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1. PURPOSE

The purpose of this calculation is to identify radionuclides that are significant to offsite doses from potential preclosure events for spent nuclear fuel (SNF) and high-level radioactive waste expected to be received at the potential Monitored Geologic Repository (MGR). In this calculation, high-level radioactive waste is included in references to DOE SNF. A previous document, *DOE SNF DBE Offsite Dose Calculations* (CRWMS M&O 1999b), calculated the source terms and offsite doses for Department of Energy (DOE) and Naval SNF for use in design basis event analyses. This calculation reproduces only DOE SNF work (i.e., no naval SNF work is included in this calculation) created in *DOE SNF DBE Offsite Dose Calculations* and expands the calculation to include DOE SNF expected to produce a high dose consequence (even though the quantity of the SNF is expected to be small) and SNF owned by commercial nuclear power producers. The calculation does not address any specific off-normal/DBE event scenarios for receiving, handling, or packaging of SNF. The results of this calculation are developed for comparative analysis to establish the important radionuclides and do not represent the final source terms to be used for license application.

This calculation will be used as input to preclosure safety analyses and is performed in accordance with procedure AP-3.12Q, *Calculations*, and is subject to the requirements of DOE/RW-0333P, *Quality Assurance Requirements and Description* (DOE 2000) as determined by the activity evaluation contained in *Technical Work Plan for: Preclosure Safety Analysis*, TWP-MGR-SE-000010 (CRWMS M&O 2000b) in accordance with procedure AP-2.21Q, *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities*.

2. METHOD

Controls prescribed by procedure AP-SV.1Q, *Control of the Electronic Management of Information*, are addressed by information management controls, such as access privileges through passwords, backup and storage of data, and compliance with procedure AP-17.1Q, *Record Source Responsibilities for Inclusionary Records*. Unverified design inputs are identified and tracked in accordance with AP-3.15Q, *Managing Technical Product Inputs*.

The approach used to identify the comprehensive list of important radionuclides was to calculate source terms for SNFs generated in different reactors and fuel cycles. This includes uranium and thorium cycles, high and low enriched uranium cycles, and reactors that burn or breed fissionable materials. A large number of these fuels are found in the DOE SNF inventory. The quantity and type of radionuclides produced varies between these different reactors and fuel cycles.

2.1 SOURCE TERM CALCULATION

2.1.1 Evaluation of Source Terms from DOE Fuel Inventory

The equation used to calculate the source term (ST_i) released to the environment by a postulated DBE is derived from *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities* (DOE 1994, p. 1-2). The material at risk component of the referenced

equation is represented by the inventory of the given fuel type multiplied by the fraction of the inventory that is involved in the DBE. The equation for the source term released to the environment then becomes the following (without the respirable fraction component):

$$ST_j = Inv_j \times fInv \times DR_j \times ARF_j \times LPF_j \quad (1)$$

where

- ST_j = the amount of the j^{th} radionuclide released to the environment (Ci)
- Inv_j = the amount of the j^{th} radionuclide in the given fuel type (Ci)
- $fInv$ = the fraction of the fuel inventory involved in the DBE (unitless)
- DR_j = the damage ratio of the j^{th} radionuclide (i.e., the fraction of MAR_j affected by the DBE (unitless))
- ARF_j = the airborne release fraction of the j^{th} radionuclide applicable to the DBE (unitless)
- LPF_j = the leak path factor for the j^{th} radionuclide applicable to the DBE (unitless).

The portion of the total source term that is respirable is equal to

$$ST_j^{inh} = ST_j \times RF_j \quad (2)$$

where

- ST_j^{inh} = the respirable amount of the j^{th} radionuclide released to the environment (Ci)
- RF_j = the respirable fraction of the j^{th} radionuclide applicable to the DBE (-).

Only one canister of a DOE SNF inventory type or one commercial spent fuel assembly (SFA) is involved in a potential DBE (Assumption 3.10). The SNF isotopic compositions provided by the National Spent Nuclear Fuel Program for DOE SNF (DTN: MO0001SPADBE00.001) are given in terms of the entire fuel inventories scheduled to be disposed of in the potential MGR. For example, if a fuel inventory were made up of 400 canisters, the isotopic data provided would be for all 400 canisters. Since the entire inventory of a given fuel type would not be involved in a potential DBE, the scaling factor ($fInv$) is used to adjust the total isotopic inventory to the amount involved in an event.

This calculation determines the per canister dose for DOE SNF (Assumption 3.10). In cases where the number of DOE canisters for an inventory type is greater than or equal to 1.0, the fraction of a given total SNF inventory involved in an event is the inverse of the total number of DOE SNF canisters.

$$fInv = \frac{1}{n_{canInv}} \quad \text{where } n_{canInv} \geq 1 \quad (3)$$

where

n_{canInv} = total number of canisters for a given fuel inventory (canisters).

If an SNF inventory does not completely fill a canister (i.e., it is listed in DTN: MO0001SPADBE00.001 as having less than one canister) the entire inventory is involved in the event; in this case $fInv$ is set equal to one.

$$fInv = 1 \quad \text{for } n_{canInv} < 1 \quad (4)$$

Note that Equation 4 assumes that DOE fuel types will not be mixed and thus, small quantity fuel types will be disposed of in a partially loaded canister. Some fuel types may be combined within a single canister, thus Equation 4 may produce nonconservative results for small quantity fuels.

A damage ratio (DR) of 1.0 is conservatively assumed for the radionuclides that comprise the total material-at-risk (Assumption 3.7).

The airborne release fractions (ARFs) and respirable fractions (RFs) used in the calculation are taken from a number of documents. The specific values used are described in Section 5.2.8.

2.1.2 Evaluation of Source Terms from DOE SNF Crud Inventory

The DOE SNF crud values used in this calculation are reproduced from *DOE SNF DBE Offsite Dose Calculations* (CRWMS M&O 1999b, page IX-13) and are shown in Table 1 below.

Table 1. DOE SNF Crud Values

Matrix	Fuel Condition	Curies Co-60 per can	Curies Fe-55 per can
Non-Metals	Intact	2.68E+02	1.69E+03
Non-Metals	Not Intact	1.23E+02	7.73E+02
Other	Intact	7.70E+02	4.85E+03
Other	Not Intact	1.76E+03	1.11E+04
Stable Metals	Intact	1.56E+01	9.85E+01
Stable Metals	Not Intact	7.60E+01	4.79E+02

The crud source term released to the environment is calculated by

$$ST_j = C_j \times DR_j \times ARF_j \times LPF_j \quad (5)$$

with the respirable portion of the source term being equal to

$$ST_j^{inh} = ST_j \times RF_j \quad (6)$$

where

C_j = activity of the j^{th} DOE SNF crud radionuclide (Ci).

A DR of 1.0 is conservatively assumed for the radionuclides that comprise the crud inventory (Assumption 3.7). The ARF and RF values used in the calculation are discussed in Section 5.2.8.

2.1.3 Source Terms from Commercial SNF

Average and maximum PWR and BWR radionuclide inventories (Ci/SFA) for spent nuclear fuel are taken from *PWR Source Term Generation and Evaluation* (CRWMS M&O 1999d) and *BWR Source Term Generation and Evaluation* (CRWMS M&O 1999e). Crud source terms from commercial SNF for 5 years and 25 years decay times are calculated in Attachment III.

2.2 DOSE CALCULATION

Only the inhalation and air submersion dose are considered in this calculation; the potential doses from ingestion, water immersion, and contaminated soil are considered insignificant (Assumption 3.1).

The inhalation dose to an individual from each radionuclide in the source term can be calculated from Regulatory Guide 1.109 (Rev. 1, 1977, Sections C.2 and C.3):

$$D_{j,k}^{inh} = ST_j^{inh} \times \frac{\chi}{Q} \times BR \times conv \times DCF_{j,k}^{inh} \quad (7)$$

while the air submersion dose is (Assumption 3.4)

$$D_{j,k}^{sub} = ST_j \times \frac{\chi}{Q} \times conv \times DCF_{j,k}^{sub} \quad (8)$$

where

- $D_{j,k}^{inh}$ = radiation dose from the j^{th} radionuclide to the k^{th} organ due to inhalation (rem)
- $D_{j,k}^{sub}$ = radiation dose from the j^{th} radionuclide to the k^{th} organ due to air submersion (rem)
- k = organ index, where organs are gonads, breast, lungs, red marrow, bone surface, thyroid, remainder, effective, and skin (-)
- $\frac{\chi}{Q}$ = atmospheric dispersion factor (s/m^3)
- BR = breathing rate (m^3/s)
- $DCF_{j,k}^{inh}$ = the inhalation dose conversion factor of the j^{th} radionuclide for the k^{th} organ (Sv/Bq)

$$DCF_{j,k}^{sub} = \text{the submersion dose conversion factor of the } j^{\text{th}} \text{ radionuclide for the } k^{\text{th}} \text{ organ } ((\text{Sv m}^3)/(\text{Bq s}))$$

$$conv = \text{DCF unit conversion factor: } 3.7\text{E}+12 \text{ (rem-Bq)/(Ci-Sv) (Eckerman et al. 1988, p. 121).}$$

Regulatory requirements applicable to the potential MGR specify four dose measures for Category 2 DBEs.

- The total effective dose equivalent (TEDE). The TEDE is equal to the committed effective dose equivalent (CEDE) plus the deep dose equivalent (DDE) per the definition in 10 CFR 20.1003. The CEDE is calculated using the effective inhalation dose conversion factor (DCF). The DDE is calculated using the effective air submersion DCF. The Category 2 TEDE limit is 5 rem (Dyer 1999).
- The highest of the seven committed dose equivalents (CDEs) plus the DDE. The seven organs evaluated to find the highest CDE are the lungs, breasts, gonads, red marrow, bone surface, thyroid, and remainder. The DDE, which is added to the highest CDE, is equal to that used to calculate the TEDE, as per the definition of DDE in 10 CFR 20.1003. The Category 2 highest CDE plus DDE limit is 50 rem (Dyer 1999).
- Lens of the Eye. The Category 2 limit is 15 rem (Dyer 1999). No doses are calculated for this limit in this calculation, as none of the 57 DOE SNF radionuclides have lens of the eye DCFs given in either Federal Guidance Report 11 (Eckerman et al. 1988) or Federal Guidance Report 12 (Eckerman and Ryman 1993). In the two Federal Guidance reports only Kr-83m (a radionuclide not contained in any DOE SNF) has a lens of the eye DCF (Eckerman et al. 1988, p. 182). However, in NUREG-1567 (NRC 2000) it is stated that compliance with the lens of the eye dose limit is achieved if the sum of the skin dose equivalent and the TEDE does not exceed 15 rem.
- Skin and Extremities. The dose to the skin and extremities is only due to the air submersion dose pathway. The Category 2 limit is 50 rem (Dyer 1999).

The TEDE and CDEs plus DDE dose measures then can be expressed, ignoring the ingestion dose pathway (Assumption 3.1) as

$$TEDE = CEDE + DDE = \sum_j D_{j, \text{effective}}^{inh} + \sum_j D_{j, \text{effective}}^{sub} \quad (9)$$

$$CDE_k + DDE = \sum_j D_{j,k}^{inh} + \sum_j D_{j, \text{effective}}^{sub} \quad \text{where } k \neq \text{effective or skin} \quad (10)$$

where

$$\begin{aligned} TEDE &= \text{total effective dose equivalent (rem)} \\ CEDE &= \text{committed effective dose equivalent (rem)} \\ DDE &= \text{deep dose equivalent (rem)} \\ CDE_k &= \text{committed dose equivalent to the } k^{\text{th}} \text{ organ (rem).} \end{aligned}$$

The skin and extremities dose is equal to

$$SKIN = \sum_j D_{j,skin}^{sub} \quad (11)$$

where

$SKIN$ = dose to the skin and extremities (rem).

2.3 TREATMENT OF DOSE CONVERSION FACTORS

The inhalation DCFs used in this calculation are taken from Federal Guidance Report 11 (Eckerman et al. 1988). The inhalation DCF of a radionuclide is dependent in part on its chemical form. This dependence is accounted for by the lung clearance class (D – daily, W – Weekly, Y – Yearly) used to evaluate the DCF of a given radionuclide. Some radionuclides have only one lung clearance class, others have multiple lung clearance classes. For radionuclides with multiple lung clearance classes, the lung clearance class that yields the highest DCF is assumed on a per organ basis (Assumption 3.3). For example, Pu-238 (which has W- and Y-clearance classes) has the highest lung inhalation DCF for the Y-clearance class, while all of the other organs have the highest inhalation DCF for the W-clearance class.

DOE SNF radionuclides that have lung clearance classes other than or in addition to D, W, and/or Y are (Eckerman et al. 1988):

- H-3 –water vapor
- C-14 – organic, CO, and CO₂
- Ni-59 – daily, weekly, and vapor
- Ni-63 – daily, weekly, and vapor.

Nickel, being a metal, is in the vapor phase only at temperatures well above ambient. As there are no events postulated in the *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000a) in which temperatures well above ambient occur, it is not anticipated that nickel radionuclides in any potential source term will be in the vapor phase. Hence, only daily and weekly lung clearance classes are considered (Assumption 3.3).

The air submersion DCFs used in this calculation are taken from Federal Guidance Report 12 (Eckerman and Ryman 1993). Values for Ac-227, Cs-137, Ru-106, and Sn-126 are calculated using equation (12).

The inhalation DCFs from Eckerman et al. (1988) account for the presence of short-lived daughter products; however, the air submersion DCFs from Eckerman and Ryman (1993) do not. For example, the inhalation DCF for Cs-137 accounts for the presence of Ba-137m (Cs-137 has a DCF listed for it, while Ba-137m does not); however, separate air submersion DCFs are listed for each radionuclide.

Using the radioactive decay product data in Table A.1 of Eckerman and Ryman (1993), four DOE SNF radionuclides are identified as having a short-lived (half-life < 2 hours) daughter product (see Attachment IV). The total air submersion DCF from the parent/daughter pair is then

$$DCF_j^{sub} = DCF_j^{sub-parent} + f \times DCF_j^{sub-daughter} \quad (12)$$

where

DCF_j^{sub}	= total air submersion DCF for the j^{th} organ $[(\text{rem m}^3)/(\text{Ci s})]$
$DCF_j^{sub-parent}$	= air submersion DCF for the j^{th} organ from the parent radionuclide $[(\text{rem m}^3)/(\text{Ci s})]$
$DCF_j^{sub-daughter}$	= air submersion DCF for the j^{th} organ from the daughter radionuclide $[(\text{rem m}^3)/(\text{Ci s})]$
f	= fraction of the parent radionuclide that decays to the daughter radionuclide (-).

The total air submersion DCFs for Ac-227, Cs-137, Ru-106, and Sn-126 are calculated in Attachment IV.

3. ASSUMPTIONS

The following assumptions are used in this calculation.

- 3.1 Only inhalation and air submersion doses are considered in calculating offsite doses; the potential doses from ingestion, water immersion, and contaminated soil are negligible. *Basis:* Category 2 design basis events result in acute releases over a period of a few hours and the doses from these pathways may be controlled by interdiction as needed, thus precluding these source term pathways. NUREG-1567 (NRC 2000, p. 9-13, bullet 3) provides the guidance for dose calculations performed by licensees and states that only inhalation and air submersion doses are required at the controlled area boundary. This assumption has minimal impact on the calculation results and requires no further confirmation. This assumption is used in Section 2.2.
- 3.2 The dose receptor is assumed to be at a distance of 11 km from any postulated DBE source term release. This distance is assumed as the nearest point of public access from the waste handling building for purposes of a dose receptor point. *Basis:* This is a reasonable conservative assumption because the distance between the Waste Handling Building and the nearest point of public access on the proposed Land Withdrawal Boundary (to the West) is 11.65 kilometers (DTN: MO0001YMP00001.000). Other points on the proposed Land Withdrawal Boundary which are closer to the Waste Handling Building are on either Nevada Test Site or Nellis Air Force Base property where public access is prohibited. In this calculation, a change in the receptor distance would only change the absolute value of the calculated doses; their relative ranking

would not change. This assumption requires no further confirmation and is used in Section 5.2.2.

- 3.3 For radionuclides with multiple clearance classes, the lung clearance class that yields the highest inhalation DCF is assumed on a per organ basis. An exception to this assumption are nickel radionuclides, where the vapor phase lung clearance class is not considered, as vapor-phase nickel is not expected to be present in the potential DBE source terms, based on the DBEs described in *Design Basis Event Frequency and Dose Calculation for Site Recommendation* (CRWMS M&O 2000a). *Basis:* This assumption maximizes the calculated inhalation doses and is the most conservative option. No further confirmation is required. This assumption is used in Section 2.3 and Attachments IV, V, and VI.
- 3.4 It is assumed that the Deep Dose Equivalent is equal to the Effective Dose Equivalent from air submersion, and that the external dose contribution from water immersion and contaminated soil is negligible. *Basis:* This assumption implies that these doses are negligible in comparison to the combined inhalation and air submersion dose and/or the receptors at the assumed site boundary are evacuated shortly after the postulated event, thus precluding these source term pathways. This assumption has minimal impact on the calculation results and requires no further confirmation. This assumption is used in Section 2.2.
- 3.5 It is assumed that the ARF multiplied by the RF for stable metal/intact DOE SNF is equal to $8.0\text{E-}07$. *Basis:* This assumption is based on information given for SNF in the *Nuclear Fuel Cycle Facility Accident Analysis Handbook* (SAIC 1998, p. 3-9). This assumption does not require confirmation because the *Nuclear Fuel Cycle Facility Accident Analysis Handbook* has been used previously in Nuclear Regulatory Commission licensing and is considered accepted data by the potential MGR. This assumption is used in Section 5.2.
- 3.6 A leak path factor (LPF) of 1.0 is conservatively used in this calculation. *Basis:* Using an LPF of 1.0 implies taking no credit for source term reduction mechanisms such as gravitational settling or operation of the Waste Handling Building ventilation system (i.e., filtration of the source term before it is released to the environment). This is a reasonable bounding assumption and does not require further confirmation. This assumption is used in Sections 2.1.1 and 2.1.2.
- 3.7 A Damage Ratio (DR) of 1.0 is conservatively assumed for this analysis. *Basis:* A damage ratio of 1.0 is a conservatively bounding value because it assumes 100 percent of the fuel assembly is damaged. This assumption does not require further confirmation. This assumption is used in Sections 2.1.1 and 2.1.2.
- 3.8 DOE crud surface activity per MTHM is bounded by the commercial BWR surface crud activity per MTU. *Basis:* The crud surface activity is proportional to the fuel burnup. Because CSNF remains in the reactor for an extended period of time to produce heat for the electric power industry, and DOE SNF remains in the reactor for a much shorter time period to irradiate targets, the CSNF has higher burnup in

comparison to DOE SNF (Wheatley 1999, p. 2), it is expected that the CSNF would bound the crud surface activity of DOE SNF. This is a reasonable conservative assumption and does not require further confirmation. This assumption is used in Section 2.1.2.

- 3.9 The CSNF assembly uranium inventory is assumed to be equal to the assembly heavy metal inventory in the calculation of the bounding crud inventories. *Basis:* The CSNF MTU per assembly has to be equal to or less than the MTHM per assembly (MTU is a subset of MTHM). Therefore using the MTU per assembly to calculate the curie inventories per MTHM yields a result equal or greater than that if the actual MTHM per assembly values were used. This is a bounding assumption and no further confirmation is required. This assumption is used in Section 2.1.2.
- 3.10 Only one canister of a DOE SNF inventory type or one commercial SFA is involved in a potential DBE. *Basis:* While DBEs involving multiple canisters or SFAs could occur, the purpose of this calculation is to identify the radionuclides that are significant to offsite doses rather than quantifying the doses. Therefore, for the purpose of this calculation, limiting the inventories to a single canister or SFA has no impact on the results and does not require further confirmation. This assumption is used in Section 2.1.1.
- 3.11 The bounding average Co-60 crud surface activity for a typical fuel assembly is conservatively equal to half the recommended value in CRWMS M&O (1999c). *Basis:* CRWMS M&O (1999c) presents the argument that the values cited for Co-60 crud are based on Co-60 activities from fuel rods freshly discharged from the reactor. Material received at the potential MGR must be discharged from the reactor a minimum of 5 years. Thus, the surface activity should be approximately half of the cited value, based on Co-60 being the principal radionuclide in the crud and its 5.3-year half-life. The crud activity on fuel rods will be less than freshly discharged fuel rods due to the relatively short half-life of the radionuclides that contribute to the crud activity. The equation for radionuclide decay was used from the *Radiological Health Handbook* (U.S. Department of Health, Education and Welfare 1970, p.28). This assumption is reasonable and justified for use in this calculation and does not require further confirmation. This assumption is used in Attachment III.

4. USE OF COMPUTER SOFTWARE AND MODELS

4.1 SOFTWARE

Microsoft® Excel 97, a commercial off-the-shelf software, was used for the calculations documented in this analysis. Microsoft® Excel 97 was used in a Windows 95 operating system with a Pentium processor. Microsoft® Excel 97 was appropriately used as a computational tool to perform calculations of radionuclide concentrations. The formulas used in the calculation spreadsheets, which invoke a combination of built-in functions (for instance, the exponential function [EXP]) linked together with user-defined formulas to automate the calculation process. The user-defined formulas for the spreadsheets provided in Attachments III, V, and VI are

described in Section 2. The checking process provides verification that the results documented in Attachments III, V, and VI are correct for the input data contained therein. The calculations shown in the attachments to this technical product can be reproduced and checked by hand. No routines, macros, or models are used in this calculation. Therefore, Section 2.1.6 of procedure AP-SI.1Q allows software used in this technical product to be exempted from the requirements of the procedure.

4.2 EXCEL WORKBOOK OVERVIEW INFORMATION

The Excel workbook shown in Attachment III, Calculation of Crud Values, contains the following spreadsheet.

- Commercial Crud Calculations (Page III-2): Commercial crud values for 5 years decay time are listed from CRWMS M&O (1999c) with no calculations performed. Commercial crud values for 25 years decay time are calculated from the equation for radionuclide decay (U.S. Department of Health, Education and Welfare 1970, p.28). Note that the values for 5 years decay can be calculated from the same formula. DOE SNF crud values listed are from CRWMS M&O (1999b, page IX-13) with no calculations performed.

The Excel workbook shown in Attachment IV, Dose Conversion Factors, contains the following spreadsheets.

- Inhalation DCFs (Page IV-2): Values are reproduced from Eckerman et al. (1988). No calculations are performed on this spreadsheet.
- Air Submersion DCFs (Page IV-3): Values are reproduced from Eckerman and Ryman (1993). No calculations are performed on this spreadsheet.
- DOE SNF Radionuclides and Their 1st Generation Daughter Products (Page IV-4): Contains a listing of the radionuclide parent and daughter product half-lives and decay fractions. The radionuclides that meet the implicit daughter product criteria (see Section 2.3) are denoted by boldface type (i.e., Ac-227, Cs-137, Ru-106, and Sn-126).
- Total Air Submersion DCF Calculations (Page IV-5): Contains the total air submersion DCF calculations (see Section 2.3) for the radionuclides identified as having implicit daughter products. The parent DCF is added to the decay fraction of the parent radionuclide multiplied by the daughter DCF to obtain the total DCF for the parent radionuclide. The calculated total air submersion DCFs are included in the Air Submersion DCFs spreadsheet.

The Excel workbooks shown in Attachments V, DOE SNF Dose Calculations, and VI, Commercial SNF Dose Calculations, contain the following spreadsheets.

- Fuel Data (for example, Pages V-2 and VI-2): Columns 1 and 2 contain radionuclide names and material types of the radionuclides (i.e., “p”-particulate; “g”-gas; and “c”-cesium). Columns 3 through 8 contain the isotopic inventory of the DOE SNFs that are

being evaluated (Wheatley 1999), the number of canisters associated with the radionuclide inventory, and crud radionuclides (CRWMS M&O 1999d, page IX-13). An “x” in the row “evaluated fuel” denotes the specific fuel evaluated. These data are copied to the last column. Note that the number in brackets after the fuel name represents the spent fuel identification number in the DOE spent fuel database (Wheatley 1999).

- Parameters (for example, Pages V-3 and VI-3): Contains the ARF, RF, and LPF data for the DOE SNF fuel types and fuel conditions that are evaluated in this calculation. The ARF, RF, and LPF data that correspond to the fuel being evaluated are copied to the “Release Fractions Used in this Calculation” table. The spreadsheet also contains the breathing rate, ground-level dispersion factor, and Sv/Bq to rem/Ci conversion factor.
- ST Calc (for example, Pages V-4 and VI-4) – The isotopic inventory for the evaluated fuel is copied into column 2 from the Fuel Data spreadsheet. The fraction of the total fuel inventory that is involved in the DBE (*fInv*) is calculated in column 3. The ARF and RF are copied to columns 4 and 5 based on the fuel type, fuel condition, and radionuclide material type from the Parameters spreadsheet. LPF is copied to column 6. For this calculation, the LPF is always 1.0.

Equations (1) and (2) are used to calculate the source term released to the environment and the respirable source term released to the environment in columns 7 and 8. Note that a bounding DR of 1.0 is used in the source term calculation (Assumption 3.7).

- Inhalation Doses (for example, Pages V-5 and VI-5) – Inhalation doses are calculated using Equation (7) with the unfiltered respirable source term released to the environment (as calculated in ST Calc spreadsheet), the inhalation DCFs (from the Inhalation DCFs spreadsheet), and the atmospheric dispersion factor and breathing rate (from the Parameters spreadsheet).

Columns 12 and 13 show the results of the isotopic effective (TEDE) dose divided by the total TEDE dose and then the isotopic TEDE percentages sorted by contribution to total dose. Columns 14 and 15 show the results of the highest organ CDE plus DDE divided by the total highest organ CDE plus DDE, and the isotopic percentages sorted by contribution to total dose.

- Air Submersion Doses (for example, Pages V-7 and V-7) – Air submersion doses are calculated using Equation (8) with the unfiltered source term released to the environment (as calculated in ST Calc spreadsheet), the inhalation DCFs (from the Air Submersion DCFs spreadsheet), and the atmospheric dispersion factor (from the Parameters spreadsheet).

Columns 12 and 13 show the results of the isotopic skin dose divided by the total skin dose and the isotopic skin dose percentages sorted by contribution to total dose.

- Offsite Dose Results (for example, Pages V-8 and VI-8): The inhalation and air submersion doses for the gonad, breasts, lung, red marrow, bone surface, thyroid,

remainder, effective, and skin are copied from the respective inhalation and air submersion spreadsheets. The inhalation effective dose (CEDE) is added to the effective air submersion dose (DDE) to calculate the TEDE, as per Equation (9). The highest inhalation organ dose (highest CDE) is identified and the effective air submersion dose (DDE) is added to it, as per Equation (10).

- Summary of Offsite Dose (for example, Pages V-9 and VI-9): The TEDE and the highest CDE plus DDE for each radionuclide are printed.

5. CALCULATION

5.1 CALCULATION DESCRIPTION

The DOE SNF source term (per canister) and dose calculations are performed for the following six DOE SNFs. These DOE SNFs were identified by *DOE SNF Screening Dose Analysis* (CRWMS M&O 1999f, Section 6 and Attachment VI) as the bounding fuels for the six DOE SNF waste types.

- HWCTR (U/TH) (112)
- ALUM CLAD SNF (411)
- Shippingport PWR Core II (193)
- Saxton (MOX) (787)
- EBWR (U Metal) LEU (64)
- N Reactor (147).

The DOE SNF source term (per canister) and dose calculations are performed for the following five DOE SNFs that were determined to be important to radiological doses based on fuel composition. Even though these SNFs did not result in the bounding doses in the *DOE SNF Screening Dose Analysis*, they are considered important to dose calculations because of their isotopic contribution to regulatory doses.

- ATR (15)
- FSVR (85)
- Shippingport LWBR (THO2-UO2) (377)
- FFTF-TFA-FSP-1 & FSP-1R (327)
- EBR-II (U-MTL Declad) (438).

Commercial SNF source term (per SFA) and dose calculations are performed for the following commercial SNFs.

- PWR Average Fuel, 4% Enrichment, 48 GWd/MTU, 25-Yr Decay
- BWR Average Fuel, 3.5% Enrichment, 40 GWd/MTU, 25-Yr Decay
- PWR Maximum Fuel, 5% Enrichment, 75 GWd/MTU, 5-Yr Decay
- BWR Maximum Fuel, 5% Enrichment, 75 GWd/MTU, 25-Yr Decay.

These calculations are shown in Attachments V and VI. The bounding crud inventory associated with each DOE SNF fuel group (i.e., fuel matrix and fuel condition) is listed in Attachment III. The input parameters used in the calculations are given in Section 5.2.

5.2 INPUT PARAMETERS

- 5.2.1 Inhalation and air submersion DCFs are taken from Federal Guidance Report 11 (Eckerman et al. 1988, Table 2.1) and Federal Guidance Report 12 (Eckerman and Ryman 1993, Table III.1), respectively. A listing of the DCFs used in this analysis is provided in Attachment IV. The Sv/Bq to rem/Ci unit conversion factor is taken from Federal Guidance Report 11 (Eckerman et al. 1988, p. 121).
- 5.2.2 The atmospheric dispersion factors (χ/Q_s) used in this calculation were extracted from *Calculations of Acute and Chronic "Chi/Q" Dispersion Estimates for a Surface Release* (CRWMS M&O 1999a, Table 3, p. 11) for the location of the dose receptor at 11 km from any postulated DBE source term release (see Assumption 3.2). Dose calculations were produced using the interpolated maximum acute χ/Q of $2.17 \times 10^{-5} \text{ sec/m}^3$.
- 5.2.3 An adult breathing rate of $3.33\text{E-}04 \text{ m}^3/\text{s}$ is used for dose calculations. This is based on the Reference Man breathing rate established in ICRP (1975, p. 346). This breathing rate is based on the volume intake of air for light activity and is considered to be appropriate for DBE scenarios resulting in short-term (< 8-hour) exposures to the public at an assumed site boundary.
- 5.2.4 DOE SNF inventory data are provided by the National Spent Nuclear Fuel Program (DTN: MO0001SPADBE00.001). The inventory data used in this calculation is reproduced in Attachment V.
- 5.2.5 Radionuclide decay products, half-lives, and decay fractions are taken from Table A.1 of Eckerman and Ryman (1993, Table A.1, pp. 197-211).
- 5.2.6 No crud inventories were provided as part of the DOE SNF isotopic inventory. The bounding crud inventory associated with each DOE SNF fuel group (i.e., fuel matrix and fuel condition) is calculated in Attachment III and described in Section 2.1.2.
- 5.2.7 ARFs and RFs for CSNF are shown in Table 2. Basis: *Commercial SNF Accident Release Fractions* (CRWMS M&O 1999c).

Table 2. ARFs and RFs for CSNF

Material Type	Airborne Release Fraction (ARF)	Respirable Fraction (RF)	Total Release Fraction (ARF x RF)
Gas (G)	3.00E-01	1.00E+00	3.00E-01
Particulate (P)	3.00E-05	5.00E-03	1.50E-07
Cesium (C)	2.00E-04	1.00E+00	2.00E-04
Crud	1.00E+00	3.00E-01	3.00E-01

5.2.8 ARFs and RFs for DOE SNF are shown in Table 3. *Basis:* DTN: MO0001SPADBE00.001, SAIC (1998), and CRWMS M&O (1999c).

Table 3. ARFs and RFs for DOE SNF

DBE Group Fuel Matrix	DBE Group Fuel Condition	Material Type	ARF	RF	Note
Stable Metals	Intact	particulate	2.0E-04	4.0E-03	1, 2, 3
		gas	3.0E-01	1.0	
		cesium	2.0E-04	1.0	
		crud	1.0E+00	0.3	
Stable Metals	Not Intact	particulate	5.0E-03	0.4	2, 3
		gas	3.0E-01	1.0	
		cesium	5.0E-03	1.0	
		crud	1.0E+00	0.3	
Non Metals	Intact	particulate	2.25E-03	1.0	2, 3
		gas	3.0E-01	1.0	
		cesium	2.25E-03	1.0	
		crud	1.0E+00	0.3	
Non Metals	Not Intact	particulate	5.0E-03	0.4	2, 3
		gas	3.0E-01	1.0	
		cesium	5.0E-03	1.0	
		crud	1.0E+00	0.3	
Other	Intact	particulate	1.0E-03	1.0	2, 3
		gas	3.0E-01	1.0	
		cesium	1.0E-03	1.0	
		crud	1.0E+00	0.3	
Other	Not Intact	particulate	5.0E-03	0.4	2, 3, 4
		gas	3.0E-01	1.0	
		cesium	5.0E-03	1.0	
		crud	1.0E+00	0.3	

Notes:

1. The ARF and RF values for Stable Metals/Intact particulate material are taken from NUREG/CR-6410 (SAIC 1998, p. 3-9) (Assumption 3.5).
2. The ARF and RF values for gases, crud, and cesium are taken from CRWMS M&O (1999c).
3. The greater of the ARF and RF values for gases, cesium, and crud in CRWMS M&O (1999c) and the fuel group ARF and RF values in DTN: MO0001SPADBE00.001 are used for gases, cesium, and crud.
4. Since the current DOE SNF data set does not differentiate between fuel that undergoes complete oxidation or is in powder form, the bounding ARF/RF combination for the powder form (ARF x RF = 2.0E-03) is used for Other/Not Intact fuel particulate and cesium material types.

5.2.9 CSNF fuel assemblies have the following surface areas and uranium inventories. The assembly data are obtained from *PWR Source Term Generation and Evaluation* (CRWMS M&O 1999d, pp. 25 and X-1) and *BWR Source Term Generation and Evaluation* (CRWMS M&O 1999e, pp. 46 and XV-1):

Assembly Surface Area: PWR = 449,003 cm²/assembly
BWR = 168,148 cm²/assembly

Assembly Uranium Inventory: PWR = 0.475 MTU/assembly
BWR = 0.200 MTU/assembly

5.2.10 Crud inventories used for dose calculations for CSNF are calculated in Attachment III and are shown in Table 4.

Table 4. Commercial Crud Calculations

Crud Decay Time	25 Years	5 Years
Fe-55 PWR Surface Activity (uCi/cm ²)	10.34	1658
Fe-55 BWR Surface Activity (uCi/cm ²)	12.98	2083
Co-60 PWR Surface Activity (uCi/cm ²)	2.61	36.3
Co-60 BWR Surface Activity (uCi/cm ²)	23.42	324.9

6. RESULTS

6.1 DOSE CALCULATION RESULTS

The offsite dose results are calculated and shown in Attachments V and VI. Columns 1 through 3 of Table 5 list the radionuclides that contribute to 99.99% of the DOE SNF calculated offsite dose from Attachment V. Column 4 is a compilation of Columns 1 through 3. Columns 5 through 7 of Table 5 list the radionuclides that contribute to the radionuclides that contribute to 99.99% of the CSNF calculated offsite dose from Attachment VI. Column 8 is a compilation of Columns 5 through 7.

The 99.99% of the radionuclides for each fuel type evaluated that contribute to the CEDE dose (i.e., inhalation effective dose) was calculated by dividing the CEDE dose for each radionuclide by the total CEDE dose to obtain the percent of CEDE dose contributed by each radionuclide. The radionuclides and their percentages were then sorted in descending order to show the contributors of 99.99% of the total CEDE dose. The same process was used to calculate the CDE dose (i.e., maximally exposed organ dose) contributors and the skin dose contributors.

Y-90 is produced as a daughter product of Sr-90. Sr-90 and Y-90 can be significant contributors to skin dose calculations. The DCF for Y-90 for skin is greater than that for Sr-90. Therefore, as the Sr-90 decays, the Y-90 daughter product will be available for a skin dose contributor approximately equal to that of Sr-90 throughout the preclosure period of the potential repository. Sr-90 skin dose contributions from DOE SNF range from a very small percent to 6.36% from the Aluminum Clad SNF (see page V-55). Because of these decay characteristics and dose conversion factors, Y-90 has been added to the composite list of DOE radionuclides significant to offsite doses.

Radionuclides that have been identified by Nuclear Regulatory Commission as those that must be analyzed for potential accident release (NRC 1997, Table 7.1) are noted in Table 5, column 4. The radionuclides required to be analyzed by the Nuclear Regulatory Commission were already contained in the calculated list of DOE SNF radionuclides determined to be significant to offsite dose.

6.2 IMPACT OF UNCONFIRMED INPUT

This document may be affected by technical product input information that requires confirmation. Any changes to the document that may occur as a result of completing the confirmation activities will be reflected in subsequent revisions. The status of the technical product input information quality may be confirmed by review of the DIRS database.

The DOE SNF fuel information (e.g., isotopic composition, source terms, number of canisters, ARFs, RFs) may change. A change in this information will result in a change in the offsite dose and, consequently, a change in the radionuclides that contribute to 99.99% of the calculated offsite dose.

Table 5. Radionuclides Significant to Offsite Dose

(1) DOE SNF - Inhalation (CEDE)	(2) DOE SNF - Inhalation (CDE)	(3) DOE SNF - Submersion (Skin)	(4) DOE SNF - All Radionuclides	(5) CSNF - Inhalation (CEDE)	(6) CSNF - Inhalation (CDE)	(7) CSNF - Submersion (Skin)	(8) CSNF - All Radionuclides
Ac-227	Ac-227	Am-241	Ac-227	Am-241	Am-241	Co-60	Am-241
Am-241	Am-241	Co-60	Am-241	Am-242m	Am-242m	Co-60(Crud)	Am-242m
Am-242m	Am-242m	Co-60 (Crud)	Am-242m	Am-243	Am-243	Cs-134	Am-243
Am-243	Am-243	Cs-134	Am-243	Cm-243	Cm-243	Cs-137	Cm-243
Cm-243	Cm-243	Cs-137	Cm-243	Cm-244	Cm-244	Eu-154	Cm-244
Cm-244	Cm-244	Eu-154	Cm-244	Co-60	Cm-245	Kr-85	Cm-245
Co-60 (Crud)	Co-60 (crud)	Eu-155	Co-60 ⁽¹⁾	Co-60(Crud)	Cm-246	Ru-106	CM-246
Cs-134	Cs-134	Kr-85	Co-60 (Crud) ⁽¹⁾	Cs-134	Co-60(Crud)	Sb-125	Co-60
Cs-137	Cs-137	Pm-147	Cs-134 ⁽¹⁾	Cs-137	Cs-134	Sr-90	Co-60(Crud)
Eu-154	Eu-154	Ru-106	Cs-137 ⁽¹⁾	Eu-154	Cs-137		Cs-134
Fe-55 (Crud)	Fe-55 (crud)	Sr-90	Eu-154	Fe-55(Crud)	Eu-154		Cs-137
H-3	Np-237		Eu-155	H-3	Fe-55(Crud)		Eu-154
I-129	Pa-231		Fe-55 (Crud)	I-129	H-3		Fe-55(Crud)
Np-237	Pm-147		H-3 ⁽¹⁾	Pu-238	Np-237		H-3
Pa-231	Pu-238		I-129 ⁽¹⁾	Pu-239	Pm-147		I-129
Pm-147	Pu-239		Kr-85 ⁽¹⁾	Pu-240	Pu-238		Kr-85
Pu-238	Pu-240		Np-237	Pu-241	Pu-239		Np-237
Pu-239	Pu-241		Pa-231	Pu-242	Pu-240		Pm-147
Pu-240	Pu-242		Pm-147	Ru-106	Pu-241		Pu-238
Pu-241	Sr-90		Pu-238	Sr-90	Pu-242		Pu-239
Pu-242	Th-229		Pu-239		Ru-106		Pu-240
Ru-106	Th-232		Pu-240		Sr-90		Pu-241
Sr-90	U-232		Pu-241				Pu-242
Th-229	U-233		Pu-242				Ru-106
Th-232	U-234		Ru-106 ⁽¹⁾				Sb-125
U-232			Sr-90 ⁽¹⁾				Sr-90
U-233			Th-229				
U-234			Th-232				
U-236			U-232				
U-238			U-233				
			U-234				
			U-236				
			U-238				
			Y-90 ⁽²⁾				

(1) Reference: NRC 1997, Table 7.1

(2) Included because of the decay of Sr-90.

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7.2 CODES, STANDARDS, AND REGULATIONS

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7.3 SOURCE DATA, LISTED BY DATA TRACKING NUMBER

MO0001SPADBE00.001. DOE Spent Nuclear Fuel Data Contained in DBEFEB99.XLS Workbook. Submittal date: 01/04/2000.

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7.4 PROCEDURES

AP-2.21Q, Rev. 1 BSCN 1. *Quality Determinations and Planning for Scientific, Engineering, and Regulatory Compliance Activities*. ACC: MOL.20010212.0018.

AP-3.12Q, Rev. 0, ICN 4. *Calculations*. ACC: MOL.20010404.0008.

AP-3.15Q, Rev. 2 ICN 1. *Managing Technical Product Inputs*. ACC: MOL.20010405.0011.

AP-17.1Q, Rev. 2 ICN 1. *Record Source Responsibilities for Inclusionary Records*. ACC: MOL.20010724.0079.

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8. ATTACHMENTS

Attachment I	Acronyms
Attachment II	Release Fractions
Attachment III	Calculations of Crud Values
Attachment IV	Dose Conversion Factors
Attachment V	DOE SNF Dose Calculations
Attachment VI	Commercial SNF Dose Calculations

ATTACHMENT I

Acronyms

ARF	airborne release fraction
ATR	Advanced Test Reactor
BWR	boiling water reactor
CDE	committed dose equivalent
CEDE	committed effective dose equivalent
CSNF	commercial spent nuclear fuel
DCF	dose conversion factor
DIRS	Document Input Reference System
DDE	deep dose equivalent
DOE	U.S. Department of Energy
DR	damage ratio
EBR-II	Experimental Breeder Reactor-II
EBWR	Experimental Breeder Water Reactor
FFTF	Fast Flux Test Facility
FSVR	Fort St. Vrain Reactor
Gwd	gigawatt day
HEPA	high-efficiency particulate air
HWTCT	Heavy Water Component Test Reactor
LPF	leak path factor
MGR	Monitored Geologic Repository
MTHM	metric tons heavy metal
MOX	Mixed Oxide
MTU	metric tons uranium
PWR	pressurized water reactor
RF	respirable fraction
SFA	spent fuel assembly
SNF	spent nuclear fuel
TEDE	total effective dose equivalent

ATTACHMENT II

Release Fractions

DOE SNF Release Fractions

Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
Stable Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	3.00E-04
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Stable Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	3.00E-04
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Non-Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	3.00E-04
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
Non-Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	3.00E-04
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Other/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	3.00E-04
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
Other/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	3.00E-04
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Crud				
Crud	1.00E+00	3.00E-01	3.00E-01	3.00E-04

Source: Release fractions for DOE SNF are from various sources; see Section 5.2.9.

Commercial SNF Release Fractions

Material Type	Airborne Release Fraction (ARF)	Respirable Fraction (RF)	Total Release Fraction (ARF x RF)	HEPA Filter LPF
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	3.00E-05	5.00E-03	1.50E-07	3.00E-04
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Crud	1.00E+00	3.00E-01	3.00E-01	3.00E-04

Source: Release fractions for Commercial SNF are from CRWMS M&O 1999c, *Commercial SNF Accident Release Fractions*, ANL-WHS-SE-000002 REV 00.

ATTACHMENT III

Calculation of Crud Values

Commercial Crud Calculations

Crud Decay Time (years):	25	5
Fe-55 PWR Surface Activity (uCi/cm ²) =	10.34	1658
Fe-55 BWR Surface Activity (uCi/cm ²) =	12.98	2083
Co-60 PWR Surface Activity (uCi/cm ²)* =	2.61	36.3
Co-60 BWR Surface Activity (uCi/cm ²)* =	23.42	324.9

5-Year surface activities are from CRWMS M&O 1999c, Section 7.2.

25-Year surface activities are calculated as follows:

Surface Activity remaining at time $t = A_0 \text{EXP}(-\text{LN}(2) * t / T_{1/2})$

where A_0 = surface activity at time zero (i.e., discharge from reactor), t = time at calculation, and

$T_{1/2}$ = radioactive half-life of isotope (DHE&W 1970, p. 28).

*Co-60 surface activity calculation is also divided by 2 (see Assumption 3.11).

Value of Co-60 $A_0 \text{ BWR}$ = 1254 uCi/cm² (CRWMS M&O 1999c, p. 39)

Value of Co-60 $A_0 \text{ PWR}$ = 140 uCi/cm² (CRWMS M&O 1999c, p. 39)

Value of Fe-55 $A_0 \text{ PWR}$ = 5902 uCi/cm² (CRWMS M&O 1999c, p. 12)

Value of Fe-55 $A_0 \text{ BWR}$ = 7415 uCi/cm² (CRWMS M&O 1999c, p. 12)

$T_{1/2}$ = 2.73 years for Fe-55 and 5.271 years for Co-60 (Walker et al. 1989, p. 25)

t = 25 or 5 (years) for this calculation

Bounding PWR Surface Area (cm ²) =	449,003	From CRWMS M&O 1999d, p. 25, based on S. Texas SFA
Bounding BWR Surface Area (cm ²) =	168,148	From CRWMS M&O 1999e, p. 46

Crud Source (Ci/FA)	25 years	5 years
Fe-55 PWR	4.64E+00	7.45E+02
Fe-55 BWR	2.18E+00	3.50E+02
Co-60 PWR	1.17E+00	1.63E+01
Co-60 BWR	3.94E+00	5.46E+01

Crud Source Calculation Formula:

(Surface Activity (uCi/cm²) x Bounding Surface Area (cm²)) / 1,000,000 uCi/Ci

For Fe-55 PWR at 25 years: ((10.34)(449,003))/1000000 = 4.64E+00.

DOE SNF Crud Values

Matrix	Fuel Condition	Curies Co-60 per can	Curies Fe-55 per can
Non-Metals	Intact	2.68E+02	1.69E+03
Non-Metals	Not Intact	1.23E+02	7.73E+02
Other	Intact	7.70E+02	4.85E+03
Other	Not Intact	1.76E+03	1.11E+04
Stable Metals	Intact	1.56E+01	9.85E+01
Stable Metals	Not Intact	7.60E+01	4.79E+02

Reference: CRWMS M&O 1999b, page IX-13.

ATTACHMENT IV

Dose Conversion Factors

Isotopes	Inhalation DCFs [Sv/Bq]								
	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin
Ac-227	3.96E-04	6.66E-08	1.54E-03	2.57E-03	3.21E-02	3.59E-08	1.47E-03	1.81E-03	0.00E+00
Am-241	3.25E-05	2.67E-09	1.84E-05	1.74E-04	2.17E-03	1.60E-09	7.82E-05	1.20E-04	0.00E+00
Am-242m	3.21E-05	1.38E-09	4.20E-06	1.69E-04	2.12E-03	5.64E-10	7.48E-05	1.15E-04	0.00E+00
Am-243	3.26E-05	1.52E-08	1.78E-05	1.73E-04	2.17E-03	8.29E-09	7.74E-05	1.19E-04	0.00E+00
C-14	5.64E-10	5.64E-10	5.64E-10	5.64E-10	5.64E-10	5.64E-10	5.64E-10	5.64E-10	0.00E+00
Cd-113m	3.32E-08	3.32E-08	4.09E-07	3.32E-08	3.32E-08	3.32E-08	1.30E-06	4.13E-07	0.00E+00
Cl-36	5.04E-10	5.04E-10	4.56E-08	5.04E-10	5.04E-10	5.04E-10	5.36E-10	5.93E-09	0.00E+00
Cm-242	5.70E-07	9.44E-10	1.55E-05	3.90E-06	4.87E-05	9.41E-10	2.45E-06	4.67E-06	0.00E+00
Cm-243	2.07E-05	6.29E-09	1.94E-05	1.18E-04	1.47E-03	3.83E-09	5.76E-05	8.30E-05	0.00E+00
Cm-244	1.59E-05	1.04E-09	1.93E-05	9.38E-05	1.17E-03	1.01E-09	4.78E-05	6.70E-05	0.00E+00
Cm-245	3.37E-05	6.69E-09	1.80E-05	1.79E-04	2.24E-03	3.68E-09	7.96E-05	1.23E-04	0.00E+00
Cm-246	3.34E-05	4.00E-09	1.82E-05	1.78E-04	2.22E-03	2.26E-09	7.94E-05	1.22E-04	0.00E+00
Cm-247	3.07E-05	2.23E-08	1.67E-05	1.63E-04	2.04E-03	1.45E-08	7.30E-05	1.12E-04	0.00E+00
Co-60	4.76E-09	1.84E-08	3.45E-07	1.72E-08	1.35E-08	1.62E-08	3.60E-08	5.91E-08	0.00E+00
Cs-134	1.30E-08	1.08E-08	1.18E-08	1.18E-08	1.10E-08	1.11E-08	1.39E-08	1.25E-08	0.00E+00
Cs-135	1.20E-09	1.20E-09	1.41E-09	1.20E-09	1.20E-09	1.20E-09	1.20E-09	1.23E-09	0.00E+00
Cs-137	8.76E-09	7.84E-09	8.82E-09	8.30E-09	7.94E-09	7.93E-09	9.12E-09	8.63E-09	0.00E+00
Eu-154	1.17E-08	1.55E-08	7.92E-08	1.06E-07	5.23E-07	7.14E-09	1.13E-07	7.73E-08	0.00E+00
Eu-155	3.56E-10	6.14E-10	1.19E-08	1.43E-08	1.52E-07	2.40E-10	1.11E-08	1.12E-08	0.00E+00
Fe-55	5.23E-10	5.09E-10	1.06E-09	5.17E-10	5.14E-10	5.42E-10	1.21E-09	7.26E-10	0.00E+00
H-3	1.73E-11	1.73E-11	1.73E-11	1.73E-11	1.73E-11	1.73E-11	1.73E-11	1.73E-11	0.00E+00
I-129	8.69E-11	2.09E-10	3.14E-10	1.40E-10	1.38E-10	1.56E-06	1.18E-10	4.69E-08	0.00E+00
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-93m	4.16E-10	4.36E-11	6.45E-08	2.85E-10	7.43E-10	3.04E-11	3.95E-10	7.90E-09	0.00E+00
Nb-94	4.76E-09	2.24E-08	7.48E-07	2.26E-08	1.97E-08	2.22E-08	4.45E-08	1.12E-07	0.00E+00
Ni-59	3.59E-10	3.46E-10	1.20E-09	3.54E-10	3.51E-10	3.77E-10	3.63E-10	3.58E-10	0.00E+00
Ni-63	8.22E-10	8.22E-10	3.07E-09	8.22E-10	8.22E-10	8.22E-10	8.59E-10	8.39E-10	0.00E+00
Np-237	2.96E-05	1.69E-08	1.61E-05	2.62E-04	3.27E-03	1.34E-08	2.34E-05	1.46E-04	0.00E+00
Pa-231	6.90E-09	8.79E-09	7.47E-04	6.97E-04	8.70E-03	7.64E-09	2.87E-07	3.47E-04	0.00E+00
Pb-210	3.18E-07	3.18E-07	3.18E-07	3.75E-06	5.47E-05	3.18E-07	4.69E-06	3.67E-06	0.00E+00
Pb-107	9.45E-13	9.45E-13	2.85E-08	5.11E-12	1.36E-11	9.45E-13	2.15E-10	3.45E-09	0.00E+00
Pm-147	1.88E-14	3.60E-14	7.74E-08	8.16E-09	1.02E-07	1.98E-14	5.89E-09	1.06E-08	0.00E+00
Pu-238	2.80E-05	1.00E-09	3.20E-04	1.52E-04	1.90E-03	9.62E-10	7.02E-05	1.06E-04	0.00E+00
Pu-239	3.18E-05	9.22E-10	3.23E-04	1.69E-04	2.11E-03	9.03E-10	7.56E-05	1.16E-04	0.00E+00
Pu-240	3.18E-05	9.51E-10	3.23E-04	1.69E-04	2.11E-03	9.05E-10	7.56E-05	1.16E-04	0.00E+00
Pu-241	6.82E-07	3.06E-11	3.18E-06	3.36E-06	4.20E-05	1.24E-11	1.31E-06	2.23E-06	0.00E+00
Pu-242	3.02E-05	9.45E-10	3.07E-04	1.61E-04	2.01E-03	8.79E-10	7.18E-05	1.11E-04	0.00E+00
Ra-226	1.02E-07	1.02E-07	1.61E-05	6.64E-07	7.59E-06	1.02E-07	1.07E-07	2.32E-06	0.00E+00
Ra-228	1.83E-07	1.84E-07	7.22E-06	7.38E-07	6.51E-06	1.83E-07	1.87E-07	1.29E-06	0.00E+00
Ru-106	1.38E-08	1.37E-08	1.04E-06	1.37E-08	1.37E-08	1.37E-08	1.69E-08	1.29E-07	0.00E+00
Sb-125	3.60E-10	4.16E-10	2.17E-08	6.49E-10	2.73E-09	3.24E-10	1.45E-09	3.30E-09	0.00E+00
Se-79	6.79E-10	6.79E-10	9.81E-09	6.79E-10	6.79E-10	6.79E-10	4.24E-09	2.66E-09	0.00E+00
Sm-147	0.00E+00	0.00E+00	7.62E-06	2.75E-05	3.44E-04	0.00E+00	1.89E-05	2.02E-05	0.00E+00
Sm-151	4.03E-14	1.49E-13	3.26E-09	1.10E-08	1.38E-07	1.32E-14	7.51E-09	8.10E-09	0.00E+00
Sn-126	1.43E-08	1.41E-08	1.51E-07	5.62E-08	1.18E-07	1.31E-08	1.76E-08	2.69E-08	0.00E+00
Sr-90	2.64E-09	2.64E-09	2.86E-06	3.36E-07	7.27E-07	2.64E-09	5.73E-09	3.51E-07	0.00E+00
Tc-99	4.52E-11	4.52E-11	1.67E-08	4.52E-11	4.52E-11	1.21E-09	6.26E-10	2.25E-09	0.00E+00
Th-229	2.76E-06	2.76E-06	1.99E-03	1.15E-03	1.43E-02	2.76E-06	7.05E-06	5.80E-04	0.00E+00
Th-230	4.08E-07	4.08E-07	3.00E-04	1.73E-04	2.16E-03	4.08E-07	1.05E-06	8.80E-05	0.00E+00
Th-232	7.62E-07	7.72E-07	9.40E-04	8.93E-04	1.11E-02	7.44E-07	1.87E-06	4.43E-04	0.00E+00
U-232	8.00E-08	8.06E-08	1.48E-03	4.06E-06	6.42E-05	7.85E-08	3.11E-06	1.78E-04	0.00E+00
U-233	2.54E-08	2.54E-08	3.04E-04	7.12E-07	1.12E-05	2.54E-08	9.40E-07	3.66E-05	0.00E+00
U-234	2.50E-08	2.50E-08	2.98E-04	6.98E-07	1.09E-05	2.50E-08	9.26E-07	3.58E-05	0.00E+00
U-235	2.37E-08	2.38E-08	2.76E-04	6.58E-07	1.01E-05	2.37E-08	8.59E-07	3.32E-05	0.00E+00
U-236	2.37E-08	2.37E-08	2.82E-04	6.60E-07	1.04E-05	2.37E-08	8.77E-07	3.39E-05	0.00E+00
U-238	2.23E-08	2.23E-08	2.66E-04	6.58E-07	9.78E-06	2.22E-08	8.22E-07	3.20E-05	0.00E+00
Zr-93	2.18E-11	4.68E-11	8.72E-08	1.77E-07	2.18E-06	1.74E-11	1.73E-10	8.67E-08	0.00E+00
crud									
Co-60	4.76E-09	1.84E-08	3.45E-07	1.72E-08	1.35E-08	1.62E-08	3.60E-08	5.91E-08	0.00E+00
Fe-55	5.23E-10	5.09E-10	1.06E-09	5.17E-10	5.14E-10	5.42E-10	1.21E-09	7.26E-10	0.00E+00

Source: Eckerman et al. 1988

Air Submersion DCFs [Sv/Bq m ³ /s]									
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin
Ac-227	3.75E-17	4.45E-17	3.38E-17	2.94E-17	1.04E-16	3.65E-17	3.18E-17	3.74E-17	3.28E-16
Am-241	8.58E-16	1.07E-15	6.74E-16	5.21E-16	2.87E-15	7.83E-16	6.34E-16	8.18E-16	1.28E-15
Am-242m	3.80E-17	6.01E-17	1.72E-17	1.72E-17	7.94E-17	2.95E-17	1.94E-17	3.17E-17	1.36E-16
Am-243	2.19E-15	2.61E-15	1.92E-15	1.55E-15	7.47E-15	2.09E-15	1.79E-15	2.18E-15	2.75E-15
C-14	2.59E-19	3.52E-19	1.53E-19	1.21E-19	7.06E-19	2.19E-19	1.54E-19	2.24E-19	2.43E-16
Cd-113m	7.17E-18	8.76E-18	5.93E-18	5.01E-18	2.10E-17	6.76E-18	5.63E-18	6.94E-18	8.48E-15
Cl-36	2.24E-17	2.66E-17	2.02E-17	1.81E-17	5.63E-17	2.19E-17	1.92E-17	2.23E-17	1.47E-14
Cm-242	7.83E-18	1.48E-17	1.13E-18	1.89E-18	1.06E-17	4.91E-18	2.27E-18	5.69E-18	4.29E-17
Cm-243	5.77E-15	6.68E-15	5.50E-15	5.00E-15	1.50E-14	5.76E-15	5.19E-15	5.88E-15	9.79E-15
Cm-244	6.90E-18	1.33E-17	7.08E-19	1.46E-18	8.82E-18	4.19E-18	1.81E-18	4.91E-18	3.91E-17
Cm-245	3.88E-15	4.55E-15	3.63E-15	3.17E-15	1.18E-14	3.84E-15	3.40E-15	3.96E-15	5.36E-15
Cm-246	6.24E-18	1.20E-17	7.00E-19	1.35E-18	8.17E-18	3.82E-18	1.67E-18	4.46E-18	3.49E-17
Cm-247	1.47E-14	1.68E-14	1.44E-14	1.38E-14	2.83E-14	1.49E-14	1.38E-14	1.50E-14	1.79E-14
Co-60	1.23E-13	1.39E-13	1.24E-13	1.23E-13	1.78E-13	1.27E-13	1.20E-13	1.26E-13	1.45E-13
Cs-134	7.40E-14	8.43E-14	7.37E-14	7.19E-14	1.20E-13	7.57E-14	7.06E-14	7.57E-14	9.45E-14
Cs-135	6.28E-19	8.23E-19	4.19E-19	3.34E-19	1.81E-18	5.50E-19	4.09E-19	5.65E-19	9.06E-16
Cs-137	2.67E-14	3.05E-14	2.65E-14	2.58E-14	4.38E-14	2.73E-14	2.54E-14	2.73E-14	4.39E-14
Eu-154	6.00E-14	6.81E-14	5.99E-14	5.87E-14	9.43E-14	6.15E-14	5.75E-14	6.14E-14	8.29E-14
Eu-155	2.49E-15	2.95E-15	2.22E-15	1.85E-15	8.09E-15	2.41E-15	2.07E-15	2.49E-15	3.39E-15
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	0.00E+00	0.00E+00	2.75E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.31E-19	0.00E+00
I-129	4.83E-16	6.66E-16	2.14E-16	1.64E-16	1.10E-15	3.86E-16	2.30E-16	3.80E-16	1.10E-15
Kr-85	1.17E-16	1.34E-16	1.14E-16	1.09E-16	2.20E-16	1.18E-16	1.09E-16	1.19E-16	1.32E-14
Nb-93m	6.33E-18	1.31E-17	2.55E-19	1.18E-18	6.92E-18	3.43E-18	1.36E-18	4.44E-18	4.28E-17
Nb-94	7.54E-14	8.57E-14	7.51E-14	7.34E-14	1.19E-13	7.72E-14	7.19E-14	7.70E-14	9.52E-14
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Np-237	1.04E-15	1.26E-15	9.02E-16	7.69E-16	3.20E-15	9.94E-16	8.50E-16	1.03E-15	1.54E-15
Pa-231	1.71E-15	1.99E-15	1.62E-15	1.52E-15	3.64E-15	1.70E-15	1.54E-15	1.72E-15	2.44E-15
Pb-210	6.19E-17	8.18E-17	4.25E-17	3.14E-17	1.95E-16	5.42E-17	4.09E-17	5.64E-17	1.28E-16
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pm-147	7.48E-19	9.56E-19	5.45E-19	4.46E-19	2.18E-18	6.75E-19	5.26E-19	6.93E-19	8.11E-16
Pu-238	6.56E-18	1.27E-17	1.06E-18	1.68E-18	9.30E-18	4.01E-18	1.99E-18	4.88E-18	4.09E-17
Pu-239	4.84E-18	7.55E-18	2.65E-18	2.67E-18	9.47E-18	3.88E-18	2.86E-18	4.24E-18	1.86E-17
Pu-240	6.36E-18	1.23E-17	1.09E-18	1.65E-18	9.26E-18	3.92E-18	1.96E-18	4.75E-18	3.92E-17
Pu-241	7.19E-20	8.67E-20	6.48E-20	5.63E-20	2.19E-19	6.98E-20	6.09E-20	7.25E-20	1.17E-19
Pu-242	5.34E-18	1.03E-17	9.69E-19	1.43E-18	7.90E-18	3.32E-18	1.68E-18	4.01E-18	3.27E-17
Ra-226	3.08E-16	3.54E-16	2.95E-16	2.70E-16	7.95E-16	3.09E-16	2.79E-16	3.15E-16	4.79E-16
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-106	1.01E-14	1.16E-14	1.01E-14	9.75E-15	1.72E-14	1.03E-14	9.63E-15	1.04E-14	1.09E-13
Sb-125	1.98E-14	2.27E-14	1.95E-14	1.87E-14	3.53E-14	2.01E-14	1.86E-14	2.02E-14	2.65E-14
Se-79	3.47E-19	4.67E-19	2.11E-19	1.67E-19	9.60E-19	2.96E-19	2.10E-19	3.03E-19	3.71E-16
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sm-151	5.20E-20	8.80E-20	7.08E-21	1.13E-20	7.09E-20	3.58E-20	1.49E-20	3.61E-20	1.90E-19
Sn-126	7.54E-14	8.62E-14	7.48E-14	7.22E-14	1.31E-13	7.69E-14	7.14E-14	7.71E-14	1.31E-13
Sr-90	7.78E-18	9.49E-18	6.44E-18	5.44E-18	2.28E-17	7.33E-18	6.11E-18	7.53E-18	9.20E-15
Tc-99	1.74E-18	2.20E-18	1.29E-18	1.05E-18	5.17E-18	1.57E-18	1.24E-18	1.62E-18	2.74E-15
Th-229	3.77E-15	4.42E-15	3.50E-15	3.03E-15	1.15E-14	3.70E-15	3.27E-15	3.83E-15	5.41E-15
Th-230	1.80E-17	2.38E-17	1.43E-17	1.22E-17	5.29E-17	1.63E-17	1.37E-17	1.74E-17	4.51E-17
Th-232	9.34E-18	1.36E-17	6.37E-18	5.52E-18	2.60E-17	7.90E-18	6.34E-18	8.72E-18	3.44E-17
U-232	1.55E-17	2.32E-17	9.84E-18	8.99E-18	3.86E-17	1.29E-17	1.00E-17	1.42E-17	5.92E-17
U-233	1.69E-17	2.22E-17	1.35E-17	1.24E-17	4.12E-17	1.55E-17	1.31E-17	1.63E-17	4.57E-17
U-234	8.79E-18	1.44E-17	4.38E-18	4.20E-18	1.99E-17	6.69E-18	4.80E-18	7.63E-18	4.25E-17
U-235	7.05E-15	8.11E-15	6.75E-15	6.15E-15	1.84E-14	7.05E-15	6.37E-15	7.20E-15	8.64E-15
U-236	6.10E-18	1.10E-17	2.18E-18	2.33E-18	1.19E-17	4.19E-18	2.70E-18	5.01E-18	3.57E-17
U-238	4.39E-18	8.54E-18	9.96E-19	1.24E-18	7.40E-18	2.72E-18	1.51E-18	3.41E-18	2.91E-17
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
crud									
Co-60	1.23E-13	1.39E-13	1.24E-13	1.23E-13	1.78E-13	1.27E-13	1.20E-13	1.26E-13	1.45E-13
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Source: Eckerman and Ryman 1993

DOE SNF Radionuclides and Their 1st Generation Daughter Products

parent isotope	parent's half-life	daughter product	decay fraction (f)	daughter's half-life	daughter product	decay fraction (f)	daughter's half-life
Ac-227	21.773y	Fr-223	1.380E-02	21.8m	Th-227	9.862E-01	18.718d
Am-241	432.2y	Np-237	1.000E+00	87.74y			
Am-242m	152y	Np-238	4.800E-03	2.117d	Am-242	9.952E-01	16.02h
Am-243	7380y	Np-239	1.000E+00	2.355d			
C-14		none					
Cd-113m		none					
Cl-36		none					
Cm-242	162.8d	Pu-238	1.000E+00	87.74y			
Cm-243	28.5y	Pu-239	9.980E-01	24065y	Am-243	2.400E-03	7380y
Cm-244	19.4m	Pu-240	1.000E+00	6537y			
Cm-245	8500y	Pu-241	1.000E+00	14.4y			
Cm-246	4730y	Pu-242	1.000E+00	3.763E+5y			
Cm-247	1.56E+07	Pu-243	1.000E+00	4.956h			
Co-60		none					
Cs-134		none					
Cs-135		none					
Cs-137	30.0y	Ba-137m	9.460E-01	2.522m			
Eu-154		none					
Eu-155		none					
Fe-55		none					
H-3		none					
I-129		none					
Kr-85		none					
Nb-93m		none					
Nb-94		none					
Ni-59		none					
Ni-63		none					
Np-237	2.14E+6y	Pa-233	1.000E+00	27.0d			
Pa-231	32760	Ac-227	1.000E+00	21.773y			
Pb-210	22.3y	Bi-210	1.000E+00	5.012d			
Pd-107		none					
Pm-147	2.623E+4y	Sm-147	1.000E+00	1.06e+11y			
Pu-238	87.7y	U-234	1.000E+00	2.445e+5y			
Pu-239	24065y	U-235	1.000E+00	703.8e+6y			
Pu-240	6537y	U-236	1.000E+00	2.3415e+7y			
Pu-241	14.4y	U-237	2.450E-05	6.75d	Am-241	1.000E+00	432.2y
Pu-242	3.763e+5y	U-238	1.000E+00	4.468e+9y			
Ra-226	1600y	Rn-222	1.000E+00	3.8235d			
Ra-228	5.75y	Ac-228	1.000E+00	6.13h			
Ru-106	3.682d	Rh-106	1.000E+00	29.9s			
Sb-125	2.77y	Te-125m	2.280E-01	58d			
Se-79		none					
Sm-147		none					
Sm-151		none					
Sn-126	1.0e+5y	Sb-126m	1.000E+00	19.0m			
Sr-90	29.12y	Y-90	1.000E+00	64.0h			
Tc-99		none					
Th-229	7340y	Ra-225	1.000E+00	14.8d			
Th-230	7.7e+4y	Ra-226	1.000E+00	1600y			
Th-232	1.405e+10y	Ra-228	1.000E+00	5.75y			
U-232	72y	Th-228	1.000E+00	1.9131y			
U-233	1.585e+5y	Th-229	1.000E+00	7340y			
U-234	2.445e+5y	Th-230	1.000E+00	7.7e+4y			
U-235	703.8e+6y	Th-231	1.000E+00	25.5h			
U-236	2.3415e+y	Th-232	1.000E+00	1.405e+10y			
U-238	4.468e+9y	Th-234	1.000E+00	24.1d			
Zr-93	1.53e+6y	Nb-93m	1.000E+00	13.6y			

Total Air Submersion DCF Calculations

Radionuclide	Parent Radionuclide	Daughter Radionuclide	Decay Fraction
	Ac-227	Fr-223	1.380E-02
	Air Submersion DCF	Air Submersion DCF	Total Air Submersion DCF
gonad	5.78E-18	2.30E-15	3.75E-17
breast	6.98E-18	2.72E-15	4.45E-17
lung	5.22E-18	2.07E-15	3.38E-17
red marrow	4.59E-18	1.80E-15	2.94E-17
bone surface	1.68E-17	6.29E-15	1.04E-16
thyroid	5.60E-18	2.24E-15	3.65E-17
remainder	4.92E-18	1.95E-15	3.18E-17
effective	5.82E-18	2.29E-15	3.74E-17
skin	1.10E-17	2.30E-14	3.28E-16

Radionuclide	Parent Radionuclide	Daughter Radionuclide	Decay Fraction
	Cs-137	Ba-137m	9.460E-01
	Air Submersion DCF	Air Submersion DCF	Total Effective Air Submersion DCF
gonad	7.96E-18	2.82E-14	2.67E-14
breast	9.67E-18	3.22E-14	3.05E-14
lung	6.68E-18	2.80E-14	2.65E-14
red marrow	5.40E-18	2.73E-14	2.58E-14
bone surface	2.29E-17	4.63E-14	4.38E-14
thyroid	7.55E-18	2.88E-14	2.73E-14
remainder	6.34E-18	2.68E-14	2.54E-14
effective	7.74E-18	2.88E-14	2.73E-14
skin	8.63E-15	3.73E-14	4.39E-14

Radionuclide	Parent Radionuclide	Daughter Radionuclide	Decay Fraction
	Ru-106	Rh-106	1.00E+00
	Air Submersion DCF	Air Submersion DCF	Total Effective Air Submersion DCF
gonad	0.00E+00	1.01E-14	1.01E-14
breast	0.00E+00	1.16E-14	1.16E-14
lung	0.00E+00	1.01E-14	1.01E-14
red marrow	0.00E+00	9.75E-15	9.75E-15
bone surface	0.00E+00	1.72E-14	1.72E-14
thyroid	0.00E+00	1.03E-14	1.03E-14
remainder	0.00E+00	9.63E-15	9.63E-15
effective	0.00E+00	1.04E-14	1.04E-14
skin	0.00E+00	1.09E-13	1.09E-13

Radionuclide	Parent Radionuclide	Daughter Radionuclide	Decay Fraction
	Sn-126	0	1.000E+00
	Air Submersion DCF	Air Submersion DCF	Total Effective Air Submersion DCF
gonad	2.13E-15	7.33E-14	7.54E-14
breast	2.55E-15	8.36E-14	8.62E-14
lung	1.85E-15	7.29E-14	7.48E-14
red marrow	1.53E-15	7.07E-14	7.22E-14
bone surface	6.94E-15	1.24E-14	1.93E-14
thyroid	2.03E-15	7.49E-14	7.69E-14
remainder	1.73E-15	6.97E-14	7.14E-14
effective	2.11E-15	7.50E-14	7.71E-14
skin	6.65E-15	1.24E-13	1.31E-13

Total DCF = Parent DCF + (Decay Fraction x Daughter DCF)

Reference: Eckerman and Ryman 1993, Table A.1.

