU	HEU	LEU
1132	2.147E+05	2.178E+05	2.136E+05	2.167E+05
1133	3.355E+05	3.358E+05	3.336E+05	3.337E+05
1133M	6.418E+03	7.105E+03	6.392E+03	6.920E+03
1134	3.797E+05	3.798E+05	3.774E+05	3.759E+05
1134M	2.249E+04	2.484E+04	2.239E+04	2.417E+04
1135	3.130E+05	3.132E+05	3.112E+05	3.112E+05
1136	1.524E+05	1.530E+05	1.515E+05	1.508E+05
1136M	9.702E+04	9.674E+04	9.642E+04	9.516E+04
1137	1.622E+05	1.628E+05	1.612E+05	1.591E+05
1138	8.247E+04	8.316E+04	8.195E+04	8.081E+04
1139	3.663E+04	3.714E+04	3.639E+04	3.602E+04
1140	1.076E+04	1.099E+04	1.069E+04	1.057E+04
1141	1.536E+03	1.599E+03	1.526E+03	1.546E+03
1142	1.113E+02	1.335E+02	1.107E+02	1.305E+02
1143	4.542E+00	6.559E+00	4.525E+00	6.227E+00
1144	1.729E-01	3.803E-01	1.727E-01	3.450E-01
1145	0.000E+00	1.543E-05	0.000E+00	0.000E+00
KR 79	4.230E-08	1.543E-05	2.215E-08	2.551E-08
KR 80	0.000E+00	1.543E-05	0.000E+00	0.000E+00
KR 81	9.681E-09	1.543E-05	4.152E-09	7.699E-09
KR 81M	6.257E-04	1.300E-03	3.494E-04	8.725E-04
KR 82	0.000E+00	1.543E-05	0.000E+00	0.000E+00
KR 83	0.000E+00	1.543E-05	0.000E+00	0.000E+00
KR 83M	2.678E+04	2.678E+04	2.662E+04	2.591E+04
KR 84	0.000E+00	1.543E-05	0.000E+00	0.000E+00
KR 85	1.999E+03	1.939E+03	1.453E+03	1.480E+03
KR 85M	6.333E+04	6.314E+04	6.295E+04	6.059E+04
KR 86	0.000E+00	1.543E-05	0.000E+00	0.000E+00
KR 87	1.281E+05	1.276E+05	1.273E+05	1.219E+05
KR 88	1.810E+05	1.804E+05	1.798E+05	1.723E+05
KR 89	2.302E+05	2.293E+05	2.287E+05	2.183E+05
KR 90	2.287E+05	2.279E+05	2.272E+05	2.167E+05
KR 91	1.688E+05	1.685E+05	1.676E+05	1.601E+05
KR 92	7.384E+04	7.422E+04	7.334E+04	7.076E+04
KR 93	2.512E+04	2.542E+04	2.495E+04	2.425E+04
KR 94	1.131E+04	1.134E+04	1.123E+04	1.071E+04
KR 95	5.090E+02	5.829E+02	5.062E+02	5.727E+02
KR 96	8.329E+01	9.418E+01	8.282E+01	9.297E+01
KR 97	2.034E+00	3.256E+00	2.029E+00	3.039E+00
KR 98	2.127E-01	3.640E-01	2.123E-01	3.394E-01
LA138	3.035E-11	1.543E-05	2.349E-11	2.378E-11
LA139	0.000E+00	1.543E-05	0.000E+00	0.000E+00
LA140	3.281E+05	3.220E+05	3.031E+05	2.996E+05
LA141	2.941E+05	2.939E+05	2.924E+05	2.900E+05
LA142	2.927E+05	2.924E+05	2.909E+05	2.875E+05
LA143	2.930E+05	2.925E+05	2.912E+05	2.862E+05
LA144	2.670E+05	2.666E+05	2.653E+05	2.600E+05
LA145	1.831E+05	1.831E+05	1.819E+05	1.793E+05
LA146	1.142E+05	1.146E+05	1.135E+05	1.125E+05
LA147	5.313E+04	5.353E+04	5.280E+04	5.262E+04
LA148	1.778E+04	1.811E+04	1.767E+04	1.793E+04
LA149	3.542E+03	3.758E+03	3.522E+03	3.720E+03
LA150	5.055E+02	5.834E+02	5.030E+02	5.660E+02
LA151	4.468E+01	5.891E+01	4.450E+01	5.612E+01
LA152	2.502E+00	4.695E+00	2.500E+00	4.288E+00
LA153	7.794E-02	3.473E-01	7.673E-02	2.986E-01
LA154	1.735E-03	1.464E-02	1.666E-03	1.232E-02
MO 95	0.000E+00	1.543E-05	0.000E+00	0.000E+00
MO 96	0.000E+00	1.543E-05	0.000E+00	0.000E+00
MO 97	0.000E+00	1.543E-05	0.000E+00	0.000E+00
MO 98	0.000E+00	1.543E-05	0.000E+00	0.000E+00
MO 99	3.020E+05	3.011E+05	3.003E+05	3.002E+05
MO100	0.000E+00	1.543E-05	0.000E+00	0.000E+00
MO101	2.530E+05	2.566E+05	2.521E+05	2.566E+05
MO102	2.109E+05	2.192E+05	2.098E+05	2.168E+05
MO103	1.560E+05	1.727E+05	1.553E+05	1.679E+05
MO104	9.121E+04	1.103E+05	9.091E+04	1.044E+05
MO105	4.652E+04	6.315E+04	4.645E+04	5.796E+04
MO106	1.827E+04	2.785E+04	1.825E+04	2.455E+04
MO107	6.751E+03	9.962E+03	6.741E+03	8.682E+03
MO108	1.678E+03	2.795E+03	1.675E+03	2.460E+03
MO109	2.117E+02	6.691E+02	2.088E+02	5.602E+02
