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HTGR SPENT FUEL COMPOSITION AND FUEL ELEMENT BLOCK FLOW

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ABSTRACT

The High-Temperature Gas-Cooled Reactor (HTGR) utilizes the thorium-uranium fuel cycle. Fully enriched uranium fissile material and thorium fertile material are used in the initial reactor core and for makeup fuel in the recycle core loadings. Bred U-233 and unburned U-235 fissile materials are recovered from spent fuel elements, refabricated into recycle fuel elements, and used as part of the recycle core loading along with the makeup fuel elements. A typical HTGR employs a 4-yr fuel cycle with approximately one-fourth of the core discharged and reloaded annually.

The fuel element composition, including heavy metals, impurity nuclides, fission products, and activation products, has been calculated for discharged spent fuel elements and for reload fresh fuel and recycle fuel elements for each cycle over the life of a typical HTGR. Fuel element compositions are presented for the conditions of equilibrium recycle. Data describing compositions for individual reloads throughout the reactor life are available in a detailed volume upon request.

Fuel element block flow data have been compiled based on a forecast HTGR market. Annual block flows are presented for each type of fuel element discharged from the reactors for reprocessing and for refabrication.

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1. INTRODUCTION

The High-Temperature Gas-Cooled Reactor (HTGR) utilizes the thorium-uranium fuel cycle. The initial HTGR core loading uses uranium enriched to 93% U-235 as feed fissile material with thorium fertile material for production of bred U-233. A 4-yr fuel cycle is employed with about one-fourth of the core discharged and reloaded on an annual basis.

The bred U-233 and unburned U-235 are recovered, purified, and recycled as refabricated fuel elements. A typical HTGR progresses in its fuel cycle from the initial core loading to a quasi-equilibrium recycle core loading of three types of fuel elements containing the bred U-233, unburned U-235, and fresh U-235 makeup feed.

Using an HTGR market forecast, fuel element block flow data have been compiled. The compilation follows the start-up of the first reactors, the progression from the initial to the recycle core loadings, and the start-up and progression of the later reactors that make up the total market. The block flow data show the annual number of fuel elements discharged and the number available for reprocessing and refabrication. The compilation is extended to show the number of each type of fuel element involved in the fuel cycle.

Fuel element compositions, including the heavy metal, impurity, fission product, and activation product nuclides, were calculated for each type of fuel element included in a typical HTGR lifetime fuel cycle. The calculations included the initial, makeup, and recycle fuel elements at the time of reactor loading and when discharged after irradiation in the reactor core. For each type of fuel element, the nuclide compositions are compiled separately for the fissile and fertile material.

In Volume I of this report, fuel element compositions are printed for a typical HTGR operating at equilibrium recycle with makeup fresh fuel elements, bred U-233 recycle fuel elements, and unburned U-235 recycle fuel elements. Volume II consists of an appendix containing the calculated fuel element compositions printed for selected cycles of a typical HTGR as the fuel cycle progresses from the initial core loading to the equilibrium recycle core loading. In view of the publication costs and specialized interest, Volume II has been issued with a limited distribution. Requests for copies of Volume II should be directed to the Document Center, General Atomic Company. Archive computer tapes have been compiled and contain the fuel element composition data for each cycle over the life of a typical HTGR. Data from the tapes may be obtained by request to V. H. Pierce, General Atomic Company.

The fuel element composition and block flow data are the basis for establishing material and nuclide mass flow data for HTGR fuel reprocessing and refabrication. These data, in turn, are the basis for process stream material balance; by-product, effluent, and waste stream composition; and decay heat load, shielding, and criticality analyses.

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2. HTGR FUEL CYCLE

A schematic diagram of the HTGR thorium-uranium fuel cycle (Ref. 1) is shown in Fig. 1. Fissile material consisting of 93% U-235 enriched uranium fabricated as fuel particles is mixed with thorium fertile fuel particles and fabricated into fuel elements, designated I type elements, for the initial reactor core loading.

To establish the 4-yr HTGR fuel loading cycle, about one-fourth of the I fuel elements are discharged following the first equivalent full-power year of reactor operation. A reload of the same number of elements is then made, and reactor operation is resumed.

The reload fuel elements are fabricated using U-235 fissile particles and thorium fertile particles but typically have greater fissile and fertile metal loadings per element than those used for the reactor initial core. The reload fuel elements containing 93% U-235 enriched fissile material are designated makeup, M type, fuel elements and have a 4-yr life in the reactor core.

The discharged, irradiated or spent, initial core fuel elements, designated IS elements, are shipped to storage facilities. The IS elements are subsequently reprocessed to recover the bred U-233 and unburned U-235 fissile material.

Annually, the remaining I fuel elements are discharged, at a rate of about one-fourth of the original number of elements each year. M elements are used for core annual reloading until recycle fuel elements become available. Discharged IS and subsequently spent makeup MS fuel elements are shipped to storage facilities.

Fig. 1. HTGR recycle fuel schematic: once-through U-235 recycle, continuous U-233 recycle

The stored IS and MS elements are reprocessed to recover the U-233 fissile material bred in the fertile particles and the unburned U-235 fissile material (Refs. 2,3). The recovered fissile materials are refabricated into recycle fuel elements. Recycle elements made from the recovered U-235 material and the recovered U-233 material are designated 25R and 23R elements, respectively. Each type of recycle element is fabricated by mixing one kind of fissile particle with thorium fertile particles.

When the recycle elements become available, they are combined with M elements for HTGR reloads. The total number of elements required for the annual reload is equal to the number of elements discharged at the given reload. The number of 23R and 25R elements comprising the total reload is determined by the number of these elements that can be refabricated from the available U-233 and U-235 fissile material. The number of M elements is determined by the difference between the total number of fuel elements required and the number of recycle fuel elements that are available.

Typically, once recycle fuel is available, all fuel reloads for an HTGR are made up from M, 23R, and 25R fuel elements. Four years after introduction of recycle fuel, the reactor discharge will consist of the burned or spent MS, 23RS, and 25RS elements. After discharge these elements are shipped and reprocessed in a manner similar to that used for the IS and MS elements.

The MS elements are reprocessed to recover the bred U-233 and the unburned U-235. Unburned U-233 and bred U-233 are recovered from the 23RS elements. The twice-burned fissile particles containing U-235 are separated from the 25RS elements and retired as a high-level solid waste. The U-233 bred in the 25RS fertile particles is recovered for recycle. The two product streams--the U-235 fissile material from the MS elements and the U-233 fissile material combined from the MS, 23RS, and 25RS elements--are used to refabricate 25R and 23R recycle fuel elements.

3. BLOCK FLOW FOR HTGR MARKET

The chronology of a typical HTGR fuel cycle development is important in the design of spent fuel storage, recycle plant, and fresh fuel plant facilities. In the initial stage of reactor operation, all discharged fuel is of the IS and MS types containing burned U-235 fissile material and bred U-233 material. When recycle 23R and 25R elements are introduced into the reactor fuel cycle, initially few, if any, of the M elements are required. As the equilibrium fuel cycle is approached, a mix of M, 23R, and 25R elements is present, consisting of about 50% M, 40% 23R, and 10% 25R elements.

In order to minimize the contamination of the U-233 material with U-235 and the subsequent neutronic penalties due to U-236 buildup, separability of the U-235 material and the U-233-containing material is maintained (Ref. 4). A mechanical separation is provided by taking advantage of the properties of the different fuel particle coatings: silicon carbide TRISO coating on the fissile particles and pyrolytic carbon BISO coating on the fertile particles. Separate solvent extraction and purification systems--PUREX for the U-235 material and THOREX for the thorium/bred U-233 material--are provided. Separate refabrication processing of the U-235 and U-233 material into the 25R and 23R fuel elements is necessary.

To provide separate processing and accommodate the changes in the number and types of fuel elements requires sizing the recycle plant process systems to match the upper limits of the respective cases. To complete the forecast of the upper limit cases for the recycle fuel plant, a schedule model for HTGR start-ups is required. Superimposing a single HTGR fuel cycle history with a reactor start-up (and fuel element discharge) schedule will develop a recycle fuel plant forecast for required throughput.

In January 1976, the U.S. Energy Research and Development Administration (ERDA), Division of Nuclear Fuel Cycle and Production, forecast a schedule

for HTGR spent fuel discharge for initial planning purposes. In its entirety the ERDA planning basis encompasses a number of qualifications including availability of recycle facilities, strategy for implementation of reactor fuel recycle, schedule for expansion of the recycle facility, and certain overall program planning elements. Although each of the qualifications in itself will represent a substantial planning effort, use of the basic HTGR fuel discharge schedule as forecast is illustrative of the potential recycle throughput variation as a function of the type of spent fuel element.

Table 1 shows the reactor discharge derived from the ERDA planning basis but extended to include IS, MS, 23RS, and 25RS fuel elements. No restrictions regarding the availability of recycle fuel facilities or programmatic strategies were used. The data represent a best case situation for fuel recycle in its simplest form.

Table 1 illustrates the changes that occur in reprocessing and refabrication requirements for a typical reactor market. The number of different types of fuel elements will change depending on the size of the market. However, the relation of the different types of elements to each other will be approximately as shown in the table.

In the early years of operation, the reprocessing head-end will be involved exclusively with IS and MS elements. The 23RS and 25RS elements do not enter head-end reprocessing for the first 5 yr. As shown in Table 1, the relation between the U-235 PUREX solvent extraction system and the thorium/U-233 THOREX system changes considerably. This is also true of the 23R and 25R refabrication systems. In both cases, in the first year of plant operation throughput will be approximately equal. The relationship will begin to change after the first year and will approach a ratio of 6 times as much U-233 throughput as U-235 throughput. Recycle plant and process system designs will be required to have sufficient flexibility to accommodate processing changes of the magnitude illustrated in Table 1.

TABLE 1
HTGR FUEL ELEMENT BLOCK FLOW FOR RECYCLE^(a)

Year	LHTGRs Discharging		Fuel Elements Available for Reprocessing				Fuel Elements Available for Refabrication		
	1160 MW(e)	1550 MW(e)	IS/MS	23RS	25RS	Total	23R	25R	Total
1989	1		1,064			1,064	309	255	564
1990	1		960			960	346	86	432
1991	1	1	2,336			2,336	793	359	1,152
1992	1	3	5,088			5,088	1,706	813	2,519
1993	1	5	7,944			7,944	2,831	981	3,812
1994	1	7	9,908	309	255	10,472	3,888	1,057	4,945
1995	1	9	12,672	346	86	13,104	5,047	1,136	6,183
1996	1	12	16,080	793	359	17,232	6,684	1,549	8,233
1997	1	16	20,321	1706	813	22,840	8,864	2,088	10,952
1998	1	20	24,308	2831	981	28,120	11,060	2,330	13,390
1999	1	24	28,439	3888	1057	33,384	13,348	2,485	15,833
2000	1	28	32,705	5047	1136	38,888	15,747	2,647	18,394

^(a)Based on the HTGR discharged fuel element forecast for planning purposes made by ERDA, Division of Nuclear Fuel Cycle and Production, in January 1976.

4. FUEL ELEMENT COMPOSITION

4.1. DISCUSSION

As a part of the development program for HTGR fuel recycle demonstration, data defining the composition of discharged spent fuel elements and fabricated recycle fuel elements are required. As described in the Introduction, the fuel cycle for an HTGR progresses through several stages in building to the quasi-equilibrium fuel loading. Included in the fuel cycle are the I, M, 23R, and 25R type fuel elements (see Fig. 1).

The spent fuel elements discharged from a reactor contain a broad spectrum of heavy metal, impurity, fission product, and activation product nuclides. In the HTGR fuel, the particle form of the fertile and fissile materials results in a segregation of the irradiation products. The different fission yields and neutronic properties of the fertile and fissile materials and the segregation afforded by the particle form of the materials result in different irradiation product concentrations.

In the spent fuel reprocessing and fuel refabrication operations, the several fuel element components are segregated and handled in separate streams. Within the process streams the various unit operations result in by-products, waste, or products that are further segregated. The composition of the fuel element components for the various types of fuel elements provides the base line data for design purposes. The nuclides, nuclide masses, and nuclide activities are the basis for analyses of process flow streams, product composition, by-product and waste streams, decay heat loads, shielding, and criticality.

4.2. METHOD OF CALCULATION

4.2.1. Basic Computational Model

The GARGOYLE code (Refs. 5,6) was used as the basic analytical model of the burnup occurring in the reactor core. Existing codes such as the ORIGEN code (Ref. 7), which is basically a one energy group code since the fast and resonance fluxes are held at a fixed ratio to the thermal flux, are not adequate to accurately model the buildup of long chains of activation products over the large shift in spectrum which occurs in going through the different operating modes (initial core, no recycle, partial recycle, full recycle, equilibrium recycle) of a typical HTGR life. The GARGOYLE code was used to calculate the flux spectrum and perform the burnup and activation calculations in nine energy groups (five fast and four thermal). For these calculations the GARGOYLE code represented the core as a point by using the core average nuclide concentration to determine the core average neutron spectrum in each group with core leakage introduced as positive or negative contributions to the fission source in each group. If desired, the GARGOYLE code could be used to calculate the local burnup of a single block by using the correct leakages for that particular location in the core. The nine group cross sections were prepared using the fourth edition of the Evaluated Nuclear Data File, Version B (ENDF/B-IV) (Ref. 8) with the MICROX code (Ref. 9), which calculates the correct spectrum for collapsing the cross sections from the input nuclide concentrations and lattice geometric data.

The GARGOYLE code is normally used to determine the fuel mass flows required for various cores and fuel cycles. For the present study the basic code was used to generate the mass flows and resulting core average fluxes for a typical fuel cycle in which recycle begins in reload 6. The calculated masses of the primary feed materials and the fluxes were then stored on magnetic tape. A modified version of GARGOYLE (Ref. 10) retrieved this information from the tape and analytically irradiated the core feed materials and initial impurities in the neutron spectrum determined for the

typical cycle. This technique allows the concentration of fission product, impurity, and activation product nuclides which have negligible neutronic importance to be calculated in a consistent spectrum without re-calculation of the core fluxes for each time point in the run. The modifications to the basic code reduced the mechanical calculation effort by a factor of 3 to 4. A detailed description of these calculation methods and procedures will be provided in a forthcoming report (Ref. 11).

The basic method and modifications described above for the HTGR calculations are equally applicable for LWRs and other reactor systems.

4.2.2. Reactions and Production Modes

In the present study, the concentration in spent fuel of approximately 370 nuclides was calculated. Owing to the differences in production modes and the large quantity of information required, four separate basic production chains were constructed.

The heavy metal or actinide production chain from Tl-205 to Cm-245 was considered as transmutation and decay daughters of the thorium and uranium used to fuel the reactor. Since the initial concentrations of the various feed materials are considerably different for the thorium, U-235, and U-233 particles, minor modifications in the production chain were required. These modifications assume that the most important production modes are considered in each particle. The chains are shown schematically for the U-235-containing fissile particles, the U-233-containing fissile particles, and the thorium-containing fertile particles in Figs. 2, 3, and 4, respectively.

The fission product (and impurity activation) chains are illustrated schematically in Fig. 5. These chains include the nuclides produced by direct fission yield, the irradiation and decay daughters of the directly yielded nuclides, and many of the impurities along with their daughters.

4.2.3. Basic Data

Most of the basic information required for this study was obtained from the third and fourth editions of the ENDF/B-IV data file. Many of the cross sections and all of the fission yields employed were obtained from ENDF/B-IV. The half-lives and production modes were taken from the "Chart of the Nuclides" (Ref. 12) and the "Table of Isotopes" (Ref. 13). The MICROX program was used to generate the nine broad-group cross sections from the ENDF/B data.

4.3. IMPURITIES

The impurity materials and concentrations in the raw materials used for fuel manufacturing used in these calculations are shown in Table 2. For other impurity concentration levels, multiplying ratios can be used for many of the materials. However, it would be necessary to recalculate the fuel element compositions for some of the impurity materials contained in the thorium, uranium, or other material where the impurity is involved in the irradiation chains.

For comparison with the impurity materials and concentrations assumed in these calculations, recent impurity data determined for candidate graphites (Ref. 14) are shown in Table 3.

No impurities resulting from the reprocessing or refabrication operations have been included in the present data. Perfect classification has been assumed, i.e., no crossover of the U-235 fissile stream into the U-233 fertile stream or vice versa. In addition, solvent extraction decontamination factors of infinity have been assumed. No addition of process chemicals or equipment corrosion products is included.