ATTACHMENT V

DOE SNF Dose Calculations

	evaluated fuel	x					evaluated fuel
Isotope	Fuel Type	Stable Metal	Non-Metal	Non-Metal	Other	Other	Stable Metal
	Condition	Intact	Intact	Not Intact	Intact	Not Intact	Intact
	Fuel Name (Ci)	ATR [15]	FSVR [85]	SHIPPINGPORT LWBR (THO2-UO2) [377]	FFTF-TFA-FSP-1 & FSP-1R [327]	EBR-II (U-MTL DE- CLAD) [438]	ATR [15]
	# of canisters	56.40	148.80	2.00	2.00	1.77	56.4
	Material Type						Curies
Ac-227	P	6.06E-05	0.00E+00	4.95E-01	1.85E-08	1.37E-04	6.06E-05
Am-241	P	1.92E+02	5.94E+02	1.38E+00	3.45E+03	1.23E+04	1.92E+02
Am-242m	P	1.95E-01	7.98E-02	1.03E-02	6.38E+00	4.73E+00	1.95E-01
Am-243	P	1.02E-01	4.33E+00	2.09E-03	4.90E-01	1.17E+01	1.02E-01
C-14	P	1.60E-05	3.82E+01	5.82E-01	4.59E-03	5.72E-03	1.60E-05
Cd-113m	P	4.00E+01	0.00E+00	8.02E-01	0.00E+00	3.53E+02	4.00E+01
Cl-36	P	0.00E+00	4.51E-01	1.22E-02	8.54E-05	0.00E+00	0.00E+00
Cm-242	P	1.61E-01	1.64E+01	8.48E-03	0.00E+00	3.90E+00	1.61E-01
Cm-243	P	3.40E-02	4.36E-01	2.46E-03	0.00E+00	1.61E+00	3.40E-02
Cm-244	P	1.95E+00	1.98E+02	1.26E-01	4.43E+01	2.08E+02	1.95E+00
Cm-245	P	9.91E-05	3.92E-02	4.68E-05	8.47E-03	6.49E-03	9.91E-05
Cm-246	P	2.67E-06	1.12E-02	3.10E-06	1.44E-03	4.79E-04	2.67E-06
Cm-247	P	0.00E+00	3.31E-08	1.10E-11	0.00E+00	0.00E+00	0.00E+00
Co-60	P	5.66E-09	0.00E+00	1.44E+01	1.29E+02	8.84E-07	5.66E-09
Cs-134	C	1.35E+04	1.11E+03	2.10E+00	4.22E+01	9.99E+04	1.35E+04
Cs-135	C	2.66E+00	2.32E+00	1.93E-01	9.38E-03	6.05E+00	2.66E+00
Cs-137	C	5.56E+05	5.82E+05	1.18E+04	4.75E+04	4.19E+06	5.56E+05
Eu-154	P	5.44E+03	0.00E+00	1.05E+02	0.00E+00	4.43E+04	5.44E+03
Eu-155	P	1.35E+03	0.00E+00	1.25E+01	0.00E+00	1.37E+04	1.35E+03
Fe-55	P	0.00E+00	0.00E+00	9.77E-02	0.00E+00	0.00E+00	0.00E+00
H-3	G	5.49E-01	1.07E+03	2.17E+01	5.93E+01	1.27E+04	5.49E-01
I-129	G	1.67E-01	3.53E-01	1.07E-02	9.92E-04	1.24E+00	1.67E-01
Kr-85	G	4.26E+04	3.87E+04	6.82E+02	5.90E+02	3.14E+05	4.26E+04
Nb-93m	P	3.35E+00	1.92E-06	4.17E-01	8.17E-02	2.42E+01	3.35E+00
Nb-94	P	2.80E-04	0.00E+00	1.51E-02	1.55E-04	2.42E-03	2.80E-04
Ni-59	P	0.00E+00	3.14E+00	4.17E-02	1.67E-02	0.00E+00	0.00E+00
Ni-63	P	2.66E-20	7.95E+01	4.71E+00	8.11E+01	0.00E+00	2.66E-20
Np-237	P	1.11E+00	2.53E+00	8.38E-04	3.43E-02	5.83E+00	1.11E+00
Pa-231	P	3.93E-04	3.31E+00	8.09E-01	3.75E-07	9.15E-04	3.93E-04
Pb-210	P	3.83E-09	4.77E-04	7.87E-05	1.57E-09	7.03E-09	3.83E-09
Pd-107	P	7.83E-02	1.43E-01	2.32E-03	2.79E-03	1.15E+00	7.83E-02
Pm-147	P	1.51E+05	0.00E+00	1.26E+01	0.00E+00	1.20E+06	1.51E+05
Pu-238	P	1.92E+03	1.34E+04	1.30E+01	6.22E+02	1.07E+04	1.92E+03
Pu-239	P	1.50E+02	3.50E+01	7.92E-01	2.59E+03	7.27E+03	1.50E+02
Pu-240	P	6.04E+01	6.23E+01	4.65E-01	2.24E+03	5.21E+03	6.04E+01
Pu-241	P	9.13E+03	0.00E+00	6.04E+01	5.09E+04	5.96E+05	9.13E+03
Pu-242	P	3.59E-02	0.00E+00	1.17E-03	5.40E-02	5.07E+00	3.59E-02
Ra-226	P	3.80E-08	5.01E-04	7.59E-05	3.54E-08	7.45E-08	3.80E-08
Ra-228	P	7.59E-10	1.13E+00	3.01E-02	1.67E-09	4.11E-09	7.59E-10
Ru-106	P	1.16E+03	4.42E-01	4.50E-05	1.65E-01	1.45E+04	1.16E+03
Sb-125	P	2.61E+03	2.10E+02	3.38E+00	0.00E+00	0.00E+00	2.61E+03
Se-79	P	4.54E+00	4.86E+00	2.38E-01	1.02E-02	3.38E+01	4.54E+00
Sm-147	P	5.42E-05	1.11E+00	8.54E-07	0.00E+00	4.04E-04	5.42E-05
Sm-151	P	4.68E+03	9.16E+03	7.73E+01	2.23E+03	1.30E+04	4.68E+03
Sn-126	P	1.49E+00	1.99E+00	2.68E-01	1.32E-02	1.33E+01	1.49E+00
Sr-90	P	5.45E+05	5.52E+05	1.20E+04	1.76E+04	3.98E+06	5.45E+05
Tc-99	P	9.41E+01	1.23E+02	2.19E+00	3.54E-01	7.04E+02	9.41E+01
Th-229	P	2.17E-07	2.73E+00	1.10E+00	5.15E-09	3.95E-07	2.17E-07
Th-230	P	1.78E-05	2.09E-01	2.82E-02	7.72E-06	3.88E-05	1.78E-05
Th-232	P	1.76E-09	9.05E-01	1.34E-01	4.25E-10	9.69E-09	1.76E-09
U-232	P	2.05E-02	4.92E+02	1.17E+03	0.00E+00	5.41E-02	2.05E-02
U-233	P	2.61E-04	1.20E+03	3.62E+02	3.63E-06	5.73E-04	2.61E-04
U-234	P	2.14E-01	9.43E+01	2.36E+01	5.31E-02	5.72E-01	2.14E-01
U-235	P	1.72E+00	3.44E-01	1.76E-03	8.42E-04	4.14E+00	1.72E+00
U-236	P	3.43E+00	3.43E+00	3.82E-03	2.08E-02	1.93E+01	3.43E+00
U-238	P	2.52E-02	8.94E-03	5.09E-05	7.56E-03	5.09E+00	2.52E-02
Zr-93	P	9.27E+00	1.97E+02	5.57E-01	4.79E-02	6.81E+01	9.27E+00
Crud (per canister)							
Co-60(crud)	P	1.56E+01	2.68E+02	1.23E+02	7.70E+02	1.76E+03	1.56E+01
Fe-55(crud)	P	9.85E+01	1.69E+03	7.73E+02	4.85E+03	1.11E+04	9.85E+01

DOE SNF Release Fractions				
Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
Stable Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Stable Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Non-Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
Non-Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Other/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
Other/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud				
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
<u>Evaluated Fuel:</u>				
ATR [15]				
Stable Metal				
Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
breathing rate	3.33E-04	[m^3/s]		
ground level dispersion factor				
distance [m]	x/Q [sec/m^3]			
11000	2.17E-05	Maximum Sector Acute (99.5%)		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
ATR [15]							
Stable Metal	Intact						
Isotope	Curies (entire fuel inventory)	flnv = 1/(# of Canisters)	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	6.06E-05	1.77E-02	2.00E-04	4.00E-03	1.00E+00	2.15E-10	8.59E-13
Am-241	1.92E+02	1.77E-02	2.00E-04	4.00E-03	1.00E+00	6.79E-04	2.72E-06
Am-242m	1.95E-01	1.77E-02	2.00E-04	4.00E-03	1.00E+00	6.92E-07	2.77E-09
Am-243	1.02E-01	1.77E-02	2.00E-04	4.00E-03	1.00E+00	3.60E-07	1.44E-09
C-14	1.60E-05	1.77E-02	2.00E-04	4.00E-03	1.00E+00	5.69E-11	2.27E-13
Cd-113m	4.00E+01	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.42E-04	5.68E-07
Cl-36	0.00E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	0.00E+00	0.00E+00
Cm-242	1.61E-01	1.77E-02	2.00E-04	4.00E-03	1.00E+00	5.72E-07	2.29E-09
Cm-243	3.40E-02	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.21E-07	4.82E-10
Cm-244	1.95E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	6.92E-06	2.77E-08
Cm-245	9.91E-05	1.77E-02	2.00E-04	4.00E-03	1.00E+00	3.51E-10	1.41E-12
Cm-246	2.67E-06	1.77E-02	2.00E-04	4.00E-03	1.00E+00	9.49E-12	3.79E-14
Cm-247	0.00E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	0.00E+00	0.00E+00
Co-60	5.66E-09	1.77E-02	2.00E-04	4.00E-03	1.00E+00	2.01E-14	8.03E-17
Cs-134	1.35E+04	1.77E-02	2.00E-04	1.00E+00	1.00E+00	4.77E-02	4.77E-02
Cs-135	2.66E+00	1.77E-02	2.00E-04	1.00E+00	1.00E+00	9.42E-06	9.42E-06
Cs-137	5.56E+05	1.77E-02	2.00E-04	1.00E+00	1.00E+00	1.97E+00	1.97E+00
Eu-154	5.44E+03	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.93E-02	7.71E-05
Eu-155	1.35E+03	1.77E-02	2.00E-04	4.00E-03	1.00E+00	4.80E-03	1.92E-05
Fe-55	0.00E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	0.00E+00	0.00E+00
H-3	5.49E-01	1.77E-02	3.00E-01	1.00E+00	1.00E+00	2.92E-03	2.92E-03
I-129	1.67E-01	1.77E-02	3.00E-01	1.00E+00	1.00E+00	8.90E-04	8.90E-04
Kr-85	4.26E+04	1.77E-02	3.00E-01	1.00E+00	1.00E+00	2.27E+02	2.27E+02
Nb-93m	3.35E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.19E-05	4.75E-08
Nb-94	2.80E-04	1.77E-02	2.00E-04	4.00E-03	1.00E+00	9.91E-10	3.97E-12
Ni-59	0.00E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	0.00E+00	0.00E+00
Ni-63	2.66E-20	1.77E-02	2.00E-04	4.00E-03	1.00E+00	9.42E-26	3.77E-28
Np-237	1.11E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	3.93E-06	1.57E-08
Pa-231	3.93E-04	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.40E-09	5.58E-12
Pb-210	3.83E-09	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.36E-14	5.43E-17
Pd-107	7.83E-02	1.77E-02	2.00E-04	4.00E-03	1.00E+00	2.78E-07	1.11E-09
Pm-147	1.51E+05	1.77E-02	2.00E-04	4.00E-03	1.00E+00	5.37E-01	2.15E-03
Pu-238	1.92E+03	1.77E-02	2.00E-04	4.00E-03	1.00E+00	6.79E-03	2.72E-05
Pu-239	1.50E+02	1.77E-02	2.00E-04	4.00E-03	1.00E+00	5.33E-04	2.13E-06
Pu-240	6.04E+01	1.77E-02	2.00E-04	4.00E-03	1.00E+00	2.14E-04	8.57E-07
Pu-241	9.13E+03	1.77E-02	2.00E-04	4.00E-03	1.00E+00	3.24E-02	1.29E-04
Pu-242	3.59E-02	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.27E-07	5.09E-10
Ra-226	3.80E-08	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.35E-13	5.39E-16
Ra-228	7.59E-10	1.77E-02	2.00E-04	4.00E-03	1.00E+00	2.69E-15	1.08E-17
Ru-106	1.16E+03	1.77E-02	2.00E-04	4.00E-03	1.00E+00	4.11E-03	1.64E-05
Sb-125	2.61E+03	1.77E-02	2.00E-04	4.00E-03	1.00E+00	9.24E-03	3.70E-05
Se-79	4.54E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.61E-05	6.44E-08
Sm-147	5.42E-05	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.92E-10	7.69E-13
Sm-151	4.68E+03	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.66E-02	6.63E-05
Sn-126	1.49E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	5.30E-06	2.12E-08
Sr-90	5.45E+05	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.93E+00	7.74E-03
Tc-99	9.41E+01	1.77E-02	2.00E-04	4.00E-03	1.00E+00	3.34E-04	1.33E-06
Th-229	2.17E-07	1.77E-02	2.00E-04	4.00E-03	1.00E+00	7.71E-13	3.08E-15
Th-230	1.78E-05	1.77E-02	2.00E-04	4.00E-03	1.00E+00	6.30E-11	2.52E-13
Th-232	1.76E-09	1.77E-02	2.00E-04	4.00E-03	1.00E+00	6.24E-15	2.50E-17
U-232	2.05E-02	1.77E-02	2.00E-04	4.00E-03	1.00E+00	7.28E-08	2.91E-10
U-233	2.61E-04	1.77E-02	2.00E-04	4.00E-03	1.00E+00	9.24E-10	3.70E-12
U-234	2.14E-01	1.77E-02	2.00E-04	4.00E-03	1.00E+00	7.59E-07	3.04E-09
U-235	1.72E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	6.09E-06	2.44E-08
U-236	3.43E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	1.22E-05	4.87E-08
U-238	2.52E-02	1.77E-02	2.00E-04	4.00E-03	1.00E+00	8.93E-08	3.57E-10
Zr-93	9.27E+00	1.77E-02	2.00E-04	4.00E-03	1.00E+00	3.29E-05	1.31E-07
crud (per canister)							
Co-60(crud)	1.56E+01	1.00E+00	1.00E+00	3.00E-01	1.00E+00	1.56E+01	4.68E+00
Fe-55(crud)	9.85E+01	1.00E+00	1.00E+00	3.00E-01	1.00E+00	9.85E+01	2.96E+01

ATR [15]														
Stable Metal	Intact													
	Inhalation Dose [rem]									Isotope Percentage of Dose				
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Lung)	
Ac-227	9.10E-12	1.53E-15	3.54E-11	5.90E-11	7.37E-10	8.25E-16	3.38E-11	4.16E-11	0.00E+00	Co-60(crud)	85.82%	Co-60(crud)	95.18%	
Am-241	2.36E-06	1.94E-10	1.34E-06	1.26E-05	1.58E-04	1.16E-10	5.68E-06	8.72E-06	0.00E+00	Fe-55(crud)	6.66%	Fe-55(crud)	1.85%	
Am-242m	2.37E-09	1.02E-13	3.11E-10	1.25E-08	1.57E-07	4.17E-14	5.53E-09	8.50E-09	0.00E+00	Cs-137	5.28%	Sr-90	1.30%	
Am-243	1.26E-09	5.86E-13	6.86E-10	6.67E-09	8.36E-08	3.20E-13	2.98E-09	4.59E-09	0.00E+00	Pu-238	0.89%	Cs-137	1.02%	
C-14	3.43E-18	3.43E-18	3.43E-18	3.43E-18	3.43E-18	3.43E-18	3.43E-18	3.43E-18	0.00E+00	Sr-90	0.84%	Pu-238	0.51%	
Cd-113m	5.04E-10	5.04E-10	6.21E-09	5.04E-10	5.04E-10	5.04E-10	1.97E-08	6.27E-09	0.00E+00	Cs-134	0.19%	Pu-239	0.04%	
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-241	0.10%	Cs-134	0.03%	
Cm-242	3.48E-11	5.77E-14	9.47E-10	2.38E-10	2.98E-09	5.75E-14	1.50E-10	2.85E-10	0.00E+00	Pu-241	0.09%	Pu-241	0.02%	
Cm-243	2.67E-10	8.11E-14	2.50E-10	1.52E-09	1.90E-08	4.94E-14	7.43E-10	1.07E-09	0.00E+00	Pu-239	0.08%	Pu-240	0.02%	
Cm-244	1.18E-08	7.69E-13	1.43E-08	6.94E-08	8.65E-07	7.47E-13	3.54E-08	4.95E-08	0.00E+00	Pu-240	0.03%	Pm-147	0.01%	
Cm-245	1.27E-12	2.51E-16	6.76E-13	6.72E-12	8.41E-11	1.38E-16	2.99E-12	4.62E-12	0.00E+00	I-129	0.01%	Am-241	0.00%	
Cm-246	3.39E-14	4.06E-18	1.85E-14	1.81E-13	2.25E-12	2.29E-18	8.05E-14	1.24E-13	0.00E+00	Pm-147	0.01%	Ru-106	0.00%	
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Eu-154	0.00%	U-236	0.00%	
Co-60	1.02E-20	3.95E-20	7.41E-19	3.69E-20	2.90E-20	3.48E-20	7.73E-20	1.27E-19	0.00E+00	Np-237	0.00%	U-235	0.00%	
Cs-134	1.66E-05	1.38E-05	1.51E-05	1.51E-05	1.40E-05	1.42E-05	1.77E-05	1.60E-05	0.00E+00	Ru-106	0.00%	Eu-154	0.00%	
Cs-135	3.02E-10	3.02E-10	3.55E-10	3.02E-10	3.02E-10	3.02E-10	3.02E-10	3.10E-10	0.00E+00	Cm-244	0.00%	U-234	0.00%	
Cs-137	4.62E-04	4.13E-04	4.65E-04	4.37E-04	4.18E-04	4.18E-04	4.80E-04	4.55E-04	0.00E+00	U-236	0.00%	Sb-125	0.00%	
Eu-154	2.41E-08	3.20E-08	1.63E-07	2.19E-07	1.08E-06	1.47E-08	2.33E-07	1.59E-07	0.00E+00	U-235	0.00%	Cm-244	0.00%	
Eu-155	1.83E-10	3.15E-10	6.11E-09	7.34E-09	7.80E-08	1.23E-10	5.70E-09	5.75E-09	0.00E+00	Sm-151	0.00%	U-232	0.00%	
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-242m	0.00%	I-129	0.00%	
H-3	1.35E-09	1.35E-09	1.35E-09	1.35E-09	1.35E-09	1.35E-09	1.35E-09	1.35E-09	0.00E+00	Cd-113m	0.00%	Np-237	0.00%	
I-129	2.07E-09	4.98E-09	7.48E-09	3.33E-09	3.29E-09	3.71E-05	2.81E-09	1.12E-06	0.00E+00	Eu-155	0.00%	Cd-113m	0.00%	
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-243	0.00%	Eu-155	0.00%	
Nb-93m	5.28E-13	5.54E-14	8.19E-11	3.62E-13	9.43E-13	3.86E-14	5.02E-13	1.00E-11	0.00E+00	Sb-125	0.00%	Sm-151	0.00%	
Nb-94	5.05E-16	2.37E-15	7.93E-14	2.40E-15	2.09E-15	2.35E-15	4.72E-15	1.19E-14	0.00E+00	U-234	0.00%	Pu-242	0.00%	
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-242	0.00%	U-238	0.00%	
Ni-63	8.28E-33	8.28E-33	3.09E-32	8.28E-33	8.28E-33	8.28E-33	8.66E-33	8.46E-33	0.00E+00	U-232	0.00%	H-3	0.00%	
Np-237	1.25E-08	7.11E-12	6.78E-09	1.10E-07	1.38E-06	5.64E-12	9.85E-09	6.14E-08	0.00E+00	H-3	0.00%	Cm-242	0.00%	
Pa-231	1.03E-15	1.31E-15	1.11E-10	1.04E-10	1.30E-09	1.14E-15	4.28E-14	5.18E-11	0.00E+00	Cm-243	0.00%	Am-243	0.00%	
Pb-210	4.62E-19	4.62E-19	4.62E-19	5.45E-18	7.95E-17	4.62E-19	6.81E-18	5.33E-18	0.00E+00	Cs-135	0.00%	Tc-99	0.00%	
Pd-107	2.81E-17	2.81E-17	8.47E-13	1.52E-16	4.04E-16	2.81E-17	6.39E-15	1.03E-13	0.00E+00	U-238	0.00%	Cs-135	0.00%	
Pm-147	1.08E-12	2.07E-12	4.44E-06	4.68E-07	5.85E-06	1.14E-12	3.38E-07	6.08E-07	0.00E+00	Zr-93	0.00%	Am-242m	0.00%	
Pu-238	2.03E-05	7.26E-10	2.32E-04	1.10E-04	1.38E-03	6.99E-10	5.10E-05	7.70E-05	0.00E+00	Cm-242	0.00%	Zr-93	0.00%	
Pu-239	1.81E-06	5.26E-11	1.84E-05	9.63E-06	1.20E-04	5.15E-11	4.31E-06	6.61E-06	0.00E+00	Tc-99	0.00%	Cm-243	0.00%	
Pu-240	7.28E-07	2.18E-11	7.40E-06	3.87E-06	4.83E-05	2.07E-11	1.73E-06	2.66E-06	0.00E+00	Pa-231	0.00%	Pa-231	0.00%	
Pu-241	2.36E-06	1.06E-10	1.10E-05	1.16E-05	1.45E-04	4.29E-11	4.54E-06	7.72E-06	0.00E+00	Ac-227	0.00%	Sn-126	0.00%	
Pu-242	4.11E-10	1.29E-14	4.18E-09	2.19E-09	2.74E-08	1.20E-14	9.77E-10	1.51E-09	0.00E+00	Sn-126	0.00%	Nb-93m	0.00%	
Ra-226	1.47E-18	1.47E-18	2.32E-16	9.56E-18	1.09E-16	1.47E-18	1.54E-18	3.34E-17	0.00E+00	Nb-93m	0.00%	Ac-227	0.00%	
Ra-228	5.27E-20	5.30E-20	2.08E-18	2.13E-19	1.87E-18	5.27E-20	5.38E-20	3.71E-19	0.00E+00	Cm-245	0.00%	U-233	0.00%	
Ru-106	6.07E-09	6.03E-09	4.57E-07	6.03E-09	6.03E-09	6.03E-09	7.43E-09	5.67E-08	0.00E+00	Se-79	0.00%	Se-79	0.00%	
Sb-125	3.56E-10	4.11E-10	2.14E-08	6.41E-10	2.70E-09	3.20E-10	1.43E-09	3.26E-09	0.00E+00	U-233	0.00%	Th-230	0.00%	
Se-79	1.17E-12	1.17E-12	1.69E-11	1.17E-12	1.17E-12	1.17E-12	7.30E-12	4.58E-12	0.00E+00	Th-230	0.00%	Pd-107	0.00%	
Sm-147	0.00E+00	0.00E+00	1.57E-13	5.65E-13	7.07E-12	0.00E+00	3.88E-13	4.15E-13	0.00E+00	Sm-147	0.00%	Cm-245	0.00%	
Sm-151	7.15E-14	2.64E-13	5.78E-09	1.95E-08	2.45E-07	2.34E-14	1.33E-08	1.44E-08	0.00E+00	Cm-246	0.00%	Th-229	0.00%	
Sn-126	8.10E-12	7.99E-12	8.56E-11	3.19E-11	6.69E-11	7.42E-12	9.98E-12	1.53E-11	0.00E+00	Pd-107	0.00%	Sm-147	0.00%	

ATR [15]													
Stable Metal	Intact												
Inhalation Dose [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Lung)
Sr-90	5.46E-07	5.46E-07	5.91E-04	6.95E-05	1.50E-04	5.46E-07	1.19E-06	7.26E-05	0.00E+00	Th-229	0.00%	Nb-94	0.00%
Tc-99	1.61E-12	1.61E-12	5.96E-10	1.61E-12	1.61E-12	4.32E-11	2.23E-11	8.03E-11	0.00E+00	Nb-94	0.00%	Cm-246	0.00%
Th-229	2.28E-16	2.28E-16	1.64E-13	9.48E-14	1.18E-12	2.28E-16	5.81E-16	4.78E-14	0.00E+00	Th-232	0.00%	Th-232	0.00%
Th-230	2.75E-15	2.75E-15	2.02E-12	1.17E-12	1.46E-11	2.75E-15	7.08E-15	5.93E-13	0.00E+00	Ra-226	0.00%	Ra-226	0.00%
Th-232	5.09E-19	5.15E-19	6.27E-16	5.96E-16	7.41E-15	4.97E-19	1.25E-18	2.96E-16	0.00E+00	Pb-210	0.00%	C-14	0.00%
U-232	6.23E-13	6.28E-13	1.15E-08	3.16E-11	5.00E-10	6.11E-13	2.42E-11	1.39E-09	0.00E+00	C-14	0.00%	Ra-228	0.00%
U-233	2.51E-15	2.51E-15	3.00E-11	7.04E-14	1.11E-12	2.51E-15	9.29E-14	3.62E-12	0.00E+00	Ra-228	0.00%	Co-60	0.00%
U-234	2.03E-12	2.03E-12	2.42E-08	5.66E-11	8.85E-10	2.03E-12	7.51E-11	2.91E-09	0.00E+00	Co-60	0.00%	Pb-210	0.00%
U-235	1.54E-11	1.55E-11	1.80E-07	4.28E-10	6.58E-09	1.54E-11	5.59E-10	2.16E-08	0.00E+00	Ni-63	0.00%	Ni-63	0.00%
U-236	3.09E-11	3.09E-11	3.67E-07	8.60E-10	1.35E-08	3.09E-11	1.14E-09	4.42E-08	0.00E+00	Cl-36	0.00%	Cl-36	0.00%
U-238	2.13E-13	2.13E-13	2.54E-09	6.29E-12	9.34E-11	2.12E-13	7.85E-12	3.06E-10	0.00E+00	Cm-247	0.00%	Cm-247	0.00%
Zr-93	7.66E-14	1.64E-13	3.06E-10	6.22E-10	7.66E-09	6.12E-14	6.08E-13	3.05E-10	0.00E+00	Fe-55	0.00%	Fe-55	0.00%
crud										Kr-85	0.00%	Kr-85	0.00%
Co-60(crud)	5.96E-04	2.30E-03	4.32E-02	2.15E-03	1.69E-03	2.03E-03	4.50E-03	7.40E-03	0.00E+00	Ni-59	0.00%	Ni-59	0.00%
Fe-55(crud)	4.13E-04	4.02E-04	8.37E-04	4.08E-04	4.06E-04	4.28E-04	9.56E-04	5.74E-04	0.00E+00				
total	1.52E-03	3.13E-03	4.54E-02	3.23E-03	4.54E-03	2.92E-03	6.03E-03	8.62E-03	0.00E+00				

Air Submersion Doses

ATR [15]										
Stable Metal	Intact									
Air Submersion Dose [rem]										Isotope % of Dose
Isotopes	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes % of Total Skin Dose
Ac-227	6.47E-19	7.68E-19	5.83E-19	5.08E-19	1.79E-18	6.30E-19	5.49E-19	6.45E-19	5.66E-18	Kr-85 55.77%
Am-241	4.68E-11	5.84E-11	3.68E-11	2.84E-11	1.57E-10	4.27E-11	3.46E-11	4.46E-11	6.98E-11	Co-60 (crud) 42.15%
Am-242m	2.11E-15	3.34E-15	9.55E-16	9.55E-16	4.41E-15	1.64E-15	1.08E-15	1.76E-15	7.55E-15	Cs-137 1.61%
Am-243	6.34E-14	7.55E-14	5.56E-14	4.49E-14	2.16E-13	6.05E-14	5.18E-14	6.31E-14	7.96E-14	Sr-90 0.33%
C-14	1.18E-21	1.61E-21	6.98E-22	5.52E-22	3.22E-21	1.00E-21	7.03E-22	1.02E-21	1.11E-18	Cs-134 0.08%
Cd-113m	8.17E-14	9.99E-14	6.76E-14	5.71E-14	2.39E-13	7.71E-14	6.42E-14	7.91E-14	9.67E-11	Eu-154 0.03%
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ru-106 0.01%
Cm-242	3.59E-16	6.79E-16	5.19E-17	8.67E-17	4.86E-16	2.25E-16	1.04E-16	2.61E-16	1.97E-15	Pm-147 0.01%
Cm-243	5.58E-14	6.47E-14	5.32E-14	4.84E-14	1.45E-13	5.58E-14	5.02E-14	5.69E-14	9.48E-14	Sb-125 0.00%
Cm-244	3.83E-15	7.38E-15	3.93E-16	8.11E-16	4.90E-15	2.33E-15	1.00E-15	2.73E-15	2.17E-14	Eu-155 0.00%
Cm-245	1.09E-16	1.28E-16	1.02E-16	8.94E-17	3.33E-16	1.08E-16	9.59E-17	1.12E-16	1.51E-16	Cd-113m 0.00%
Cm-246	4.75E-21	9.14E-21	5.33E-21	1.03E-21	6.22E-21	2.91E-21	1.27E-21	3.40E-21	2.66E-20	I-129 0.00%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Tc-99 0.00%
Co-60	1.98E-19	2.24E-19	2.00E-19	1.98E-19	2.87E-19	2.05E-19	1.93E-19	2.03E-19	2.34E-19	Am-241 0.00%
Cs-134	2.84E-07	3.23E-07	2.82E-07	2.76E-07	4.60E-07	2.90E-07	2.71E-07	2.90E-07	3.62E-07	Sn-126 0.00%
Cs-135	4.75E-16	6.23E-16	3.17E-16	2.53E-16	1.37E-15	4.16E-16	3.09E-16	4.28E-16	6.86E-13	Pu-238 0.00%
Cs-137	4.22E-06	4.82E-06	4.19E-06	4.09E-06	6.93E-06	4.31E-06	4.01E-06	4.31E-06	6.95E-06	U-235 0.00%
Eu-154	9.29E-08	1.05E-07	9.27E-08	9.09E-08	1.46E-07	9.52E-08	8.90E-08	9.50E-08	1.28E-07	Pu-239 0.00%
Eu-155	9.59E-10	1.14E-09	8.55E-10	7.13E-10	3.12E-09	9.28E-10	7.97E-10	9.59E-10	1.31E-09	Cs-135 0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-240 0.00%
H-3	0.00E+00	0.00E+00	6.45E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.76E-14	0.00E+00	Np-237 0.00%
I-129	3.45E-11	4.76E-11	1.53E-11	1.17E-11	7.86E-11	2.76E-11	1.64E-11	2.72E-11	7.86E-11	Se-79 0.00%
Kr-85	2.13E-06	2.44E-06	2.08E-06	1.98E-06	4.00E-06	2.15E-06	1.98E-06	2.17E-06	2.40E-04	Pu-241 0.00%
Nb-93m	6.03E-15	1.25E-14	2.43E-16	1.12E-15	6.60E-15	3.27E-15	1.30E-15	4.23E-15	4.08E-14	Sm-151 0.00%
Nb-94	6.00E-15	6.82E-15	5.98E-15	5.84E-15	9.47E-15	6.14E-15	5.72E-15	6.13E-15	7.58E-15	Cm-243 0.00%
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-243 0.00%
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Nb-93m 0.00%
Np-237	3.29E-13	3.98E-13	2.85E-13	2.43E-13	1.01E-12	3.14E-13	2.69E-13	3.25E-13	4.87E-13	U-236 0.00%
Pa-231	1.92E-16	2.23E-16	1.81E-16	1.70E-16	4.08E-16	1.90E-16	1.73E-16	1.93E-16	2.73E-16	Cm-244 0.00%
Pb-210	6.75E-23	8.92E-23	4.64E-23	3.43E-23	2.13E-22	5.91E-23	4.46E-23	6.15E-23	1.40E-22	Nb-94 0.00%
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-242m 0.00%
Pm-147	3.22E-11	4.12E-11	2.35E-11	1.92E-11	9.39E-11	2.91E-11	2.27E-11	2.99E-11	3.49E-08	U-234 0.00%
Pu-238	3.58E-12	6.93E-12	5.78E-13	9.16E-13	5.07E-12	2.19E-12	1.09E-12	2.66E-12	2.23E-11	Cm-242 0.00%
Pu-239	2.07E-13	3.23E-13	1.13E-13	1.14E-13	4.05E-13	1.66E-13	1.22E-13	1.81E-13	7.96E-13	U-232 0.00%
Pu-240	1.09E-13	2.12E-13	1.87E-14	2.84E-14	1.59E-13	6.74E-14	3.37E-14	8.17E-14	6.74E-13	Pu-242 0.00%
Pu-241	1.87E-13	2.25E-13	1.68E-13	1.46E-13	5.69E-13	1.81E-13	1.58E-13	1.88E-13	3.04E-13	Pa-231 0.00%
Pu-242	5.46E-17	1.05E-16	9.90E-18	1.46E-17	8.07E-17	3.39E-17	1.72E-17	4.10E-17	3.34E-16	U-238 0.00%
Ra-226	3.33E-21	3.83E-21	3.19E-21	2.92E-21	8.59E-21	3.34E-21	3.02E-21	3.40E-21	5.18E-21	Cm-245 0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ac-227 0.00%
Ru-106	3.33E-09	3.83E-09	3.33E-09	3.22E-09	5.68E-09	3.40E-09	3.18E-09	3.43E-09	3.60E-08	U-233 0.00%
Sb-125	1.47E-08	1.68E-08	1.45E-08	1.39E-08	2.62E-08	1.49E-08	1.38E-08	1.50E-08	1.97E-08	C-14 0.00%
Se-79	4.48E-16	6.03E-16	2.73E-16	2.16E-16	1.24E-15	3.82E-16	2.71E-16	3.92E-16	4.79E-13	Th-229 0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60 0.00%
Sm-151	6.92E-14	1.17E-13	9.43E-15	1.50E-14	9.44E-14	4.77E-14	1.98E-14	4.81E-14	2.53E-13	Th-230 0.00%
Sn-126	3.21E-11	3.67E-11	3.18E-11	3.07E-11	5.57E-11	3.27E-11	3.04E-11	3.28E-11	5.56E-11	Cm-246 0.00%
Sr-90	1.21E-09	1.47E-09	1.00E-09	8.45E-10	3.54E-09	1.14E-09	9.49E-10	1.17E-09	1.43E-06	Ra-226 0.00%
Tc-99	4.66E-14	5.89E-14	3.45E-14	2.81E-14	1.38E-13	4.20E-14	3.32E-14	4.34E-14	7.34E-11	Pb-210 0.00%
Th-229	2.33E-19	2.74E-19	2.17E-19	1.88E-19	7.12E-19	2.29E-19	2.02E-19	2.37E-19	3.35E-19	Th-232 0.00%
Th-230	9.11E-20	1.20E-19	7.24E-20	6.17E-20	2.68E-19	8.25E-20	6.93E-20	8.81E-20	2.28E-19	Cl-36 0.00%
Th-232	4.68E-24	6.82E-24	3.19E-24	2.77E-24	1.30E-23	3.96E-24	3.18E-24	4.37E-24	1.72E-23	Cm-247 0.00%
U-232	9.06E-17	1.36E-16	5.75E-17	5.26E-17	2.26E-16	7.54E-17	5.85E-17	8.30E-17	3.46E-16	Fe-55 0.00%
U-233	1.25E-18	1.65E-18	1.00E-18	9.20E-19	3.06E-18	1.15E-18	9.72E-19	1.21E-18	3.39E-18	Fe-55 (crud) 0.00%
U-234	5.36E-16	8.77E-16	2.67E-16	2.56E-16	1.21E-15	4.08E-16	2.92E-16	4.65E-16	2.59E-15	H-3 0.00%
U-235	3.45E-12	3.96E-12	3.30E-12	3.01E-12	9.00E-12	3.45E-12	3.11E-12	3.52E-12	4.22E-12	Ni-59 0.00%
U-236	5.96E-15	1.08E-14	2.13E-15	2.28E-15	1.16E-14	4.10E-15	2.64E-15	4.90E-15	3.49E-14	Ni-63 0.00%
U-238	3.15E-17	6.13E-17	7.14E-18	8.90E-18	5.31E-17	1.95E-17	1.08E-17	2.45E-17	2.09E-16	Pd-107 0.00%
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ra-228 0.00%
crud										Sm-147 0.00%
Co-60(crud)	1.54E-04	1.74E-04	1.55E-04	1.54E-04	2.23E-04	1.59E-04	1.50E-04	1.58E-04	1.82E-04	Zr-93 0.00%
Fe-55(crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
totals	1.61E-04	1.82E-04	1.62E-04	1.61E-04	2.35E-04	1.66E-04	1.57E-04	1.65E-04	4.31E-04	

ATR [15]		Stable Metal		Intact		
	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	1.52E-03		1.61E-04			
Breast	3.13E-03		1.82E-04			
Lung	4.54E-02	<CDE	1.62E-04			
R Marrow	3.23E-03		1.61E-04			
B Surface	4.54E-03		2.35E-04			
Thyroid	2.92E-03		1.66E-04			
Remainder	6.03E-03		1.57E-04			
Whole Body	8.62E-03	<CEDE	1.65E-04	<DDE	8.78E-03	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	4.31E-04	<SKIN	4.31E-04	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					4.55E-02	<CDE + DDE

Summary of Offsite Dose

ATR [15]

Stable Metal

Intact

Isotope	Material Type	Offsite Doses [rem]	
		TEDE	lung CDE + DDE
Ac-227	P	4.16E-11	3.54E-11
Am-241	P	8.72E-06	1.34E-06
Am-242m	P	8.50E-09	3.11E-10
Am-243	P	4.59E-09	6.86E-10
C-14	P	3.43E-18	3.43E-18
Cd-113m	P	6.27E-09	6.21E-09
Cl-36	P	0.00E+00	0.00E+00
Cm-242	P	2.85E-10	9.47E-10
Cm-243	P	1.07E-09	2.50E-10
Cm-244	P	4.95E-08	1.43E-08
Cm-245	P	4.62E-12	6.76E-13
Cm-246	P	1.24E-13	1.85E-14
Cm-247	P	0.00E+00	0.00E+00
Co-60	P	3.30E-19	9.44E-19
Cs-134	C	1.62E-05	1.53E-05
Cs-135	C	3.10E-10	3.55E-10
Cs-137	C	4.59E-04	4.69E-04
Eu-154	P	2.54E-07	2.58E-07
Eu-155	P	6.71E-09	7.07E-09
Fe-55	P	0.00E+00	0.00E+00
H-3	G	1.35E-09	1.35E-09
I-129	G	1.12E-06	7.50E-09
Kr-85	G	2.17E-06	2.17E-06
Nb-93m	P	1.00E-11	8.19E-11
Nb-94	P	1.80E-14	8.54E-14
Ni-59	P	0.00E+00	0.00E+00
Ni-63	P	8.46E-33	3.09E-32
Np-237	P	6.14E-08	6.78E-09
Pa-231	P	5.18E-11	1.11E-10
Pb-210	P	5.33E-18	4.62E-19
Pd-107	P	1.03E-13	8.47E-13
Pm-147	P	6.08E-07	4.44E-06
Pu-238	P	7.70E-05	2.32E-04
Pu-239	P	6.61E-06	1.84E-05
Pu-240	P	2.66E-06	7.40E-06
Pu-241	P	7.72E-06	1.10E-05
Pu-242	P	1.51E-09	4.18E-09
Ra-226	P	3.34E-17	2.32E-16
Ra-228	P	3.71E-19	2.08E-18
Ru-106	P	6.02E-08	4.61E-07
Sb-125	P	1.82E-08	3.64E-08
Se-79	P	4.58E-12	1.69E-11
Sm-147	P	4.15E-13	1.57E-13
Sm-151	P	1.44E-08	5.78E-09
Sn-126	P	4.81E-11	1.18E-10
Sr-90	P	7.26E-05	5.91E-04
Tc-99	P	8.03E-11	5.96E-10
Th-229	P	4.78E-14	1.64E-13
Th-230	P	5.93E-13	2.02E-12
Th-232	P	2.96E-16	6.27E-16
U-232	P	1.39E-09	1.15E-08
U-233	P	3.62E-12	3.00E-11
U-234	P	2.91E-09	2.42E-08
U-235	P	2.16E-08	1.80E-07
U-236	P	4.42E-08	3.67E-07
U-238	P	3.06E-10	2.54E-09
Zr-93	P	3.05E-10	3.06E-10
Co-60(crud)	crud	7.55E-03	4.33E-02
Fe-55(crud)	crud	5.74E-04	8.37E-04
Total		8.78E-03	4.55E-02

	evaluated fuel		x				evaluated fuel
Isotope	Fuel Type	Stable Metal	Non-Metal	Non-Metal	Other	Other	Non-Metal
	Condition	Intact	Intact	Not Intact	Intact	Not Intact	Intact
	Fuel Name (Ci)	ATR [15]	FSVR [85]	SHIPPINGPORT LWBR (THO2-UO2) [377]	FFTF-TFA-FSP-1 & FSP-1R [327]	EBR-II (U-MTL DE- CLAD) [438]	FSVR [85]
	# of canisters	56.40	148.80	2.00	2.00	1.77	148.80
	Material Type						Curies
Ac-227	P	6.06E-05	0.00E+00	4.95E-01	1.85E-08	1.37E-04	0.00E+00
Am-241	P	1.92E+02	5.94E+02	1.38E+00	3.45E+03	1.23E+04	5.94E+02
Am-242m	P	1.95E-01	7.98E-02	1.03E-02	6.38E+00	4.73E+00	7.98E-02
Am-243	P	1.02E-01	4.33E+00	2.09E-03	4.90E-01	1.17E+01	4.33E+00
C-14	P	1.60E-05	3.82E+01	5.82E-01	4.59E-03	5.72E-03	3.82E+01
Cd-113m	P	4.00E+01	0.00E+00	8.02E-01	0.00E+00	3.53E+02	0.00E+00
Cl-36	P	0.00E+00	4.51E-01	1.22E-02	8.54E-05	0.00E+00	4.51E-01
Cm-242	P	1.61E-01	1.64E+01	8.48E-03	0.00E+00	3.90E+00	1.64E+01
Cm-243	P	3.40E-02	4.36E-01	2.46E-03	0.00E+00	1.61E+00	4.36E-01
Cm-244	P	1.95E+00	1.98E+02	1.26E-01	4.43E+01	2.08E+02	1.98E+02
Cm-245	P	9.91E-05	3.92E-02	4.68E-05	8.47E-03	6.49E-03	3.92E-02
Cm-246	P	2.67E-06	1.12E-02	3.10E-06	1.44E-03	4.79E-04	1.12E-02
Cm-247	P	0.00E+00	3.31E-08	1.10E-11	0.00E+00	0.00E+00	3.31E-08
Co-60	P	5.66E-09	0.00E+00	1.44E+01	1.29E+02	8.84E-07	0.00E+00
Cs-134	C	1.35E+04	1.11E+03	2.10E+00	4.22E+01	9.99E+04	1.11E+03
Cs-135	C	2.66E+00	2.32E+00	1.93E-01	9.38E-03	6.05E+00	2.32E+00
Cs-137	C	5.56E+05	5.82E+05	1.18E+04	4.75E+04	4.19E+06	5.82E+05
Eu-154	P	5.44E+03	0.00E+00	1.05E+02	0.00E+00	4.43E+04	0.00E+00
Eu-155	P	1.35E+03	0.00E+00	1.25E+01	0.00E+00	1.37E+04	0.00E+00
Fe-55	P	0.00E+00	0.00E+00	9.77E-02	0.00E+00	0.00E+00	0.00E+00
H-3	G	5.49E-01	1.07E+03	2.17E+01	5.93E+01	1.27E+04	1.07E+03
I-129	G	1.67E-01	3.53E-01	1.07E-02	9.92E-04	1.24E+00	3.53E-01
Kr-85	G	4.26E+04	3.87E+04	6.82E+02	5.90E+02	3.14E+05	3.87E+04
Nb-93m	P	3.35E+00	1.92E-06	4.17E-01	8.17E-02	2.42E+01	1.92E-06
Nb-94	P	2.80E-04	0.00E+00	1.51E-02	1.55E-04	2.42E-03	0.00E+00
Ni-59	P	0.00E+00	3.14E+00	4.17E-02	1.67E-02	0.00E+00	3.14E+00
Ni-63	P	2.66E-20	7.95E+01	4.71E+00	8.11E+01	0.00E+00	7.95E+01
Np-237	P	1.11E+00	2.53E+00	8.38E-04	3.43E-02	5.83E+00	2.53E+00
Pa-231	P	3.93E-04	3.31E+00	8.09E-01	3.75E-07	9.15E-04	3.31E+00
Pb-210	P	3.83E-09	4.77E-04	7.87E-05	1.57E-09	7.03E-09	4.77E-04
Pd-107	P	7.83E-02	1.43E-01	2.32E-03	2.79E-03	1.15E+00	1.43E-01
Pm-147	P	1.51E+05	0.00E+00	1.26E+01	0.00E+00	1.20E+06	0.00E+00
Pu-238	P	1.92E+03	1.34E+04	1.30E+01	6.22E+02	1.07E+04	1.34E+04
Pu-239	P	1.50E+02	3.50E+01	7.92E-01	2.59E+03	7.27E+03	3.50E+01
Pu-240	P	6.04E+01	6.23E+01	4.65E-01	2.24E+03	5.21E+03	6.23E+01
Pu-241	P	9.13E+03	0.00E+00	6.04E+01	5.09E+04	5.96E+05	0.00E+00
Pu-242	P	3.59E-02	0.00E+00	1.17E-03	5.40E-02	5.07E+00	0.00E+00
Ra-226	P	3.80E-08	5.01E-04	7.59E-05	3.54E-08	7.45E-08	5.01E-04
Ra-228	P	7.59E-10	1.13E+00	3.01E-02	1.67E-09	4.11E-09	1.13E+00
Ru-106	P	1.16E+03	4.42E-01	4.50E-05	1.65E-01	1.45E+04	4.42E-01
Sb-125	P	2.61E+03	2.10E+02	3.38E+00	0.00E+00	0.00E+00	2.10E+02
Se-79	P	4.54E+00	4.86E+00	2.38E-01	1.02E-02	3.38E+01	4.86E+00
Sm-147	P	5.42E-05	1.11E+00	8.54E-07	0.00E+00	4.04E-04	1.11E+00
Sm-151	P	4.68E+03	9.16E+03	7.73E+01	2.23E+03	1.30E+04	9.16E+03
Sn-126	P	1.49E+00	1.99E+00	2.68E-01	1.32E-02	1.33E+01	1.99E+00
Sr-90	P	5.45E+05	5.52E+05	1.20E+04	1.76E+04	3.98E+06	5.52E+05
Tc-99	P	9.41E+01	1.23E+02	2.19E+00	3.54E-01	7.04E+02	1.23E+02
Th-229	P	2.17E-07	2.73E+00	1.10E+00	5.15E-09	3.95E-07	2.73E+00
Th-230	P	1.78E-05	2.09E-01	2.82E-02	7.72E-06	3.88E-05	2.09E-01
Th-232	P	1.76E-09	9.05E-01	1.34E-01	4.25E-10	9.69E-09	9.05E-01
U-232	P	2.05E-02	4.92E+02	1.17E+03	0.00E+00	5.41E-02	4.92E+02
U-233	P	2.61E-04	1.20E+03	3.62E+02	3.63E-06	5.73E-04	1.20E+03
U-234	P	2.14E-01	9.43E+01	2.36E+01	5.31E-02	5.72E-01	9.43E+01
U-235	P	1.72E+00	3.44E-01	1.76E-03	8.42E-04	4.14E+00	3.44E-01
U-236	P	3.43E+00	3.43E+00	3.82E-03	2.08E-02	1.93E+01	3.43E+00
U-238	P	2.52E-02	8.94E-03	5.09E-05	7.56E-03	5.09E+00	8.94E-03
Zr-93	P	9.27E+00	1.97E+02	5.57E-01	4.79E-02	6.81E+01	1.97E+02
Crud (per canister)							
Co-60(crud)	P	1.56E+01	2.68E+02	1.23E+02	7.70E+02	1.76E+03	2.68E+02
Fe-55(crud)	P	9.85E+01	1.69E+03	7.73E+02	4.85E+03	1.11E+04	1.69E+03

DOE SNF Release Fractions				
Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
Stable Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Stable Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Non-Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
Non-Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Other/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
Other/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud				
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
<u>Evaluated Fuel:</u>				
FSVR [85]				
Non-Metal				
Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
breathing rate	3.33E-04	[m^3/s]		
ground level dispersion factor				
distance [m]	x/Q [sec/m^3]			
11000	2.17E-05	Maximum Sector Acute (99.5%)		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
FSVR [85]							
Non-Metal	Intact						
Isotope	Curies (entire fuel inventory)	f _{inv} = 1/(# of Canisters)	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	0.00E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Am-241	5.94E+02	6.72E-03	2.25E-04	1.00E+00	1.00E+00	8.98E-04	8.98E-04
Am-242m	7.98E-02	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.21E-07	1.21E-07
Am-243	4.33E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	6.55E-06	6.55E-06
C-14	3.82E+01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	5.78E-05	5.78E-05
Cd-113m	0.00E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Cl-36	4.51E-01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	6.82E-07	6.82E-07
Cm-242	1.64E+01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	2.47E-05	2.47E-05
Cm-243	4.36E-01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	6.60E-07	6.60E-07
Cm-244	1.98E+02	6.72E-03	2.25E-04	1.00E+00	1.00E+00	2.99E-04	2.99E-04
Cm-245	3.92E-02	6.72E-03	2.25E-04	1.00E+00	1.00E+00	5.93E-08	5.93E-08
Cm-246	1.12E-02	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.70E-08	1.70E-08
Cm-247	3.31E-08	6.72E-03	2.25E-04	1.00E+00	1.00E+00	5.01E-14	5.01E-14
Co-60	0.00E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Cs-134	1.11E+03	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.68E-03	1.68E-03
Cs-135	2.32E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	3.51E-06	3.51E-06
Cs-137	5.82E+05	6.72E-03	2.25E-04	1.00E+00	1.00E+00	8.80E-01	8.80E-01
Eu-154	0.00E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Eu-155	0.00E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Fe-55	0.00E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
H-3	1.07E+03	6.72E-03	3.00E-01	1.00E+00	1.00E+00	2.16E+00	2.16E+00
I-129	3.53E-01	6.72E-03	3.00E-01	1.00E+00	1.00E+00	7.13E-04	7.13E-04
Kr-85	3.87E+04	6.72E-03	3.00E-01	1.00E+00	1.00E+00	7.79E+01	7.79E+01
Nb-93m	1.92E-06	6.72E-03	2.25E-04	1.00E+00	1.00E+00	2.91E-12	2.91E-12
Nb-94	0.00E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Ni-59	3.14E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	4.76E-06	4.76E-06
Ni-63	7.95E+01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.20E-04	1.20E-04
Np-237	2.53E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	3.82E-06	3.82E-06
Pa-231	3.31E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	5.00E-06	5.00E-06
Pb-210	4.77E-04	6.72E-03	2.25E-04	1.00E+00	1.00E+00	7.21E-10	7.21E-10
Pd-107	1.43E-01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	2.16E-07	2.16E-07
Pm-147	0.00E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Pu-238	1.34E+04	6.72E-03	2.25E-04	1.00E+00	1.00E+00	2.03E-02	2.03E-02
Pu-239	3.50E+01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	5.30E-05	5.30E-05
Pu-240	6.23E+01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	9.42E-05	9.42E-05
Pu-241	0.00E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Pu-242	0.00E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Ra-226	5.01E-04	6.72E-03	2.25E-04	1.00E+00	1.00E+00	7.57E-10	7.57E-10
Ra-228	1.13E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.71E-06	1.71E-06
Ru-106	4.42E-01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	6.69E-07	6.69E-07
Sb-125	2.10E+02	6.72E-03	2.25E-04	1.00E+00	1.00E+00	3.18E-04	3.18E-04
Se-79	4.86E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	7.36E-06	7.36E-06
Sm-147	1.11E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.68E-06	1.68E-06
Sm-151	9.16E+03	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.39E-02	1.39E-02
Sn-126	1.99E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	3.00E-06	3.00E-06
Sr-90	5.52E+05	6.72E-03	2.25E-04	1.00E+00	1.00E+00	8.34E-01	8.34E-01
Tc-99	1.23E+02	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.86E-04	1.86E-04
Th-229	2.73E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	4.12E-06	4.12E-06
Th-230	2.09E-01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	3.16E-07	3.16E-07
Th-232	9.05E-01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.37E-06	1.37E-06
U-232	4.92E+02	6.72E-03	2.25E-04	1.00E+00	1.00E+00	7.43E-04	7.43E-04
U-233	1.20E+03	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.82E-03	1.82E-03
U-234	9.43E+01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.43E-04	1.43E-04
U-235	3.44E-01	6.72E-03	2.25E-04	1.00E+00	1.00E+00	5.19E-07	5.19E-07
U-236	3.43E+00	6.72E-03	2.25E-04	1.00E+00	1.00E+00	5.19E-06	5.19E-06
U-238	8.94E-03	6.72E-03	2.25E-04	1.00E+00	1.00E+00	1.35E-08	1.35E-08
Zr-93	1.97E+02	6.72E-03	2.25E-04	1.00E+00	1.00E+00	2.98E-04	2.98E-04
crud (per canister)							
Co-60(crud)	2.68E+02	1.00E+00	1.00E+00	3.00E-01	1.00E+00	2.68E+02	8.04E+01
Fe-55(crud)	1.69E+03	1.00E+00	1.00E+00	3.00E-01	1.00E+00	1.69E+03	5.07E+02

FSVR [85]													
Non-Metal	Intact												
Inhalation Dose [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Ac-227	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60(crud)	59.95%	Pu-238	88.95%
Am-241	7.80E-04	6.41E-08	4.42E-04	4.18E-03	5.21E-02	3.84E-08	1.88E-03	2.88E-03	0.00E+00	Pu-238	27.13%	Am-241	4.50%
Am-242m	1.04E-07	4.45E-12	1.36E-08	5.45E-07	6.84E-06	1.82E-12	2.41E-07	3.71E-07	0.00E+00	Fe-55(crud)	4.64%	Co-60(crud)	2.50%
Am-243	5.71E-06	2.66E-09	3.12E-06	3.03E-05	3.80E-04	1.45E-09	1.36E-05	2.08E-05	0.00E+00	Sr-90	3.69%	Sr-90	1.40%
C-14	8.71E-10	8.71E-10	8.71E-10	8.71E-10	8.71E-10	8.71E-10	8.71E-10	8.71E-10	0.00E+00	U-232	1.67%	Cm-244	0.81%
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-241	1.36%	Fe-55(crud)	0.60%
Cl-36	9.18E-12	9.18E-12	8.31E-10	9.18E-12	9.18E-12	9.18E-12	9.77E-12	1.08E-10	0.00E+00	U-233	0.84%	Pu-240	0.46%
Cm-242	3.77E-07	6.24E-10	1.02E-05	2.58E-06	3.22E-05	6.22E-10	1.62E-06	3.09E-06	0.00E+00	Cm-244	0.25%	Pu-239	0.26%
Cm-243	3.65E-07	1.11E-10	3.42E-07	2.08E-06	2.59E-05	6.75E-11	1.02E-06	1.46E-06	0.00E+00	Pu-240	0.14%	Th-229	0.14%
Cm-244	1.27E-04	8.33E-09	1.54E-04	7.51E-04	9.37E-03	8.08E-09	3.83E-04	5.36E-04	0.00E+00	Cs-137	0.10%	U-232	0.11%
Cm-245	5.34E-08	1.06E-11	2.85E-08	2.84E-07	3.55E-06	5.83E-12	1.26E-07	1.95E-07	0.00E+00	Pu-239	0.08%	Pa-231	0.10%
Cm-246	1.52E-08	1.82E-12	8.27E-09	8.09E-08	1.01E-06	1.03E-12	8.61E-08	5.55E-08	0.00E+00	U-234	0.06%	U-233	0.05%
Cm-247	4.11E-14	2.98E-17	2.24E-14	2.18E-13	2.73E-12	1.94E-17	9.77E-14	1.50E-13	0.00E+00	Th-229	0.03%	Th-232	0.04%
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pa-231	0.02%	Am-243	0.03%
Cs-134	5.83E-07	4.84E-07	5.29E-07	5.29E-07	4.93E-07	4.98E-07	6.23E-07	5.61E-07	0.00E+00	Am-243	0.01%	Np-237	0.03%
Cs-135	1.12E-10	1.12E-10	1.32E-10	1.12E-10	1.12E-10	1.12E-10	1.12E-10	1.15E-10	0.00E+00	Th-232	0.01%	Cs-137	0.02%
Cs-137	2.06E-04	1.84E-04	2.08E-04	1.95E-04	1.87E-04	1.87E-04	2.15E-04	2.03E-04	0.00E+00	Np-237	0.01%	Sm-151	0.00%
Eu-154	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236	0.00%	U-234	0.00%
Eu-155	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-242	0.00%	Cm-242	0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-151	0.00%	Cm-243	0.00%
H-3	9.98E-07	9.98E-07	9.98E-07	9.98E-07	9.98E-07	9.98E-07	9.98E-07	9.98E-07	0.00E+00	Cm-243	0.00%	Th-230	0.00%
I-129	1.66E-09	3.98E-09	5.98E-09	2.67E-09	2.63E-09	2.97E-05	2.25E-09	8.94E-07	0.00E+00	H-3	0.00%	Zr-93	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-147	0.00%	Sm-147	0.00%
Nb-93m	3.23E-17	3.39E-18	5.02E-15	2.22E-17	5.78E-17	2.36E-18	3.07E-17	6.14E-16	0.00E+00	I-129	0.00%	Am-242m	0.00%
Nb-94	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-230	0.00%	Cm-245	0.00%
Ni-59	4.56E-11	4.40E-11	1.53E-10	4.50E-11	4.46E-11	4.79E-11	4.62E-11	4.55E-11	0.00E+00	Zr-93	0.00%	U-236	0.00%
Ni-63	2.64E-09	2.64E-09	9.87E-09	2.64E-09	2.64E-09	2.64E-09	2.76E-09	2.70E-09	0.00E+00	Cs-134	0.00%	Cm-246	0.00%
Np-237	3.03E-06	1.73E-09	1.65E-06	2.68E-05	3.34E-04	1.37E-09	2.39E-06	1.49E-05	0.00E+00	U-235	0.00%	H-3	0.00%
Pa-231	9.22E-10	1.18E-09	9.99E-05	9.32E-05	1.16E-03	1.02E-09	3.84E-08	4.64E-05	0.00E+00	Am-242m	0.00%	Cs-134	0.00%
Pb-210	6.13E-12	6.13E-12	6.13E-12	7.23E-11	1.05E-09	6.13E-12	9.04E-11	7.08E-11	0.00E+00	Cm-245	0.00%	Ra-228	0.00%
Pd-107	5.46E-15	5.46E-15	1.65E-10	2.95E-14	7.86E-14	5.46E-15	1.24E-12	1.99E-11	0.00E+00	Ra-228	0.00%	U-235	0.00%
Pm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-246	0.00%	Sb-125	0.00%
Pu-238	1.52E-02	5.42E-07	1.74E-01	8.24E-02	1.03E+00	5.22E-07	3.81E-02	5.75E-02	0.00E+00	Sb-125	0.00%	Sn-126	0.00%
Pu-239	4.51E-05	1.31E-09	4.58E-04	2.39E-04	2.99E-03	1.28E-09	1.07E-04	1.64E-04	0.00E+00	U-238	0.00%	U-238	0.00%
Pu-240	8.01E-05	2.39E-09	8.13E-04	4.26E-04	5.31E-03	2.28E-09	1.90E-04	2.92E-04	0.00E+00	Tc-99	0.00%	Ni-63	0.00%
Pu-241	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ni-63	0.00%	I-129	0.00%
Pu-242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ru-106	0.00%	Pb-210	0.00%
Ra-226	2.07E-12	2.07E-12	3.26E-10	1.34E-11	1.54E-10	2.07E-12	2.17E-12	4.70E-11	0.00E+00	Sn-126	0.00%	C-14	0.00%
Ra-228	8.38E-09	8.42E-09	3.30E-07	3.38E-08	2.98E-07	8.38E-09	8.56E-09	5.90E-08	0.00E+00	C-14	0.00%	Ru-106	0.00%
Ru-106	2.47E-10	2.45E-10	1.86E-08	2.45E-10	2.45E-10	2.45E-10	3.02E-10	2.31E-09	0.00E+00	Se-79	0.00%	Tc-99	0.00%
Sb-125	3.06E-09	3.54E-09	1.84E-07	5.52E-09	2.32E-08	2.75E-09	1.23E-08	2.81E-08	0.00E+00	Cs-135	0.00%	Ra-226	0.00%
Se-79	1.34E-10	1.34E-10	1.93E-09	1.34E-10	1.34E-10	1.34E-10	8.34E-10	5.23E-10	0.00E+00	Cl-36	0.00%	Se-79	0.00%
Sm-147	0.00E+00	0.00E+00	3.43E-07	1.24E-06	1.55E-05	0.00E+00	8.51E-07	9.09E-07	0.00E+00	Pb-210	0.00%	Cs-135	0.00%
Sm-151	1.49E-11	5.52E-11	1.21E-06	4.08E-06	5.11E-05	4.89E-12	2.78E-06	3.00E-06	0.00E+00	Ra-226	0.00%	Ni-59	0.00%
Sn-126	1.15E-09	1.13E-09	1.21E-08	4.51E-09	9.47E-09	1.05E-09	1.41E-09	2.16E-09	0.00E+00	Ni-59	0.00%	Cl-36	0.00%
Sr-90	5.89E-05	5.89E-05	6.38E-02	7.49E-03	1.62E-02	5.89E-05	1.28E-04	7.83E-03	0.00E+00	Pd-107	0.00%	Cm-247	0.00%

FSVR [85]													
Non-Metal	Intact												
Inhalation Dose [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Tc-99	2.25E-10	2.25E-10	8.32E-08	2.25E-10	2.25E-10	6.03E-09	3.12E-09	1.12E-08	0.00E+00	Cm-247	0.00%	Pd-107	0.00%
Th-229	3.04E-07	3.04E-07	2.19E-04	1.27E-04	1.58E-03	3.04E-07	7.77E-07	6.40E-05	0.00E+00	Nb-93m	0.00%	Nb-93m	0.00%
Th-230	3.44E-09	3.44E-09	2.53E-06	1.46E-06	1.82E-05	3.44E-09	8.86E-09	7.43E-07	0.00E+00	Ac-227	0.00%	Ac-227	0.00%
Th-232	2.79E-08	2.82E-08	3.44E-05	3.27E-05	4.06E-04	2.72E-08	6.84E-08	1.62E-05	0.00E+00	Cd-113m	0.00%	Cd-113m	0.00%
U-232	1.59E-06	1.60E-06	2.94E-02	8.07E-05	1.28E-03	1.56E-06	6.18E-05	3.54E-03	0.00E+00	Co-60	0.00%	Co-60	0.00%
U-233	1.23E-06	1.23E-06	1.48E-02	3.46E-05	5.44E-04	1.23E-06	4.56E-05	1.78E-03	0.00E+00	Eu-154	0.00%	Eu-154	0.00%
U-234	9.53E-08	9.53E-08	1.14E-03	2.66E-06	4.15E-05	9.53E-08	3.53E-06	1.36E-04	0.00E+00	Eu-155	0.00%	Eu-155	0.00%
U-235	3.29E-10	3.31E-10	3.83E-06	9.14E-09	1.40E-07	3.29E-10	1.19E-08	4.61E-07	0.00E+00	Fe-55	0.00%	Fe-55	0.00%
U-236	3.29E-09	3.29E-09	3.91E-05	9.16E-08	1.44E-06	3.29E-09	1.22E-07	4.70E-06	0.00E+00	Kr-85	0.00%	Kr-85	0.00%
U-238	8.06E-12	8.06E-12	9.61E-08	2.38E-10	3.53E-09	8.02E-12	2.97E-10	1.16E-08	0.00E+00	Nb-94	0.00%	Nb-94	0.00%
Zr-93	1.74E-10	3.73E-10	6.96E-07	1.41E-06	1.74E-05	1.39E-10	1.38E-09	6.92E-07	0.00E+00	Pm-147	0.00%	Pm-147	0.00%
										Pu-241	0.00%	Pu-241	0.00%
crud										Pu-242	0.00%	Pu-242	0.00%
Co-60(crud)	1.02E-02	3.96E-02	7.42E-01	3.70E-02	2.90E-02	3.48E-02	7.74E-02	1.27E-01	0.00E+00				
Fe-55(crud)	7.09E-03	6.90E-03	1.44E-02	7.01E-03	6.97E-03	7.35E-03	1.64E-02	9.84E-03	0.00E+00				
total	3.38E-02	4.67E-02	1.04E+00	1.40E-01	1.16E+00	4.25E-02	1.35E-01	2.12E-01	0.00E+00				