MO110	3.094E+01	1.331E+02	3.043E+01	1.135E+02
MO111	2.195E+00	2.460E+01	2.069E+00	2.058E+01
MO112	2.656E-01	4.408E+00	2.421E-01	3.675E+00
MO113	1.764E-02	3.125E-01	1.596E-02	2.604E-01
MO114	1.295E-03	3.158E-02	1.121E-03	2.626E-02
MO115	5.971E-05	2.094E-03	4.783E-05	1.737E-03
NB 91	0.000E+00	1.543E-05	0.000E+00	0.000E+00
NB 92	1.888E-07	1.543E-05	6.294E-08	6.475E-08
NB 93	0.000E+00	1.543E-05	0.000E+00	0.000E+00
NB 93M	2.387E-02	2.359E-02	1.251E-02	1.348E-02
NB 94	3.603E-06	1.543E-05	2.609E-06	4.174E-06
NB 94M	2.248E-02	5.347E-02	2.219E-02	4.487E-02
NB 95	3.214E+05	3.161E+05	2.734E+05	2.690E+05
NB 95M	2.258E+03	2.223E+03	1.950E+03	1.918E+03
NB 96	3.740E+02	3.252E+02	2.458E+02	2.365E+02
NB 97	2.929E+05	2.930E+05	2.918E+05	2.901E+05
NB 97M	2.764E+05	2.765E+05	2.753E+05	2.736E+05
NB 98	2.897E+05	2.899E+05	2.880E+05	2.875E+05
NB 98M	1.353E+03	1.615E+03	1.350E+03	1.544E+03
NB 99	2.908E+05	2.911E+05	2.891E+05	2.886E+05
NB 99M	7.413E+03	8.136E+03	7.382E+03	7.938E+03
NB100	1.560E+05	1.561E+05	1.550E+05	1.556E+05
NB100M	1.560E+05	1.561E+05	1.550E+05	1.556E+05
NB101	2.474E+05	2.484E+05	2.460E+05	2.480E+05
NB102	1.903E+05	1.943E+05	1.892E+05	1.932E+05
NB103	1.101E+05	1.168E+05	1.095E+05	1.148E+05
NB104	4.044E+04	4.565E+04	4.025E+04	4.394E+04
NB105	1.062E+04	1.287E+04	1.058E+04	1.212E+04
NB106	3.609E+03	4.012E+03	3.590E+03	3.841E+03
NB107	5.735E+02	6.261E+02	5.702E+02	5.994E+02
NB108	4.276E+01	7.891E+01	4.272E+01	7.224E+01
NB109	1.412E+00	9.928E+00	1.365E+00	8.362E+00
NB110	7.491E-02	1.073E+00	6.931E-02	8.973E-01
NB111	2.648E-03	8.836E-02	2.148E-03	7.330E-02
NB112	0.000E+00	1.543E-05	0.000E+00	0.000E+00
NB141	0.000E+00	1.543E-05	0.000E+00	0.000E+00
ND142	0.000E+00	1.543E-05	0.000E+00	0.000E+00
ND143	0.000E+00	1.543E-05	0.000E+00	0.000E+00
ND144	1.883E-10	1.543E-05	1.073E-10	1.125E-10
ND145	0.000E+00	1.543E-05	0.000E+00	0.000E+00
ND146	0.000E+00	1.543E-05	0.000E+00	0.000E+00
ND147	1.138E+05	1.138E+05	1.078E+05	1.071E+05

WORST-CASE					BEST-ESTIMATE				
FUEL	HEU	LEU	HEU	LEU	FUEL	HEU	LEU	HEU	LEU
ND149	5.518E+04	5.635E+04	5.470E+04	5.561E+04	PM160	2.546E+00	5.232E+00	2.529E+00	4.387E+00
ND150	0.000E+00	1.543E+05	0.000E+00	0.000E+00	PM161	4.887E-02	4.230E-01	4.539E-02	3.179E-01
ND151	2.119E+04	2.316E+04	2.107E+04	2.245E+04	PM162	2.699E-03	1.991E-02	2.576E-03	1.576E-02
ND152	1.327E+04	1.488E+04	1.321E+04	1.439E+04	PR139	0.000E+00	1.543E-05	0.000E+00	0.000E+00
ND153	7.447E+03	8.455E+03	7.415E+03	8.140E+03	PR140	3.542E+00	2.879E+00	1.856E+00	1.765E+00
ND154	2.818E+03	3.532E+03	2.810E+03	3.308E+03	PR141	0.000E+00	1.543E-05	0.000E+00	0.000E+00
ND155	8.910E+02	1.205E+03	8.892E+02	1.107E+03	PR142	1.165E+04	9.465E+03	6.102E+03	5.804E+03
ND156	1.782E+02	3.162E+02	1.776E+02	2.729E+02	PR142M	2.487E+03	2.021E+03	1.303E+03	1.239E+03
ND157	3.043E+01	7.319E+01	3.014E+01	6.013E+01	PR143	2.851E+05	2.834E+05	2.637E+05	2.588E+05
ND158	3.448E+00	1.021E+01	3.397E+00	8.181E+00	PR144	2.430E+05	2.370E+05	1.970E+05	1.969E+05
ND159	1.689E-01	8.885E-01	1.631E-01	6.902E-01	PR144M	2.899E+03	2.829E+03	2.352E+03	2.349E+03
ND160	4.878E-02	1.002E-01	4.863E-02	8.829E-02	PR145	1.946E+05	1.945E+05	1.936E+05	1.910E+05
ND161	1.957E-04	4.675E-03	1.656E-04	3.776E-03	PR146	1.482E+05	1.484E+05	1.473E+05	1.462E+05
PD102	0.000E+00	1.543E-05	0.000E+00	0.000E+00	PR147	1.135E+05	1.137E+05	1.128E+05	1.124E+05