The calculation method (Ref. 7) has the capability for user specification of factors to model impurities, contamination, and crossover. In general, decontamination factors and equipment corrosion products have a negligible effect on the subsequent recycle fuel irradiation or on the

Fig. 2. I, M, 25R fissile particle chain

Fig. 3. 238U fissile particle chain

Fig. 4. I, M, 23R, 25R fertile particle chain

Fig. 5. Fission product and impurity chains (Sheet 1 of 3)

Fig. 5. Fission product and impurity chains (Sheet 2 of 3)

Fig. 5. Fission product and impurity chains (Sheet 3 of 3)

TABLE 2
ASSUMED CONCENTRATION OF IMPURITIES IN GRAPHITE, THORIUM,
AND URANIUM IN INITIAL REACTOR FUEL LOADINGS

Element	Concentration (ppm)		
	Graphite	Thorium	Uranium
Ag	0	0.5	0.5
B	59.5	0.5	0.5
Ba	0	10	10
Bi	0	2	2
Cd	0.05	0.5	0.5
Ce	0	50	50
Cl	3	0	0
Co	0	5	5
Cs	0	10	10
Eu	0.0001	0	0
Gd	0.02	0	0
In	0.4	5	5
La	0	50	50
Li	1	2	2
Mo	0	50	50
N	1	1	1
Nb	0	50	50
Ni	10	100	100
O	1	1	1
P	0	50	50
Pb	0	5	5
S	200	50	50
Sm	0.01	0	0
Sb	0	10	10
Si	100	100	100
Sn	0	10	10
Sr	0	20	20
Th(a)	0	0	15
U	0	(b)	0
Zr	0	50	50

(a) Th-230 impurity in thorium is assumed to be 100 ppm. Resulting decay daughters from 2 yr of decay are also assumed.

(b) Resulting decay daughters from 2 yr of decay are also assumed.

TABLE 3
MEASURED IMPURITIES FOR CANDIDATE HTGR GRAPHITES

Element	Impurity Content (ppm)	Element	Impurity Content (ppm)
Nonburnable		Ni	<4.0
Ag	<0.5	O	--
Al	<3.7	P	<1.0
Ba	<0.5	Pb	<6.9
Be	<0.005	Pr	<0.42
Bi	<1.0	Rb	<1.0
Ca	<21.5	S	<1.6
Ce	<0.30	Sb	<1.0
Cl	<3.0	Sc	<0.01
Co	<4.0	Si	<26.0
Cr	<1.0	Sn	<1.0
Cs	<1.0	Sr	<0.30
Cu	<0.07	Ta	<0.35
Dy	<0.12	Tb	<0.20
Er	<0.03	Ti	<1.2
Fe	<3.0	Tl	<1.0
Hf	<0.17	Tm	<0.04
Ho	<0.08	V	<0.5
In	<1.0	W	<25.5
K	<1.0	Yb	<0.03
La	<0.03	Zn	<1.0
Lu	<0.02	Zr	<0.08
Mg	<0.8	Burnable	
Mn	<1.0	B	<2.4
Mo	<1.0	Cd	<0.5
N	--	Eu	<0.04
Na	<10.3	Gd	<0.05
Nb	<0.05	Li	<0.005
Nd	<0.3	Sm	<0.39

irradiated recycle fuel composition. The production of the irradiation nuclides substantially exceeds nuclide concentration as an impurity. However, the presence of these impurities in the refabrication feed is important in terms of the feed specifications, process and support system design, shielding requirements, decay heat loads, and criticality. Future calculations can be made to estimate the effect on refabrication operations or at a time when process specifications are available establishing a range for impurity concentrations.

4.4. RESULTS

The calculational method described in Section 4.2 was used to determine the average spent fuel composition for a typical HTGR operating at equilibrium recycle with M, 23R, and 25R type fuel elements, reload 13. For the reload, two data tabulations are included: (1) Table 4, the composition of the elements as originally charged, and (2) Table 5, the composition and activity of the discharged fuel elements at 180 days after reactor shutdown. Volume II of this report^{*} contains data in a printed form for the following selected HTGR reloads:

Reload 1 - initial core IS type fuel elements discharged after one equivalent full-power year.

Reload 5 - MS type fuel elements (and IS type elements) discharged after 4 yr of burnup. Representative of M type fuel elements for non-recycle reloads.

Reload 10 - only 23RS and 25RS fuel elements (no M type elements used) discharged after 4 yr of burnup.

Reload 13 - MS, 23RS, and 25RS elements discharged after 4 yr of burnup. Typical for an HTGR operating at equilibrium recycle.

^{*}Requests for copies of Volume II should be directed to the Document Center, General Atomic Company. Printed tabulations for other HTGR reloads may be obtained by request to V. H. Pierce, General Atomic Company.

For each discharge or reload, two data tabulations are included: the composition and activity of the reload fuel elements and of the discharged spent fuel elements. The spent fuel element tabulations are presented for 180-day, 1-yr, 3-yr, 5-yr, and 10-yr decay times after reactor shutdown.

In addition to the reloads printed in Volume II of this report, computer tape data files are in archives for all the other reactor reloads. The files can be used to calculate and print the composition of the fuel elements for any other reload. Also, the spent fuel element composition and activity data can be calculated and printed for any specified decay times beginning 24 hr after reactor shutdown.

TABLE 4
RELOAD 13 - FUEL ELEMENT COMPOSITION AS CHARGED

MS, 23RS, and 25RS elements are discharged at reload 13. The elements were originally loaded at reload 9. The M elements contain fertile thorium particles and U-235 fully enriched uranium particles. The 23R and 25R elements were fabricated using bred U-233 material and unburned U-235 recovered and purified from reprocessing of earlier discharged MS, 23RS, and 25RS elements.

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH U-235 F.E.		23R RECYCLE U-233 F.E.		25R RECYCLE U-235 F.E.	
	FERTILE PTL.	FISSILE PTL.	FERTILE PTL.	FISSILE PTL.	FERTILE PTL.	FISSILE PTL.
CM-242	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CM-243	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CM-244	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CM-245	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CURIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AM-241	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AM-242M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AM-242	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AM-243	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AM-244	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AMERICIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-236	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-238	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-239	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-241	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-242	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-243	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-244	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PLUTONIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-236	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-237	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-238	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-239	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-241	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NEPTUNIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U-230	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U-232	0.0000	0.0000	0.0000	3.0844-01	0.0000	0.0000
U-233	0.0000	0.0000	0.0000	5.4462+02	0.0000	0.0000
U-234	0.0000	6.1808+00	0.0000	1.1720+02	0.0000	2.5636+01
U-235	0.0000	7.7926+02	0.0000	2.3186+01	0.0000	5.7671+02

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

4-23

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
U-236	0.0000	2.3648+00	0.0000	3.8751+00	0.0000	1.1273+03
U-237	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U-238	0.0000	4.9009+01	0.0000	0.0000	0.0000	3.6560+02
U-239	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U-240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
URANIUM	0.0000	8.3682+02	0.0000	6.8519+02	0.0000	2.0952+03
PA-230	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PA-231	0.0000	3.4301-07	0.0000	4.6879-08	0.0000	1.1652-06
PA-232	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PA-233	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PA-234M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PA-234	0.0000	8.0431-12	0.0000	0.0000	0.0000	6.0370-11
PA-235	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROTACTINIUM	0.0000	3.4302-07	0.0000	4.6879-08	0.0000	1.1652-06
TH-226	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TH-227	0.0000	1.5605-14	0.0000	2.0536-15	0.0000	5.0994-14
TH-228	6.3487-08	3.7617-19	6.3487-08	4.0974-03	6.3487-08	1.7411-16
TH-229	0.0000	0.0000	0.0000	4.6986-02	0.0000	0.0000
TH-230	8.4756-01	3.3204-05	8.4756-01	6.3359-04	8.4756-01	1.4312-04
TH-231	3.0894-08	6.3520-10	3.0894-08	9.4134-11	3.0894-08	2.3426-09
TH-232	8.5465+03	1.3812-07	8.5465+03	2.2595-07	8.5465+03	6.5592-05
TH-233	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TH-234	0.0000	6.4345-10	0.0000	0.0000	0.0000	5.3043-09
TH-235	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
THORIUM	8.5474+03	3.3343-05	8.5474+03	5.1717-02	8.5474+03	2.0872-04
AC-225	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AC-227	0.0000	6.2420-12	0.0000	9.5279-13	0.0000	2.3802-11
AC-228	7.8283-11	6.2695-22	7.8283-11	0.0000	7.8283-11	3.0960-19
AC-229	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ACTINIUM	7.8283-11	6.2420-12	7.8283-11	9.5279-13	7.8283-11	2.3802-11
RA-222	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RA-223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
RA-224	3.2078-10	0.0000	3.2078-10	0.0000	3.2078-10	0.0000
RA-225	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RA-226	1.4443-05	2.8587-10	1.4443-05	5.3969-09	1.4443-05	1.2181-09
RA-227	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RA-228	7.5128-07	6.2695-18	7.5128-07	1.0220-17	7.5128-07	2.9771-15
RA-229	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RADIUM	1.5194-05	2.8587-10	1.5194-05	5.3969-09	1.5194-05	1.2181-09
FR-221	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FR-223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FR-224	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FRANCIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RN-218	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RN-219	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RN-220	5.5237-14	0.0000	5.5237-14	0.0000	5.5237-14	0.0000
RN-222	9.1903-11	0.0000	9.1903-11	0.0000	9.1903-11	0.0000
RN-223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RN-224	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RADON	9.1958-11	0.0000	9.1958-11	0.0000	9.1958-11	0.0000
AT-217	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AT-218	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AT-219	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ASTATINE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-209	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-210	5.9202-11	0.0000	5.9202-11	0.0000	5.9202-11	0.0000
PO-211	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-212	1.8213-22	0.0000	1.8213-22	0.0000	1.8213-22	0.0000
PO-213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-214	4.3698-20	0.0000	4.3698-20	0.0000	4.3698-20	0.0000
PO-215	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-216	1.4180-16	0.0000	1.4180-16	0.0000	1.4180-16	0.0000
PO-218	4.9915-14	0.0000	4.9915-14	0.0000	4.9915-14	0.0000
POLONIUM	5.9252-11	0.0000	5.9252-11	0.0000	5.9252-11	0.0000

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
BI-209	1.7130-02	0.0000	1.7130-02	0.0000	1.7130-02	0.0000
BI-210	3.6209-12	0.0000	3.6209-12	0.0000	3.6209-12	0.0000
BI-211	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BI-212	3.4676-12	0.0000	3.4676-12	0.0000	3.4676-12	0.0000
BI-213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BI-214	3.1542-13	0.0000	3.1542-13	0.0000	3.1542-13	0.0000
BISMUTH	1.7130-02	0.0000	1.7130-02	0.0000	1.7130-02	0.0000
PB-206M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-206	9.9618-03	0.0000	9.9618-03	0.0000	9.9618-03	0.0000
PB-207M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-207	9.5859-03	0.0000	9.5859-03	0.0000	9.5859-03	0.0000
PB-208	2.2290-02	0.0000	2.2290-02	0.0000	2.2290-02	0.0000
PB-209	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-210	5.5008-09	0.0000	5.5008-09	0.0000	5.5008-09	0.0000
PB-211	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-212	3.6636-11	0.0000	3.6636-11	0.0000	3.6636-11	0.0000
PB-214	4.2979-13	0.0000	4.2979-13	0.0000	4.2979-13	0.0000
LEAD	4.1838-02	0.0000	4.1838-02	0.0000	4.1838-02	0.0000
TL-205	2.9614-02	0.0000	2.9614-02	0.0000	2.9614-02	0.0000
TL-206	2.4966-19	0.0000	2.4966-19	0.0000	2.4966-19	0.0000
TL-207M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-207	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-208	6.4208-14	0.0000	6.4208-14	0.0000	6.4208-14	0.0000
TL-209	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-210	4.2921-18	0.0000	4.2921-18	0.0000	4.2921-18	0.0000
THALIUM	2.9614-02	0.0000	2.9614-02	0.0000	2.9614-02	0.0000
DY-156	2.3877-06	3.9250-07	2.3877-06	5.8167-07	2.3877-06	2.2346-06
DY-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DY-158	4.1793-06	6.8646-07	4.1793-06	1.0173-06	4.1793-06	3.9080-06
DY-159	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DY-160	1.0794-04	1.7731-05	1.0794-04	2.6276-05	1.0794-04	1.0094-04
DY-161	8.9479-04	1.4698-04	8.9479-04	2.1782-04	8.9479-04	8.3679-04
DY-162	1.2181-03	2.0001-04	1.2181-03	2.9641-04	1.2181-03	1.1387-03

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23R RECYCLE U-233 F.E. FERTILE PTL.	FISSILE PTL.	25R RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
DY-163	1.1990-03	1.9677-04	1.1990-03	2.9160-04	1.1990-03	1.1202-03
DY-164	1.3623-03	2.2368-04	1.3623-03	3.3148-04	1.3623-03	1.2734-03
DYSPROSIUM	4.7887-03	7.8625-04	4.7887-03	1.1652-03	4.7887-03	4.4762-03
TB-155	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-158	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-159	5.8597-03	9.6187-04	5.8597-03	1.4255-03	5.8597-03	5.4767-03
TB-160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-161	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-163	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERBIUM	5.8597-03	9.6187-04	5.8597-03	1.4255-03	5.8597-03	5.4760-03
GD-152	6.2342-05	1.1536-04	6.2342-05	1.7096-04	6.2342-05	6.5675-04
GD-153	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-154	6.7739-04	1.2535-03	6.7739-04	1.8576-03	6.7739-04	7.1360-03
GD-155	4.6758-04	8.6522-04	4.6758-04	1.2822-03	4.6758-04	4.9258-03
GD-156	6.5373-03	1.2097-02	6.5373-03	1.7927-02	6.5373-03	6.8868-02
GD-157	5.0394-03	9.3251-03	5.0394-03	1.3919-02	5.0394-03	5.3088-02
GD-158	8.0299-03	1.4859-02	8.0299-03	2.2020-02	8.0299-03	8.4592-02
GD-159	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-160	7.1804-03	1.3287-02	7.1804-03	1.9691-02	7.1804-03	7.5644-02
GD-162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GADOLINIUM	2.7994-02	5.1802-02	2.7994-02	7.6768-02	2.7994-02	2.9491-01
EU-149	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-150	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-151	2.1272-03	3.9363-03	2.1272-03	5.8334-03	2.1272-03	2.2409-02
EU-152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-153	2.3418-03	4.3334-03	2.3418-03	6.4219-03	2.3418-03	2.4670-02
EU-154	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-155	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
EUROPIUM	4.4690-03	8.2696-03	4.4690-03	1.2255-02	4.4690-03	4.7080-02
SM-144	5.2213-04	9.6616-04	5.2213-04	1.4318-03	5.2213-04	5.5004-03
SM-145	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-146	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-147	2.5777-03	4.7698-03	2.5777-03	7.0686-03	2.5777-03	2.7155-02
SM-148	1.9486-03	3.6057-03	1.9486-03	5.3436-03	1.9486-03	2.0528-02
SM-149	2.4134-03	4.4659-03	2.4134-03	6.6183-03	2.4134-03	2.5425-02
SM-150	1.3084-03	2.4212-03	1.3084-03	3.5881-03	1.3084-03	1.3784-02
SM-151	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-152	4.7660-03	8.8191-03	4.7660-03	1.3070-02	4.7660-03	5.0208-02
SM-153	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-154	4.0964-03	7.5801-03	4.0964-03	1.1233-02	4.0964-03	4.3154-02
SM-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SAMARIUM	1.7633-02	3.2628-02	1.7633-02	4.8353-02	1.7633-02	1.8575-01
PM-144	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-145	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-146	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-147	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-148M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-149	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-151	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROMETHIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-142	1.4180-03	2.3272-04	1.4180-03	3.4488-04	1.4180-03	1.3249-03
ND-143	6.4112-04	1.0538-04	6.4112-04	1.5617-04	6.4112-04	5.9995-04
ND-144	1.2653-03	2.0788-04	1.2653-03	3.0807-04	1.2653-03	1.1835-03
ND-145	4.4344-04	7.2966-05	4.4344-04	1.0813-04	4.4344-04	4.1547-04
ND-146	9.2641-04	1.5216-04	9.2641-04	2.2549-04	9.2641-04	8.6624-04
ND-147	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-148	3.1230-04	5.0464-05	3.1230-04	7.4786-05	3.1230-04	2.8730-04
ND-150	3.0984-04	5.1146-05	3.0984-04	7.5796-05	3.0984-04	2.9118-04
NEODYMIUM	5.3164-03	8.7272-04	5.3164-03	1.2933-03	5.3164-03	4.9684-03