Air Submersion Doses

FSVR [85]											
Non-Metal	Intact										
Air Submersion Dose [rem]										Isotope % of Dose	
Isotopes	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes	% of Total Skin Dose
Ac-227	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60 (crud)	97.31%
Am-241	6.19E-11	7.72E-11	4.86E-11	3.76E-11	2.07E-10	5.65E-11	4.57E-11	5.90E-11	9.23E-11	Kr-85	2.58%
Am-242m	3.68E-16	5.83E-16	1.67E-16	1.67E-16	7.70E-16	2.86E-16	1.88E-16	3.07E-16	1.32E-15	Cs-137	0.10%
Am-243	1.15E-12	1.37E-12	1.01E-12	8.15E-13	3.93E-12	1.10E-12	9.41E-13	1.15E-12	1.45E-12	Sr-90	0.02%
C-14	1.20E-15	1.63E-15	7.10E-16	5.61E-16	3.27E-15	1.02E-15	7.14E-16	1.04E-15	1.13E-12	Cs-134	0.00%
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sb-125	0.00%
Cl-36	1.23E-15	1.46E-15	1.11E-15	9.91E-16	3.08E-15	1.20E-15	1.05E-15	1.22E-15	8.04E-13	Am-241	0.00%
Cm-242	1.55E-14	2.94E-14	2.24E-15	3.75E-15	2.10E-14	9.75E-15	4.51E-15	1.13E-14	8.52E-14	Pu-238	0.00%
Cm-243	3.06E-13	3.54E-13	2.91E-13	2.65E-13	7.94E-13	3.05E-13	2.75E-13	3.11E-13	5.18E-13	I-129	0.00%
Cm-244	1.66E-13	3.20E-13	1.70E-14	3.51E-14	2.12E-13	1.01E-13	4.35E-14	1.18E-13	9.40E-13	Tc-99	0.00%
Cm-245	1.85E-14	2.17E-14	1.73E-14	1.51E-14	5.62E-14	1.83E-14	1.62E-14	1.88E-14	2.55E-14	Sn-126	0.00%
Cm-246	8.52E-18	1.64E-17	9.56E-19	1.84E-18	1.12E-17	5.21E-18	2.28E-18	6.09E-18	4.76E-17	U-233	0.00%
Cm-247	5.91E-20	6.75E-20	5.79E-20	5.55E-20	1.14E-19	5.99E-20	5.55E-20	6.03E-20	7.19E-20	Ru-106	0.00%
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-232	0.00%
Cs-134	9.96E-09	1.14E-08	9.92E-09	9.68E-09	1.62E-08	1.02E-08	9.51E-09	1.02E-08	1.27E-08	Th-229	0.00%
Cs-135	1.77E-16	2.32E-16	1.18E-16	9.40E-17	5.09E-16	1.55E-16	1.15E-16	1.59E-16	2.55E-13	Am-243	0.00%
Cs-137	1.89E-06	2.15E-06	1.87E-06	1.83E-06	3.10E-06	1.93E-06	1.79E-06	1.93E-06	3.10E-06	C-14	0.00%
Eu-154	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pa-231	0.00%
Eu-155	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-244	0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cl-36	0.00%
H-3	0.00E+00	0.00E+00	4.76E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.73E-11	0.00E+00	Cm-243	0.00%
I-129	2.76E-11	3.81E-11	1.22E-11	9.38E-12	6.29E-11	2.21E-11	1.32E-11	2.17E-11	6.29E-11	U-234	0.00%
Kr-85	7.32E-07	8.39E-07	7.13E-07	6.82E-07	1.38E-06	7.38E-07	6.82E-07	7.45E-07	8.26E-05	Np-237	0.00%
Nb-93m	1.48E-21	3.06E-21	5.95E-23	2.76E-22	1.62E-21	8.01E-22	3.18E-22	1.04E-21	9.99E-21	U-235	0.00%
Nb-94	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-240	0.00%
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cs-135	0.00%
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Se-79	0.00%
Np-237	3.19E-13	3.87E-13	2.77E-13	2.36E-13	9.82E-13	3.05E-13	2.61E-13	3.16E-13	4.73E-13	Sm-151	0.00%
Pa-231	6.86E-13	7.99E-13	6.50E-13	6.10E-13	1.46E-12	6.82E-13	6.18E-13	6.90E-13	9.80E-13	Cm-242	0.00%
Pb-210	3.58E-18	4.74E-18	2.46E-18	1.82E-18	1.13E-17	3.14E-18	2.37E-18	3.27E-18	7.41E-18	Pu-239	0.00%
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-245	0.00%
Pm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236	0.00%
Pu-238	1.07E-11	2.07E-11	1.73E-12	2.74E-12	1.51E-11	6.53E-12	3.24E-12	7.95E-12	6.66E-11	Th-232	0.00%
Pu-239	2.06E-14	3.21E-14	1.13E-14	1.14E-14	4.03E-14	1.65E-14	1.22E-14	1.80E-14	7.91E-14	Am-242m	0.00%
Pu-240	4.81E-14	9.30E-14	8.24E-15	1.25E-14	7.00E-14	2.96E-14	1.48E-14	3.59E-14	2.96E-13	Th-230	0.00%
Pu-241	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-246	0.00%
Pu-242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-238	0.00%
Ra-226	1.87E-17	2.15E-17	1.79E-17	1.64E-17	4.83E-17	1.88E-17	1.70E-17	1.92E-17	2.91E-17	Ra-226	0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pb-210	0.00%
Ru-106	5.42E-13	6.23E-13	5.42E-13	5.23E-13	9.23E-13	5.53E-13	5.17E-13	5.58E-13	5.85E-12	Cm-247	0.00%
Sb-125	5.05E-10	5.79E-10	4.98E-10	4.77E-10	9.01E-10	5.13E-10	4.75E-10	5.16E-10	6.76E-10	Nb-93m	0.00%
Se-79	2.05E-16	2.76E-16	1.25E-16	9.86E-17	5.67E-16	1.75E-16	1.24E-16	1.79E-16	2.19E-13	Ac-227	0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cd-113m	0.00%
Sm-151	5.79E-14	9.79E-14	7.88E-15	1.26E-14	7.89E-14	3.98E-14	1.66E-14	4.02E-14	2.11E-13	Co-60	0.00%
Sn-126	1.82E-11	2.08E-11	1.80E-11	1.74E-11	3.15E-11	1.85E-11	1.72E-11	1.86E-11	3.15E-11	Eu-154	0.00%
Sr-90	5.21E-10	6.36E-10	4.31E-10	3.64E-10	1.53E-09	4.91E-10	4.09E-10	5.04E-10	6.16E-07	Eu-155	0.00%
Tc-99	2.60E-14	3.29E-14	1.93E-14	1.57E-14	7.74E-14	2.35E-14	1.86E-14	2.42E-14	4.10E-11	Fe-55	0.00%
Th-229	1.25E-12	1.46E-12	1.16E-12	1.00E-12	3.81E-12	1.23E-12	1.08E-12	1.27E-12	1.79E-12	Fe-55 (crud)	0.00%
Th-230	4.56E-16	6.03E-16	3.62E-16	3.09E-16	1.34E-15	4.13E-16	3.47E-16	4.41E-16	1.14E-15	H-3	0.00%
Th-232	1.03E-15	1.49E-15	7.00E-16	6.06E-16	2.86E-15	8.68E-16	6.96E-16	9.58E-16	3.78E-15	Nb-94	0.00%
U-232	9.25E-13	1.38E-12	5.87E-13	5.37E-13	2.30E-12	7.70E-13	5.97E-13	8.48E-13	3.53E-12	Ni-59	0.00%
U-233	2.46E-12	3.24E-12	1.97E-12	1.81E-12	6.01E-12	2.26E-12	1.91E-12	2.38E-12	6.66E-12	Ni-63	0.00%
U-234	1.01E-13	1.65E-13	5.01E-14	4.81E-14	2.28E-13	7.66E-14	5.49E-14	8.73E-14	4.86E-13	Pd-107	0.00%
U-235	2.94E-13	3.38E-13	2.81E-13	2.56E-13	7.67E-13	2.94E-13	2.66E-13	3.00E-13	3.60E-13	Pm-147	0.00%
U-236	2.54E-15	4.58E-15	9.09E-16	9.71E-16	4.96E-15	1.75E-15	1.13E-15	2.09E-15	1.49E-14	Pu-241	0.00%
U-238	4.76E-18	9.27E-18	1.08E-18	1.35E-18	8.03E-18	2.95E-18	1.64E-18	3.70E-18	3.16E-17	Pu-242	0.00%
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ra-228	0.00%
										Sm-147	0.00%
crud										Zr-93	0.00%
Co-60(crud)	2.65E-03	2.99E-03	2.67E-03	2.65E-03	3.83E-03	2.73E-03	2.58E-03	2.71E-03	3.12E-03		
Fe-55(crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
totals	2.65E-03	2.99E-03	2.67E-03	2.65E-03	3.83E-03	2.74E-03	2.58E-03	2.71E-03	3.21E-03		

FSVR [85]

Non-Metal

Intact

	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	3.38E-02		2.65E-03			
Breast	4.67E-02		2.99E-03			
Lung	1.04E+00		2.67E-03			
R Marrow	1.40E-01		2.65E-03			
B Surface	1.16E+00	<CDE	3.83E-03			
Thyroid	4.25E-02		2.74E-03			
Remainder	1.35E-01		2.58E-03			
Whole Body	2.12E-01	<CEDE	2.71E-03	<DDE	2.15E-01	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	3.21E-03	<SKIN	3.21E-03	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					1.16E+00	<CDE + DDE

Summary of Offsite Dose

FSVR [85]

Non-Metal

Intact

Isotope	Material Type	Offsite Doses [rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	0.00E+00	0.00E+00
Am-241	P	2.88E-03	5.21E-02
Am-242m	P	3.71E-07	6.84E-06
Am-243	P	2.08E-05	3.80E-04
C-14	P	8.71E-10	8.71E-10
Cd-113m	P	0.00E+00	0.00E+00
Cl-36	P	1.08E-10	9.19E-12
Cm-242	P	3.09E-06	3.22E-05
Cm-243	P	1.46E-06	2.59E-05
Cm-244	P	5.36E-04	9.37E-03
Cm-245	P	1.95E-07	3.55E-06
Cm-246	P	5.55E-08	1.01E-06
Cm-247	P	1.50E-13	2.73E-12
Co-60	P	0.00E+00	0.00E+00
Cs-134	C	5.71E-07	5.03E-07
Cs-135	C	1.15E-10	1.12E-10
Cs-137	C	2.05E-04	1.89E-04
Eu-154	P	0.00E+00	0.00E+00
Eu-155	P	0.00E+00	0.00E+00
Fe-55	P	0.00E+00	0.00E+00
H-3	G	9.98E-07	9.98E-07
I-129	G	8.94E-07	2.65E-09
Kr-85	G	7.45E-07	7.45E-07
Nb-93m	P	6.14E-16	5.78E-17
Nb-94	P	0.00E+00	0.00E+00
Ni-59	P	4.55E-11	4.46E-11
Ni-63	P	2.70E-09	2.64E-09
Np-237	P	1.49E-05	3.34E-04
Pa-231	P	4.64E-05	1.16E-03
Pb-210	P	7.08E-11	1.05E-09
Pd-107	P	1.99E-11	7.86E-14
Pm-147	P	0.00E+00	0.00E+00
Pu-238	P	5.75E-02	1.03E+00
Pu-239	P	1.64E-04	2.99E-03
Pu-240	P	2.92E-04	5.31E-03
Pu-241	P	0.00E+00	0.00E+00
Pu-242	P	0.00E+00	0.00E+00
Ra-226	P	4.70E-11	1.54E-10
Ra-228	P	5.90E-08	2.98E-07
Ru-106	P	2.31E-09	2.45E-10
Sb-125	P	2.86E-08	2.37E-08
Se-79	P	5.23E-10	1.34E-10
Sm-147	P	9.09E-07	1.55E-05
Sm-151	P	3.00E-06	5.11E-05
Sn-126	P	2.18E-09	9.49E-09
Sr-90	P	7.83E-03	1.62E-02
Tc-99	P	1.12E-08	2.25E-10
Th-229	P	6.40E-05	1.58E-03
Th-230	P	7.43E-07	1.82E-05
Th-232	P	1.62E-05	4.06E-04
U-232	P	3.54E-03	1.28E-03
U-233	P	1.78E-03	5.44E-04
U-234	P	1.36E-04	4.15E-05
U-235	P	4.61E-07	1.40E-07
U-236	P	4.70E-06	1.44E-06
U-238	P	1.16E-08	3.53E-09
Zr-93	P	6.92E-07	1.74E-05
Co-60(crud)	crud	1.30E-01	3.17E-02
Fe-55(crud)	crud	9.84E-03	6.97E-03
Total		2.15E-01	1.16E+00

	evaluated fuel			x			evaluated fuel
Isotope	Fuel Type	Stable Metal	Non-Metal	Non-Metal	Other	Other	Non-Metal
	Condition	Intact	Intact	Not Intact	Intact	Not Intact	Not Intact
	Fuel Name (Ci)	ATR [15]	FSVR [85]	SHIPPINGPORT LWBR (THO2-UO2) [377]	FFTF-TFA-FSP-1 & FSP-1R [327]	EBR-II (U-MTL DE- CLAD) [438]	SHIPPINGPORT LWBR (THO2-UO2) [377]
	# of canisters	56.40	148.80	2.00	2.00	1.77	2.00
	Material Type						Curies
Ac-227	P	6.06E-05	0.00E+00	4.95E-01	1.85E-08	1.37E-04	4.95E-01
Am-241	P	1.92E+02	5.94E+02	1.38E+00	3.45E+03	1.23E+04	1.38E+00
Am-242m	P	1.95E-01	7.98E-02	1.03E-02	6.38E+00	4.73E+00	1.03E-02
Am-243	P	1.02E-01	4.33E+00	2.09E-03	4.90E-01	1.17E+01	2.09E-03
C-14	P	1.60E-05	3.82E+01	5.82E-01	4.59E-03	5.72E-03	5.82E-01
Cd-113m	P	4.00E+01	0.00E+00	8.02E-01	0.00E+00	3.53E+02	8.02E-01
Cl-36	P	0.00E+00	4.51E-01	1.22E-02	8.54E-05	0.00E+00	1.22E-02
Cm-242	P	1.61E-01	1.64E+01	8.48E-03	0.00E+00	3.90E+00	8.48E-03
Cm-243	P	3.40E-02	4.36E-01	2.46E-03	0.00E+00	1.61E+00	2.46E-03
Cm-244	P	1.95E+00	1.98E+02	1.26E-01	4.43E+01	2.08E+02	1.26E-01
Cm-245	P	9.91E-05	3.92E-02	4.68E-05	8.47E-03	6.49E-03	4.68E-05
Cm-246	P	2.67E-06	1.12E-02	3.10E-06	1.44E-03	4.79E-04	3.10E-06
Cm-247	P	0.00E+00	3.31E-08	1.10E-11	0.00E+00	0.00E+00	1.10E-11
Co-60	P	5.66E-09	0.00E+00	1.44E+01	1.29E+02	8.84E-07	1.44E+01
Cs-134	C	1.35E+04	1.11E+03	2.10E+00	4.22E+01	9.99E+04	2.10E+00
Cs-135	C	2.66E+00	2.32E+00	1.93E-01	9.38E-03	6.05E+00	1.93E-01
Cs-137	C	5.56E+05	5.82E+05	1.18E+04	4.75E+04	4.19E+06	1.18E+04
Eu-154	P	5.44E+03	0.00E+00	1.05E+02	0.00E+00	4.43E+04	1.05E+02
Eu-155	P	1.35E+03	0.00E+00	1.25E+01	0.00E+00	1.37E+04	1.25E+01
Fe-55	P	0.00E+00	0.00E+00	9.77E-02	0.00E+00	0.00E+00	9.77E-02
H-3	G	5.49E-01	1.07E+03	2.17E+01	5.93E+01	1.27E+04	2.17E+01
I-129	G	1.67E-01	3.53E-01	1.07E-02	9.92E-04	1.24E+00	1.07E-02
Kr-85	G	4.26E+04	3.87E+04	6.82E+02	5.90E+02	3.14E+05	6.82E+02
Nb-93m	P	3.35E+00	1.92E-06	4.17E-01	8.17E-02	2.42E+01	4.17E-01
Nb-94	P	2.80E-04	0.00E+00	1.51E-02	1.55E-04	2.42E-03	1.51E-02
Ni-59	P	0.00E+00	3.14E+00	4.17E-02	1.67E-02	0.00E+00	4.17E-02
Ni-63	P	2.66E-20	7.95E+01	4.71E+00	8.11E+01	0.00E+00	4.71E+00
Np-237	P	1.11E+00	2.53E+00	8.38E-04	3.43E-02	5.83E+00	8.38E-04
Pa-231	P	3.93E-04	3.31E+00	8.09E-01	3.75E-07	9.15E-04	8.09E-01
Pb-210	P	3.83E-09	4.77E-04	7.87E-05	1.57E-09	7.03E-09	7.87E-05
Pd-107	P	7.83E-02	1.43E-01	2.32E-03	2.79E-03	1.15E+00	2.32E-03
Pm-147	P	1.51E+05	0.00E+00	1.26E+01	0.00E+00	1.20E+06	1.26E+01
Pu-238	P	1.92E+03	1.34E+04	1.30E+01	6.22E+02	1.07E+04	1.30E+01
Pu-239	P	1.50E+02	3.50E+01	7.92E-01	2.59E+03	7.27E+03	7.92E-01
Pu-240	P	6.04E+01	6.23E+01	4.65E-01	2.24E+03	5.21E+03	4.65E-01
Pu-241	P	9.13E+03	0.00E+00	6.04E+01	5.09E+04	5.96E+05	6.04E+01
Pu-242	P	3.59E-02	0.00E+00	1.17E-03	5.40E-02	5.07E+00	1.17E-03
Ra-226	P	3.80E-08	5.01E-04	7.59E-05	3.54E-08	7.45E-08	7.59E-05
Ra-228	P	7.59E-10	1.13E+00	3.01E-02	1.67E-09	4.11E-09	3.01E-02
Ru-106	P	1.16E+03	4.42E-01	4.50E-05	1.65E-01	1.45E+04	4.50E-05
Sb-125	P	2.61E+03	2.10E+02	3.38E+00	0.00E+00	0.00E+00	3.38E+00
Se-79	P	4.54E+00	4.86E+00	2.38E-01	1.02E-02	3.38E+01	2.38E-01
Sm-147	P	5.42E-05	1.11E+00	8.54E-07	0.00E+00	4.04E-04	8.54E-07
Sm-151	P	4.68E+03	9.16E+03	7.73E+01	2.23E+03	1.30E+04	7.73E+01
Sn-126	P	1.49E+00	1.99E+00	2.68E-01	1.32E-02	1.33E+01	2.68E-01
Sr-90	P	5.45E+05	5.52E+05	1.20E+04	1.76E+04	3.98E+06	1.20E+04
Tc-99	P	9.41E+01	1.23E+02	2.19E+00	3.54E-01	7.04E+02	2.19E+00
Th-229	P	2.17E-07	2.73E+00	1.10E+00	5.15E-09	3.95E-07	1.10E+00
Th-230	P	1.78E-05	2.09E-01	2.82E-02	7.72E-06	3.88E-05	2.82E-02
Th-232	P	1.76E-09	9.05E-01	1.34E-01	4.25E-10	9.69E-09	1.34E-01
U-232	P	2.05E-02	4.92E+02	1.17E+03	0.00E+00	5.41E-02	1.17E+03
U-233	P	2.61E-04	1.20E+03	3.62E+02	3.63E-06	5.73E-04	3.62E+02
U-234	P	2.14E-01	9.43E+01	2.36E+01	5.31E-02	5.72E-01	2.36E+01
U-235	P	1.72E+00	3.44E-01	1.76E-03	8.42E-04	4.14E+00	1.76E-03
U-236	P	3.43E+00	3.43E+00	3.82E-03	2.08E-02	1.93E+01	3.82E-03
U-238	P	2.52E-02	8.94E-03	5.09E-05	7.56E-03	5.09E+00	5.09E-05
Zr-93	P	9.27E+00	1.97E+02	5.57E-01	4.79E-02	6.81E+01	5.57E-01
Crud (per canister)							
Co-60 (crud)	P	1.56E+01	2.68E+02	1.23E+02	7.70E+02	1.76E+03	1.23E+02
Fe-55 (crud)	P	9.85E+01	1.69E+03	7.73E+02	4.85E+03	1.11E+04	7.73E+02

DOE SNF Release Fractions				
Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
Stable Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Stable Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Non-Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
Non-Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Other/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
Other/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud				
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Evaluated Fuel:				
SHIPPINGPORT LWBR (THO2-UO2) [377]				
Non-Metal				
Not Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
breathing rate	3.33E-04	[m^3/s]		
ground level dispersion factor				
distance [m]	x/Q [sec/m^3]			
11000	2.17E-05	Maximum Sector Acute (99.5%)		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
SHIPPINGPORT LWBR (THO2-UO2) [377]							
Non-Metal	Not Intact						
Isotope	Curies (entire fuel inventory)	flnv = 1/(# of Canisters)	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	4.95E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.24E-03	4.95E-04
Am-241	1.38E+00	5.00E-01	5.00E-03	4.00E-01	1.00E+00	3.45E-03	1.38E-03
Am-242m	1.03E-02	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.58E-05	1.03E-05
Am-243	2.09E-03	5.00E-01	5.00E-03	4.00E-01	1.00E+00	5.24E-06	2.09E-06
C-14	5.82E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.46E-03	5.82E-04
Cd-113m	8.02E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.00E-03	8.02E-04
Cl-36	1.22E-02	5.00E-01	5.00E-03	4.00E-01	1.00E+00	3.05E-05	1.22E-05
Cm-242	8.48E-03	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.12E-05	8.48E-06
Cm-243	2.46E-03	5.00E-01	5.00E-03	4.00E-01	1.00E+00	6.16E-06	2.46E-06
Cm-244	1.26E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	3.16E-04	1.26E-04
Cm-245	4.68E-05	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.17E-07	4.68E-08
Cm-246	3.10E-06	5.00E-01	5.00E-03	4.00E-01	1.00E+00	7.75E-09	3.10E-09
Cm-247	1.10E-11	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.74E-14	1.10E-14
Co-60	1.44E+01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	3.60E-02	1.44E-02
Cs-134	2.10E+00	5.00E-01	5.00E-03	1.00E+00	1.00E+00	5.25E-03	5.25E-03
Cs-135	1.93E-01	5.00E-01	5.00E-03	1.00E+00	1.00E+00	4.82E-04	4.82E-04
Cs-137	1.18E+04	5.00E-01	5.00E-03	1.00E+00	1.00E+00	2.95E+01	2.95E+01
Eu-154	1.05E+02	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.63E-01	1.05E-01
Eu-155	1.25E+01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	3.13E-02	1.25E-02
Fe-55	9.77E-02	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.44E-04	9.77E-05
H-3	2.17E+01	5.00E-01	3.00E-01	1.00E+00	1.00E+00	3.26E+00	3.26E+00
I-129	1.07E-02	5.00E-01	3.00E-01	1.00E+00	1.00E+00	1.60E-03	1.60E-03
Kr-85	6.82E+02	5.00E-01	3.00E-01	1.00E+00	1.00E+00	1.02E+02	1.02E+02
Nb-93m	4.17E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.04E-03	4.17E-04
Nb-94	1.51E-02	5.00E-01	5.00E-03	4.00E-01	1.00E+00	3.77E-05	1.51E-05
Ni-59	4.17E-02	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.04E-04	4.17E-05
Ni-63	4.71E+00	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.18E-02	4.71E-03
Np-237	8.38E-04	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.10E-06	8.38E-07
Pa-231	8.09E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.02E-03	8.09E-04
Pb-210	7.87E-05	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.97E-07	7.87E-08
Pd-107	2.32E-03	5.00E-01	5.00E-03	4.00E-01	1.00E+00	5.81E-06	2.32E-06
Pm-147	1.26E+01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	3.15E-02	1.26E-02
Pu-238	1.30E+01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	3.24E-02	1.30E-02
Pu-239	7.92E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.98E-03	7.92E-04
Pu-240	4.65E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.16E-03	4.65E-04
Pu-241	6.04E+01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.51E-01	6.04E-02
Pu-242	1.17E-03	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.93E-06	1.17E-06
Ra-226	7.59E-05	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.90E-07	7.59E-08
Ra-228	3.01E-02	5.00E-01	5.00E-03	4.00E-01	1.00E+00	7.54E-05	3.01E-05
Ru-106	4.50E-05	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.12E-07	4.50E-08
Sb-125	3.38E+00	5.00E-01	5.00E-03	4.00E-01	1.00E+00	8.45E-03	3.38E-03
Se-79	2.38E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	5.96E-04	2.38E-04
Sm-147	8.54E-07	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.14E-09	8.54E-10
Sm-151	7.73E+01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.93E-01	7.73E-02
Sn-126	2.68E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	6.71E-04	2.68E-04
Sr-90	1.20E+04	5.00E-01	5.00E-03	4.00E-01	1.00E+00	3.00E+01	1.20E+01
Tc-99	2.19E+00	5.00E-01	5.00E-03	4.00E-01	1.00E+00	5.47E-03	2.19E-03
Th-229	1.10E+00	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.74E-03	1.10E-03
Th-230	2.82E-02	5.00E-01	5.00E-03	4.00E-01	1.00E+00	7.04E-05	2.82E-05
Th-232	1.34E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	3.34E-04	1.34E-04
U-232	1.17E+03	5.00E-01	5.00E-03	4.00E-01	1.00E+00	2.93E+00	1.17E+00
U-233	3.62E+02	5.00E-01	5.00E-03	4.00E-01	1.00E+00	9.06E-01	3.62E-01
U-234	2.36E+01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	5.89E-02	2.36E-02
U-235	1.76E-03	5.00E-01	5.00E-03	4.00E-01	1.00E+00	4.40E-06	1.76E-06
U-236	3.82E-03	5.00E-01	5.00E-03	4.00E-01	1.00E+00	9.56E-06	3.82E-06
U-238	5.09E-05	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.27E-07	5.09E-08
Zr-93	5.57E-01	5.00E-01	5.00E-03	4.00E-01	1.00E+00	1.39E-03	5.57E-04
crud (per canister)							
Co-60 (crud)	1.23E+02	1.00E+00	1.00E+00	3.00E-01	1.00E+00	1.23E+02	3.69E+01
Fe-55 (crud)	7.73E+02	1.00E+00	1.00E+00	3.00E-01	1.00E+00	7.73E+02	2.32E+02

SHIPPINGPORT LWBR (THO2-UO2) [377]													
Non-Metal	Not Intact												
Inhalation Dose [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Lung)
Ac-227	5.25E-03	8.82E-07	2.04E-02	3.40E-02	4.25E-01	4.76E-07	1.95E-02	2.40E-02	0.00E+00	U-232	89.42%	U-232	90.91%
Am-241	1.20E-03	9.85E-08	6.79E-04	6.42E-03	8.00E-02	5.90E-08	2.88E-03	4.43E-03	0.00E+00	U-233	5.69%	U-233	5.78%
Am-242m	8.84E-06	3.80E-10	1.16E-06	4.66E-05	5.84E-04	1.55E-10	2.06E-05	3.17E-05	0.00E+00	Sr-90	1.81%	Sr-90	1.80%
Am-243	1.83E-06	8.51E-10	9.97E-07	9.69E-06	1.21E-04	4.64E-10	4.33E-06	6.66E-06	0.00E+00	Co-60(crud)	0.94%	Co-60(crud)	0.67%
C-14	8.78E-09	8.78E-09	8.78E-09	8.78E-09	8.78E-09	8.78E-09	8.78E-09	8.78E-09	0.00E+00	Pu-238	0.59%	U-234	0.37%
Cd-113m	7.12E-07	7.12E-07	8.77E-06	7.12E-07	7.12E-07	7.12E-07	2.79E-05	8.85E-06	0.00E+00	Ac-227	0.38%	Pu-238	0.22%
Cl-36	1.64E-10	1.64E-10	1.49E-08	1.64E-10	1.64E-10	1.64E-10	1.75E-10	1.93E-09	0.00E+00	U-234	0.36%	Th-229	0.11%
Cm-242	1.29E-07	2.14E-10	3.51E-06	8.84E-07	1.10E-05	2.13E-10	5.56E-07	1.06E-06	0.00E+00	Th-229	0.27%	Ac-227	0.04%
Cm-243	1.36E-06	4.14E-10	1.28E-06	7.77E-06	9.68E-05	2.52E-10	3.79E-06	5.47E-06	0.00E+00	Pa-231	0.12%	Pa-231	0.03%
Cm-244	5.37E-05	3.51E-09	6.52E-05	3.17E-04	3.95E-03	3.41E-09	1.61E-04	2.26E-04	0.00E+00	Cs-137	0.11%	Cs-137	0.01%
Cm-245	4.21E-08	8.37E-12	2.25E-08	2.24E-07	2.80E-06	4.60E-12	9.95E-08	1.54E-07	0.00E+00	Fe-55(crud)	0.07%	Pu-239	0.01%
Cm-246	2.77E-09	3.31E-13	1.51E-09	1.47E-08	1.84E-07	1.87E-13	6.58E-09	1.01E-08	0.00E+00	Am-241	0.07%	Fe-55(crud)	0.01%
Cm-247	9.01E-15	6.54E-18	4.90E-15	4.78E-14	5.98E-13	4.25E-18	2.14E-14	3.29E-14	0.00E+00	Pu-241	0.06%	Pu-241	0.01%
Co-60	1.83E-06	7.08E-06	1.33E-04	6.62E-06	5.20E-06	6.24E-06	1.39E-05	2.28E-05	0.00E+00	Pu-239	0.04%	Pu-240	0.01%
Cs-134	1.82E-06	1.51E-06	1.65E-06	1.65E-06	1.54E-06	1.56E-06	1.95E-06	1.75E-06	0.00E+00	Th-232	0.03%	Th-232	0.01%
Cs-135	1.55E-08	1.55E-08	1.82E-08	1.55E-08	1.55E-08	1.55E-08	1.55E-08	1.58E-08	0.00E+00	Pu-240	0.02%	Am-241	0.00%
Cs-137	6.92E-03	6.19E-03	6.96E-03	6.55E-03	6.27E-03	6.26E-03	7.20E-03	6.81E-03	0.00E+00	Cm-244	0.00%	Th-230	0.00%
Eu-154	3.29E-05	4.36E-05	2.23E-04	2.98E-04	1.47E-03	2.01E-05	3.18E-04	2.17E-04	0.00E+00	Eu-154	0.00%	Eu-154	0.00%
Eu-155	1.19E-07	2.06E-07	3.99E-06	4.79E-06	5.09E-05	8.04E-08	3.72E-06	3.75E-06	0.00E+00	Th-230	0.00%	Co-60	0.00%
Fe-55	1.37E-09	1.33E-09	2.77E-09	1.35E-09	1.34E-09	1.42E-09	3.16E-09	1.90E-09	0.00E+00	Am-242m	0.00%	Cm-244	0.00%
H-3	1.51E-06	1.51E-06	1.51E-06	1.51E-06	1.51E-06	1.51E-06	1.51E-06	1.51E-06	0.00E+00	Co-60	0.00%	U-236	0.00%
I-129	3.72E-09	8.94E-09	1.34E-08	5.99E-09	5.91E-09	6.68E-05	5.05E-09	2.01E-06	0.00E+00	Sm-151	0.00%	Pm-147	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cd-113m	0.00%	U-235	0.00%
Nb-93m	4.63E-09	4.86E-10	7.18E-07	3.17E-09	8.27E-09	3.39E-10	4.40E-09	8.80E-08	0.00E+00	Am-243	0.00%	Pu-242	0.00%
Nb-94	1.92E-09	9.04E-09	3.02E-07	9.12E-09	7.95E-09	8.96E-09	1.80E-08	4.52E-08	0.00E+00	Cm-243	0.00%	Cd-113m	0.00%
Ni-59	4.00E-10	3.86E-10	1.34E-09	3.94E-10	3.91E-10	4.20E-10	4.05E-10	3.99E-10	0.00E+00	Eu-155	0.00%	Sm-151	0.00%
Ni-63	1.04E-07	1.04E-07	3.87E-07	1.04E-07	1.04E-07	1.04E-07	1.08E-07	1.06E-07	0.00E+00	Pm-147	0.00%	Ra-228	0.00%
Np-237	6.63E-07	3.79E-10	3.61E-07	5.87E-06	7.33E-05	3.00E-10	5.24E-07	3.27E-06	0.00E+00	Pu-242	0.00%	Eu-155	0.00%
Pa-231	1.49E-07	1.90E-07	1.62E-02	1.51E-02	1.88E-01	1.65E-07	6.21E-06	7.50E-03	0.00E+00	U-236	0.00%	Cm-242	0.00%
Pb-210	6.69E-10	6.69E-10	6.69E-10	7.89E-09	1.15E-07	6.69E-10	9.86E-09	7.72E-09	0.00E+00	Np-237	0.00%	Sb-125	0.00%
Pd-107	5.87E-14	5.87E-14	1.77E-09	3.17E-13	8.44E-13	5.87E-14	1.33E-11	2.14E-10	0.00E+00	I-129	0.00%	Cs-134	0.00%
Pm-147	6.33E-12	1.21E-11	2.60E-05	2.75E-06	3.43E-05	6.66E-12	1.98E-06	3.57E-06	0.00E+00	Cs-134	0.00%	H-3	0.00%
Pu-238	9.71E-03	3.47E-07	1.11E-01	5.27E-02	6.59E-01	3.34E-07	2.44E-02	3.68E-02	0.00E+00	U-235	0.00%	Zr-93	0.00%
Pu-239	6.73E-04	1.95E-08	6.84E-03	3.58E-03	4.47E-02	1.91E-08	1.60E-03	2.46E-03	0.00E+00	H-3	0.00%	Cm-243	0.00%
Pu-240	3.96E-04	1.18E-08	4.02E-03	2.10E-03	2.63E-02	1.13E-08	9.41E-04	1.44E-03	0.00E+00	Zr-93	0.00%	Am-242m	0.00%
Pu-241	1.10E-03	4.94E-08	5.14E-03	5.43E-03	6.79E-02	2.00E-08	2.12E-03	3.60E-03	0.00E+00	Cm-242	0.00%	Sn-126	0.00%
Pu-242	9.48E-07	2.97E-11	9.63E-06	5.05E-06	6.31E-05	2.76E-11	2.25E-06	3.48E-06	0.00E+00	Ra-228	0.00%	Am-243	0.00%
Ra-226	2.07E-10	2.07E-10	3.27E-08	1.35E-09	1.54E-08	2.07E-10	2.17E-10	4.71E-09	0.00E+00	Sb-125	0.00%	Tc-99	0.00%
Ra-228	1.48E-07	1.48E-07	5.82E-06	5.95E-07	5.25E-06	1.48E-07	1.51E-07	1.04E-06	0.00E+00	Sn-126	0.00%	Nb-93m	0.00%
Ru-106	1.66E-11	1.65E-11	1.25E-09	1.65E-11	1.65E-11	1.65E-11	2.03E-11	1.55E-10	0.00E+00	Cm-245	0.00%	Ni-63	0.00%
Sb-125	3.25E-08	3.76E-08	1.96E-06	5.86E-08	2.47E-07	2.93E-08	1.31E-07	2.98E-07	0.00E+00	Tc-99	0.00%	U-238	0.00%
Se-79	4.33E-09	4.33E-09	6.25E-08	4.33E-09	4.33E-09	4.33E-09	2.70E-08	1.70E-08	0.00E+00	Ni-63	0.00%	Np-237	0.00%
Sm-147	0.00E+00	0.00E+00	1.74E-10	6.28E-10	7.85E-09	0.00E+00	4.32E-10	4.61E-10	0.00E+00	Nb-93m	0.00%	Nb-94	0.00%
Sm-151	8.33E-11	3.08E-11	6.74E-06	2.27E-05	2.85E-04	2.73E-11	1.55E-05	1.67E-05	0.00E+00	Nb-94	0.00%	Se-79	0.00%
Sn-126	1.03E-07	1.01E-07	1.08E-06	4.03E-07	8.46E-07	9.39E-08	1.26E-07	1.93E-07	0.00E+00	U-238	0.00%	Ra-226	0.00%
Sr-90	8.47E-04	8.47E-04	9.17E-01	1.08E-01	2.33E-01	8.47E-04	1.84E-03	1.13E-01	0.00E+00	Se-79	0.00%	Cm-245	0.00%

Inhalation Doses

Tc-99	2.65E-09	2.65E-09	9.78E-07	2.65E-09	2.65E-09	7.08E-08	3.67E-08	1.32E-07	0.00E+00	Cs-135	0.00%	Cs-135	0.00%
Th-229	8.09E-05	8.09E-05	5.83E-02	3.37E-02	4.19E-01	8.09E-05	2.07E-04	1.70E-02	0.00E+00	Cm-246	0.00%	Cl-36	0.00%
Th-230	3.07E-07	3.07E-07	2.26E-04	1.30E-04	1.63E-03	3.07E-07	7.91E-07	6.63E-05	0.00E+00	C-14	0.00%	I-129	0.00%
Th-232	2.72E-06	2.76E-06	3.36E-03	3.19E-03	3.97E-02	2.66E-06	6.68E-06	1.58E-03	0.00E+00	Pb-210	0.00%	C-14	0.00%
U-232	2.50E-03	2.52E-03	4.63E+01	1.27E-01	2.01E+00	2.46E-03	9.73E-02	5.57E+00	0.00E+00	Ra-226	0.00%	Fe-55	0.00%
U-233	2.46E-04	2.46E-04	2.95E+00	6.90E-03	1.09E-01	2.46E-04	9.11E-03	3.55E-01	0.00E+00	Cl-36	0.00%	Pd-107	0.00%
U-234	1.57E-05	1.57E-05	1.88E-01	4.40E-04	6.86E-03	1.57E-05	5.83E-04	2.25E-02	0.00E+00	Fe-55	0.00%	Cm-246	0.00%
U-235	1.11E-09	1.12E-09	1.30E-05	3.09E-08	4.75E-07	1.11E-09	4.04E-08	1.56E-06	0.00E+00	Sm-147	0.00%	Ni-59	0.00%
U-236	2.42E-09	2.42E-09	2.88E-05	6.75E-08	1.06E-06	2.42E-09	8.97E-08	3.47E-06	0.00E+00	Ni-59	0.00%	Ru-106	0.00%
U-238	3.03E-11	3.03E-11	3.62E-07	8.95E-10	1.33E-08	3.02E-11	1.12E-09	4.35E-08	0.00E+00	Pd-107	0.00%	Pb-210	0.00%
Zr-93	3.25E-10	6.97E-10	1.30E-06	2.64E-06	3.25E-05	2.59E-10	2.58E-09	1.29E-06	0.00E+00	Ru-106	0.00%	Sm-147	0.00%
										Cm-247	0.00%	Cm-247	0.00%
crud										Kr-85	0.00%	Kr-85	0.00%
Co-60 (crud)	4.70E-03	1.82E-02	3.40E-01	1.70E-02	1.33E-02	1.60E-02	3.55E-02	5.83E-02	0.00E+00				
Fe-55 (crud)	3.24E-03	3.16E-03	6.57E-03	3.21E-03	3.19E-03	3.36E-03	7.50E-03	4.50E-03	0.00E+00				
total	3.70E-02	3.13E-02	5.09E+01	4.26E-01	4.34E+00	2.94E-02	2.11E-01	6.23E+00	0.00E+00				

SHIPPINGPORT LWBR (THO2-UO2) [377]										
Non-Metal	Not Intact									
Air Submersion Dose [rem]										Isotope % of Dose
Isotopes	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes % of Total Skin Dose
Ac-227	3.73E-12	4.43E-12	3.36E-12	2.93E-12	1.03E-11	3.63E-12	3.17E-12	3.72E-12	3.27E-11	Co-60 (crud) 85.80%
Am-241	2.38E-10	2.96E-10	1.87E-10	1.44E-10	7.95E-10	2.17E-10	1.76E-10	2.27E-10	3.54E-10	Kr-85 6.49%
Am-242m	7.86E-14	1.24E-13	3.56E-14	3.56E-14	1.64E-13	6.10E-14	4.01E-14	6.56E-14	2.81E-13	Cs-137 6.24%
Am-243	9.21E-13	1.10E-12	8.07E-13	6.52E-13	3.14E-12	8.79E-13	7.52E-13	9.16E-13	1.16E-12	Sr-90 1.33%
C-14	3.03E-14	4.11E-14	1.79E-14	1.41E-14	8.25E-14	2.56E-14	1.80E-14	2.62E-14	2.84E-11	Eu-154 0.10%
Cd-113m	1.15E-12	1.41E-12	9.54E-13	8.06E-13	3.38E-12	1.09E-12	9.06E-13	1.12E-12	1.36E-09	Co-60 0.03%
Cl-36	5.48E-14	6.51E-14	4.94E-14	4.43E-14	1.38E-13	5.36E-14	4.70E-14	5.45E-14	3.60E-11	Cs-134 0.00%
Cm-242	1.33E-14	2.52E-14	1.92E-15	3.22E-15	1.80E-14	8.36E-15	3.86E-15	9.69E-15	7.30E-14	Sb-125 0.00%
Cm-243	2.85E-12	3.30E-12	2.72E-12	2.47E-12	7.42E-12	2.85E-12	2.57E-12	2.91E-12	4.84E-12	U-232 0.00%
Cm-244	1.75E-13	3.37E-13	1.79E-14	3.70E-14	2.24E-13	1.06E-13	4.59E-14	1.24E-13	9.91E-13	Eu-155 0.00%
Cm-245	3.64E-14	4.27E-14	3.41E-14	2.98E-14	1.11E-13	3.61E-14	3.19E-14	3.72E-14	5.03E-14	Sn-126 0.00%
Cm-246	3.88E-18	7.46E-18	4.35E-19	8.40E-19	5.08E-18	2.38E-18	1.04E-18	2.77E-18	2.17E-17	U-233 0.00%
Cm-247	3.24E-20	3.70E-20	3.17E-20	3.04E-20	6.23E-20	3.28E-20	3.04E-20	3.30E-20	3.94E-20	Pm-147 0.00%
Co-60	3.56E-07	4.02E-07	3.58E-07	3.56E-07	5.14E-07	3.67E-07	3.47E-07	3.64E-07	4.19E-07	Cd-113m 0.00%
Cs-134	3.12E-08	3.55E-08	3.10E-08	3.03E-08	5.05E-08	3.19E-08	2.97E-08	3.19E-08	3.98E-08	Tc-99 0.00%
Cs-135	2.43E-14	3.18E-14	1.62E-14	1.29E-14	7.00E-14	2.13E-14	1.58E-14	2.19E-14	3.51E-11	Th-229 0.00%
Cs-137	6.33E-05	7.22E-05	6.28E-05	6.12E-05	1.04E-04	6.46E-05	6.01E-05	6.46E-05	1.04E-04	Pa-231 0.00%
Eu-154	1.27E-06	1.44E-06	1.26E-06	1.24E-06	1.99E-06	1.30E-06	1.21E-06	1.30E-06	1.75E-06	Am-241 0.00%
Eu-155	6.26E-09	7.42E-09	5.58E-09	4.65E-09	2.04E-08	6.06E-09	5.21E-09	6.26E-09	8.53E-09	Nb-94 0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-234 0.00%
H-3	0.00E+00	0.00E+00	7.20E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.67E-11	0.00E+00	I-129 0.00%
I-129	6.21E-11	8.56E-11	2.75E-11	2.11E-11	1.41E-10	4.96E-11	2.96E-11	4.88E-11	1.41E-10	Pu-238 0.00%
Kr-85	9.61E-07	1.10E-06	9.36E-07	8.95E-07	1.81E-06	9.69E-07	8.95E-07	9.77E-07	1.08E-04	Cl-36 0.00%
Nb-93m	5.29E-13	1.10E-12	2.13E-14	9.87E-14	5.79E-13	2.87E-13	1.14E-13	3.71E-13	3.58E-12	Cs-135 0.00%
Nb-94	2.28E-10	2.60E-10	2.28E-10	2.22E-10	3.61E-10	2.34E-10	2.18E-10	2.33E-10	2.88E-10	Ac-227 0.00%
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	C-14 0.00%
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Se-79 0.00%
Np-237	1.75E-13	2.12E-13	1.52E-13	1.29E-13	5.38E-13	1.67E-13	1.43E-13	1.73E-13	2.59E-13	Cm-243 0.00%
Pa-231	2.78E-10	3.23E-10	2.63E-10	2.47E-10	5.91E-10	2.76E-10	2.50E-10	2.79E-10	3.96E-10	Pu-240 0.00%
Pb-210	9.77E-16	1.29E-15	6.71E-16	4.96E-16	3.08E-15	8.56E-16	6.46E-16	8.90E-16	2.02E-15	Nb-93m 0.00%
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-235 0.00%
Pm-147	1.89E-12	2.41E-12	1.38E-12	1.13E-12	5.51E-12	1.71E-12	1.33E-12	1.75E-12	2.05E-09	Pu-239 0.00%
Pu-238	1.71E-11	3.31E-11	2.76E-12	4.37E-12	2.42E-11	1.04E-11	5.18E-12	1.27E-11	1.07E-10	Sm-151 0.00%
Pu-239	7.69E-13	1.20E-12	4.21E-13	4.24E-13	1.50E-12	6.17E-13	4.54E-13	6.74E-13	2.96E-12	Pu-241 0.00%
Pu-240	5.94E-13	1.15E-12	1.02E-13	1.54E-13	8.65E-13	3.66E-13	1.83E-13	4.44E-13	3.66E-12	Am-243 0.00%
Pu-241	8.72E-13	1.05E-12	7.86E-13	6.83E-13	2.66E-12	8.47E-13	7.39E-13	8.79E-13	1.42E-12	Cm-244 0.00%
Pu-242	1.26E-15	2.43E-15	2.28E-16	3.37E-16	1.86E-15	7.82E-16	3.96E-16	9.45E-16	7.70E-15	Ru-106 0.00%
Ra-226	4.69E-15	5.39E-15	4.49E-15	4.11E-15	1.21E-14	4.71E-15	4.25E-15	4.80E-15	7.30E-15	Th-232 0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-242m 0.00%
Ru-106	9.12E-14	1.05E-13	9.12E-14	8.80E-14	1.55E-13	9.30E-14	8.69E-14	9.39E-14	9.84E-13	Np-237 0.00%
Sb-125	1.34E-08	1.54E-08	1.32E-08	1.27E-08	2.39E-08	1.36E-08	1.26E-08	1.37E-08	1.80E-08	Th-230 0.00%
Se-79	1.66E-14	2.23E-14	1.01E-14	7.99E-15	4.59E-14	1.42E-14	1.00E-14	1.45E-14	1.78E-11	Cm-242 0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-245 0.00%
Sm-151	8.07E-13	1.36E-12	1.10E-13	1.75E-13	1.10E-12	5.55E-13	2.31E-13	5.60E-13	2.95E-12	U-236 0.00%
Sn-126	4.06E-09	4.64E-09	4.02E-09	3.89E-09	7.05E-09	4.14E-09	3.85E-09	4.15E-09	7.03E-09	Pu-242 0.00%
Sr-90	1.87E-08	2.28E-08	1.55E-08	1.31E-08	5.49E-08	1.76E-08	1.47E-08	1.81E-08	2.21E-05	Ra-226 0.00%
Tc-99	7.65E-13	9.67E-13	5.67E-13	4.62E-13	2.27E-12	6.90E-13	5.45E-13	7.12E-13	1.20E-09	Pb-210 0.00%
Th-229	8.29E-10	9.72E-10	7.70E-10	6.66E-10	2.53E-09	8.14E-10	7.19E-10	8.42E-10	1.19E-09	U-238 0.00%
Th-230	1.02E-13	1.35E-13	8.08E-14	6.90E-14	2.99E-13	9.21E-14	7.74E-14	9.84E-14	2.55E-13	Cm-246 0.00%
Th-232	2.51E-13	3.65E-13	1.71E-13	1.48E-13	6.97E-13	2.12E-13	1.70E-13	2.34E-13	9.23E-13	Cm-247 0.00%
U-232	3.64E-09	5.45E-09	2.31E-09	2.11E-09	9.07E-09	3.03E-09	2.35E-09	3.34E-09	1.39E-08	Fe-55 0.00%
U-233	1.23E-09	1.61E-09	9.82E-10	9.02E-10	3.00E-09	1.13E-09	9.53E-10	1.19E-09	3.32E-09	Fe-55 (crud) 0.00%
U-234	4.16E-11	6.81E-11	2.07E-11	1.99E-11	9.41E-11	3.16E-11	2.27E-11	3.61E-11	2.01E-10	H-3 0.00%
U-235	2.49E-12	2.86E-12	2.38E-12	2.17E-12	6.50E-12	2.49E-12	2.25E-12	2.54E-12	3.05E-12	Ni-59 0.00%
U-236	4.68E-15	8.44E-15	1.67E-15	1.79E-15	9.13E-15	3.22E-15	2.07E-15	3.84E-15	2.74E-14	Ni-63 0.00%
U-238	4.48E-17	8.72E-17	1.02E-17	1.27E-17	7.56E-17	2.78E-17	1.54E-17	3.48E-17	2.97E-16	Pd-107 0.00%
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ra-228 0.00%
										Sm-147 0.00%
crud										Zr-93 0.00%
Co-60 (crud)	1.21E-03	1.37E-03	1.22E-03	1.21E-03	1.76E-03	1.25E-03	1.19E-03	1.24E-03	1.43E-03	
Fe-55 (crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
totals	1.28E-03	1.45E-03	1.29E-03	1.28E-03	1.87E-03	1.32E-03	1.25E-03	1.31E-03	1.67E-03	

SHIPPINGPORT LWBR (THO2-UO2) [377]

Non-Metal

Not Intact

	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	3.70E-02		1.28E-03			
Breast	3.13E-02		1.45E-03			
Lung	5.09E+01	<CDE	1.29E-03			
R Marrow	4.26E-01		1.28E-03			
B Surface	4.34E+00		1.87E-03			
Thyroid	2.94E-02		1.32E-03			
Remainder	2.11E-01		1.25E-03			
Whole Body	6.23E+00	<CEDE	1.31E-03	<DDE	6.23E+00	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	1.67E-03	<SKIN	1.67E-03	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					5.09E+01	<CDE + DDE

SHIPPINGPORT LWBR (THO2-
UO2) [377]

Isotope	Material Type	Offsite Doses [rem]	
		TEDE	lung CDE + DDE
Ac-227	P	2.40E-02	2.04E-02
Am-241	P	4.43E-03	6.79E-04
Am-242m	P	3.17E-05	1.16E-06
Am-243	P	6.66E-06	9.97E-07
C-14	P	8.78E-09	8.78E-09
Cd-113m	P	8.85E-06	8.77E-06
Cl-36	P	1.93E-09	1.49E-08
Cm-242	P	1.06E-06	3.51E-06
Cm-243	P	5.47E-06	1.28E-06
Cm-244	P	2.26E-04	6.52E-05
Cm-245	P	1.54E-07	2.25E-08
Cm-246	P	1.01E-08	1.51E-09
Cm-247	P	3.29E-14	4.90E-15
Co-60	P	2.31E-05	1.33E-04
Cs-134	C	1.78E-06	1.69E-06
Cs-135	C	1.58E-08	1.82E-08
Cs-137	C	6.88E-03	7.03E-03
Eu-154	P	2.19E-04	2.24E-04
Eu-155	P	3.76E-06	3.99E-06
Fe-55	P	1.90E-09	2.77E-09
H-3	G	1.51E-06	1.51E-06
I-129	G	2.01E-06	1.35E-08
Kr-85	G	9.77E-07	9.77E-07
Nb-93m	P	8.80E-08	7.18E-07
Nb-94	P	4.54E-08	3.02E-07
Ni-59	P	3.99E-10	1.34E-09
Ni-63	P	1.06E-07	3.87E-07
Np-237	P	3.27E-06	3.61E-07
Pa-231	P	7.50E-03	1.62E-02
Pb-210	P	7.72E-09	6.69E-10
Pd-107	P	2.14E-10	1.77E-09
Pm-147	P	3.57E-06	2.60E-05
Pu-238	P	3.68E-02	1.11E-01
Pu-239	P	2.46E-03	6.84E-03
Pu-240	P	1.44E-03	4.02E-03
Pu-241	P	3.60E-03	5.14E-03
Pu-242	P	3.48E-06	9.63E-06
Ra-226	P	4.71E-09	3.27E-08
Ra-228	P	1.04E-06	5.82E-06
Ru-106	P	1.55E-10	1.25E-09
Sb-125	P	3.12E-07	1.97E-06
Se-79	P	1.70E-08	6.25E-08
Sm-147	P	4.61E-10	1.74E-10
Sm-151	P	1.67E-05	6.74E-06
Sn-126	P	1.97E-07	1.09E-06
Sr-90	P	1.13E-01	9.17E-01
Tc-99	P	1.32E-07	9.78E-07
Th-229	P	1.70E-02	5.83E-02
Th-230	P	6.63E-05	2.26E-04
Th-232	P	1.58E-03	3.36E-03
U-232	P	5.57E+00	4.63E+01
U-233	P	3.55E-01	2.95E+00
U-234	P	2.25E-02	1.88E-01
U-235	P	1.56E-06	1.30E-05
U-236	P	3.47E-06	2.88E-05
U-238	P	4.35E-08	3.62E-07
Zr-93	P	1.29E-06	1.30E-06
Co-60 (crud)	crud	5.96E-02	3.42E-01
Fe-55 (crud)	crud	4.50E-03	6.57E-03
Total		6.23E+00	5.09E+01

	evaluated fuel				x		evaluated fuel
Isotope	Fuel Type	Stable Metal	Non-Metal	Non-Metal	Other	Other	Other
	Condition	Intact	Intact	Not Intact	Intact	Not Intact	Intact
	Fuel Name (Ci)	ATR [15]	FSVR [85]	SHIPPINGPORT LWBR (THO2-UO2) [377]	FFTF-TFA-FSP-1 & FSP-1R [327]	EBR-II (U-MTL DE- CLAD) [438]	FFTF-TFA-FSP-1 & FSP-1R [327]
	# of canisters	56.40	148.80	2.00	2.00	1.77	2
	Material Type						Curies
Ac-227	P	6.06E-05	0.00E+00	4.95E-01	1.85E-08	1.37E-04	1.85E-08
Am-241	P	1.92E+02	5.94E+02	1.38E+00	3.45E+03	1.23E+04	3.45E+03
Am-242m	P	1.95E-01	7.98E-02	1.03E-02	6.38E+00	4.73E+00	6.38E+00
Am-243	P	1.02E-01	4.33E+00	2.09E-03	4.90E-01	1.17E+01	4.90E-01
C-14	P	1.60E-05	3.82E+01	5.82E-01	4.59E-03	5.72E-03	4.59E-03
Cd-113m	P	4.00E+01	0.00E+00	8.02E-01	0.00E+00	3.53E+02	0.00E+00
Cl-36	P	0.00E+00	4.51E-01	1.22E-02	8.54E-05	0.00E+00	8.54E-05
Cm-242	P	1.61E-01	1.64E+01	8.48E-03	0.00E+00	3.90E+00	0.00E+00
Cm-243	P	3.40E-02	4.36E-01	2.46E-03	0.00E+00	1.61E+00	0.00E+00
Cm-244	P	1.95E+00	1.98E+02	1.26E-01	4.43E+01	2.08E+02	4.43E+01
Cm-245	P	9.91E-05	3.92E-02	4.68E-05	8.47E-03	6.49E+03	8.47E-03
Cm-246	P	2.67E-06	1.12E-02	3.10E-06	1.44E-03	4.79E-04	1.44E-03
Cm-247	P	0.00E+00	3.31E-08	1.10E-11	0.00E+00	0.00E+00	0.00E+00
Co-60	P	5.66E-09	0.00E+00	1.44E+01	1.29E+02	8.84E-07	1.29E+02
Cs-134	C	1.35E+04	1.11E+03	2.10E+00	4.22E+01	9.99E+04	4.22E+01
Cs-135	C	2.66E+00	2.32E+00	1.93E-01	9.38E-03	6.05E+00	9.38E-03
Cs-137	C	5.56E+05	5.82E+05	1.18E+04	4.75E+04	4.19E+06	4.75E+04
Eu-154	P	5.44E+03	0.00E+00	1.05E+02	0.00E+00	4.43E+04	0.00E+00
Eu-155	P	1.35E+03	0.00E+00	1.25E+01	0.00E+00	1.37E+04	0.00E+00
Fe-55	P	0.00E+00	0.00E+00	9.77E-02	0.00E+00	0.00E+00	0.00E+00
H-3	G	5.49E-01	1.07E+03	2.17E+01	5.93E+01	1.27E+04	5.93E+01
I-129	G	1.67E-01	3.53E-01	1.07E-02	9.92E-04	1.24E+00	9.92E-04
Kr-85	G	4.26E+04	3.87E+04	6.82E+02	5.90E+02	3.14E+05	5.90E+02
Nb-93m	P	3.35E+00	1.92E-06	4.17E-01	8.17E-02	2.42E+01	8.17E-02
Nb-94	P	2.80E-04	0.00E+00	1.51E-02	1.55E-04	2.42E-03	1.55E-04
Ni-59	P	0.00E+00	3.14E+00	4.17E-02	1.67E-02	0.00E+00	1.67E-02
Ni-63	P	2.66E-20	7.95E+01	4.71E+00	8.11E+01	0.00E+00	8.11E+01
Np-237	P	1.11E+00	2.53E+00	8.38E-04	3.43E-02	5.83E+00	3.43E-02
Pa-231	P	3.93E-04	3.31E+00	8.09E-01	3.75E-07	9.15E-04	3.75E-07
Pb-210	P	3.83E-09	4.77E-04	7.87E-05	1.57E-09	7.03E-09	1.57E-09
Pd-107	P	7.83E-02	1.43E-01	2.32E-03	2.79E-03	1.15E+00	2.79E-03
Pm-147	P	1.51E+05	0.00E+00	1.26E+01	0.00E+00	1.20E+06	0.00E+00
Pu-238	P	1.92E+03	1.34E+04	1.30E+01	6.22E+02	1.07E+04	6.22E+02
Pu-239	P	1.50E+02	3.50E+01	7.92E-01	2.59E+03	7.27E+03	2.59E+03
Pu-240	P	6.04E+01	6.23E+01	4.65E-01	2.24E+03	5.21E+03	2.24E+03
Pu-241	P	9.13E+03	0.00E+00	6.04E+01	5.09E+04	5.96E+05	5.09E+04
Pu-242	P	3.59E-02	0.00E+00	1.17E-03	5.40E-02	5.07E+00	5.40E-02
Ra-226	P	3.80E-08	5.01E-04	7.59E-05	3.54E-08	7.45E-08	3.54E-08
Ra-228	P	7.59E-10	1.13E+00	3.01E-02	1.67E-09	4.11E-09	1.67E-09
Ru-106	P	1.16E+03	4.42E-01	4.50E-05	1.65E-01	1.45E+04	1.65E-01
Sb-125	P	2.61E+03	2.10E+02	3.38E+00	0.00E+00	0.00E+00	0.00E+00
Se-79	P	4.54E+00	4.86E+00	2.38E-01	1.02E-02	3.38E+01	1.02E-02
Sm-147	P	5.42E-05	1.11E+00	8.54E-07	0.00E+00	4.04E-04	0.00E+00
Sm-151	P	4.68E+03	9.16E+03	7.73E+01	2.23E+03	1.30E+04	2.23E+03
Sn-126	P	1.49E+00	1.99E+00	2.68E-01	1.32E-02	1.33E+01	1.32E-02
Sr-90	P	5.45E+05	5.52E+05	1.20E+04	1.76E+04	3.98E+06	1.76E+04
Tc-99	P	9.41E+01	1.23E+02	2.19E+00	3.54E-01	7.04E+02	3.54E-01
Th-229	P	2.17E-07	2.73E+00	1.10E+00	5.15E-09	3.95E-07	5.15E-09
Th-230	P	1.78E-05	2.09E-01	2.82E-02	7.72E-06	3.88E-05	7.72E-06
Th-232	P	1.76E-09	9.05E-01	1.34E-01	4.25E-10	9.69E-09	4.25E-10
U-232	P	2.05E-02	4.92E+02	1.17E+03	0.00E+00	5.41E-02	0.00E+00
U-233	P	2.61E-04	1.20E+03	3.62E+02	3.63E-06	5.73E-04	3.63E-06
U-234	P	2.14E-01	9.43E+01	2.36E+01	5.31E-02	5.72E-01	5.31E-02
U-235	P	1.72E+00	3.44E-01	1.76E-03	8.42E-04	4.14E+00	8.42E-04
U-236	P	3.43E+00	3.43E+00	3.82E-03	2.08E-02	1.93E+01	2.08E-02
U-238	P	2.52E-02	8.94E-03	5.09E-05	7.56E-03	5.09E+00	7.56E-03
Zr-93	P	9.27E+00	1.97E+02	5.57E-01	4.79E-02	6.81E+01	4.79E-02
Crud (per canister)							
Co-60(crud)	P	1.56E+01	2.68E+02	1.23E+02	7.70E+02	1.76E+03	7.70E+02
Fe-55(crud)	P	9.85E+01	1.69E+03	7.73E+02	4.85E+03	1.11E+04	4.85E+03

DOE SNF Release Fractions				
Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
Stable Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Stable Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Non-Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
Non-Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Other/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
Other/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud				
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Evaluated Fuel:				
FFTF-TFA-FSP-1 & FSP-1R [327]				
Other				
Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
breathing rate	3.33E-04	[m^3/s]		
ground level dispersion factor				
distance [m]	x/Q [sec/m^3]			
11000	2.17E-05	Maximum Sector Acute (99.5%)		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
FFTF-TFA-FSP-1 & FSP-1R [327]							
Other							
Intact							
Isotope	Curies (entire fuel inventory)	flnv = 1/(# of Canisters)	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	1.85E-08	5.00E-01	1.00E-03	1.00E+00	1.00E+00	9.25E-12	9.25E-12
Am-241	3.45E+03	5.00E-01	1.00E-03	1.00E+00	1.00E+00	1.73E+00	1.73E+00
Am-242m	6.38E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	3.19E-03	3.19E-03
Am-243	4.90E-01	5.00E-01	1.00E-03	1.00E+00	1.00E+00	2.45E-04	2.45E-04
C-14	4.59E-03	5.00E-01	1.00E-03	1.00E+00	1.00E+00	2.29E-06	2.29E-06
Cd-113m	0.00E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Cl-36	8.54E-05	5.00E-01	1.00E-03	1.00E+00	1.00E+00	4.27E-08	4.27E-08
Cm-242	0.00E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Cm-243	0.00E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Cm-244	4.43E+01	5.00E-01	1.00E-03	1.00E+00	1.00E+00	2.21E-02	2.21E-02
Cm-245	8.47E-03	5.00E-01	1.00E-03	1.00E+00	1.00E+00	4.23E-06	4.23E-06
Cm-246	1.44E-03	5.00E-01	1.00E-03	1.00E+00	1.00E+00	7.19E-07	7.19E-07
Cm-247	0.00E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Co-60	1.29E+02	5.00E-01	1.00E-03	1.00E+00	1.00E+00	6.43E-02	6.43E-02
Cs-134	4.22E+01	5.00E-01	1.00E-03	1.00E+00	1.00E+00	2.11E-02	2.11E-02
Cs-135	9.38E-03	5.00E-01	1.00E-03	1.00E+00	1.00E+00	4.69E-06	4.69E-06
Cs-137	4.75E+04	5.00E-01	1.00E-03	1.00E+00	1.00E+00	2.37E+01	2.37E+01
Eu-154	0.00E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Eu-155	0.00E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Fe-55	0.00E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00
H-3	5.93E+01	5.00E-01	3.00E-01	1.00E+00	1.00E+00	8.89E+00	8.89E+00
I-129	9.92E-04	5.00E-01	3.00E-01	1.00E+00	1.00E+00	1.49E-04	1.49E-04
Kr-85	5.90E+02	5.00E-01	3.00E-01	1.00E+00	1.00E+00	8.86E+01	8.86E+01
Nb-93m	8.17E-02	5.00E-01	1.00E-03	1.00E+00	1.00E+00	4.09E-05	4.09E-05
Nb-94	1.55E-04	5.00E-01	1.00E-03	1.00E+00	1.00E+00	7.75E-08	7.75E-08
Ni-59	1.67E-02	5.00E-01	1.00E-03	1.00E+00	1.00E+00	8.33E-06	8.33E-06
Ni-63	8.11E+01	5.00E-01	1.00E-03	1.00E+00	1.00E+00	4.05E-02	4.05E-02
Np-237	3.43E-02	5.00E-01	1.00E-03	1.00E+00	1.00E+00	1.71E-05	1.71E-05
Pa-231	3.75E-07	5.00E-01	1.00E-03	1.00E+00	1.00E+00	1.87E-10	1.87E-10
Pb-210	1.57E-09	5.00E-01	1.00E-03	1.00E+00	1.00E+00	7.87E-13	7.87E-13
Pd-107	2.79E-03	5.00E-01	1.00E-03	1.00E+00	1.00E+00	1.40E-06	1.40E-06
Pm-147	0.00E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Pu-238	6.22E+02	5.00E-01	1.00E-03	1.00E+00	1.00E+00	3.11E-01	3.11E-01
Pu-239	2.59E+03	5.00E-01	1.00E-03	1.00E+00	1.00E+00	1.29E+00	1.29E+00
Pu-240	2.24E+03	5.00E-01	1.00E-03	1.00E+00	1.00E+00	1.12E+00	1.12E+00
Pu-241	5.09E+04	5.00E-01	1.00E-03	1.00E+00	1.00E+00	2.54E+01	2.54E+01
Pu-242	5.40E-02	5.00E-01	1.00E-03	1.00E+00	1.00E+00	2.70E-05	2.70E-05
Ra-226	3.54E-08	5.00E-01	1.00E-03	1.00E+00	1.00E+00	1.77E-11	1.77E-11
Ra-228	1.67E-09	5.00E-01	1.00E-03	1.00E+00	1.00E+00	8.33E-13	8.33E-13
Ru-106	1.65E-01	5.00E-01	1.00E-03	1.00E+00	1.00E+00	8.26E-05	8.26E-05
Sb-125	0.00E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Se-79	1.02E-02	5.00E-01	1.00E-03	1.00E+00	1.00E+00	5.10E-06	5.10E-06
Sm-147	0.00E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Sm-151	2.23E+03	5.00E-01	1.00E-03	1.00E+00	1.00E+00	1.11E+00	1.11E+00
Sn-126	1.32E-02	5.00E-01	1.00E-03	1.00E+00	1.00E+00	6.62E-06	6.62E-06
Sr-90	1.76E+04	5.00E-01	1.00E-03	1.00E+00	1.00E+00	8.79E+00	8.79E+00
Tc-99	3.54E-01	5.00E-01	1.00E-03	1.00E+00	1.00E+00	1.77E-04	1.77E-04
Th-229	5.15E-09	5.00E-01	1.00E-03	1.00E+00	1.00E+00	2.58E-12	2.58E-12
Th-230	7.72E-06	5.00E-01	1.00E-03	1.00E+00	1.00E+00	3.86E-09	3.86E-09
Th-232	4.25E-10	5.00E-01	1.00E-03	1.00E+00	1.00E+00	2.12E-13	2.12E-13
U-232	0.00E+00	5.00E-01	1.00E-03	1.00E+00	1.00E+00	0.00E+00	0.00E+00
U-233	3.63E-06	5.00E-01	1.00E-03	1.00E+00	1.00E+00	1.82E-09	1.82E-09
U-234	5.31E-02	5.00E-01	1.00E-03	1.00E+00	1.00E+00	2.66E-05	2.66E-05
U-235	8.42E-04	5.00E-01	1.00E-03	1.00E+00	1.00E+00	4.21E-07	4.21E-07
U-236	2.08E-02	5.00E-01	1.00E-03	1.00E+00	1.00E+00	1.04E-05	1.04E-05
U-238	7.56E-03	5.00E-01	1.00E-03	1.00E+00	1.00E+00	3.78E-06	3.78E-06
Zr-93	4.79E-02	5.00E-01	1.00E-03	1.00E+00	1.00E+00	2.40E-05	2.40E-05
crud (per canister)							
Co-60(crud)	7.70E+02	1.00E+00	1.00E+00	3.00E-01	1.00E+00	7.70E+02	2.31E+02
Fe-55(crud)	4.85E+03	1.00E+00	1.00E+00	3.00E-01	1.00E+00	4.85E+03	1.46E+03