PD104	0.000E+00	1.543E-05	0.000E+00	0.000E+00	PR148	8.400E+04	8.429E+04	8.351E+04	8.384E+04
PD105	0.000E+00	1.543E-05	0.000E+00	0.000E+00	PR149	5.325E+04	5.409E+04	5.295E+04	5.387E+04
PD106	0.000E+00	1.543E+05	0.000E+00	0.000E+00	PR150	2.972E+04	3.137E+04	2.956E+04	3.089E+04
PD107	2.531E-03	4.493E-03	1.821E-03	2.975E-03	PR151	1.497E+04	1.617E+04	1.489E+04	1.581E+04
PD107M	2.446E+00	2.644E+00	1.052E+00	1.309E+00	PR152	6.056E+03	6.690E+03	6.027E+03	6.501E+03
PD108	0.000E+00	1.543E-05	0.000E+00	0.000E+00	PR153	1.624E+03	1.888E+03	1.617E+03	1.814E+03
PD109	3.127E+03	1.105E+04	2.699E+03	7.997E+03	PR154	2.797E+02	3.647E+02	2.788E+02	3.412E+02
PD109M	1.207E+03	4.902E+03	1.161E+03	3.669E+03	PR155	3.436E+01	5.628E+01	3.433E+01	5.077E+01
PD110	0.000E+00	1.543E-05	0.000E+00	0.000E+00	PR156	2.619E+00	7.508E+00	2.592E+00	6.314E+00
PD111	1.349E+03	3.163E+03	1.330E+03	2.588E+03	PR157	1.718E-01	9.932E-01	1.665E-01	8.114E-01
PD111M	1.342E+01	3.952E+01	1.247E+01	3.000E+01	PR158	7.309E-03	7.024E-02	6.910E-03	5.730E-02
PD112	9.505E+02	1.919E+03	9.458E+02	1.647E+03	PR159	1.422E-04	2.668E-03	1.262E-04	2.173E-03
PD113	9.228E+02	1.679E+03	9.207E+02	1.481E+03	RB 85	0.000E+00	1.543E-05	0.000E+00	0.000E+00
PD114	8.536E+02	1.354E+03	8.529E+02	1.235E+03	RB 86	2.985E+02	2.415E+02	1.468E+02	1.391E+02
PD115	7.568E+02	1.269E+03	7.562E+02	1.160E+03	RB 86M	2.992E+01	2.582E+01	1.709E+01	1.725E+01
PD116	7.278E+02	1.090E+03	7.262E+02	1.017E+03	RB 87	4.679E+06	1.543E-05	3.365E-06	3.428E+06
PD117	7.881E+02	1.090E+03	7.854E+02	1.035E+03	RB 88	1.826E+05	1.820E+05	1.815E+05	1.740E+05
PD118	3.316E+02	6.497E+02	3.313E+02	5.908E+02	RB 89	2.387E+05	2.378E+05	2.371E+05	2.269E+05
PD119	1.745E+02	4.092E+02	1.736E+02	3.601E+02	RB 90	2.366E+05	2.356E+05	2.350E+05	2.244E+05
PD120	5.849E+01	1.537E+02	5.823E+01	1.365E+02	RB 90M	4.920E+04	4.896E+04	4.887E+04	4.716E+04
PD121	1.527E+01	5.416E+01	1.512E+01	4.716E+01	RB 91	2.798E+05	2.789E+05	2.779E+05	2.665E+05
PD122	3.663E+00	1.583E+01	3.610E+00	1.366E+01	RB 92	2.368E+05	2.362E+05	2.352E+05	2.261E+05
PD123	8.206E-01	3.591E+00	8.086E-01	3.103E+00	RB 93	1.756E+05	1.755E+05	1.744E+05	1.680E+05
PD124	1.606E-01	6.697E-01	1.584E-01	5.769E-01	RB 94	8.794E+04	8.814E+04	8.735E+04	8.450E+04
PD125	0.000E+00	1.543E+05	0.000E+00	0.000E+00	RB 95	4.509E+04	4.544E+04	4.479E+04	4.332E+04
PD126	2.026E-03	9.381E-03	1.989E-03	7.902E-03	RB 96	1.004E+04	1.030E+04	9.974E+03	9.941E+03
PM145	0.000E+00	1.543E-05	0.000E+00	0.000E+00	RB 97	1.814E+03	1.873E+03	1.802E+03	1.811E+03
PM146	4.272E-01	3.906E-01	2.203E-01	2.238E-01	RB 98	2.624E+02	2.888E+02	2.609E+02	2.863E+02
PM147	2.974E+04	3.095E+04	2.760E+04	2.877E+04	RB 99	2.026E+01	2.405E+01	2.015E+01	2.352E+01
PM148	5.001E+04	4.509E+04	3.610E+04	3.468E+04	RB100	8.520E-01	1.375E+00	8.497E-01	1.288E+00
PM148M	6.337E+03	6.130E+03	5.406E+03	5.450E+03	RB101	0.000E+00	1.543E-05	0.000E+00	0.000E+00
PM149	9.182E+04	8.604E+04	7.692E+04	7.593E+04	RH102	1.075E-01	1.001E-01	4.946E-02	5.216E-02
PM150	9.728E+02	7.560E+02	6.115E+02	5.572E+02	RH103	0.000E+00	1.543E-05	0.000E+00	0.000E+00
PM151	2.119E+04	2.319E+04	2.109E+04	2.249E+04	RH103M	1.432E+05	1.582E+05	1.262E+05	1.356E+05
PM152	1.350E+04	1.519E+04	1.346E+04	1.467E+04	RH104	9.638E+04	8.633E+04	5.635E+04	5.641E+04
PM152M	1.826E+02	2.276E+02	1.822E+02	2.145E+02	RH104M	6.978E+03	6.251E+03	4.080E+03	4.084E+03