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23R RECYCLE U-233 F.E. FERTILE PTL.	FISSILE PTL.	25R RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
PR-141	5.1942-03	8.5298-04	5.1942-03	1.2641-03	5.1942-03	4.8561-03
PR-142	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PR-143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PR-144	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PR-145	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRASEODYMIUM	5.1942-03	8.5298-04	5.1942-03	1.2641-03	5.1942-03	4.8561-03
CE-136	4.8342-04	7.9282-05	4.8342-04	1.1749-04	4.8342-04	4.5136-04
CE-137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-138	6.3551-04	1.0435-04	6.3551-04	1.5465-04	6.3551-04	5.9410-04
CE-139	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-140	2.2822-01	3.7458-02	2.2822-01	5.5511-02	2.2822-01	2.1325-01
CE-141	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-142	2.8951-02	4.7637-03	2.8951-02	7.0596-03	2.8951-02	2.7120-02
CE-143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-144	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CERIUM	2.5829-01	4.2405-02	2.5829-01	6.2842-02	2.5829-01	2.4141-01
LA-137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LA-138	2.2619-03	3.7150-04	2.2619-03	5.5055-04	2.2619-03	2.1150-03
LA-139	2.5572-01	4.1662-02	2.5572-01	6.1741-02	2.5572-01	2.3718-01
LA-140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LANTHANUM	2.5798-01	4.2033-02	2.5798-01	6.2292-02	2.5798-01	2.3930-01
BA-135	3.2780-03	5.3827-04	3.2780-03	7.9769-04	3.2780-03	3.0644-03
BA-136	3.9126-03	6.4323-04	3.9126-03	9.5324-04	3.9126-03	3.6619-03
BA-137M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BA-137	5.7126-03	9.3803-04	5.7126-03	1.3901-03	5.7126-03	5.3403-03
BA-138	3.6421-02	5.9577-03	3.6421-02	8.8290-03	3.6421-02	3.3917-02
BA-140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BARIUM	4.9324-02	8.0772-03	4.9324-02	1.1970-02	4.9324-02	4.5984-02
CS-133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CS-134	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CS-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CS-136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
CS-137 CESIUM	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000
XE-131M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-131	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-133M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-134	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-135M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XENON	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-127	5.2088-03	7.6829-04	5.2088-03	1.1386-03	5.2088-03	4.3739-03
I-129	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-131	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IODINE	5.2088-03	7.6829-04	5.2088-03	1.1386-03	5.2088-03	4.3739-03
TE-125M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-125	3.5850-04	5.2933-05	3.5850-04	7.8445-05	3.5850-04	3.0135-04
TE-127M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-128	1.6681-03	2.4638-04	1.6681-03	3.6513-04	1.6681-03	1.4027-03
TE-129M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-129	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-130	1.8391-03	2.7096-04	1.8391-03	4.0156-04	1.8391-03	1.5426-03
TE-131M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-131	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TELLURIUM	3.8657-03	5.7028-04	3.8657-03	8.4513-04	3.8657-03	3.2466-03
SB-121	2.8410-02	4.1923-03	2.8410-02	6.2128-03	2.8410-02	2.3867-02

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23R RECYCLE U-233 F.E. FERTILE PTL.	FISSILE PTL.	25R RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
SB-122	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-123	2.1568-02	3.1793-03	2.1568-02	4.7116-03	2.1568-02	1.8100-02
SB-124	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-125	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-128	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-129	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ANTIMONY	4.9978-02	7.3716-03	4.9978-02	1.0924-02	4.9978-02	4.1967-02
SN-115	1.5978-04	2.3622-05	1.5978-04	3.5007-05	1.5978-04	1.3448-04
SN-117M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-117	3.6338-03	5.3728-04	3.6338-03	7.9623-04	3.6338-03	3.0588-03
SN-119M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-119	4.1910-03	6.1845-04	4.1910-03	9.1652-04	4.1910-03	3.5209-03
SN-120	1.6138-02	2.3824-03	1.6138-02	3.5306-03	1.6138-02	1.3563-02
SN-121M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-121	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-123	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-125	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TIN	2.4123-02	3.5618-03	2.4123-02	5.2784-03	2.4123-02	2.0277-02
IN-113	1.7967-02	2.6722-04	1.7967-02	3.9601-04	1.7967-02	1.5213-03
IN-114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IN-115M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IN-115	4.0843-01	6.0715-03	4.0843-01	8.9977-03	4.0843-01	3.4566-02
INDIUM	4.2640-01	6.3387-03	4.2640-01	9.3938-03	4.2640-01	3.6087-02
CD-110	2.7952-04	7.4712-05	2.7952-04	1.1072-04	2.7952-04	4.2534-04
CD-111	6.5155-03	7.7833-05	6.5155-03	1.1534-04	6.5155-03	4.4311-04
CD-112	1.2483-02	1.4937-04	1.2483-02	2.2136-04	1.2483-02	8.5036-04
CD-113	6.3810-03	7.6128-05	6.3810-03	1.1282-04	6.3810-03	4.3340-04
CD-114	1.5060-02	1.7993-04	1.5060-02	2.6666-04	1.5060-02	1.0244-03
CD-115M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-115	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CADMIUM	4.0719-02	5.5798-04	4.0719-02	8.2690-04	4.0719-02	3.1766-03

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
AG-107	1.1273-03	1.6624-04	1.1273-03	2.4636-04	1.1273-03	9.4641-04
AG-108	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-109M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-109	1.0852-03	1.6035-04	1.0852-03	2.3764-04	1.0852-03	9.1290-04
AG-110M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-111M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-111	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SILVER	2.2126-03	3.2659-04	2.2126-03	4.8400-04	2.2126-03	1.8593-03
PD-104	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-105	9.5492-04	1.4090-04	9.5492-04	2.0881-04	9.5492-04	8.0215-04
PD-106	1.1861-03	1.7518-04	1.1861-03	2.5961-04	1.1861-03	9.9730-04
PD-107	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-108	1.1812-03	1.7444-04	1.1812-03	2.5852-04	1.1812-03	9.9312-04
PD-109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-111M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-111	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PALLADIUM	3.3222-03	4.9052-04	3.3222-03	7.2693-04	3.3222-03	2.7926-03
RH-103M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-103	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-105M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-105	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-106	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RHODIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-99	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-102	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-103	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-104	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-105	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I, M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
RU-106 RUTHENIUM	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000
TC-99M TC-99 TECHNETIUM	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000
MO-95 MO-96 MO-97 MO-98 MO-99 MO-100 MOLYBDENUM	6.8468-02 7.2756-02 4.1802-02 1.0777-01 0.0000 4.4581-02 3.3537-01	1.0005-02 1.0638-02 6.1348-03 1.5630-02 0.0000 6.4345-03 4.8842-02	6.8468-02 7.2756-02 4.1802-02 1.0777-01 0.0000 4.4581-02 3.3537-01	1.4827-02 1.5766-02 9.0915-03 2.3163-02 0.0000 9.5357-03 7.2383-02	6.8468-02 7.2756-02 4.1802-02 1.0777-01 0.0000 4.4581-02 3.3537-01	5.6960-02 6.0565-02 3.4926-02 8.8981-02 0.0000 3.6632-02 2.7806-01
NB-93M NB-93 NB-95M NB-95 NB-96 NB-97M NB-97 NIORIUM	0.0000 4.4224-01 0.0000 0.0000 0.0000 0.0000 0.0000 4.4224-01	0.0000 6.3932-02 0.0000 0.0000 0.0000 0.0000 0.0000 6.3932-02	0.0000 4.4224-01 0.0000 0.0000 0.0000 0.0000 0.0000 4.4224-01	0.0000 9.4745-02 0.0000 0.0000 0.0000 0.0000 0.0000 9.4745-02	0.0000 4.4224-01 0.0000 0.0000 0.0000 0.0000 0.0000 4.4224-01	0.0000 3.6397-01 0.0000 0.0000 0.0000 0.0000 0.0000 3.6397-01
ZR-90 ZR-91 ZR-92 ZR-93 ZR-94 ZR-95 ZR-96 ZR-97 ZIRCONIUM	2.2469-01 4.9629-02 7.6560-02 0.0000 7.9481-02 0.0000 1.2982-02 0.0000 4.4334-01	3.2667-02 7.2567-03 1.1131-02 0.0000 1.1502-02 0.0000 1.9007-03 0.0000 6.4458-02	2.2469-01 4.9629-02 7.6560-02 0.0000 7.9481-02 0.0000 1.2982-02 0.0000 4.4334-01	4.8412-02 1.0754-02 1.6496-02 0.0000 1.7046-02 0.0000 2.8167-03 0.0000 9.5524-02	2.2469-01 4.9629-02 7.6560-02 0.0000 7.9481-02 0.0000 1.2982-02 0.0000 4.4334-01	1.8598-01 4.1313-02 6.3370-02 0.0000 6.5484-02 0.0000 1.0821-02 0.0000 3.6697-01
Y-89 Y-90	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23R RECYCLE U-233 F.E. FERTILE PTL.	FISSILE PTL.	25R RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
Y-91M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-91	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-92	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-93	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
YTTERBIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-86	1.7253-02	2.5304-03	1.7253-02	3.7499-03	1.7253-02	1.4405-02
SR-87	1.2282-02	1.8373-03	1.2282-02	2.7228-03	1.2282-02	1.0460-02
SR-88	1.5039-01	2.1730-02	1.5039-01	3.2203-02	1.5039-01	1.2371-01
SR-89	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-90	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-91	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STRONTIUM	1.7992-01	2.6098-02	1.7992-01	3.8675-02	1.7992-01	1.4858-01
RB-85	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RB-86	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RB-87	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RUBIDIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-82	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-83M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-83	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-84	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-85M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-85	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-86	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KRYPTON	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-79	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-81	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-82	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-83	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BROMINE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SE-79	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SE-80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23R RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.	25R RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
SE-82 SELENIUM	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000
CO-58 CO-60 COBALT	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000
NI-58 NI-59 NI-60 NI-61 NI-62 NI-63 NI-64 NICKEL	1.2928+00 0.0000 5.1714-01 2.4928-02 7.4167-02 0.0000 2.4727-02 1.9338+00	8.6123-02 0.0000 3.4647-02 1.6774-03 4.9441-03 0.0000 1.6367-03 1.2903-01	1.2928+00 0.0000 5.1714-01 2.4928-02 7.4167-02 0.0000 2.4727-02 1.9338+00	1.2763-01 0.0000 5.1346-02 2.4858-03 7.3270-03 0.0000 2.4255-03 1.9122-01	1.2928+00 0.0000 5.1714-01 2.4928-02 7.4167-02 0.0000 2.4727-02 1.9338+00	4.9031-01 0.0000 1.9725-01 9.5494-03 2.8147-02 0.0000 9.3177-03 7.3457-01
CL-35 CL-36 CL-37 CHLORINE	2.3925-01 0.0000 8.2474-02 3.2172-01	0.0000 0.0000 0.0000 0.0000	2.3925-01 0.0000 8.2474-02 3.2172-01	0.0000 0.0000 0.0000 0.0000	2.3925-01 0.0000 8.2474-02 3.2172-01	0.0000 0.0000 0.0000 0.0000
S-32 S-33 S-34 S-35 S-36 SULFUR	1.9497+01 1.6183-01 9.0944-01 0.0000 3.2098-03 2.0571+01	6.4235-02 5.3538-04 3.0479-03 0.0000 1.0889-06 6.7819-02	1.9497+01 1.6183-01 9.0944-01 0.0000 3.2098-03 2.0571+01	9.5194-02 7.9342-04 4.5168-03 0.0000 1.6137-06 1.0051-01	1.9497+01 1.6183-01 9.0944-01 0.0000 3.2098-03 2.0571+01	3.6569-01 3.0480-03 1.7352-02 0.0000 6.1993-06 3.8610-01
P-33 PHOSPHOROUS	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000
SILICON	0.0000	2.0326+03	0.0000	3.0123+03	0.0000	1.1572+04
O-16 O-17 OXYGEN	1.1888+03 4.6735-01 1.1888+03 1.1893+03	4.3997+01 1.7296-02 4.4014+01	1.1888+03 4.6735-01 1.1888+03 1.1893+03	6.5201+01 2.5632-02 6.5227+01	1.1888+03 4.6735-01 1.1888+03 1.1893+03	2.5048+02 9.8468-02 2.5057+02

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
N-14	1.0610-01	1.3089-03	1.0610-01	1.9397-03	1.0610-01	7.4516-03
N-15	2.6748-04	4.9496-06	2.6748-04	7.3351-06	2.6748-04	2.8178-05
NITROGEN	1.0637-01	1.3138-03	1.0637-01	1.9471-03	1.0637-01	7.4798-03
C-12	1.0521+05	0.0000	1.0521+05	0.0000	1.0521+05	0.0000
C-13	1.2653+03	0.0000	1.2653+03	0.0000	1.2653+03	0.0000
C-14 FROM C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-14 FROM N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-14 FROM O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CARBON	1.0648+05	0.0000	1.0648+05	0.0000	1.0648+05	0.0000
B-10	2.6748+00	0.0000	2.6748+00	0.0000	2.6748+00	0.0000
B-11	1.1769+01	0.0000	1.1769+01	0.0000	1.1769+01	0.0000
BORON	1.4444+01	0.0000	1.4444+01	0.0000	1.4444+01	0.0000
LI-6	8.2028-03	1.6994-04	8.2028-03	2.5184-04	8.2028-03	9.6746-04
LI-7	1.1650-01	2.4253-03	1.1650-01	3.5942-03	1.1650-01	1.3807-02
LITHIUM	1.2471-01	2.5952-03	1.2471-01	3.8460-03	1.2471-01	1.4775-02
H-3 FROM LI6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H-3 FROM B10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H-3 F. YIELD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TRITIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MWD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
CM-242	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CM-243	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CM-244	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CM-245	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CURIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AM-241	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AM-242M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AM-242	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AM-243	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AM-244	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AMERICIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-236	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-238	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-239	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-241	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-242	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-243	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-244	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PLUTONIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-236	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-237	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-238	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-239	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-241	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NEPTUNIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U-230	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U-232	0.0000	0.0000	0.0000	6.6008-00	0.0000	0.0000
U-233	0.0000	0.0000	0.0000	5.2897+00	0.0000	0.0000
U-234	0.0000	3.8705-02	0.0000	7.0885-01	0.0000	1.6054-01
U-235	0.0000	1.6842-03	0.0000	5.0109-05	0.0000	1.2464-03

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23R RECYCLE U-233 F.E. FERTILE PTL.	FISSILE PTL.	25R RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
U-236	0.0000	1.5298-04	0.0000	2.5068-04	0.0000	7.2923-02
U-237	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U-238	0.0000	1.6471-05	0.0000	0.0000	0.0000	1.2287-04
U-239	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U-240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
URANIUM	0.0000	4.0559-02	0.0000	5.9988+00	0.0000	2.3483-01
PA-230	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PA-231	0.0000	1.6340-08	0.0000	2.2332-09	0.0000	5.5505-08
PA-232	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PA-233	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PA-234M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PA-234	0.0000	1.5960-05	0.0000	0.0000	0.0000	1.1980-04
PA-235	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROTACTINIUM	0.0000	1.5977-05	0.0000	2.2332-09	0.0000	1.1985-04
TH-226	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TH-227	0.0000	4.9342-09	0.0000	6.4933-10	0.0000	1.6124-08
TH-228	5.2126-05	3.0886-16	5.2126-05	3.3642+00	5.2126-05	1.4295-13
TH-229	0.0000	0.0000	0.0000	9.9949-03	0.0000	0.0000
TH-230	1.6467-02	6.4510-07	1.6467-02	1.2310-05	1.6467-02	2.7807-06
TH-231	1.6426-02	3.3773-04	1.6426-02	5.0050-05	1.6426-02	1.2455-03
TH-232	9.4082-04	1.5204-14	9.4082-04	2.4974-14	9.4082-04	7.2205-12
TH-233	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TH-234	0.0000	1.4901-05	0.0000	0.0000	0.0000	1.2284-04
TH-235	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
THORIUM	3.3886-02	3.5328-04	3.3886-02	3.3743+00	3.3886-02	1.3712-03
AC-225	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AC-227	0.0000	4.5518-10	0.0000	6.9480-11	0.0000	1.7357-09
AC-228	1.7555-04	1.4060-15	1.7555-04	0.0000	1.7555-04	6.9429-13
AC-229	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ACTINIUM	1.7555-04	4.5519-10	1.7555-04	6.9480-11	1.7555-04	1.7364-09
RA-222	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RA-223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
RA-224	5.1377-05	0.0000	5.1377-05	0.0000	5.1377-05	0.0000
RA-225	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RA-226	1.4261-05	2.8228-10	1.4261-05	5.3290-09	1.4261-05	1.2028-09
RA-227	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RA-228	1.7587-03	1.4677-14	1.7587-03	2.3925-14	1.7587-03	6.9693-12
RA-229	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RADIUM	1.8244-03	2.8229-10	1.8244-03	5.3291-09	1.8244-03	1.2098-09
FR-221	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FR-223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FR-224	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FRANCIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RN-218	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RN-219	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RN-220	5.1228-05	0.0000	5.1228-05	0.0000	5.1228-05	0.0000
RN-222	1.4141-05	0.0000	1.4141-05	0.0000	1.4141-05	0.0000
RN-223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RN-224	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RADON	6.5370-05	0.0000	6.5370-05	0.0000	6.5370-05	0.0000
AT-217	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AT-218	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AT-219	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ASTATINE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-209	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-210	2.6619-07	0.0000	2.6619-07	0.0000	2.6619-07	0.0000
PO-211	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-212	3.1886-05	0.0000	3.1886-05	0.0000	3.1886-05	0.0000
PO-213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-214	1.4047-05	0.0000	1.4047-05	0.0000	1.4047-05	0.0000
PO-215	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-216	5.1080-05	0.0000	5.1080-05	0.0000	5.1080-05	0.0000
PO-218	1.4117-05	0.0000	1.4117-05	0.0000	1.4117-05	0.0000
POLONIUM	1.1140-04	0.0000	1.1140-04	0.0000	1.1140-04	0.0000