FFTF-TFA-FSP-1 & FSP-1R [327]													
Other	Intact												
Inhalation Dose [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Ac-227	9.80E-11	1.65E-14	3.81E-10	6.36E-10	7.94E-09	8.89E-15	3.64E-10	4.48E-10	0.00E+00	Am-241	34.69%	Am-241	35.51%
Am-241	1.50E+00	1.23E-04	8.49E-01	8.03E+00	1.00E+02	7.38E-05	3.61E+00	5.54E+00	0.00E+00	Pu-239	25.15%	Pu-239	25.90%
Am-242m	2.74E-03	1.18E-07	3.58E-04	1.44E-02	1.81E-01	4.81E-08	6.38E-03	9.81E-03	0.00E+00	Pu-240	21.80%	Pu-240	22.44%
Am-243	2.14E-04	9.97E-08	1.17E-04	1.13E-03	1.42E-02	5.44E-08	5.07E-04	7.80E-04	0.00E+00	Pu-241	9.50%	Pu-241	10.13%
C-14	3.46E-11	3.46E-11	3.46E-11	3.46E-11	3.46E-11	3.46E-11	3.46E-11	3.46E-11	0.00E+00	Pu-238	5.52%	Pu-238	5.60%
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60(crud)	2.29%	Cm-244	0.25%
Cl-36	5.75E-13	5.75E-13	5.20E-11	5.75E-13	5.75E-13	5.75E-13	6.12E-13	6.77E-12	0.00E+00	Sr-90	0.52%	Am-242m	0.06%
Cm-242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-244	0.25%	Sr-90	0.06%
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Fe-55(crud)	0.18%	Co-60(crud)	0.03%
Cm-244	9.41E-03	6.16E-07	1.14E-02	5.55E-02	6.93E-01	5.98E-07	2.83E-02	3.97E-02	0.00E+00	Am-242m	0.06%	Fe-55(crud)	0.01%
Cm-245	3.82E-06	7.57E-10	2.04E-06	2.03E-05	2.54E-04	4.17E-10	9.01E-06	1.39E-05	0.00E+00	Cs-137	0.03%	Am-243	0.01%
Cm-246	6.42E-07	7.69E-11	3.50E-07	3.42E-06	4.27E-05	4.34E-11	1.53E-06	2.34E-06	0.00E+00	Am-243	0.00%	Cs-137	0.00%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-151	0.00%	Sm-151	0.00%
Co-60	8.18E-06	3.16E-05	5.93E-04	2.96E-05	2.32E-05	2.78E-05	6.18E-05	1.02E-04	0.00E+00	Co-60	0.00%	Np-237	0.00%
Cs-134	7.34E-06	6.10E-06	6.66E-06	6.66E-06	6.21E-06	6.27E-06	7.85E-06	7.06E-06	0.00E+00	Pu-242	0.00%	Pu-242	0.00%
Cs-135	1.50E-10	1.50E-10	1.77E-10	1.50E-10	1.50E-10	1.50E-10	1.50E-10	1.54E-10	0.00E+00	Np-237	0.00%	Cm-245	0.00%
Cs-137	5.56E-03	4.97E-03	5.60E-03	5.27E-03	5.04E-03	5.03E-03	5.79E-03	5.47E-03	0.00E+00	U-234	0.00%	Cm-246	0.00%
Eu-154	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-245	0.00%	Co-60	0.00%
Eu-155	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236	0.00%	U-234	0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cs-134	0.00%	Cs-134	0.00%
H-3	4.11E-06	4.11E-06	4.11E-06	4.11E-06	4.11E-06	4.11E-06	4.11E-06	4.11E-06	0.00E+00	H-3	0.00%	H-3	0.00%
I-129	3.46E-10	8.32E-10	1.25E-09	5.57E-10	5.49E-10	6.21E-06	4.70E-10	1.87E-07	0.00E+00	U-238	0.00%	U-236	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-246	0.00%	Zr-93	0.00%
Nb-93m	4.55E-10	4.76E-11	7.05E-08	3.11E-10	8.12E-10	3.32E-11	4.32E-10	8.63E-09	0.00E+00	Ni-63	0.00%	U-238	0.00%
Nb-94	9.87E-12	4.64E-11	1.55E-09	4.69E-11	4.08E-11	4.60E-11	9.23E-11	2.32E-10	0.00E+00	U-235	0.00%	Ni-63	0.00%
Ni-59	8.00E-11	7.71E-11	2.67E-10	7.89E-11	7.82E-11	8.40E-11	8.09E-11	7.98E-11	0.00E+00	Ru-106	0.00%	Th-230	0.00%
Ni-63	8.91E-07	8.91E-07	3.33E-06	8.91E-07	8.91E-07	8.91E-07	9.31E-07	9.09E-07	0.00E+00	I-129	0.00%	U-235	0.00%
Np-237	1.36E-05	7.75E-09	7.38E-06	1.20E-04	1.50E-03	6.14E-09	1.07E-05	6.69E-05	0.00E+00	Zr-93	0.00%	Pa-231	0.00%
Pa-231	3.46E-14	4.40E-14	3.74E-09	3.49E-09	4.36E-08	3.83E-14	1.44E-12	1.74E-09	0.00E+00	Tc-99	0.00%	Ru-106	0.00%
Pb-210	6.69E-15	6.69E-15	6.69E-15	7.89E-14	1.15E-12	6.69E-15	9.87E-14	7.72E-14	0.00E+00	Th-230	0.00%	Sn-126	0.00%
Pd-107	3.53E-14	3.53E-14	1.06E-09	1.91E-13	5.08E-13	3.53E-14	8.03E-12	1.29E-10	0.00E+00	Nb-93m	0.00%	Ac-227	0.00%
Pm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sn-126	0.00%	Th-229	0.00%
Pu-238	2.33E-01	8.32E-06	2.66E+00	1.26E+00	1.58E+01	8.00E-06	5.84E-01	8.82E-01	0.00E+00	U-233	0.00%	Nb-93m	0.00%
Pu-239	1.10E+00	3.19E-05	1.12E+01	5.85E+00	7.30E+01	3.12E-05	2.62E+00	4.01E+00	0.00E+00	Pa-231	0.00%	I-129	0.00%
Pu-240	9.54E-01	2.85E-05	9.69E+00	5.07E+00	6.33E+01	2.71E-05	2.27E+00	3.48E+00	0.00E+00	Ac-227	0.00%	U-233	0.00%
Pu-241	4.64E-01	2.08E-05	2.16E+00	2.28E+00	2.86E+01	8.43E-06	8.91E-01	1.52E+00	0.00E+00	Se-79	0.00%	Tc-99	0.00%
Pu-242	2.18E-05	6.83E-10	2.22E-04	1.16E-04	1.45E-03	6.35E-10	5.19E-05	8.02E-05	0.00E+00	Nb-94	0.00%	Cs-135	0.00%
Ra-226	4.83E-14	4.83E-14	7.62E-12	3.14E-13	3.59E-12	4.83E-14	5.07E-14	1.10E-12	0.00E+00	Cs-135	0.00%	Se-79	0.00%
Ra-228	4.08E-15	4.10E-15	1.61E-13	1.64E-14	1.45E-13	4.08E-15	4.17E-15	2.87E-14	0.00E+00	Pd-107	0.00%	Ni-59	0.00%
Ru-106	3.05E-08	3.03E-08	2.30E-06	3.03E-08	3.03E-08	3.03E-08	3.73E-08	2.85E-07	0.00E+00	Ni-59	0.00%	Th-232	0.00%
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-229	0.00%	Nb-94	0.00%
Se-79	9.25E-11	9.25E-11	1.34E-09	9.25E-11	9.25E-11	9.25E-11	5.78E-10	3.63E-10	0.00E+00	C-14	0.00%	C-14	0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cl-36	0.00%	Ra-226	0.00%
Sm-151	1.20E-09	4.44E-09	9.72E-05	3.28E-04	4.11E-03	3.93E-10	2.24E-04	2.41E-04	0.00E+00	Th-232	0.00%	Pb-210	0.00%
Sn-126	2.53E-09	2.50E-09	2.67E-08	9.95E-09	2.09E-08	2.32E-09	3.12E-09	4.76E-09	0.00E+00	Ra-226	0.00%	Cl-36	0.00%
Sr-90	6.20E-04	6.20E-04	6.72E-01	7.89E-02	1.71E-01	6.20E-04	1.35E-03	8.25E-02	0.00E+00	Pb-210	0.00%	Pd-107	0.00%

Inhalation Doses

Tc-99	2.14E-10	2.14E-10	7.91E-08	2.14E-10	2.14E-10	5.73E-09	2.96E-09	1.07E-08	0.00E+00		Ra-228	0.00%	Ra-228	0.00%
Th-229	1.90E-13	1.90E-13	1.37E-10	7.92E-11	9.85E-10	1.90E-13	4.86E-13	4.00E-11	0.00E+00		Cd-113m	0.00%	Cd-113m	0.00%
Th-230	4.21E-11	4.21E-11	3.10E-08	1.79E-08	2.23E-07	4.21E-11	1.08E-10	9.08E-09	0.00E+00		Cm-242	0.00%	Cm-242	0.00%
Th-232	4.33E-15	4.38E-15	5.34E-12	5.07E-12	6.30E-11	4.22E-15	1.06E-14	2.51E-12	0.00E+00		Cm-243	0.00%	Cm-243	0.00%
U-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		Cm-247	0.00%	Cm-247	0.00%
U-233	1.23E-12	1.23E-12	1.48E-08	3.46E-11	5.44E-10	1.23E-12	4.57E-11	1.78E-09	0.00E+00		Eu-154	0.00%	Eu-154	0.00%
U-234	1.78E-08	1.78E-08	2.12E-04	4.96E-07	7.74E-06	1.78E-08	6.58E-07	2.54E-05	0.00E+00		Eu-155	0.00%	Eu-155	0.00%
U-235	2.67E-10	2.68E-10	3.11E-06	7.41E-09	1.14E-07	2.67E-10	9.67E-09	3.74E-07	0.00E+00		Fe-55	0.00%	Fe-55	0.00%
U-236	6.59E-09	6.59E-09	7.84E-05	1.84E-07	2.89E-06	6.59E-09	2.44E-07	9.43E-06	0.00E+00		Kr-85	0.00%	Kr-85	0.00%
U-238	2.25E-09	2.25E-09	2.69E-05	6.65E-08	9.89E-07	2.24E-09	8.31E-08	3.23E-06	0.00E+00		Pm-147	0.00%	Pm-147	0.00%
Zr-93	1.40E-11	3.00E-11	5.58E-08	1.13E-07	1.40E-06	1.11E-11	1.11E-10	5.55E-08	0.00E+00		Sb-125	0.00%	Sb-125	0.00%
											Sm-147	0.00%	Sm-147	0.00%
crud											U-232	0.00%	U-232	0.00%
Co-60(crud)	2.94E-02	1.14E-01	2.13E+00	1.06E-01	8.34E-02	1.00E-01	2.22E-01	3.65E-01	0.00E+00					
Fe-55(crud)	2.03E-02	1.98E-02	4.12E-02	2.01E-02	2.00E-02	2.11E-02	4.71E-02	2.82E-02	0.00E+00					
total	4.32E+00	1.39E-01	2.94E+01	2.28E+01	2.82E+02	1.27E-01	1.03E+01	1.60E+01	0.00E+00					

Air Submersion Doses

FFTF-TFA-FSP-1 & FSP-1R [327]										
Other	Intact									
Air Submersion Dose [rem]										Isotope % of Dose
Isotopes	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes % of Total Skin Dose
Ac-227	2.79E-20	3.31E-20	2.51E-20	2.19E-20	7.70E-20	2.71E-20	2.36E-20	2.78E-20	2.44E-19	Co-60 (crud) 97.98%
Am-241	1.19E-07	1.48E-07	9.34E-08	7.22E-08	3.98E-07	1.08E-07	8.78E-08	1.13E-07	1.77E-07	Kr-85 1.03%
Am-242m	9.73E-12	1.54E-11	4.41E-12	4.41E-12	2.03E-11	7.56E-12	4.97E-12	8.12E-12	3.48E-11	Cs-137 0.91%
Am-243	4.31E-11	5.14E-11	3.78E-11	3.05E-11	1.47E-10	4.12E-11	3.52E-11	4.29E-11	5.41E-11	Sr-90 0.07%
C-14	4.77E-17	6.48E-17	2.82E-17	2.23E-17	1.30E-16	4.03E-17	2.84E-17	4.12E-17	4.47E-14	Co-60 0.01%
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-241 0.00%
Cl-36	7.68E-17	9.12E-17	6.92E-17	6.20E-17	1.93E-16	7.51E-17	6.58E-17	7.64E-17	5.04E-14	Cs-134 0.00%
Cm-242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-240 0.00%
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-239 0.00%
Cm-244	1.23E-11	2.36E-11	1.26E-12	2.60E-12	1.57E-11	7.45E-12	3.22E-12	8.73E-12	6.95E-11	Pu-238 0.00%
Cm-245	1.32E-12	1.55E-12	1.23E-12	1.08E-12	4.01E-12	1.31E-12	1.16E-12	1.35E-12	1.82E-12	Ru-106 0.00%
Cm-246	3.60E-16	6.92E-16	4.04E-17	7.79E-17	4.71E-16	2.20E-16	9.64E-17	2.57E-16	2.01E-15	Pu-241 0.00%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-244 0.00%
Co-60	6.35E-07	7.17E-07	6.40E-07	6.35E-07	9.18E-07	6.55E-07	6.19E-07	6.50E-07	7.48E-07	Sn-126 0.00%
Cs-134	1.25E-07	1.43E-07	1.25E-07	1.22E-07	2.03E-07	1.28E-07	1.20E-07	1.28E-07	1.60E-07	Am-243 0.00%
Cs-135	2.36E-16	3.10E-16	1.58E-16	1.26E-16	6.81E-16	2.07E-16	1.54E-16	2.13E-16	3.41E-13	Tc-99 0.00%
Cs-137	5.08E-05	5.80E-05	5.05E-05	4.92E-05	8.35E-05	5.19E-05	4.83E-05	5.19E-05	8.37E-05	Am-242m 0.00%
Eu-154	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-151 0.00%
Eu-155	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	I-129 0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Np-237 0.00%
H-3	0.00E+00	0.00E+00	1.96E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-10	Cm-245 0.00%
I-129	5.77E-12	7.96E-12	2.56E-12	1.96E-12	1.31E-11	4.61E-12	2.75E-12	4.54E-12	1.31E-11	Nb-94 0.00%
Kr-85	8.32E-07	9.53E-07	8.11E-07	7.75E-07	1.56E-06	8.39E-07	7.75E-07	8.46E-07	9.39E-05	Cs-135 0.00%
Nb-93m	2.08E-14	4.30E-14	8.37E-16	3.87E-15	2.27E-14	1.13E-14	4.46E-15	1.46E-14	1.40E-13	U-235 0.00%
Nb-94	4.69E-13	5.34E-13	4.68E-13	4.57E-13	7.41E-13	4.81E-13	4.48E-13	4.79E-13	5.93E-13	Se-79 0.00%
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Nb-93m 0.00%
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-234 0.00%
Np-237	1.43E-12	1.73E-12	1.24E-12	1.06E-12	4.00E-12	1.37E-12	1.17E-12	1.42E-12	2.12E-12	Pu-242 0.00%
Pa-231	2.57E-17	2.99E-17	2.44E-17	2.29E-17	5.47E-17	2.56E-17	2.32E-17	2.59E-17	3.67E-17	Cl-36 0.00%
Pb-210	3.91E-21	5.17E-21	2.68E-21	1.98E-21	1.23E-20	3.42E-21	2.58E-21	3.56E-21	8.09E-21	C-14 0.00%
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236 0.00%
Pm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-238 0.00%
Pu-238	1.64E-10	3.17E-10	2.65E-11	4.20E-11	2.32E-10	1.00E-10	4.97E-11	1.22E-10	1.02E-09	Cm-246 0.00%
Pu-239	5.03E-10	7.85E-10	2.75E-10	2.77E-10	9.84E-10	4.03E-10	2.97E-10	4.41E-10	1.93E-09	Pa-231 0.00%
Pu-240	5.73E-10	1.11E-09	9.82E-11	1.49E-10	8.34E-10	3.53E-10	1.77E-10	4.28E-10	3.53E-09	Th-230 0.00%
Pu-241	1.47E-10	1.77E-10	1.32E-10	1.15E-10	4.47E-10	1.43E-10	1.24E-10	1.48E-10	2.39E-10	U-233 0.00%
Pu-242	1.16E-14	2.23E-14	2.10E-15	3.10E-15	1.71E-14	7.20E-15	3.64E-15	8.70E-15	7.09E-14	Th-229 0.00%
Ra-226	4.38E-19	5.03E-19	4.19E-19	3.84E-19	1.13E-18	4.39E-19	3.97E-19	4.48E-19	6.81E-19	Ra-226 0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ac-227 0.00%
Ru-106	6.70E-11	7.70E-11	6.70E-11	6.47E-11	1.14E-10	6.84E-11	6.39E-11	6.90E-11	7.23E-10	Pb-210 0.00%
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-232 0.00%
Se-79	1.42E-16	1.91E-16	8.64E-17	6.83E-17	3.93E-16	1.21E-16	8.59E-17	1.24E-16	1.52E-13	Cd-113m 0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-242 0.00%
Sm-151	4.65E-12	7.88E-12	6.34E-13	1.01E-12	6.35E-12	3.20E-12	1.33E-12	3.23E-12	1.70E-11	Cm-243 0.00%
Sn-126	4.01E-11	4.58E-11	3.97E-11	3.84E-11	6.96E-11	4.09E-11	3.80E-11	4.10E-11	6.94E-11	Cm-247 0.00%
Sr-90	5.49E-09	6.70E-09	4.54E-09	3.84E-09	1.61E-08	5.17E-09	4.31E-09	5.31E-09	6.49E-06	Eu-154 0.00%
Tc-99	2.47E-14	3.13E-14	1.83E-14	1.49E-14	7.35E-14	2.23E-14	1.76E-14	2.30E-14	3.90E-11	Eu-155 0.00%
Th-229	7.80E-19	9.15E-19	7.24E-19	6.27E-19	2.38E-18	7.66E-19	6.77E-19	7.92E-19	1.12E-18	Fe-55 0.00%
Th-230	5.58E-18	7.38E-18	4.43E-18	3.78E-18	1.64E-17	5.05E-18	4.25E-18	5.39E-18	1.40E-17	Fe-55 (crud) 0.00%
Th-232	1.59E-22	2.32E-22	1.09E-22	9.41E-23	4.43E-22	1.35E-22	1.08E-22	1.49E-22	5.86E-22	H-3 0.00%
U-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ni-59 0.00%
U-233	2.46E-18	3.24E-18	1.97E-18	1.81E-18	6.01E-18	2.26E-18	1.91E-18	2.38E-18	6.67E-18	Ni-63 0.00%
U-234	1.87E-14	3.07E-14	9.34E-15	8.96E-15	4.24E-14	1.43E-14	1.02E-14	1.63E-14	9.07E-14	Pd-107 0.00%
U-235	2.38E-13	2.74E-13	2.28E-13	2.08E-13	6.22E-13	2.38E-13	2.15E-13	2.43E-13	2.92E-13	Pm-147 0.00%
U-236	5.09E-15	9.18E-15	1.82E-15	1.95E-15	9.94E-15	3.50E-15	2.25E-15	4.18E-15	2.98E-14	Ra-228 0.00%
U-238	1.33E-15	2.59E-15	3.02E-16	3.76E-16	2.25E-15	8.26E-16	4.58E-16	1.04E-15	8.83E-15	Sb-125 0.00%
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-147 0.00%
										U-232 0.00%
crud										Zr-93 0.00%
Co-60(crud)	7.60E-03	8.59E-03	7.67E-03	7.60E-03	1.10E-02	7.85E-03	7.42E-03	7.79E-03	8.96E-03	
Fe-55(crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
totals	7.66E-03	8.65E-03	7.72E-03	7.66E-03	1.11E-02	7.91E-03	7.47E-03	7.84E-03	9.15E-03	

FFTF-TFA-FSP-1 & FSP-1R [327]

Other

Intact

	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	4.32E+00		7.66E-03			
Breast	1.39E-01		8.65E-03			
Lung	2.94E+01		7.72E-03			
R Marrow	2.28E+01		7.66E-03			
B Surface	2.82E+02	<CDE	1.11E-02			
Thyroid	1.27E-01		7.91E-03			
Remainder	1.03E+01		7.47E-03			
Whole Body	1.60E+01	<CEDE	7.84E-03	<DDE	1.60E+01	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	9.15E-03	<SKIN	9.15E-03	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					2.82E+02	<CDE + DDE

FFTF-TFA-FSP-1 & FSP-1R
[327]

Isotope	Material Type	Offsite Doses[rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	4.48E-10	7.94E-09
Am-241	P	5.54E+00	1.00E+02
Am-242m	P	9.81E-03	1.81E-01
Am-243	P	7.80E-04	1.42E-02
C-14	P	3.46E-11	3.46E-11
Cd-113m	P	0.00E+00	0.00E+00
Cl-36	P	6.77E-12	5.75E-13
Cm-242	P	0.00E+00	0.00E+00
Cm-243	P	0.00E+00	0.00E+00
Cm-244	P	3.97E-02	6.93E-01
Cm-245	P	1.39E-05	2.54E-04
Cm-246	P	2.34E-06	4.27E-05
Cm-247	P	0.00E+00	0.00E+00
Co-60	P	1.02E-04	2.38E-05
Cs-134	C	7.19E-06	6.34E-06
Cs-135	C	1.54E-10	1.50E-10
Cs-137	C	5.53E-03	5.09E-03
Eu-154	P	0.00E+00	0.00E+00
Eu-155	P	0.00E+00	0.00E+00
Fe-55	P	0.00E+00	0.00E+00
H-3	G	4.11E-06	4.11E-06
I-129	G	1.87E-07	5.54E-10
Kr-85	G	8.46E-07	8.46E-07
Nb-93m	P	8.63E-09	8.12E-10
Nb-94	P	2.33E-10	4.13E-11
Ni-59	P	7.98E-11	7.82E-11
Ni-63	P	9.09E-07	8.91E-07
Np-237	P	6.69E-05	1.50E-03
Pa-231	P	1.74E-09	4.36E-08
Pb-210	P	7.72E-14	1.15E-12
Pd-107	P	1.29E-10	5.08E-13
Pm-147	P	0.00E+00	0.00E+00
Pu-238	P	8.82E-01	1.58E+01
Pu-239	P	4.01E+00	7.30E+01
Pu-240	P	3.48E+00	6.33E+01
Pu-241	P	1.52E+00	2.86E+01
Pu-242	P	8.02E-05	1.45E-03
Ra-226	P	1.10E-12	3.59E-12
Ra-228	P	2.87E-14	1.45E-13
Ru-106	P	2.85E-07	3.03E-08
Sb-125	P	0.00E+00	0.00E+00
Se-79	P	3.63E-10	9.25E-11
Sm-147	P	0.00E+00	0.00E+00
Sm-151	P	2.41E-04	4.11E-03
Sn-126	P	4.80E-09	2.09E-08
Sr-90	P	8.25E-02	1.71E-01
Tc-99	P	1.07E-08	2.14E-10
Th-229	P	4.00E-11	9.85E-10
Th-230	P	9.08E-09	2.23E-07
Th-232	P	2.51E-12	6.30E-11
U-232	P	0.00E+00	0.00E+00
U-233	P	1.78E-09	5.44E-10
U-234	P	2.54E-05	7.74E-06
U-235	P	3.74E-07	1.14E-07
U-236	P	9.43E-06	2.89E-06
U-238	P	3.23E-06	9.89E-07
Zr-93	P	5.55E-08	1.40E-06
Co-60(crud)	crud	3.73E-01	9.12E-02
Fe-55(crud)	crud	2.82E-02	2.00E-02
Total		1.60E+01	2.82E+02

	evaluated fuel					x	evaluated fuel
Isotope	Fuel Type	Stable Metal	Non-Metal	Non-Metal	Other	Other	Other
	Condition	Intact	Intact	Not Intact	Intact	Not Intact	Not Intact
	Fuel Name (Ci)	ATR [15]	FSVR [85]	SHIPPINGPORT LWBR (THO2-UO2) [377]	FFTF-TFA-FSP-1 & FSP-1R [327]	EBR-II (U-MTL DE- CLAD) [438]	EBR-II (U-MTL DE- CLAD) [438]
	# of canisters	56.40	148.80	2.00	2.00	1.77	1.77
	Material Type						Curies
Ac-227	P	6.06E-05	0.00E+00	4.95E-01	1.85E-08	1.37E-04	1.37E-04
Am-241	P	1.92E+02	5.94E+02	1.38E+00	3.45E+03	1.23E+04	1.23E+04
Am-242m	P	1.95E-01	7.98E-02	1.03E-02	6.38E+00	4.73E+00	4.73E+00
Am-243	P	1.02E-01	4.33E+00	2.09E-03	4.90E-01	1.17E+01	1.17E+01
C-14	P	1.60E-05	3.82E+01	5.82E-01	4.59E-03	5.72E-03	5.72E-03
Cd-113m	P	4.00E+01	0.00E+00	8.02E-01	0.00E+00	3.53E+02	3.53E+02
Cl-36	P	0.00E+00	4.51E-01	1.22E-02	8.54E-05	0.00E+00	0.00E+00
Cm-242	P	1.61E-01	1.64E+01	8.48E-03	0.00E+00	3.90E+00	3.90E+00
Cm-243	P	3.40E-02	4.36E-01	2.46E-03	0.00E+00	1.61E+00	1.61E+00
Cm-244	P	1.95E+00	1.98E+02	1.26E-01	4.43E+01	2.08E+02	2.08E+02
Cm-245	P	9.91E-05	3.92E-02	4.68E-05	8.47E-03	6.49E-03	6.49E-03
Cm-246	P	2.67E-06	1.12E-02	3.10E-06	1.44E-03	4.79E-04	4.79E-04
Cm-247	P	0.00E+00	3.31E-08	1.10E-11	0.00E+00	0.00E+00	0.00E+00
Co-60	P	5.66E-09	0.00E+00	1.44E+01	1.29E+02	8.84E-07	8.84E-07
Cs-134	C	1.35E+04	1.11E+03	2.10E+00	4.22E+01	9.99E+04	9.99E+04
Cs-135	C	2.66E+00	2.32E+00	1.93E-01	9.38E-03	6.05E+00	6.05E+00
Cs-137	C	5.56E+05	5.82E+05	1.18E+04	4.75E+04	4.19E+06	4.19E+06
Eu-154	P	5.44E+03	0.00E+00	1.05E+02	0.00E+00	4.43E+04	4.43E+04
Eu-155	P	1.35E+03	0.00E+00	1.25E+01	0.00E+00	1.37E+04	1.37E+04
Fe-55	P	0.00E+00	0.00E+00	9.77E-02	0.00E+00	0.00E+00	0.00E+00
H-3	G	5.49E-01	1.07E+03	2.17E+01	5.93E+01	1.27E+04	1.27E+04
I-129	G	1.67E-01	3.53E-01	1.07E-02	9.92E-04	1.24E+00	1.24E+00
Kr-85	G	4.26E+04	3.87E+04	6.82E+02	5.90E+02	3.14E+05	3.14E+05
Nb-93m	P	3.35E+00	1.92E-06	4.17E-01	8.17E-02	2.42E+01	2.42E+01
Nb-94	P	2.80E-04	0.00E+00	1.51E-02	1.55E-04	2.42E-03	2.42E-03
Ni-59	P	0.00E+00	3.14E+00	4.17E-02	1.67E-02	0.00E+00	0.00E+00
Ni-63	P	2.66E-20	7.95E+01	4.71E+00	8.11E+01	0.00E+00	0.00E+00
Np-237	P	1.11E+00	2.53E+00	8.38E-04	3.43E-02	5.83E+00	5.83E+00
Pa-231	P	3.93E-04	3.31E+00	8.09E-01	3.75E-07	9.15E-04	9.15E-04
Pb-210	P	3.83E-09	4.77E-04	7.87E-05	1.57E-09	7.03E-09	7.03E-09
Pd-107	P	7.83E-02	1.43E-01	2.32E-03	2.79E-03	1.15E+00	1.15E+00
Pm-147	P	1.51E+05	0.00E+00	1.26E+01	0.00E+00	1.20E+06	1.20E+06
Pu-238	P	1.92E+03	1.34E+04	1.30E+01	6.22E+02	1.07E+04	1.07E+04
Pu-239	P	1.50E+02	3.50E+01	7.92E-01	2.59E+03	7.27E+03	7.27E+03
Pu-240	P	6.04E+01	6.23E+01	4.65E-01	2.24E+03	5.21E+03	5.21E+03
Pu-241	P	9.13E+03	0.00E+00	6.04E+01	5.09E+04	5.96E+05	5.96E+05
Pu-242	P	3.59E-02	0.00E+00	1.17E-03	5.40E-02	5.07E+00	5.07E+00
Ra-226	P	3.80E-08	5.01E-04	7.59E-05	3.54E-08	7.45E-08	7.45E-08
Ra-228	P	7.59E-10	1.13E+00	3.01E-02	1.67E-09	4.11E-09	4.11E-09
Ru-106	P	1.16E+03	4.42E-01	4.50E-05	1.65E-01	1.45E+04	1.45E+04
Sb-125	P	2.61E+03	2.10E+02	3.38E+00	0.00E+00	0.00E+00	0.00E+00
Se-79	P	4.54E+00	4.86E+00	2.38E-01	1.02E-02	3.38E+01	3.38E+01
Sm-147	P	5.42E-05	1.11E+00	8.54E-07	0.00E+00	4.04E-04	4.04E-04
Sm-151	P	4.68E+03	9.16E+03	7.73E+01	2.23E+03	1.30E+04	1.30E+04
Sn-126	P	1.49E+00	1.99E+00	2.68E-01	1.32E-02	1.33E+01	1.33E+01
Sr-90	P	5.45E+05	5.52E+05	1.20E+04	1.76E+04	3.98E+06	3.98E+06
Tc-99	P	9.41E+01	1.23E+02	2.19E+00	3.54E-01	7.04E+02	7.04E+02
Th-229	P	2.17E-07	2.73E+00	1.10E+00	5.15E-09	3.95E-07	3.95E-07
Th-230	P	1.78E-05	2.09E-01	2.82E-02	7.72E-06	3.88E-05	3.88E-05
Th-232	P	1.76E-09	9.05E-01	1.34E-01	4.25E-10	9.69E-09	9.69E-09
U-232	P	2.05E-02	4.92E+02	1.17E+03	0.00E+00	5.41E-02	5.41E-02
U-233	P	2.61E-04	1.20E+03	3.62E+02	3.63E-06	5.73E-04	5.73E-04
U-234	P	2.14E-01	9.43E+01	2.36E+01	5.31E-02	5.72E-01	5.72E-01
U-235	P	1.72E+00	3.44E-01	1.76E-03	8.42E-04	4.14E+00	4.14E+00
U-236	P	3.43E+00	3.43E+00	3.82E-03	2.08E-02	1.93E+01	1.93E+01
U-238	P	2.52E-02	8.94E-03	5.09E-05	7.56E-03	5.09E+00	5.09E+00
Zr-93	P	9.27E+00	1.97E+02	5.57E-01	4.79E-02	6.81E+01	6.81E+01
Crud (per canister)							
Co-60(crud)	P	1.56E+01	2.68E+02	1.23E+02	7.70E+02	1.76E+03	1.76E+03
Fe-55(crud)	P	9.85E+01	1.69E+03	7.73E+02	4.85E+03	1.11E+04	1.11E+04

DOE SNF Release Fractions				
Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
Stable Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Stable Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Non-Metal/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
Non-Metal/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Other/Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
Other/Not Intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud				
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Evaluated Fuel:				
EBR-II (U-MTL DE-CLAD) [438]				
Other				
Not Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
breathing rate	3.33E-04	[m^3/s]		
ground level dispersion factor				
distance [m]	x/Q [sec/m^3]			
11000	2.17E-05	Maximum Sector Acute (99.5%)		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
EBR-II (U-MTL DE-CLAD) [438]							
Other Not Intact							
Isotope	Curies (entire fuel inventory)	f _{inv} = 1/(# of Canisters)	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	1.37E-04	5.65E-01	5.00E-03	4.00E-01	1.00E+00	3.87E-07	1.55E-07
Am-241	1.23E+04	5.65E-01	5.00E-03	4.00E-01	1.00E+00	3.46E+01	1.39E+01
Am-242m	4.73E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.34E-02	5.34E-03
Am-243	1.17E+01	5.65E-01	5.00E-03	4.00E-01	1.00E+00	3.31E-02	1.32E-02
C-14	5.72E-03	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.62E-05	6.46E-06
Cd-113m	3.53E+02	5.65E-01	5.00E-03	4.00E-01	1.00E+00	9.98E-01	3.99E-01
Cl-36	0.00E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Cm-242	3.90E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.10E-02	4.41E-03
Cm-243	1.61E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	4.53E-03	1.81E-03
Cm-244	2.08E+02	5.65E-01	5.00E-03	4.00E-01	1.00E+00	5.89E-01	2.36E-01
Cm-245	6.49E-03	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.83E-05	7.33E-06
Cm-246	4.79E-04	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.35E-06	5.42E-07
Cm-247	0.00E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Co-60	8.84E-07	5.65E-01	5.00E-03	4.00E-01	1.00E+00	2.50E-09	9.99E-10
Cs-134	9.99E+04	5.65E-01	5.00E-03	1.00E+00	1.00E+00	2.82E+02	2.82E+02
Cs-135	6.05E+00	5.65E-01	5.00E-03	1.00E+00	1.00E+00	1.71E-02	1.71E-02
Cs-137	4.19E+06	5.65E-01	5.00E-03	1.00E+00	1.00E+00	1.18E+04	1.18E+04
Eu-154	4.43E+04	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.25E+02	5.00E+01
Eu-155	1.37E+04	5.65E-01	5.00E-03	4.00E-01	1.00E+00	3.87E+01	1.55E+01
Fe-55	0.00E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
H-3	1.27E+04	5.65E-01	3.00E-01	1.00E+00	1.00E+00	2.15E+03	2.15E+03
I-129	1.24E+00	5.65E-01	3.00E-01	1.00E+00	1.00E+00	2.10E-01	2.10E-01
Kr-85	3.14E+05	5.65E-01	3.00E-01	1.00E+00	1.00E+00	5.33E+04	5.33E+04
Nb-93m	2.42E+01	5.65E-01	5.00E-03	4.00E-01	1.00E+00	6.83E-02	2.73E-02
Nb-94	2.42E-03	5.65E-01	5.00E-03	4.00E-01	1.00E+00	6.83E-06	2.73E-06
Ni-59	0.00E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Ni-63	0.00E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Np-237	5.83E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.65E-02	6.59E-03
Pa-231	9.15E-04	5.65E-01	5.00E-03	4.00E-01	1.00E+00	2.59E-06	1.03E-06
Pb-210	7.03E-09	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.99E-11	7.95E-12
Pd-107	1.15E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	3.24E-03	1.30E-03
Pm-147	1.20E+06	5.65E-01	5.00E-03	4.00E-01	1.00E+00	3.40E+03	1.36E+03
Pu-238	1.07E+04	5.65E-01	5.00E-03	4.00E-01	1.00E+00	3.03E+01	1.21E+01
Pu-239	7.27E+03	5.65E-01	5.00E-03	4.00E-01	1.00E+00	2.05E+01	8.21E+00
Pu-240	5.21E+03	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.47E+01	5.88E+00
Pu-241	5.96E+05	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.68E+03	6.74E+02
Pu-242	5.07E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.43E-02	5.73E-03
Ra-226	7.45E-08	5.65E-01	5.00E-03	4.00E-01	1.00E+00	2.10E-10	8.41E-11
Ra-228	4.11E-09	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.16E-11	4.65E-12
Ru-106	1.45E+04	5.65E-01	5.00E-03	4.00E-01	1.00E+00	4.09E+01	1.64E+01
Sb-125	0.00E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Se-79	3.38E+01	5.65E-01	5.00E-03	4.00E-01	1.00E+00	9.54E-02	3.82E-02
Sm-147	4.04E-04	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.14E-06	4.56E-07
Sm-151	1.30E+04	5.65E-01	5.00E-03	4.00E-01	1.00E+00	3.68E+01	1.47E+01
Sn-126	1.33E+01	5.65E-01	5.00E-03	4.00E-01	1.00E+00	3.75E-02	1.50E-02
Sr-90	3.98E+06	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.12E+04	4.50E+03
Tc-99	7.04E+02	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.99E+00	7.96E-01
Th-229	3.95E-07	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.11E-09	4.46E-10
Th-230	3.88E-05	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.10E-07	4.38E-08
Th-232	9.69E-09	5.65E-01	5.00E-03	4.00E-01	1.00E+00	2.74E-11	1.09E-11
U-232	5.41E-02	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.53E-04	6.11E-05
U-233	5.73E-04	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.62E-06	6.47E-07
U-234	5.72E-01	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.62E-03	6.46E-04
U-235	4.14E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.17E-02	4.67E-03
U-236	1.93E+01	5.65E-01	5.00E-03	4.00E-01	1.00E+00	5.45E-02	2.18E-02
U-238	5.09E+00	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.44E-02	5.76E-03
Zr-93	6.81E+01	5.65E-01	5.00E-03	4.00E-01	1.00E+00	1.92E-01	7.70E-02
crud (per canister)							
Co-60(crud)	1.76E+03	1	1.00E+00	3.00E-01	1.00E+00	1.76E+03	5.28E+02
Fe-55(crud)	1.11E+04	1	1.00E+00	3.00E-01	1.00E+00	1.11E+04	3.33E+03

EBR-II (U-MTL DE-CLAD) [438]																			
Other	Not Intact																		
	Inhalation Dose [rem]										Isotope Percentage of Dose								
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin		Isotope	% of Effective (CEDE) Dose		Isotope	% of CDE (Bone Surface)				
Ac-227	1.64E-06	2.76E-10	6.38E-06	1.06E-05	1.33E-04	1.49E-10	6.09E-06	7.50E-06	0.00E+00		Am-241	21.19%		Am-241	26.14%				
Am-241	1.20E+01	9.89E-04	6.82E+00	6.45E+01	8.04E+02	5.93E-04	2.90E+01	4.45E+01	0.00E+00		Sr-90	20.12%		Pu-241	24.61%				
Am-242m	4.58E-03	1.97E-07	6.00E-04	2.41E-02	3.03E-01	8.05E-08	1.07E-02	1.64E-02	0.00E+00		Pu-241	19.16%		Pu-238	20.01%				
Am-243	1.15E-02	5.37E-06	6.29E-03	6.12E-02	7.67E-01	2.93E-06	2.74E-02	4.21E-02	0.00E+00		Pu-238	16.37%		Pu-239	15.06%				
C-14	9.74E-11	9.74E-11	9.74E-11	9.74E-11	9.74E-11	9.74E-11	9.74E-11	9.74E-11	0.00E+00		Pu-239	12.14%		Pu-240	10.79%				
Cd-113m	3.54E-04	3.54E-04	4.37E-03	3.54E-04	3.54E-04	3.54E-04	1.39E-02	4.41E-03	0.00E+00		Pu-240	8.70%		Sr-90	2.84%				
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		Cs-137	1.30%		Cm-244	0.24%				
Cm-242	6.72E-05	1.11E-07	1.83E-03	4.60E-04	5.74E-03	1.11E-07	2.89E-04	5.50E-04	0.00E+00		Co-60(crud)	0.40%		Pm-147	0.12%				
Cm-243	1.00E-03	3.05E-07	9.41E-04	5.72E-03	7.13E-02	1.86E-07	2.79E-03	4.02E-03	0.00E+00		Cm-244	0.20%		Cs-137	0.08%				
Cm-244	1.00E-01	6.55E-06	1.22E-01	5.91E-01	7.37E+00	6.36E-06	3.01E-01	4.22E-01	0.00E+00		Pm-147	0.18%		Am-243	0.02%				
Cm-245	6.60E-06	1.31E-09	3.53E-06	3.51E-05	4.39E-04	7.21E-10	1.56E-05	2.41E-05	0.00E+00		Eu-154	0.05%		Eu-154	0.02%				
Cm-246	4.84E-07	5.79E-11	2.64E-07	2.58E-06	3.21E-05	3.27E-11	1.15E-06	1.77E-06	0.00E+00		Cs-134	0.04%		Np-237	0.02%				
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		Fe-55(crud)	0.03%		Pu-242	0.01%				
Co-60	1.27E-13	4.91E-13	9.21E-12	4.59E-13	3.61E-13	4.33E-13	9.61E-13	1.58E-12	0.00E+00		Ru-106	0.03%		Am-242m	0.01%				
Cs-134	9.81E-02	8.15E-02	8.90E-02	8.90E-02	8.30E-02	8.37E-02	1.05E-01	9.43E-02	0.00E+00		Am-243	0.02%		Co-60(crud)	0.01%				
Cs-135	5.49E-07	5.49E-07	6.45E-07	5.49E-07	5.49E-07	5.49E-07	5.49E-07	5.62E-07	0.00E+00		Np-237	0.01%		Cs-134	0.00%				
Cs-137	2.77E+00	2.48E+00	2.79E+00	2.63E+00	2.51E+00	2.51E+00	2.89E+00	2.73E+00	0.00E+00		U-236	0.01%		Cm-243	0.00%				
Eu-154	1.56E-02	2.07E-02	1.06E-01	1.42E-01	6.99E-01	9.55E-03	1.51E-01	1.03E-01	0.00E+00		Pu-242	0.01%		Eu-155	0.00%				
Eu-155	1.47E-04	2.54E-04	4.93E-03	5.92E-03	6.30E-02	9.94E-05	4.60E-03	4.64E-03	0.00E+00		Am-242m	0.01%		Sm-151	0.00%				
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		U-238	0.00%		Fe-55(crud)	0.00%				
H-3	9.96E-04	9.96E-04	9.96E-04	9.96E-04	9.96E-04	9.96E-04	9.96E-04	9.96E-04	0.00E+00		Eu-155	0.00%		U-236	0.00%				
I-129	4.87E-07	1.17E-06	1.76E-06	7.85E-07	7.74E-07	8.75E-03	6.62E-07	2.63E-04	0.00E+00		Cd-113m	0.00%		Ru-106	0.00%				
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		U-235	0.00%		Cm-242	0.00%				
Nb-93m	3.04E-07	3.19E-08	4.71E-05	2.08E-07	5.43E-07	2.22E-08	2.89E-07	5.77E-06	0.00E+00		Cm-243	0.00%		Zr-93	0.00%				
Nb-94	3.48E-10	1.64E-09	5.47E-08	1.65E-09	1.44E-09	1.62E-09	3.25E-09	8.18E-09	0.00E+00		Sm-151	0.00%		U-238	0.00%				
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		H-3	0.00%		U-235	0.00%				
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		U-234	0.00%		H-3	0.00%				
Np-237	5.21E-03	2.98E-06	2.84E-03	4.61E-02	5.76E-01	2.36E-06	4.12E-03	2.57E-02	0.00E+00		Cm-242	0.00%		Cm-245	0.00%				
Pa-231	1.91E-10	2.43E-10	2.07E-05	1.93E-05	2.41E-04	2.11E-10	7.93E-09	9.59E-06	0.00E+00		U-232	0.00%		Cd-113m	0.00%				
Pb-210	6.76E-14	6.76E-14	6.76E-14	7.97E-13	1.16E-11	6.76E-14	9.97E-13	7.80E-13	0.00E+00		I-129	0.00%		Pa-231	0.00%				
Pd-107	3.28E-11	3.28E-11	9.89E-07	1.77E-10	4.72E-10	3.28E-11	7.46E-09	1.20E-07	0.00E+00		Zr-93	0.00%		U-234	0.00%				
Pm-147	6.84E-07	1.31E-06	2.82E+00	2.97E-01	3.71E+00	7.20E-07	2.14E-01	3.86E-01	0.00E+00		Tc-99	0.00%		Ac-227	0.00%				
Pu-238	9.07E+00	3.24E-04	1.04E+02	4.92E+01	6.16E+02	3.12E-04	2.27E+01	3.43E+01	0.00E+00		Cm-245	0.00%		U-232	0.00%				
Pu-239	6.98E+00	2.02E-04	7.09E+01	3.71E+01	4.63E+02	1.98E-04	1.66E+01	2.55E+01	0.00E+00		Sn-126	0.00%		Sn-126	0.00%				
Pu-240	5.00E+00	1.50E-04	5.08E+01	2.66E+01	3.32E+02	1.42E-04	1.19E+01	1.82E+01	0.00E+00		Pa-231	0.00%		Cm-246	0.00%				
Pu-241	1.23E+01	5.51E-04	5.73E+01	6.05E+01	7.57E+02	2.23E-04	2.36E+01	4.02E+01	0.00E+00		Ac-227	0.00%		Sm-147	0.00%				
Pu-242	4.63E-03	1.45E-07	4.70E-02	2.47E-02	3.08E-01	1.35E-07	1.10E-02	1.70E-02	0.00E+00		Nb-93m	0.00%		Th-230	0.00%				
Ra-226	2.29E-13	2.29E-13	3.62E-11	1.49E-12	1.71E-11	2.29E-13	2.41E-13	5.22E-12	0.00E+00		Se-79	0.00%		Tc-99	0.00%				
Ra-228	2.27E-14	2.29E-14	8.97E-13	9.17E-14	8.09E-13	2.27E-14	2.32E-14	1.60E-13	0.00E+00		Cm-246	0.00%		I-129	0.00%				
Ru-106	6.04E-03	6.00E-03	4.55E-01	6.00E-03	6.00E-03	6.00E-03	7.40E-03	5.65E-02	0.00E+00		U-233	0.00%		Se-79	0.00%				
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		Cs-135	0.00%		Cs-135	0.00%				
Se-79	6.93E-07	6.93E-07	1.00E-05	6.93E-07	6.93E-07	6.93E-07	4.33E-06	2.71E-06	0.00E+00		Sm-147	0.00%		Nb-93m	0.00%				
Sm-147	0.00E+00	0.00E+00	9.29E-08	3.35E-07	4.19E-06	0.00E+00	2.30E-07	2.46E-07	0.00E+00		Pd-107	0.00%		U-233	0.00%				
Sm-151	1.59E-08	5.87E-08	1.28E-03	4.33E-03	5.44E-02	5.20E-09	2.96E-03	3.19E-03	0.00E+00		Th-230	0.00%		Th-229	0.00%				
Sn-126	5.73E-06	5.65E-06	6.06E-05	2.25E-05	4.73E-05	5.25E-06	7.06E-06	1.08E-05	0.00E+00		Nb-94	0.00%		Th-232	0.00%				
Sr-90	3.17E-01	3.17E-01	3.44E+02	4.04E+01	8.74E+01	3.17E-01	6.89E-01	4.22E+01	0.00E+00		Th-229	0.00%		Nb-94	0.00%				

Inhalation Doses

Tc-99	9.62E-07	9.62E-07	3.55E-04	9.62E-07	9.62E-07	2.58E-05	1.33E-05	4.79E-05	0.00E+00	Th-232	0.00%	Pd-107	0.00%
Th-229	3.29E-11	3.29E-11	2.37E-08	1.37E-08	1.70E-07	3.29E-11	8.40E-11	6.91E-09	0.00E+00	C-14	0.00%	C-14	0.00%
Th-230	4.78E-10	4.78E-10	3.52E-07	2.03E-07	2.53E-06	4.78E-10	1.23E-09	1.03E-07	0.00E+00	Ra-226	0.00%	Ra-226	0.00%
Th-232	2.23E-13	2.26E-13	2.75E-10	2.61E-10	3.25E-09	2.18E-13	5.47E-13	1.30E-10	0.00E+00	Co-60	0.00%	Pb-210	0.00%
U-232	1.31E-07	1.32E-07	2.42E-03	6.63E-06	1.05E-04	1.28E-07	5.08E-06	2.91E-04	0.00E+00	Pb-210	0.00%	Ra-228	0.00%
U-233	4.40E-10	4.40E-10	5.26E-06	1.23E-08	1.94E-07	4.40E-10	1.63E-08	6.34E-07	0.00E+00	Ra-228	0.00%	Co-60	0.00%
U-234	4.32E-07	4.32E-07	5.15E-03	1.21E-05	1.88E-04	4.32E-07	1.60E-05	6.18E-04	0.00E+00	Cl-36	0.00%	Cl-36	0.00%
U-235	2.96E-06	2.97E-06	3.45E-02	8.22E-05	1.26E-03	2.96E-06	1.07E-04	4.15E-03	0.00E+00	Cm-247	0.00%	Cm-247	0.00%
U-236	1.38E-05	1.38E-05	1.64E-01	3.85E-04	6.06E-03	1.38E-05	5.11E-04	1.97E-02	0.00E+00	Fe-55	0.00%	Fe-55	0.00%
U-238	3.43E-06	3.43E-06	4.09E-02	1.01E-04	1.51E-03	3.42E-06	1.27E-04	4.92E-03	0.00E+00	Kr-85	0.00%	Kr-85	0.00%
Zr-93	4.49E-08	9.63E-08	1.79E-04	3.64E-04	4.49E-03	3.58E-08	3.56E-07	1.78E-04	0.00E+00	Ni-59	0.00%	Ni-59	0.00%
										Ni-63	0.00%	Ni-63	0.00%
crud										Sb-125	0.00%	Sb-125	0.00%
Co-60(crud)	6.72E-02	2.60E-01	4.87E+00	2.43E-01	1.91E-01	2.29E-01	5.08E-01	8.34E-01	0.00E+00				
Fe-55(crud)	4.66E-02	4.53E-02	9.44E-02	4.60E-02	4.58E-02	4.83E-02	1.08E-01	6.46E-02	0.00E+00				
total	4.88E+01	3.22E+00	6.45E+02	2.83E+02	3.08E+03	3.22E+00	1.09E+02	2.10E+02	0.00E+00				

EBR-II (U-MTL DE-CLAD) [438]										
Other	Not Intact									
Air Submersion Dose [rem]										Isotope % of Dose
Isotopes	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes % of Total Skin Dose
Ac-227	1.17E-15	1.38E-15	1.05E-15	9.15E-16	3.22E-15	1.14E-15	9.90E-16	1.16E-15	1.02E-14	Kr-85 43.13%
Am-241	2.39E-06	2.98E-06	1.87E-06	1.45E-06	7.98E-06	2.18E-06	1.76E-06	2.27E-06	3.56E-06	Cs-137 31.89%
Am-242m	4.07E-11	6.44E-11	1.84E-11	1.84E-11	8.51E-11	3.16E-11	2.08E-11	3.40E-11	1.46E-10	Co-60 (crud) 15.92%
Am-243	5.81E-09	6.93E-09	5.10E-09	4.11E-09	1.98E-08	5.55E-09	4.75E-09	5.79E-09	7.30E-09	Sr-90 6.34%
C-14	3.36E-16	4.57E-16	1.98E-16	1.57E-16	9.16E-16	2.84E-16	2.00E-16	2.91E-16	3.15E-13	Cs-134 1.64%
Cd-113m	5.75E-10	7.02E-10	4.75E-10	4.02E-10	1.68E-09	5.42E-10	4.51E-10	5.56E-10	6.80E-07	Eu-154 0.64%
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ru-106 0.27%
Cm-242	6.93E-12	1.31E-11	1.00E-12	1.67E-12	9.38E-12	4.34E-12	2.01E-12	5.03E-12	3.80E-11	Pm-147 0.17%
Cm-243	2.10E-09	2.43E-09	2.00E-09	1.82E-09	5.46E-09	2.10E-09	1.89E-09	2.14E-09	3.56E-09	Eu-155 0.01%
Cm-244	3.26E-10	6.29E-10	3.35E-11	6.90E-11	4.17E-10	1.98E-10	8.56E-11	2.32E-10	1.85E-09	Am-241 0.00%
Cm-245	5.71E-12	6.69E-12	5.34E-12	4.66E-12	1.74E-11	5.65E-12	5.00E-12	5.83E-12	7.89E-12	Cd-113m 0.00%
Cm-246	6.78E-16	1.30E-15	7.61E-17	1.47E-16	8.88E-16	4.15E-16	1.82E-16	4.85E-16	3.79E-15	Tc-99 0.00%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sn-126 0.00%
Co-60	2.47E-14	2.49E-14	2.49E-14	2.47E-14	2.47E-14	2.55E-14	2.41E-14	2.53E-14	2.91E-14	Pu-238 0.00%
Cs-134	1.68E-03	1.91E-03	1.67E-03	1.63E-03	2.72E-03	1.71E-03	1.60E-03	1.71E-03	2.14E-03	Pu-240 0.00%
Cs-135	8.62E-13	1.13E-12	5.75E-13	4.59E-13	2.48E-12	7.55E-13	5.61E-13	7.76E-13	1.24E-09	Pu-239 0.00%
Cs-137	2.54E-02	2.90E-02	2.52E-02	2.46E-02	4.17E-02	2.59E-02	2.41E-02	2.59E-02	4.18E-02	I-129 0.00%
Eu-154	6.02E-04	6.84E-04	6.01E-04	5.89E-04	9.46E-04	6.17E-04	5.77E-04	6.16E-04	8.32E-04	Pu-241 0.00%
Eu-155	7.74E-06	9.17E-06	6.90E-06	5.75E-06	2.52E-05	7.49E-06	6.44E-06	7.74E-06	1.05E-05	U-235 0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-243 0.00%
H-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-243 0.00%
I-129	8.13E-09	1.12E-08	3.60E-09	2.76E-09	1.85E-08	6.50E-09	3.87E-09	6.40E-09	1.85E-08	Se-79 0.00%
Kr-85	5.00E-04	5.73E-04	4.88E-04	4.66E-04	9.41E-04	5.05E-04	4.66E-04	5.09E-04	5.65E-02	Np-237 0.00%
Nb-93m	3.47E-11	7.19E-11	1.40E-12	6.47E-12	3.80E-11	1.88E-11	7.46E-12	2.44E-11	2.35E-10	Cm-244 0.00%
Nb-94	4.14E-11	4.70E-11	4.12E-11	4.03E-11	6.53E-11	4.24E-11	3.94E-11	4.22E-11	5.22E-11	Cs-135 0.00%
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-151 0.00%
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Nb-93m 0.00%
Np-237	1.38E-09	1.67E-09	1.19E-09	1.02E-09	4.23E-09	1.31E-09	1.12E-09	1.36E-09	2.04E-09	U-236 0.00%
Pa-231	3.55E-13	4.13E-13	3.36E-13	3.16E-13	7.56E-13	3.53E-13	3.20E-13	3.57E-13	5.06E-13	Am-242m 0.00%
Pb-210	9.87E-20	1.30E-19	6.78E-20	5.01E-20	3.11E-19	8.65E-20	6.52E-20	9.00E-20	2.04E-19	Nb-94 0.00%
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-242 0.00%
Pm-147	2.04E-07	2.61E-07	1.49E-07	1.22E-07	5.95E-07	1.84E-07	1.44E-07	1.89E-07	2.21E-04	Pu-242 0.00%
Pu-238	1.60E-08	3.09E-08	2.58E-09	4.09E-09	2.26E-08	9.75E-09	4.84E-09	1.19E-08	9.95E-08	U-238 0.00%
Pu-239	7.98E-09	1.24E-08	4.37E-09	4.40E-09	1.56E-08	6.40E-09	4.71E-09	6.99E-09	3.07E-08	Cm-245 0.00%
Pu-240	7.51E-09	1.45E-08	1.29E-09	1.95E-09	1.09E-08	4.63E-09	2.31E-09	5.61E-09	4.63E-08	U-234 0.00%
Pu-241	9.73E-09	1.17E-08	8.76E-09	7.62E-09	2.96E-08	9.44E-09	8.24E-09	9.81E-09	1.58E-08	U-232 0.00%
Pu-242	6.14E-12	1.18E-11	1.11E-12	1.64E-12	9.09E-12	3.82E-12	1.93E-12	4.61E-12	3.76E-11	Pa-231 0.00%
Ra-226	5.20E-18	5.98E-18	4.98E-18	4.56E-18	1.34E-17	5.22E-18	4.71E-18	5.32E-18	8.09E-18	C-14 0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60 0.00%
Ru-106	3.32E-05	3.81E-05	3.32E-05	3.20E-05	5.65E-05	3.39E-05	3.17E-05	3.42E-05	3.58E-04	Ac-227 0.00%
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-233 0.00%
Se-79	2.66E-12	3.58E-12	1.62E-12	1.28E-12	7.35E-12	2.27E-12	1.61E-12	2.32E-12	2.84E-09	Cm-246 0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-229 0.00%
Sm-151	1.54E-10	2.60E-10	2.09E-11	3.34E-11	2.10E-10	1.06E-10	4.41E-11	1.07E-10	5.62E-10	Th-230 0.00%
Sn-126	2.27E-07	2.59E-07	2.25E-07	2.17E-07	3.94E-07	2.31E-07	2.15E-07	2.32E-07	3.93E-07	Ra-226 0.00%
Sr-90	7.02E-06	8.57E-06	5.81E-06	4.91E-06	2.06E-05	6.62E-06	5.51E-06	6.80E-06	8.30E-03	Pb-210 0.00%
Tc-99	2.78E-10	3.52E-10	2.06E-10	1.68E-10	8.26E-10	2.51E-10	1.98E-10	2.59E-10	4.38E-07	Th-232 0.00%
Th-229	3.37E-16	3.96E-16	3.13E-16	2.71E-16	1.03E-15	3.31E-16	2.93E-16	3.43E-16	4.84E-16	Cl-36 0.00%
Th-230	1.58E-16	2.09E-16	1.26E-16	1.07E-16	4.65E-16	1.43E-16	1.21E-16	1.53E-16	3.97E-16	Cm-247 0.00%
Th-232	2.05E-20	2.99E-20	1.40E-20	1.21E-20	5.71E-20	1.74E-20	1.39E-20	1.92E-20	7.56E-20	Fe-55 0.00%
U-232	1.90E-13	2.84E-13	1.21E-13	1.10E-13	4.73E-13	1.58E-13	1.23E-13	1.74E-13	7.26E-13	Fe-55 (crud) 0.00%
U-233	2.20E-15	2.88E-15	1.75E-15	1.61E-15	5.35E-15	2.01E-15	1.70E-15	2.12E-15	5.94E-15	H-3 0.00%
U-234	1.14E-12	1.87E-12	5.68E-13	5.45E-13	2.58E-12	8.68E-13	6.23E-13	9.90E-13	5.51E-12	Ni-59 0.00%
U-235	6.61E-09	7.61E-09	6.33E-09	5.77E-09	1.73E-08	6.61E-09	5.97E-09	6.75E-09	8.10E-09	Ni-63 0.00%
U-236	2.67E-11	4.81E-11	9.53E-12	1.02E-11	5.20E-11	1.83E-11	1.18E-11	2.19E-11	1.56E-10	Pd-107 0.00%
U-238	5.07E-12	9.87E-12	1.15E-12	1.43E-12	8.55E-12	3.14E-12	1.74E-12	3.94E-12	3.36E-11	Ra-228 0.00%
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sb-125 0.00%
										Sm-147 0.00%
crud										Zr-93 0.00%
Co-60(crud)	1.74E-02	1.96E-02	1.75E-02	1.74E-02	2.52E-02	1.79E-02	1.70E-02	1.78E-02	2.05E-02	
Fe-55(crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
totals	4.56E-02	5.18E-02	4.55E-02	4.47E-02	7.15E-02	4.67E-02	4.38E-02	4.66E-02	1.31E-01	

EBR-II (U-MTL DE-CLAD) [438]

Other

Not Intact

	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	4.88E+01		4.56E-02			
Breast	3.22E+00		5.18E-02			
Lung	6.45E+02		4.55E-02			
R Marrow	2.83E+02		4.47E-02			
B Surface	3.08E+03	<CDE	7.15E-02			
Thyroid	3.22E+00		4.67E-02			
Remainder	1.09E+02		4.38E-02			
Whole Body	2.10E+02	<CEDE	4.66E-02	<DDE	2.10E+02	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	1.31E-01	<SKIN	1.31E-01	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					3.08E+03	<CDE + DDE

EBR-II (U-MTL DE-CLAD) [438]

Other

Not Intact

Isotope	Material Type	Offsite Doses [rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	7.50E-06	1.33E-04
Am-241	P	4.45E+01	8.04E+02
Am-242m	P	1.64E-02	3.03E-01
Am-243	P	4.21E-02	7.67E-01
C-14	P	9.74E-11	9.74E-11
Cd-113m	P	4.41E-03	3.54E-04
Cl-36	P	0.00E+00	0.00E+00
Cm-242	P	5.50E-04	5.74E-03
Cm-243	P	4.02E-03	7.13E-02
Cm-244	P	4.22E-01	7.37E+00
Cm-245	P	2.41E-05	4.39E-04
Cm-246	P	1.77E-06	3.21E-05
Cm-247	P	0.00E+00	0.00E+00
Co-60	P	1.60E-12	3.86E-13
Cs-134	C	9.60E-02	8.47E-02
Cs-135	C	5.62E-07	5.49E-07
Cs-137	C	2.76E+00	2.54E+00
Eu-154	P	1.04E-01	7.00E-01
Eu-155	P	4.65E-03	6.30E-02
Fe-55	P	0.00E+00	0.00E+00
H-3	G	9.96E-04	9.96E-04
I-129	G	2.63E-04	7.80E-07
Kr-85	G	5.09E-04	5.09E-04
Nb-93m	P	5.77E-06	5.43E-07
Nb-94	P	8.23E-09	1.48E-09
Ni-59	P	0.00E+00	0.00E+00
Ni-63	P	0.00E+00	0.00E+00
Np-237	P	2.57E-02	5.76E-01
Pa-231	P	9.59E-06	2.41E-04
Pb-210	P	7.80E-13	1.16E-11
Pd-107	P	1.20E-07	4.72E-10
Pm-147	P	3.86E-01	3.71E+00
Pu-238	P	3.43E+01	6.16E+02
Pu-239	P	2.55E+01	4.63E+02
Pu-240	P	1.82E+01	3.32E+02
Pu-241	P	4.02E+01	7.57E+02
Pu-242	P	1.70E-02	3.08E-01
Ra-226	P	5.22E-12	1.71E-11
Ra-228	P	1.60E-13	8.09E-13
Ru-106	P	5.65E-02	6.03E-03
Sb-125	P	0.00E+00	0.00E+00
Se-79	P	2.71E-06	6.93E-07
Sm-147	P	2.46E-07	4.19E-06
Sm-151	P	3.19E-03	5.44E-02
Sn-126	P	1.10E-05	4.75E-05
Sr-90	P	4.22E+01	8.74E+01
Tc-99	P	4.79E-05	9.62E-07
Th-229	P	6.91E-09	1.70E-07
Th-230	P	1.03E-07	2.53E-06
Th-232	P	1.30E-10	3.25E-09
U-232	P	2.91E-04	1.05E-04
U-233	P	6.34E-07	1.94E-07
U-234	P	6.18E-04	1.88E-04
U-235	P	4.15E-03	1.26E-03
U-236	P	1.97E-02	6.06E-03
U-238	P	4.92E-03	1.51E-03
Zr-93	P	1.78E-04	4.49E-03
Co-60(crud)	crud	8.52E-01	2.08E-01
Fe-55(crud)	crud	6.46E-02	4.58E-02
Total		2.10E+02	3.08E+03

	Evaluated Fuel	x						Evaluated Fuel
Isotope	Fuel Type	Stable Metal	Stable Metal	Non-Metal	Non-Metal	Other	Other	Stable Metal
	Condition	Intact	Not Intact	Intact	Not Intact	Intact	Not Intact	Intact
				SHIPPINGPORT		EBWR (U		
	Fuel Name	HWCTR	ALUM CLAD	PWR CORE II	SAXTON	METAL) LEU	N REACTOR	HWCTR (U/TH)
	# of canisters	(U/TH) [112]	SNF [411]	[193]	(MOX) [787]	[64]	[147]	[112]
		0.17	1.00	24.00	1.00	10.50	194.95	0.17
	Material Type	Curies (entire fuel inventory)						Curies
Ac-227	P	9.27E-09	2.81E-07	1.24E-02	1.33E-05	3.38E-05	1.03E-02	9.27E-09
Am-241	P	1.22E-01	2.51E+01	7.61E+04	6.45E+03	1.63E+04	2.80E+05	1.22E-01
Am-242m	P	8.67E-05	9.69E-03	1.18E+02	1.07E+01	2.71E+01	7.96E+00	8.67E-05
Am-243	P	2.85E-04	2.40E-02	3.38E+02	2.83E+01	7.18E+01	4.10E+01	2.85E-04
C-14	P	1.09E-06	1.17E-05	1.53E+00	1.81E+00	4.59E+00	3.63E+02	1.09E-06
Cd-113m	P	6.32E-02	7.25E-01	0.00E+00	2.59E+01	6.56E+01	0.00E+00	6.32E-02
Cl-36	P	2.51E-30	0.00E+00	0.00E+00	2.35E-02	5.96E-02	0.00E+00	2.51E-30
Cm-242	P	2.62E-04	8.00E-03	0.00E+00	8.79E+00	2.23E+01	0.00E+00	2.62E-04
Cm-243	P	4.52E-05	3.29E-03	0.00E+00	1.60E+01	4.06E+01	0.00E+00	4.52E-05
Cm-244	P	9.94E-03	4.27E-01	3.16E+04	9.29E+02	2.36E+03	2.44E+03	9.94E-03
Cm-245	P	5.84E-07	1.33E-05	5.82E+00	2.12E-01	5.37E-01	5.13E-01	5.84E-07
Cm-246	P	3.99E-08	9.83E-07	9.89E-01	4.28E-02	1.08E-01	6.79E-02	3.99E-08
Cm-247	P	4.17E-14	0.00E+00	0.00E+00	1.12E-07	2.83E-07	0.00E+00	4.17E-14
Co-60	P	7.30E-03	1.81E-09	1.10E+04	2.12E+01	5.38E+01	4.75E+02	7.30E-03
Cs-134	C	9.30E+01	2.05E+02	3.63E+03	1.24E+01	3.13E+01	1.63E+02	9.30E+01
Cs-135	C	6.58E-04	1.24E-02	6.19E+00	6.65E-01	1.69E+00	4.00E+01	6.58E-04
Cs-137	C	5.49E+02	8.60E+03	2.07E+06	1.00E+05	2.53E+05	5.34E+06	5.49E+02
Eu-154	P	1.57E+01	9.08E+01	0.00E+00	1.84E+03	4.67E+03	0.00E+00	1.57E+01
Eu-155	P	7.47E+00	2.81E+01	0.00E+00	1.92E+02	4.86E+02	0.00E+00	7.47E+00
Fe-55	P	1.29E+00	0.00E+00	0.00E+00	1.76E-01	4.45E-01	0.00E+00	1.29E+00
H-3	G	2.02E+00	2.61E+01	5.09E+03	2.92E+02	7.41E+02	1.03E+04	2.02E+00
I-129	G	1.44E-04	2.54E-03	7.20E-01	6.09E-02	1.54E-01	3.29E+00	1.44E-04
Kr-85	G	5.46E+01	6.45E+02	5.07E+04	2.59E+03	6.56E+03	1.53E+05	5.46E+01
Nb-93m	P	2.82E-03	4.96E-02	5.72E+01	2.82E+00	7.15E+00	4.54E+02	2.82E-03
Nb-94	P	1.37E-07	4.96E-06	0.00E+00	5.18E-02	1.31E-01	6.71E-05	1.37E-07
Ni-59	P	2.43E-04	0.00E+00	0.00E+00	4.01E-02	1.02E-01	2.03E+01	2.43E-04
Ni-63	P	3.69E-02	0.00E+00	8.04E+04	4.42E+00	1.12E+01	2.21E+03	3.69E-02
Np-237	P	1.82E-03	1.20E-02	7.06E+00	6.46E-01	1.64E+00	3.87E+01	1.82E-03
Pa-231	P	9.79E-08	1.88E-06	1.15E-02	3.02E-05	7.65E-05	1.38E-02	9.79E-08
Pb-210	P	1.04E-10	1.44E-11	2.71E-06	5.13E-08	1.30E-07	7.52E-08	1.04E-10
Pd-107	P	9.52E-05	2.35E-03	1.95E+00	2.14E-01	5.42E-01	7.46E+00	9.52E-05
Pm-147	P	4.86E+02	2.47E+03	0.00E+00	9.36E+01	2.37E+02	0.00E+00	4.86E+02
Pu-238	P	7.65E+02	2.20E+01	8.02E+04	5.66E+02	1.18E+04	6.37E+04	7.65E+02
Pu-239	P	1.59E+01	1.49E+01	7.55E+03	9.81E+01	2.05E+03	1.23E+05	1.59E+01
Pu-240	P	9.08E+00	1.07E+01	1.13E+04	1.70E+02	3.54E+03	7.18E+04	9.08E+00
Pu-241	P	2.56E+03	1.22E+03	1.57E+06	9.43E+03	1.97E+05	2.06E+06	2.56E+03
Pu-242	P	1.35E-02	1.04E-02	3.73E+01	4.84E-01	1.01E+01	3.46E+01	1.35E-02
Ra-226	P	1.93E-09	1.53E-10	6.13E-06	2.46E-07	6.22E-07	1.15E-03	1.93E-09
Ra-228	P	1.74E-13	8.44E-12	5.85E-02	2.80E-07	7.11E-07	1.03E-06	1.74E-13
Ru-106	P	3.64E+01	2.97E+01	1.42E+01	1.17E-03	2.97E-03	3.16E-01	3.64E+01
Sb-125	P	1.20E+01	0.00E+00	0.00E+00	1.70E+01	4.30E+01	0.00E+00	1.20E+01
Se-79	P	2.47E-03	6.93E-02	7.69E+00	7.90E-01	2.00E+00	4.48E+01	2.47E-03
Sm-147	P	3.48E-08	8.28E-07	0.00E+00	9.01E-06	2.28E-05	0.00E+00	3.48E-08
Sm-151	P	2.16E+00	2.67E+01	2.58E+04	5.86E+02	1.48E+03	8.55E+04	2.16E+00
Sn-126	P	2.21E-03	2.72E-02	9.72E+00	1.50E+00	3.80E+00	7.83E+01	2.21E-03
Sr-90	P	5.25E+02	8.16E+03	1.56E+06	6.87E+04	1.74E+05	4.03E+06	5.25E+02
Tc-99	P	8.07E-02	1.44E+00	2.67E+02	2.51E+01	6.37E+01	1.51E+03	8.07E-02
Th-229	P	3.77E-08	8.09E-10	1.57E-02	4.93E-07	1.03E-05	9.31E-06	3.77E-08
Th-230	P	3.27E-04	7.96E-08	1.08E-03	8.39E-06	1.75E-04	1.02E-03	3.27E-04
Th-232	P	1.49E-10	1.99E-11	5.56E-03	4.58E-08	9.56E-07	1.21E-07	1.49E-10
U-232	P	4.47E-03	1.11E-04	0.00E+00	4.23E-03	8.82E-02	0.00E+00	4.47E-03
U-233	P	6.56E-05	1.18E-06	6.07E+00	1.70E-04	3.55E-03	5.71E-03	6.56E-05
U-234	P	6.83E+00	1.17E-03	5.82E+00	5.70E-02	1.19E+00	4.85E+02	6.83E+00
U-235	P	1.34E-01	8.48E-03	6.58E-01	5.12E-03	1.07E-01	1.85E+01	1.34E-01
U-236	P	5.77E-01	3.95E-02	5.50E+00	7.81E-02	1.63E+00	7.02E+01	5.77E-01
U-238	P	2.22E-03	1.04E-02	5.15E+00	9.65E-02	2.01E+00	3.82E+02	2.22E-03
Zr-93	P	1.27E-02	1.40E-01	3.61E+01	3.72E+00	9.42E+00	2.10E+02	1.27E-02
crud (per canister)								
Co-60(crud)		1.56E+01	6.37E+00	2.68E+02	1.23E+02	7.70E+02	1.76E+03	1.56E+01
Fe-55(crud)		9.85E+01	4.01E+01	1.69E+03	7.73E+02	4.85E+03	1.11E+04	9.85E+01