PM153	8.268E+03	9.453E+03	8.234E+03	9.085E+03	RH105	5.001E+04	6.987E+04	4.923E+04	6.401E+04
PM154	3.333E+03	4.240E+03	3.324E+03	3.955E+03	RH105M	1.455E+04	2.076E+04	1.449E+04	1.881E+04
PM154M	4.679E+02	6.432E+02	4.675E+02	5.895E+02	RH106	1.986E+04	3.051E+04	1.561E+04	2.209E+04
PM155	1.672E+03	2.329E+03	1.671E+03	2.123E+03	RH106M	1.244E+03	1.472E+03	9.333E+02	1.122E+03
PM156	5.812E+02	1.004E+03	5.792E+02	8.682E+02	RH107	9.938E+03	2.582E+04	9.781E+03	2.050E+04
PM157	2.056E+02	4.214E+02	2.042E+02	3.503E+02	RH108	4.800E+03	1.607E+04	4.662E+03	1.224E+04
PM158	5.626E+01	1.270E+02	5.570E+01	1.028E+02	RH108M	5.489E+00	1.229E+02	3.990E+00	8.589E+01

WORST-CASE					BEST-ESTIMATE				
FUEL	HEU	LEU	HEU	LEU	FUEL	HEU	LEU	HEU	LEU
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
RH109M	1.195E+03	4.879E+03	1.155E+03	3.667E+03	SB134M	1.284E+04	1.316E+04	1.277E+04	1.302E+04
RH110	1.639E+03	4.892E+03	1.607E+03	3.822E+03	SB135	9.818E+03	1.006E+04	9.754E+03	9.708E+03
RH110M	5.554E+01	2.914E+02	5.268E+01	2.086E+02	SB136	1.492E+03	1.576E+03	1.483E+03	1.543E+03
RH111	1.329E+03	3.108E+03	1.315E+03	2.551E+03	SB137	1.064E+02	1.385E+02	1.059E+02	1.334E+02
RH112	9.045E+02	1.813E+03	9.005E+02	1.561E+03	SB138	6.631E+00	1.209E+01	6.621E+00	1.118E+01
RH113	7.711E+02	1.413E+03	7.697E+02	1.252E+03	SB139	2.989E-01	7.423E-01	2.981E-01	6.671E-01
RH114	5.355E+02	9.104E+02	5.350E+02	8.294E+02	SE 76	0.000E+00	1.543E-05	0.000E+00	0.000E+00
RH115	2.874E+02	6.100E+02	2.869E+02	5.485E+02	SE 77	0.000E+00	1.543E-05	0.000E+00	0.000E+00
RH116	1.345E+02	2.910E+02	1.343E+02	2.626E+02	SE 77M	1.306E+00	1.278E+00	1.279E+00	1.267E+00
RH117	3.021E+02	3.460E+02	3.004E+02	3.418E+02	SE 78	0.000E+00	1.543E-05	0.000E+00	0.000E+00
RH118	1.393E+01	1.678E+02	1.308E+01	1.407E+02	SE 79	6.958E-02	6.948E-02	5.008E-02	5.225E-02
RH119	2.326E+00	1.366E+01	2.249E+00	1.130E+01	SE 79M	2.640E+03	2.656E+03	2.626E+03	2.620E+03
RH120	2.929E-01	2.134E+00	2.834E-01	1.808E+00	SE 80	0.000E+00	1.543E-05	0.000E+00	0.000E+00
RH121	3.065E-02	3.248E-01	2.904E-02	2.724E-01	SE 81	1.063E+04	1.064E+04	1.057E+04	1.042E+04
RH122	3.185E-03	3.894E-02	2.987E-03	3.259E-02	SE 81M	3.408E+02	3.379E+02	3.395E+02	3.282E+02
RH123	2.968E-04	3.353E-03	2.801E-04	2.814E-03	SE 82	0.000E+00	1.543E-05	0.000E+00	0.000E+00
RH 99	0.000E+00	1.543E-05	0.000E+00	0.000E+00	SE 83	9.983E+03	9.986E+03	9.921E+03	9.702E+03
RU100	0.000E+00	1.543E-05	0.000E+00	0.000E+00	SE 83M	1.662E+04	1.662E+04	1.651E+04	1.600E+04
RU101	0.000E+00	1.543E-05	0.000E+00	0.000E+00	SE 84	4.947E+04	4.942E+04	4.915E+04	4.739E+04
RU102	0.000E+00	1.543E-05	0.000E+00	0.000E+00	SE 85	3.136E+04	3.130E+04	3.115E+04	2.982E+04
RU103	1.589E+05	1.756E+05	1.400E+05	1.505E+05	SE 85M	2.289E+04	2.280E+04	2.273E+04	2.177E+04
RU104	0.000E+00	1.543E-05	0.000E+00	0.000E+00	SE 86	6.567E+04	6.552E+04	6.521E+04	6.208E+04
RU105	5.198E+04	7.413E+04	5.173E+04	6.716E+04	SE 87	4.869E+04	4.868E+04	4.836E+04	4.638E+04
RU106	1.729E+04	2.748E+04	1.369E+04	1.980E+04	SE 88	1.780E+04	1.766E+04	1.767E+04	1.705E+04
RU107	9.935E+03	2.572E+04	9.779E+03	2.043E+04	SE 89	4.624E+03	4.717E+03	4.593E+03	4.481E+03
RU108	4.795E+03	1.594E+04	4.678E+03	1.216E+04	SE 90	1.608E+03	1.629E+03	1.596E+03	1.541E+03
RU109	2.352E+03	9.433E+03	2.275E+03	7.094E+03	SE 91	1.604E+02	1.683E+02	1.593E+02	1.618E+02