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
BI-209	1.4655-17	0.0000	1.4655-17	0.0000	1.4655-17	0.0000
BI-210	4.4919-07	0.0000	4.4919-07	0.0000	4.4919-07	0.0000
BI-211	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BI-212	5.0757-05	0.0000	5.0757-05	0.0000	5.0757-05	0.0000
BI-213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BI-214	1.4070-05	0.0000	1.4070-05	0.0000	1.4070-05	0.0000
BISMUTH	6.5276-05	0.0000	6.5276-05	0.0000	6.5276-05	0.0000
PB-206M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-206	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-207M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-207	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-208	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-209	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-210	4.5906-07	0.0000	4.5906-07	0.0000	4.5906-07	0.0000
PB-211	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-212	5.0905-05	0.0000	5.0905-05	0.0000	5.0905-05	0.0000
PB-214	1.4094-05	0.0000	1.4094-05	0.0000	1.4094-05	0.0000
LEAD	6.5458-05	0.0000	6.5458-05	0.0000	6.5458-05	0.0000
TL-205	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-206	5.4392-11	0.0000	5.4392-11	0.0000	5.4392-11	0.0000
TL-207M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-207	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-208	1.8726-05	0.0000	1.8726-05	0.0000	1.8726-05	0.0000
TL-209	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-210	2.9118-09	0.0000	2.9118-09	0.0000	2.9118-09	0.0000
THALIUM	1.8729-05	0.0000	1.8729-05	0.0000	1.8729-05	0.0000
DY-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DY-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DY-158	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DY-159	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DY-160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DY-161	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DY-162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FERTILE PTL.	FRESH U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
DY-163	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DY-164	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DYSPROSIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-155	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-158	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-159	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-161	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-163	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERBIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-153	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-154	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-155	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-158	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-159	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GADOLINIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-149	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-150	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-151	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-153	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-154	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-155	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
EUROPIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-144	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-145	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-146	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-147	5.9669-11	1.1041-10	5.9669-11	1.6363-10	5.9669-11	6.2859-10
SM-148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-149	5.7873-15	1.0709-14	5.7873-15	1.5870-14	5.7873-15	6.0967-14
SM-150	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-151	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-153	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-154	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SAMARIUM	5.9675-11	1.1042-10	5.9675-11	1.6364-10	5.9675-11	6.2865-10
PM-144	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-145	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-146	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-147	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-148M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-149	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM-151	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROMETHIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-142	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-144	1.3081-15	2.1492-16	1.3081-15	3.1851-16	1.3081-15	1.2236-15
ND-145	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-146	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-147	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-150	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NEODYMIUM	1.3081-15	2.1492-16	1.3081-15	3.1851-16	1.3081-15	1.2236-15

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THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
PR-141	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PR-142	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PR-143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PR-144	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PR-145	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRASEODYMIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-136	4.3785-11	7.1808-12	4.3785-11	1.0642-11	4.3785-11	4.0981-11
CE-137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-138	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-139	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-141	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-142	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-144	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CERIUM	4.3785-11	7.1808-12	4.3785-11	1.0642-11	4.3785-11	4.0981-11
LA-137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LA-138	5.2291-11	8.5882-12	5.2291-11	1.2727-11	5.2291-11	4.8893-11
LA-139	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LA-140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LANTHANUM	5.2291-11	8.5882-12	5.2291-11	1.2727-11	5.2291-11	4.8893-11
BA-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BA-136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BA-137M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BA-137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BA-138	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BA-140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BARIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CS-133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CS-134	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CS-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CS-136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4-42

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23R RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.	25R RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
CS-137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CESIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-131M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-131	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-133M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-134	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-135M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XENON	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-129	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-131	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IODINE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-125M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-125	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-127M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-128	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-129M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-129	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-130	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-131M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-131	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TELLURIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-121	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4-43

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
SB-122	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-123	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-124	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-125	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-128	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-129	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ANTIMONY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-115	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-117M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-117	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-119M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-119	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-121M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-121	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-123	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-125	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TIN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IN-113	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IN-114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IN-115M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IN-115	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
INDIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-111	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-113	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-115M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-115	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CADMIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4-44

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
AG-107	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-108	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-109M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-110M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-111M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-111	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SILVER	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-104	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-105	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-106	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-107	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-108	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-111M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-111	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PALLADIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-103M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-103	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-105M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-105	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-106	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RHONIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-99	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-102	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-103	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-104	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-105	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4-45

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
RU-106	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RUTHENIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TC-99M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TC-99	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TECHNETIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MO-95	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MO-96	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MO-97	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MO-98	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MO-99	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MO-100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MOLYBDENUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-93M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-93	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-95M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-95	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-96	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-97M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-97	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NIوبيUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-90	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-91	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-92	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-93	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-94	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-95	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-96	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-97	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZIRCONIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-89	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-90	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4-46

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
-----	-----	-----	-----	-----	-----	-----
Y-91M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-91	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-92	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-93	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
YTTERBIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-86	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-87	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-88	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-89	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-90	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-91	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STRONTIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RB-85	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RB-86	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RB-87	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RUBIDIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-82	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-83M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-83	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-84	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-85M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-85	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-86	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KRYPTON	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-79	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-81	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-82	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-83	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BROMINE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SE-79	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SE-80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4-47

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FERTILE PTL.	FRESH U-275 F.E. FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
SE-82	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SELENIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CO-58	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CO-60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COBALT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI-58	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI-59	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI-60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI-61	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI-62	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI-63	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI-64	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NICKEL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CL-35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CL-36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CL-37	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CHLORINE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S-32	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S-33	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S-34	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S-35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S-36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SULFUR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
P-33	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PHOSPHOROUS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SILICON	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
O-16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
O-17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OXYGEN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4-48

THESE ARE THE CONCENTRATIONS AS LOADED FOR RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. FOR RELOAD 9

NUCLIDES	I,M FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23R RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25R RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
-----	-----	-----	-----	-----	-----	-----
N-14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N-15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NITROGEN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-14 FROM C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-14 FROM N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-14 FROM O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CARBON	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
B-10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
B-11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BORON	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LI-6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LI-7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LITHIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H-3 FROM LI6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H-3 FROM B10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H-3 F. YIELD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TRITIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MWD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4-49

TABLE 5
RELOAD 13 - FUEL ELEMENT COMPOSITION AS DISCHARGED

The MS, 23RS, and 25RS elements discharged at reload 13 were in the reactor core for 4 yr. Reload 13 spent fuel elements are typical for an HTGR operating at equilibrium with recycle fuel.

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
CM-242	8.6891-07	5.3970-03	8.6891-07	1.1103-04	8.6891-07	4.3546-02
CM-243	1.2260-08	1.6413-04	1.2260-08	2.1526-06	1.2260-08	1.3083-03
CM-244	1.0007-04	8.8856-02	1.0007-04	7.0976-04	1.0007-04	6.9435-01
CM-245	5.4869-07	3.6608-04	5.4869-07	2.7668-06	5.4869-07	2.8487-03
CURIUM	1.0150-04	9.4783-02	1.0150-04	8.2572-04	1.0150-04	7.4205-01
AM-241	1.0811-05	2.6799-02	1.0811-05	9.4788-04	1.0811-05	2.1598-01
AM-242M	6.0454-07	3.7442-04	6.0454-07	1.0561-05	6.0454-07	3.0349-03
AM-242	7.2700-12	4.5027-09	7.2700-12	1.2700-10	7.2700-12	3.6497-08
AM-243	4.9655-05	1.9600-01	4.9655-05	2.1975-03	4.9655-05	1.5507+00
AM-244	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AMEPICIUM	6.1071-05	2.2318-01	6.1071-05	3.1560-03	6.1071-05	1.7697+00
PU-236	2.5125-12	6.2185-06	2.5125-12	4.9471-11	2.5125-12	4.9620-05
PU-238	2.1330-02	6.8513+00	2.1330-02	8.6921-01	2.1330-02	5.3332+01
PU-239	1.6711-03	1.4848+00	1.6711-03	8.2130-02	1.6711-03	1.1523+01
PU-240	5.3359-04	6.9124-01	5.3359-04	3.3024-02	5.3359-04	5.4710+00
PU-241	3.2752-04	6.6127-01	3.2752-04	2.6021-02	3.2752-04	5.3108+00
PU-242	1.1775-04	6.7850-01	1.1775-04	1.3197-02	1.1775-04	5.4370+00
PU-243	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-244	5.7867-09	2.0943-05	5.7867-09	2.0849-07	5.7867-09	1.6510-04
PLUTONIUM	2.3980-02	1.0367+01	2.3980-02	1.0236+00	2.3980-02	8.1074+01
NP-236	2.0030-08	0.0000	2.0030-08	5.6627-07	2.0030-08	0.0000
NP-237	8.8174-02	1.4083+01	8.8174-02	1.9454+00	8.8174-02	9.1238+01
NP-238	5.5583-30	9.1849-28	5.5583-30	1.2632-28	5.5583-30	6.0997-27
NP-239	3.7373-31	2.4057-25	3.7373-31	1.0456-29	3.7373-31	1.7946-24
NP-240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-241	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NEPTUNIUM	8.8174-02	1.4083+01	8.8174-02	1.9454+00	8.8174-02	9.1238+01
U-230	9.9200-11	2.2332-14	9.9200-11	1.0168-10	9.9200-11	9.3224-14
U-232	1.2122-01	1.9822-05	1.2122-01	1.1845-01	1.2122-01	8.2191-05
U-233	2.1127+02	3.2443-06	2.1127+02	3.2161+01	2.1127+02	1.7387-05
U-234	4.2267+01	2.6778+00	4.2267+01	7.9675+01	4.2267+01	1.1107+01
U-235	8.6167+00	6.5028+01	8.6167+00	3.1550+01	8.6167+00	5.0840+01

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
U-236	1.3594+00	1.1510+02	1.3594+00	1.6082+01	1.3594+00	1.0542+03
U-237	3.4910-11	2.7008-09	3.4910-11	4.2082-10	3.4910-11	2.3602-08
U-238	5.9095-05	3.7535+01	5.9095-05	1.6408-03	5.9095-05	2.8000+02
U-239	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U-240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
URANIUM	2.6364+02	2.2034+02	2.6364+02	1.5959+02	2.6364+02	1.3962+03
PA-230	6.2596-12	9.7219-16	6.2596-12	6.4231-13	6.2596-12	4.0586-15
PA-231	5.8657-02	9.7975-06	5.8657-02	6.4764-03	5.8657-02	4.0006-05
PA-232	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PA-233	1.9835-01	2.6166-10	1.9835-01	2.0679-09	1.9835-01	5.2394-09
PA-234M	7.7898-10	0.0000	7.7898-10	0.0000	7.7898-10	0.0000
PA-234	2.6850-07	6.3581-11	2.6850-07	1.7932-15	2.6850-07	4.7435-10
PA-235	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROTACTINIUM	2.5701-01	9.7978-06	2.5701-01	6.4764-03	2.5701-01	4.0812-05
TH-226	1.0067-13	2.2663-17	1.0067-13	0.0000	1.0067-13	9.4604-17
TH-227	7.6085-09	6.2446-13	7.6085-09	3.8099-10	7.6085-09	2.5990-12
TH-228	1.3769-03	2.2377-07	1.3769-03	4.4931-03	1.3769-03	9.2536-07
TH-229	1.3659-03	3.0360-08	1.3659-03	5.8919-03	1.3659-03	1.2497-07
TH-230	3.1050-01	3.8556-05	3.1050-01	2.4274-02	3.1050-01	1.6189-04
TH-231	3.5025-11	2.6432-10	3.5025-11	1.2824-10	3.5025-11	2.0666-10
TH-232	7.9359+03	9.9100-06	7.9359+03	8.6102-05	7.9359+03	1.7672-04
TH-233	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TH-234	1.2256-05	5.4479-10	1.2256-05	1.5214-13	1.2256-05	4.0642-09
TH-235	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
THORIUM	7.9362+03	4.8721-05	7.9362+03	3.4747-02	7.9362+03	3.3967-04
AC-225	4.6688-09	1.0377-13	4.6688-09	2.0139-08	4.6688-09	4.2716-13
AC-227	3.3385-06	2.6488-10	3.3385-06	1.7636-07	3.3385-06	1.1858-09
AC-228	1.6889-09	1.7461-18	1.6889-09	6.0680-16	1.6889-09	9.2345-18
AC-229	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ACTINIUM	3.3448-06	2.8488-10	3.3448-06	1.7636-07	3.3448-06	1.1858-09
RA-222	2.0267-15	4.5622-19	2.0267-15	2.0774-15	2.0267-15	1.9045-18
RA-223	4.6978-10	3.8557-14	4.6978-10	2.3524-11	4.6978-10	1.6048-13

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23RS RECYCLE U-233 F.E. FERTILE PTL.	FISSILE PTL.	25RS RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
RA-224	6.8741-06	1.1172-09	6.8741-06	2.2432-05	6.8741-06	4.6199-09
RA-225	7.0400-09	1.5648-13	7.0400-09	3.0767-08	7.0400-09	6.4411-13
RA-226	2.0046-05	1.0931-09	2.0046-05	5.6973-07	2.0046-05	4.6287-09
RA-227	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RA-228	1.6298-06	1.6726-14	1.6298-06	5.7804-12	1.6798-06	8.8463-14
RA-229	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RADIUM	2.8557-05	1.0931-09	2.8557-05	5.6974-07	2.8557-05	4.6288-09
FR-221	1.5286-12	3.3976-17	1.5286-12	6.5937-12	1.5286-12	1.3986-16
FR-223	8.8917-14	7.2978-18	8.8917-14	4.4524-15	8.8917-14	3.0374-17
FR-224	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FRANCIUM	1.6175-12	1.3276-16	1.6175-12	8.0997-14	1.6175-12	5.5255-16
RN-218	1.8330-18	4.1262-22	1.8330-18	1.8788-18	1.8330-18	1.7225-21
RN-219	1.8681-14	1.5332-18	1.8681-14	9.3543-16	1.8681-14	6.3814-18
RN-220	1.1871-09	1.9293-13	1.1871-09	3.8738-09	1.1871-09	7.9783-13
RN-222	1.2838-10	1.5942-14	1.2838-10	1.0737-11	1.2838-10	6.6938-14
RN-223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RN-224	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RADON	1.3155-09	1.6335-13	1.3155-09	1.0285-10	1.3155-09	6.8590-13
AT-217	1.6833-16	3.7414-21	1.6833-16	7.2608-16	1.6833-16	1.5401-20
AT-218	1.0592-19	1.3152-23	1.0592-19	8.2805-21	1.0592-19	5.5224-23
AT-219	1.4289-19	1.1728-23	1.4289-19	7.1551-21	1.4289-19	4.8811-23
ASTATINE	1.6858-16	1.3836-20	1.6858-16	8.4414-18	1.6858-16	5.7586-20
PO-209	2.5916-13	5.8341-17	2.5916-13	2.6565-13	2.5916-13	2.4354-16
PO-210	1.5148-07	3.4100-11	1.5148-07	1.5527-07	1.5148-07	1.4235-10
PO-211	6.3275-18	5.1932-22	6.3275-18	3.1684-19	6.3275-18	2.1614-21
PO-212	3.9957-18	6.4940-22	3.9957-18	1.3039-17	3.9957-18	2.6854-21
PO-213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-214	8.4322-21	1.8982-24	8.4322-21	8.6431-21	8.4322-21	7.9238-24
PO-215	8.1527-18	6.6912-22	8.1527-18	4.0824-19	8.1527-18	2.7849-21
PO-216	3.0562-12	4.9671-16	3.0562-12	9.9732-12	3.0562-12	2.0540-15
PO-218	6.9848-14	8.6734-18	6.9848-14	5.4607-15	6.9848-14	3.6418-17
POLONIUM	1.5148-07	3.4100-11	1.5148-07	1.5527-07	1.5148-07	1.4235-10