Release Fractions				
Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
stable metal/ intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
stable metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
non-metal/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
non-metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
other/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
other/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud				
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
HWCTR (U/TH) [112]				
Stable Metal				
Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Breathing Rate	3.33E-04	[m ³ /s]		
Ground Level Dispersion Factor				
distance [m]	x/Q [sec/m ³]			
11000	2.17E-05	99.5% worst-sector		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
HWCTR (U/TH) [112]							
Stable Metal	Intact						
Isotope	Curies (entire fuel inventory)	$f_{inv} = 1/nCan$	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	9.27E-09	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.11E-11	4.45E-14
Am-241	1.22E-01	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.46E-04	5.83E-07
Am-242m	8.67E-05	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.04E-07	4.16E-10
Am-243	2.85E-04	6.00E+00	2.00E-04	4.00E-03	1.00E+00	3.42E-07	1.37E-09
C-14	1.09E-06	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.31E-09	5.25E-12
Cd-113m	6.32E-02	6.00E+00	2.00E-04	4.00E-03	1.00E+00	7.58E-05	3.03E-07
Cl-36	2.51E-30	6.00E+00	2.00E-04	4.00E-03	1.00E+00	3.01E-33	1.20E-35
Cm-242	2.62E-04	6.00E+00	2.00E-04	4.00E-03	1.00E+00	3.14E-07	1.26E-09
Cm-243	4.52E-05	6.00E+00	2.00E-04	4.00E-03	1.00E+00	5.43E-08	2.17E-10
Cm-244	9.94E-03	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.19E-05	4.77E-08
Cm-245	5.84E-07	6.00E+00	2.00E-04	4.00E-03	1.00E+00	7.01E-10	2.81E-12
Cm-246	3.99E-08	6.00E+00	2.00E-04	4.00E-03	1.00E+00	4.79E-11	1.91E-13
Cm-247	4.17E-14	6.00E+00	2.00E-04	4.00E-03	1.00E+00	5.00E-17	2.00E-19
Co-60	7.30E-03	6.00E+00	2.00E-04	4.00E-03	1.00E+00	8.75E-06	3.50E-08
Cs-134	9.30E+01	6.00E+00	2.00E-04	1.00E+00	1.00E+00	1.12E-01	1.12E-01
Cs-135	6.58E-04	6.00E+00	2.00E-04	1.00E+00	1.00E+00	7.90E-07	7.90E-07
Cs-137	5.49E+02	6.00E+00	2.00E-04	1.00E+00	1.00E+00	6.58E-01	6.58E-01
Eu-154	1.57E+01	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.88E-02	7.52E-05
Eu-155	7.47E+00	6.00E+00	2.00E-04	4.00E-03	1.00E+00	8.97E-03	3.59E-05
Fe-55	1.29E+00	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.55E-03	6.18E-06
H-3	2.02E+00	6.00E+00	3.00E-01	1.00E+00	1.00E+00	3.64E+00	3.64E+00
I-129	1.44E-04	6.00E+00	3.00E-01	1.00E+00	1.00E+00	2.59E-04	2.59E-04
Kr-85	5.46E+01	6.00E+00	3.00E-01	1.00E+00	1.00E+00	9.83E+01	9.83E+01
Nb-93m	2.82E-03	6.00E+00	2.00E-04	4.00E-03	1.00E+00	3.38E-06	1.35E-08
Nb-94	1.37E-07	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.64E-10	6.55E-13
Ni-59	2.43E-04	6.00E+00	2.00E-04	4.00E-03	1.00E+00	2.91E-07	1.16E-09
Ni-63	3.69E-02	6.00E+00	2.00E-04	4.00E-03	1.00E+00	4.43E-05	1.77E-07
Np-237	1.82E-03	6.00E+00	2.00E-04	4.00E-03	1.00E+00	2.19E-06	8.75E-09
Pa-231	9.79E-08	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.17E-10	4.70E-13
Pb-210	1.04E-10	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.24E-13	4.97E-16
Pd-107	9.52E-05	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.14E-07	4.57E-10
Pm-147	4.86E+02	6.00E+00	2.00E-04	4.00E-03	1.00E+00	5.83E-01	2.33E-03
Pu-238	7.65E+02	6.00E+00	2.00E-04	4.00E-03	1.00E+00	9.18E-01	3.67E-03
Pu-239	1.59E+01	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.91E-02	7.65E-05
Pu-240	9.08E+00	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.09E-02	4.36E-05
Pu-241	2.56E+03	6.00E+00	2.00E-04	4.00E-03	1.00E+00	3.07E+00	1.23E-02
Pu-242	1.35E-02	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.62E-05	6.49E-08
Ra-226	1.93E-09	6.00E+00	2.00E-04	4.00E-03	1.00E+00	2.32E-12	9.29E-15
Ra-228	1.74E-13	6.00E+00	2.00E-04	4.00E-03	1.00E+00	2.08E-16	8.33E-19
Ru-106	3.64E+01	6.00E+00	2.00E-04	4.00E-03	1.00E+00	4.37E-02	1.75E-04
Sb-125	1.20E+01	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.44E-02	5.77E-05
Se-79	2.47E-03	6.00E+00	2.00E-04	4.00E-03	1.00E+00	2.96E-06	1.19E-08
Sm-147	3.48E-08	6.00E+00	2.00E-04	4.00E-03	1.00E+00	4.18E-11	1.67E-13
Sm-151	2.16E+00	6.00E+00	2.00E-04	4.00E-03	1.00E+00	2.59E-03	1.04E-05
Sn-126	2.21E-03	6.00E+00	2.00E-04	4.00E-03	1.00E+00	2.65E-06	1.06E-08
Sr-90	5.25E+02	6.00E+00	2.00E-04	4.00E-03	1.00E+00	6.30E-01	2.52E-03
Tc-99	8.07E-02	6.00E+00	2.00E-04	4.00E-03	1.00E+00	9.68E-05	3.87E-07
Th-229	3.77E-08	6.00E+00	2.00E-04	4.00E-03	1.00E+00	4.53E-11	1.81E-13
Th-230	3.27E-04	6.00E+00	2.00E-04	4.00E-03	1.00E+00	3.93E-07	1.57E-09
Th-232	1.49E-10	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.78E-13	7.14E-16
U-232	4.47E-03	6.00E+00	2.00E-04	4.00E-03	1.00E+00	5.36E-06	2.14E-08
U-233	6.56E-05	6.00E+00	2.00E-04	4.00E-03	1.00E+00	7.87E-08	3.15E-10
U-234	6.83E+00	6.00E+00	2.00E-04	4.00E-03	1.00E+00	8.19E-03	3.28E-05
U-235	1.34E-01	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.61E-04	6.44E-07
U-236	5.77E-01	6.00E+00	2.00E-04	4.00E-03	1.00E+00	6.92E-04	2.77E-06
U-238	2.22E-03	6.00E+00	2.00E-04	4.00E-03	1.00E+00	2.67E-06	1.07E-08
Zr-93	1.27E-02	6.00E+00	2.00E-04	4.00E-03	1.00E+00	1.53E-05	6.10E-08
crud (per canister)							
Co-60(crud)	1.56E+01	1	1.00E+00	3.00E-01	1.00E+00	1.56E+01	4.68E+00
Fe-55(crud)	9.85E+01	1	1.00E+00	3.00E-01	1.00E+00	9.85E+01	2.96E+01

HWCTR (U/TH) [112]													
Stable Metal	Intact												
	Inhalation Doses [rem]									Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Ac-227	4.71E-13	7.93E-17	1.83E-12	3.06E-12	3.82E-11	4.27E-17	1.75E-12	2.15E-12	0.00E+00	Pu-238	52.73%	Pu-238	89.04%
Am-241	5.07E-07	4.16E-11	2.87E-07	2.71E-06	3.38E-05	2.50E-11	1.22E-06	1.87E-06	0.00E+00	Co-60(crud)	37.48%	Pu-241	6.59%
Am-242m	3.57E-10	1.54E-14	4.68E-11	1.88E-09	2.36E-08	6.28E-15	8.33E-10	1.28E-09	0.00E+00	Pu-241	3.71%	Pu-239	2.06%
Am-243	1.19E-09	5.56E-13	6.51E-10	6.33E-09	7.93E-08	3.03E-13	2.83E-09	4.35E-09	0.00E+00	Fe-55(crud)	2.91%	Pu-240	1.17%
C-14	7.91E-17	7.91E-17	7.91E-17	7.91E-17	7.91E-17	7.91E-17	7.91E-17	7.91E-17	0.00E+00	Pu-239	1.20%	Co-60(crud)	0.81%
Cd-113m	2.69E-10	2.69E-10	3.32E-09	2.69E-10	2.69E-10	2.69E-10	1.05E-08	3.35E-09	0.00E+00	Cs-137	0.77%	Fe-55(crud)	0.19%
Cl-36	1.62E-40	1.62E-40	1.47E-38	1.62E-40	1.62E-40	1.62E-40	1.72E-40	1.91E-39	0.00E+00	Pu-240	0.69%	Cs-137	0.07%
Cm-242	1.91E-11	3.17E-14	5.20E-10	1.31E-10	1.63E-09	3.16E-14	8.22E-11	1.57E-10	0.00E+00	Cs-134	0.19%	Sr-90	0.02%
Cm-243	1.20E-10	3.65E-14	1.13E-10	6.85E-10	8.53E-09	2.22E-14	3.34E-10	4.82E-10	0.00E+00	U-234	0.16%	Am-241	0.02%
Cm-244	2.03E-08	1.33E-12	2.46E-08	1.20E-07	1.49E-06	1.29E-12	6.10E-08	8.54E-08	0.00E+00	Sr-90	0.12%	Cs-134	0.02%
Cm-245	2.53E-12	5.02E-16	1.35E-12	1.34E-11	1.68E-10	2.76E-16	5.97E-12	9.23E-12	0.00E+00	U-236	0.01%	U-234	0.00%
Cm-246	1.71E-13	2.05E-17	9.31E-14	9.11E-13	1.14E-11	1.16E-17	4.06E-13	6.24E-13	0.00E+00	Am-241	0.01%	Pm-147	0.00%
Cm-247	1.64E-19	1.19E-22	8.93E-20	8.72E-19	1.09E-17	7.76E-23	3.90E-19	5.99E-19	0.00E+00	H-3	0.01%	Pu-242	0.00%
Co-60	4.46E-12	1.72E-11	3.23E-10	1.61E-11	1.26E-11	1.52E-11	3.37E-11	5.53E-11	0.00E+00	Pm-147	0.00%	H-3	0.00%
Cs-134	3.88E-05	3.22E-05	3.52E-05	3.52E-05	3.28E-05	3.31E-05	4.15E-05	3.73E-05	0.00E+00	Ru-106	0.00%	Cm-244	0.00%
Cs-135	2.53E-11	2.53E-11	2.98E-11	2.53E-11	2.53E-11	2.53E-11	2.53E-11	2.60E-11	0.00E+00	U-235	0.00%	Eu-154	0.00%
Cs-137	1.54E-04	1.38E-04	1.55E-04	1.46E-04	1.40E-04	1.40E-04	1.61E-04	1.52E-04	0.00E+00	I-129	0.00%	U-236	0.00%
Eu-154	2.35E-08	3.12E-08	1.59E-07	2.13E-07	1.05E-06	1.44E-08	2.27E-07	1.55E-07	0.00E+00	Pu-242	0.00%	Np-237	0.00%
Eu-155	3.41E-10	5.89E-10	1.14E-08	1.37E-08	1.46E-07	2.30E-10	1.06E-08	1.07E-08	0.00E+00	Eu-154	0.00%	U-235	0.00%
Fe-55	8.64E-11	8.41E-11	1.75E-10	8.54E-11	8.49E-11	8.96E-11	2.00E-10	1.20E-10	0.00E+00	U-232	0.00%	Eu-155	0.00%
H-3	1.69E-06	1.69E-06	1.69E-06	1.69E-06	1.69E-06	1.69E-06	1.69E-06	1.69E-06	0.00E+00	Cm-244	0.00%	Th-230	0.00%
I-129	6.01E-10	1.45E-09	2.17E-09	9.69E-10	9.55E-10	1.08E-05	8.17E-10	3.25E-07	0.00E+00	Np-237	0.00%	Am-243	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Eu-155	0.00%	Ru-106	0.00%
Nb-93m	1.51E-13	1.58E-14	2.33E-11	1.03E-13	2.69E-13	1.10E-14	1.43E-13	2.86E-12	0.00E+00	U-238	0.00%	Sm-151	0.00%
Nb-94	8.34E-17	3.93E-16	1.31E-14	3.96E-16	3.45E-16	3.89E-16	7.80E-16	1.96E-15	0.00E+00	Sb-125	0.00%	U-232	0.00%
Ni-59	1.12E-14	1.08E-14	3.74E-14	1.10E-14	1.09E-14	1.17E-14	1.13E-14	1.11E-14	0.00E+00	Am-243	0.00%	Am-242m	0.00%
Ni-63	3.89E-12	3.89E-12	1.45E-11	3.89E-12	3.89E-12	3.89E-12	4.07E-12	3.97E-12	0.00E+00	Th-230	0.00%	Cm-243	0.00%
Np-237	6.93E-09	3.95E-12	3.77E-09	6.13E-08	7.65E-07	3.14E-12	5.47E-09	3.42E-08	0.00E+00	Cd-113m	0.00%	Sb-125	0.00%
Pa-231	8.67E-17	1.10E-16	9.39E-12	8.76E-12	1.09E-10	9.60E-17	3.61E-15	4.36E-12	0.00E+00	Sm-151	0.00%	Zr-93	0.00%
Pb-210	4.23E-18	4.23E-18	4.23E-18	4.99E-17	7.28E-16	4.23E-18	6.24E-17	4.88E-17	0.00E+00	Am-242m	0.00%	U-238	0.00%
Pd-107	1.15E-17	1.15E-17	3.48E-13	6.24E-17	1.66E-16	1.15E-17	2.63E-15	4.21E-14	0.00E+00	Cm-243	0.00%	Cm-242	0.00%
Pm-147	1.17E-12	2.25E-12	4.83E-06	5.09E-07	6.36E-06	1.23E-12	3.67E-07	6.61E-07	0.00E+00	U-233	0.00%	I-129	0.00%
Pu-238	2.75E-03	9.82E-08	3.14E-02	1.49E-02	1.87E-01	9.44E-08	6.89E-03	1.04E-02	0.00E+00	Cm-242	0.00%	Cd-113m	0.00%
Pu-239	6.51E-05	1.89E-09	6.61E-04	3.46E-04	4.32E-03	1.85E-09	1.55E-04	2.37E-04	0.00E+00	Zr-93	0.00%	Cm-245	0.00%
Pu-240	3.71E-05	1.11E-09	3.76E-04	1.97E-04	2.46E-03	1.05E-09	8.81E-05	1.35E-04	0.00E+00	Fe-55	0.00%	Pa-231	0.00%
Pu-241	2.24E-04	1.01E-08	1.04E-03	1.10E-03	1.38E-02	4.07E-09	4.30E-04	7.33E-04	0.00E+00	Co-60	0.00%	U-233	0.00%
Pu-242	5.24E-08	1.64E-12	5.33E-07	2.79E-07	3.49E-06	1.53E-12	1.25E-07	1.93E-07	0.00E+00	Cs-135	0.00%	Fe-55	0.00%
Ra-226	2.53E-17	2.53E-17	4.00E-15	1.65E-16	1.88E-15	2.53E-17	2.66E-17	5.76E-16	0.00E+00	Tc-99	0.00%	Th-229	0.00%
Ra-228	4.08E-21	4.10E-21	1.61E-19	1.64E-20	1.45E-19	4.08E-21	4.17E-21	2.87E-20	0.00E+00	Cm-245	0.00%	Ac-227	0.00%
Ru-106	6.44E-08	6.40E-08	4.86E-06	6.40E-08	6.40E-08	6.40E-08	7.89E-08	6.02E-07	0.00E+00	Sn-126	0.00%	Sn-126	0.00%
Sb-125	5.55E-10	6.42E-10	3.35E-08	1.00E-09	4.21E-09	5.00E-10	2.24E-09	5.09E-09	0.00E+00	Pa-231	0.00%	Cs-135	0.00%
Se-79	2.15E-13	2.15E-13	3.11E-12	2.15E-13	2.15E-13	2.15E-13	1.34E-12	8.43E-13	0.00E+00	Ni-63	0.00%	Co-60	0.00%
Sm-147	0.00E+00	0.00E+00	3.41E-14	1.23E-13	1.54E-12	0.00E+00	8.45E-14	9.03E-14	0.00E+00	Nb-93m	0.00%	Cm-246	0.00%
Sm-151	1.12E-14	4.13E-14	9.04E-10	3.05E-09	3.83E-08	3.66E-15	2.08E-09	2.25E-09	0.00E+00	Th-229	0.00%	Ni-63	0.00%
Sn-126	4.06E-12	4.00E-12	4.29E-11	1.59E-11	3.35E-11	3.72E-12	4.99E-12	7.63E-12	0.00E+00	Ac-227	0.00%	Sm-147	0.00%
Sr-90	1.78E-07	1.78E-07	1.93E-04	2.26E-05	4.90E-05	1.78E-07	3.86E-07	2.37E-05	0.00E+00	Se-79	0.00%	Tc-99	0.00%

Inhalation Doses

Tc-99	4.68E-13	4.68E-13	1.73E-10	4.68E-13	4.68E-13	1.25E-11	6.48E-12	2.33E-11	0.00E+00	Cm-246	0.00%	Nb-93m	0.00%
Th-229	1.34E-14	1.34E-14	9.64E-12	5.57E-12	6.93E-11	1.34E-14	3.41E-14	2.81E-12	0.00E+00	Sm-147	0.00%	Se-79	0.00%
Th-230	1.71E-11	1.71E-11	1.26E-08	7.26E-09	9.07E-08	1.71E-11	4.41E-11	3.69E-09	0.00E+00	Pd-107	0.00%	Th-232	0.00%
Th-232	1.45E-17	1.47E-17	1.79E-14	1.70E-14	2.12E-13	1.42E-17	3.57E-17	8.45E-15	0.00E+00	Ni-59	0.00%	Ni-59	0.00%
U-232	4.58E-11	4.62E-11	8.48E-07	2.33E-09	3.68E-08	4.50E-11	1.78E-09	1.02E-07	0.00E+00	Th-232	0.00%	Ra-226	0.00%
U-233	2.14E-13	2.14E-13	2.56E-09	5.99E-12	9.42E-11	2.14E-13	7.91E-12	3.08E-10	0.00E+00	Nb-94	0.00%	Pb-210	0.00%
U-234	2.19E-08	2.19E-08	2.61E-04	6.12E-07	9.55E-06	2.19E-08	8.11E-07	3.14E-05	0.00E+00	Ra-226	0.00%	Nb-94	0.00%
U-235	4.08E-10	4.10E-10	4.75E-06	1.13E-08	1.74E-07	4.08E-10	1.48E-08	5.71E-07	0.00E+00	C-14	0.00%	Pd-107	0.00%
U-236	1.75E-09	1.75E-09	2.09E-05	4.88E-08	7.70E-07	1.75E-09	6.49E-08	2.51E-06	0.00E+00	Pb-210	0.00%	C-14	0.00%
U-238	6.36E-12	6.36E-12	7.59E-08	1.88E-10	2.79E-09	6.33E-12	2.35E-10	9.13E-09	0.00E+00	Cm-247	0.00%	Cm-247	0.00%
Zr-93	3.56E-14	7.64E-14	1.42E-10	2.89E-10	3.56E-09	2.84E-14	2.82E-13	1.41E-10	0.00E+00	Ra-228	0.00%	Ra-228	0.00%
										Cl-36	0.00%	Cl-36	0.00%
crud										Kr-85	0.00%	Kr-85	0.00%
Co-60(crud)	5.96E-04	2.30E-03	4.32E-02	2.15E-03	1.69E-03	2.03E-03	4.50E-03	7.40E-03	0.00E+00				
Fe-55(crud)	4.13E-04	4.02E-04	8.37E-04	4.08E-04	4.06E-04	4.28E-04	9.56E-04	5.74E-04	0.00E+00				
total	4.28E-03	2.88E-03	7.82E-02	1.93E-02	2.09E-01	2.64E-03	1.32E-02	1.97E-02	0.00E+00				

Air Submersion Doses

HWCTR (U/TH) [112]												
Stable Metal		Intact										
	Air Submersion Doses [rem]										Isotope % of Dose	
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes	% of Total Skin Dose	
Ac-227	3.35E-20	3.98E-20	3.02E-20	2.63E-20	9.25E-20	3.26E-20	2.84E-20	3.34E-20	2.93E-19	Co-60(crud)	96.20%	
Am-241	1.00E-11	1.25E-11	7.89E-12	6.10E-12	3.36E-11	9.17E-12	7.42E-12	9.58E-12	1.50E-11	Cs-137	2.27%	
Am-242m	3.18E-16	5.02E-16	1.44E-16	1.44E-16	6.64E-16	2.47E-16	1.62E-16	2.65E-16	1.14E-15	Kr-85	1.17%	
Am-243	6.01E-14	7.16E-14	5.27E-14	4.25E-14	2.05E-13	5.74E-14	4.91E-14	5.98E-14	7.55E-14	Sr-90	0.36%	
C-14	2.73E-20	3.71E-20	1.61E-20	1.27E-20	7.44E-20	2.31E-20	1.62E-20	2.36E-20	2.56E-17	Am-241	0.00%	
Cd-113m	4.36E-14	5.33E-14	3.61E-14	3.05E-14	1.28E-13	4.11E-14	3.43E-14	4.22E-14	5.16E-11	Co-60	0.00%	
Cl-36	5.41E-42	6.42E-42	4.88E-42	4.37E-42	1.36E-41	5.29E-42	4.64E-42	5.38E-42	3.55E-39	Cs-134	0.00%	
Cm-242	1.97E-16	3.73E-16	2.85E-17	4.76E-17	2.67E-16	1.24E-16	5.72E-17	1.43E-16	1.08E-15	Sn-126	0.00%	
Cm-243	2.51E-14	2.91E-14	2.40E-14	2.18E-14	6.53E-14	2.51E-14	2.26E-14	2.56E-14	4.26E-14	Tc-99	0.00%	
Cm-244	6.61E-15	1.27E-14	6.78E-16	1.40E-15	8.44E-15	4.01E-15	1.73E-15	4.70E-15	3.74E-14	Pu-240	0.00%	
Cm-245	2.18E-16	2.56E-16	2.04E-16	1.79E-16	6.64E-16	2.16E-16	1.91E-16	2.23E-16	3.02E-16	Pu-238	0.00%	
Cm-246	2.40E-20	4.61E-20	2.69E-21	5.19E-21	3.14E-20	1.47E-20	6.42E-21	1.71E-20	1.34E-19	Pu-239	0.00%	
Cm-247	5.90E-23	6.75E-23	5.78E-23	5.54E-23	1.14E-22	5.98E-23	5.54E-23	6.02E-23	7.19E-23	Pu-241	0.00%	
Co-60	8.65E-11	9.77E-11	8.72E-11	8.65E-11	1.25E-10	8.93E-11	8.43E-11	8.86E-11	1.02E-10	I-129	0.00%	
Cs-134	6.63E-07	7.55E-07	6.60E-07	6.44E-07	1.07E-06	6.78E-07	6.32E-07	6.78E-07	8.47E-07	U-235	0.00%	
Cs-135	3.98E-17	5.22E-17	2.66E-17	2.12E-17	1.15E-16	3.49E-17	2.59E-17	3.58E-17	5.75E-14	Am-243	0.00%	
Cs-137	1.41E-06	1.61E-06	1.40E-06	1.37E-06	2.32E-06	1.44E-06	1.34E-06	1.44E-06	2.32E-06	Cm-244	0.00%	
Eu-154	9.06E-08	1.03E-07	9.04E-08	8.86E-08	1.42E-07	9.28E-08	8.68E-08	9.27E-08	1.25E-07	C-14	0.00%	
Eu-155	1.79E-09	2.12E-09	1.60E-09	1.33E-09	5.82E-09	1.74E-09	1.49E-09	1.79E-09	2.44E-09	Np-237	0.00%	
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cs-135	0.00%	
H-3	0.00E+00	0.00E+00	8.04E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.68E-11	0.00E+00	Ru-106	0.00%	
I-129	1.00E-11	1.38E-11	4.45E-12	3.41E-12	2.29E-11	8.02E-12	4.78E-12	7.90E-12	2.29E-11	U-234	0.00%	
Kr-85	9.23E-07	1.06E-06	9.00E-07	8.60E-07	1.74E-06	9.31E-07	8.60E-07	9.39E-07	1.04E-04	Nb-93m	0.00%	
Nb-93m	1.72E-15	3.56E-15	6.93E-17	3.21E-16	1.88E-15	9.32E-16	3.69E-16	1.21E-15	1.16E-14	Se-79	0.00%	
Nb-94	9.92E-16	1.13E-15	9.88E-16	9.66E-16	1.57E-15	1.02E-15	9.46E-16	1.01E-15	1.25E-15	Sm-151	0.00%	
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-238	0.00%	
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-245	0.00%	
Np-237	1.83E-13	2.21E-13	1.58E-13	1.35E-13	5.62E-13	1.75E-13	1.49E-13	1.81E-13	2.71E-13	U-236	0.00%	
Pa-231	1.61E-17	1.88E-17	1.53E-17	1.43E-17	3.43E-17	1.60E-17	1.45E-17	1.62E-17	2.30E-17	Pu-242	0.00%	
Pb-210	6.18E-22	8.17E-22	4.24E-22	3.14E-22	1.95E-21	5.41E-22	4.08E-22	5.63E-22	1.28E-21	Am-242m	0.00%	
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pa-231	0.00%	
Pm-147	3.50E-11	4.48E-11	2.55E-11	2.09E-11	1.02E-10	3.16E-11	2.46E-11	3.24E-11	3.80E-08	Nb-94	0.00%	
Pu-238	4.83E-10	9.36E-10	7.81E-11	1.24E-10	6.85E-10	2.96E-10	1.47E-10	3.60E-10	3.01E-09	Ac-227	0.00%	
Pu-239	7.44E-12	1.16E-11	4.07E-12	4.10E-12	1.45E-11	5.96E-12	4.39E-12	6.51E-12	2.86E-11	Cm-246	0.00%	
Pu-240	5.57E-12	1.08E-11	9.54E-13	1.44E-12	8.10E-12	3.43E-12	1.72E-12	4.16E-12	3.43E-11	Ra-226	0.00%	
Pu-241	1.77E-11	2.14E-11	1.60E-11	1.39E-11	5.40E-11	1.72E-11	1.50E-11	1.79E-11	2.89E-11	U-233	0.00%	
Pu-242	6.96E-15	1.34E-14	1.26E-15	1.86E-15	1.03E-14	4.33E-15	2.19E-15	5.22E-15	4.26E-14	Th-229	0.00%	
Ra-226	5.74E-20	6.60E-20	5.50E-20	5.03E-20	1.48E-19	5.76E-20	5.20E-20	5.87E-20	8.93E-20	Th-230	0.00%	
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pb-210	0.00%	
Ru-106	3.54E-08	4.07E-08	3.54E-08	3.42E-08	6.03E-08	3.61E-08	3.38E-08	3.65E-08	3.82E-07	Th-232	0.00%	
Sb-125	2.29E-08	2.63E-08	2.26E-08	2.17E-08	4.09E-08	2.33E-08	2.15E-08	2.34E-08	3.07E-08	Cd-113m	0.00%	
Se-79	8.26E-17	1.11E-16	5.02E-17	3.97E-17	2.28E-16	7.04E-17	5.00E-17	7.21E-17	8.83E-14	Cl-36	0.00%	
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-242	0.00%	
Sm-151	1.08E-14	1.83E-14	1.47E-15	2.35E-15	1.48E-14	7.45E-15	3.10E-15	7.51E-15	3.95E-14	Cm-243	0.00%	
Sn-126	1.61E-11	1.83E-11	1.59E-11	1.54E-11	2.79E-11	1.64E-11	1.52E-11	1.64E-11	2.78E-11	Cm-247	0.00%	
Sr-90	3.94E-10	4.80E-10	3.26E-10	2.75E-10	1.15E-09	3.71E-10	3.09E-10	3.81E-10	4.66E-07	Eu-154	0.00%	
Tc-99	1.35E-14	1.71E-14	1.00E-14	8.16E-15	4.02E-14	1.22E-14	9.64E-15	1.26E-14	2.13E-11	Eu-155	0.00%	
Th-229	1.37E-17	1.61E-17	1.27E-17	1.10E-17	4.18E-17	1.35E-17	1.19E-17	1.39E-17	1.97E-17	Fe-55	0.00%	
Th-230	5.67E-16	7.50E-16	4.51E-16	3.85E-16	1.67E-15	5.14E-16	4.32E-16	5.48E-16	1.42E-15	Fe-55(crud)	0.00%	
Th-232	1.34E-22	1.95E-22	9.13E-23	7.91E-23	3.73E-22	1.13E-22	9.08E-23	1.25E-22	4.93E-22	H-3	0.00%	
U-232	6.67E-15	9.98E-15	4.23E-15	3.87E-15	1.66E-14	5.55E-15	4.30E-15	6.11E-15	2.55E-14	Ni-59	0.00%	
U-233	1.07E-16	1.40E-16	8.53E-17	7.83E-17	2.60E-16	9.79E-17	8.28E-17	1.03E-16	2.89E-16	Ni-63	0.00%	
U-234	5.78E-12	9.47E-12	2.88E-12	2.76E-12	1.31E-11	4.40E-12	3.16E-12	5.02E-12	2.80E-11	Pd-107	0.00%	
U-235	9.11E-11	1.05E-10	8.72E-11	7.95E-11	2.38E-10	9.11E-11	8.23E-11	9.30E-11	1.12E-10	Pm-147	0.00%	
U-236	3.39E-13	6.11E-13	1.21E-13	1.29E-13	6.61E-13	2.33E-13	1.50E-13	2.78E-13	1.98E-12	Ra-228	0.00%	
U-238	9.40E-16	1.83E-15	2.13E-16	2.66E-16	1.58E-15	5.83E-16	3.23E-16	7.30E-16	6.23E-15	Sb-125	0.00%	
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-147	0.00%	
crud										U-232	0.00%	
										Zr-93	0.00%	
Co-60(crud)	1.54E-04	1.74E-04	1.55E-04	1.54E-04	2.23E-04	1.59E-04	1.50E-04	1.58E-04	1.82E-04			
Fe-55(crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00			
total	1.57E-04	1.78E-04	1.58E-04	1.57E-04	2.28E-04	1.62E-04	1.53E-04	1.61E-04	2.90E-04			

HWCTR (U/TH) [112]

Stable Metal

Intact

	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	4.28E-03		1.57E-04			
Breast	2.88E-03		1.78E-04			
Lung	7.82E-02		1.58E-04			
R Marrow	1.93E-02		1.57E-04			
B Surface	2.09E-01	<CDE	2.28E-04			
Thyroid	2.64E-03		1.62E-04			
Remainder	1.32E-02		1.53E-04			
Whole Body	1.97E-02	<CEDE	1.61E-04	<DDE	1.99E-02	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	2.90E-04	<SKIN	2.90E-04	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					2.10E-01	<CDE + DDE

HWCTR (U/TH) [112]

Stable Metal

Isotope	Material Type	Offsite Doses [rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	2.15E-12	3.82E-11
Am-241	P	1.87E-06	3.38E-05
Am-242m	P	1.28E-09	2.36E-08
Am-243	P	4.35E-09	7.93E-08
C-14	P	7.91E-17	7.91E-17
Cd-113m	P	3.35E-09	2.69E-10
Cl-36	P	1.91E-39	1.67E-40
Cm-242	P	1.57E-10	1.63E-09
Cm-243	P	4.82E-10	8.53E-09
Cm-244	P	8.54E-08	1.49E-06
Cm-245	P	9.23E-12	1.68E-10
Cm-246	P	6.24E-13	1.14E-11
Cm-247	P	5.99E-19	1.09E-17
Co-60	P	1.44E-10	1.01E-10
Cs-134	C	3.80E-05	3.35E-05
Cs-135	C	2.60E-11	2.53E-11
Cs-137	C	1.53E-04	1.41E-04
Eu-154	P	2.48E-07	1.14E-06
Eu-155	P	1.25E-08	1.48E-07
Fe-55	P	1.20E-10	8.49E-11
H-3	G	1.69E-06	1.69E-06
I-129	G	3.25E-07	9.63E-10
Kr-85	G	9.39E-07	9.39E-07
Nb-93m	P	2.86E-12	2.70E-13
Nb-94	P	2.98E-15	1.36E-15
Ni-59	P	1.11E-14	1.09E-14
Ni-63	P	3.97E-12	3.89E-12
Np-237	P	3.42E-08	7.65E-07
Pa-231	P	4.36E-12	1.09E-10
Pb-210	P	4.88E-17	7.28E-16
Pd-107	P	4.21E-14	1.66E-16
Pm-147	P	6.61E-07	6.36E-06
Pu-238	P	1.04E-02	1.87E-01
Pu-239	P	2.37E-04	4.32E-03
Pu-240	P	1.35E-04	2.46E-03
Pu-241	P	7.33E-04	1.38E-02
Pu-242	P	1.93E-07	3.49E-06
Ra-226	P	5.76E-16	1.88E-15
Ra-228	P	2.87E-20	1.45E-19
Ru-106	P	6.39E-07	1.00E-07
Sb-125	P	2.85E-08	2.76E-08
Se-79	P	8.43E-13	2.15E-13
Sm-147	P	9.03E-14	1.54E-12
Sm-151	P	2.25E-09	3.83E-08
Sn-126	P	2.41E-11	4.99E-11
Sr-90	P	2.37E-05	4.90E-05
Tc-99	P	2.33E-11	4.80E-13
Th-229	P	2.81E-12	6.93E-11
Th-230	P	3.69E-09	9.07E-08
Th-232	P	8.45E-15	2.12E-13
U-232	P	1.02E-07	3.68E-08
U-233	P	3.08E-10	9.42E-11
U-234	P	3.14E-05	9.55E-06
U-235	P	5.71E-07	1.74E-07
U-236	P	2.51E-06	7.70E-07
U-238	P	9.13E-09	2.79E-09
Zr-93	P	1.41E-10	3.56E-09
Co-60(crud)	crud	7.55E-03	1.85E-03
Fe-55(crud)	crud	5.74E-04	4.06E-04
total		1.99E-02	2.10E-01

	Evaluated Fuel		x					Evaluated Fuel
	Fuel Type	Stable Metal	Stable Metal	Non-Metal	Non-Metal	Other	Other	Stable Metal
	Condition	Intact	Not Intact	Intact	Not Intact	Intact	Not Intact	Not Intact
				SHIPPINGPORT		EBWR (U		
	Fuel Name	HWCTR	ALUM CLAD	PWR CORE II	SAXTON	METAL) LEU	N REACTOR	ALUM CLAD SNF
	# of canisters	(U/TH) [112]	SNF [411]	[193]	(MOX) [787]	[64]	[147]	[411]
		0.17	1.00	24.00	1.00	10.50	194.95	1.00
Isotope	Material Type	Curies (entire fuel inventory)						Curies
Ac-227	P	9.27E-09	2.81E-07	1.24E-02	1.33E-05	3.38E-05	1.03E-02	2.81E-07
Am-241	P	1.22E-01	2.51E+01	7.61E+04	6.45E+03	1.63E+04	2.80E+05	2.51E+01
Am-242m	P	8.67E-05	9.69E-03	1.18E+02	1.07E+01	2.71E+01	7.96E+00	9.69E-03
Am-243	P	2.85E-04	2.40E-02	3.38E+02	2.83E+01	7.18E+01	4.10E+01	2.40E-02
C-14	P	1.09E-06	1.17E-05	1.53E+00	1.81E+00	4.59E+00	3.63E+02	1.17E-05
Cd-113m	P	6.32E-02	7.25E-01	0.00E+00	2.59E+01	6.56E+01	0.00E+00	7.25E-01
Cl-36	P	2.51E-30	0.00E+00	0.00E+00	2.35E-02	5.96E-02	0.00E+00	0.00E+00
Cm-242	P	2.62E-04	8.00E-03	0.00E+00	8.79E+00	2.23E+01	0.00E+00	8.00E-03
Cm-243	P	4.52E-05	3.29E-03	0.00E+00	1.60E+01	4.06E+01	0.00E+00	3.29E-03
Cm-244	P	9.94E-03	4.27E-01	3.16E+04	9.29E+02	2.36E+03	2.44E+03	4.27E-01
Cm-245	P	5.84E-07	1.33E-05	5.82E+00	2.12E-01	5.37E-01	5.13E-01	1.33E-05
Cm-246	P	3.99E-08	9.83E-07	9.89E-01	4.28E-02	1.08E-01	6.79E-02	9.83E-07
Cm-247	P	4.17E-14	0.00E+00	0.00E+00	1.12E-07	2.83E-07	0.00E+00	0.00E+00
Co-60	P	7.30E-03	1.81E-09	1.10E+04	2.12E+01	5.38E+01	4.75E+02	1.81E-09
Cs-134	C	9.30E+01	2.05E+02	3.63E+03	1.24E+01	3.13E+01	1.63E+02	2.05E+02
Cs-135	C	6.58E-04	1.24E-02	6.19E+00	6.65E-01	1.69E+00	4.00E+01	1.24E-02
Cs-137	C	5.49E+02	8.60E+03	2.07E+06	1.00E+05	2.53E+05	5.34E+06	8.60E+03
Eu-154	P	1.57E+01	9.08E+01	0.00E+00	1.84E+03	4.67E+03	0.00E+00	9.08E+01
Eu-155	P	7.47E+00	2.81E+01	0.00E+00	1.92E+02	4.86E+02	0.00E+00	2.81E+01
Fe-55	P	1.29E+00	0.00E+00	0.00E+00	1.76E-01	4.45E-01	0.00E+00	0.00E+00
H-3	G	2.02E+00	2.61E+01	5.09E+03	2.92E+02	7.41E+02	1.03E+04	2.61E+01
I-129	G	1.44E-04	2.54E-03	7.20E-01	6.09E-02	1.54E-01	3.29E+00	2.54E-03
Kr-85	G	5.46E+01	6.45E+02	5.07E+04	2.59E+03	6.56E+03	1.53E+05	6.45E+02
Nb-93m	P	2.82E-03	4.96E-02	5.72E+01	2.82E+00	7.15E+00	4.54E+02	4.96E-02
Nb-94	P	1.37E-07	4.96E-06	0.00E+00	5.18E-02	1.31E-01	6.71E-05	4.96E-06
Ni-59	P	2.43E-04	0.00E+00	0.00E+00	4.01E-02	1.02E-01	2.03E+01	0.00E+00
Ni-63	P	3.69E-02	0.00E+00	8.04E+04	4.42E+00	1.12E+01	2.21E+03	0.00E+00
Np-237	P	1.82E-03	1.20E-02	7.06E+00	6.46E-01	1.64E+00	3.87E+01	1.20E-02
Pa-231	P	9.79E-08	1.88E-06	1.15E-02	3.02E-05	7.65E-05	1.38E-02	1.88E-06
Pb-210	P	1.04E-10	1.44E-11	2.71E-06	5.13E-08	1.30E-07	7.52E-08	1.44E-11
Pd-107	P	9.52E-05	2.35E-03	1.95E+00	2.14E-01	5.42E-01	7.46E+00	2.35E-03
Pm-147	P	4.86E+02	2.47E+03	0.00E+00	9.36E+01	2.37E+02	0.00E+00	2.47E+03
Pu-238	P	7.65E+02	2.20E+01	8.02E+04	5.66E+02	1.18E+04	6.37E+04	2.20E+01
Pu-239	P	1.59E+01	1.49E+01	7.55E+03	9.81E+01	2.05E+03	1.23E+05	1.49E+01
Pu-240	P	9.08E+00	1.07E+01	1.13E+04	1.70E+02	3.54E+03	7.18E+04	1.07E+01
Pu-241	P	2.56E+03	1.22E+03	1.57E+06	9.43E+03	1.97E+05	2.06E+06	1.22E+03
Pu-242	P	1.35E-02	1.04E-02	3.73E+01	4.84E-01	1.01E+01	3.46E+01	1.04E-02
Ra-226	P	1.93E-09	1.53E-10	6.13E-06	2.46E-07	6.22E-07	1.15E-03	1.53E-10
Ra-228	P	1.74E-13	8.44E-12	5.85E-02	2.80E-07	7.11E-07	1.03E-06	8.44E-12
Ru-106	P	3.64E+01	2.97E+01	1.42E+01	1.17E-03	2.97E-03	3.16E-01	2.97E+01
Sb-125	P	1.20E+01	0.00E+00	0.00E+00	1.70E+01	4.30E+01	0.00E+00	0.00E+00
Se-79	P	2.47E-03	6.93E-02	7.69E+00	7.90E-01	2.00E+00	4.48E+01	6.93E-02
Sm-147	P	3.48E-08	8.28E-07	0.00E+00	9.01E-06	2.28E-05	0.00E+00	8.28E-07
Sm-151	P	2.16E+00	2.67E+01	2.58E+04	5.86E+02	1.48E+03	8.55E+04	2.67E+01
Sn-126	P	2.21E-03	2.72E-02	9.72E+00	1.50E+00	3.80E+00	7.83E+01	2.72E-02
Sr-90	P	5.25E+02	8.16E+03	1.56E+06	6.87E+04	1.74E+05	4.03E+06	8.16E+03
Tc-99	P	8.07E-02	1.44E+00	2.67E+02	2.51E+01	6.37E+01	1.51E+03	1.44E+00
Th-229	P	3.77E-08	8.09E-10	1.57E-02	4.93E-07	1.03E-05	9.31E-06	8.09E-10
Th-230	P	3.27E-04	7.96E-08	1.08E-03	8.39E-06	1.75E-04	1.02E-03	7.96E-08
Th-232	P	1.49E-10	1.99E-11	5.56E-03	4.58E-08	9.56E-07	1.21E-07	1.99E-11
U-232	P	4.47E-03	1.11E-04	0.00E+00	4.23E-03	8.82E-02	0.00E+00	1.11E-04
U-233	P	6.56E-05	1.18E-06	6.07E+00	1.70E-04	3.55E-03	5.71E-03	1.18E-06
U-234	P	6.83E+00	1.17E-03	5.82E+00	5.70E-02	1.19E+00	4.85E+02	1.17E-03
U-235	P	1.34E-01	8.48E-03	6.58E-01	5.12E-03	1.07E-01	1.85E+01	8.48E-03
U-236	P	5.77E-01	3.95E-02	5.50E+00	7.81E-02	1.63E+00	7.02E+01	3.95E-02
U-238	P	2.22E-03	1.04E-02	5.15E+00	9.65E-02	2.01E+00	3.82E+02	1.04E-02
Zr-93	P	1.27E-02	1.40E-01	3.61E+01	3.72E+00	9.42E+00	2.10E+02	1.40E-01
crud (per canister)								
Co-60(crud)		1.56E+01	6.37E+00	2.68E+02	1.23E+02	7.70E+02	1.76E+03	6.37E+00
Fe-55(crud)		9.85E+01	4.01E+01	1.69E+03	7.73E+02	4.85E+03	1.11E+04	4.01E+01

Release Fractions				
Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
stable metal/ intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
stable metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
non-metal/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
non-metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
other/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
other/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud				
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
ALUM CLAD SNF [411]				
Stable Metal				
Not Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Breathing Rate	3.33E-04	[m ³ /s]		
Ground Level Dispersion Factor				
distance [m]	x/Q [sec/m ³]			
11000	2.17E-05	99.5% worst-sector		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
ALUM CLAD SNF [411]							
Stable Metal		Not Intact					
Isotope	Curies (entire fuel inventory)	flnv = 1/nCan	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	2.81E-07	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.41E-09	5.62E-10
Am-241	2.51E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.26E-01	5.03E-02
Am-242m	9.69E-03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.85E-05	1.94E-05
Am-243	2.40E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.20E-04	4.80E-05
C-14	1.17E-05	1.00E+00	5.00E-03	4.00E-01	1.00E+00	5.86E-08	2.35E-08
Cd-113m	7.25E-01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	3.62E-03	1.45E-03
Cl-36	0.00E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Cm-242	8.00E-03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.00E-05	1.60E-05
Cm-243	3.29E-03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.65E-05	6.58E-06
Cm-244	4.27E-01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.14E-03	8.55E-04
Cm-245	1.33E-05	1.00E+00	5.00E-03	4.00E-01	1.00E+00	6.65E-08	2.66E-08
Cm-246	9.83E-07	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.92E-09	1.97E-09
Cm-247	0.00E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Co-60	1.81E-09	1.00E+00	5.00E-03	4.00E-01	1.00E+00	9.06E-12	3.63E-12
Cs-134	2.05E+02	1.00E+00	5.00E-03	1.00E+00	1.00E+00	1.02E+00	1.02E+00
Cs-135	1.24E-02	1.00E+00	5.00E-03	1.00E+00	1.00E+00	6.21E-05	6.21E-05
Cs-137	8.60E+03	1.00E+00	5.00E-03	1.00E+00	1.00E+00	4.30E+01	4.30E+01
Eu-154	9.08E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.54E-01	1.82E-01
Eu-155	2.81E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.41E-01	5.62E-02
Fe-55	0.00E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
H-3	2.61E+01	1.00E+00	3.00E-01	1.00E+00	1.00E+00	7.82E+00	7.82E+00
I-129	2.54E-03	1.00E+00	3.00E-01	1.00E+00	1.00E+00	7.61E-04	7.61E-04
Kr-85	6.45E+02	1.00E+00	3.00E-01	1.00E+00	1.00E+00	1.93E+02	1.93E+02
Nb-93m	4.96E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.48E-04	9.92E-05
Nb-94	4.96E-06	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.48E-08	9.92E-09
Ni-59	0.00E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Ni-63	0.00E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Np-237	1.20E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	5.98E-05	2.39E-05
Pa-231	1.88E-06	1.00E+00	5.00E-03	4.00E-01	1.00E+00	9.38E-09	3.75E-09
Pb-210	1.44E-11	1.00E+00	5.00E-03	4.00E-01	1.00E+00	7.21E-14	2.88E-14
Pd-107	2.35E-03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.18E-05	4.71E-06
Pm-147	2.47E+03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.23E+01	4.94E+00
Pu-238	2.20E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.10E-01	4.40E-02
Pu-239	1.49E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	7.45E-02	2.98E-02
Pu-240	1.07E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	5.34E-02	2.14E-02
Pu-241	1.22E+03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	6.12E+00	2.45E+00
Pu-242	1.04E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	5.20E-05	2.08E-05
Ra-226	1.53E-10	1.00E+00	5.00E-03	4.00E-01	1.00E+00	7.64E-13	3.05E-13
Ra-228	8.44E-12	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.22E-14	1.69E-14
Ru-106	2.97E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.49E-01	5.94E-02
Sb-125	0.00E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Se-79	6.93E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	3.46E-04	1.39E-04
Sm-147	8.28E-07	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.14E-09	1.66E-09
Sm-151	2.67E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.34E-01	5.35E-02
Sn-126	2.72E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.36E-04	5.44E-05
Sr-90	8.16E+03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.08E+01	1.63E+01
Tc-99	1.44E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	7.22E-03	2.89E-03
Th-229	8.09E-10	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.05E-12	1.62E-12
Th-230	7.96E-08	1.00E+00	5.00E-03	4.00E-01	1.00E+00	3.98E-10	1.59E-10
Th-232	1.99E-11	1.00E+00	5.00E-03	4.00E-01	1.00E+00	9.93E-14	3.97E-14
U-232	1.11E-04	1.00E+00	5.00E-03	4.00E-01	1.00E+00	5.54E-07	2.22E-07
U-233	1.18E-06	1.00E+00	5.00E-03	4.00E-01	1.00E+00	5.88E-09	2.35E-09
U-234	1.17E-03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	5.86E-06	2.35E-06
U-235	8.48E-03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.24E-05	1.70E-05
U-236	3.95E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.98E-04	7.91E-05
U-238	1.04E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	5.22E-05	2.09E-05
Zr-93	1.40E-01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	6.98E-04	2.79E-04
crud (per canister)							
Co-60(crud)	6.37E+00	1	1.00E+00	3.00E-01	1.00E+00	6.37E+00	1.91E+00
Fe-55(crud)	4.01E+01	1	1.00E+00	3.00E-01	1.00E+00	4.01E+01	1.20E+01

ALUM CLAD SNF [411]													
Stable Metal	Not Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Ac-227	5.95E-09	1.00E-12	2.32E-08	3.86E-08	4.83E-07	5.40E-13	2.21E-08	2.72E-08	0.00E+00	Am-241	21.20%	Am-241	26.14%
Am-241	4.37E-02	3.59E-06	2.47E-02	2.34E-01	2.92E+00	2.15E-06	1.05E-01	1.61E-01	0.00E+00	Sr-90	20.12%	Pu-241	24.61%
Am-242m	1.66E-05	7.15E-10	2.18E-06	8.76E-05	1.10E-03	2.92E-10	3.88E-05	5.96E-05	0.00E+00	Pu-241	19.16%	Pu-238	20.01%
Am-243	4.18E-05	1.95E-08	2.28E-05	2.22E-04	2.79E-03	1.06E-08	9.93E-05	1.53E-04	0.00E+00	Pu-238	16.37%	Pu-239	15.06%
C-14	3.54E-13	3.54E-13	3.54E-13	3.54E-13	3.54E-13	3.54E-13	3.54E-13	3.54E-13	0.00E+00	Pu-239	12.14%	Pu-240	10.79%
Cd-113m	1.29E-06	1.29E-06	1.58E-05	1.29E-06	1.29E-06	1.29E-06	5.04E-05	1.60E-05	0.00E+00	Pu-240	8.70%	Sr-90	2.84%
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cs-137	1.30%	Cm-244	0.24%
Cm-242	2.44E-07	4.04E-10	6.63E-06	1.67E-06	2.08E-05	4.03E-10	1.05E-06	2.00E-06	0.00E+00	Co-60(crud)	0.40%	Pm-147	0.12%
Cm-243	3.64E-06	1.11E-09	3.41E-06	2.08E-05	2.59E-04	6.74E-10	1.01E-05	1.46E-05	0.00E+00	Cm-244	0.20%	Cs-137	0.08%
Cm-244	3.63E-04	2.38E-08	4.41E-04	2.14E-03	2.67E-02	2.31E-08	1.09E-03	1.53E-03	0.00E+00	Pm-147	0.18%	Am-243	0.02%
Cm-245	2.40E-08	4.76E-12	1.28E-08	1.27E-07	1.59E-06	2.62E-12	5.66E-08	8.75E-08	0.00E+00	Eu-154	0.05%	Eu-154	0.02%
Cm-246	1.76E-09	2.10E-13	9.57E-10	9.36E-09	1.17E-07	1.19E-13	4.17E-09	6.41E-09	0.00E+00	Cs-134	0.04%	Np-237	0.02%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Fe-55(crud)	0.03%	Pu-242	0.01%
Co-60	4.61E-16	1.78E-15	3.34E-14	1.67E-15	1.31E-15	1.57E-15	3.49E-15	5.73E-15	0.00E+00	Ru-106	0.03%	Am-242m	0.01%
Cs-134	3.56E-04	2.96E-04	3.23E-04	3.23E-04	3.01E-04	3.04E-04	3.81E-04	3.42E-04	0.00E+00	Am-243	0.02%	Co-60(crud)	0.01%
Cs-135	1.99E-09	1.99E-09	2.34E-09	1.99E-09	1.99E-09	1.99E-09	1.99E-09	2.04E-09	0.00E+00	Np-237	0.01%	Cs-134	0.00%
Cs-137	1.01E-02	9.01E-03	1.01E-02	9.54E-03	9.12E-03	9.11E-03	1.05E-02	9.92E-03	0.00E+00	U-236	0.01%	Cm-243	0.00%
Eu-154	5.68E-05	7.52E-05	3.84E-04	5.14E-04	2.54E-03	3.47E-05	5.48E-04	3.75E-04	0.00E+00	Pu-242	0.01%	Eu-155	0.00%
Eu-155	5.35E-07	9.23E-07	1.79E-05	2.15E-05	2.29E-04	3.61E-07	1.67E-05	1.68E-05	0.00E+00	Am-242m	0.01%	Sm-151	0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-238	0.00%	Fe-55(crud)	0.00%
H-3	3.62E-06	3.62E-06	3.62E-06	3.62E-06	3.62E-06	3.62E-06	3.62E-06	3.62E-06	0.00E+00	Eu-155	0.00%	U-236	0.00%
I-129	1.77E-09	4.25E-09	6.39E-09	2.85E-09	2.81E-09	3.18E-05	2.40E-09	9.55E-07	0.00E+00	Cd-113m	0.00%	Ru-106	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-235	0.00%	Cm-242	0.00%
Nb-93m	1.10E-09	1.16E-10	1.71E-07	7.56E-10	1.97E-09	8.06E-11	1.05E-09	2.10E-08	0.00E+00	Cm-243	0.00%	Zr-93	0.00%
Nb-94	1.26E-12	5.94E-12	1.98E-10	6.00E-12	5.23E-12	5.89E-12	1.18E-11	2.97E-11	0.00E+00	Sm-151	0.00%	U-238	0.00%
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	H-3	0.00%	U-235	0.00%
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-234	0.00%	H-3	0.00%
Np-237	1.89E-05	1.08E-08	1.03E-05	1.68E-04	2.09E-03	8.57E-09	1.50E-05	9.33E-05	0.00E+00	Cm-242	0.00%	Cm-245	0.00%
Pa-231	6.92E-13	8.82E-13	7.50E-08	7.00E-08	8.73E-07	7.67E-13	2.88E-11	3.48E-08	0.00E+00	U-232	0.00%	Cd-113m	0.00%
Pb-210	2.45E-16	2.45E-16	2.45E-16	2.89E-15	4.22E-14	2.45E-16	3.62E-15	2.83E-15	0.00E+00	I-129	0.00%	Pa-231	0.00%
Pd-107	1.19E-13	1.19E-13	3.59E-09	6.43E-13	1.71E-12	1.19E-13	2.71E-11	4.34E-10	0.00E+00	Zr-93	0.00%	U-234	0.00%
Pm-147	2.48E-09	4.75E-09	1.02E-02	1.08E-03	1.35E-02	2.61E-09	7.78E-04	1.40E-03	0.00E+00	Tc-99	0.00%	Ac-227	0.00%
Pu-238	3.29E-02	1.18E-06	3.76E-01	1.79E-01	2.23E+00	1.13E-06	8.26E-02	1.25E-01	0.00E+00	Cm-245	0.00%	U-232	0.00%
Pu-239	2.53E-02	7.35E-07	2.57E-01	1.35E-01	1.68E+00	7.20E-07	6.03E-02	9.25E-02	0.00E+00	Sn-126	0.00%	Sn-126	0.00%
Pu-240	1.82E-02	5.43E-07	1.84E-01	9.65E-02	1.20E+00	5.17E-07	4.32E-02	6.62E-02	0.00E+00	Pa-231	0.00%	Cm-246	0.00%
Pu-241	4.46E-02	2.00E-06	2.08E-01	2.20E-01	2.75E+00	8.11E-07	8.57E-02	1.46E-01	0.00E+00	Ac-227	0.00%	Sm-147	0.00%
Pu-242	1.68E-05	5.26E-10	1.71E-04	8.95E-05	1.12E-03	4.89E-10	3.99E-05	6.17E-05	0.00E+00	Nb-93m	0.00%	Th-230	0.00%
Ra-226	8.33E-16	8.33E-16	1.31E-13	5.42E-15	6.20E-14	8.33E-16	8.74E-16	1.89E-14	0.00E+00	Se-79	0.00%	Tc-99	0.00%
Ra-228	8.25E-17	8.30E-17	3.26E-15	3.33E-16	2.94E-15	8.25E-17	8.44E-17	5.82E-16	0.00E+00	Cm-246	0.00%	I-129	0.00%
Ru-106	2.19E-05	2.18E-05	1.65E-03	2.18E-05	2.18E-05	2.18E-05	2.69E-05	2.05E-04	0.00E+00	U-233	0.00%	Se-79	0.00%
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cs-135	0.00%	Cs-135	0.00%
Se-79	2.51E-09	2.51E-09	3.63E-08	2.51E-09	2.51E-09	2.51E-09	1.57E-08	9.85E-09	0.00E+00	Sm-147	0.00%	Nb-93m	0.00%
Sm-147	0.00E+00	0.00E+00	3.37E-10	1.22E-09	1.52E-08	0.00E+00	8.36E-10	8.94E-10	0.00E+00	Pd-107	0.00%	U-233	0.00%
Sm-151	5.76E-11	2.13E-10	4.66E-06	1.57E-05	1.97E-04	1.89E-11	1.07E-05	1.16E-05	0.00E+00	Th-230	0.00%	Th-229	0.00%
Sn-126	2.08E-08	2.05E-08	2.20E-07	8.18E-08	1.72E-07	1.91E-08	2.56E-08	3.91E-08	0.00E+00	Nb-94	0.00%	Th-232	0.00%
Sr-90	1.15E-03	1.15E-03	1.25E+00	1.47E-01	3.17E-01	1.15E-03	2.50E-03	1.53E-01	0.00E+00	Th-229	0.00%	Nb-94	0.00%

Inhalation Doses

Tc-99	3.49E-09	3.49E-09	1.29E-06	3.49E-09	3.49E-09	9.35E-08	4.84E-08	1.74E-07	0.00E+00	Th-232	0.00%	Pd-107	0.00%
Th-229	1.19E-13	1.19E-13	8.61E-11	4.98E-11	6.19E-10	1.19E-13	3.05E-13	2.51E-11	0.00E+00	C-14	0.00%	C-14	0.00%
Th-230	1.74E-12	1.74E-12	1.28E-09	7.36E-10	9.19E-09	1.74E-12	4.47E-12	3.74E-10	0.00E+00	Ra-226	0.00%	Ra-226	0.00%
Th-232	8.09E-16	8.20E-16	9.99E-13	9.49E-13	1.18E-11	7.90E-16	1.99E-15	4.71E-13	0.00E+00	Co-60	0.00%	Pb-210	0.00%
U-232	4.74E-10	4.78E-10	8.77E-06	2.41E-08	3.81E-07	4.65E-10	1.84E-08	1.06E-06	0.00E+00	Pb-210	0.00%	Ra-228	0.00%
U-233	1.60E-12	1.60E-12	1.91E-08	4.47E-11	7.04E-10	1.60E-12	5.91E-11	2.30E-09	0.00E+00	Ra-228	0.00%	Co-60	0.00%
U-234	1.57E-09	1.57E-09	1.87E-05	4.38E-08	6.84E-07	1.57E-09	5.81E-08	2.25E-06	0.00E+00	Cl-36	0.00%	Cl-36	0.00%
U-235	1.07E-08	1.08E-08	1.25E-04	2.98E-07	4.58E-06	1.07E-08	3.90E-07	1.51E-05	0.00E+00	Cm-247	0.00%	Cm-247	0.00%
U-236	5.01E-08	5.01E-08	5.96E-04	1.40E-06	2.20E-05	5.01E-08	1.85E-06	7.17E-05	0.00E+00	Fe-55	0.00%	Fe-55	0.00%
U-238	1.25E-08	1.25E-08	1.49E-04	3.68E-07	5.46E-06	1.24E-08	4.59E-07	1.79E-05	0.00E+00	Kr-85	0.00%	Kr-85	0.00%
Zr-93	1.63E-10	3.50E-10	6.51E-07	1.32E-06	1.63E-05	1.30E-10	1.29E-09	6.48E-07	0.00E+00	Ni-59	0.00%	Ni-59	0.00%
										Ni-63	0.00%	Ni-63	0.00%
crud										Sb-125	0.00%	Sb-125	0.00%
Co-60(crud)	2.43E-04	9.40E-04	1.76E-02	8.79E-04	6.90E-04	8.28E-04	1.84E-03	3.02E-03	0.00E+00				
Fe-55(crud)	1.68E-04	1.64E-04	3.41E-04	1.66E-04	1.65E-04	1.74E-04	3.89E-04	2.34E-04	0.00E+00				
total	1.77E-01	1.17E-02	2.34E+00	1.03E+00	1.12E+01	1.17E-02	3.95E-01	7.61E-01	0.00E+00				