RU110	1.582E+03	4.601E+03	1.554E+03	3.614E+03	SE 92	2.388E+00	3.572E+00	2.380E+00	3.384E+00
RU111	1.043E+03	2.372E+03	1.034E+03	1.975E+03	SE 93	0.000E+00	1.543E-05	0.000E+00	0.000E+00
RU112	5.263E+02	1.136E+03	5.239E+02	9.847E+02	SM145	0.000E+00	1.543E-05	0.000E+00	0.000E+00
RU113	2.842E+02	6.311E+02	2.832E+02	5.568E+02	SM146	2.577E-08	1.543E-05	9.151E-09	9.699E-09
RU114	1.049E+02	2.741E+02	1.045E+02	2.423E+02	SM147	3.259E-07	1.543E-05	2.104E-07	2.288E-07
RU115	2.523E+01	1.110E+02	2.485E+01	9.572E+01	SM148	7.069E-12	1.543E-05	3.656E-12	3.789E-12
RU116	4.510E+00	2.399E+01	4.417E+00	2.055E+01	SM149	1.257E-13	1.543E-05	1.076E-13	1.180E-13
RU117	2.396E+00	4.990E+00	2.394E+00	4.566E+00	SM150	0.000E+00	1.543E-05	0.000E+00	0.000E+00
RU118	4.975E-01	2.050E+01	3.802E-01	1.689E+01	SM151	5.492E+01	6.114E+01	5.393E+01	6.048E+01
RU119	0.000E+00	1.543E-05	0.000E+00	0.000E+00	SM152	0.000E+00	1.543E-05	0.000E+00	0.000E+00
RU120	2.122E-04	4.363E-03	1.983E-04	3.630E-03	SM153	4.879E+04	4.497E+04	3.105E+04	3.171E+04
SB121	0.000E+00	1.543E-05	0.000E+00	0.000E+00	SM154	0.000E+00	1.543E-05	0.000E+00	0.000E+00
SB122	1.091E+02	1.151E+02	5.880E+01	7.014E+01	SM155	1.929E+03	2.671E+03	1.869E+03	2.390E+03
SB122M	9.505E-01	1.006E+00	5.138E-01	6.150E-01	SM156	7.498E+02	1.323E+03	7.468E+02	1.141E+03
SB123	0.000E+00	1.543E-05	0.000E+00	0.000E+00	SM157	3.840E+02	7.762E+02	3.813E+02	6.480E+02
SB124	6.739E+01	7.098E+01	3.172E+01	3.778E+01	SM158	1.870E+02	3.999E+02	1.853E+02	3.273E+02
SB124M	5.630E-01	7.257E-01	4.546E-01	5.905E-01	SM159	5.441E+01	1.598E+02	5.337E+01	1.234E+02
SB125	9.129E+02	1.159E+03	6.842E+02	8.673E+02	SM160	2.095E+01	5.969E+01	2.059E+01	4.677E+01
SB126	7.360E+01	8.706E+01	2.938E+01	3.755E+01	SM161	2.317E+00	1.364E+01	2.194E+00	1.000E+01
SB126M	2.733E+01	3.725E+01	2.630E+01	3.375E+01	SM162	3.802E-01	1.907E+00	3.671E-01	1.475E+00
SB127	7.957E+03	9.917E+03	7.920E+03	9.389E+03	SM163	2.541E-02	2.079E-01	2.397E-02	1.621E-01
SB128	7.974E+02	1.116E+03	7.969E+02	1.033E+03	SM164	1.471E+03	1.831E-02	1.352E-03	1.459E-02
SB128M	1.904E+04	2.104E+04	1.896E+04	2.058E+04	SM165	7.109E-05	1.155E-03	6.403E-05	9.362E-04
SB129	3.428E+04	3.780E+04	3.412E+04	3.692E+04	SR 86	0.000E+00	1.543E-05	0.000E+00	0.000E+00
SB130	1.085E+04	1.202E+04	1.080E+04	1.171E+04	SR 87	0.000E+00	1.543E-05	0.000E+00	0.000E+00
SB130M	6.207E+04	6.465E+04	6.174E+04	6.405E+04	SR 87M	4.541E-01	3.950E-01	1.784E-01	2.097E-01
SB131	1.279E+05	1.288E+05	1.273E+05	1.287E+05	SR 88	0.000E+00	1.543E-05	0.000E+00	0.000E+00
SB132	8.324E+04	8.386E+04	8.273E+04	8.266E+04	SR 89	2.405E+05	2.334E+05	2.106E+05	2.019E+05
SB132M	5.324E+04	5.335E+04	5.292E+04	5.298E+04	SR 90	1.629E+04	1.573E+04	1.177E+04	1.197E+04
SB133	1.119E+05	1.126E+05	1.112E+05	1.092E+05	SR 91	2.91E+05	2.902E+05	2.895E+05	2.783E+05

WORST-CASE				BEST-ESTIMATE					
FUEL	HEU	LEU	HEU	LEU	HEU	LEU			
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)			
SR 93	3.168E+05	3.162E+05	3.148E+05	3.061E+05	TE139	6.484E+02	7.307E+02	6.448E+02	7.210E+02
SR 94	2.933E+05	2.926E+05	2.914E+05	2.838E+05	TE140	6.041E+01	7.484E+01	6.010E+01	7.286E+01
SR 95	2.705E+05	2.704E+05	2.688E+05	2.619E+05	TE141	2.099E+00	2.887E+00	2.091E+00	2.769E+00
SR 96	1.873E+05	1.876E+05	1.860E+05	1.813E+05	TE142	4.225E-02	1.638E-01	4.177E-02	1.427E-01
SR 97	9.605E+04	9.670E+04	9.542E+04	9.331E+04	XE126	0.000E+00	1.543E-05	0.000E+00	0.000E+00