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23RS RECYCLE U-233 F.E. FERTILE PTL.	FISSILE PTL.	25RS RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
BI-209	1.7128-02	3.8070-07	1.7128-02	7.3882-02	1.7128-02	1.5671-06
BI-210	1.6478-10	3.7094-14	1.6478-10	1.6890-10	1.6478-10	1.5485-13
BI-211	5.8412-13	4.7941-17	5.8412-13	2.9749-14	5.8412-13	1.9953-16
BI-212	7.4672-08	1.2136-11	7.4672-08	2.4368-07	7.4672-08	5.0186-11
BI-213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BI-214	4.4277-13	5.4981-17	4.4277-13	3.4616-14	4.4277-13	2.3086-16
BISMUTH	1.7128-02	3.8071-07	1.7128-02	7.3882-02	1.7128-02	1.5671-06
PB-206M	1.7299-18	3.8941-22	1.7299-18	1.7731-18	1.7299-18	1.6256-21
PB-206	9.9634-03	2.2429-06	9.9634-03	1.0213-02	9.9634-03	9.3627-06
PB-207M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-207	9.5804-03	7.8630-07	9.5804-03	4.7973-04	9.5804-03	3.2726-06
PB-208	2.2668-02	3.6841-06	2.2668-02	7.3971-02	2.2668-02	1.5235-05
PB-209	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-210	2.4462-07	5.5065-11	2.4462-07	2.5073-07	2.4462-07	2.2987-10
PB-211	9.7622-12	8.0122-16	9.7622-12	4.8883-13	9.7622-12	3.3347-15
PB-212	7.8663-07	1.2785-10	7.8663-07	2.5670-06	7.8663-07	5.2867-10
PB-214	6.0230-13	7.4791-17	6.0230-13	4.7087-14	6.0230-13	3.1404-16
LEAD	4.2213-02	6.8606-06	4.2213-02	1.3775-01	4.2213-02	2.8370-05
TL-205	2.9603-02	0.0000	2.9603-02	0.0000	2.9603-02	0.0000
TL-206	9.3828-20	2.1122-23	9.3828-20	9.6176-20	9.3828-20	8.8172-23
TL-207M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-207	1.2673-12	2.8527-16	1.2673-12	1.2990-12	1.2673-12	1.1909-15
TL-208	1.3492-09	2.1927-13	1.3492-09	4.4027-09	1.3492-09	9.0675-13
TL-209	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-210	6.0697-18	7.5370-22	6.0697-18	4.7452-19	6.0697-18	3.1647-21
THALIUM	2.9603-02	6.6639-06	2.9603-02	3.0343-02	2.9603-02	2.7818-05
DY-156	2.2839-06	3.7544-07	2.2839-06	5.5638-07	2.2839-06	2.1374-06
DY-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DY-158	9.4946-07	1.5595-07	9.4946-07	2.3113-07	9.4946-07	8.8784-07
DY-159	1.3794-07	2.2641-08	1.3794-07	3.3584-08	1.3794-07	1.2889-07
DY-160	1.6823-03	1.4727-03	1.6823-03	1.4707-03	1.6823-03	2.9666-03
DY-161	3.3057-04	3.4969-04	3.3057-04	3.3176-04	3.3057-04	7.1858-04
DY-162	1.1910-03	9.3193-04	1.1910-03	8.7014-04	1.1910-03	2.1591-03

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THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
DY-163	1.4590-03	7.2738-04	1.4590-03	6.9472-04	1.4590-03	2.0401-03
DY-164	6.8207-05	3.3106-05	6.8207-05	3.1676-05	6.8207-05	9.3885-05
DYSPROSIUM	4.7344-03	3.5153-03	4.7344-03	3.3498-03	4.7344-03	7.9815-03
TB-155	1.0126-22	7.1098-25	1.0126-22	1.7817-23	1.0126-22	0.0000
TB-156	9.1601-19	6.4294-21	9.1601-19	1.6176-19	9.1601-19	0.0000
TB-157	1.1901-07	1.7217-08	1.1901-07	4.6664-08	1.1901-07	9.6260-08
TB-158	8.9853-09	1.5933-09	8.9853-09	1.1314-08	8.9853-09	1.7719-09
TB-159	5.9490-03	7.5852-03	5.9490-03	6.7460-03	5.9490-03	1.2635-02
TB-160	3.7377-05	4.5945-05	3.7377-05	4.1367-05	3.7377-05	7.8471-05
TB-161	2.1637-13	2.7939-13	2.1637-13	2.5835-13	2.1637-13	5.4313-13
TB-162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-163	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TERBIUM	5.9865-03	7.6311-03	5.9865-03	6.7874-03	5.9865-03	1.2714-02
GD-152	9.9535-06	2.1777-05	9.9535-06	2.3505-05	9.9535-06	7.1884-05
GD-153	2.1091-06	4.7061-06	2.1091-06	5.4141-06	2.1091-06	1.7587-05
GD-154	5.3774-03	2.4775-02	5.3774-03	1.6821-02	5.3774-03	2.3201-02
GD-155	3.4298-04	1.0406-03	3.4298-04	6.9242-04	3.4298-04	8.2223-04
GD-156	3.9058-01	1.8228+00	3.9058-01	1.1974+00	3.9058-01	1.4915+00
GD-157	4.1746-04	1.3052-03	4.1746-04	8.6831-04	4.1746-04	1.0327-03
GD-158	6.9900-02	2.5661-01	6.9900-02	1.9401-01	6.9900-02	3.2752-01
GD-159	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-160	7.7715-03	1.4235-02	7.7715-03	2.0476-02	7.7715-03	7.5607-02
GD-162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GADOLINIUM	4.7440-01	2.1208+00	4.7440-01	1.4303+00	4.7440-01	1.5047+00
EU-149	3.0788-13	2.1181-15	3.0788-13	6.6666-14	3.0788-13	0.0000
EU-150	7.8256-13	5.2198-15	7.8256-13	3.2048-13	7.8256-13	0.0000
EU-151	4.8716-04	6.0878-04	4.8716-04	4.2598-04	4.8716-04	4.5980-04
EU-152	3.2528-04	5.3122-04	3.2528-04	3.6181-04	3.2528-04	4.1795-04
EU-153	4.9459-01	1.1913+00	4.9459-01	7.9626-01	4.9459-01	9.0415-01
EU-154	1.1894-01	3.3579-01	1.1894-01	2.2273-01	1.1894-01	2.5545-01
EU-155	1.8799-02	5.1977-02	1.8799-02	3.4496-02	1.8799-02	3.9590-02
EU-156	7.1852-06	1.9886-05	7.1852-06	1.3203-05	7.1852-06	1.5155-05
EU-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23PS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
EUROPIUM	6.3314-01	1.5807+00	6.3314-01	1.0543+00	6.3314-01	1.1605+00
SM-144	5.1797-04	9.5847-04	5.1797-04	1.4204-03	5.1797-04	5.4567-03
SM-145	8.0714-07	1.4036-06	8.0714-07	2.2134-06	8.0714-07	8.5029-06
SM-146	2.3625-07	4.3201-07	2.3625-07	6.4154-07	2.3625-07	2.4593-06
SM-147	6.2890-01	1.2895+00	6.2890-01	9.1698-01	6.2890-01	9.7202-01
SM-148	1.0320+00	3.2669+00	1.0320+00	2.2892+00	1.0320+00	2.4682+00
SM-149	1.8837-02	1.0029-02	1.8837-02	8.1962-03	1.8837-02	7.6418-03
SM-150	1.5122+00	3.2201+00	1.5122+00	2.1373+00	1.5122+00	2.4266+00
SM-151	1.0760-01	1.3327-01	1.0760-01	9.3270-02	1.0760-01	1.0061-01
SM-152	6.6624-01	1.1547+00	6.6624-01	7.8796-01	6.6624-01	8.7109-01
SM-153	9.0898-31	1.3812-30	9.0898-31	9.5253-31	9.0898-31	1.0429-30
SM-154	1.1646-01	3.1980-01	1.1646-01	1.9392-01	1.1646-01	2.7483-01
SM-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SAMARIUM	4.0828+00	9.3952+00	4.0828+00	6.4284+00	4.0828+00	7.1265+00
PM-144	2.9828-12	2.0263-14	2.9828-12	8.0135-13	2.9828-12	0.0000
PM-145	8.1173-07	1.5006-06	8.1173-07	2.2240-06	8.1173-07	8.5427-06
PM-146	4.2806-07	7.0489-07	4.2806-07	1.0594-06	4.2806-07	4.0107-06
PM-147	1.2905+00	1.1231+00	1.2905+00	8.5504-01	1.2905+00	8.4401-01
PM-148M	7.1835-04	6.5952-04	7.1835-04	4.9833-04	7.1835-04	4.9526-04
PM-148	1.1611-12	1.0620-12	1.1611-12	8.0783-13	1.1611-12	7.9752-13
PM-149	2.6601-27	1.3571-27	2.6601-27	1.1174-27	2.6601-27	1.0346-27
PM-151	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROMETHIUM	1.2912+00	1.1237+00	1.2912+00	8.5554-01	1.2912+00	8.4452-01
ND-142	2.8312-01	7.9121-01	2.8312-01	7.6533-01	2.8312-01	5.9093-01
ND-143	7.8807+00	1.0072+01	7.8807+00	8.7839+00	7.8807+00	7.5224+00
ND-144	9.6134+00	2.6763+01	9.6134+00	2.1367+01	9.6134+00	1.9957+01
ND-145	6.1170+00	1.0616+01	6.1170+00	8.1723+00	6.1170+00	7.9291+00
ND-146	6.7875+00	1.5344+01	6.7875+00	1.1642+01	6.7875+00	1.1456+01
ND-147	1.0736-06	4.1411-07	1.0736-06	3.7274-07	1.0736-06	3.1697-07
ND-148	2.8503+00	6.2843+00	2.8503+00	4.3608+00	2.8503+00	4.6940+00
ND-150	1.1151+00	2.4476+00	1.1151+00	1.7166+00	1.1151+00	1.8282+00
NEODYMIUM	3.4647+01	7.2318+01	3.4647+01	5.6802+01	3.4647+01	5.3978+01

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT PELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
PR-141	1.3602+01	2.0485+01	1.3602+01	1.9877+01	1.3602+01	1.5282+01
PR-142	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PR-143	3.8327-05	1.1958-05	3.8327-05	1.2175-05	3.8327-05	9.1103-06
PR-144	1.1910-04	1.0607-04	1.1910-04	8.4822-05	1.1910-04	7.9567-05
PR-145	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRASEODYMIUM	1.3602+01	2.0485+01	1.3602+01	1.9877+01	1.3602+01	1.5282+01
CE-136	4.3882-04	7.1968-05	4.3882-04	1.0665-04	4.3882-04	4.0972-04
CE-137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-138	6.2594-04	1.0278-04	6.2594-04	1.5237-04	6.2594-04	5.8511-04
CE-139	9.4751-07	1.1294-07	9.4751-07	2.5125-07	9.4751-07	6.2784-07
CE-140	1.3485+01	2.3735+01	1.3485+01	2.1058+01	1.3485+01	1.7915+01
CE-141	1.8635-02	5.3605-03	1.8635-02	5.7917-03	1.8635-02	4.0685-03
CE-142	1.3980+01	2.1340+01	1.3980+01	2.0613+01	1.3980+01	1.5938+01
CE-143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-144	2.6856+00	2.3919+00	2.6856+00	1.9127+00	2.6856+00	1.7942+00
CERIUM	3.0170+01	4.7472+01	3.0170+01	4.3590+01	3.0170+01	3.5652+01
LA-137	5.7184-05	7.5753-06	5.7184-05	2.7630-05	5.7184-05	4.1753-05
LA-138	2.4953-03	5.8809-04	2.4953-03	9.1783-04	2.4953-03	2.2494-03
LA-139	1.2870+01	2.1233+01	1.2870+01	1.8370+01	1.2870+01	1.6026+01
LA-140	2.9620-06	8.6012-07	2.9620-06	8.9288-07	2.9620-06	6.5559-07
LANTHANUM	1.2873+01	2.1233+01	1.2873+01	1.8371+01	1.2873+01	1.6026+01
BA-135	3.2780-03	5.3827-04	3.2780-03	7.9769-04	3.2780-03	3.0644-03
BA-136	3.0426-01	2.9375-01	3.0426-01	5.0742-01	3.0426-01	2.2104-01
BA-137M	2.1580-06	3.3489-06	2.1580-06	3.1430-06	2.1580-06	2.4979-06
BA-137	5.7311-01	1.3317+00	5.7311-01	1.2922+00	5.7311-01	9.9689-01
BA-138	1.2184+01	2.4023+01	1.2184+01	1.8533+01	1.2184+01	1.7964+01
BA-140	1.9630-05	5.7004-06	1.9630-05	5.9176-06	1.9630-05	4.3449-06
BARIUM	1.3062+01	2.5648+01	1.3062+01	2.0322+01	1.3062+01	1.9182+01
CS-133	1.0164+01	1.7126+01	1.0164+01	1.3652+01	1.0164+01	1.2789+01
CS-134	9.6858-01	2.6262+00	9.6858-01	2.0615+00	9.6858-01	1.9583+00
CS-135	2.0990+00	4.1536+00	2.0990+00	3.1743+00	2.0990+00	3.1012+00
CS-136	1.0365-06	7.8225-07	1.0365-06	7.0967-07	1.0365-06	5.8085-07

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THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
CS-137	1.3345+01	2.0710+01	1.3345+01	1.9437+01	1.3345+01	1.5448+01
CESIUM	2.6577+01	4.4616+01	2.6577+01	3.8325+01	2.6577+01	3.3296+01
XF-131M	7.6688-08	1.8571-08	7.6688-08	2.1850-08	7.6688-08	1.4081-08
XE-131	4.5968+00	4.5535+00	4.5968+00	4.8788+00	4.5968+00	3.3965+00
XE-132	1.1641+01	1.9222+01	1.1641+01	1.9199+01	1.1641+01	1.4330+01
XE-133M	9.0969-26	2.0641-26	9.0969-26	2.9035-26	9.0969-26	2.2672-26
XE-133	1.3582-11	4.4549-12	1.3582-11	4.3691-12	1.3582-11	3.4063-12
XE-134	1.2405+01	2.6427+01	1.2405+01	1.9156+01	1.2405+01	1.9734+01
XE-135M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-136	1.9797+01	3.9627+01	1.9797+01	3.0165+01	1.9797+01	2.9585+01
XENON	4.8440+01	8.9829+01	4.8440+01	7.3358+01	4.8440+01	6.7046+01
I-127	1.2362+00	4.0311-01	1.2362+00	1.6146+00	1.2362+00	2.9881-01
I-129	2.9456+00	2.0235+00	2.9456+00	3.9958+00	2.9456+00	1.5005+00
I-131	2.0522-08	4.9296-09	2.0522-08	5.8087-09	2.0522-08	3.7384-09
I-132	3.1637-20	8.6054-21	3.1637-20	9.3272-21	3.1637-20	6.5536-21
I-133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IODINE	4.1818+00	2.4266+00	4.1818+00	5.6104+00	4.1818+00	1.7993+00
TE-125M	8.9684-03	2.9802-03	8.9684-03	9.5421-03	8.9684-03	2.1890-03
TE-125	6.8343-02	4.3202-02	6.8343-02	1.4350-01	6.8343-02	3.2163-02
TE-127M	1.2813-02	1.1030-03	1.2813-02	3.7849-03	1.2813-02	7.8061-04
TE-127	4.6205-05	3.9778-06	4.6205-05	1.3649-05	4.6205-05	2.8151-06
TE-128	1.7831+00	1.1475+00	1.7831+00	2.4868+00	1.7831+00	8.5129-01
TE-129M	4.7857-03	6.8105-04	4.7857-03	1.1962-03	4.7857-03	5.0414-04
TE-129	6.7054-06	9.5424-07	6.7054-06	1.6760-06	6.7054-06	7.0637-07
TE-130	4.5557+00	4.8076+00	4.5557+00	6.5508+00	4.5557+00	3.5768+00
TE-131M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-131	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-132	1.0563-18	2.8732-19	1.0563-18	3.1142-19	1.0563-18	2.1882-19
TELLURIUM	6.4338+00	6.0031+00	6.4338+00	9.1956+00	6.4338+00	4.4658+00
SB-121	5.3387-02	4.3606-02	5.3387-02	4.3701-02	5.3387-02	5.3053-02