Air Submersion Doses

ALUM CLAD SNF [411]												
Stable Metal		Not Intact										
Air Submersion Doses [rem]											Isotope % of Dose	
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes	% of Total Skin Dose	
Ac-227	4.24E-18	5.03E-18	3.81E-18	3.32E-18	1.17E-17	4.12E-18	3.59E-18	4.22E-18	3.71E-17	Kr-85	43.26%	
Am-241	8.66E-09	1.08E-08	6.80E-09	5.26E-09	2.90E-08	7.90E-09	6.40E-09	8.26E-09	1.29E-08	Cs-137	31.99%	
Am-242m	1.48E-13	2.34E-13	6.69E-14	6.69E-14	3.09E-13	1.15E-13	7.55E-14	1.23E-13	5.29E-13	Co-60(crud)	15.65%	
Am-243	2.11E-11	2.52E-11	1.85E-11	1.49E-11	7.20E-11	2.01E-11	1.72E-11	2.10E-11	2.65E-11	Sr-90	6.36%	
C-14	1.22E-18	1.66E-18	7.20E-19	5.70E-19	3.32E-18	1.03E-18	7.25E-19	1.05E-18	1.14E-15	Cs-134	1.64%	
Cd-113m	2.09E-12	2.55E-12	1.73E-12	1.46E-12	6.11E-12	1.97E-12	1.64E-12	2.02E-12	2.47E-09	Eu-154	0.64%	
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ru-106	0.27%	
Cm-242	2.52E-14	4.75E-14	3.63E-15	6.07E-15	3.40E-14	1.58E-14	7.29E-15	1.83E-14	1.38E-13	Pm-147	0.17%	
Cm-243	7.63E-12	8.83E-12	7.27E-12	6.61E-12	1.98E-11	7.61E-12	6.86E-12	7.77E-12	1.29E-11	Eu-155	0.01%	
Cm-244	1.18E-12	2.28E-12	1.22E-13	2.51E-13	1.51E-12	7.19E-13	3.11E-13	8.43E-13	6.71E-12	Am-241	0.00%	
Cm-245	2.07E-14	2.43E-14	1.94E-14	1.69E-14	6.30E-14	2.05E-14	1.82E-14	2.12E-14	2.86E-14	Cd-113m	0.00%	
Cm-246	2.46E-18	4.74E-18	2.76E-19	5.33E-19	3.22E-18	1.51E-18	6.59E-19	1.76E-18	1.38E-17	Tc-99	0.00%	
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sn-126	0.00%	
Co-60	8.95E-17	1.01E-16	9.02E-17	8.95E-17	1.30E-16	9.24E-17	8.73E-17	9.17E-17	1.06E-16	Pu-238	0.00%	
Cs-134	6.08E-06	6.93E-06	6.06E-06	5.91E-06	9.87E-06	6.22E-06	5.81E-06	6.22E-06	7.77E-06	Pu-240	0.00%	
Cs-135	3.13E-15	4.10E-15	2.09E-15	1.66E-15	9.02E-15	2.74E-15	2.04E-15	2.82E-15	4.51E-12	Pu-239	0.00%	
Cs-137	9.21E-05	1.05E-04	9.14E-05	8.91E-05	1.51E-04	9.40E-05	8.75E-05	9.40E-05	1.52E-04	I-129	0.00%	
Eu-154	2.19E-06	2.48E-06	2.18E-06	2.14E-06	3.44E-06	2.24E-06	2.09E-06	2.24E-06	3.02E-06	Pu-241	0.00%	
Eu-155	2.81E-08	3.33E-08	2.51E-08	2.09E-08	9.13E-08	2.72E-08	2.34E-08	2.81E-08	3.83E-08	U-235	0.00%	
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-243	0.00%	
H-3	0.00E+00	0.00E+00	1.73E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-10	0.00E+00	Cm-243	0.00%	
I-129	2.95E-11	4.07E-11	1.31E-11	1.00E-11	6.72E-11	2.36E-11	1.41E-11	2.32E-11	6.72E-11	Se-79	0.00%	
Kr-85	1.82E-06	2.08E-06	1.77E-06	1.69E-06	3.42E-06	1.83E-06	1.69E-06	1.85E-06	2.05E-04	Np-237	0.00%	
Nb-93m	1.26E-13	2.61E-13	5.08E-15	2.35E-14	1.38E-13	6.83E-14	2.71E-14	8.84E-14	8.52E-13	Cm-244	0.00%	
Nb-94	1.50E-13	1.71E-13	1.50E-13	1.46E-13	2.37E-13	1.54E-13	1.43E-13	1.53E-13	1.90E-13	Cs-135	0.00%	
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-151	0.00%	
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Nb-93m	0.00%	
Np-237	4.99E-12	6.05E-12	4.33E-12	3.69E-12	1.54E-11	4.77E-12	4.08E-12	4.94E-12	7.39E-12	U-236	0.00%	
Pa-231	1.29E-15	1.50E-15	1.22E-15	1.15E-15	2.74E-15	1.28E-15	1.16E-15	1.30E-15	1.84E-15	Am-242m	0.00%	
Pb-210	3.58E-22	4.74E-22	2.46E-22	1.82E-22	1.13E-21	3.14E-22	2.37E-22	3.27E-22	7.41E-22	Nb-94	0.00%	
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-242	0.00%	
Pm-147	7.41E-10	9.48E-10	5.40E-10	4.42E-10	2.16E-09	6.69E-10	5.21E-10	6.87E-10	8.04E-07	Pu-242	0.00%	
Pu-238	5.79E-11	1.12E-10	9.36E-12	1.48E-11	8.21E-11	3.54E-11	1.76E-11	4.31E-11	3.61E-10	U-238	0.00%	
Pu-239	2.90E-11	4.52E-11	1.59E-11	1.60E-11	5.67E-11	2.32E-11	1.71E-11	2.54E-11	1.11E-10	Cm-245	0.00%	
Pu-240	2.73E-11	5.27E-11	4.67E-12	7.07E-12	3.97E-11	1.68E-11	8.40E-12	2.04E-11	1.68E-10	U-234	0.00%	
Pu-241	3.53E-11	4.26E-11	3.18E-11	2.76E-11	1.08E-10	3.43E-11	2.99E-11	3.56E-11	5.74E-11	U-232	0.00%	
Pu-242	2.23E-14	4.30E-14	4.05E-15	5.97E-15	3.30E-14	1.39E-14	7.02E-15	1.67E-14	1.37E-13	Pa-231	0.00%	
Ra-226	1.89E-20	2.17E-20	1.81E-20	1.66E-20	4.87E-20	1.89E-20	1.71E-20	1.93E-20	2.94E-20	C-14	0.00%	
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60	0.00%	
Ru-106	1.20E-07	1.38E-07	1.20E-07	1.16E-07	2.05E-07	1.23E-07	1.15E-07	1.24E-07	1.30E-06	Ac-227	0.00%	
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-233	0.00%	
Se-79	9.65E-15	1.30E-14	5.87E-15	4.64E-15	2.67E-14	8.23E-15	5.84E-15	8.43E-15	1.03E-11	Cm-246	0.00%	
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-229	0.00%	
Sm-151	5.58E-13	9.45E-13	7.60E-14	1.21E-13	7.61E-13	3.84E-13	1.60E-13	3.88E-13	2.04E-12	Th-230	0.00%	
Sn-126	8.24E-10	9.41E-10	8.16E-10	7.89E-10	1.43E-09	8.40E-10	7.80E-10	8.42E-10	1.43E-09	Ra-226	0.00%	
Sr-90	2.55E-08	3.11E-08	2.11E-08	1.78E-08	7.47E-08	2.40E-08	2.00E-08	2.47E-08	3.01E-05	Pb-210	0.00%	
Tc-99	1.01E-12	1.28E-12	7.48E-13	6.09E-13	3.00E-12	9.11E-13	7.19E-13	9.40E-13	1.59E-09	Th-232	0.00%	
Th-229	1.22E-18	1.44E-18	1.14E-18	9.84E-19	3.74E-18	1.20E-18	1.06E-18	1.24E-18	1.76E-18	Cl-36	0.00%	
Th-230	5.75E-19	7.60E-19	4.57E-19	3.90E-19	1.69E-18	5.21E-19	4.38E-19	5.56E-19	1.44E-18	Cm-247	0.00%	
Th-232	7.45E-23	1.08E-22	5.08E-23	4.40E-23	2.07E-22	6.30E-23	5.06E-23	6.95E-23	2.74E-22	Fe-55	0.00%	
U-232	6.90E-16	1.03E-15	4.38E-16	4.00E-16	1.72E-15	5.74E-16	4.45E-16	6.32E-16	2.63E-15	Fe-55(crud)	0.00%	
U-233	7.97E-18	1.05E-17	6.37E-18	5.85E-18	1.94E-17	7.31E-18	6.18E-18	7.69E-18	2.16E-17	H-3	0.00%	
U-234	4.14E-15	6.78E-15	2.06E-15	1.98E-15	9.37E-15	3.15E-15	2.26E-15	3.59E-15	2.00E-14	Ni-59	0.00%	
U-235	2.40E-11	2.76E-11	2.30E-11	2.09E-11	6.26E-11	2.40E-11	2.17E-11	2.45E-11	2.94E-11	Ni-63	0.00%	
U-236	9.68E-14	1.75E-13	3.46E-14	3.70E-14	1.89E-13	6.65E-14	4.29E-14	7.95E-14	5.67E-13	Pd-107	0.00%	
U-238	1.84E-14	3.58E-14	4.18E-15	5.20E-15	3.10E-14	1.14E-14	6.33E-15	1.43E-14	1.22E-13	Ra-228	0.00%	
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sb-125	0.00%	
crud										Sm-147	0.00%	
Co-60(crud)	6.29E-05	7.11E-05	6.34E-05	6.29E-05	9.10E-05	6.50E-05	6.14E-05	6.44E-05	7.42E-05	Zr-93	0.00%	
Fe-55(crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00			
total	1.65E-04	1.88E-04	1.65E-04	1.62E-04	2.59E-04	1.69E-04	1.59E-04	1.69E-04	4.74E-04			

ALUM CLAD SNF [411]

Stable Metal

Not Intact

	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	1.77E-01		1.65E-04			
Breast	1.17E-02		1.88E-04			
Lung	2.34E+00		1.65E-04			
R Marrow	1.03E+00		1.62E-04			
B Surface	1.12E+01	<CDE	2.59E-04			
Thyroid	1.17E-02		1.69E-04			
Remainder	3.95E-01		1.59E-04			
Whole Body	7.61E-01	<CEDE	1.69E-04	<DDE	7.61E-01	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	4.74E-04	<SKIN	4.74E-04	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					1.12E+01	<CDE + DDE

ALUM CLAD SNF [411]

Stable Metal

Isotope	Material Type	Offsite Doses[rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	2.72E-08	4.83E-07
Am-241	P	1.61E-01	2.92E+00
Am-242m	P	5.96E-05	1.10E-03
Am-243	P	1.53E-04	2.79E-03
C-14	P	3.54E-13	3.54E-13
Cd-113m	P	1.60E-05	1.29E-06
Cl-36	P	0.00E+00	0.00E+00
Cm-242	P	2.00E-06	2.08E-05
Cm-243	P	1.46E-05	2.59E-04
Cm-244	P	1.53E-03	2.67E-02
Cm-245	P	8.75E-08	1.59E-06
Cm-246	P	6.41E-09	1.17E-07
Cm-247	P	0.00E+00	0.00E+00
Co-60	P	5.82E-15	1.40E-15
Cs-134	C	3.49E-04	3.07E-04
Cs-135	C	2.04E-09	1.99E-09
Cs-137	C	1.00E-02	9.22E-03
Eu-154	P	3.77E-04	2.54E-03
Eu-155	P	1.69E-05	2.29E-04
Fe-55	P	0.00E+00	0.00E+00
H-3	G	3.62E-06	3.62E-06
I-129	G	9.55E-07	2.83E-09
Kr-85	G	1.85E-06	1.85E-06
Nb-93m	P	2.10E-08	1.97E-09
Nb-94	P	2.99E-11	5.38E-12
Ni-59	P	0.00E+00	0.00E+00
Ni-63	P	0.00E+00	0.00E+00
Np-237	P	9.33E-05	2.09E-03
Pa-231	P	3.48E-08	8.73E-07
Pb-210	P	2.83E-15	4.22E-14
Pd-107	P	4.34E-10	1.71E-12
Pm-147	P	1.40E-03	1.35E-02
Pu-238	P	1.25E-01	2.23E+00
Pu-239	P	9.25E-02	1.68E+00
Pu-240	P	6.62E-02	1.20E+00
Pu-241	P	1.46E-01	2.75E+00
Pu-242	P	6.17E-05	1.12E-03
Ra-226	P	1.89E-14	6.20E-14
Ra-228	P	5.82E-16	2.94E-15
Ru-106	P	2.05E-04	2.19E-05
Sb-125	P	0.00E+00	0.00E+00
Se-79	P	9.85E-09	2.51E-09
Sm-147	P	8.94E-10	1.52E-08
Sm-151	P	1.16E-05	1.97E-04
Sn-126	P	4.00E-08	1.72E-07
Sr-90	P	1.53E-01	3.17E-01
Tc-99	P	1.74E-07	3.49E-09
Th-229	P	2.51E-11	6.19E-10
Th-230	P	3.74E-10	9.19E-09
Th-232	P	4.71E-13	1.18E-11
U-232	P	1.06E-06	3.81E-07
U-233	P	2.30E-09	7.04E-10
U-234	P	2.25E-06	6.84E-07
U-235	P	1.51E-05	4.58E-06
U-236	P	7.17E-05	2.20E-05
U-238	P	1.79E-05	5.46E-06
Zr-93	P	6.48E-07	1.63E-05
Co-60(crud)	crud	3.08E-03	7.54E-04
Fe-55(crud)	crud	2.34E-04	1.65E-04
total		7.61E-01	1.12E+01

	Evaluated Fuel			x				Evaluated Fuel
	Fuel Type	Stable Metal	Stable Metal	Non-Metal	Non-Metal	Other	Other	Non-Metal
	Condition	Intact	Not Intact	Intact	Not Intact	Intact	Not Intact	Intact
				SHIPPINGPORT		EBWR (U		
	Fuel Name	HWCTR	ALUM CLAD	PWR CORE II	SAXTON	METAL) LEU	N REACTOR	SHIPPINGPORT
	# of canisters	(U/TH) [112]	SNF [411]	[193]	(MOX) [787]	[64]	[147]	PWR CORE II [193]
		0.17	1.00	24.00	1.00	10.50	194.95	24.00
Isotope	Material Type	Curies (entire fuel inventory)						Curies
Ac-227	P	9.27E-09	2.81E-07	1.24E-02	1.33E-05	3.38E-05	1.03E-02	1.24E-02
Am-241	P	1.22E-01	2.51E+01	7.61E+04	6.45E+03	1.63E+04	2.80E+05	7.61E+04
Am-242m	P	8.67E-05	9.69E-03	1.18E+02	1.07E+01	2.71E+01	7.96E+00	1.18E+02
Am-243	P	2.85E-04	2.40E-02	3.38E+02	2.83E+01	7.18E+01	4.10E+01	3.38E+02
C-14	P	1.09E-06	1.17E-05	1.53E+00	1.81E+00	4.59E+00	3.63E+02	1.53E+00
Cd-113m	P	6.32E-02	7.25E-01	0.00E+00	2.59E+01	6.56E+01	0.00E+00	0.00E+00
Cl-36	P	2.51E-30	0.00E+00	0.00E+00	2.35E-02	5.96E-02	0.00E+00	0.00E+00
Cm-242	P	2.62E-04	8.00E-03	0.00E+00	8.79E+00	2.23E+01	0.00E+00	0.00E+00
Cm-243	P	4.52E-05	3.29E-03	0.00E+00	1.60E+01	4.06E+01	0.00E+00	0.00E+00
Cm-244	P	9.94E-03	4.27E-01	3.16E+04	9.29E+02	2.36E+03	2.44E+03	3.16E+04
Cm-245	P	5.84E-07	1.33E-05	5.82E+00	2.12E-01	5.37E-01	5.13E-01	5.82E+00
Cm-246	P	3.99E-08	9.83E-07	9.89E-01	4.28E-02	1.08E-01	6.79E-02	9.89E-01
Cm-247	P	4.17E-14	0.00E+00	0.00E+00	1.12E-07	2.83E-07	0.00E+00	0.00E+00
Co-60	P	7.30E-03	1.81E-09	1.10E+04	2.12E+01	5.38E+01	4.75E+02	1.10E+04
Cs-134	C	9.30E+01	2.05E+02	3.63E+03	1.24E+01	3.13E+01	1.63E+02	3.63E+03
Cs-135	C	6.58E-04	1.24E-02	6.19E+00	6.65E-01	1.69E+00	4.00E+01	6.19E+00
Cs-137	C	5.49E+02	8.60E+03	2.07E+06	1.00E+05	2.53E+05	5.34E+06	2.07E+06
Eu-154	P	1.57E+01	9.08E+01	0.00E+00	1.84E+03	4.67E+03	0.00E+00	0.00E+00
Eu-155	P	7.47E+00	2.81E+01	0.00E+00	1.92E+02	4.86E+02	0.00E+00	0.00E+00
Fe-55	P	1.29E+00	0.00E+00	0.00E+00	1.76E-01	4.45E-01	0.00E+00	0.00E+00
H-3	G	2.02E+00	2.61E+01	5.09E+03	2.92E+02	7.41E+02	1.03E+04	5.09E+03
I-129	G	1.44E-04	2.54E-03	7.20E-01	6.09E-02	1.54E-01	3.29E+00	7.20E-01
Kr-85	G	5.46E+01	6.45E+02	5.07E+04	2.59E+03	6.56E+03	1.53E+05	5.07E+04
Nb-93m	P	2.82E-03	4.96E-02	5.72E+01	2.82E+00	7.15E+00	4.54E+02	5.72E+01
Nb-94	P	1.37E-07	4.96E-06	0.00E+00	5.18E-02	1.31E-01	6.71E-05	0.00E+00
Ni-59	P	2.43E-04	0.00E+00	0.00E+00	4.01E-02	1.02E-01	2.03E+01	0.00E+00
Ni-63	P	3.69E-02	0.00E+00	8.04E+04	4.42E+00	1.12E+01	2.21E+03	8.04E+04
Np-237	P	1.82E-03	1.20E-02	7.06E+00	6.46E-01	1.64E+00	3.87E+01	7.06E+00
Pa-231	P	9.79E-08	1.88E-06	1.15E-02	3.02E-05	7.65E-05	1.38E-02	1.15E-02
Pb-210	P	1.04E-10	1.44E-11	2.71E-06	5.13E-08	1.30E-07	7.52E-08	2.71E-06
Pd-107	P	9.52E-05	2.35E-03	1.95E+00	2.14E-01	5.42E-01	7.46E+00	1.95E+00
Pm-147	P	4.86E+02	2.47E+03	0.00E+00	9.36E+01	2.37E+02	0.00E+00	0.00E+00
Pu-238	P	7.65E+02	2.20E+01	8.02E+04	5.66E+02	1.18E+04	6.37E+04	8.02E+04
Pu-239	P	1.59E+01	1.49E+01	7.55E+03	9.81E+01	2.05E+03	1.23E+05	7.55E+03
Pu-240	P	9.08E+00	1.07E+01	1.13E+04	1.70E+02	3.54E+03	7.18E+04	1.13E+04
Pu-241	P	2.56E+03	1.22E+03	1.57E+06	9.43E+03	1.97E+05	2.06E+06	1.57E+06
Pu-242	P	1.35E-02	1.04E-02	3.73E+01	4.84E-01	1.01E+01	3.46E+01	3.73E+01
Ra-226	P	1.93E-09	1.53E-10	6.13E-06	2.46E-07	6.22E-07	1.15E-03	6.13E-06
Ra-228	P	1.74E-13	8.44E-12	5.85E-02	2.80E-07	7.11E-07	1.03E-06	5.85E-02
Ru-106	P	3.64E+01	2.97E+01	1.42E+01	1.17E-03	2.97E-03	3.16E-01	1.42E+01
Sb-125	P	1.20E+01	0.00E+00	0.00E+00	1.70E+01	4.30E+01	0.00E+00	0.00E+00
Se-79	P	2.47E-03	6.93E-02	7.69E+00	7.90E-01	2.00E+00	4.48E+01	7.69E+00
Sm-147	P	3.48E-08	8.28E-07	0.00E+00	9.01E-06	2.28E-05	0.00E+00	0.00E+00
Sm-151	P	2.16E+00	2.67E+01	2.58E+04	5.86E+02	1.48E+03	8.55E+04	2.58E+04
Sn-126	P	2.21E-03	2.72E-02	9.72E+00	1.50E+00	3.80E+00	7.83E+01	9.72E+00
Sr-90	P	5.25E+02	8.16E+03	1.56E+06	6.87E+04	1.74E+05	4.03E+06	1.56E+06
Tc-99	P	8.07E-02	1.44E+00	2.67E+02	2.51E+01	6.37E+01	1.51E+03	2.67E+02
Th-229	P	3.77E-08	8.09E-10	1.57E-02	4.93E-07	1.03E-05	9.31E-06	1.57E-02
Th-230	P	3.27E-04	7.96E-08	1.08E-03	8.39E-06	1.75E-04	1.02E-03	1.08E-03
Th-232	P	1.49E-10	1.99E-11	5.56E-03	4.58E-08	9.56E-07	1.21E-07	5.56E-03
U-232	P	4.47E-03	1.11E-04	0.00E+00	4.23E-03	8.82E-02	0.00E+00	0.00E+00
U-233	P	6.56E-05	1.18E-06	6.07E+00	1.70E-04	3.55E-03	5.71E-03	6.07E+00
U-234	P	6.83E+00	1.17E-03	5.82E+00	5.70E-02	1.19E+00	4.85E+02	5.82E+00
U-235	P	1.34E-01	8.48E-03	6.58E-01	5.12E-03	1.07E-01	1.85E+01	6.58E-01
U-236	P	5.77E-01	3.95E-02	5.50E+00	7.81E-02	1.63E+00	7.02E+01	5.50E+00
U-238	P	2.22E-03	1.04E-02	5.15E+00	9.65E-02	2.01E+00	3.82E+02	5.15E+00
Zr-93	P	1.27E-02	1.40E-01	3.61E+01	3.72E+00	9.42E+00	2.10E+02	3.61E+01
crud (per canister)								
Co-60(crud)		1.56E+01	6.37E+00	2.68E+02	1.23E+02	7.70E+02	1.76E+03	2.68E+02
Fe-55(crud)		9.85E+01	4.01E+01	1.69E+03	7.73E+02	4.85E+03	1.11E+04	1.69E+03

Release Fractions				
Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
stable metal/ intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
stable metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
non-metal/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
non-metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
other/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
other/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud				
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
SHIPPINGPORT PWR CORE II [193]				
Non-Metal				
Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Breathing Rate	3.33E-04	[m ³ /s]		
Ground Level Dispersion Factor				
distance [m]	x/Q [sec/m ³]			
11000	2.17E-05	99.5% worst-sector		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
SHIPPINGPORT PWR CORE II [193]							
Non-Metal	Intact						
Isotope	Curies (entire fuel inventory)	flnv = 1/nCan	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	1.24E-02	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.16E-07	1.16E-07
Am-241	7.61E+04	4.17E-02	2.25E-04	1.00E+00	1.00E+00	7.14E-01	7.14E-01
Am-242m	1.18E+02	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.11E-03	1.11E-03
Am-243	3.38E+02	4.17E-02	2.25E-04	1.00E+00	1.00E+00	3.17E-03	3.17E-03
C-14	1.53E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.44E-05	1.44E-05
Cd-113m	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Cl-36	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Cm-242	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Cm-243	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Cm-244	3.16E+04	4.17E-02	2.25E-04	1.00E+00	1.00E+00	2.96E-01	2.96E-01
Cm-245	5.82E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	5.45E-05	5.45E-05
Cm-246	9.89E-01	4.17E-02	2.25E-04	1.00E+00	1.00E+00	9.28E-06	9.28E-06
Cm-247	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Co-60	1.10E+04	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.04E-01	1.04E-01
Cs-134	3.63E+03	4.17E-02	2.25E-04	1.00E+00	1.00E+00	3.40E-02	3.40E-02
Cs-135	6.19E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	5.80E-05	5.80E-05
Cs-137	2.07E+06	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.94E+01	1.94E+01
Eu-154	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Eu-155	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Fe-55	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
H-3	5.09E+03	4.17E-02	3.00E-01	1.00E+00	1.00E+00	6.37E+01	6.37E+01
I-129	7.20E-01	4.17E-02	3.00E-01	1.00E+00	1.00E+00	9.00E-03	9.00E-03
Kr-85	5.07E+04	4.17E-02	3.00E-01	1.00E+00	1.00E+00	6.34E+02	6.34E+02
Nb-93m	5.72E+01	4.17E-02	2.25E-04	1.00E+00	1.00E+00	5.36E-04	5.36E-04
Nb-94	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Ni-59	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Ni-63	8.04E+04	4.17E-02	2.25E-04	1.00E+00	1.00E+00	7.54E-01	7.54E-01
Np-237	7.06E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	6.62E-05	6.62E-05
Pa-231	1.15E-02	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.08E-07	1.08E-07
Pb-210	2.71E-06	4.17E-02	2.25E-04	1.00E+00	1.00E+00	2.54E-11	2.54E-11
Pd-107	1.95E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.83E-05	1.83E-05
Pm-147	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Pu-238	8.02E+04	4.17E-02	2.25E-04	1.00E+00	1.00E+00	7.52E-01	7.52E-01
Pu-239	7.55E+03	4.17E-02	2.25E-04	1.00E+00	1.00E+00	7.08E-02	7.08E-02
Pu-240	1.13E+04	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.06E-01	1.06E-01
Pu-241	1.57E+06	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.47E+01	1.47E+01
Pu-242	3.73E+01	4.17E-02	2.25E-04	1.00E+00	1.00E+00	3.49E-04	3.49E-04
Ra-226	6.13E-06	4.17E-02	2.25E-04	1.00E+00	1.00E+00	5.75E-11	5.75E-11
Ra-228	5.85E-02	4.17E-02	2.25E-04	1.00E+00	1.00E+00	5.49E-07	5.49E-07
Ru-106	1.42E+01	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.33E-04	1.33E-04
Sb-125	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Se-79	7.69E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	7.21E-05	7.21E-05
Sm-147	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
Sm-151	2.58E+04	4.17E-02	2.25E-04	1.00E+00	1.00E+00	2.42E-01	2.42E-01
Sn-126	9.72E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	9.11E-05	9.11E-05
Sr-90	1.56E+06	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.46E+01	1.46E+01
Tc-99	2.67E+02	4.17E-02	2.25E-04	1.00E+00	1.00E+00	2.51E-03	2.51E-03
Th-229	1.57E-02	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.47E-07	1.47E-07
Th-230	1.08E-03	4.17E-02	2.25E-04	1.00E+00	1.00E+00	1.02E-08	1.02E-08
Th-232	5.56E-03	4.17E-02	2.25E-04	1.00E+00	1.00E+00	5.21E-08	5.21E-08
U-232	0.00E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	0.00E+00	0.00E+00
U-233	6.07E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	5.69E-05	5.69E-05
U-234	5.82E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	5.45E-05	5.45E-05
U-235	6.58E-01	4.17E-02	2.25E-04	1.00E+00	1.00E+00	6.17E-06	6.17E-06
U-236	5.50E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	5.16E-05	5.16E-05
U-238	5.15E+00	4.17E-02	2.25E-04	1.00E+00	1.00E+00	4.83E-05	4.83E-05
Zr-93	3.61E+01	4.17E-02	2.25E-04	1.00E+00	1.00E+00	3.38E-04	3.38E-04
crud (per canister)							
Co-60(crud)	2.68E+02	1	1.00E+00	3.00E-01	1.00E+00	2.68E+02	8.04E+01
Fe-55(crud)	1.69E+03	1	1.00E+00	3.00E-01	1.00E+00	1.69E+03	5.07E+02

SHIPPINGPORT PWR CORE II [193]													
Non-Metal	Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE Bone Surface)
Ac-227	1.23E-06	2.06E-10	4.77E-06	7.96E-06	9.94E-05	1.11E-10	4.55E-06	5.60E-06	0.00E+00	Am-241	34.32%	Am-241	35.70%
Am-241	6.20E-01	5.09E-05	3.51E-01	3.32E+00	4.14E+01	3.05E-05	1.49E+00	2.29E+00	0.00E+00	Pu-238	31.95%	Pu-238	32.94%
Am-242m	9.48E-04	4.08E-08	1.24E-04	4.99E-03	6.26E-02	1.67E-08	2.21E-03	3.40E-03	0.00E+00	Pu-241	13.15%	Pu-241	14.25%
Am-243	2.76E-03	1.29E-06	1.51E-03	1.46E-02	1.84E-01	7.02E-07	6.55E-03	1.01E-02	0.00E+00	Cm-244	7.96%	Cm-244	8.00%
C-14	2.17E-10	2.17E-10	2.17E-10	2.17E-10	2.17E-10	2.17E-10	2.17E-10	2.17E-10	0.00E+00	Pu-240	4.93%	Pu-240	5.15%
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-239	3.29%	Pu-239	3.44%
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sr-90	2.05%	Sr-90	0.24%
Cm-242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60(crud)	1.90%	Am-243	0.16%
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-243	0.15%	Am-242m	0.05%
Cm-244	1.26E-01	8.24E-06	1.53E-01	7.43E-01	9.27E+00	8.00E-06	3.79E-01	5.31E-01	0.00E+00	Fe-55(crud)	0.15%	Co-60(crud)	0.03%
Cm-245	4.91E-05	9.75E-09	2.62E-05	2.61E-04	3.27E-03	5.36E-09	1.16E-04	1.79E-04	0.00E+00	Cs-137	0.07%	Pu-242	0.02%
Cm-246	8.28E-06	9.92E-10	4.51E-06	4.41E-05	5.51E-04	5.61E-10	1.97E-05	3.03E-05	0.00E+00	Am-242m	0.05%	Fe-55(crud)	0.01%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-242	0.02%	Np-237	0.00%
Co-60	1.32E-05	5.09E-05	9.55E-04	4.76E-05	3.74E-05	4.49E-05	9.97E-05	1.64E-04	0.00E+00	Np-237	0.00%	Cs-137	0.00%
Cs-134	1.18E-05	9.83E-06	1.07E-05	1.07E-05	1.00E-05	1.01E-05	1.26E-05	1.14E-05	0.00E+00	Cm-245	0.00%	Cm-245	0.00%
Cs-135	1.86E-09	1.86E-09	2.19E-09	1.86E-09	1.86E-09	1.86E-09	1.86E-09	1.91E-09	0.00E+00	Co-60	0.00%	Sm-151	0.00%
Cs-137	4.54E-03	4.07E-03	4.57E-03	4.30E-03	4.12E-03	4.11E-03	4.73E-03	4.47E-03	0.00E+00	U-233	0.00%	Cm-246	0.00%
Eu-154	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-151	0.00%	Ac-227	0.00%
Eu-155	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-234	0.00%	Th-229	0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236	0.00%	Co-60	0.00%
H-3	2.95E-05	2.95E-05	2.95E-05	2.95E-05	2.95E-05	2.95E-05	2.95E-05	2.95E-05	0.00E+00	U-238	0.00%	H-3	0.00%
I-129	2.09E-08	5.03E-08	7.56E-08	3.37E-08	3.32E-08	3.75E-04	2.84E-08	1.13E-05	0.00E+00	Cm-246	0.00%	Pa-231	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	H-3	0.00%	Zr-93	0.00%
Nb-93m	5.96E-09	6.25E-10	9.24E-07	4.08E-09	1.06E-08	4.36E-10	5.66E-09	1.13E-07	0.00E+00	Ni-63	0.00%	U-233	0.00%
Nb-94	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cs-134	0.00%	Ni-63	0.00%
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	I-129	0.00%	U-234	0.00%
Ni-63	1.66E-05	1.66E-05	6.19E-05	1.66E-05	1.66E-05	1.66E-05	1.73E-05	1.69E-05	0.00E+00	Ac-227	0.00%	Th-232	0.00%
Np-237	5.24E-05	2.99E-08	2.85E-05	4.64E-04	5.79E-03	2.37E-08	4.14E-05	2.59E-04	0.00E+00	U-235	0.00%	U-236	0.00%
Pa-231	1.98E-11	2.53E-11	2.15E-06	2.00E-06	2.50E-05	2.20E-11	8.26E-10	9.98E-07	0.00E+00	Th-229	0.00%	U-238	0.00%
Pb-210	2.16E-13	2.16E-13	2.16E-13	2.55E-12	3.72E-11	2.16E-13	3.19E-12	2.50E-12	0.00E+00	Pa-231	0.00%	Cs-134	0.00%
Pd-107	4.62E-13	4.62E-13	1.39E-08	2.50E-12	6.65E-12	4.62E-13	1.05E-10	1.69E-09	0.00E+00	Zr-93	0.00%	U-235	0.00%
Pm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-232	0.00%	Th-230	0.00%
Pu-238	5.63E-01	2.01E-05	6.43E+00	3.06E+00	3.82E+01	1.93E-05	1.41E+00	2.13E+00	0.00E+00	Ru-106	0.00%	Sn-126	0.00%
Pu-239	6.02E-02	1.75E-06	6.11E-01	3.20E-01	3.99E+00	1.71E-06	1.43E-01	2.20E-01	0.00E+00	Tc-99	0.00%	Ra-228	0.00%
Pu-240	9.01E-02	2.69E-06	9.15E-01	4.79E-01	5.98E+00	2.56E-06	2.14E-01	3.29E-01	0.00E+00	Nb-93m	0.00%	Ru-106	0.00%
Pu-241	2.68E-01	1.20E-05	1.25E+00	1.32E+00	1.65E+01	4.88E-06	5.15E-01	8.77E-01	0.00E+00	Sn-126	0.00%	I-129	0.00%
Pu-242	2.82E-04	8.83E-09	2.87E-03	1.50E-03	1.88E-02	8.21E-09	6.71E-04	1.04E-03	0.00E+00	Th-230	0.00%	Nb-93m	0.00%
Ra-226	1.57E-13	1.57E-13	2.47E-11	1.02E-12	1.17E-11	1.57E-13	1.64E-13	3.56E-12	0.00E+00	Ra-228	0.00%	Tc-99	0.00%
Ra-228	2.69E-09	2.70E-09	1.06E-07	1.08E-08	9.55E-08	2.69E-09	2.74E-09	1.89E-08	0.00E+00	Se-79	0.00%	Cs-135	0.00%
Ru-106	4.91E-08	4.88E-08	3.70E-06	4.88E-08	4.88E-08	4.88E-08	6.02E-08	4.59E-07	0.00E+00	Cs-135	0.00%	Se-79	0.00%
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pd-107	0.00%	C-14	0.00%
Se-79	1.31E-09	1.31E-09	1.89E-08	1.31E-09	1.31E-09	1.31E-09	8.17E-09	5.13E-09	0.00E+00	C-14	0.00%	Pb-210	0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ra-226	0.00%	Ra-226	0.00%
Sm-151	2.60E-10	9.62E-10	2.11E-05	7.10E-05	8.91E-04	8.52E-11	4.85E-05	5.23E-05	0.00E+00	Pb-210	0.00%	Pd-107	0.00%
Sn-126	3.48E-08	3.43E-08	3.68E-07	1.37E-07	2.87E-07	3.19E-08	4.29E-08	6.56E-08	0.00E+00	Cd-113m	0.00%	Cd-113m	0.00%
Sr-90	1.03E-03	1.03E-03	1.12E+00	1.31E-01	2.83E-01	1.03E-03	2.23E-03	1.37E-01	0.00E+00	Cl-36	0.00%	Cl-36	0.00%

Inhalation Doses

Tc-99	3.03E-09	3.03E-09	1.12E-06	3.03E-09	3.03E-09	8.11E-08	4.20E-08	1.51E-07	0.00E+00	Cm-242	0.00%	Cm-242	0.00%
Th-229	1.09E-08	1.09E-08	7.84E-06	4.53E-06	5.63E-05	1.09E-08	2.78E-08	2.28E-06	0.00E+00	Cm-243	0.00%	Cm-243	0.00%
Th-230	1.11E-10	1.11E-10	8.14E-08	4.70E-08	5.86E-07	1.11E-10	2.85E-10	2.39E-08	0.00E+00	Cm-247	0.00%	Cm-247	0.00%
Th-232	1.06E-09	1.08E-09	1.31E-06	1.24E-06	1.55E-05	1.04E-09	2.61E-09	6.18E-07	0.00E+00	Eu-154	0.00%	Eu-154	0.00%
U-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Eu-155	0.00%	Eu-155	0.00%
U-233	3.86E-08	3.86E-08	4.62E-04	1.08E-06	1.70E-05	3.86E-08	1.43E-06	5.57E-05	0.00E+00	Fe-55	0.00%	Fe-55	0.00%
U-234	3.64E-08	3.64E-08	4.34E-04	1.02E-06	1.59E-05	3.64E-08	1.35E-06	5.22E-05	0.00E+00	Kr-85	0.00%	Kr-85	0.00%
U-235	3.91E-09	3.92E-09	4.55E-05	1.08E-07	1.67E-06	3.91E-09	1.42E-07	5.47E-06	0.00E+00	Nb-94	0.00%	Nb-94	0.00%
U-236	3.27E-08	3.27E-08	3.89E-04	9.10E-07	1.43E-05	3.27E-08	1.21E-06	4.68E-05	0.00E+00	Ni-59	0.00%	Ni-59	0.00%
U-238	2.88E-08	2.88E-08	3.44E-04	8.50E-07	1.26E-05	2.87E-08	1.06E-06	4.13E-05	0.00E+00	Pm-147	0.00%	Pm-147	0.00%
Zr-93	1.97E-10	4.24E-10	7.89E-07	1.60E-06	1.97E-05	1.57E-10	1.57E-09	7.85E-07	0.00E+00	Sb-125	0.00%	Sb-125	0.00%
										Sm-147	0.00%	Sm-147	0.00%
crud										U-232	0.00%	U-232	0.00%
Co-60(crud)	1.02E-02	3.96E-02	7.42E-01	3.70E-02	2.90E-02	3.48E-02	7.74E-02	1.27E-01	0.00E+00				
Fe-55(crud)	7.09E-03	6.90E-03	1.44E-02	7.01E-03	6.97E-03	7.35E-03	1.64E-02	9.84E-03	0.00E+00				
total	1.75E+00	5.18E-02	1.16E+01	9.44E+00	1.16E+02	4.79E-02	4.27E+00	6.67E+00	0.00E+00				

Air Submersion Doses

SHIPPINGPORT PWR CORE II [193]										
Non-Metal	Intact									
Air Submersion Doses [rem]										Isotope % of Dose
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes % of Total Skin Dose
Ac-227	3.49E-16	4.14E-16	3.14E-16	2.74E-16	9.63E-16	3.39E-16	2.96E-16	3.48E-16	3.05E-15	Co-60 (crud) 80.56%
Am-241	4.92E-08	6.13E-08	3.86E-08	2.98E-08	1.64E-07	4.49E-08	3.63E-08	4.69E-08	7.33E-08	Kr-85 17.36%
Am-242m	3.37E-12	5.33E-12	1.53E-12	1.53E-12	7.04E-12	2.62E-12	1.72E-12	2.81E-12	1.21E-11	Cs-137 1.77%
Am-243	5.57E-10	6.63E-10	4.88E-10	3.94E-10	1.90E-09	5.31E-10	4.55E-10	5.54E-10	6.99E-10	Sr-90 0.28%
C-14	2.99E-16	4.06E-16	1.77E-16	1.40E-16	8.15E-16	2.53E-16	1.78E-16	2.59E-16	2.81E-13	Co-60 0.03%
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cs-134 0.01%
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-241 0.00%
Cm-242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-238 0.00%
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ru-106 0.00%
Cm-244	1.64E-10	3.17E-10	1.68E-11	3.47E-11	2.10E-10	9.97E-11	4.31E-11	1.17E-10	9.30E-10	Sn-126 0.00%
Cm-245	1.70E-11	1.99E-11	1.59E-11	1.39E-11	5.17E-11	1.68E-11	1.49E-11	1.73E-11	2.35E-11	Cm-244 0.00%
Cm-246	4.65E-15	8.94E-15	5.21E-16	1.01E-15	6.08E-15	2.85E-15	1.24E-15	3.32E-15	2.60E-14	I-129 0.00%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-243 0.00%
Co-60	1.02E-06	1.16E-06	1.03E-06	1.02E-06	1.48E-06	1.06E-06	9.98E-07	1.05E-06	1.21E-06	Tc-99 0.00%
Cs-134	2.02E-07	2.30E-07	2.01E-07	1.96E-07	3.28E-07	2.07E-07	1.93E-07	2.07E-07	2.58E-07	Pu-240 0.00%
Cs-135	2.92E-15	3.83E-15	1.95E-15	1.56E-15	8.43E-15	2.56E-15	1.90E-15	2.63E-15	4.22E-12	Pu-241 0.00%
Cs-137	4.16E-05	4.74E-05	4.12E-05	4.02E-05	6.82E-05	4.24E-05	3.95E-05	4.24E-05	6.84E-05	Pu-239 0.00%
Eu-154	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-245 0.00%
Eu-155	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-242m 0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Np-237 0.00%
H-3	0.00E+00	0.00E+00	1.41E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-09	0.00E+00	U-235 0.00%
I-129	3.49E-10	4.81E-10	1.55E-10	1.19E-10	7.95E-10	2.79E-10	1.66E-10	2.75E-10	7.95E-10	Cs-135 0.00%
Kr-85	5.96E-06	6.82E-06	5.81E-06	5.55E-06	1.12E-05	6.01E-06	5.55E-06	6.06E-06	6.72E-04	Sm-151 0.00%
Nb-93m	2.72E-13	5.64E-13	1.10E-14	5.08E-14	2.98E-13	1.48E-13	5.85E-14	1.91E-13	1.84E-12	Se-79 0.00%
Nb-94	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Nb-93m 0.00%
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-242 0.00%
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	C-14 0.00%
Np-237	5.53E-12	6.70E-12	4.80E-12	4.09E-12	1.70E-11	5.29E-12	4.52E-12	5.48E-12	8.19E-12	U-233 0.00%
Pa-231	1.48E-14	1.72E-14	1.40E-14	1.31E-14	3.14E-14	1.47E-14	1.33E-14	1.49E-14	2.11E-14	U-234 0.00%
Pb-210	1.26E-19	1.67E-19	8.68E-20	6.41E-20	3.98E-19	1.11E-19	8.35E-20	1.15E-19	2.61E-19	U-236 0.00%
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-238 0.00%
Pm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-229 0.00%
Pu-238	3.96E-10	7.67E-10	6.40E-11	1.01E-10	5.61E-10	2.42E-10	1.20E-10	2.95E-10	2.47E-09	Cm-246 0.00%
Pu-239	2.75E-11	4.29E-11	1.51E-11	1.52E-11	5.38E-11	2.21E-11	1.63E-11	2.41E-11	1.06E-10	Pa-231 0.00%
Pu-240	5.41E-11	1.05E-10	9.27E-12	1.40E-11	7.88E-11	3.33E-11	1.67E-11	4.04E-11	3.33E-10	Ac-227 0.00%
Pu-241	8.49E-11	1.02E-10	7.65E-11	6.65E-11	2.59E-10	8.24E-11	7.19E-11	8.56E-11	1.38E-10	Th-232 0.00%
Pu-242	1.50E-13	2.89E-13	2.72E-14	4.01E-14	2.22E-13	9.32E-14	4.71E-14	1.13E-13	9.17E-13	Th-230 0.00%
Ra-226	1.42E-18	1.63E-18	1.36E-18	1.25E-18	3.67E-18	1.43E-18	1.29E-18	1.45E-18	2.21E-18	Ra-226 0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pb-210 0.00%
Ru-106	1.08E-10	1.24E-10	1.08E-10	1.04E-10	1.84E-10	1.10E-10	1.03E-10	1.11E-10	1.17E-09	Cd-113m 0.00%
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cl-36 0.00%
Se-79	2.01E-15	2.70E-15	1.22E-15	9.67E-16	5.56E-15	1.71E-15	1.22E-15	1.75E-15	2.15E-12	Cm-242 0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-243 0.00%
Sm-151	1.01E-12	1.71E-12	1.37E-13	2.19E-13	1.37E-12	6.94E-13	2.89E-13	7.00E-13	3.68E-12	Cm-247 0.00%
Sn-126	5.52E-10	6.30E-10	5.47E-10	5.28E-10	9.58E-10	5.63E-10	5.23E-10	5.64E-10	9.55E-10	Eu-154 0.00%
Sr-90	9.11E-09	1.11E-08	7.54E-09	6.37E-09	2.67E-08	8.58E-09	7.15E-09	8.82E-09	1.08E-05	Eu-155 0.00%
Tc-99	3.50E-13	4.43E-13	2.60E-13	2.11E-13	1.04E-12	3.16E-13	2.50E-13	3.26E-13	5.51E-10	Fe-55 0.00%
Th-229	4.46E-14	5.23E-14	4.14E-14	3.58E-14	1.36E-13	4.38E-14	3.87E-14	4.53E-14	6.40E-14	Fe-55 (crud) 0.00%
Th-230	1.47E-17	1.94E-17	1.17E-17	9.95E-18	4.31E-17	1.33E-17	1.12E-17	1.42E-17	3.68E-17	H-3 0.00%
Th-232	3.91E-17	5.69E-17	2.67E-17	2.31E-17	1.09E-16	3.31E-17	2.65E-17	3.65E-17	1.44E-16	Nb-94 0.00%
U-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ni-59 0.00%
U-233	7.72E-14	1.01E-13	6.17E-14	5.67E-14	1.88E-13	7.08E-14	5.98E-14	7.45E-14	2.09E-13	Ni-63 0.00%
U-234	3.85E-14	6.30E-14	1.92E-14	1.84E-14	8.71E-14	2.93E-14	2.10E-14	3.34E-14	1.86E-13	Pd-107 0.00%
U-235	3.49E-12	4.01E-12	3.34E-12	3.04E-12	9.11E-12	3.49E-12	3.15E-12	3.56E-12	4.28E-12	Pm-147 0.00%
U-236	2.53E-14	4.56E-14	9.03E-15	9.65E-15	4.93E-14	1.74E-14	1.12E-14	2.08E-14	1.48E-13	Ra-228 0.00%
U-238	1.70E-14	3.31E-14	3.86E-15	4.81E-15	2.87E-14	1.05E-14	5.86E-15	1.32E-14	1.13E-13	Sb-125 0.00%
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-147 0.00%
crud										U-232 0.00%
Co-60(crud)	2.65E-03	2.99E-03	2.67E-03	2.65E-03	3.83E-03	2.73E-03	2.58E-03	2.71E-03	3.12E-03	Zr-93 0.00%
Fe-55(crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
total	2.70E-03	3.05E-03	2.72E-03	2.69E-03	3.91E-03	2.78E-03	2.63E-03	2.76E-03	3.87E-03	

SHIPPINGPORT PWR CORE II [193]

Non-Metal

Intact

	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	1.75E+00		2.70E-03			
Breast	5.18E-02		3.05E-03			
Lung	1.16E+01		2.72E-03			
R Marrow	9.44E+00		2.69E-03			
B Surface	1.16E+02	<CDE	3.91E-03			
Thyroid	4.79E-02		2.78E-03			
Remainder	4.27E+00		2.63E-03			
Whole Body	6.67E+00	<CEDE	2.76E-03	<DDE	6.67E+00	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	3.87E-03	<SKIN	3.87E-03	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					1.16E+02	<CDE + DDE

SHIPPINGPORT PWR CORE II [193]

Non-Metal

Isotope	Material Type	Offsite Doses [rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	5.60E-06	9.94E-05
Am-241	P	2.29E+00	4.14E+01
Am-242m	P	3.40E-03	6.26E-02
Am-243	P	1.01E-02	1.84E-01
C-14	P	2.17E-10	2.17E-10
Cd-113m	P	0.00E+00	0.00E+00
Cl-36	P	0.00E+00	0.00E+00
Cm-242	P	0.00E+00	0.00E+00
Cm-243	P	0.00E+00	0.00E+00
Cm-244	P	5.31E-01	9.27E+00
Cm-245	P	1.79E-04	3.27E-03
Cm-246	P	3.03E-05	5.51E-04
Cm-247	P	0.00E+00	0.00E+00
Co-60	P	1.65E-04	3.84E-05
Cs-134	C	1.16E-05	1.02E-05
Cs-135	C	1.91E-09	1.86E-09
Cs-137	C	4.52E-03	4.16E-03
Eu-154	P	0.00E+00	0.00E+00
Eu-155	P	0.00E+00	0.00E+00
Fe-55	P	0.00E+00	0.00E+00
H-3	G	2.95E-05	2.95E-05
I-129	G	1.13E-05	3.35E-08
Kr-85	G	6.06E-06	6.06E-06
Nb-93m	P	1.13E-07	1.06E-08
Nb-94	P	0.00E+00	0.00E+00
Ni-59	P	0.00E+00	0.00E+00
Ni-63	P	1.69E-05	1.66E-05
Np-237	P	2.59E-04	5.79E-03
Pa-231	P	9.98E-07	2.50E-05
Pb-210	P	2.50E-12	3.72E-11
Pd-107	P	1.69E-09	6.65E-12
Pm-147	P	0.00E+00	0.00E+00
Pu-238	P	2.13E+00	3.82E+01
Pu-239	P	2.20E-01	3.99E+00
Pu-240	P	3.29E-01	5.98E+00
Pu-241	P	8.77E-01	1.65E+01
Pu-242	P	1.04E-03	1.88E-02
Ra-226	P	3.56E-12	1.17E-11
Ra-228	P	1.89E-08	9.55E-08
Ru-106	P	4.60E-07	4.89E-08
Sb-125	P	0.00E+00	0.00E+00
Se-79	P	5.13E-09	1.31E-09
Sm-147	P	0.00E+00	0.00E+00
Sm-151	P	5.23E-05	8.91E-04
Sn-126	P	6.61E-08	2.88E-07
Sr-90	P	1.37E-01	2.83E-01
Tc-99	P	1.51E-07	3.03E-09
Th-229	P	2.28E-06	5.63E-05
Th-230	P	2.39E-08	5.86E-07
Th-232	P	6.18E-07	1.55E-05
U-232	P	0.00E+00	0.00E+00
U-233	P	5.57E-05	1.70E-05
U-234	P	5.22E-05	1.59E-05
U-235	P	5.47E-06	1.67E-06
U-236	P	4.68E-05	1.43E-05
U-238	P	4.13E-05	1.26E-05
Zr-93	P	7.85E-07	1.97E-05
Co-60(crud)	crud	1.30E-01	3.17E-02
Fe-55(crud)	crud	9.84E-03	6.97E-03
	total	6.67E+00	1.16E+02

	Evaluated Fuel				x			Evaluated Fuel
	Fuel Type	Stable Metal	Stable Metal	Non-Metal	Non-Metal	Other	Other	Non-Metal
	Condition	Intact	Not Intact	Intact	Not Intact	Intact	Not Intact	Not Intact
				SHIPPINGPORT		EBWR (U		
	Fuel Name	HWCTR	ALUM CLAD	PWR CORE II	SAXTON	METAL) LEU	N REACTOR	SAXTON (MOX)
	# of canisters	(U/TH) [112]	SNF [411]	[193]	(MOX) [787]	[64]	[147]	[787]
		0.17	1.00	24.00	1.00	10.50	194.95	1.00
Isotope	Material Type	Curies (entire fuel inventory)						Curies
Ac-227	P	9.27E-09	2.81E-07	1.24E-02	1.33E-05	3.38E-05	1.03E-02	1.33E-05
Am-241	P	1.22E-01	2.51E+01	7.61E+04	6.45E+03	1.63E+04	2.80E+05	6.45E+03
Am-242m	P	8.67E-05	9.69E-03	1.18E+02	1.07E+01	2.71E+01	7.96E+00	1.07E+01
Am-243	P	2.85E-04	2.40E-02	3.38E+02	2.83E+01	7.18E+01	4.10E+01	2.83E+01
C-14	P	1.09E-06	1.17E-05	1.53E+00	1.81E+00	4.59E+00	3.63E+02	1.81E+00
Cd-113m	P	6.32E-02	7.25E-01	0.00E+00	2.59E+01	6.56E+01	0.00E+00	2.59E+01
Cl-36	P	2.51E-30	0.00E+00	0.00E+00	2.35E-02	5.96E-02	0.00E+00	2.35E-02
Cm-242	P	2.62E-04	8.00E-03	0.00E+00	8.79E+00	2.23E+01	0.00E+00	8.79E+00
Cm-243	P	4.52E-05	3.29E-03	0.00E+00	1.60E+01	4.06E+01	0.00E+00	1.60E+01
Cm-244	P	9.94E-03	4.27E-01	3.16E+04	9.29E+02	2.36E+03	2.44E+03	9.29E+02
Cm-245	P	5.84E-07	1.33E-05	5.82E+00	2.12E-01	5.37E-01	5.13E-01	2.12E-01
Cm-246	P	3.99E-08	9.83E-07	9.89E-01	4.28E-02	1.08E-01	6.79E-02	4.28E-02
Cm-247	P	4.17E-14	0.00E+00	0.00E+00	1.12E-07	2.83E-07	0.00E+00	1.12E-07
Co-60	P	7.30E-03	1.81E-09	1.10E+04	2.12E+01	5.38E+01	4.75E+02	2.12E+01
Cs-134	C	9.30E+01	2.05E+02	3.63E+03	1.24E+01	3.13E+01	1.63E+02	1.24E+01
Cs-135	C	6.58E-04	1.24E-02	6.19E+00	6.65E-01	1.69E+00	4.00E+01	6.65E-01
Cs-137	C	5.49E+02	8.60E+03	2.07E+06	1.00E+05	2.53E+05	5.34E+06	1.00E+05
Eu-154	P	1.57E+01	9.08E+01	0.00E+00	1.84E+03	4.67E+03	0.00E+00	1.84E+03
Eu-155	P	7.47E+00	2.81E+01	0.00E+00	1.92E+02	4.86E+02	0.00E+00	1.92E+02
Fe-55	P	1.29E+00	0.00E+00	0.00E+00	1.76E-01	4.45E-01	0.00E+00	1.76E-01
H-3	G	2.02E+00	2.61E+01	5.09E+03	2.92E+02	7.41E+02	1.03E+04	2.92E+02
I-129	G	1.44E-04	2.54E-03	7.20E-01	6.09E-02	1.54E-01	3.29E+00	6.09E-02
Kr-85	G	5.46E+01	6.45E+02	5.07E+04	2.59E+03	6.56E+03	1.53E+05	2.59E+03
Nb-93m	P	2.82E-03	4.96E-02	5.72E+01	2.82E+00	7.15E+00	4.54E+02	2.82E+00
Nb-94	P	1.37E-07	4.96E-06	0.00E+00	5.18E-02	1.31E-01	6.71E-05	5.18E-02
Ni-59	P	2.43E-04	0.00E+00	0.00E+00	4.01E-02	1.02E-01	2.03E+01	4.01E-02
Ni-63	P	3.69E-02	0.00E+00	8.04E+04	4.42E+00	1.12E+01	2.21E+03	4.42E+00
Np-237	P	1.82E-03	1.20E-02	7.06E+00	6.46E-01	1.64E+00	3.87E+01	6.46E-01
Pa-231	P	9.79E-08	1.88E-06	1.15E-02	3.02E-05	7.65E-05	1.38E-02	3.02E-05
Pb-210	P	1.04E-10	1.44E-11	2.71E-06	5.13E-08	1.30E-07	7.52E-08	5.13E-08
Pd-107	P	9.52E-05	2.35E-03	1.95E+00	2.14E-01	5.42E-01	7.46E+00	2.14E-01
Pm-147	P	4.86E+02	2.47E+03	0.00E+00	9.36E+01	2.37E+02	0.00E+00	9.36E+01
Pu-238	P	7.65E+02	2.20E+01	8.02E+04	5.66E+02	1.18E+04	6.37E+04	5.66E+02
Pu-239	P	1.59E+01	1.49E+01	7.55E+03	9.81E+01	2.05E+03	1.23E+05	9.81E+01
Pu-240	P	9.08E+00	1.07E+01	1.13E+04	1.70E+02	3.54E+03	7.18E+04	1.70E+02
Pu-241	P	2.56E+03	1.22E+03	1.57E+06	9.43E+03	1.97E+05	2.06E+06	9.43E+03
Pu-242	P	1.35E-02	1.04E-02	3.73E+01	4.84E-01	1.01E+01	3.46E+01	4.84E-01
Ra-226	P	1.93E-09	1.53E-10	6.13E-06	2.46E-07	6.22E-07	1.15E-03	2.46E-07
Ra-228	P	1.74E-13	8.44E-12	5.85E-02	2.80E-07	7.11E-07	1.03E-06	2.80E-07
Ru-106	P	3.64E+01	2.97E+01	1.42E+01	1.17E-03	2.97E-03	3.16E-01	1.17E-03
Sb-125	P	1.20E+01	0.00E+00	0.00E+00	1.70E+01	4.30E+01	0.00E+00	1.70E+01
Se-79	P	2.47E-03	6.93E-02	7.69E+00	7.90E-01	2.00E+00	4.48E+01	7.90E-01
Sm-147	P	3.48E-08	8.28E-07	0.00E+00	9.01E-06	2.28E-05	0.00E+00	9.01E-06
Sm-151	P	2.16E+00	2.67E+01	2.58E+04	5.86E+02	1.48E+03	8.55E+04	5.86E+02
Sn-126	P	2.21E-03	2.72E-02	9.72E+00	1.50E+00	3.80E+00	7.83E+01	1.50E+00
Sr-90	P	5.25E+02	8.16E+03	1.56E+06	6.87E+04	1.74E+05	4.03E+06	6.87E+04
Tc-99	P	8.07E-02	1.44E+00	2.67E+02	2.51E+01	6.37E+01	1.51E+03	2.51E+01
Th-229	P	3.77E-08	8.09E-10	1.57E-02	4.93E-07	1.03E-05	9.31E-06	4.93E-07
Th-230	P	3.27E-04	7.96E-08	1.08E-03	8.39E-06	1.75E-04	1.02E-03	8.39E-06
Th-232	P	1.49E-10	1.99E-11	5.56E-03	4.58E-08	9.56E-07	1.21E-07	4.58E-08
U-232	P	4.47E-03	1.11E-04	0.00E+00	4.23E-03	8.82E-02	0.00E+00	4.23E-03
U-233	P	6.56E-05	1.18E-06	6.07E+00	1.70E-04	3.55E-03	5.71E-03	1.70E-04
U-234	P	6.83E+00	1.17E-03	5.82E+00	5.70E-02	1.19E+00	4.85E+02	5.70E-02
U-235	P	1.34E-01	8.48E-03	6.58E-01	5.12E-03	1.07E-01	1.85E+01	5.12E-03
U-236	P	5.77E-01	3.95E-02	5.50E+00	7.81E-02	1.63E+00	7.02E+01	7.81E-02
U-238	P	2.22E-03	1.04E-02	5.15E+00	9.65E-02	2.01E+00	3.82E+02	9.65E-02
Zr-93	P	1.27E-02	1.40E-01	3.61E+01	3.72E+00	9.42E+00	2.10E+02	3.72E+00
crud (per canister)								
Co-60(crud)		1.56E+01	6.37E+00	2.68E+02	1.23E+02	7.70E+02	1.76E+03	1.23E+02
Fe-55(crud)		9.85E+01	4.01E+01	1.69E+03	7.73E+02	4.85E+03	1.11E+04	7.73E+02

Release Fractions				
Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
stable metal/ intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
stable metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
non-metal/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
non-metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
other/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
other/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud				
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
SAXTON (MOX) [787]				
Non-Metal				
Not Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Breathing Rate	3.33E-04	[m ³ /s]		
Ground Level Dispersion Factor				
distance [m]	x/Q [sec/m ³]			
11000	2.17E-05	99.5% worst-sector		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
SAXTON (MOX) [787]							
Non-Metal Not Intact							
Isotope	Curies (entire fuel inventory)	$f_{inv} = 1/n_{Can}$	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	1.33E-05	1.00E+00	5.00E-03	4.00E-01	1.00E+00	6.67E-08	2.67E-08
Am-241	6.45E+03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	3.22E+01	1.29E+01
Am-242m	1.07E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	5.34E-02	2.13E-02
Am-243	2.83E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.42E-01	5.66E-02
C-14	1.81E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	9.05E-03	3.62E-03
Cd-113m	2.59E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.29E-01	5.17E-02
Cl-36	2.35E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.18E-04	4.70E-05
Cm-242	8.79E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.39E-02	1.76E-02
Cm-243	1.60E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	8.01E-02	3.21E-02
Cm-244	9.29E+02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.65E+00	1.86E+00
Cm-245	2.12E-01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.06E-03	4.24E-04
Cm-246	4.28E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.14E-04	8.56E-05
Cm-247	1.12E-07	1.00E+00	5.00E-03	4.00E-01	1.00E+00	5.58E-10	2.23E-10
Co-60	2.12E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.06E-01	4.25E-02
Cs-134	1.24E+01	1.00E+00	5.00E-03	1.00E+00	1.00E+00	6.18E-02	6.18E-02
Cs-135	6.65E-01	1.00E+00	5.00E-03	1.00E+00	1.00E+00	3.32E-03	3.32E-03
Cs-137	1.00E+05	1.00E+00	5.00E-03	1.00E+00	1.00E+00	5.00E+02	5.00E+02
Eu-154	1.84E+03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	9.20E+00	3.68E+00
Eu-155	1.92E+02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	9.59E-01	3.84E-01
Fe-55	1.76E-01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	8.79E-04	3.51E-04
H-3	2.92E+02	1.00E+00	3.00E-01	1.00E+00	1.00E+00	8.76E+01	8.76E+01
I-129	6.09E-02	1.00E+00	3.00E-01	1.00E+00	1.00E+00	1.83E-02	1.83E-02
Kr-85	2.59E+03	1.00E+00	3.00E-01	1.00E+00	1.00E+00	7.77E+02	7.77E+02
Nb-93m	2.82E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.41E-02	5.64E-03
Nb-94	5.18E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.59E-04	1.04E-04
Ni-59	4.01E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.01E-04	8.03E-05
Ni-63	4.42E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.21E-02	8.85E-03
Np-237	6.46E-01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	3.23E-03	1.29E-03
Pa-231	3.02E-05	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.51E-07	6.03E-08
Pb-210	5.13E-08	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.57E-10	1.03E-10
Pd-107	2.14E-01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.07E-03	4.28E-04
Pm-147	9.36E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.68E-01	1.87E-01
Pu-238	5.66E+02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.83E+00	1.13E+00
Pu-239	9.81E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.90E-01	1.96E-01
Pu-240	1.70E+02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	8.48E-01	3.39E-01
Pu-241	9.43E+03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.71E+01	1.89E+01
Pu-242	4.84E-01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.42E-03	9.68E-04
Ra-226	2.46E-07	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.23E-09	4.91E-10
Ra-228	2.80E-07	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.40E-09	5.61E-10
Ru-106	1.17E-03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	5.85E-06	2.34E-06
Sb-125	1.70E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	8.48E-02	3.39E-02
Se-79	7.90E-01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	3.95E-03	1.58E-03
Sm-147	9.01E-06	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.50E-08	1.80E-08
Sm-151	5.86E+02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.93E+00	1.17E+00
Sn-126	1.50E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	7.50E-03	3.00E-03
Sr-90	6.87E+04	1.00E+00	5.00E-03	4.00E-01	1.00E+00	3.44E+02	1.37E+02
Tc-99	2.51E+01	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.26E-01	5.03E-02
Th-229	4.93E-07	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.47E-09	9.87E-10
Th-230	8.39E-06	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.19E-08	1.68E-08
Th-232	4.58E-08	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.29E-10	9.16E-11
U-232	4.23E-03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.11E-05	8.45E-06
U-233	1.70E-04	1.00E+00	5.00E-03	4.00E-01	1.00E+00	8.51E-07	3.41E-07
U-234	5.70E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.85E-04	1.14E-04
U-235	5.12E-03	1.00E+00	5.00E-03	4.00E-01	1.00E+00	2.56E-05	1.02E-05
U-236	7.81E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	3.90E-04	1.56E-04
U-238	9.65E-02	1.00E+00	5.00E-03	4.00E-01	1.00E+00	4.82E-04	1.93E-04
Zr-93	3.72E+00	1.00E+00	5.00E-03	4.00E-01	1.00E+00	1.86E-02	7.43E-03
crud (per canister)							
Co-60(crud)	1.23E+02	1	1.00E+00	3.00E-01	1.00E+00	1.23E+02	3.69E+01
Fe-55(crud)	7.73E+02	1	1.00E+00	3.00E-01	1.00E+00	7.73E+02	2.32E+02

SAXTON (MOX) [787]													
Non-Metal	Not Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Ac-227	2.83E-07	4.76E-11	1.10E-06	1.83E-06	2.29E-05	2.56E-11	1.05E-06	1.29E-06	0.00E+00	Am-241	78.80%	Am-241	80.97%
Am-241	1.12E+01	9.20E-04	6.34E+00	6.00E+01	7.48E+02	5.51E-04	2.70E+01	4.14E+01	0.00E+00	Cm-244	6.34%	Cm-244	6.29%
Am-242m	1.83E-02	7.88E-07	2.40E-03	9.65E-02	1.21E+00	3.22E-07	4.27E-02	6.56E-02	0.00E+00	Pu-238	6.11%	Pu-238	6.22%
Am-243	4.94E-02	2.30E-05	2.69E-02	2.62E-01	3.28E+00	1.25E-05	1.17E-01	1.80E-01	0.00E+00	Sr-90	2.46%	Pu-241	2.29%
C-14	5.46E-08	5.46E-08	5.46E-08	5.46E-08	5.46E-08	5.46E-08	5.46E-08	5.46E-08	0.00E+00	Pu-241	2.14%	Pu-240	2.07%
Cd-113m	4.59E-05	4.59E-05	5.66E-04	4.59E-05	4.59E-05	4.59E-05	1.80E-03	5.71E-04	0.00E+00	Pu-240	2.00%	Pu-239	1.20%
Cl-36	6.33E-10	6.33E-10	5.73E-08	6.33E-10	6.33E-10	6.33E-10	6.74E-10	7.45E-09	0.00E+00	Pu-239	1.16%	Am-243	0.36%
Cm-242	2.68E-04	4.44E-07	7.28E-03	1.83E-03	2.29E-02	4.42E-07	1.15E-03	2.19E-03	0.00E+00	Am-243	0.34%	Sr-90	0.29%
Cm-243	1.77E-02	5.39E-06	1.66E-02	1.01E-01	1.26E+00	3.28E-06	4.94E-02	7.11E-02	0.00E+00	Cs-137	0.22%	Cm-243	0.14%
Cm-244	7.90E-01	5.17E-05	9.59E-01	4.66E+00	5.81E+01	5.02E-05	2.37E+00	3.33E+00	0.00E+00	Cm-243	0.14%	Am-242m	0.13%
Cm-245	3.82E-04	7.58E-08	2.04E-04	2.03E-03	2.54E-02	4.17E-08	9.02E-04	1.39E-03	0.00E+00	Am-242m	0.13%	Np-237	0.01%
Cm-246	7.64E-05	9.15E-09	4.16E-05	4.07E-04	5.08E-03	5.17E-09	1.82E-04	2.79E-04	0.00E+00	Co-60(crud)	0.11%	Cs-137	0.01%
Cm-247	1.83E-10	1.33E-13	9.97E-11	9.73E-10	1.22E-08	8.66E-14	4.36E-10	6.69E-10	0.00E+00	Eu-154	0.01%	Pu-242	0.01%
Co-60	5.41E-06	2.09E-05	3.92E-04	1.95E-05	1.53E-05	1.84E-05	4.09E-05	6.71E-05	0.00E+00	Np-237	0.01%	Eu-154	0.01%
Cs-134	2.15E-05	1.78E-05	1.95E-05	1.95E-05	1.82E-05	1.83E-05	2.30E-05	2.07E-05	0.00E+00	Fe-55(crud)	0.01%	Cm-245	0.00%
Cs-135	1.07E-07	1.07E-07	1.25E-07	1.07E-07	1.07E-07	1.07E-07	1.07E-07	1.09E-07	0.00E+00	Pu-242	0.01%	Cm-242	0.00%
Cs-137	1.17E-01	1.05E-01	1.18E-01	1.11E-01	1.06E-01	1.06E-01	1.22E-01	1.15E-01	0.00E+00	Cm-242	0.00%	Co-60(crud)	0.00%
Eu-154	1.15E-03	1.53E-03	7.80E-03	1.04E-02	5.15E-02	7.03E-04	1.11E-02	7.61E-03	0.00E+00	Cm-245	0.00%	Cm-246	0.00%
Eu-155	3.65E-06	6.30E-06	1.22E-04	1.47E-04	1.56E-03	2.46E-06	1.14E-04	1.15E-04	0.00E+00	Cd-113m	0.00%	Sm-151	0.00%
Fe-55	4.91E-09	4.78E-09	9.96E-09	4.86E-09	4.83E-09	5.09E-09	1.14E-08	6.82E-09	0.00E+00	Cm-246	0.00%	Fe-55(crud)	0.00%
H-3	4.05E-05	4.05E-05	4.05E-05	4.05E-05	4.05E-05	4.05E-05	4.05E-05	4.05E-05	0.00E+00	Sm-151	0.00%	Eu-155	0.00%
I-129	4.24E-08	1.02E-07	1.53E-07	6.84E-08	6.74E-08	7.62E-04	5.76E-08	2.29E-05	0.00E+00	U-238	0.00%	Pm-147	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236	0.00%	Zr-93	0.00%
Nb-93m	6.27E-08	6.57E-09	9.73E-06	4.30E-08	1.12E-07	4.58E-09	5.96E-08	1.19E-06	0.00E+00	Eu-155	0.00%	U-238	0.00%
Nb-94	1.32E-08	6.20E-08	2.07E-06	6.26E-08	5.45E-08	6.15E-08	1.23E-07	3.10E-07	0.00E+00	U-234	0.00%	Cd-113m	0.00%
Ni-59	7.70E-10	7.42E-10	2.57E-09	7.60E-10	7.53E-10	8.09E-10	7.79E-10	7.68E-10	0.00E+00	Co-60	0.00%	U-236	0.00%
Ni-63	1.94E-07	1.94E-07	7.26E-07	1.94E-07	1.94E-07	1.94E-07	2.03E-07	1.98E-07	0.00E+00	Pm-147	0.00%	H-3	0.00%
Np-237	1.02E-03	5.84E-07	5.56E-04	9.06E-03	1.13E-01	4.63E-07	8.09E-04	5.05E-03	0.00E+00	H-3	0.00%	U-234	0.00%
Pa-231	1.11E-11	1.42E-11	1.20E-06	1.12E-06	1.40E-05	1.23E-11	4.63E-10	5.60E-07	0.00E+00	U-232	0.00%	Ac-227	0.00%
Pb-210	8.73E-13	8.73E-13	8.73E-13	1.03E-11	1.50E-10	8.73E-13	1.29E-11	1.01E-11	0.00E+00	I-129	0.00%	Cs-134	0.00%
Pd-107	1.08E-11	1.08E-11	3.26E-07	5.85E-11	1.56E-10	1.08E-11	2.46E-09	3.95E-08	0.00E+00	Cs-134	0.00%	Co-60	0.00%
Pm-147	9.41E-11	1.80E-10	3.87E-04	4.09E-05	5.11E-04	9.91E-11	2.95E-05	5.31E-05	0.00E+00	Zr-93	0.00%	U-232	0.00%
Pu-238	8.47E-01	3.02E-05	9.68E+00	4.60E+00	5.75E+01	2.91E-05	2.12E+00	3.21E+00	0.00E+00	U-235	0.00%	Pa-231	0.00%
Pu-239	1.67E-01	4.84E-06	1.69E+00	8.86E-01	1.11E+01	4.74E-06	3.96E-01	6.08E-01	0.00E+00	Tc-99	0.00%	Sn-126	0.00%
Pu-240	2.88E-01	8.63E-06	2.93E+00	1.53E+00	1.91E+01	8.21E-06	6.86E-01	1.05E+00	0.00E+00	Sb-125	0.00%	U-235	0.00%
Pu-241	3.44E-01	1.54E-05	1.60E+00	1.69E+00	2.12E+01	6.25E-06	6.61E-01	1.12E+00	0.00E+00	Sn-126	0.00%	Sb-125	0.00%
Pu-242	7.81E-04	2.44E-08	7.94E-03	4.16E-03	5.20E-02	2.27E-08	1.86E-03	2.87E-03	0.00E+00	Ac-227	0.00%	Th-230	0.00%
Ra-226	1.34E-12	1.34E-12	2.11E-10	8.72E-12	9.97E-11	1.34E-12	1.41E-12	3.05E-11	0.00E+00	Nb-93m	0.00%	Th-229	0.00%
Ra-228	2.74E-12	2.76E-12	1.08E-10	1.11E-11	9.76E-11	2.74E-12	2.80E-12	1.93E-11	0.00E+00	Pa-231	0.00%	Ni-63	0.00%
Ru-106	8.64E-10	8.58E-10	6.51E-08	8.58E-10	8.58E-10	8.58E-10	1.06E-09	8.08E-09	0.00E+00	U-233	0.00%	Sm-147	0.00%
Sb-125	3.27E-07	3.77E-07	1.97E-05	5.89E-07	2.48E-06	2.94E-07	1.32E-06	2.99E-06	0.00E+00	Nb-94	0.00%	Nb-93m	0.00%
Se-79	2.87E-08	2.87E-08	4.14E-07	2.87E-08	2.87E-08	2.87E-08	1.79E-07	1.12E-07	0.00E+00	Ni-63	0.00%	Cs-135	0.00%
Sm-147	0.00E+00	0.00E+00	3.67E-09	1.32E-08	1.66E-07	0.00E+00	9.10E-09	9.73E-09	0.00E+00	Se-79	0.00%	U-233	0.00%
Sm-151	1.26E-09	4.67E-09	1.02E-04	3.44E-04	4.32E-03	4.13E-04	2.35E-04	2.54E-04	0.00E+00	Cs-135	0.00%	I-129	0.00%
Sn-126	1.15E-06	1.13E-06	1.21E-05	4.51E-06	9.47E-06	1.05E-06	1.41E-06	2.16E-06	0.00E+00	C-14	0.00%	Tc-99	0.00%
Sr-90	9.70E-03	9.70E-03	1.05E+01	1.23E+00	2.67E+00	9.70E-03	2.11E-02	1.29E+00	0.00E+00	Pd-107	0.00%	C-14	0.00%