SR 98	3.494E+04	3.561E+04	3.472E+04	3.437E+04	XE127	2.504E-03	2.054E-03	7.107E-04	7.380E-04
SR 99	7.682E+03	8.033E+03	7.633E+03	7.835E+03	XE128	0.000E+00	1.543E-05	0.000E+00	0.000E+00
SR100	1.187E+03	1.281E+03	1.180E+03	1.269E+03	XE129	0.000E+00	1.543E-05	0.000E+00	0.000E+00
SR101	1.476E+02	1.651E+02	1.467E+02	1.630E+02	XE129M	2.925E-01	2.363E-01	9.005E-02	9.259E-02
SR102	9.834E+00	1.219E+01	9.784E+00	1.181E+01	XE130	0.000E+00	1.543E-05	0.000E+00	0.000E+00
SR103	2.399E-01	3.333E-01	2.389E-01	3.155E-01	XE131	0.000E+00	1.543E-05	0.000E+00	0.000E+00
SR104	4.157E-03	8.978E-03	4.148E-03	7.934E-03	XE131M	1.606E+03	1.646E+03	1.428E+03	1.453E+03
TC 98	5.825E-07	1.543E-05	2.548E-07	2.611E-07	XE132	0.000E+00	1.543E-05	0.000E+00	0.000E+00
TC 99	2.245E+00	2.259E+00	1.651E+00	1.723E+00	XE133	3.220E+05	3.220E+05	3.163E+05	3.162E+05
TC 99M	2.644E+05	2.637E+05	2.629E+05	2.628E+05	XE133M	9.805E+03	9.874E+03	9.757E+03	9.857E+03
TC100	5.573E+04	4.595E+04	3.039E+04	2.900E+04	XE134	0.000E+00	1.543E-05	0.000E+00	0.000E+00
TC101	2.530E+05	2.566E+05	2.521E+05	2.556E+05	XE134M	1.184E+03	1.428E+03	1.181E+03	1.362E+03
TC102	2.110E+05	2.194E+05	2.098E+05	2.169E+05	XE135	1.361E+05	1.388E+05	9.954E+04	1.082E+05
TC102M	6.473E+01	1.101E+02	6.451E+01	9.747E+01	XE135M	5.662E+04	5.794E+04	5.631E+04	5.759E+04
TC103	1.569E+05	1.742E+05	1.562E+05	1.692E+05	XE136	0.000E+00	1.543E-05	0.000E+00	0.000E+00
TC104	9.407E+04	1.152E+05	9.379E+04	1.088E+05	XE137	2.983E+05	2.983E+05	2.966E+05	2.958E+05
TC105	5.136E+04	7.321E+04	5.132E+04	6.652E+04	XE138	3.109E+05	3.107E+05	3.090E+05	3.046E+05
TC106	2.093E+04	3.829E+04	2.083E+04	3.258E+04	XE139	2.528E+05	2.527E+05	2.512E+05	2.465E+05
TC107	9.554E+03	1.893E+04	9.486E+03	1.551E+04	XE140	1.772E+05	1.773E+05	1.760E+05	1.716E+05
TC108	4.085E+03	9.948E+03	4.034E+03	7.933E+03	XE141	5.907E+04	5.950E+04	5.869E+04	5.755E+04
TC109	1.312E+03	4.299E+03	1.284E+03	3.388E+03	XE142	1.903E+04	1.945E+04	1.890E+04	1.877E+04
TC110	4.793E+02	1.239E+03	4.744E+02	1.033E+03	XE143	2.594E+03	2.699E+03	2.578E+03	2.637E+03
TC111	1.307E+02	4.066E+02	1.293E+02	3.464E+02	XE144	3.277E+02	3.627E+02	3.258E+02	3.589E+02
TC112	2.807E+01	1.294E+02	2.757E+01	1.102E+02	XE145	7.498E+00	1.711E+01	7.480E+00	1.532E+01
TC113	6.194E+00	3.360E+01	6.058E+00	2.858E+01	XE146	6.933E-01	1.285E+00	6.925E-01	1.184E+00
TC114	8.972E-01	7.223E+00	8.640E-01	6.102E+00	XE147	1.288E-02	7.549E-02	1.258E-02	6.457E-02
TC115	9.144E-02	1.449E+00	8.380E-02	1.210E+00	Y 89	0.000E+00	1.543E-05	0.000E+00	0.000E+00
TC116	5.334E-02	8.959E-02	4.858E-03	7.478E-02	Y 89M	1.434E-02	2.755E-02	1.425E-02	2.392E-02
TC117	6.180E-04	4.129E-03	5.986E-04	3.519E-03	Y 90	1.696E+04	1.626E+04	1.212E+04	1.228E+04
TC118	0.000E+00	1.543E-05	0.000E+00	0.000E+00	Y 90M	1.108E+00	1.338E+00	8.705E-01	1.098E+00
TE122	0.000E+00	1.543E-05	0.000E+00	0.000E+00	Y 91	2.925E+05	2.842E+05	2.549E+05	2.455E+05
TE123	5.909E-14	1.543E-05	1.869E-14	2.327E-14	Y 91M	1.689E+05	1.683E+05	1.679E+05	1.615E+05
TE123M	4.306E-01	4.079E-01	1.205E-01	1.433E-01	Y 92	2.988E+05	2.980E+05	2.969E+05	2.866E+05
TE124	0.000E+00	1.543E-05	0.000E+00	0.000E+00	Y 93	3.217E+05	3.211E+05	3.196E+05	3.114E+05
TE125	0.000E+00	1.543E-05	0.000E+00	0.000E+00	Y 94	3.108E+05	3.100E+05	3.089E+05	3.018E+05
TE125M	1.948E+02	2.444E+02	1.427E+02	1.803E+02	Y 95	3.177E+05	3.174E+05	3.157E+05	3.102E+05