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23RS RECYCLE U-233 F.E. FERTILE PTL.	FISSILE PTL.	25RS RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
SB-122	2.5200-26	2.0745-26	2.5200-26	2.0783-26	2.5200-26	2.5275-26
SB-123	7.8312-02	5.3794-02	7.8312-02	8.7914-02	7.8312-02	5.5532-02
SB-124	7.2947-06	5.5100-06	7.2947-06	9.0181-06	7.2947-06	5.7594-06
SB-125	1.4707-01	4.8101-02	1.4707-01	1.5788-01	1.4707-01	3.5326-02
SB-127	9.9060-17	6.2634-18	9.9060-17	1.9910-17	9.9060-17	4.3526-18
SB-128	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-129	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ANTIMONY	2.7878-01	1.4551-01	2.7878-01	2.8551-01	2.7878-01	1.4392-01
SN-115	1.0140-03	1.3277-03	1.0140-03	1.2637-03	1.0140-03	1.0886-03
SN-117M	1.8725-08	5.4181-09	1.8725-08	5.7019-09	1.8725-08	4.1287-09
SN-117	2.1184-02	2.9397-02	2.1184-02	2.6601-02	2.1184-02	2.4212-02
SN-119M	2.4548-04	1.5860-04	2.4548-04	1.5398-04	2.4548-04	1.1882-04
SN-119	2.5000-02	3.3705-02	2.5000-02	3.2078-02	2.5000-02	2.8122-02
SN-120	4.0100-02	3.8989-02	4.0100-02	3.9265-02	4.0100-02	4.0920-02
SN-121M	1.9243-06	2.0751-06	1.9243-06	2.1103-06	1.9243-06	2.4431-06
SN-121	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-123	2.3731-03	5.4388-04	2.3731-03	8.5941-04	2.3731-03	4.0441-04
SN-125	3.5005-09	2.7441-10	3.5005-09	7.3204-10	3.5005-09	1.9524-10
TIN	8.9918-02	1.0412-01	8.9918-02	1.0022-01	8.9918-02	9.4868-02
IN-113	1.3833-02	2.0574-04	1.3833-02	3.0490-04	1.3833-02	1.1713-03
IN-114	1.8480-05	2.7485-07	1.8480-05	4.0731-07	1.8480-05	1.5647-06
IN-115M	4.4001-30	1.3525-30	4.4001-30	1.4428-30	4.4001-30	1.0305-30
IN-115	1.2904-02	3.5983-03	1.2904-02	3.5664-03	1.2904-02	3.2244-03
INDIUM	2.6756-02	3.8043-03	2.6756-02	3.8717-03	2.6756-02	4.3973-03
CD-110	3.3674-02	6.8205-02	3.3674-02	7.6037-02	3.3674-02	5.1876-02
CD-111	3.8893-02	5.3986-02	3.8893-02	4.9231-02	3.8893-02	4.0665-02
CD-112	3.5414-02	3.6632-02	3.5414-02	3.5891-02	3.5414-02	2.7984-02
CD-113	1.7666-04	6.7494-05	1.7666-04	7.0249-05	1.7666-04	5.1470-05
CD-114	6.6663-02	7.1560-02	6.6663-02	6.7249-02	6.6663-02	5.4723-02
CD-115M	4.2999-06	1.7247-06	4.2999-06	1.7638-06	4.2999-06	1.3127-06
CD-115	4.8036-29	1.4765-29	4.8036-29	1.5751-29	4.8036-29	1.1249-29
CADMIUM	1.7483-01	2.3045-01	1.7483-01	2.2848-01	1.7483-01	1.7530-01

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23RS RECYCLE U-233 F.E. FERTILE PTL.	FISSILE PTL.	25RS RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
AG-107	8.8507-04	1.3062-04	8.8507-04	1.9348-04	8.8507-04	7.4307-04
AG-108	1.7504-05	2.5817-06	1.7504-05	3.8255-06	1.7504-05	1.4695-05
AG-109M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-109	4.8013-02	5.1562-02	4.8013-02	5.2810-02	4.8013-02	3.8694-02
AG-110M	2.6005-04	3.6428-04	2.6005-04	3.8681-04	2.6005-04	2.7357-04
AG-111M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-111	3.0703-11	9.0800-12	3.0703-11	9.6420-12	3.0703-11	6.9148-12
AG-112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SILVER	4.9176-02	5.2059-02	4.9176-02	5.3394-02	4.9176-02	3.9725-02
PD-104	1.0051+00	4.7959+00	1.0051+00	2.4523+00	1.0051+00	3.4963+00
PD-105	6.6969-01	2.3230+00	6.6969-01	1.0900+00	6.6969-01	1.7381+00
PD-106	3.5420-01	1.2735+00	3.5420-01	7.1299-01	3.5420-01	9.5187-01
PD-107	1.7745-01	4.2005-01	1.7745-01	2.7271-01	1.7745-01	3.1384-01
PD-108	9.7377-02	1.9128-01	9.7377-02	1.4482-01	9.7377-02	1.4346-01
PD-109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-110	4.1431-02	6.2540-02	4.1431-02	6.1365-02	4.1431-02	4.6636-02
PD-111M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-111	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PALLADIUM	2.3452+00	9.0662+00	2.3452+00	4.7342+00	2.3452+00	6.6902+00
RH-103M	8.8622-06	5.1323-06	8.8622-06	3.8005-06	8.8622-06	3.8430-06
RH-103	1.5890+00	2.9585+00	1.5890+00	1.6468+00	1.5890+00	2.1658+00
RH-105M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-105	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-106	1.3579-07	1.8167-07	1.3579-07	1.1910-07	1.3579-07	1.3628-07
RHODIUM	1.5890+00	2.9585+00	1.5890+00	1.6468+00	1.5890+00	2.1658+00
RU-99	6.6698-06	2.1363-05	6.6698-06	1.5397-05	6.6698-06	1.5567-05
RU-100	6.8645-01	2.5191+00	6.8645-01	1.8103+00	6.8645-01	1.8353+00
RU-101	4.8099+00	1.2518+01	4.8099+00	7.5277+00	4.8099+00	9.1366+00
RU-102	3.8804+00	1.1420+01	3.8804+00	6.3778+00	3.8804+00	8.3357+00
RU-103	8.9017-03	5.1551-03	8.9017-03	3.8175-03	8.9017-03	3.8601-03
RU-104	1.6194+00	4.8439+00	1.6194+00	2.6260+00	1.6194+00	3.5363+00
RU-105	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
RU-106	1.4395-01	1.9260-01	1.4395-01	1.2626-01	1.4395-01	1.4447-01
RUTHENIUM	1.1149+01	3.1499+01	1.1149+01	1.8472+01	1.1149+01	2.2992+01
TC-99M	1.2198-22	4.3211-23	1.2198-22	4.0013-23	1.2198-22	3.2299-23
TC-99	6.6746+00	1.2987+01	6.6746+00	9.5097+00	6.6746+00	9.4732+00
TECHNETIUM	6.6746+00	1.2987+01	6.6746+00	9.5097+00	6.6746+00	9.4732+00
MO-95	8.1666+00	1.4124+01	8.1666+00	1.2013+01	8.1666+00	1.0735+01
MO-96	4.9802-01	1.4602+00	4.9802-01	1.2488+00	4.9802-01	1.1239+00
MO-97	7.7905+00	1.4722+01	7.7905+00	1.1704+01	7.7905+00	1.0764+01
MO-98	7.7424+00	1.4736+01	7.7424+00	1.1705+01	7.7424+00	1.0822+01
MO-99	1.2211-21	4.3256-22	1.2211-21	4.0055-22	1.2211-21	3.2332-22
MO-100	6.6796+00	1.6107+01	6.6796+00	1.0414+01	6.6796+00	1.1785+01
MOLYBDENUM	3.0877+01	6.1150+01	3.0877+01	4.7785+01	3.0877+01	4.4829+01
NB-93M	1.1377-05	2.6529-05	1.1377-05	2.5582-05	1.1377-05	1.9713-05
NB-93	4.3554-01	6.2965-02	4.3554-01	9.3311-02	4.3554-01	3.5846-01
NB-95M	9.7030-06	3.5074-06	9.7030-06	3.4799-06	9.7030-06	2.5984-06
NB-95	1.7275-04	6.3220-05	1.7275-04	6.1305-05	1.7275-04	4.6822-05
NB-96	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-97M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-97	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NIOPHIUM	4.3573-01	6.3058-02	4.3573-01	9.3401-02	4.3573-01	3.5852-01
ZR-90	6.2413-01	1.0339+00	6.2413-01	9.8329-01	6.2413-01	9.1501-01
ZR-91	2.4131+00	3.7282+00	2.4131+00	3.5597+00	2.4131+00	2.7516+00
ZR-92	9.1184+00	1.4039+01	9.1184+00	1.3441+01	9.1184+00	1.0281+01
ZR-93	9.6579+00	1.5001+01	9.6579+00	1.4284+01	9.6579+00	1.0927+01
ZR-94	9.6815+00	1.5623+01	9.6815+00	1.4405+01	9.6815+00	1.1439+01
ZR-95	1.5986-01	5.7786-02	1.5986-01	5.6180-02	1.5986-01	4.2810-02
ZR-96	8.1589+00	1.5353+01	8.1589+00	1.2356+01	8.1589+00	1.1200+01
ZR-97	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZIRCONIUM	3.9814+01	6.4835+01	3.9814+01	5.9086+01	3.9814+01	4.7557+01
Y-89	7.1766+00	1.0395+01	7.1766+00	1.1403+01	7.1766+00	7.5642+00
Y-90	2.3002-03	3.3498-03	2.3002-03	3.3155-03	2.3002-03	2.4396-03

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
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Y-91M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-91	3.0282-02	9.4813-03	3.0282-02	1.0018-02	3.0282-02	7.0094-03
Y-92	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-93	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
YTTERBIUM	7.2092+00	1.0407+01	7.2092+00	1.1416+01	7.2092+00	7.5737+00
SR-86	2.6983-02	6.3857-03	2.6983-02	1.9286-02	2.6983-02	1.7163-02
SR-87	1.2299-02	1.8379-03	1.2299-02	2.7677-03	1.2299-02	1.0446-02
SR-88	7.4239+00	8.3931+00	7.4239+00	1.0658+01	7.4239+00	6.2109+00
SR-89	7.6388-02	2.0024-02	7.6388-02	2.3431-02	7.6388-02	1.4757-02
SR-90	8.7119+00	1.2687+01	8.7119+00	1.2558+01	8.7119+00	9.2399+00
SR-91	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STRONTIUM	1.6251+01	2.1109+01	1.6251+01	2.3262+01	1.6251+01	1.5493+01
RB-85	8.7040+00	6.6220+00	8.7040+00	9.1054+00	8.7040+00	4.8115+00
RB-86	5.0127-07	1.7489-07	5.0127-07	2.9943-07	5.0127-07	1.2536-07
RB-87	5.0758+00	5.4900+00	5.0758+00	7.2086+00	5.0758+00	3.9909+00
RUBIDIUM	1.3780+01	1.2112+01	1.3780+01	1.6314+01	1.3780+01	8.8025+00
KR-82	3.3808-03	3.9083-03	3.3808-03	6.6520-03	3.3808-03	2.8350-03
KR-83M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-83	9.2428-01	6.5280-01	9.2428-01	1.0191+00	9.2428-01	4.7372-01
KR-84	2.4497+00	2.6138+00	2.4497+00	3.8065+00	2.4497+00	1.8988+00
KR-85M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-85	8.4829-01	6.4538-01	8.4829-01	8.8742-01	8.4829-01	4.6893-01
KR-86	4.6251+00	5.9124+00	4.6251+00	7.5313+00	4.6251+00	4.2997+00
KRYPTON	8.8504+00	9.8284+00	8.8504+00	1.3251+01	8.8504+00	7.1435+00
BR-79	2.5114-06	2.1263-06	2.5114-06	4.9382-06	2.5114-06	1.5393-06
BR-81	3.7306-01	4.3316-01	3.7306-01	5.3850-01	3.7306-01	3.1501-01
BR-82	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-83	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BROMINE	3.7306-01	4.3316-01	3.7306-01	5.3851-01	3.7306-01	3.1501-01
SE-79	1.2294-01	5.9619-02	1.2294-01	1.3239-01	1.2294-01	4.3062-02
SE-80	3.3249-01	2.9571-01	3.3249-01	5.1055-01	3.3249-01	2.1454-01

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
SE-82 SELENIUM	6.8366-01 1.1391+00	7.0297-01 1.0583+00	6.8366-01 1.1391+00	9.8106-01 1.6240+00	6.8366-01 1.1391+00	5.1080-01 7.6839-01
CO-58	3.5233-08	2.3471-09	3.5233-08	3.4783-09	3.5233-08	1.3362-08
CO-60	4.4004-07	2.9482-08	4.4004-07	4.3691-08	4.4004-07	1.6784-07
COEALT	4.7527-07	3.1829-08	4.7527-07	4.7169-08	4.7527-07	1.8121-07
NI-58	1.2689+00	8.4530-02	1.2689+00	1.2527-01	1.2689+00	4.8124-01
NI-59	2.4092-02	1.6049-03	2.4092-02	2.3784-03	2.4092-02	9.1370-03
NI-60	5.1157-01	3.4275-02	5.1157-01	5.0793-02	5.1157-01	1.9513-01
NI-61	3.0557-02	2.0544-03	3.0557-02	3.0446-03	3.0557-02	1.1696-02
NI-62	7.0503-02	4.7000-03	7.0503-02	6.9652-03	7.0503-02	2.6758-02
NI-63	3.9187-03	2.6123-04	3.9187-03	3.8713-04	3.9187-03	1.4872-03
NI-64	2.4584-02	1.6272-03	2.4584-02	2.4114-03	2.4584-02	9.2637-03
NICKEL	1.9341+00	1.2905-01	1.9341+00	1.9125-01	1.9341+00	7.3470-01
CL-35	2.0240-01	0.0000	2.0240-01	0.0000	2.0240-01	0.0000
CL-36	3.7157-02	0.0000	3.7157-02	0.0000	3.7157-02	0.0000
CL-37	8.3103-02	0.0000	8.3103-02	0.0000	8.3103-02	0.0000
CHLORINE	3.2266-01	0.0000	3.2266-01	0.0000	3.2266-01	0.0000
S-32	1.9456+01	6.4103-02	1.9456+01	9.4998-02	1.9456+01	3.6494-01
S-33	2.0311-01	6.7139-04	2.0311-01	9.9497-04	2.0311-01	3.8223-03
S-34	9.0880-01	3.0457-03	9.0880-01	4.5136-03	9.0880-01	1.7339-02
S-35	2.1470-05	7.1953-08	2.1470-05	1.0563-07	2.1470-05	4.0963-07
S-36	3.0400-03	1.0322-06	3.0400-03	1.5296-06	3.0400-03	5.8762-06
SULFUR	2.0571+01	6.7821-02	2.0571+01	1.0551-01	2.0571+01	3.8611-01
P-33	1.2895-06	4.2642-09	1.2895-06	6.3193-09	1.2895-06	2.4276-08
PHOSPHOROUS	1.2895-06	4.2642-09	1.2895-06	6.3193-09	1.2895-06	2.4276-08
SILICON	0.0000	2.0314+03	0.0000	3.0104+03	0.0000	1.1565+04
O-16	1.1888+03	4.3997+01	1.1888+03	6.5201+01	1.1888+03	2.5048+02
O-17	5.5532-01	1.7313-02	5.5532-01	2.5657-02	5.5532-01	9.8562-02
OXYGEN	1.1888+03 1.1894+03	4.4014+01	1.1888+03 1.1894+03	6.5227+01	1.1888+03 1.1894+03	2.5057+02

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THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE WEIGHTS IN GRAMS PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
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N-14	1.0533-01	1.2994-03	1.0533-01	1.9256-03	1.0533-01	7.3975-03
N-15	3.0219-04	5.3777-06	3.0219-04	7.9696-06	3.0219-04	3.0616-05
NITROGEN	1.0563-01	1.3048-03	1.0563-01	1.9336-03	1.0563-01	7.4281-03
C-12	1.0521+05	0.0000	1.0521+05	0.0000	1.0521+05	0.0000
C-13	1.2669+03	0.0000	1.2669+03	0.0000	1.2669+03	0.0000
C-14 FROM C	4.7724-03	0.0000	4.7724-03	0.0000	4.7724-03	
C-14 FROM N	7.7097-04	9.5108-06	7.7097-04	1.4095-05	7.7097-04	5.4146-05
C-14 FROM O	3.9304-04	1.3301-05	3.9304-04	1.9711-05	3.9304-04	7.5722-05
CARBON	1.0648+05	2.2812-05	1.0648+05	3.3806-05	1.0648+05	1.2987-04
B-10	2.2682-06	0.0000	2.2682-06	0.0000	2.2682-06	0.0000
B-11	1.1769+01	0.0000	1.1769+01	0.0000	1.1769+01	0.0000
BORON	1.1769+01	0.0000	1.1769+01	0.0000	1.1769+01	0.0000
LI-6	2.3174-04	4.8008-06	2.3174-04	7.1146-06	2.3174-04	2.7331-05
LI-7	1.9886+00	2.4250-03	1.9886+00	3.5937-03	1.9886+00	1.3806-02
LITHIUM	1.9889+00	2.4298-03	1.9889+00	3.6008-03	1.9889+00	1.3833-02
H-3 FROM LI6	3.3771-03	6.9963-05	3.3771-03	1.0368-04	3.3771-03	3.9830-04
H-3 FROM B10	6.6059-06	0.0000	6.6059-06	0.0000	6.6059-06	0.0000
H-3 F. YIELD	4.0649-04	6.5792-04	4.0649-04	5.7683-04	4.0649-04	4.7949-04
TRITIUM	3.7902-03	7.2788-04	3.7902-03	6.8051-04	3.7902-03	8.7779-04
MWD	3.3351+02	5.7131+02	3.3351+02	5.0039+02	3.3351+02	4.1633+02