Inhalation Doses

Tc-99	6.08E-08	6.08E-08	2.25E-05	6.08E-08	6.08E-08	1.63E-06	8.42E-07	3.03E-06	0.00E+00	Th-230	0.00%	Nb-94	0.00%
Th-229	7.28E-11	7.28E-11	5.25E-08	3.03E-08	3.77E-07	7.28E-11	1.86E-10	1.53E-08	0.00E+00	Th-229	0.00%	Se-79	0.00%
Th-230	1.83E-10	1.83E-10	1.35E-07	7.76E-08	9.69E-07	1.83E-10	4.71E-10	3.95E-08	0.00E+00	Sm-147	0.00%	Th-232	0.00%
Th-232	1.87E-12	1.89E-12	2.30E-09	2.19E-09	2.72E-08	1.82E-12	4.58E-12	1.09E-09	0.00E+00	Ru-106	0.00%	Cm-247	0.00%
U-232	1.81E-08	1.82E-08	3.34E-04	9.18E-07	1.45E-05	1.77E-08	7.03E-07	4.02E-05	0.00E+00	Cl-36	0.00%	Fe-55	0.00%
U-233	2.31E-10	2.31E-10	2.77E-06	6.48E-09	1.02E-07	2.31E-10	8.56E-09	3.33E-07	0.00E+00	Fe-55	0.00%	Ru-106	0.00%
U-234	7.62E-08	7.62E-08	9.08E-04	2.13E-06	3.32E-05	7.62E-08	2.82E-06	1.09E-04	0.00E+00	Th-232	0.00%	Ni-59	0.00%
U-235	6.49E-09	6.51E-09	7.55E-05	1.80E-07	2.76E-06	6.49E-09	2.35E-07	9.09E-06	0.00E+00	Ni-59	0.00%	Cl-36	0.00%
U-236	9.89E-08	9.89E-08	1.18E-03	2.76E-06	4.34E-05	9.89E-08	3.66E-06	1.42E-04	0.00E+00	Cm-247	0.00%	Pd-107	0.00%
U-238	1.15E-07	1.15E-07	1.37E-03	3.39E-06	5.05E-05	1.15E-07	4.24E-06	1.65E-04	0.00E+00	Ra-226	0.00%	Pb-210	0.00%
Zr-93	4.33E-09	9.30E-09	1.73E-05	3.52E-05	4.33E-04	3.46E-09	3.44E-08	1.72E-05	0.00E+00	Ra-228	0.00%	Ra-226	0.00%
										Pb-210	0.00%	Ra-228	0.00%
crud										Kr-85	0.00%	Kr-85	0.00%
Co-60(crud)	4.70E-03	1.82E-02	3.40E-01	1.70E-02	1.33E-02	1.60E-02	3.55E-02	5.83E-02	0.00E+00				
Fe-55(crud)	3.24E-03	3.16E-03	6.57E-03	3.21E-03	3.19E-03	3.36E-03	7.50E-03	4.50E-03	0.00E+00				
total	1.39E+01	1.38E-01	3.43E+01	7.52E+01	9.24E+02	1.37E-01	3.36E+01	5.25E+01	0.00E+00				

SAXTON (MOX) [787]												
Non-Metal		Not Intact										
	Air Submersion Doses [rem]										Isotope % of Dose	
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes	% of Total Skin Dose	
Ac-227	2.01E-16	2.39E-16	1.81E-16	1.58E-16	5.55E-16	1.96E-16	1.71E-16	2.01E-16	1.76E-15	Cs-137	40.62%	
Am-241	2.22E-06	2.77E-06	1.74E-06	1.35E-06	7.43E-06	2.03E-06	1.64E-06	2.12E-06	3.31E-06	Co-60(crud)	33.01%	
Am-242m	1.63E-10	2.58E-10	7.37E-11	7.37E-11	3.40E-10	1.26E-10	8.31E-11	1.36E-10	5.83E-10	Kr-85	18.98%	
Am-243	2.49E-08	2.97E-08	2.18E-08	1.76E-08	8.49E-08	2.38E-08	2.03E-08	2.48E-08	3.13E-08	Sr-90	5.85%	
C-14	1.88E-13	2.56E-13	1.11E-13	8.79E-14	5.13E-13	1.59E-13	1.12E-13	1.63E-13	1.77E-10	Eu-154	1.41%	
Cd-113m	7.44E-11	9.09E-11	6.16E-11	5.20E-11	2.18E-10	7.02E-11	5.85E-11	7.21E-11	8.80E-08	Am-241	0.08%	
Cl-36	2.11E-13	2.51E-13	1.91E-13	1.71E-13	5.31E-13	2.07E-13	1.81E-13	2.10E-13	1.39E-10	Co-60	0.03%	
Cm-242	2.76E-11	5.22E-11	3.99E-12	6.67E-12	3.74E-11	1.73E-11	8.01E-12	2.01E-11	1.51E-10	Cs-134	0.01%	
Cm-243	3.71E-08	4.30E-08	3.54E-08	3.22E-08	9.65E-08	3.71E-08	3.34E-08	3.78E-08	6.30E-08	Eu-155	0.01%	
Cm-244	2.57E-09	4.96E-09	2.64E-10	5.45E-10	3.29E-09	1.56E-09	6.75E-10	1.83E-09	1.46E-08	Sb-125	0.00%	
Cm-245	3.30E-10	3.87E-10	3.09E-10	2.70E-10	1.00E-09	3.27E-10	2.89E-10	3.37E-10	4.56E-10	Cd-113m	0.00%	
Cm-246	1.07E-13	2.06E-13	1.20E-14	2.32E-14	1.40E-13	6.56E-14	2.87E-14	7.66E-14	6.00E-13	Sn-126	0.00%	
Cm-247	6.59E-16	7.53E-16	6.45E-16	6.18E-16	1.27E-15	6.68E-16	6.18E-16	6.72E-16	8.02E-16	Cm-243	0.00%	
Co-60	1.05E-06	1.19E-06	1.06E-06	1.05E-06	1.52E-06	1.08E-06	1.02E-06	1.07E-06	1.24E-06	Am-243	0.00%	
Cs-134	3.67E-07	4.18E-07	3.66E-07	3.57E-07	5.95E-07	3.76E-07	3.50E-07	3.76E-07	4.69E-07	Pm-147	0.00%	
Cs-135	1.68E-13	2.20E-13	1.12E-13	8.92E-14	4.83E-13	1.47E-13	1.09E-13	1.51E-13	2.42E-10	Tc-99	0.00%	
Cs-137	1.07E-03	1.22E-03	1.06E-03	1.04E-03	1.76E-03	1.09E-03	1.02E-03	1.09E-03	1.76E-03	Cm-244	0.00%	
Eu-154	4.43E-05	5.03E-05	4.43E-05	4.34E-05	6.97E-05	4.55E-05	4.25E-05	4.54E-05	6.13E-05	Pu-238	0.00%	
Eu-155	1.92E-07	2.27E-07	1.71E-07	1.42E-07	6.23E-07	1.86E-07	1.59E-07	1.92E-07	2.61E-07	Pu-240	0.00%	
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Nb-94	0.00%	
H-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-09	0.00E+00	I-129	0.00%	
I-129	7.08E-10	9.77E-10	3.14E-10	2.40E-10	1.61E-09	5.66E-10	3.37E-10	5.57E-10	1.61E-09	Pu-239	0.00%	
Kr-85	7.30E-06	8.36E-06	7.11E-06	6.80E-06	1.37E-05	7.36E-06	6.80E-06	7.42E-06	8.23E-04	Am-242m	0.00%	
Nb-93m	7.17E-12	1.48E-11	2.89E-13	1.34E-12	7.83E-12	3.88E-12	1.54E-12	5.03E-12	4.85E-11	Cm-245	0.00%	
Nb-94	1.57E-09	1.78E-09	1.56E-09	1.53E-09	2.47E-09	1.60E-09	1.49E-09	1.60E-09	1.98E-09	Pu-241	0.00%	
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Np-237	0.00%	
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cs-135	0.00%	
Np-237	2.70E-10	3.27E-10	2.34E-10	2.00E-10	8.30E-10	2.58E-10	2.21E-10	2.67E-10	4.00E-10	C-14	0.00%	
Pa-231	2.07E-14	2.41E-14	1.96E-14	1.84E-14	4.41E-14	2.06E-14	1.86E-14	2.08E-14	2.95E-14	Cm-242	0.00%	
Pb-210	1.28E-18	1.69E-18	8.76E-19	6.47E-19	4.02E-18	1.12E-18	8.43E-19	1.16E-18	2.64E-18	Cl-36	0.00%	
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Se-79	0.00%	
Pm-147	2.81E-11	3.59E-11	2.05E-11	1.68E-11	8.19E-11	2.54E-11	1.98E-11	2.60E-11	3.05E-08	Ru-106	0.00%	
Pu-238	1.49E-09	2.88E-09	2.41E-10	3.81E-10	2.11E-09	9.10E-10	4.52E-10	1.11E-09	9.29E-09	Nb-93m	0.00%	
Pu-239	1.91E-10	2.97E-10	1.04E-10	1.05E-10	3.73E-10	1.53E-10	1.13E-10	1.67E-10	7.32E-10	Sm-151	0.00%	
Pu-240	4.33E-10	8.38E-10	7.42E-11	1.12E-10	6.31E-10	2.67E-10	1.33E-10	3.23E-10	2.67E-09	U-235	0.00%	
Pu-241	2.72E-10	3.28E-10	2.45E-10	2.13E-10	8.29E-10	2.64E-10	2.31E-10	2.74E-10	4.43E-10	Pu-242	0.00%	
Pu-242	1.04E-12	2.00E-12	1.88E-13	2.78E-13	1.53E-12	6.45E-13	3.26E-13	7.79E-13	6.35E-12	U-238	0.00%	
Ra-226	3.04E-17	3.49E-17	2.91E-17	2.66E-17	7.84E-17	3.05E-17	2.75E-17	3.11E-17	4.72E-17	U-236	0.00%	
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-234	0.00%	
Ru-106	4.75E-12	5.45E-12	4.75E-12	4.58E-12	8.08E-12	4.84E-12	4.53E-12	4.89E-12	5.12E-11	Cm-246	0.00%	
Sb-125	1.35E-07	1.55E-07	1.33E-07	1.27E-07	2.40E-07	1.37E-07	1.27E-07	1.38E-07	1.80E-07	U-232	0.00%	
Se-79	1.10E-13	1.48E-13	6.69E-14	5.29E-14	3.04E-13	9.38E-14	6.66E-14	9.60E-14	1.18E-10	Pa-231	0.00%	
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-233	0.00%	
Sm-151	1.22E-11	2.07E-11	1.66E-12	2.66E-12	1.67E-11	8.42E-12	3.50E-12	8.49E-12	4.47E-11	Ac-227	0.00%	
Sn-126	4.54E-08	5.19E-08	4.50E-08	4.35E-08	7.88E-08	4.63E-08	4.30E-08	4.64E-08	7.87E-08	Th-229	0.00%	
Sr-90	2.15E-07	2.62E-07	1.78E-07	1.50E-07	6.29E-07	2.02E-07	1.69E-07	2.08E-07	2.54E-04	Cm-247	0.00%	
Tc-99	1.76E-11	2.22E-11	1.30E-11	1.06E-11	5.22E-11	1.58E-11	1.25E-11	1.64E-11	2.77E-08	Th-230	0.00%	
Th-229	7.47E-16	8.75E-16	6.93E-16	6.00E-16	2.28E-15	7.33E-16	6.48E-16	7.59E-16	1.07E-15	Ra-226	0.00%	
Th-230	6.06E-17	8.02E-17	4.82E-17	4.11E-17	1.78E-16	5.49E-17	4.61E-17	5.86E-17	1.52E-16	Pb-210	0.00%	
Th-232	1.72E-19	2.50E-19	1.17E-19	1.02E-19	4.78E-19	1.45E-19	1.17E-19	1.60E-19	6.33E-19	Th-232	0.00%	
U-232	2.63E-14	3.94E-14	1.67E-14	1.53E-14	6.55E-14	2.19E-14	1.70E-14	2.41E-14	1.00E-13	Fe-55	0.00%	
U-233	1.16E-15	1.52E-15	9.23E-16	8.48E-16	2.82E-15	1.06E-15	8.95E-16	1.11E-15	3.12E-15	Fe-55(crud)	0.00%	
U-234	2.01E-13	3.29E-13	1.00E-13	9.61E-14	4.55E-13	1.53E-13	1.10E-13	1.75E-13	9.72E-13	H-3	0.00%	
U-235	1.45E-11	1.67E-11	1.39E-11	1.26E-11	3.78E-11	1.45E-11	1.31E-11	1.48E-11	1.78E-11	Ni-59	0.00%	
U-236	1.91E-13	3.45E-13	6.83E-14	7.30E-14	3.73E-13	1.31E-13	8.46E-14	1.57E-13	1.12E-12	Ni-63	0.00%	
U-238	1.70E-13	3.31E-13	3.86E-14	4.80E-14	2.87E-13	1.05E-13	5.85E-14	1.32E-13	1.13E-12	Pd-107	0.00%	
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ra-228	0.00%	
										Sm-147	0.00%	
crud										Zr-93	0.00%	
Co-60(crud)	1.21E-03	1.37E-03	1.22E-03	1.21E-03	1.76E-03	1.25E-03	1.19E-03	1.24E-03	1.43E-03			
Fe-55(crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00			
total	2.34E-03	2.66E-03	2.34E-03	2.30E-03	3.61E-03	2.40E-03	2.26E-03	2.39E-03	4.34E-03			

SAXTON (MOX) [787]

Non-Metal

Not Intact

	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	1.39E+01		2.34E-03			
Breast	1.38E-01		2.66E-03			
Lung	3.43E+01		2.34E-03			
R Marrow	7.52E+01		2.30E-03			
B Surface	9.24E+02	<CDE	3.61E-03			
Thyroid	1.37E-01		2.40E-03			
Remainder	3.36E+01		2.26E-03			
Whole Body	5.25E+01	<CEDE	2.39E-03	<DDE	5.25E+01	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	4.34E-03	<SKIN	4.34E-03	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					9.24E+02	<CDE + DDE

SAXTON (MOX) [787]

Non-Metal

Isotope	Material Type	Offsite Doses [rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	1.29E-06	2.29E-05
Am-241	P	4.14E+01	7.48E+02
Am-242m	P	6.56E-02	1.21E+00
Am-243	P	1.80E-01	3.28E+00
C-14	P	5.46E-08	5.46E-08
Cd-113m	P	5.71E-04	4.59E-05
Cl-36	P	7.45E-09	6.34E-10
Cm-242	P	2.19E-03	2.29E-02
Cm-243	P	7.11E-02	1.26E+00
Cm-244	P	3.33E+00	5.81E+01
Cm-245	P	1.39E-03	2.54E-02
Cm-246	P	2.79E-04	5.08E-03
Cm-247	P	6.69E-10	1.22E-08
Co-60	P	6.82E-05	1.64E-05
Cs-134	C	2.10E-05	1.86E-05
Cs-135	C	1.09E-07	1.07E-07
Cs-137	C	1.16E-01	1.07E-01
Eu-154	P	7.65E-03	5.15E-02
Eu-155	P	1.15E-04	1.56E-03
Fe-55	P	6.82E-09	4.83E-09
H-3	G	4.05E-05	4.05E-05
I-129	G	2.29E-05	6.79E-08
Kr-85	G	7.42E-06	7.42E-06
Nb-93m	P	1.19E-06	1.12E-07
Nb-94	P	3.12E-07	5.61E-08
Ni-59	P	7.68E-10	7.53E-10
Ni-63	P	1.98E-07	1.94E-07
Np-237	P	5.05E-03	1.13E-01
Pa-231	P	5.60E-07	1.40E-05
Pb-210	P	1.01E-11	1.50E-10
Pd-107	P	3.95E-08	1.56E-10
Pm-147	P	5.31E-05	5.11E-04
Pu-238	P	3.21E+00	5.75E+01
Pu-239	P	6.08E-01	1.11E+01
Pu-240	P	1.05E+00	1.91E+01
Pu-241	P	1.12E+00	2.12E+01
Pu-242	P	2.87E-03	5.20E-02
Ra-226	P	3.05E-11	9.97E-11
Ra-228	P	1.93E-11	9.76E-11
Ru-106	P	8.08E-09	8.63E-10
Sb-125	P	3.13E-06	2.61E-06
Se-79	P	1.12E-07	2.87E-08
Sm-147	P	9.73E-09	1.66E-07
Sm-151	P	2.54E-04	4.32E-03
Sn-126	P	2.21E-06	9.51E-06
Sr-90	P	1.29E+00	2.67E+00
Tc-99	P	3.03E-06	6.08E-08
Th-229	P	1.53E-08	3.77E-07
Th-230	P	3.95E-08	9.69E-07
Th-232	P	1.09E-09	2.72E-08
U-232	P	4.02E-05	1.45E-05
U-233	P	3.33E-07	1.02E-07
U-234	P	1.09E-04	3.32E-05
U-235	P	9.09E-06	2.76E-06
U-236	P	1.42E-04	4.34E-05
U-238	P	1.65E-04	5.05E-05
Zr-93	P	1.72E-05	4.33E-04
Co-60(crud)	crud	5.96E-02	1.46E-02
Fe-55(crud)	crud	4.50E-03	3.19E-03
total		5.25E+01	9.24E+02

	Evaluated Fuel					x		Evaluated Fuel
	Fuel Type	Stable Metal	Stable Metal	Non-Metal	Non-Metal	Other	Other	Other
	Condition	Intact	Not Intact	Intact	Not Intact	Intact	Not Intact	Intact
				SHIPPINGPORT		EBWR (U		
	Fuel Name	HWCTR	ALUM CLAD	PWR CORE II	SAXTON	METAL) LEU	N REACTOR	EBWR (U METAL)
	# of canisters	(U/TH) [112]	SNF [411]	[193]	(MOX) [787]	[64]	[147]	LEU [64]
		0.17	1.00	24.00	1.00	10.50	194.95	10.50
Isotope	Material Type	Curies (entire fuel inventory)						Curies
Ac-227	P	9.27E-09	2.81E-07	1.24E-02	1.33E-05	3.38E-05	1.03E-02	3.38E-05
Am-241	P	1.22E-01	2.51E+01	7.61E+04	6.45E+03	1.63E+04	2.80E+05	1.63E+04
Am-242m	P	8.67E-05	9.69E-03	1.18E+02	1.07E+01	2.71E+01	7.96E+00	2.71E+01
Am-243	P	2.85E-04	2.40E-02	3.38E+02	2.83E+01	7.18E+01	4.10E+01	7.18E+01
C-14	P	1.09E-06	1.17E-05	1.53E+00	1.81E+00	4.59E+00	3.63E+02	4.59E+00
Cd-113m	P	6.32E-02	7.25E-01	0.00E+00	2.59E+01	6.56E+01	0.00E+00	6.56E+01
Cl-36	P	2.51E-30	0.00E+00	0.00E+00	2.35E-02	5.96E-02	0.00E+00	5.96E-02
Cm-242	P	2.62E-04	8.00E-03	0.00E+00	8.79E+00	2.23E+01	0.00E+00	2.23E+01
Cm-243	P	4.52E-05	3.29E-03	0.00E+00	1.60E+01	4.06E+01	0.00E+00	4.06E+01
Cm-244	P	9.94E-03	4.27E-01	3.16E+04	9.29E+02	2.36E+03	2.44E+03	2.36E+03
Cm-245	P	5.84E-07	1.33E-05	5.82E+00	2.12E-01	5.37E-01	5.13E-01	5.37E-01
Cm-246	P	3.99E-08	9.83E-07	9.89E-01	4.28E-02	1.08E-01	6.79E-02	1.08E-01
Cm-247	P	4.17E-14	0.00E+00	0.00E+00	1.12E-07	2.83E-07	0.00E+00	2.83E-07
Co-60	P	7.30E-03	1.81E-09	1.10E+04	2.12E+01	5.38E+01	4.75E+02	5.38E+01
Cs-134	C	9.30E+01	2.05E+02	3.63E+03	1.24E+01	3.13E+01	1.63E+02	3.13E+01
Cs-135	C	6.58E-04	1.24E-02	6.19E+00	6.65E-01	1.69E+00	4.00E+01	1.69E+00
Cs-137	C	5.49E+02	8.60E+03	2.07E+06	1.00E+05	2.53E+05	5.34E+06	2.53E+05
Eu-154	P	1.57E+01	9.08E+01	0.00E+00	1.84E+03	4.67E+03	0.00E+00	4.67E+03
Eu-155	P	7.47E+00	2.81E+01	0.00E+00	1.92E+02	4.86E+02	0.00E+00	4.86E+02
Fe-55	P	1.29E+00	0.00E+00	0.00E+00	1.76E-01	4.45E-01	0.00E+00	4.45E-01
H-3	G	2.02E+00	2.61E+01	5.09E+03	2.92E+02	7.41E+02	1.03E+04	7.41E+02
I-129	G	1.44E-04	2.54E-03	7.20E-01	6.09E-02	1.54E-01	3.29E+00	1.54E-01
Kr-85	G	5.46E+01	6.45E+02	5.07E+04	2.59E+03	6.56E+03	1.53E+05	6.56E+03
Nb-93m	P	2.82E-03	4.96E-02	5.72E+01	2.82E+00	7.15E+00	4.54E+02	7.15E+00
Nb-94	P	1.37E-07	4.96E-06	0.00E+00	5.18E-02	1.31E-01	6.71E-05	1.31E-01
Ni-59	P	2.43E-04	0.00E+00	0.00E+00	4.01E-02	1.02E-01	2.03E+01	1.02E-01
Ni-63	P	3.69E-02	0.00E+00	8.04E+04	4.42E+00	1.12E+01	2.21E+03	1.12E+01
Np-237	P	1.82E-03	1.20E-02	7.06E+00	6.46E-01	1.64E+00	3.87E+01	1.64E+00
Pa-231	P	9.79E-08	1.88E-06	1.15E-02	3.02E-05	7.65E-05	1.38E-02	7.65E-05
Pb-210	P	1.04E-10	1.44E-11	2.71E-06	5.13E-08	1.30E-07	7.52E-08	1.30E-07
Pd-107	P	9.52E-05	2.35E-03	1.95E+00	2.14E-01	5.42E-01	7.46E+00	5.42E-01
Pm-147	P	4.86E+02	2.47E+03	0.00E+00	9.36E+01	2.37E+02	0.00E+00	2.37E+02
Pu-238	P	7.65E+02	2.20E+01	8.02E+04	5.66E+02	1.18E+04	6.37E+04	1.18E+04
Pu-239	P	1.59E+01	1.49E+01	7.55E+03	9.81E+01	2.05E+03	1.23E+05	2.05E+03
Pu-240	P	9.08E+00	1.07E+01	1.13E+04	1.70E+02	3.54E+03	7.18E+04	3.54E+03
Pu-241	P	2.56E+03	1.22E+03	1.57E+06	9.43E+03	1.97E+05	2.06E+06	1.97E+05
Pu-242	P	1.35E-02	1.04E-02	3.73E+01	4.84E-01	1.01E+01	3.46E+01	1.01E+01
Ra-226	P	1.93E-09	1.53E-10	6.13E-06	2.46E-07	6.22E-07	1.15E-03	6.22E-07
Ra-228	P	1.74E-13	8.44E-12	5.85E-02	2.80E-07	7.11E-07	1.03E-06	7.11E-07
Ru-106	P	3.64E+01	2.97E+01	1.42E+01	1.17E-03	2.97E-03	3.16E-01	2.97E-03
Sb-125	P	1.20E+01	0.00E+00	0.00E+00	1.70E+01	4.30E+01	0.00E+00	4.30E+01
Se-79	P	2.47E-03	6.93E-02	7.69E+00	7.90E-01	2.00E+00	4.48E+01	2.00E+00
Sm-147	P	3.48E-08	8.28E-07	0.00E+00	9.01E-06	2.28E-05	0.00E+00	2.28E-05
Sm-151	P	2.16E+00	2.67E+01	2.58E+04	5.86E+02	1.48E+03	8.55E+04	1.48E+03
Sn-126	P	2.21E-03	2.72E-02	9.72E+00	1.50E+00	3.80E+00	7.83E+01	3.80E+00
Sr-90	P	5.25E+02	8.16E+03	1.56E+06	6.87E+04	1.74E+05	4.03E+06	1.74E+05
Tc-99	P	8.07E-02	1.44E+00	2.67E+02	2.51E+01	6.37E+01	1.51E+03	6.37E+01
Th-229	P	3.77E-08	8.09E-10	1.57E-02	4.93E-07	1.03E-05	9.31E-06	1.03E-05
Th-230	P	3.27E-04	7.96E-08	1.08E-03	8.39E-06	1.75E-04	1.02E-03	1.75E-04
Th-232	P	1.49E-10	1.99E-11	5.56E-03	4.58E-08	9.56E-07	1.21E-07	9.56E-07
U-232	P	4.47E-03	1.11E-04	0.00E+00	4.23E-03	8.82E-02	0.00E+00	8.82E-02
U-233	P	6.56E-05	1.18E-06	6.07E+00	1.70E-04	3.55E-03	5.71E-03	3.55E-03
U-234	P	6.83E+00	1.17E-03	5.82E+00	5.70E-02	1.19E+00	4.85E+02	1.19E+00
U-235	P	1.34E-01	8.48E-03	6.58E-01	5.12E-03	1.07E-01	1.85E+01	1.07E-01
U-236	P	5.77E-01	3.95E-02	5.50E+00	7.81E-02	1.63E+00	7.02E+01	1.63E+00
U-238	P	2.22E-03	1.04E-02	5.15E+00	9.65E-02	2.01E+00	3.82E+02	2.01E+00
Zr-93	P	1.27E-02	1.40E-01	3.61E+01	3.72E+00	9.42E+00	2.10E+02	9.42E+00
crud (per canister)								
Co-60(crud)		1.56E+01	6.37E+00	2.68E+02	1.23E+02	7.70E+02	1.76E+03	7.70E+02
Fe-55(crud)		9.85E+01	4.01E+01	1.69E+03	7.73E+02	4.85E+03	1.11E+04	4.85E+03

Release Fractions				
Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
stable metal/ intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
stable metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
non-metal/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
non-metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
other/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
other/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud				
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
EBWR (U METAL) LEU [64]				
Other				
Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Breathing Rate	3.33E-04	[m ³ /s]		
Ground Level Dispersion Factor				
distance [m]	x/Q [sec/m ³]			
11000	2.17E-05	99.5% worst-sector		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
EBWR (U METAL) LEU [64]							
Other Intact							
Isotope	Curies (entire fuel inventory)	$f_{inv} = 1/n_{Can}$	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	3.38E-05	9.52E-02	1.00E-03	1.00E+00	1.00E+00	3.22E-09	3.22E-09
Am-241	1.63E+04	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.56E+00	1.56E+00
Am-242m	2.71E+01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	2.58E-03	2.58E-03
Am-243	7.18E+01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	6.83E-03	6.83E-03
C-14	4.59E+00	9.52E-02	1.00E-03	1.00E+00	1.00E+00	4.37E-04	4.37E-04
Cd-113m	6.56E+01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	6.24E-03	6.24E-03
Cl-36	5.96E-02	9.52E-02	1.00E-03	1.00E+00	1.00E+00	5.67E-06	5.67E-06
Cm-242	2.23E+01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	2.12E-03	2.12E-03
Cm-243	4.06E+01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	3.87E-03	3.87E-03
Cm-244	2.36E+03	9.52E-02	1.00E-03	1.00E+00	1.00E+00	2.24E-01	2.24E-01
Cm-245	5.37E-01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	5.11E-05	5.11E-05
Cm-246	1.08E-01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.03E-05	1.03E-05
Cm-247	2.83E-07	9.52E-02	1.00E-03	1.00E+00	1.00E+00	2.69E-11	2.69E-11
Co-60	5.38E+01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	5.13E-03	5.13E-03
Cs-134	3.13E+01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	2.98E-03	2.98E-03
Cs-135	1.69E+00	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.61E-04	1.61E-04
Cs-137	2.53E+05	9.52E-02	1.00E-03	1.00E+00	1.00E+00	2.41E+01	2.41E+01
Eu-154	4.67E+03	9.52E-02	1.00E-03	1.00E+00	1.00E+00	4.44E-01	4.44E-01
Eu-155	4.86E+02	9.52E-02	1.00E-03	1.00E+00	1.00E+00	4.63E-02	4.63E-02
Fe-55	4.45E-01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	4.24E-05	4.24E-05
H-3	7.41E+02	9.52E-02	3.00E-01	1.00E+00	1.00E+00	2.12E+01	2.12E+01
I-129	1.54E-01	9.52E-02	3.00E-01	1.00E+00	1.00E+00	4.41E-03	4.41E-03
Kr-85	6.56E+03	9.52E-02	3.00E-01	1.00E+00	1.00E+00	1.88E+02	1.88E+02
Nb-93m	7.15E+00	9.52E-02	1.00E-03	1.00E+00	1.00E+00	6.81E-04	6.81E-04
Nb-94	1.31E-01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.25E-05	1.25E-05
Ni-59	1.02E-01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	9.69E-06	9.69E-06
Ni-63	1.12E+01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.07E-03	1.07E-03
Np-237	1.64E+00	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.56E-04	1.56E-04
Pa-231	7.65E-05	9.52E-02	1.00E-03	1.00E+00	1.00E+00	7.28E-09	7.28E-09
Pb-210	1.30E-07	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.24E-11	1.24E-11
Pd-107	5.42E-01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	5.17E-05	5.17E-05
Pm-147	2.37E+02	9.52E-02	1.00E-03	1.00E+00	1.00E+00	2.26E-02	2.26E-02
Pu-238	1.18E+04	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.12E+00	1.12E+00
Pu-239	2.05E+03	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.95E-01	1.95E-01
Pu-240	3.54E+03	9.52E-02	1.00E-03	1.00E+00	1.00E+00	3.37E-01	3.37E-01
Pu-241	1.97E+05	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.87E+01	1.87E+01
Pu-242	1.01E+01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	9.61E-04	9.61E-04
Ra-226	6.22E-07	9.52E-02	1.00E-03	1.00E+00	1.00E+00	5.93E-11	5.93E-11
Ra-228	7.11E-07	9.52E-02	1.00E-03	1.00E+00	1.00E+00	6.77E-11	6.77E-11
Ru-106	2.97E-03	9.52E-02	1.00E-03	1.00E+00	1.00E+00	2.83E-07	2.83E-07
Sb-125	4.30E+01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	4.09E-03	4.09E-03
Se-79	2.00E+00	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.91E-04	1.91E-04
Sm-147	2.28E-05	9.52E-02	1.00E-03	1.00E+00	1.00E+00	2.17E-09	2.17E-09
Sm-151	1.48E+03	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.41E-01	1.41E-01
Sn-126	3.80E+00	9.52E-02	1.00E-03	1.00E+00	1.00E+00	3.62E-04	3.62E-04
Sr-90	1.74E+05	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.66E+01	1.66E+01
Tc-99	6.37E+01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	6.07E-03	6.07E-03
Th-229	1.03E-05	9.52E-02	1.00E-03	1.00E+00	1.00E+00	9.81E-10	9.81E-10
Th-230	1.75E-04	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.67E-08	1.67E-08
Th-232	9.56E-07	9.52E-02	1.00E-03	1.00E+00	1.00E+00	9.11E-11	9.11E-11
U-232	8.82E-02	9.52E-02	1.00E-03	1.00E+00	1.00E+00	8.40E-06	8.40E-06
U-233	3.55E-03	9.52E-02	1.00E-03	1.00E+00	1.00E+00	3.38E-07	3.38E-07
U-234	1.19E+00	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.13E-04	1.13E-04
U-235	1.07E-01	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.02E-05	1.02E-05
U-236	1.63E+00	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.55E-04	1.55E-04
U-238	2.01E+00	9.52E-02	1.00E-03	1.00E+00	1.00E+00	1.92E-04	1.92E-04
Zr-93	9.42E+00	9.52E-02	1.00E-03	1.00E+00	1.00E+00	8.97E-04	8.97E-04
crud (per canister)							
Co-60(crud)	7.70E+02	1	1.00E+00	3.00E-01	1.00E+00	7.70E+02	2.31E+02
Fe-55(crud)	4.85E+03	1	1.00E+00	3.00E-01	1.00E+00	4.85E+03	1.46E+03

EBWR (U METAL) LEU [64]													
Other	Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Ac-227	3.41E-08	5.74E-12	1.33E-07	2.21E-07	2.77E-06	3.10E-12	1.27E-07	1.56E-07	0.00E+00	Am-241	41.79%	Am-241	43.69%
Am-241	1.35E+00	1.11E-04	7.65E-01	7.24E+00	9.03E+01	6.66E-05	3.25E+00	4.99E+00	0.00E+00	Pu-238	26.67%	Pu-238	27.63%
Am-242m	2.21E-03	9.51E-08	2.89E-04	1.16E-02	1.46E-01	3.89E-08	5.15E-03	7.92E-03	0.00E+00	Pu-241	9.35%	Pu-241	10.18%
Am-243	5.96E-03	2.78E-06	3.25E-03	3.16E-02	3.97E-01	1.51E-06	1.41E-02	2.17E-02	0.00E+00	Pu-240	8.75%	Pu-240	9.20%
C-14	6.59E-09	6.59E-09	6.59E-09	6.59E-09	6.59E-09	6.59E-09	6.59E-09	6.59E-09	0.00E+00	Pu-239	5.06%	Pu-239	5.32%
Cd-113m	5.54E-06	5.54E-06	6.83E-05	5.54E-06	5.54E-06	5.54E-06	2.17E-04	6.89E-05	0.00E+00	Cm-244	3.36%	Cm-244	3.40%
Cl-36	7.65E-11	7.65E-11	6.92E-09	7.65E-11	7.65E-11	7.65E-11	8.13E-11	9.00E-10	0.00E+00	Co-60(crud)	3.06%	Am-243	0.19%
Cm-242	3.23E-05	5.35E-08	8.79E-04	2.21E-04	2.76E-03	5.34E-08	1.39E-04	2.65E-04	0.00E+00	Sr-90	1.30%	Sr-90	0.16%
Cm-243	2.14E-03	6.51E-07	2.01E-03	1.22E-02	1.52E-01	3.96E-07	5.96E-03	8.59E-03	0.00E+00	Fe-55(crud)	0.24%	Cm-243	0.07%
Cm-244	9.53E-02	6.24E-06	1.16E-01	5.62E-01	7.02E+00	6.06E-06	2.87E-01	4.02E-01	0.00E+00	Am-243	0.18%	Am-242m	0.07%
Cm-245	4.61E-05	9.15E-09	2.46E-05	2.45E-04	3.06E-03	5.03E-09	1.09E-04	1.68E-04	0.00E+00	Cm-243	0.07%	Co-60(crud)	0.04%
Cm-246	9.23E-06	1.10E-09	5.03E-06	4.92E-05	6.13E-04	6.24E-10	2.19E-05	3.37E-05	0.00E+00	Am-242m	0.07%	Pu-242	0.03%
Cm-247	2.21E-11	1.61E-14	1.20E-11	1.17E-10	1.47E-09	1.04E-14	5.26E-11	8.07E-11	0.00E+00	Cs-137	0.05%	Fe-55(crud)	0.01%
Co-60	6.53E-07	2.52E-06	4.73E-05	2.36E-06	1.85E-06	2.22E-06	4.94E-06	8.10E-06	0.00E+00	Pu-242	0.02%	Np-237	0.01%
Cs-134	1.04E-06	8.62E-07	9.41E-07	9.41E-07	8.78E-07	8.86E-07	1.11E-06	9.97E-07	0.00E+00	Eu-154	0.01%	Eu-154	0.00%
Cs-135	5.15E-09	5.15E-09	6.05E-09	5.15E-09	5.15E-09	5.15E-09	5.15E-09	5.28E-09	0.00E+00	Np-237	0.01%	Cs-137	0.00%
Cs-137	5.65E-03	5.06E-03	5.69E-03	5.36E-03	5.12E-03	5.12E-03	5.88E-03	5.57E-03	0.00E+00	Cm-242	0.00%	Cm-245	0.00%
Eu-154	1.39E-04	1.84E-04	9.41E-04	1.26E-03	6.21E-03	8.48E-05	1.34E-03	9.19E-04	0.00E+00	Cm-245	0.00%	Cm-242	0.00%
Eu-155	4.41E-07	7.60E-07	1.47E-05	1.77E-05	1.88E-04	2.97E-07	1.37E-05	1.39E-05	0.00E+00	U-238	0.00%	Cm-246	0.00%
Fe-55	5.93E-10	5.77E-10	1.20E-09	5.86E-10	5.83E-10	6.15E-10	1.37E-09	8.23E-10	0.00E+00	U-236	0.00%	Sm-151	0.00%
H-3	9.79E-06	9.79E-06	9.79E-06	9.79E-06	9.79E-06	9.79E-06	9.79E-06	9.79E-06	0.00E+00	U-234	0.00%	Eu-155	0.00%
I-129	1.02E-08	2.46E-08	3.70E-08	1.65E-08	1.63E-08	1.84E-04	1.39E-08	5.53E-06	0.00E+00	Cd-113m	0.00%	Pm-147	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-232	0.00%	Zr-93	0.00%
Nb-93m	7.57E-09	7.94E-10	1.17E-06	5.19E-09	1.35E-08	5.53E-10	7.19E-09	1.44E-07	0.00E+00	Cm-246	0.00%	U-238	0.00%
Nb-94	1.59E-09	7.48E-09	2.50E-07	7.55E-09	6.58E-09	7.42E-09	1.49E-08	3.74E-08	0.00E+00	Sm-151	0.00%	U-236	0.00%
Ni-59	9.30E-11	8.96E-11	3.11E-10	9.17E-11	9.09E-11	9.76E-11	9.40E-11	9.27E-11	0.00E+00	Eu-155	0.00%	U-234	0.00%
Ni-63	2.35E-08	2.35E-08	8.76E-08	2.35E-08	2.35E-08	2.35E-08	2.45E-08	2.40E-08	0.00E+00	H-3	0.00%	U-232	0.00%
Np-237	1.23E-04	7.05E-08	6.72E-05	1.09E-03	1.36E-02	5.59E-08	9.76E-05	6.09E-04	0.00E+00	U-235	0.00%	H-3	0.00%
Pa-231	1.34E-12	1.71E-12	1.45E-07	1.36E-07	1.69E-06	1.49E-12	5.59E-11	6.76E-08	0.00E+00	Co-60	0.00%	Cd-113m	0.00%
Pb-210	1.05E-13	1.05E-13	1.05E-13	1.24E-12	1.81E-11	1.05E-13	1.55E-12	1.22E-12	0.00E+00	Pm-147	0.00%	Ac-227	0.00%
Pd-107	1.31E-12	1.31E-12	3.94E-08	7.06E-12	1.88E-11	1.31E-12	2.97E-10	4.77E-09	0.00E+00	I-129	0.00%	U-235	0.00%
Pm-147	1.14E-11	2.18E-11	4.68E-05	4.93E-06	6.16E-05	1.20E-11	3.56E-06	6.41E-06	0.00E+00	Zr-93	0.00%	Co-60	0.00%
Pu-238	8.41E-01	3.00E-05	9.62E+00	4.57E+00	5.71E+01	2.89E-05	2.11E+00	3.19E+00	0.00E+00	Cs-134	0.00%	Pa-231	0.00%
Pu-239	1.66E-01	4.80E-06	1.68E+00	8.81E-01	1.10E+01	4.71E-06	3.94E-01	6.05E-01	0.00E+00	Tc-99	0.00%	Sn-126	0.00%
Pu-240	2.87E-01	8.57E-06	2.91E+00	1.52E+00	1.90E+01	8.16E-06	6.81E-01	1.05E+00	0.00E+00	Sb-125	0.00%	Th-230	0.00%
Pu-241	3.42E-01	1.53E-05	1.59E+00	1.68E+00	2.10E+01	6.21E-06	6.56E-01	1.12E+00	0.00E+00	U-233	0.00%	Cs-134	0.00%
Pu-242	7.76E-04	2.43E-08	7.89E-03	4.14E-03	5.17E-02	2.26E-08	1.85E-03	2.85E-03	0.00E+00	Sn-126	0.00%	Th-229	0.00%
Ra-226	1.62E-13	1.62E-13	2.55E-11	1.05E-12	1.20E-11	1.62E-13	1.70E-13	3.68E-12	0.00E+00	Ac-227	0.00%	Sb-125	0.00%
Ra-228	3.31E-13	3.33E-13	1.31E-11	1.34E-12	1.18E-11	3.31E-13	3.38E-13	2.33E-12	0.00E+00	Nb-93m	0.00%	U-233	0.00%
Ru-106	1.04E-10	1.04E-10	7.86E-09	1.04E-10	1.04E-10	1.04E-10	1.28E-10	9.75E-10	0.00E+00	Pa-231	0.00%	Th-232	0.00%
Sb-125	3.94E-08	4.55E-08	2.38E-06	7.11E-08	2.99E-07	3.55E-08	1.59E-07	3.61E-07	0.00E+00	Th-230	0.00%	Ni-63	0.00%
Se-79	3.46E-09	3.46E-09	5.00E-08	3.46E-09	3.46E-09	3.46E-09	2.16E-08	1.36E-08	0.00E+00	Nb-94	0.00%	Sm-147	0.00%
Sm-147	0.00E+00	0.00E+00	4.43E-10	1.60E-09	2.00E-08	0.00E+00	1.10E-09	1.17E-09	0.00E+00	Ni-63	0.00%	I-129	0.00%
Sm-151	1.52E-10	5.63E-10	1.23E-05	4.16E-05	5.22E-04	4.99E-11	2.84E-05	3.06E-05	0.00E+00	Th-229	0.00%	Nb-93m	0.00%
Sn-126	1.38E-07	1.37E-07	1.46E-06	5.44E-07	1.14E-06	1.27E-07	1.71E-07	2.61E-07	0.00E+00	Se-79	0.00%	Tc-99	0.00%
Sr-90	1.17E-03	1.17E-03	1.27E+00	1.49E-01	3.23E-01	1.17E-03	2.54E-03	1.56E-01	0.00E+00	C-14	0.00%	C-14	0.00%

Inhalation Doses

Tc-99	7.34E-09	7.34E-09	2.71E-06	7.34E-09	7.34E-09	1.96E-07	1.02E-07	3.65E-07	0.00E+00	Cs-135	0.00%	Nb-94	0.00%
Th-229	7.24E-11	7.24E-11	5.22E-08	3.01E-08	3.75E-07	7.24E-11	1.85E-10	1.52E-08	0.00E+00	Pd-107	0.00%	Cs-135	0.00%
Th-230	1.82E-10	1.82E-10	1.34E-07	7.71E-08	9.63E-07	1.82E-10	4.68E-10	3.92E-08	0.00E+00	Sm-147	0.00%	Se-79	0.00%
Th-232	1.86E-12	1.88E-12	2.29E-09	2.17E-09	2.70E-08	1.81E-12	4.55E-12	1.08E-09	0.00E+00	Th-232	0.00%	Cm-247	0.00%
U-232	1.80E-08	1.81E-08	3.32E-04	9.12E-07	1.44E-05	1.76E-08	6.98E-07	4.00E-05	0.00E+00	Ru-106	0.00%	Fe-55	0.00%
U-233	2.30E-10	2.30E-10	2.75E-06	6.44E-09	1.01E-07	2.30E-10	8.50E-09	3.31E-07	0.00E+00	Cl-36	0.00%	Ru-106	0.00%
U-234	7.57E-08	7.57E-08	9.03E-04	2.11E-06	3.30E-05	7.57E-08	2.80E-06	1.08E-04	0.00E+00	Fe-55	0.00%	Ni-59	0.00%
U-235	6.44E-09	6.47E-09	7.51E-05	1.79E-07	2.75E-06	6.44E-09	2.34E-07	9.03E-06	0.00E+00	Ni-59	0.00%	Cl-36	0.00%
U-236	9.83E-08	9.83E-08	1.17E-03	2.74E-06	4.31E-05	9.83E-08	3.64E-06	1.41E-04	0.00E+00	Cm-247	0.00%	Pd-107	0.00%
U-238	1.14E-07	1.14E-07	1.36E-03	3.37E-06	5.01E-05	1.14E-07	4.21E-06	1.64E-04	0.00E+00	Ra-226	0.00%	Pb-210	0.00%
Zr-93	5.23E-10	1.12E-09	2.09E-06	4.24E-06	5.23E-05	4.17E-10	4.15E-09	2.08E-06	0.00E+00	Ra-228	0.00%	Ra-226	0.00%
										Pb-210	0.00%	Ra-228	0.00%
crud										Kr-85	0.00%	Kr-85	0.00%
Co-60(crud)	2.94E-02	1.14E-01	2.13E+00	1.06E-01	8.34E-02	1.00E-01	2.22E-01	3.65E-01	0.00E+00				
Fe-55(crud)	2.03E-02	1.98E-02	4.12E-02	2.01E-02	2.00E-02	2.11E-02	4.71E-02	2.82E-02	0.00E+00				
total	3.15E+00	1.40E-01	2.02E+01	1.68E+01	2.07E+02	1.28E-01	7.69E+00	1.19E+01	0.00E+00				

Air Submersion Doses

EBWR (U METAL) LEU [64]																			
Other		Intact																	
	Air Submersion Doses [rem]										Isotope % of Dose								
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes	% of Total Skin Dose								
Ac-227	9.71E-18	1.15E-17	8.74E-18	7.62E-18	2.68E-17	9.45E-18	8.24E-18	9.68E-18	8.50E-17	Co-60(crud)	96.77%								
Am-241	1.07E-07	1.34E-07	8.42E-08	6.51E-08	3.59E-07	9.78E-08	7.92E-08	1.02E-07	1.60E-07	Kr-85	2.15%								
Am-242m	7.86E-12	1.24E-11	3.56E-12	3.56E-12	1.64E-11	6.10E-12	4.01E-12	6.56E-12	2.81E-11	Cs-137	0.92%								
Am-243	1.20E-09	1.43E-09	1.05E-09	8.51E-10	4.10E-09	1.15E-09	9.82E-10	1.20E-09	1.51E-09	Sr-90	0.13%								
C-14	9.09E-15	1.24E-14	5.37E-15	4.25E-15	2.48E-14	7.69E-15	5.40E-15	7.86E-15	8.53E-12	Eu-154	0.03%								
Cd-113m	3.59E-12	4.39E-12	2.97E-12	2.51E-12	1.05E-11	3.39E-12	2.82E-12	3.48E-12	4.25E-09	Am-241	0.00%								
Cl-36	1.02E-14	1.21E-14	9.20E-15	8.25E-15	2.56E-14	9.98E-15	8.75E-15	1.02E-14	6.70E-12	Co-60	0.00%								
Cm-242	1.33E-12	2.52E-12	1.92E-13	3.22E-13	1.81E-12	8.36E-13	3.87E-13	9.69E-13	7.31E-12	Cs-134	0.00%								
Cm-243	1.79E-09	2.08E-09	1.71E-09	1.55E-09	4.66E-09	1.79E-09	1.61E-09	1.83E-09	3.04E-09	Eu-155	0.00%								
Cm-244	1.24E-10	2.40E-10	1.27E-11	2.63E-11	1.59E-10	7.55E-11	3.26E-11	8.84E-11	7.04E-10	Sb-125	0.00%								
Cm-245	1.59E-11	1.87E-11	1.49E-11	1.30E-11	4.85E-11	1.58E-11	1.40E-11	1.63E-11	2.20E-11	Cd-113m	0.00%								
Cm-246	5.18E-15	9.95E-15	5.81E-16	1.12E-15	6.78E-15	3.17E-15	1.39E-15	3.70E-15	2.89E-14	Sn-126	0.00%								
Cm-247	3.18E-17	3.64E-17	3.12E-17	2.99E-17	6.12E-17	3.22E-17	2.99E-17	3.25E-17	3.87E-17	Pu-238	0.00%								
Co-60	5.06E-08	5.72E-08	5.10E-08	5.06E-08	7.33E-08	5.23E-08	4.94E-08	5.19E-08	5.97E-08	Cm-243	0.00%								
Cs-134	1.77E-08	2.02E-08	1.77E-08	1.72E-08	2.87E-08	1.81E-08	1.69E-08	1.81E-08	2.26E-08	Am-243	0.00%								
Cs-135	8.09E-15	1.06E-14	5.40E-15	4.31E-15	2.33E-14	7.09E-15	5.27E-15	7.28E-15	1.17E-11	Pm-147	0.00%								
Cs-137	5.17E-05	5.90E-05	5.13E-05	5.00E-05	8.49E-05	5.28E-05	4.91E-05	5.28E-05	8.51E-05	Tc-99	0.00%								
Eu-154	2.14E-06	2.43E-06	2.14E-06	2.09E-06	3.36E-06	2.19E-06	2.05E-06	2.19E-06	2.96E-06	Pu-240	0.00%								
Eu-155	9.26E-09	1.10E-08	8.25E-09	6.88E-09	3.01E-08	8.96E-09	7.70E-09	9.26E-09	1.26E-08	Cm-244	0.00%								
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	I-129	0.00%								
H-3	0.00E+00	0.00E+00	4.67E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-10	0.00E+00	Pu-239	0.00%								
I-129	1.71E-10	2.36E-10	7.58E-11	5.81E-11	3.89E-10	1.37E-10	8.14E-11	1.35E-10	3.89E-10	Pu-241	0.00%								
Kr-85	1.76E-06	2.02E-06	1.72E-06	1.64E-06	3.31E-06	1.78E-06	1.64E-06	1.79E-06	1.99E-04	Nb-94	0.00%								
Nb-93m	3.46E-13	7.16E-13	1.39E-14	6.45E-14	3.78E-13	1.87E-13	7.43E-14	2.43E-13	2.34E-12	Am-242m	0.00%								
Nb-94	7.57E-11	8.60E-11	7.54E-11	7.37E-11	1.19E-10	7.75E-11	7.21E-11	7.73E-11	9.55E-11	Cm-245	0.00%								
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Np-237	0.00%								
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cs-135	0.00%								
Np-237	1.30E-11	1.58E-11	1.13E-11	9.64E-12	4.01E-11	1.25E-11	1.06E-11	1.29E-11	1.93E-11	C-14	0.00%								
Pa-231	1.00E-15	1.16E-15	9.47E-16	8.89E-16	2.13E-15	9.94E-16	9.00E-16	1.01E-15	1.43E-15	Cm-242	0.00%								
Pb-210	6.16E-20	8.14E-20	4.23E-20	3.12E-20	1.94E-19	5.39E-20	4.07E-20	5.61E-20	1.27E-19	U-235	0.00%								
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cl-36	0.00%								
Pm-147	1.36E-12	1.73E-12	9.89E-13	8.09E-13	3.96E-12	1.22E-12	9.55E-13	1.26E-12	1.47E-09	Se-79	0.00%								
Pu-238	5.92E-10	1.15E-09	9.57E-11	1.52E-10	8.39E-10	3.62E-10	1.80E-10	4.40E-10	3.69E-09	Pu-242	0.00%								
Pu-239	7.57E-11	1.18E-10	4.15E-11	4.18E-11	1.48E-10	6.07E-11	4.48E-11	6.64E-11	2.91E-10	Ru-106	0.00%								
Pu-240	1.72E-10	3.33E-10	2.95E-11	4.47E-11	2.51E-10	1.06E-10	5.30E-11	1.29E-10	1.06E-09	Nb-93m	0.00%								
Pu-241	1.08E-10	1.30E-10	9.75E-11	8.47E-11	3.30E-10	1.05E-10	9.16E-11	1.09E-10	1.76E-10	Sm-151	0.00%								
Pu-242	4.12E-13	7.95E-13	7.48E-14	1.10E-13	6.10E-13	2.56E-13	1.30E-13	3.10E-13	2.52E-12	U-238	0.00%								
Ra-226	1.47E-18	1.69E-18	1.40E-18	1.29E-18	3.78E-18	1.47E-18	1.33E-18	1.50E-18	2.28E-18	U-236	0.00%								
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-234	0.00%								
Ru-106	2.29E-13	2.63E-13	2.29E-13	2.21E-13	3.90E-13	2.34E-13	2.19E-13	2.36E-13	2.47E-12	U-232	0.00%								
Sb-125	6.51E-09	7.46E-09	6.41E-09	6.15E-09	1.16E-08	6.61E-09	6.12E-09	6.64E-09	8.71E-09	Cm-246	0.00%								
Se-79	5.31E-15	7.15E-15	3.23E-15	2.56E-15	1.47E-14	4.53E-15	3.21E-15	4.64E-15	5.68E-12	Pa-231	0.00%								
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-233	0.00%								
Sm-151	5.90E-13	9.99E-13	8.04E-14	1.28E-13	8.05E-13	4.06E-13	1.69E-13	4.10E-13	2.16E-12	Th-229	0.00%								
Sn-126	2.19E-09	2.51E-09	2.17E-09	2.10E-09	3.81E-09	2.24E-09	2.08E-09	2.24E-09	3.80E-09	Ac-227	0.00%								
Sr-90	1.04E-08	1.26E-08	8.58E-09	7.25E-09	3.04E-08	9.77E-09	8.14E-09	1.00E-08	1.23E-05	Th-230	0.00%								
Tc-99	8.48E-13	1.07E-12	6.29E-13	5.12E-13	2.52E-12	7.65E-13	6.04E-13	7.90E-13	1.34E-09	Cm-247	0.00%								
Th-229	2.97E-16	3.48E-16	2.76E-16	2.39E-16	9.05E-16	2.91E-16	2.57E-16	3.02E-16	4.26E-16	Ra-226	0.00%								
Th-230	2.41E-17	3.19E-17	1.91E-17	1.63E-17	7.08E-17	2.18E-17	1.83E-17	2.33E-17	6.04E-17	Th-232	0.00%								
Th-232	6.83E-20	9.94E-20	4.66E-20	4.04E-20	1.90E-19	5.78E-20	4.64E-20	6.38E-20	2.52E-19	Pb-210	0.00%								
U-232	1.05E-14	1.56E-14	6.64E-15	6.06E-15	2.60E-14	8.70E-15	6.74E-15	9.58E-15	3.99E-14	Fe-55	0.00%								
U-233	4.59E-16	6.03E-16	3.67E-16	3.37E-16	1.12E-15	4.21E-16	3.56E-16	4.43E-16	1.24E-15	Fe-55(crud)	0.00%								
U-234	7.99E-14	1.31E-13	3.98E-14	3.82E-14	1.81E-13	6.08E-14	4.37E-14	6.94E-14	3.87E-13	H-3	0.00%								
U-235	5.76E-12	6.62E-12	5.51E-12	5.02E-12	1.50E-11	5.76E-12	5.20E-12	5.88E-12	7.06E-12	Ni-59	0.00%								
U-236	7.60E-14	1.37E-13	2.72E-14	2.90E-14	1.48E-13	5.22E-14	3.36E-14	6.24E-14	4.45E-13	Ni-63	0.00%								
U-238	6.76E-14	1.31E-13	1.53E-14	1.91E-14	1.14E-13	4.19E-14	2.32E-14	5.25E-14	4.48E-13	Pd-107	0.00%								
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ra-228	0.00%								
										Sm-147	0.00%								
crud										Zr-93	0.00%								
Co-60(crud)	7.60E-03	8.59E-03	7.67E-03	7.60E-03	1.10E-02	7.85E-03	7.42E-03	7.79E-03	8.96E-03										
Fe-55(crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00										
total	7.66E-03	8.66E-03	7.72E-03	7.66E-03	1.11E-02	7.91E-03	7.47E-03	7.85E-03	9.26E-03										

EBWR (U METAL) LEU [64]

Other

Intact

	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	3.15E+00		7.66E-03			
Breast	1.40E-01		8.66E-03			
Lung	2.02E+01		7.72E-03			
R Marrow	1.68E+01		7.66E-03			
B Surface	2.07E+02	<CDE	1.11E-02			
Thyroid	1.28E-01		7.91E-03			
Remainder	7.69E+00		7.47E-03			
Whole Body	1.19E+01	<CEDE	7.85E-03	<DDE	1.20E+01	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	9.26E-03	<SKIN	9.26E-03	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					2.07E+02	<CDE + DDE

EBWR (U METAL) LEU [64]

Other

Isotope	Material Type	Offsite Doses[rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	1.56E-07	2.77E-06
Am-241	P	4.99E+00	9.03E+01
Am-242m	P	7.92E-03	1.46E-01
Am-243	P	2.17E-02	3.97E-01
C-14	P	6.59E-09	6.59E-09
Cd-113m	P	6.89E-05	5.54E-06
Cl-36	P	9.00E-10	7.65E-11
Cm-242	P	2.65E-04	2.76E-03
Cm-243	P	8.59E-03	1.52E-01
Cm-244	P	4.02E-01	7.02E+00
Cm-245	P	1.68E-04	3.06E-03
Cm-246	P	3.37E-05	6.13E-04
Cm-247	P	8.07E-11	1.47E-09
Co-60	P	8.15E-06	1.90E-06
Cs-134	C	1.02E-06	8.96E-07
Cs-135	C	5.28E-09	5.15E-09
Cs-137	C	5.62E-03	5.18E-03
Eu-154	P	9.21E-04	6.22E-03
Eu-155	P	1.39E-05	1.88E-04
Fe-55	P	8.23E-10	5.83E-10
H-3	G	9.79E-06	9.79E-06
I-129	G	5.53E-06	1.64E-08
Kr-85	G	1.79E-06	1.79E-06
Nb-93m	P	1.44E-07	1.35E-08
Nb-94	P	3.75E-08	6.66E-09
Ni-59	P	9.27E-11	9.09E-11
Ni-63	P	2.40E-08	2.35E-08
Np-237	P	6.09E-04	1.36E-02
Pa-231	P	6.76E-08	1.69E-06
Pb-210	P	1.22E-12	1.81E-11
Pd-107	P	4.77E-09	1.88E-11
Pm-147	P	6.41E-06	6.16E-05
Pu-238	P	3.19E+00	5.71E+01
Pu-239	P	6.05E-01	1.10E+01
Pu-240	P	1.05E+00	1.90E+01
Pu-241	P	1.12E+00	2.10E+01
Pu-242	P	2.85E-03	5.17E-02
Ra-226	P	3.68E-12	1.20E-11
Ra-228	P	2.33E-12	1.18E-11
Ru-106	P	9.75E-10	1.04E-10
Sb-125	P	3.68E-07	3.06E-07
Se-79	P	1.36E-08	3.46E-09
Sm-147	P	1.17E-09	2.00E-08
Sm-151	P	3.06E-05	5.22E-04
Sn-126	P	2.63E-07	1.15E-06
Sr-90	P	1.56E-01	3.23E-01
Tc-99	P	3.65E-07	7.34E-09
Th-229	P	1.52E-08	3.75E-07
Th-230	P	3.92E-08	9.63E-07
Th-232	P	1.08E-09	2.70E-08
U-232	P	4.00E-05	1.44E-05
U-233	P	3.31E-07	1.01E-07
U-234	P	1.08E-04	3.30E-05
U-235	P	9.03E-06	2.75E-06
U-236	P	1.41E-04	4.31E-05
U-238	P	1.64E-04	5.01E-05
Zr-93	P	2.08E-06	5.23E-05
Co-60(crud)	crud	3.73E-01	9.12E-02
Fe-55(crud)	crud	2.82E-02	2.00E-02
total		1.20E+01	2.07E+02

	Evaluated Fuel						x	Evaluated Fuel
	Fuel Type	Stable Metal	Stable Metal	Non-Metal	Non-Metal	Other	Other	Other
	Condition	Intact	Not Intact	Intact	Not Intact	Intact	Not Intact	Not Intact
				SHIPPINGPORT		EBWR (U		
	Fuel Name	HWCTR	ALUM CLAD	PWR CORE II	SAXTON	METAL) LEU	N REACTOR	N REACTOR [147]
	# of canisters	(U/TH) [112]	SNF [411]	[193]	(MOX) [787]	[64]	[147]	
		0.17	1.00	24.00	1.00	10.50	194.95	194.95
Isotope	Material Type	Curies (entire fuel inventory)						Curies
Ac-227	P	9.27E-09	2.81E-07	1.24E-02	1.33E-05	3.38E-05	1.03E-02	1.03E-02
Am-241	P	1.22E-01	2.51E+01	7.61E+04	6.45E+03	1.63E+04	2.80E+05	2.80E+05
Am-242m	P	8.67E-05	9.69E-03	1.18E+02	1.07E+01	2.71E+01	7.96E+00	7.96E+00
Am-243	P	2.85E-04	2.40E-02	3.38E+02	2.83E+01	7.18E+01	4.10E+01	4.10E+01
C-14	P	1.09E-06	1.17E-05	1.53E+00	1.81E+00	4.59E+00	3.63E+02	3.63E+02
Cd-113m	P	6.32E-02	7.25E-01	0.00E+00	2.59E+01	6.56E+01	0.00E+00	0.00E+00
Cl-36	P	2.51E-30	0.00E+00	0.00E+00	2.35E-02	5.96E-02	0.00E+00	0.00E+00
Cm-242	P	2.62E-04	8.00E-03	0.00E+00	8.79E+00	2.23E+01	0.00E+00	0.00E+00
Cm-243	P	4.52E-05	3.29E-03	0.00E+00	1.60E+01	4.06E+01	0.00E+00	0.00E+00
Cm-244	P	9.94E-03	4.27E-01	3.16E+04	9.29E+02	2.36E+03	2.44E+03	2.44E+03
Cm-245	P	5.84E-07	1.33E-05	5.82E+00	2.12E-01	5.37E-01	5.13E-01	5.13E-01
Cm-246	P	3.99E-08	9.83E-07	9.89E-01	4.28E-02	1.08E-01	6.79E-02	6.79E-02
Cm-247	P	4.17E-14	0.00E+00	0.00E+00	1.12E-07	2.83E-07	0.00E+00	0.00E+00
Co-60	P	7.30E-03	1.81E-09	1.10E+04	2.12E+01	5.38E+01	4.75E+02	4.75E+02
Cs-134	C	9.30E+01	2.05E+02	3.63E+03	1.24E+01	3.13E+01	1.63E+02	1.63E+02
Cs-135	C	6.58E-04	1.24E-02	6.19E+00	6.65E-01	1.69E+00	4.00E+01	4.00E+01
Cs-137	C	5.49E+02	8.60E+03	2.07E+06	1.00E+05	2.53E+05	5.34E+06	5.34E+06
Eu-154	P	1.57E+01	9.08E+01	0.00E+00	1.84E+03	4.67E+03	0.00E+00	0.00E+00
Eu-155	P	7.47E+00	2.81E+01	0.00E+00	1.92E+02	4.86E+02	0.00E+00	0.00E+00
Fe-55	P	1.29E+00	0.00E+00	0.00E+00	1.76E-01	4.45E-01	0.00E+00	0.00E+00
H-3	G	2.02E+00	2.61E+01	5.09E+03	2.92E+02	7.41E+02	1.03E+04	1.03E+04
I-129	G	1.44E-04	2.54E-03	7.20E-01	6.09E-02	1.54E-01	3.29E+00	3.29E+00
Kr-85	G	5.46E+01	6.45E+02	5.07E+04	2.59E+03	6.56E+03	1.53E+05	1.53E+05
Nb-93m	P	2.82E-03	4.96E-02	5.72E+01	2.82E+00	7.15E+00	4.54E+02	4.54E+02
Nb-94	P	1.37E-07	4.96E-06	0.00E+00	5.18E-02	1.31E-01	6.71E-05	6.71E-05
Ni-59	P	2.43E-04	0.00E+00	0.00E+00	4.01E-02	1.02E-01	2.03E+01	2.03E+01
Ni-63	P	3.69E-02	0.00E+00	8.04E+04	4.42E+00	1.12E+01	2.21E+03	2.21E+03
Np-237	P	1.82E-03	1.20E-02	7.06E+00	6.46E-01	1.64E+00	3.87E+01	3.87E+01
Pa-231	P	9.79E-08	1.88E-06	1.15E-02	3.02E-05	7.65E-05	1.38E-02	1.38E-02
Pb-210	P	1.04E-10	1.44E-11	2.71E-06	5.13E-08	1.30E-07	7.52E-08	7.52E-08
Pd-107	P	9.52E-05	2.35E-03	1.95E+00	2.14E-01	5.42E-01	7.46E+00	7.46E+00
Pm-147	P	4.86E+02	2.47E+03	0.00E+00	9.36E+01	2.37E+02	0.00E+00	0.00E+00
Pu-238	P	7.65E+02	2.20E+01	8.02E+04	5.66E+02	1.18E+04	6.37E+04	6.37E+04
Pu-239	P	1.59E+01	1.49E+01	7.55E+03	9.81E+01	2.05E+03	1.23E+05	1.23E+05
Pu-240	P	9.08E+00	1.07E+01	1.13E+04	1.70E+02	3.54E+03	7.18E+04	7.18E+04
Pu-241	P	2.56E+03	1.22E+03	1.57E+06	9.43E+03	1.97E+05	2.06E+06	2.06E+06
Pu-242	P	1.35E-02	1.04E-02	3.73E+01	4.84E-01	1.01E+01	3.46E+01	3.46E+01
Ra-226	P	1.93E-09	1.53E-10	6.13E-06	2.46E-07	6.22E-07	1.15E-03	1.15E-03
Ra-228	P	1.74E-13	8.44E-12	5.85E-02	2.80E-07	7.11E-07	1.03E-06	1.03E-06
Ru-106	P	3.64E+01	2.97E+01	1.42E+01	1.17E-03	2.97E-03	3.16E-01	3.16E-01
Sb-125	P	1.20E+01	0.00E+00	0.00E+00	1.70E+01	4.30E+01	0.00E+00	0.00E+00
Se-79	P	2.47E-03	6.93E-02	7.69E+00	7.90E-01	2.00E+00	4.48E+01	4.48E+01
Sm-147	P	3.48E-08	8.28E-07	0.00E+00	9.01E-06	2.28E-05	0.00E+00	0.00E+00
Sm-151	P	2.16E+00	2.67E+01	2.58E+04	5.86E+02	1.48E+03	8.55E+04	8.55E+04
Sn-126	P	2.21E-03	2.72E-02	9.72E+00	1.50E+00	3.80E+00	7.83E+01	7.83E+01
Sr-90	P	5.25E+02	8.16E+03	1.56E+06	6.87E+04	1.74E+05	4.03E+06	4.03E+06
Tc-99	P	8.07E-02	1.44E+00	2.67E+02	2.51E+01	6.37E+01	1.51E+03	1.51E+03
Th-229	P	3.77E-08	8.09E-10	1.57E-02	4.93E-07	1.03E-05	9.31E-06	9.31E-06
Th-230	P	3.27E-04	7.96E-08	1.08E-03	8.39E-06	1.75E-04	1.02E-03	1.02E-03
Th-232	P	1.49E-10	1.99E-11	5.56E-03	4.58E-08	9.56E-07	1.21E-07	1.21E-07
U-232	P	4.47E-03	1.11E-04	0.00E+00	4.23E-03	8.82E-02	0.00E+00	0.00E+00
U-233	P	6.56E-05	1.18E-06	6.07E+00	1.70E-04	3.55E-03	5.71E-03	5.71E-03
U-234	P	6.83E+00	1.17E-03	5.82E+00	5.70E-02	1.19E+00	4.85E+02	4.85E+02
U-235	P	1.34E-01	8.48E-03	6.58E-01	5.12E-03	1.07E-01	1.85E+01	1.85E+01
U-236	P	5.77E-01	3.95E-02	5.50E+00	7.81E-02	1.63E+00	7.02E+01	7.02E+01
U-238	P	2.22E-03	1.04E-02	5.15E+00	9.65E-02	2.01E+00	3.82E+02	3.82E+02
Zr-93	P	1.27E-02	1.40E-01	3.61E+01	3.72E+00	9.42E+00	2.10E+02	2.10E+02
crud (per canister)								
Co-60(crud)		1.56E+01	6.37E+00	2.68E+02	1.23E+02	7.70E+02	1.76E+03	1.76E+03
Fe-55(crud)		9.85E+01	4.01E+01	1.69E+03	7.73E+02	4.85E+03	1.11E+04	1.11E+04