TE126	0.000E+00	1.543E-05	0.000E+00	0.000E+00	Y 96	2.988E+05	2.986E+05	2.969E+05	2.919E+05
TE127	7.939E+03	9.865E+03	7.754E+03	9.166E+03	Y 97	2.514E+05	2.516E+05	2.489E+05	2.461E+05
TE127M	1.112E+03	1.343E+03	9.490E+02	1.099E+03	Y 98	1.801E+05	1.807E+05	1.789E+05	1.761E+05
TE128	0.000E+00	1.543E-05	0.000E+00	0.000E+00	Y 99	1.002E+05	1.012E+05	9.960E+04	9.839E+04
TE129	3.382E+04	3.733E+04	3.337E+04	3.605E+04	Y100	4.384E+04	4.452E+04	4.356E+04	4.322E+04
TE129M	5.111E+03	5.618E+03	4.538E+03	4.871E+03	Y101	1.354E+04	1.390E+04	1.345E+04	1.348E+04
TE130	0.000E+00	1.543E-05	0.000E+00	0.000E+00	Y102	2.684E+03	2.816E+03	2.668E+03	2.765E+03
TE131	1.292E+05	1.315E+05	1.285E+05	1.310E+05	Y103	2.664E+02	3.023E+02	2.649E+02	2.950E+02
TE131M	1.817E+04	1.916E+04	1.808E+04	1.890E+04	Y104	1.269E+01	1.783E+01	1.264E+01	1.655E+01
TE132	2.137E+05	2.162E+05	2.125E+05	2.152E+05	Y105	1.122E+00	1.291E+00	1.115E+00	1.249E+00
TE133	1.941E+05	1.948E+05	1.930E+05	1.933E+05	Y106	0.000E+00	1.543E-05	0.000E+00	0.000E+00
TE133M	1.458E+05	1.452E+05	1.448E+05	1.420E+05	Y107	1.861E-03	1.890E-03	1.849E-03	1.789E-03
TE134	3.350E+05	3.349E+05	3.329E+05	3.254E+05	ZR 90	0.000E+00	1.543E-05	0.000E+00	0.000E+00
TE135	1.638E+05	1.644E+05	1.627E+05	1.602E+05	ZR 90M	5.294E-05	1.859E-04	5.155E-05	1.489E-04
TE136	9.355E+04	9.408E+04	9.294E+04	9.089E+04	ZR 91	0.000E+00	1.543E-05	0.000E+00	0.000E+00
TE137	2.101E+04	2.158E+04	2.088E+04	2.107E+04	ZR 92	0.000E+00	1.543E-05	0.000E+00	0.000E+00

FUEL	WORST-CASE		BEST-ESTIMATE	
	HEU	LEU	HEU	LEU
Isotope	Activity (Ci)	Activity (Ci)	Activity (Ci)	Activity (Ci)
ZR 94	0.000E+00	1.543E-05	0.000E+00	0.000E+00
ZR 95	3.214E+05	3.163E+05	2.799E+05	2.751E+05
ZR 96	0.000E+00	1.543E-05	0.000E+00	0.000E+00
ZR 97	2.917E+05	2.918E+05	2.906E+05	2.888E+05
ZR 98	2.875E+05	2.877E+05	2.858E+05	2.849E+05
ZR 99	2.840E+05	2.843E+05	2.823E+05	2.813E+05
ZR100	2.652E+05	2.656E+05	2.636E+05	2.623E+05
ZR101	1.728E+05	1.738E+05	1.717E+05	1.705E+05
ZR102	8.878E+04	8.999E+04	8.824E+04	8.861E+04
ZR103	2.645E+04	2.751E+04	2.630E+04	2.722E+04
ZR104	4.004E+03	4.631E+03	3.983E+03	4.439E+03
ZR105	5.144E+02	6.024E+02	5.118E+02	5.745E+02
ZR106	1.234E+02	1.257E+02	1.226E+02	1.214E+02
ZR107	5.925E+00	6.047E+00	5.886E+00	5.814E+00
ZR108	1.372E-01	4.597E-01	1.360E-01	4.046E-01
ZR109	1.233E-03	2.658E-02	1.087E-03	2.212E-02
Inventory	2.906E+07	2.944E+07	2.829E+07	2.823E+07

B.4 The Test Matrix

		TEST MATRIX											
MODEL	MBHR	MBHS	MPHR	MPHS	MBLR	MBLS	MPLR	MPLS					
INPUT PARAMETERS													
X-section library	BWR	BWR	PWR	PWR	BWR	BWR	PWR	PWR					
Fuel enrichment	HEU	HEU	HEU	HEU	LEU	LEU	LEU	LEU					
Power history	cyclic	continuous	cyclic	continuous	cyclic	continuous	cyclic	continuous					
INPUT MATERIALS													
U235 (kg)	12.13	12.13	12.13	12.13	12.40	12.40	12.40	12.40					
U238 (kg)	8.89	8.89	8.89	8.89	49.70	49.70	49.70	49.70					
Al (kg)	91.90	91.90	91.90	91.90	57.90	57.90	57.90	57.90					
Mo (kg)	0.00	0.00	0.00	0.00	4.40	4.40	4.40	4.40					
VALIDATION DATA													
Total MWD	3864	3864	3864	3864	4032	4032	4032	4032					
End-of-cycle burn-up %	40.6%	40.6%	40.6%	40.6%	39.8%	39.8%	39.7%	39.7%					
Initial U235 (g)	12132	12132	12132	12132	12400	12400	12400	12400					
Final U235 (g)	7202	7202	7205	7205	7466	7464	7479	7477					
2U235 (g)	4930	4930	4927	4927	4934	4936	4921	4923					