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH	U-235 F.E.	23RS RECYCLE	U-233 F.E.	25RS RECYCLE	U-235 F.E.
	FERTILE PTL.	FISSILE PTL.	FERTILE PTL.	FISSILE PTL.	FERTILE PTL.	FISSILE PTL.
CM-242	2.8767-03	1.7868+01	2.8767-03	3.6760-01	2.8767-03	1.4417+02
CM-243	5.6373-07	7.5471-03	5.6373-07	9.8983-05	5.6373-07	6.0158-02
CM-244	8.1925-03	7.2742+00	8.1925-03	5.8105-02	8.1925-03	5.6843+01
CM-245	8.6098-08	5.7444-05	8.6098-08	4.3416-07	8.6098-08	4.4691-04
CURIUM	1.1070-02	2.5150+01	1.1070-02	4.2580-01	1.1070-02	2.0107+02
AM-241	3.7042-05	9.1823-02	3.7042-05	3.2477-03	3.7042-05	7.4000-01
AM-242M	5.8761-06	3.6394-03	5.8761-06	1.0265-04	5.8761-06	2.9499-02
AM-242	5.8776-06	3.6403-03	5.8776-06	1.0268-04	5.8776-06	2.9506-02
AM-243	9.9142-06	3.9134-02	9.9142-06	4.3876-04	9.9142-06	3.0967-01
AM-244	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AMERICIUM	5.8710-05	1.3824-01	5.8710-05	3.8918-03	5.8710-05	1.1086+00
PU-236	1.3356-09	3.3057-03	1.3356-09	2.6258-08	1.3356-09	2.6377-02
PU-238	3.6498-01	1.1723+02	3.6498-01	1.4873+01	3.6498-01	9.1254+02
PU-239	1.0250-04	9.1075-02	1.0250-04	5.0376-03	1.0250-04	7.0681-01
PU-240	1.2155-04	1.5746-01	1.2155-04	7.5226-03	1.2155-04	1.2463+00
PU-241	3.2394-02	6.5403+01	3.2394-02	2.5736+00	3.2394-02	5.2528+02
PU-242	4.4955-07	2.5903-03	4.4955-07	5.0784-05	4.4955-07	2.0757-02
PU-243	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PU-244	1.1159-13	4.0386-10	1.1159-13	4.0206-12	1.1159-13	3.1837-09
PLUTONIUM	3.9760-01	1.8289+02	3.9760-01	1.7459+01	3.9760-01	1.4398+03
NP-236	5.9854-09	0.0000	5.9854-09	1.6921-07	5.9854-09	0.0000
NP-237	6.2161-05	9.9283-03	6.2161-05	1.3715-03	6.2161-05	6.4321-02
NP-238	1.4524-24	2.4000-22	1.4524-24	3.3006-23	1.4524-24	1.5938-21
NP-239	8.7046-26	5.6032-20	8.7046-26	2.4353-24	8.7046-26	4.1799-19
NP-240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NP-241	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NEPTUNIUM	6.2167-05	9.9283-03	6.2167-05	1.3717-03	6.2167-05	6.4321-02
U-230	2.7080-06	6.0962-10	2.7080-06	3.2622-06	2.7080-06	2.5448-09
U-232	2.5941-00	4.2421-04	2.5941-00	2.5349-00	2.5941-00	1.7589-09 03
U-233	2.0520+00	3.1511-08	2.0520+00	3.1236-01	2.0520+00	1.6887-07
U-234	2.6468-01	1.6769-02	2.6468-01	4.9894-01	2.6468-01	6.9552-02
U-235	1.8623-05	1.4054-04	1.8623-05	6.8186-05	1.8623-05	1.0988-04

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THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
U-236	8.7939-05	7.4455-03	8.7939-05	1.0404-03	8.7939-05	6.8197-02
U-237	2.8498-06	2.2047-04	2.8498-06	3.4353-05	2.8498-06	1.9267-03
U-238	1.9861-11	1.2615-05	1.9861-11	5.5145-10	1.9861-11	9.4106-05
U-239	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U-240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
URANIUM	2.3168+00	2.4588-02	2.3168+00	8.1245-01	2.3168+00	1.3988-01
PA-230	2.0082-07	3.1190-11	2.0082-07	2.0607-08	2.0082-07	1.3021-10
PA-231	2.7942-03	4.6673-07	2.7942-03	3.0852-04	2.7942-03	1.9439-06
PA-232	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PA-233	4.1175+03	5.4318-06	4.1175+03	4.2927-05	4.1175+03	1.0876-04
PA-234M	5.3279-01	0.0000	5.3279-01	0.0000	5.3279-01	0.0000
PA-234	5.3279-01	1.2617-04	5.3279-01	3.5584-09	5.3279-01	9.4128-04
PA-235	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROTACTINIUM	4.1186+03	1.3207-04	4.1186+03	3.5147-04	4.1186+03	1.0520-03
TH-226	2.7106-06	6.1017-10	2.7106-06	0.0000	2.7106-06	2.5471-09
TH-227	2.4058-03	1.9745-07	2.4058-03	1.2047-04	2.4058-03	8.2181-07
TH-228	1.1305+00	1.8373-04	1.1305+00	3.6891+00	1.1305+00	7.5977-04
TH-229	2.9056-04	6.4583-09	2.9056-04	1.2533-03	2.9056-04	2.6584-08
TH-230	6.0325-03	7.4909-07	6.0325-03	4.7162-04	6.0325-03	3.1453-06
TH-231	1.8623-05	1.4054-04	1.8623-05	6.8186-05	1.8623-05	1.0988-04
TH-232	8.7360-04	1.0909-12	8.7360-04	9.6985-12	8.7360-04	1.9454-11
TH-233	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TH-234	2.8382-01	1.2616-05	2.8382-01	3.5233-09	2.8382-01	9.4118-05
TH-235	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
THORIUM	1.4239+00	3.3784-04	1.4239+00	3.6910+00	1.4239+00	9.6776-04
AC-225	2.7098-04	6.0231-09	2.7098-04	1.1689-03	2.7098-04	2.4793-08
AC-227	2.4345-04	2.0774-08	2.4345-04	1.2861-05	2.4345-04	8.6469-08
AC-228	3.7874-03	3.9157-12	3.7874-03	1.3608-09	3.7874-03	2.0709-11
AC-229	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ACTINIUM	4.3018-03	2.0778-08	4.3018-03	1.2862-05	4.3018-03	8.6489-08
RA-222	2.7106-06	6.1019-10	2.7106-06	2.7784-06	2.7106-06	2.5472-09
RA-223	2.4061-04	1.9748-08	2.4061-04	1.2048-05	2.4061-04	8.2192-08

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
RA-224	1.1010+00	1.7893-04	1.1010+00	3.5927+00	1.1010+00	7.3992-04
RA-225	2.7609-04	6.1366-09	2.7609-04	1.1909-03	2.7609-04	2.5260-08
RA-226	1.9794-05	1.0793-09	1.9794-05	5.6257-07	1.9794-05	4.5705-09
RA-227	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RA-228	3.8153-03	3.9154-11	3.8153-03	1.3532-08	3.8153-03	2.0709-10
RA-229	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RADIUM	1.1053+00	1.1185-09	1.1053+00	5.7610-07	1.1053+00	4.7776-09
FR-221	2.7098-04	6.0231-09	2.7098-04	1.1689-03	2.7098-04	2.4793-08
FR-223	3.4083-06	2.7974-10	3.4083-06	1.7067-07	3.4083-06	1.1643-09
FR-224	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FRANCIUM	2.7439-04	2.2520-08	2.7439-04	1.3740-05	2.7439-04	9.3731-08
RN-218	2.7106-06	6.1019-10	2.7106-06	2.7784-06	2.7106-06	2.5472-09
RN-219	2.4061-04	1.9748-08	2.4061-04	1.2048-05	2.4061-04	8.2192-08
RN-220	1.1010+00	1.7893-04	1.1010+00	3.5927+00	1.1010+00	7.3992-04
RN-222	1.9755-05	2.4531-09	1.9755-05	1.5444-06	1.9755-05	1.0300-08
RN-223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RN-224	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RADON	1.1012+00	1.3674-04	1.1012+00	8.6092-02	1.1012+00	5.7417-04
AT-217	2.7098-04	6.0231-09	2.7098-04	1.1689-03	2.7098-04	2.4793-08
AT-218	3.6546-09	4.5382-13	3.6546-09	2.8572-10	3.6546-09	1.9055-12
AT-219	1.3633-10	1.1189-14	1.3633-10	6.8267-12	1.3633-10	4.6571-14
ASTATINE	2.7099-04	2.2241-08	2.7099-04	1.3569-05	2.7099-04	9.2568-08
PO-209	4.3056-12	9.6923-16	4.3056-12	4.4133-12	4.3056-12	4.0460-15
PO-210	6.8109-04	1.5332-07	6.8109-04	6.9813-04	6.8109-04	6.4203-07
PO-211	6.5071-07	5.3406-11	6.5071-07	3.2584-08	6.5071-07	2.2228-10
PO-212	6.9953-01	1.1369-04	6.9953-01	2.2827+00	6.9953-01	4.7014-04
PO-213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PO-214	2.7106-06	6.1019-10	2.7106-06	2.7784-06	2.7106-06	2.5472-09
PO-215	2.4061-04	1.9748-08	2.4061-04	1.2048-05	2.4061-04	8.2192-08
PO-216	1.1010+00	1.7893-04	1.1010+00	3.5927+00	1.1010+00	7.3992-04
PO-218	1.9755-05	2.4531-09	1.9755-05	1.5444-06	1.9755-05	1.0300-08
POLONIUM	1.8014+00	4.0552-04	1.8014+00	1.8465+00	1.8014+00	1.6928-03

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
BI-209	1.4653-17	3.2570-22	1.4653-17	6.3207-17	1.4653-17	1.3407-21
BI-210	2.0442-05	4.6018-09	2.0442-05	2.0954-05	2.0442-05	1.9210-08
BI-211	2.4100-04	1.9780-08	2.4100-04	1.2068-05	2.4100-04	8.2326-08
BI-212	1.0930+00	1.7764-04	1.0930+00	3.5668+00	1.0930+00	7.3459-04
BI-213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BI-214	1.9751-05	2.4526-09	1.9751-05	1.5441-06	1.9751-05	1.0298-08
BISMUTH	1.0933+00	2.4300-05	1.0933+00	4.7159+00	1.0933+00	1.0003-04
PB-206M	7.5196-04	1.6927-07	7.5196-04	7.7078-04	7.5196-04	7.0663-07
PB-206	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-207M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-207	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-208	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-209	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PB-210	2.0414-05	4.5954-09	2.0414-05	2.0025-05	2.0414-05	1.9183-08
PB-211	2.4100-04	1.9780-08	2.4100-04	1.2068-05	2.4100-04	8.2326-08
PB-212	1.0930+00	1.7764-04	1.0930+00	3.5668+00	1.0930+00	7.3459-04
PB-214	1.9751-05	2.4526-09	1.9751-05	1.5441-06	1.9751-05	1.0298-08
LEAD	1.0940+00	1.7781-04	1.0940+00	3.5702+00	1.0940+00	7.3528-04
TL-205	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-206	2.0442-11	4.6018-15	2.0442-11	2.0954-11	2.0442-11	1.9210-14
TL-207M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-207	2.4035-04	5.4106-08	2.4035-04	2.4637-04	2.4035-04	2.2586-07
TL-208	3.9349-01	6.3951-05	3.9349-01	1.2840+00	3.9349-01	2.6445-04
TL-209	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TL-210	4.1178-09	5.1132-13	4.1178-09	3.2192-10	4.1178-09	2.1470-12
THALIUM	3.9373-01	8.8632-05	3.9373-01	4.0358-01	3.9373-01	3.6999-04
OY-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OY-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OY-158	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OY-159	7.8685-04	1.2916-04	7.8685-04	1.9158-04	7.8685-04	7.3527-04
OY-160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OY-161	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OY-162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
DY-163	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DY-164	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DYSPROSIUM	7.8685-04	1.2916-04	7.8685-04	1.9158-04	7.8685-04	7.3527-04
TB-155	1.5235-17	1.0697-19	1.5235-17	2.6807-18	1.5235-17	0.0000
TB-156	9.8433-14	6.9089-16	9.8433-14	1.7383-14	9.8433-14	0.0000
TB-157	1.8057-06	2.6121-07	1.8057-06	7.0799-07	1.8057-06	1.4605-06
TB-158	1.3546-07	2.4021-08	1.3546-07	1.7056-07	1.3546-07	2.6713-08
TB-159	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-160	4.2370-01	5.2083-01	4.2370-01	4.6893-01	4.2370-01	8.8954-01
TB-161	2.5436-08	3.2844-08	2.5436-08	3.0372-08	2.5436-08	6.3849-08
TP-162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TB-163	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TFRPIUM	4.2370-01	5.2083-01	4.2370-01	4.6893-01	4.2370-01	8.8954-01
GD-152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-153	7.4391-03	1.6599-02	7.4391-03	1.9097-02	7.4391-03	6.2032-02
GD-154	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-155	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-158	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-159	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GD-162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GADOLINIUM	7.4391-03	1.6599-02	7.4391-03	1.9097-02	7.4391-03	6.2032-02
EU-149	2.5458-09	1.7515-11	2.5458-09	5.5126-10	2.5458-09	0.0000
EU-150	3.7283-10	2.4868-12	3.7283-10	1.5269-10	3.7283-10	0.0000
EU-151	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-152	6.0206-02	9.8324-02	6.0206-02	6.6968-02	6.0206-02	7.7360-02
EU-153	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
EU-154	1.7245+01	4.8688+01	1.7245+01	3.2294+01	1.7245+01	3.7039+01
EU-155	2.3942+01	6.6198+01	2.3942+01	4.3934+01	2.3942+01	5.0422+01
EU-156	3.9057-01	1.0810+00	3.9057-01	7.1770-01	3.9057-01	8.2380-01
EU-157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23RS RECYCLE U-233 F.E. FERTILE PTL.	FISSILE PTL.	25RS RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
EUROPIUM	4.1638+01	1.1607+02	4.1638+01	7.7013+01	4.1638+01	3.7940+01
SM-144	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-145	2.1381-03	3.9564-03	2.1381-03	5.8633-03	2.1381-03	2.2524-02
SM-146	8.2597-12	1.5104-11	8.2597-12	2.2429-11	8.2597-12	8.5983-11
SM-147	1.4558-08	2.9850-08	1.4558-08	2.1727-08	1.4558-08	2.2501-08
SM-148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-149	4.5170-14	2.4048-14	4.5170-14	1.9654-14	4.5170-14	1.8325-14
SM-150	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-151	2.9264+00	3.6226+00	2.9264+00	2.5395+00	2.9264+00	2.7363+00
SM-152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-153	3.9788-25	6.0457-25	3.9788-25	4.1694-25	3.9788-25	4.5648-25
SM-154	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SM-156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SAMARIUM	2.9286+00	3.6269+00	2.9286+00	2.5453+00	2.9286+00	2.7588+00
PM-144	7.7094-09	5.2372-11	7.7094-09	2.0712-09	7.7094-09	0.0000
PM-145	1.1302-04	2.0892-04	1.1302-04	3.0965-04	1.1302-04	1.1894-03
PM-146	2.3809-04	3.9206-04	2.3809-04	5.8923-04	2.3809-04	2.2307-03
PM-147	1.1972+03	1.0419+03	1.1972+03	7.9724+02	1.1972+03	7.8301+02
PM-148M	1.5165+01	1.3923+01	1.5165+01	1.0520+01	1.5165+01	1.0455+01
PM-148	1.8972-07	1.7352-07	1.8972-07	1.3118-07	1.8972-07	1.3031-07
PM-149	1.0538-21	5.3760-22	1.0538-21	4.4266-22	1.0538-21	4.0983-22
PM-151	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PROMETHIUM	1.2124+03	1.0558+03	1.2124+03	8.0376+02	1.2124+03	7.9347+02
ND-142	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-144	9.9389-12	2.7669-11	9.9389-12	2.2084-11	9.9389-12	2.0633-11
ND-145	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-146	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-147	8.6239-02	3.3262-02	8.6239-02	2.9940-02	8.6239-02	2.5460-02
ND-148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ND-150	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NEODYMIUM	8.6239-02	3.3262-02	8.6239-02	2.9940-02	8.6239-02	2.5460-02