2U238 (g)	~	~	~	~	430	430	450	450					
Final U236 (g)	872	872	870	870	873	873	872	872					
Final Pu239 (g)	~	~	~	~	192	192	199	200					
MWD/2U235 (Modeled)	0.78	0.78	0.78	0.78	0.82	0.82	0.82	0.82					
MWD/2U235 (analytical)	0.79	0.79	0.79	0.79	0.82	0.82	0.82	0.82					
Validation comparison	1.01	1.01	1.00	1.00	1.00	1.01	1.01	1.00					
BENCHMARK DATA													
(saturation activity) (Ci)													
1131 (1.50E+05)	1.383E+05	1.432E+05	1.384E+05	1.433E+05	1.406E+05	1.457E+05	1.409E+05	1.459E+05					
Kr69m (7.79E+04)	6.333E+04	6.333E+04	6.333E+04	6.333E+04	6.314E+04	6.314E+04	6.312E+04	6.312E+04					
Nd147 (1.34E+05)	1.078E+05	1.138E+05	1.078E+05	1.138E+05	1.078E+05	1.138E+05	1.077E+05	1.138E+05					
Xe138 (2.86E+05)	3.109E+05	3.109E+05	3.109E+05	3.109E+05	3.107E+05	3.107E+05	3.107E+05	3.107E+05					
CORE INVENTORIES													
COMPLETE LIST													
ACT Inventory (Ci)	2.468E+04	2.466E+04	2.498E+04	2.497E+04	5.609E+05	5.613E+05	5.934E+05	5.938E+05					
FP Inventory (Ci)	2.828E+07	2.863E+07	2.827E+07	2.862E+07	2.819E+07	2.856E+07	2.818E+07	2.854E+07					
TOTAL Inventory (Ci)	2.830E+07	2.865E+07	2.829E+07	2.864E+07	2.875E+07	2.912E+07	2.877E+07	2.910E+07					
REDUCED LIST													
ACT Inventory (Ci)	2.466E+04	2.465E+04	2.497E+04	2.496E+04	5.609E+05	5.613E+05	5.934E+05	5.938E+05					
FP Inventory (Ci)	1.545E+07	1.581E+07	1.544E+07	1.579E+07	1.540E+07	1.576E+07	1.539E+07	1.575E+07					
TOTAL Inventory (Ci)	1.548E+07	1.583E+07	1.547E+07	1.582E+07	1.597E+07	1.632E+07	1.598E+07	1.634E+07					
EQUILIBRIUM STATES													
NQ isotopes	36	36	36	36	52	52	52	52					
NQ Inventory (Ci)	7.590E+05	8.045E+05	7.564E+05	8.019E+05	1.393E+06	1.479E+06	1.398E+06	1.484E+06					
EQ isotopes	98	98	98	98	83	83	83	83					
EQ Inventory (Ci)	1.470E+07	1.500E+07	1.469E+07	1.499E+07	1.401E+07	1.428E+07	1.399E+07	1.426E+07					
SAT COMPARISON													
SAT Inventory(8.92E+6Ci)	6.96E+06	7.18E+06	6.95E+06	7.17E+06	6.97E+06	7.19E+06	6.96E+06	7.18E+06					
OUTPUT FILE													
ORIGEN2 file?	Y	Y	Y	Y	Y	Y	Y	Y					
Condensed matrix file?	Y	Y	Y	Y	Y	Y	Y	Y					
Final matrix file?	Y	Y	Y	Y	Y	Y	Y	Y					
EQS file?	Y	Y	Y	Y	Y	Y	Y	Y					
SAT file?	Y	Y	Y	Y	Y	Y	Y	Y					

B.5 Element Reduction Criterion

Element Reduction Criterion	
Actinides	Am, Cm, Np, Pu
Fission Products	Ba, Br, Ce, Co, Cs, Eu, I, Kr, La, Mo, Nb, Nd, Pd, Pm, Pr, Rb, Rh, Ru, Sb, Se, Sm, Sr, Tc, Te, Xe, Y, Zr

B.6 SAT Isotopes

SAT Isotope List					
BA140	CS137	KR88	RU105	TE129	XE133
BR83	I131	LA140	RU106	TE129M	XE133M
BR84	I132	MO99	SB127	TE131	XE135
CE141	I133	NB95	SB129	TE131M	XE135M
CE143	I134	ND147	SR91	TE132	XE138
CE144	I135	RB86	TC99M	TE133M	ZR95
CS134	KR85M	RH105	TE127	TE134	ZR97
CS136	KR87	RU103	TE127M	XE131M	

B.7 Summary of Acronyms

Summary of the Acronyms Found in Tables and Figures		
Model	Component	Quantity
BHR	ACT actinide isotopes	EOC end-of-cycle inventory
BHS	FP fission product isotopes	MAX maximum activity between 0% and 40% burn-up
PHR	NQ non-equilibrium isotopes	G# growth over interval # (1 = 10%-20% burn-up)
PHS	EQ equilibrium isotopes	TOT total inventory for the component
BLR	SAT isotopes considered in previous work	BLANK same as TOT
BLS		
PLR	INV isotopes included in the core inventory	T core inventory found in the condensed matrix file
PLS		S core inventory found in the final matrix file