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
PR-141	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PR-142	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PR-143	2.5760+00	8.0366-01	2.5760+00	8.1830-01	2.5760+00	6.1229-01
PR-144	9.0079+03	8.0227+03	9.0079+03	6.4154+03	9.0079+03	6.0179+03
PR-145	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PRASEODYMIUM	9.0105+03	8.0235+03	9.0105+03	6.4162+03	9.0105+03	6.0186+03
CE-136	3.9746-11	6.5184-12	3.9746-11	9.6600-12	3.9746-11	3.7110-11
CE-137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-138	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-139	6.3587-03	7.5795-04	6.3587-03	1.6861-03	6.3587-03	4.2134-03
CE-140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-141	5.3108+02	1.5277+02	5.3108+02	1.6506+02	5.3108+02	1.1595+02
CE-142	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CE-144	8.5754+03	7.6375+03	8.5754+03	6.1074+03	8.5754+03	5.7290+03
CERIUM	9.1065+03	7.7903+03	9.1065+03	6.2724+03	9.1065+03	5.8449+03
LA-137	2.4857-05	3.2928-06	2.4857-05	1.2010-05	2.4857-05	1.8149-05
LA-138	5.7685-11	1.3595-11	5.7685-11	2.1218-11	5.7685-11	5.2000-11
LA-139	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LA-140	1.6463+00	4.7807-01	1.6463+00	4.9629-01	1.6463+00	3.6440-01
LANTHANUM	1.6464+00	4.7808-01	1.6464+00	4.9630-01	1.6464+00	3.6441-01
BA-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BA-136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BA-137M	1.1616+03	1.8027+03	1.1616+03	1.6919+03	1.1616+03	1.3447+03
BA-137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BA-138	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BA-140	1.4305+00	4.1540-01	1.4305+00	4.3122-01	1.4305+00	3.1662-01
BARIUM	1.1631+03	1.8032+03	1.1631+03	1.6923+03	1.1631+03	1.3450+03
CS-133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CS-134	1.2625+03	3.4233+03	1.2625+03	2.6971+03	1.2625+03	2.5526+03
CS-135	1.8518-03	3.6644-03	1.8518-03	2.6004-03	1.8518-03	2.7360-03
CS-136	7.2629-02	5.4815-02	7.2629-02	4.9658-02	7.2629-02	4.0701-02

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
CS-137	1.1602+03	1.8005+03	1.1602+03	1.6897+03	1.1602+03	1.3430+03
CESIUM	2.4228+03	5.2238+03	2.4228+03	4.3769+03	2.4228+03	3.8956+03
XE-131M	6.4772-03	1.5685-03	6.4772-03	1.8455-03	6.4772-03	1.1893-03
XE-131	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-133M	3.9515-20	1.2875-20	3.9515-20	1.2612-20	3.9515-20	9.8480-21
XE-133	2.5300-06	8.2982-07	2.5300-06	8.1388-07	2.5300-06	6.3454-07
XE-134	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-135M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XE-136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
XENON	6.4797-03	1.5693-03	6.4797-03	1.8463-03	6.4797-03	1.1899-03
I-127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-129	5.1028-04	3.5054-04	5.1028-04	6.9220-04	5.1028-04	2.5993-04
I-131	2.5409-03	6.1036-04	2.5409-03	7.1921-04	2.5409-03	4.6287-04
I-132	3.3233-13	9.0395-14	3.3233-13	9.7977-14	3.3233-13	6.8843-14
I-133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IODINE	3.0512-03	9.6090-04	3.0512-03	1.4114-03	3.0512-03	7.2280-04
TE-125M	1.6152+02	5.3674+01	1.6152+02	1.7186+02	1.6152+02	3.9425+01
TE-125	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-127M	1.2086+02	1.0404+01	1.2086+02	3.5701+01	1.2086+02	7.3631+00
TE-127	1.2129+02	1.0442+01	1.2129+02	3.5829+01	1.2129+02	7.3897+00
TE-128	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-129M	1.4204+02	2.0213+01	1.4204+02	3.5502+01	1.4204+02	1.4963+01
TE-129	1.4224+02	2.0242+01	1.4224+02	3.5552+01	1.4224+02	1.4984+01
TE-130	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-131M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-131	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TE-132	3.2267-13	8.7767-14	3.2267-13	9.5128-14	3.2267-13	6.6841-14
TELLURIUM	6.8794+02	1.1498+02	6.8794+02	3.1444+02	6.8794+02	8.4125+01
SB-121	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
SB-122	9.9156-21	8.1628-21	9.9156-21	8.1777-21	9.9156-21	9.9453-21
SB-123	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-124	1.2756-01	9.6348-02	1.2756-01	1.5769-01	1.2756-01	1.0071-01
SB-125	1.5519+02	5.0757+01	1.5519+02	1.6238+02	1.5519+02	3.7277+01
SB-127	2.6283-11	1.6618-12	2.6283-11	5.2826-12	2.6283-11	1.1549-12
SB-128	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SB-129	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ANTIMONY	1.5532+02	5.0853+01	1.5532+02	1.6254+02	1.5532+02	3.7378+01
SN-115	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-117M	1.4926-03	4.3187-04	1.4926-03	4.5449-04	1.4926-03	3.2909-04
SN-117	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-119M	1.0772+00	6.9598-01	1.0772+00	6.7570-01	1.0772+00	5.2142-01
SN-119	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-121M	7.4790-05	8.0650-05	7.4790-05	8.2020-05	7.4790-05	9.4953-05
SN-121	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SN-123	2.0154+01	4.6189+00	2.0154+01	7.2986+00	2.0154+01	3.4345+00
SN-125	3.8898-04	3.0493-05	3.8898-04	8.1347-05	3.8898-04	2.1695-05
TIN	2.1233+01	5.3154+00	2.1233+01	7.9749+00	2.1233+01	3.9563+00
IN-113	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IN-114	4.2749-01	6.3578-03	4.2749-01	9.4221-03	4.2749-01	3.6196-02
IN-115M	2.6639-23	8.1884-24	2.6639-23	8.7351-24	2.6639-23	6.2385-24
IN-115	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
INDIUM	4.2749-01	6.3578-03	4.2749-01	9.4221-03	4.2749-01	3.6196-02
CD-110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-111	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-113	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-114	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CD-115M	1.1351-01	4.5530-02	1.1351-01	4.6564-02	1.1351-01	3.4653-02
CD-115	2.4403-23	7.5013-24	2.4403-23	8.0021-24	2.4403-23	5.7157-24
CADMIUM	1.1351-01	4.5530-02	1.1351-01	4.6564-02	1.1351-01	3.4653-02

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
AG-107	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-108	4.4560-04	6.5725-05	4.4560-04	9.7387-05	4.4560-04	3.7409-04
AG-109M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-110M	1.2103+00	1.6954+00	1.2103+00	1.8003+00	1.2103+00	1.2732+00
AG-111M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AG-111	4.8134-06	1.4235-06	4.8134-06	1.5116-06	4.8134-06	1.0840-06
AG-112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SILVER	1.2108+00	1.6955+00	1.2108+00	1.8004+00	1.2108+00	1.2736+00
PD-104	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-105	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-106	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-107	8.4687-05	2.0047-04	8.4687-05	1.3015-04	8.4687-05	1.4978-04
PD-108	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-111M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-111	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PD-112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PALLADIUM	8.4687-05	2.0047-04	8.4687-05	1.3015-04	8.4687-05	1.4978-04
RH-103M	2.6390+02	1.6441+02	2.8390+02	1.2175+02	2.8390+02	1.2311+02
RH-103	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-105M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-105	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RH-106	4.8171+02	6.4448+02	4.8171+02	4.2249+02	4.8171+02	4.8343+02
RHODIUM	7.6561+02	8.0890+02	7.6561+02	5.4424+02	7.6561+02	6.0655+02
RU-99	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-102	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-103	2.8362+02	1.6425+02	2.8362+02	1.2163+02	2.8362+02	1.2299+02
RU-104	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RU-105	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH U-235 F.E. FERTILE PTL.	FISSILE PTL.	23RS RECYCLE U-233 F.E. FERTILE PTL.	FISSILE PTL.	25RS RECYCLE U-235 F.E. FERTILE PTL.	FISSILE PTL.
RU-106	4.8171+02	6.4448+02	4.8171+02	4.2249+02	4.8171+02	4.8343+02
RUTHENIUM	7.6533+02	8.0873+02	7.6533+02	5.4412+02	7.6533+02	6.0642+02
TC-99M	6.3823-16	2.2609-16	6.3823-16	2.0935-16	6.3823-16	1.6899-16
TC-99	1.9876-02	3.8671-02	1.9876-02	2.8318-02	1.9876-02	2.8209-02
TECHNETIUM	1.9876-02	3.8671-02	1.9876-02	2.8318-02	1.9876-02	2.8209-02
MO-95	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MO-96	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MO-97	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MO-98	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MO-99	5.8026-16	2.0555-16	5.8026-16	1.9034-16	5.8026-16	1.5364-16
MO-100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MOLYBDENUM	5.8026-16	2.0555-16	5.8026-16	1.9034-16	5.8026-16	1.5364-16
NB-93M	3.2162-03	7.4993-03	3.2162-03	7.2316-03	3.2162-03	5.4594-03
NB-93	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-95M	3.5564+03	1.2855+03	3.5564+03	1.2498+03	3.5564+03	9.5238+02
NB-95	6.7846+03	2.4829+03	6.7846+03	2.4077+03	6.7846+03	1.8389+03
NB-96	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-97M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NB-97	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI0BIUM	1.0341+04	3.7684+03	1.0341+04	3.6575+03	1.0341+04	2.7912+03
ZR-90	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-91	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-92	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-93	3.9101-02	6.0733-02	3.9101-02	5.7831-02	3.9101-02	4.4239-02
ZR-94	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-95	3.3529+03	1.2120+03	3.3529+03	1.1783+03	3.3529+03	8.9788+02
ZR-96	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZR-97	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ZIRCONIUM	3.3529+03	1.2120+03	3.3529+03	1.1783+03	3.3529+03	8.9792+02
Y-89	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-90	1.2514+03	1.8225+03	1.2514+03	1.8038+03	1.2514+03	1.3273+03

THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
Y-91M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-91	7.4915+02	2.3456+02	7.4915+02	2.4784+02	7.4915+02	1.7341+02
Y-92	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Y-93	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
YTTERBIUM	2.0006+03	2.0570+03	2.0006+03	2.0517+03	2.0006+03	1.5007+03
SR-86	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-87	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-88	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-89	2.1265+03	5.5743+02	2.1265+03	6.5227+02	2.1265+03	4.1081+02
SR-90	1.2497+03	1.8200+03	1.2497+03	1.8714+03	1.2497+03	1.3255+03
SR-91	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STRONTIUM	3.3762+03	2.3774+03	3.3762+03	2.4536+03	3.3762+03	1.7363+03
RB-85	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
RB-86	4.0799-02	1.4235-02	4.0799-02	2.4371-02	4.0799-02	1.0203-02
RB-87	4.3469-07	4.7016-07	4.3469-07	6.1734-07	4.3469-07	3.4178-07
RUBIDIUM	4.0800-02	1.4235-02	4.0800-02	2.4372-02	4.0800-02	1.0204-02
KR-82	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-83M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-83	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-84	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-85M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KR-85	3.3173+02	2.5238+02	3.3172+02	3.4703+02	3.3172+02	1.8339+02
KR-86	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
KRYPTON	3.3173+02	2.5238+02	3.3172+02	3.4703+02	3.3172+02	1.8339+02
BR-79	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-81	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-82	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BR-83	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BROMINE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SE-79	8.5623-03	4.1522-03	8.5623-03	9.2203-03	8.5623-03	2.9991-03
SE-80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
SE-82	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SELENIUM	8.5623-03	4.1522-03	8.5623-03	9.2203-03	8.5623-03	2.9991-03
CO-58	1.1115-03	7.4042-05	1.1115-03	1.0973-04	1.1115-03	4.2153-04
CO-60	4.9879-04	3.3418-05	4.9879-04	4.9525-05	4.9879-04	1.9025-04
COBALT	1.6103-03	1.0746-04	1.6103-03	1.5925-04	1.6103-03	6.1178-04
NI-58	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI-59	1.8253-03	1.2160-04	1.8253-03	1.8020-04	1.8253-03	6.9225-04
NI-60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI-61	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI-62	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NI-63	2.4179-01	1.6119-02	2.4179-01	2.3987-02	2.4179-01	9.1764-02
NI-64	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NICKEL	2.4362-01	1.6240-02	2.4362-01	2.4067-02	2.4362-01	9.2456-02
CL-35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CL-36	1.2023-03	0.0000	1.2023-03	0.0000	1.2023-03	0.0000
CL-37	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CHLORINE	1.2023-03	0.0000	1.2023-03	0.0000	1.2023-03	0.0000
S-32	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S-33	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S-34	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S-35	9.1877-01	3.0791-03	9.1877-01	4.5631-03	9.1877-01	1.7530-02
S-36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SULFUR	9.1877-01	3.0791-03	9.1877-01	4.5631-03	9.1877-01	1.7530-02
P-33	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PHOSPHOROUS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SILICON	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
O-16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
O-17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OXYGEN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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THIS SEGMENT WAS DISCHARGED AT THE BEGINNING OF RELOAD 13 AND WAS ORIGINALLY LOADED AT RELOAD 9

NUCLIDE ACTIVITIES IN CURIES PER F.E. AT TIME 180.0 DAYS AFTER DISCHARGE

NUCLIDES	IS,MS FRESH FERTILE PTL.	U-235 F.E. FISSILE PTL.	23RS RECYCLE FERTILE PTL.	U-233 F.E. FISSILE PTL.	25RS RECYCLE FERTILE PTL.	U-235 F.E. FISSILE PTL.
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N-14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N-15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NITROGEN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-14 FROM C	2.4382-02	0.0000	2.4382-02	0.0000	2.4382-02	0.0000
C-14 FROM N	3.9389-03	4.8592-05	3.9389-03	7.2011-05	3.9389-03	2.7664-04
C-14 FROM O	2.0081-03	6.7955-05	2.0081-03	1.0071-04	2.0081-03	3.8687-04
CARBON	3.0329-02	1.1655-04	3.0329-02	1.7272-04	3.0329-02	6.6351-04
B-10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
B-11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BORON	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LI-6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LI-7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LITHIUM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H-3 FROM LI6	3.2654+01	6.7650-01	3.2654+01	1.0025+00	3.2654+01	3.8513+00
H-3 FROM B10	6.3875-02	0.0000	6.3875-02	0.0000	6.3875-02	0.0000
H-3 F. YIELD	3.9305+00	6.3616+00	3.9305+00	5.5776+00	3.9305+00	4.6363+00
TRITIUM	3.6649+01	7.0381+00	3.6649+01	6.5801+00	3.6649+01	8.4677+00
MWD	3.3351+02	5.7131+02	3.3351+02	5.0039+02	3.3351+02	4.1633+02

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5. CONCLUSIONS

The HTGR discharge and reload fuel element block flow data have been forecast for an HTGR market developed by ERDA for use as a planning basis. The data illustrate the change in the number of different types of fuel elements that occurs annually for reprocessing and refabrication.

Initially, the reprocessing head end handles IS and MS elements, with the 23RS and 25RS elements entering the recycle system only after 5 yr. Throughput requirements for the U-235 PUREX and the U-233 THOREX solvent extraction systems change as the reactor market builds and as the individual reactor fuel cycles develop toward the equilibrium recycle fuel mode.

Similarly, the 25R and 23R fuel refabrication throughput requirements change with the age or development of the reactor market. Initially, about an equal number of 25R fuel elements and 23R fuel elements are refabricated. After the first year, the relative number of each type of fuel element refabricated changes until about six times as many 23R elements are refabricated as 25R elements.

The recycle plant reprocessing and refabrication systems will be required to have sufficient throughput flexibility to accommodate changes in the relative number of fuel element types forecast for an HTGR market.

The fuel element composition, including heavy metals, impurities, fission products, and activation products, has been calculated for reload fresh and recycle fuel elements and for discharged spent fuel elements for each operating cycle of a typical HTGR. The nuclide composition of the fissile and the fertile particles in each type of fuel element has been stored on archive tapes.

Two codes have been written to process the fuel element composition data. The NUCLIN code reads the data tape files and computes the nuclide concentrations for user-specified decay times. Reports from printout tabulations are compiled by the LOOKUP code for the user-specified reactor operating cycles and decay periods. The LOOKUP code calculates the concentration data in units of grams per fuel element and curies per fuel element.

Although the printed results included in this volume and in Volume II are extensive, there are a number of additional cases that would be valuable for recycle fuel design engineering and analyses. Process systems, process support systems, and waste or effluent handling systems are designed for upper-limit cases. The printout results included in this report and the data available from the archive files are average data for each fuel element type. A series of calculations specifically to develop the upper limit fuel element compositions can be made for use in the design limit calculations.

As a result of ongoing fuel cycle economic studies, alternate fuel recycle strategies, reactor reload cycle variations, and fissile or fertile fuel loading variations are identified. Fuel element composition and mass flow calculations should be carried out for the promising fuel management cases.

In addition to the HTGR results presented in this report, the calculational method is applicable to other reactor or fuel composition analyses. A number of stand-in irradiated fuels are candidates for the ERDA Thorium Utilization Program hot engineering scale testing. Calculations to estimate the fuel compositions could be made to assist in the determination of the useful fuels.

With the archive data files available for the current HTGR cases or for other cases developed in the future, additional data can be derived for design uses. The calculational method should be extended to calculate

decay heat loads as a function of decay time. Also, irradiation energies for types of decay radiation can be calculated for the nuclides present in the spent fuel. The radiation data would be necessary for shielding, activation, and dose level analyses.

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