Release Fractions				
Material Type	ARF	RF	Total Release Fraction	HEPA Filter LPF
stable metal/ intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.00E-04	4.00E-03	8.00E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
stable metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
non-metal/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	2.25E-04	1.00E+00	2.25E-04	1.00E+00
C	2.25E-04	1.00E+00	2.25E-04	1.00E+00
non-metal/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
other/intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	1.00E-03	1.00E+00	1.00E-03	1.00E+00
C	1.00E-03	1.00E+00	1.00E-03	1.00E+00
other/not intact				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud				
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
N REACTOR [147]				
Other				
Not Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	5.00E-03	4.00E-01	2.00E-03	1.00E+00
C	5.00E-03	1.00E+00	5.00E-03	1.00E+00
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Breathing Rate	3.33E-04	[m ³ /s]		
Ground Level Dispersion Factor				
distance [m]	x/Q [sec/m ³]			
11000	2.17E-05	99.5% worst-sector		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
N REACTOR [147]							
Other							
Not Intact							
Isotope	Curies (entire fuel inventory)	$f_{inv} = 1/n_{Can}$	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	1.03E-02	5.13E-03	5.00E-03	4.00E-01	1.00E+00	2.65E-07	1.06E-07
Am-241	2.80E+05	5.13E-03	5.00E-03	4.00E-01	1.00E+00	7.19E+00	2.88E+00
Am-242m	7.96E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	2.04E-04	8.17E-05
Am-243	4.10E+01	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.05E-03	4.21E-04
C-14	3.63E+02	5.13E-03	5.00E-03	4.00E-01	1.00E+00	9.31E-03	3.73E-03
Cd-113m	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Cl-36	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Cm-242	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Cm-243	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Cm-244	2.44E+03	5.13E-03	5.00E-03	4.00E-01	1.00E+00	6.25E-02	2.50E-02
Cm-245	5.13E-01	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.31E-05	5.26E-06
Cm-246	6.79E-02	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.74E-06	6.97E-07
Cm-247	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Co-60	4.75E+02	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.22E-02	4.87E-03
Cs-134	1.63E+02	5.13E-03	5.00E-03	1.00E+00	1.00E+00	4.19E-03	4.19E-03
Cs-135	4.00E+01	5.13E-03	5.00E-03	1.00E+00	1.00E+00	1.03E-03	1.03E-03
Cs-137	5.34E+06	5.13E-03	5.00E-03	1.00E+00	1.00E+00	1.37E+02	1.37E+02
Eu-154	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Eu-155	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Fe-55	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
H-3	1.03E+04	5.13E-03	3.00E-01	1.00E+00	1.00E+00	1.59E+01	1.59E+01
I-129	3.29E+00	5.13E-03	3.00E-01	1.00E+00	1.00E+00	5.06E-03	5.06E-03
Kr-85	1.53E+05	5.13E-03	3.00E-01	1.00E+00	1.00E+00	2.35E+02	2.35E+02
Nb-93m	4.54E+02	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.16E-02	4.66E-03
Nb-94	6.71E-05	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.72E-09	6.89E-10
Ni-59	2.03E+01	5.13E-03	5.00E-03	4.00E-01	1.00E+00	5.22E-04	2.09E-04
Ni-63	2.21E+03	5.13E-03	5.00E-03	4.00E-01	1.00E+00	5.66E-02	2.26E-02
Np-237	3.87E+01	5.13E-03	5.00E-03	4.00E-01	1.00E+00	9.93E-04	3.97E-04
Pa-231	1.38E-02	5.13E-03	5.00E-03	4.00E-01	1.00E+00	3.54E-07	1.41E-07
Pb-210	7.52E-08	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.93E-12	7.71E-13
Pd-107	7.46E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.91E-04	7.65E-05
Pm-147	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Pu-238	6.37E+04	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.63E+00	6.53E-01
Pu-239	1.23E+05	5.13E-03	5.00E-03	4.00E-01	1.00E+00	3.15E+00	1.26E+00
Pu-240	7.18E+04	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.84E+00	7.37E-01
Pu-241	2.06E+06	5.13E-03	5.00E-03	4.00E-01	1.00E+00	5.28E+01	2.11E+01
Pu-242	3.46E+01	5.13E-03	5.00E-03	4.00E-01	1.00E+00	8.87E-04	3.55E-04
Ra-226	1.15E-03	5.13E-03	5.00E-03	4.00E-01	1.00E+00	2.95E-08	1.18E-08
Ra-228	1.03E-06	5.13E-03	5.00E-03	4.00E-01	1.00E+00	2.63E-11	1.05E-11
Ru-106	3.16E-01	5.13E-03	5.00E-03	4.00E-01	1.00E+00	8.11E-06	3.24E-06
Sb-125	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Se-79	4.48E+01	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.15E-03	4.60E-04
Sm-147	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
Sm-151	8.55E+04	5.13E-03	5.00E-03	4.00E-01	1.00E+00	2.19E+00	8.77E-01
Sn-126	7.83E+01	5.13E-03	5.00E-03	4.00E-01	1.00E+00	2.01E-03	8.03E-04
Sr-90	4.03E+06	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.03E+02	4.14E+01
Tc-99	1.51E+03	5.13E-03	5.00E-03	4.00E-01	1.00E+00	3.86E-02	1.54E-02
Th-229	9.31E-06	5.13E-03	5.00E-03	4.00E-01	1.00E+00	2.39E-10	9.55E-11
Th-230	1.02E-03	5.13E-03	5.00E-03	4.00E-01	1.00E+00	2.62E-08	1.05E-08
Th-232	1.21E-07	5.13E-03	5.00E-03	4.00E-01	1.00E+00	3.09E-12	1.24E-12
U-232	0.00E+00	5.13E-03	5.00E-03	4.00E-01	1.00E+00	0.00E+00	0.00E+00
U-233	5.71E-03	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.46E-07	5.86E-08
U-234	4.85E+02	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.24E-02	4.98E-03
U-235	1.85E+01	5.13E-03	5.00E-03	4.00E-01	1.00E+00	4.75E-04	1.90E-04
U-236	7.02E+01	5.13E-03	5.00E-03	4.00E-01	1.00E+00	1.80E-03	7.20E-04
U-238	3.82E+02	5.13E-03	5.00E-03	4.00E-01	1.00E+00	9.79E-03	3.91E-03
Zr-93	2.10E+02	5.13E-03	5.00E-03	4.00E-01	1.00E+00	5.39E-03	2.16E-03
crud (per canister)							
Co-60(crud)	1.76E+03	1	1.00E+00	3.00E-01	1.00E+00	1.76E+03	5.28E+02
Fe-55(crud)	1.11E+04	1	1.00E+00	3.00E-01	1.00E+00	1.11E+04	3.33E+03

N REACTOR [147]													
Other	Not Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE Bone Surface)
Ac-227	1.12E-06	1.89E-10	4.36E-06	7.28E-06	9.09E-05	1.02E-10	4.16E-06	5.12E-06	0.00E+00	Am-241	46.35%	Am-241	49.31%
Am-241	2.50E+00	2.05E-04	1.42E+00	1.34E+01	1.67E+02	1.23E-04	6.01E+00	9.23E+00	0.00E+00	Pu-239	19.65%	Pu-239	21.03%
Am-242m	7.01E-05	3.01E-09	9.18E-06	3.69E-04	4.63E-03	1.23E-09	1.63E-04	2.51E-04	0.00E+00	Pu-240	11.48%	Pu-240	12.28%
Am-243	3.67E-04	1.71E-07	2.00E-04	1.95E-03	2.44E-02	9.33E-08	8.71E-04	1.34E-03	0.00E+00	Pu-238	9.30%	Pu-238	9.80%
C-14	5.62E-08	5.62E-08	5.62E-08	5.62E-08	5.62E-08	5.62E-08	5.62E-08	5.62E-08	0.00E+00	Pu-241	6.32%	Pu-241	7.00%
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60(crud)	4.19%	Sr-90	0.24%
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sr-90	1.95%	Cm-244	0.23%
Cm-242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Fe-55(crud)	0.32%	Co-60(crud)	0.06%
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-244	0.22%	Fe-55(crud)	0.01%
Cm-244	1.06E-02	6.95E-07	1.29E-02	6.27E-02	7.82E-01	6.75E-07	3.19E-02	4.48E-02	0.00E+00	Cs-137	0.16%	Np-237	0.01%
Cm-245	4.74E-06	9.41E-10	2.53E-06	2.52E-05	3.15E-04	5.17E-10	1.12E-05	1.73E-05	0.00E+00	U-234	0.02%	Cs-137	0.01%
Cm-246	6.22E-07	7.45E-11	3.39E-07	3.32E-06	4.14E-05	4.21E-11	1.48E-06	2.27E-06	0.00E+00	U-238	0.02%	Am-243	0.01%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Np-237	0.01%	Pu-242	0.01%
Co-60	6.20E-07	2.40E-06	4.49E-05	2.24E-06	1.76E-06	2.11E-06	4.69E-06	7.69E-06	0.00E+00	Am-243	0.01%	Am-242m	0.00%
Cs-134	1.45E-06	1.21E-06	1.32E-06	1.32E-06	1.23E-06	1.24E-06	1.56E-06	1.40E-06	0.00E+00	Pu-242	0.01%	Sm-151	0.00%
Cs-135	3.29E-08	3.29E-08	3.87E-08	3.29E-08	3.29E-08	3.29E-08	3.29E-08	3.37E-08	0.00E+00	U-236	0.00%	U-234	0.00%
Cs-137	3.21E-02	2.87E-02	3.23E-02	3.04E-02	2.91E-02	2.91E-02	3.34E-02	3.16E-02	0.00E+00	Am-242m	0.00%	U-238	0.00%
Eu-154	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-151	0.00%	Cm-245	0.00%
Eu-155	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-235	0.00%	U-236	0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-245	0.00%	Zr-93	0.00%
H-3	7.35E-06	7.35E-06	7.35E-06	7.35E-06	7.35E-06	7.35E-06	7.35E-06	7.35E-06	0.00E+00	Co-60	0.00%	Ac-227	0.00%
I-129	1.18E-08	2.83E-08	4.25E-08	1.89E-08	1.87E-08	2.11E-04	1.60E-08	6.34E-06	0.00E+00	H-3	0.00%	U-235	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	I-129	0.00%	Cm-246	0.00%
Nb-93m	5.18E-08	5.43E-09	8.03E-06	3.55E-08	9.25E-08	3.79E-09	4.92E-08	9.84E-07	0.00E+00	Ac-227	0.00%	Pa-231	0.00%
Nb-94	8.76E-14	4.12E-13	1.38E-11	4.16E-13	3.63E-13	4.09E-13	8.19E-13	2.06E-12	0.00E+00	Zr-93	0.00%	H-3	0.00%
Ni-59	2.00E-09	1.93E-09	6.70E-09	1.98E-09	1.96E-09	2.10E-09	2.03E-09	2.00E-09	0.00E+00	Cm-246	0.00%	Sn-126	0.00%
Ni-63	4.98E-07	4.98E-07	1.86E-06	4.98E-07	4.98E-07	4.98E-07	5.20E-07	5.08E-07	0.00E+00	Cs-134	0.00%	Co-60	0.00%
Np-237	3.14E-04	1.80E-07	1.71E-04	2.78E-03	3.47E-02	1.42E-07	2.49E-04	1.55E-03	0.00E+00	Pa-231	0.00%	Cs-134	0.00%
Pa-231	2.61E-11	3.33E-11	2.83E-06	2.64E-06	3.29E-05	2.89E-11	1.09E-09	1.31E-06	0.00E+00	Nb-93m	0.00%	Th-230	0.00%
Pb-210	6.56E-15	6.56E-15	6.56E-15	7.73E-14	1.13E-12	6.56E-15	9.67E-14	7.57E-14	0.00E+00	Tc-99	0.00%	Ni-63	0.00%
Pd-107	1.93E-12	1.93E-12	5.83E-08	1.05E-11	2.78E-11	1.93E-12	4.40E-10	7.06E-09	0.00E+00	Sn-126	0.00%	Nb-93m	0.00%
Pm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ni-63	0.00%	C-14	0.00%
Pu-238	4.89E-01	1.75E-05	5.59E+00	2.65E+00	3.32E+01	1.68E-05	1.23E+00	1.85E+00	0.00E+00	U-233	0.00%	Th-229	0.00%
Pu-239	1.07E+00	3.11E-05	1.09E+01	5.70E+00	7.12E+01	3.05E-05	2.55E+00	3.91E+00	0.00E+00	C-14	0.00%	Cs-135	0.00%
Pu-240	6.27E-01	1.87E-05	6.36E+00	3.33E+00	4.16E+01	1.78E-05	1.49E+00	2.29E+00	0.00E+00	Cs-135	0.00%	Tc-99	0.00%
Pu-241	3.85E-01	1.73E-05	1.79E+00	1.90E+00	2.37E+01	7.00E-06	7.39E-01	1.26E+00	0.00E+00	Se-79	0.00%	I-129	0.00%
Pu-242	2.87E-04	8.97E-09	2.91E-03	1.53E-03	1.91E-02	8.34E-09	6.81E-04	1.05E-03	0.00E+00	Th-230	0.00%	U-233	0.00%
Ra-226	3.22E-11	3.22E-11	5.08E-09	2.09E-10	2.39E-09	3.22E-11	3.37E-11	7.31E-10	0.00E+00	Ru-106	0.00%	Se-79	0.00%
Ra-228	5.15E-14	5.18E-14	2.03E-12	2.08E-13	1.83E-12	5.15E-14	5.26E-14	3.63E-13	0.00E+00	Pd-107	0.00%	Ra-226	0.00%
Ru-106	1.20E-09	1.19E-09	9.02E-08	1.19E-09	1.19E-09	1.19E-09	1.47E-09	1.12E-08	0.00E+00	Ni-59	0.00%	Ni-59	0.00%
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-229	0.00%	Ru-106	0.00%
Se-79	8.35E-09	8.35E-09	1.21E-07	8.35E-09	8.35E-09	8.35E-09	5.21E-08	3.27E-08	0.00E+00	Ra-226	0.00%	Th-232	0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-232	0.00%	Pd-107	0.00%
Sm-151	9.45E-10	3.49E-09	7.65E-05	2.58E-04	3.24E-03	3.10E-10	1.76E-04	1.90E-04	0.00E+00	Nb-94	0.00%	Ra-228	0.00%
Sn-126	3.07E-07	3.03E-07	3.24E-06	1.21E-06	2.53E-06	2.81E-07	3.78E-07	5.78E-07	0.00E+00	Ra-228	0.00%	Pb-210	0.00%
Sr-90	2.92E-03	2.92E-03	3.16E+00	3.72E-01	8.04E-01	2.92E-03	6.34E-03	3.88E-01	0.00E+00	Pb-210	0.00%	Nb-94	0.00%

Inhalation Doses

Tc-99	1.87E-08	1.87E-08	6.90E-06	1.87E-08	1.87E-08	5.00E-07	2.59E-07	9.29E-07	0.00E+00	Cd-113m	0.00%	Cd-113m	0.00%
Th-229	7.05E-12	7.05E-12	5.08E-09	2.94E-09	3.65E-08	7.05E-12	1.80E-11	1.48E-09	0.00E+00	Cl-36	0.00%	Cl-36	0.00%
Th-230	1.14E-10	1.14E-10	8.40E-08	4.84E-08	6.05E-07	1.14E-10	2.94E-10	2.46E-08	0.00E+00	Cm-242	0.00%	Cm-242	0.00%
Th-232	2.52E-14	2.56E-14	3.11E-11	2.96E-11	3.67E-10	2.46E-14	6.19E-14	1.47E-11	0.00E+00	Cm-243	0.00%	Cm-243	0.00%
U-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-247	0.00%	Cm-247	0.00%
U-233	3.98E-11	3.98E-11	4.76E-07	1.12E-09	1.75E-08	3.98E-11	1.47E-09	5.73E-08	0.00E+00	Eu-154	0.00%	Eu-154	0.00%
U-234	3.33E-06	3.33E-06	3.96E-02	9.29E-05	1.45E-03	3.33E-06	1.23E-04	4.76E-03	0.00E+00	Eu-155	0.00%	Eu-155	0.00%
U-235	1.20E-07	1.21E-07	1.40E-03	3.34E-06	5.13E-05	1.20E-07	4.36E-06	1.68E-04	0.00E+00	Fe-55	0.00%	Fe-55	0.00%
U-236	4.56E-07	4.56E-07	5.43E-03	1.27E-05	2.00E-04	4.56E-07	1.69E-05	6.53E-04	0.00E+00	Kr-85	0.00%	Kr-85	0.00%
U-238	2.33E-06	2.33E-06	2.78E-02	6.89E-05	1.02E-03	2.32E-06	8.60E-05	3.35E-03	0.00E+00	Pm-147	0.00%	Pm-147	0.00%
Zr-93	1.26E-09	2.70E-09	5.03E-06	1.02E-05	1.26E-04	1.00E-09	9.98E-09	5.00E-06	0.00E+00	Sb-125	0.00%	Sb-125	0.00%
										Sm-147	0.00%	Sm-147	0.00%
crud										U-232	0.00%	U-232	0.00%
Co-60(crud)	6.72E-02	2.60E-01	4.87E+00	2.43E-01	1.91E-01	2.29E-01	5.08E-01	8.34E-01	0.00E+00				
Fe-55(crud)	4.66E-02	4.53E-02	9.44E-02	4.60E-02	4.58E-02	4.83E-02	1.08E-01	6.46E-02	0.00E+00				
total	5.23E+00	3.37E-01	3.43E+01	2.77E+01	3.38E+02	3.09E-01	1.27E+01	1.99E+01	0.00E+00				

Air Submersion Doses

N REACTOR [147]												
Other		Not Intact										
	Air Submersion Doses [rem]										Isotope % of Dose	
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes	% of Total Skin Dose	
Ac-227	7.97E-16	9.46E-16	7.18E-16	6.25E-16	2.20E-15	7.76E-16	6.76E-16	7.95E-16	6.98E-15	Co-60(crud)	96.20%	
Am-241	4.95E-07	6.18E-07	3.89E-07	3.01E-07	1.66E-06	4.52E-07	3.66E-07	4.72E-07	7.39E-07	Cs-137	2.27%	
Am-242m	6.23E-13	9.86E-13	2.82E-13	2.82E-13	1.30E-12	4.84E-13	3.18E-13	5.20E-13	2.23E-12	Kr-85	1.17%	
Am-243	1.85E-10	2.21E-10	1.62E-10	1.31E-10	6.31E-10	1.77E-10	1.51E-10	1.84E-10	2.32E-10	Sr-90	0.36%	
C-14	1.94E-13	2.63E-13	1.14E-13	9.05E-14	5.28E-13	1.64E-13	1.15E-13	1.68E-13	1.82E-10	Am-241	0.00%	
Cd-113m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60	0.00%	
Cl-36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cs-134	0.00%	
Cm-242	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sn-126	0.00%	
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Tc-99	0.00%	
Cm-244	3.46E-11	6.67E-11	3.55E-12	7.33E-12	4.43E-11	2.10E-11	9.08E-12	2.46E-11	1.96E-10	Pu-240	0.00%	
Cm-245	4.10E-12	4.80E-12	3.83E-12	3.35E-12	1.25E-11	4.05E-12	3.59E-12	4.18E-12	5.66E-12	Pu-238	0.00%	
Cm-246	8.73E-16	1.68E-15	9.79E-17	1.89E-16	1.14E-15	5.34E-16	2.34E-16	6.24E-16	4.88E-15	Pu-239	0.00%	
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-241	0.00%	
Co-60	1.20E-07	1.36E-07	1.21E-07	1.20E-07	1.74E-07	1.24E-07	1.17E-07	1.23E-07	1.42E-07	I-129	0.00%	
Cs-134	2.49E-08	2.83E-08	2.48E-08	2.42E-08	4.03E-08	2.54E-08	2.37E-08	2.54E-08	3.18E-08	U-235	0.00%	
Cs-135	5.17E-14	6.78E-14	3.45E-14	2.75E-14	1.49E-13	4.53E-14	3.37E-14	4.65E-14	7.46E-11	Am-243	0.00%	
Cs-137	2.94E-04	3.35E-04	2.92E-04	2.84E-04	4.82E-04	3.00E-04	2.79E-04	3.00E-04	4.83E-04	Cm-244	0.00%	
Eu-154	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	C-14	0.00%	
Eu-155	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Np-237	0.00%	
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cs-135	0.00%	
H-3	0.00E+00	0.00E+00	3.51E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.22E-10	0.00E+00	Ru-106	0.00%	
I-129	1.96E-10	2.70E-10	8.69E-11	6.66E-11	4.47E-10	1.57E-10	9.34E-11	1.54E-10	4.47E-10	U-234	0.00%	
Kr-85	2.21E-06	2.53E-06	2.15E-06	2.06E-06	4.15E-06	2.23E-06	2.06E-06	2.25E-06	2.49E-04	Nb-93m	0.00%	
Nb-93m	5.92E-12	1.22E-11	2.38E-13	1.10E-12	6.47E-12	3.21E-12	1.27E-12	4.15E-12	4.00E-11	Se-79	0.00%	
Nb-94	1.04E-14	1.18E-14	1.04E-14	1.01E-14	1.64E-14	1.07E-14	9.94E-15	1.06E-14	1.32E-14	Sm-151	0.00%	
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-238	0.00%	
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-245	0.00%	
Np-237	8.29E-11	1.00E-10	7.19E-11	6.13E-11	2.55E-10	7.93E-11	6.78E-11	8.21E-11	1.23E-10	U-236	0.00%	
Pa-231	4.86E-14	5.65E-14	4.60E-14	4.32E-14	1.03E-13	4.83E-14	4.37E-14	4.88E-14	6.93E-14	Pu-242	0.00%	
Pb-210	9.58E-21	1.27E-20	6.58E-21	4.86E-21	3.02E-20	8.39E-21	6.33E-21	8.73E-21	1.98E-20	Am-242m	0.00%	
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pa-231	0.00%	
Pm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Nb-94	0.00%	
Pu-238	8.60E-10	1.67E-09	1.39E-10	2.20E-10	1.22E-09	5.26E-10	2.61E-10	6.40E-10	5.36E-09	Ac-227	0.00%	
Pu-239	1.23E-09	1.91E-09	6.71E-10	6.76E-10	2.40E-09	9.83E-10	7.24E-10	1.07E-09	4.71E-09	Cm-246	0.00%	
Pu-240	9.41E-10	1.82E-09	1.61E-10	2.44E-10	1.37E-09	5.80E-10	2.90E-10	7.03E-10	5.80E-09	Ra-226	0.00%	
Pu-241	3.05E-10	3.67E-10	2.75E-10	2.39E-10	9.28E-10	2.96E-10	2.58E-10	3.07E-10	4.96E-10	U-233	0.00%	
Pu-242	3.80E-13	7.34E-13	6.90E-14	1.02E-13	5.63E-13	2.37E-13	1.20E-13	2.86E-13	2.33E-12	Th-229	0.00%	
Ra-226	7.29E-16	8.38E-16	6.98E-16	6.39E-16	1.88E-15	7.31E-16	6.60E-16	7.45E-16	1.13E-15	Th-230	0.00%	
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pb-210	0.00%	
Ru-106	6.57E-12	7.55E-12	6.57E-12	6.35E-12	1.12E-11	6.70E-12	6.27E-12	6.77E-12	7.09E-11	Th-232	0.00%	
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cd-113m	0.00%	
Se-79	3.20E-14	4.31E-14	1.95E-14	1.54E-14	8.86E-14	2.73E-14	1.94E-14	2.80E-14	3.42E-11	Cl-36	0.00%	
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-242	0.00%	
Sm-151	9.16E-12	1.55E-11	1.25E-12	1.99E-12	1.25E-11	6.30E-12	2.62E-12	6.36E-12	3.35E-11	Cm-243	0.00%	
Sn-126	1.22E-08	1.39E-08	1.20E-08	1.16E-08	2.11E-08	1.24E-08	1.15E-08	1.24E-08	2.10E-08	Cm-247	0.00%	
Sr-90	6.46E-08	7.88E-08	5.35E-08	4.52E-08	1.89E-07	6.09E-08	5.08E-08	6.26E-08	7.64E-05	Eu-154	0.00%	
Tc-99	5.39E-12	6.82E-12	4.00E-12	3.26E-12	1.60E-11	4.87E-12	3.84E-12	5.02E-12	8.49E-09	Eu-155	0.00%	
Th-229	7.23E-17	8.47E-17	6.71E-17	5.81E-17	2.20E-16	7.09E-17	6.27E-17	7.34E-17	1.04E-16	Fe-55	0.00%	
Th-230	3.78E-17	5.00E-17	3.01E-17	2.56E-17	1.11E-16	3.43E-17	2.88E-17	3.66E-17	9.48E-17	Fe-55(crud)	0.00%	
Th-232	2.32E-21	3.38E-21	1.58E-21	1.37E-21	6.46E-21	1.96E-21	1.58E-21	2.17E-21	8.55E-21	H-3	0.00%	
U-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ni-59	0.00%	
U-233	1.99E-16	2.61E-16	1.59E-16	1.46E-16	4.85E-16	1.82E-16	1.54E-16	1.92E-16	5.38E-16	Ni-63	0.00%	
U-234	8.78E-12	1.44E-11	4.37E-12	4.19E-12	1.99E-11	6.68E-12	4.79E-12	7.62E-12	4.24E-11	Pd-107	0.00%	
U-235	2.69E-10	3.09E-10	2.57E-10	2.34E-10	7.01E-10	2.69E-10	2.43E-10	2.74E-10	3.29E-10	Pm-147	0.00%	
U-236	8.82E-13	1.59E-12	3.15E-13	3.37E-13	1.72E-12	6.06E-13	3.90E-13	7.24E-13	5.16E-12	Ra-228	0.00%	
U-238	3.45E-12	6.71E-12	7.83E-13	9.74E-13	5.81E-12	2.14E-12	1.19E-12	2.68E-12	2.29E-11	Sb-125	0.00%	
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sm-147	0.00%	
										U-232	0.00%	
crud										Zr-93	0.00%	
Co-60(crud)	1.74E-02	1.96E-02	1.75E-02	1.74E-02	2.52E-02	1.79E-02	1.70E-02	1.78E-02	2.05E-02			
Fe-55(crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00			
total	1.77E-02	2.00E-02	1.78E-02	1.77E-02	2.56E-02	1.82E-02	1.72E-02	1.81E-02	2.13E-02			

N REACTOR [147]

Other

Not Intact

	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	5.23E+00		1.77E-02			
Breast	3.37E-01		2.00E-02			
Lung	3.43E+01		1.78E-02			
R Marrow	2.77E+01		1.77E-02			
B Surface	3.38E+02	<CDE	2.56E-02			
Thyroid	3.09E-01		1.82E-02			
Remainder	1.27E+01		1.72E-02			
Whole Body	1.99E+01	<CEDE	1.81E-02	<DDE	1.99E+01	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	2.13E-02	<SKIN	2.13E-02	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					3.38E+02	<CDE + DDE

N REACTOR [147]

Other

Isotope	Material Type	Offsite Doses[rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	5.12E-06	9.09E-05
Am-241	P	9.23E+00	1.67E+02
Am-242m	P	2.51E-04	4.63E-03
Am-243	P	1.34E-03	2.44E-02
C-14	P	5.62E-08	5.62E-08
Cd-113m	P	0.00E+00	0.00E+00
Cl-36	P	0.00E+00	0.00E+00
Cm-242	P	0.00E+00	0.00E+00
Cm-243	P	0.00E+00	0.00E+00
Cm-244	P	4.48E-02	7.82E-01
Cm-245	P	1.73E-05	3.15E-04
Cm-246	P	2.27E-06	4.14E-05
Cm-247	P	0.00E+00	0.00E+00
Co-60	P	7.82E-06	1.88E-06
Cs-134	C	1.42E-06	1.26E-06
Cs-135	C	3.37E-08	3.29E-08
Cs-137	C	3.19E-02	2.94E-02
Eu-154	P	0.00E+00	0.00E+00
Eu-155	P	0.00E+00	0.00E+00
Fe-55	P	0.00E+00	0.00E+00
H-3	G	7.35E-06	7.35E-06
I-129	G	6.34E-06	1.88E-08
Kr-85	G	2.25E-06	2.25E-06
Nb-93m	P	9.84E-07	9.25E-08
Nb-94	P	2.07E-12	3.73E-13
Ni-59	P	2.00E-09	1.96E-09
Ni-63	P	5.08E-07	4.98E-07
Np-237	P	1.55E-03	3.47E-02
Pa-231	P	1.31E-06	3.29E-05
Pb-210	P	7.57E-14	1.13E-12
Pd-107	P	7.06E-09	2.78E-11
Pm-147	P	0.00E+00	0.00E+00
Pu-238	P	1.85E+00	3.32E+01
Pu-239	P	3.91E+00	7.12E+01
Pu-240	P	2.29E+00	4.16E+01
Pu-241	P	1.26E+00	2.37E+01
Pu-242	P	1.05E-03	1.91E-02
Ra-226	P	7.31E-10	2.39E-09
Ra-228	P	3.63E-13	1.83E-12
Ru-106	P	1.12E-08	1.19E-09
Sb-125	P	0.00E+00	0.00E+00
Se-79	P	3.27E-08	8.35E-09
Sm-147	P	0.00E+00	0.00E+00
Sm-151	P	1.90E-04	3.24E-03
Sn-126	P	5.90E-07	2.55E-06
Sr-90	P	3.88E-01	8.04E-01
Tc-99	P	9.29E-07	1.87E-08
Th-229	P	1.48E-09	3.65E-08
Th-230	P	2.46E-08	6.05E-07
Th-232	P	1.47E-11	3.67E-10
U-232	P	0.00E+00	0.00E+00
U-233	P	5.73E-08	1.75E-08
U-234	P	4.76E-03	1.45E-03
U-235	P	1.68E-04	5.13E-05
U-236	P	6.53E-04	2.00E-04
U-238	P	3.35E-03	1.02E-03
Zr-93	P	5.00E-06	1.26E-04
Co-60(crud)	crud	8.52E-01	2.08E-01
Fe-55(crud)	crud	6.46E-02	4.58E-02
total		1.99E+01	3.38E+02

ATTACHMENT VI

Commercial SNF Dose Calculations

	Evaluated Fuel	x				Evaluated Fuel
	Fuel Type	Stable Metal	Stable Metal	Stable Metal	Stable Metal	Stable Metal
	Condition	Intact	Intact	Intact	Intact	Intact
	Fuel Name	PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs	BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs	PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs	BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs	PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs
	# of canisters	1.00	1.00	1.00	1.00	1.00
Isotope	Material Type	(Ci/FA)	(Ci/FA)	(Ci/FA)	(Ci/FA)	(Ci/FA)
Ac-227	P	1.61E-05	0.00E+00	1.04E-05	0.00E+00	1.61E-05
Am-241	P	1.98E+03	5.58E+02	8.71E+02	2.66E+02	1.98E+03
Am-242m	P	6.39E+00	2.17E+00	1.02E+01	3.41E+00	6.39E+00
Am-243	P	2.20E+01	5.34E+00	5.21E+01	1.93E+01	2.20E+01
C-14	P	3.32E-01	1.76E-01	4.89E-01	3.16E-01	3.32E-01
Cd-113m	P	7.66E+00	2.26E+00	3.82E+01	1.39E+01	7.66E+00
Cl-36	P	6.80E-03	2.93E-03	9.69E-03	4.99E-03	6.80E-03
Cm-242	P	5.26E+00	1.78E+00	3.43E+01	1.13E+01	5.26E+00
Cm-243	P	1.03E+01	2.47E+00	3.83E+01	1.12E+01	1.03E+01
Cm-244	P	1.36E+03	2.55E+02	1.12E+04	3.94E+03	1.36E+03
Cm-245	P	3.07E-01	4.03E-02	1.41E+00	3.53E-01	3.07E-01
Cm-246	P	1.04E-01	1.45E-02	8.37E-01	2.96E-01	1.04E-01
Cm-247	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	P	3.13E+02	4.39E+01	5.66E+03	8.53E+02	3.13E+02
Cs-134	C	2.52E+01	6.32E+00	3.72E+04	1.15E+04	2.52E+01
Cs-135	C	3.50E-01	1.39E-01	5.99E-01	2.82E-01	3.50E-01
Cs-137	C	4.11E+04	1.39E+04	9.87E+04	3.87E+04	4.11E+04
Eu-154	P	6.71E+02	1.75E+02	5.77E+03	1.80E+03	6.71E+02
Eu-155	P	5.15E+01	1.60E+01	1.68E+03	6.28E+02	5.15E+01
Fe-55	P	3.46E+00	1.09E+00	6.84E+02	2.34E+02	3.46E+00
H-3	G	1.14E+02	3.95E+01	4.72E+02	1.76E+02	1.14E+02
I-129	G	2.19E-02	7.42E-03	3.38E-02	1.36E-02	2.19E-02
Kr-85	G	1.13E+03	3.81E+02	5.63E+03	2.03E+03	1.13E+03
Nb-93m	P	1.30E+01	4.73E-01	4.53E+01	1.22E+00	1.30E+01
Nb-94	P	8.39E-01	1.87E-02	1.27E+00	3.38E-02	8.39E-01
Ni-59	P	2.09E+00	5.02E-01	2.78E+00	7.78E-01	2.09E+00
Ni-63	P	2.52E+02	5.86E+01	4.16E+02	1.16E+02	2.52E+02
Np-237	P	2.47E-01	6.88E-02	3.84E-01	1.33E-01	2.47E-01
Pa-231	P	2.97E-05	1.39E-05	4.25E-05	2.94E-05	2.97E-05
Pb-210	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pd-107	P	8.41E-02	2.65E-02	1.45E-01	5.69E-02	8.41E-02
Pm-147	P	1.19E+02	3.98E+01	2.34E+04	7.46E+03	1.19E+02
Pu-238	P	2.29E+03	5.85E+02	6.15E+03	2.11E+03	2.29E+03
Pu-239	P	1.77E+02	5.35E+01	1.85E+02	5.36E+01	1.77E+02
Pu-240	P	3.18E+02	1.14E+02	3.90E+02	1.48E+02	3.18E+02
Pu-241	P	2.46E+04	6.78E+03	7.90E+04	2.25E+04	2.46E+04
Pu-242	P	1.64E+00	5.08E-01	3.01E+00	1.26E+00	1.64E+00
Ra-226	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ra-228	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-106	P	1.23E-02	3.00E-03	1.27E+04	3.29E+03	1.23E-02
Sb-125	P	9.71E+00	2.89E+00	2.04E+03	6.21E+02	9.71E+00
Se-79	P	4.57E-02	1.59E-02	6.94E-02	2.88E-02	4.57E-02
Sm-147	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sm-151	P	2.11E+02	5.39E+01	3.13E+02	8.22E+01	2.11E+02
Sn-126	P	3.85E-01	1.27E-01	6.28E-01	2.52E-01	3.85E-01
Sr-90	P	2.72E+04	9.54E+03	6.30E+04	2.52E+04	2.72E+04
Tc-99	P	8.98E+00	3.20E+00	1.28E+01	5.35E+00	8.98E+00
Th-229	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Th-230	P	1.48E-04	6.09E-05	3.57E-05	2.05E-05	1.48E-04
Th-232	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
U-232	P	2.04E-02	4.63E-03	5.31E-02	2.00E-02	2.04E-02
U-233	P	3.79E-05	1.06E-05	2.33E-05	0.00E+00	3.79E-05
U-234	P	6.77E-01	2.50E-01	5.47E-01	2.26E-01	6.77E-01
U-235	P	7.37E-03	2.62E-03	4.16E-03	9.43E-04	7.37E-03
U-236	P	1.72E-01	6.26E-02	2.24E-01	9.55E-02	1.72E-01
U-238	P	1.48E-01	6.32E-02	1.43E-01	6.07E-02	1.48E-01
Zr-93	P	8.94E-01	3.38E-01	1.34E+00	6.03E-01	8.94E-01
Crud						
Co-60(Crud)	P	1.17E+00	3.94E+00	1.63E+01	5.46E+01	1.17E+00
Fe-55(Crud)	P	4.64E+00	2.18E+00	7.45E+02	3.50E+02	4.64E+00

Commercial SNF Release Fractions				
Material Type	Airborne Release Fraction (ARF)	Respirable Fraction (RF)	Total Release Fraction (ARF x RF)	HEPA Filter LPF
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	3.00E-05	5.00E-03	1.50E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Crud				
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Release fractions for Commercial SNF are from CRWMS M&O 1999c, <i>Commercial SNF Accident Release Fractions</i> , ANL-WHS-SE-000002 REV 00.				
PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs				
Stable Metal				
Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	3.00E-05	5.00E-03	1.50E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Breathing Rate:	3.33E-04	[m ³ /s]		
Gound Level Dispersion Factor				
distance [m]	x/Q [sec/m ³]			
11000	2.17E-05	99.5% worst-sector		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs							
Stable Metal	Intact						
Isotope	Curies (entire fuel inventory)	$f_{inv} = 1/n_{Can}$	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	1.61E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.83E-10	2.42E-12
Am-241	1.98E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	5.94E-02	2.97E-04
Am-242m	6.39E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.92E-04	9.59E-07
Am-243	2.20E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.60E-04	3.30E-06
C-14	3.32E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	9.96E-06	4.98E-08
Cd-113m	7.66E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.30E-04	1.15E-06
Cl-36	6.80E-03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.04E-07	1.02E-09
Cm-242	5.26E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.58E-04	7.89E-07
Cm-243	1.03E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.09E-04	1.55E-06
Cm-244	1.36E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.08E-02	2.04E-04
Cm-245	3.07E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	9.21E-06	4.61E-08
Cm-246	1.04E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.12E-06	1.56E-08
Cm-247	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Co-60	3.13E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	9.39E-03	4.70E-05
Cs-134	2.52E+01	1.00E+00	2.00E-04	1.00E+00	1.00E+00	5.04E-03	5.04E-03
Cs-135	3.50E-01	1.00E+00	2.00E-04	1.00E+00	1.00E+00	7.00E-05	7.00E-05
Cs-137	4.11E+04	1.00E+00	2.00E-04	1.00E+00	1.00E+00	8.22E+00	8.22E+00
Eu-154	6.71E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.01E-02	1.01E-04
Eu-155	5.15E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.55E-03	7.73E-06
Fe-55	3.46E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.04E-04	5.19E-07
H-3	1.14E+02	1.00E+00	3.00E-01	1.00E+00	1.00E+00	3.42E+01	3.42E+01
I-129	2.19E-02	1.00E+00	3.00E-01	1.00E+00	1.00E+00	6.57E-03	6.57E-03
Kr-85	1.13E+03	1.00E+00	3.00E-01	1.00E+00	1.00E+00	3.39E+02	3.39E+02
Nb-93m	1.30E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.90E-04	1.95E-06
Nb-94	8.39E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.52E-05	1.26E-07
Ni-59	2.09E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.27E-05	3.14E-07
Ni-63	2.52E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.56E-03	3.78E-05
Np-237	2.47E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.41E-06	3.71E-08
Pa-231	2.97E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	8.91E-10	4.46E-12
Pb-210	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Pd-107	8.41E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.52E-06	1.26E-08
Pm-147	1.19E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.57E-03	1.79E-05
Pu-238	2.29E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.87E-02	3.44E-04
Pu-239	1.77E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	5.31E-03	2.66E-05
Pu-240	3.18E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	9.54E-03	4.77E-05
Pu-241	2.46E+04	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.38E-01	3.69E-03
Pu-242	1.64E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.92E-05	2.46E-07
Ra-226	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Ra-228	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Ru-106	1.23E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.69E-07	1.85E-09
Sb-125	9.71E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.91E-04	1.46E-06
Se-79	4.57E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.37E-06	6.86E-09
Sm-147	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Sm-151	2.11E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.33E-03	3.17E-05
Sn-126	3.85E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.16E-05	5.78E-08
Sr-90	2.72E+04	1.00E+00	3.00E-05	5.00E-03	1.00E+00	8.16E-01	4.08E-03
Tc-99	8.98E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.69E-04	1.35E-06
Th-229	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Th-230	1.48E-04	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.44E-09	2.22E-11
Th-232	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
U-232	2.04E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.12E-07	3.06E-09
U-233	3.79E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.14E-09	5.69E-12
U-234	6.77E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.03E-05	1.02E-07
U-235	7.37E-03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.21E-07	1.11E-09
U-236	1.72E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	5.16E-06	2.58E-08
U-238	1.48E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.44E-06	2.22E-08
Zr-93	8.94E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.68E-05	1.34E-07
crud							
Co-60(Crud)	1.17E+00	1.00E+00	1.00E+00	3.00E-01	1.00E+00	1.17E+00	3.51E-01
Fe-55(Crud)	4.64E+00	1.00E+00	1.00E+00	3.00E-01	1.00E+00	4.64E+00	1.39E+00

PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs													
Stable Metal	Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Ac-227	2.56E-11	4.30E-15	9.94E-11	1.66E-10	2.07E-09	2.32E-15	9.49E-11	1.17E-10	0.00E+00	Cs-137	35.77%	Pu-238	33.74%
Am-241	2.58E-04	2.12E-08	1.46E-04	1.38E-03	1.72E-02	1.27E-08	6.21E-04	9.53E-04	0.00E+00	Pu-238	18.36%	Am-241	33.32%
Am-242m	8.23E-07	3.54E-11	1.08E-07	4.33E-06	5.43E-05	1.45E-11	1.92E-06	2.95E-06	0.00E+00	Am-241	17.97%	Cm-244	12.34%
Am-243	2.88E-06	1.34E-09	1.57E-06	1.53E-05	1.91E-04	7.31E-10	6.83E-06	1.05E-05	0.00E+00	Co-60(Crud)	10.46%	Pu-241	8.01%
C-14	7.51E-13	7.51E-13	7.51E-13	7.51E-13	7.51E-13	7.51E-13	7.51E-13	7.51E-13	0.00E+00	Cm-244	6.89%	Pu-240	5.20%
Cd-113m	1.02E-09	1.02E-09	1.26E-08	1.02E-09	1.02E-09	1.02E-09	3.99E-08	1.27E-08	0.00E+00	Pu-241	4.15%	Cs-137	3.37%
Cl-36	1.37E-14	1.37E-14	1.24E-12	1.37E-14	1.37E-14	1.37E-14	1.46E-14	1.62E-13	0.00E+00	Pu-240	2.79%	Pu-239	2.90%
Cm-242	1.20E-08	1.99E-11	3.27E-07	8.23E-08	1.03E-06	1.99E-11	5.17E-08	9.85E-08	0.00E+00	Pu-239	1.55%	Am-243	0.37%
Cm-243	8.55E-07	2.60E-10	8.01E-07	4.87E-06	6.07E-05	1.58E-10	2.38E-06	3.43E-06	0.00E+00	Sr-90	0.72%	Co-60(Crud)	0.24%
Cm-244	8.67E-05	5.67E-09	1.05E-04	5.12E-04	6.38E-03	5.51E-09	2.61E-04	3.65E-04	0.00E+00	Fe-55(Crud)	0.51%	Sr-90	0.15%
Cm-245	4.15E-08	8.24E-12	2.22E-08	2.20E-07	2.76E-06	4.53E-12	9.80E-08	1.51E-07	0.00E+00	H-3	0.30%	Cm-243	0.12%
Cm-246	1.39E-08	1.67E-12	7.59E-09	7.42E-08	9.26E-07	9.43E-13	3.31E-08	5.09E-08	0.00E+00	Am-243	0.20%	Am-242m	0.11%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	I-129	0.16%	Fe-55(Crud)	0.04%
Co-60	5.98E-09	2.31E-08	4.33E-07	2.16E-08	1.69E-08	2.03E-08	4.52E-08	7.42E-08	0.00E+00	Cm-243	0.06%	H-3	0.03%
Cs-134	1.75E-06	1.46E-06	1.59E-06	1.59E-06	1.48E-06	1.50E-06	1.87E-06	1.68E-06	0.00E+00	Am-242m	0.06%	Pu-242	0.03%
Cs-135	2.25E-09	2.25E-09	2.64E-09	2.25E-09	2.25E-09	2.25E-09	2.25E-09	2.30E-09	0.00E+00	Cs-134	0.03%	Np-237	0.01%
Cs-137	1.93E-03	1.72E-03	1.94E-03	1.82E-03	1.75E-03	1.74E-03	2.00E-03	1.90E-03	0.00E+00	Pu-242	0.01%	Cm-245	0.01%
Eu-154	3.15E-08	4.17E-08	2.13E-07	2.85E-07	1.41E-06	1.92E-08	3.04E-07	2.08E-07	0.00E+00	Eu-154	0.00%	Cs-134	0.00%
Eu-155	7.35E-11	1.27E-10	2.46E-09	2.95E-09	3.14E-08	4.96E-11	2.29E-09	2.31E-09	0.00E+00	Cm-245	0.00%	Eu-154	0.00%
Fe-55	7.26E-12	7.06E-12	1.47E-11	7.17E-12	7.13E-12	7.52E-12	1.68E-11	1.01E-11	0.00E+00	Np-237	0.00%	Cm-242	0.00%
H-3	1.58E-05	1.58E-05	1.58E-05	1.58E-05	1.58E-05	1.58E-05	1.58E-05	1.58E-05	0.00E+00	Cm-242	0.00%	Cm-246	0.00%
I-129	1.53E-08	3.67E-08	5.52E-08	2.46E-08	2.42E-08	2.74E-04	2.07E-08	8.24E-06	0.00E+00	U-234	0.00%	Sm-151	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60	0.00%	Pm-147	0.00%
Nb-93m	2.17E-11	2.27E-12	3.36E-09	1.49E-11	3.87E-11	1.58E-12	2.06E-11	4.12E-10	0.00E+00	Cm-246	0.00%	Eu-155	0.00%
Nb-94	1.60E-11	7.54E-11	2.52E-09	7.60E-11	6.63E-11	7.47E-11	1.50E-10	3.77E-10	0.00E+00	U-236	0.00%	U-234	0.00%
Ni-59	3.01E-12	2.90E-12	1.01E-11	2.97E-12	2.94E-12	3.16E-12	3.04E-12	3.00E-12	0.00E+00	U-238	0.00%	I-129	0.00%
Ni-63	8.31E-10	8.31E-10	3.10E-09	8.31E-10	8.31E-10	8.31E-10	8.68E-10	8.48E-10	0.00E+00	U-232	0.00%	Co-60	0.00%
Np-237	2.93E-08	1.67E-11	1.59E-08	2.60E-07	3.24E-06	1.33E-11	2.32E-08	1.45E-07	0.00E+00	Cd-113m	0.00%	Zr-93	0.00%
Pa-231	8.22E-16	1.05E-15	8.90E-11	8.30E-11	1.04E-09	9.10E-16	3.42E-14	4.13E-11	0.00E+00	Sm-151	0.00%	U-236	0.00%
Pb-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pm-147	0.00%	U-238	0.00%
Pd-107	3.19E-16	3.19E-16	9.61E-12	1.72E-15	4.59E-15	3.19E-16	7.25E-14	1.16E-12	0.00E+00	Eu-155	0.00%	U-232	0.00%
Pm-147	8.97E-15	1.72E-14	3.69E-08	3.89E-09	4.87E-08	9.45E-15	2.81E-09	5.06E-09	0.00E+00	Cs-135	0.00%	Cs-135	0.00%
Pu-238	2.57E-04	9.18E-09	2.94E-03	1.40E-03	1.74E-02	8.84E-09	6.45E-04	9.74E-04	0.00E+00	U-235	0.00%	Ac-227	0.00%
Pu-239	2.26E-05	6.54E-10	2.29E-04	1.20E-04	1.50E-03	6.41E-10	5.37E-05	8.23E-05	0.00E+00	Ni-63	0.00%	Th-230	0.00%
Pu-240	4.06E-05	1.21E-09	4.12E-04	2.16E-04	2.69E-03	1.15E-09	9.64E-05	1.48E-04	0.00E+00	Nb-93m	0.00%	Pa-231	0.00%
Pu-241	6.73E-05	3.02E-09	3.14E-04	3.31E-04	4.14E-03	1.22E-09	1.29E-04	2.20E-04	0.00E+00	Nb-94	0.00%	Cd-113m	0.00%
Pu-242	1.99E-07	6.22E-12	2.02E-06	1.06E-06	1.32E-05	5.78E-12	4.72E-07	7.30E-07	0.00E+00	Zr-93	0.00%	Ni-63	0.00%
Ra-226	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sb-125	0.00%	U-235	0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ac-227	0.00%	Sn-126	0.00%
Ru-106	6.81E-13	6.76E-13	5.13E-11	6.76E-13	6.76E-13	6.76E-13	8.34E-13	6.36E-12	0.00E+00	Tc-99	0.00%	Sb-125	0.00%
Sb-125	1.40E-11	1.62E-11	8.45E-10	2.53E-11	1.06E-10	1.26E-11	5.65E-11	1.29E-10	0.00E+00	Th-230	0.00%	Nb-94	0.00%
Se-79	1.24E-13	1.24E-13	1.80E-12	1.24E-13	1.24E-13	1.24E-13	7.77E-13	4.88E-13	0.00E+00	Sn-126	0.00%	Nb-93m	0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pa-231	0.00%	Fe-55	0.00%
Sm-151	3.41E-14	1.26E-13	2.76E-09	9.31E-09	1.17E-07	1.12E-14	6.36E-09	6.85E-09	0.00E+00	Fe-55	0.00%	Ni-59	0.00%
Sn-126	2.21E-11	2.18E-11	2.33E-10	8.68E-11	1.82E-10	2.02E-11	2.72E-11	4.16E-11	0.00E+00	Ru-106	0.00%	U-233	0.00%
Sr-90	2.88E-07	2.88E-07	3.12E-04	3.67E-05	7.93E-05	2.88E-07	6.25E-07	3.83E-05	0.00E+00	U-233	0.00%	Tc-99	0.00%

Inhalation Doses

PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs													
Stable Metal	Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Tc-99	1.63E-12	1.63E-12	6.01E-10	1.63E-12	1.63E-12	4.36E-11	2.25E-11	8.10E-11	0.00E+00	Ni-59	0.00%	C-14	0.00%
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pd-107	0.00%	Ru-106	0.00%
Th-230	2.42E-13	2.42E-13	1.78E-10	1.03E-10	1.28E-09	2.42E-13	6.23E-13	5.22E-11	0.00E+00	C-14	0.00%	Se-79	0.00%
Th-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Se-79	0.00%	Cl-36	0.00%
U-232	6.55E-12	6.59E-12	1.21E-07	3.32E-10	5.25E-09	6.42E-12	2.54E-10	1.46E-08	0.00E+00	Cl-36	0.00%	Pd-107	0.00%
U-233	3.86E-15	3.86E-15	4.62E-11	1.08E-13	1.70E-12	3.86E-15	1.43E-13	5.56E-12	0.00E+00	Cm-247	0.00%	Cm-247	0.00%
U-234	6.79E-11	6.79E-11	8.09E-07	1.90E-09	2.96E-08	6.79E-11	2.51E-09	9.72E-08	0.00E+00	Kr-85	0.00%	Kr-85	0.00%
U-235	7.01E-13	7.03E-13	8.16E-09	1.94E-11	2.99E-10	7.01E-13	2.54E-11	9.81E-10	0.00E+00	Pb-210	0.00%	Pb-210	0.00%
U-236	1.63E-11	1.63E-11	1.95E-07	4.55E-10	7.17E-09	1.63E-11	6.05E-10	2.34E-08	0.00E+00	Ra-226	0.00%	Ra-226	0.00%
U-238	1.32E-11	1.32E-11	1.58E-07	3.91E-10	5.80E-09	1.32E-11	4.88E-10	1.90E-08	0.00E+00	Ra-228	0.00%	Ra-228	0.00%
Zr-93	7.82E-14	1.68E-13	3.13E-10	6.35E-10	7.82E-09	6.24E-14	6.20E-13	3.11E-10	0.00E+00	Sm-147	0.00%	Sm-147	0.00%
crud										Th-229	0.00%	Th-229	0.00%
Co-60(Crud)	4.47E-05	1.73E-04	3.24E-03	1.61E-04	1.27E-04	1.52E-04	3.38E-04	5.55E-04	0.00E+00	Th-232	0.00%	Th-232	0.00%
Fe-55(Crud)	1.95E-05	1.89E-05	3.95E-05	1.92E-05	1.91E-05	2.02E-05	4.50E-05	2.70E-05	0.00E+00				
total	2.74E-03	1.93E-03	9.70E-03	6.04E-03	5.17E-02	2.21E-03	4.22E-03	5.30E-03	0.00E+00				

Air Submersion Doses

PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs												
Stable Metal		Intact										
	Air Submersion Doses [rem]									Isotope % of Dose		
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes	% of Total Skin Dose	
Ac-227	1.46E-18	1.73E-18	1.31E-18	1.14E-18	4.02E-18	1.42E-18	1.23E-18	1.45E-18	1.27E-17	Kr-85	89.20%	
Am-241	4.09E-09	5.10E-09	3.21E-09	2.48E-09	1.37E-08	3.73E-09	3.02E-09	3.90E-09	6.10E-09	Cs-137	7.20%	
Am-242m	5.85E-13	9.25E-13	2.65E-13	2.65E-13	1.22E-12	4.54E-13	2.99E-13	4.88E-13	2.09E-12	Co-60(Crud)	3.38%	
Am-243	1.16E-10	1.38E-10	1.02E-10	8.21E-11	3.96E-10	1.11E-10	9.49E-11	1.16E-10	1.46E-10	Sr-90	0.15%	
C-14	2.07E-16	2.81E-16	1.22E-16	9.68E-17	5.65E-16	1.75E-16	1.23E-16	1.79E-16	1.94E-13	Eu-154	0.03%	
Cd-113m	1.32E-13	1.62E-13	1.09E-13	9.24E-14	3.87E-13	1.25E-13	1.04E-13	1.28E-13	1.56E-10	Co-60	0.03%	
Cl-36	3.67E-16	4.36E-16	3.31E-16	2.96E-16	9.22E-16	3.59E-16	3.14E-16	3.65E-16	2.41E-13	Cs-134	0.01%	
Cm-242	9.92E-14	1.88E-13	1.43E-14	2.39E-14	1.34E-13	6.22E-14	2.88E-14	7.21E-14	5.44E-13	Am-241	0.00%	
Cm-243	1.43E-10	1.66E-10	1.36E-10	1.24E-10	3.72E-10	1.43E-10	1.29E-10	1.46E-10	2.43E-10	Sb-125	0.00%	
Cm-244	2.26E-11	4.36E-11	2.32E-12	4.78E-12	2.89E-11	1.37E-11	5.93E-12	1.61E-11	1.28E-10	I-129	0.00%	
Cm-245	2.87E-12	3.36E-12	2.68E-12	2.34E-12	8.73E-12	2.84E-12	2.51E-12	2.93E-12	3.96E-12	Eu-155	0.00%	
Cm-246	1.56E-15	3.01E-15	1.75E-16	3.38E-16	2.05E-15	9.57E-16	4.18E-16	1.12E-15	8.74E-15	Cm-243	0.00%	
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pm-147	0.00%	
Co-60	9.27E-08	1.05E-07	9.35E-08	9.27E-08	1.34E-07	9.57E-08	9.05E-08	9.50E-08	1.09E-07	Pu-238	0.00%	
Cs-134	2.99E-08	3.41E-08	2.98E-08	2.91E-08	4.86E-08	3.06E-08	2.86E-08	3.06E-08	3.82E-08	Nb-94	0.00%	
Cs-135	3.53E-15	4.63E-15	2.35E-15	1.88E-15	1.02E-14	3.09E-15	2.30E-15	3.18E-15	5.09E-12	Cd-113m	0.00%	
Cs-137	1.76E-05	2.01E-05	1.75E-05	1.70E-05	2.89E-05	1.80E-05	1.67E-05	1.80E-05	2.90E-05	Am-243	0.00%	
Eu-154	9.70E-08	1.10E-07	9.68E-08	9.49E-08	1.52E-07	9.94E-08	9.29E-08	9.92E-08	1.34E-07	Cm-244	0.00%	
Eu-155	3.09E-10	3.66E-10	2.75E-10	2.29E-10	1.00E-09	2.99E-10	2.57E-10	3.09E-10	4.21E-10	Sn-126	0.00%	
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Tc-99	0.00%	
H-3	0.00E+00	0.00E+00	7.55E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.09E-10	0.00E+00	Pu-240	0.00%	
I-129	2.55E-10	3.51E-10	1.13E-10	8.65E-11	5.80E-10	2.04E-10	1.21E-10	2.00E-10	5.80E-10	Pu-239	0.00%	
Kr-85	3.18E-06	3.65E-06	3.10E-06	2.97E-06	5.99E-06	3.21E-06	2.97E-06	3.24E-06	3.59E-04	Pu-241	0.00%	
Nb-93m	1.98E-13	4.10E-13	7.98E-15	3.69E-14	2.17E-13	1.07E-13	4.26E-14	1.39E-13	1.34E-12	Cs-135	0.00%	
Nb-94	1.52E-10	1.73E-10	1.52E-10	1.48E-10	2.40E-10	1.56E-10	1.45E-10	1.56E-10	1.92E-10	Cm-245	0.00%	
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ru-106	0.00%	
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-242m	0.00%	
Np-237	6.19E-13	7.50E-13	5.37E-13	4.58E-13	1.90E-12	5.91E-13	5.06E-13	6.13E-13	9.16E-13	Nb-93m	0.00%	
Pa-231	1.22E-16	1.42E-16	1.16E-16	1.09E-16	2.60E-16	1.22E-16	1.10E-16	1.23E-16	1.75E-16	Np-237	0.00%	
Pb-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-242	0.00%	
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cl-36	0.00%	
Pm-147	2.14E-13	2.74E-13	1.56E-13	1.28E-13	6.25E-13	1.93E-13	1.51E-13	1.99E-13	2.32E-10	C-14	0.00%	
Pu-238	3.62E-11	7.01E-11	5.85E-12	9.27E-12	5.13E-11	2.21E-11	1.10E-11	2.69E-11	2.26E-10	U-235	0.00%	
Pu-239	2.06E-12	3.22E-12	1.13E-12	1.14E-12	4.04E-12	1.65E-12	1.22E-12	1.81E-12	7.93E-12	Pu-242	0.00%	
Pu-240	4.87E-12	9.42E-12	8.35E-13	1.26E-12	7.09E-12	3.00E-12	1.50E-12	3.64E-12	3.00E-11	Sm-151	0.00%	
Pu-241	4.26E-12	5.14E-12	3.84E-12	3.34E-12	1.30E-11	4.14E-12	3.61E-12	4.30E-12	6.93E-12	U-234	0.00%	
Pu-242	2.11E-14	4.07E-14	3.83E-15	5.65E-15	3.12E-14	1.31E-14	6.64E-15	1.58E-14	1.29E-13	Se-79	0.00%	
Ra-226	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236	0.00%	
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-238	0.00%	
Ru-106	2.99E-13	3.44E-13	2.99E-13	2.89E-13	5.10E-13	3.05E-13	2.85E-13	3.08E-13	3.23E-12	Cm-246	0.00%	
Sb-125	4.63E-10	5.31E-10	4.56E-10	4.37E-10	8.26E-10	4.70E-10	4.35E-10	4.72E-10	6.20E-10	U-232	0.00%	
Se-79	3.82E-17	5.14E-17	2.32E-17	1.84E-17	1.06E-16	3.26E-17	2.31E-17	3.34E-17	4.08E-14	Pa-231	0.00%	
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-230	0.00%	
Sm-151	2.64E-14	4.47E-14	3.60E-15	5.74E-15	3.60E-14	1.82E-14	7.57E-15	1.83E-14	9.66E-14	Ac-227	0.00%	
Sn-126	6.99E-11	7.99E-11	6.93E-11	6.70E-11	1.21E-10	7.13E-11	6.62E-11	7.15E-11	1.21E-10	U-233	0.00%	
Sr-90	5.10E-10	6.22E-10	4.22E-10	3.56E-10	1.49E-09	4.80E-10	4.00E-10	4.93E-10	6.03E-07	Cm-247	0.00%	
Tc-99	3.76E-14	4.76E-14	2.79E-14	2.27E-14	1.12E-13	3.40E-14	2.68E-14	3.50E-14	5.93E-11	Fe-55	0.00%	
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Fe-55(Crud)	0.00%	
Th-230	6.42E-18	8.48E-18	5.10E-18	4.35E-18	1.89E-17	5.81E-18	4.88E-18	6.20E-18	1.61E-17	H-3	0.00%	
Th-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ni-59	0.00%	
U-232	7.62E-16	1.14E-15	4.84E-16	4.42E-16	1.90E-15	6.34E-16	4.91E-16	6.98E-16	2.91E-15	Ni-63	0.00%	
U-233	1.54E-18	2.03E-18	1.23E-18	1.13E-18	3.76E-18	1.41E-18	1.20E-18	1.49E-18	4.17E-18	Pb-210	0.00%	
U-234	1.43E-14	2.35E-14	7.14E-15	6.85E-15	3.25E-14	1.09E-14	7.83E-15	1.24E-14	6.93E-14	Pd-107	0.00%	
U-235	1.25E-13	1.44E-13	1.20E-13	1.09E-13	3.27E-13	1.25E-13	1.13E-13	1.28E-13	1.53E-13	Ra-226	0.00%	
U-236	2.53E-15	4.56E-15	9.03E-16	9.65E-16	4.93E-15	1.74E-15	1.12E-15	2.08E-15	1.48E-14	Ra-228	0.00%	
U-238	1.56E-15	3.04E-15	3.55E-16	4.42E-16	2.64E-15	9.70E-16	5.38E-16	1.22E-15	1.04E-14	Sm-147	0.00%	
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-229	0.00%	
crud										Th-232	0.00%	
Co-60(Crud)	1.16E-05	1.31E-05	1.16E-05	1.16E-05	1.67E-05	1.19E-05	1.13E-05	1.18E-05	1.36E-05	Zr-93	0.00%	
Fe-55(Crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00			
total	3.26E-05	3.71E-05	3.25E-05	3.18E-05	5.20E-05	3.34E-05	3.12E-05	3.33E-05	4.03E-04			

Offsite Dose Results

PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs

		Stable Metal	Intact		
	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation	Dose Term for Regulation
Gonad	2.74E-03		3.26E-05		
Breast	1.93E-03		3.71E-05		
Lung	9.70E-03		3.25E-05		
R Marrow	6.04E-03		3.18E-05		
B Surface	5.17E-02	<CDE	5.20E-05		
Thyroid	2.21E-03		3.34E-05		
Remainder	4.22E-03		3.12E-05		
Whole Body	5.30E-03	<CEDE	3.33E-05	<DDE	5.34E-03 <TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	4.03E-04	<SKIN	4.03E-04 <SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A <EYE
					5.17E-02 <CDE + DDE

Summary of Offsite Dose

PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs

Isotope	Material Type	Offsite Doses [rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	1.17E-10	2.07E-09
Am-241	P	9.53E-04	1.72E-02
Am-242m	P	2.95E-06	5.43E-05
Am-243	P	1.05E-05	1.91E-04
C-14	P	7.51E-13	7.51E-13
Cd-113m	P	1.27E-08	1.02E-09
Cl-36	P	1.62E-13	1.41E-14
Cm-242	P	9.85E-08	1.03E-06
Cm-243	P	3.43E-06	6.07E-05
Cm-244	P	3.65E-04	6.38E-03
Cm-245	P	1.51E-07	2.76E-06
Cm-246	P	5.09E-08	9.26E-07
Cm-247	P	0.00E+00	0.00E+00
Co-60	P	1.69E-07	1.12E-07
Cs-134	C	1.72E-06	1.51E-06
Cs-135	C	2.30E-09	2.25E-09
Cs-137	C	1.91E-03	1.76E-03
Eu-154	P	3.07E-07	1.51E-06
Eu-155	P	2.62E-09	3.17E-08
Fe-55	P	1.01E-11	7.13E-12
H-3	G	1.58E-05	1.58E-05
I-129	G	8.24E-06	2.44E-08
Kr-85	G	3.24E-06	3.24E-06
Nb-93m	P	4.12E-10	3.89E-11
Nb-94	P	5.32E-10	2.22E-10
Ni-59	P	3.00E-12	2.94E-12
Ni-63	P	8.48E-10	8.31E-10
Np-237	P	1.45E-07	3.24E-06
Pa-231	P	4.13E-11	1.04E-09
Pb-210	P	0.00E+00	0.00E+00
Pd-107	P	1.16E-12	4.59E-15
Pm-147	P	5.06E-09	4.87E-08
Pu-238	P	9.74E-04	1.74E-02
Pu-239	P	8.23E-05	1.50E-03
Pu-240	P	1.48E-04	2.69E-03
Pu-241	P	2.20E-04	4.14E-03
Pu-242	P	7.30E-07	1.32E-05
Ra-226	P	0.00E+00	0.00E+00
Ra-228	P	0.00E+00	0.00E+00
Ru-106	P	6.67E-12	9.84E-13
Sb-125	P	6.01E-10	5.79E-10
Se-79	P	4.88E-13	1.24E-13
Sm-147	P	0.00E+00	0.00E+00
Sm-151	P	6.85E-09	1.17E-07
Sn-126	P	1.13E-10	2.54E-10
Sr-90	P	3.83E-05	7.93E-05
Tc-99	P	8.11E-11	1.66E-12
Th-229	P	0.00E+00	0.00E+00
Th-230	P	5.22E-11	1.28E-09
Th-232	P	0.00E+00	0.00E+00
U-232	P	1.46E-08	5.25E-09
U-233	P	5.56E-12	1.70E-12
U-234	P	9.72E-08	2.96E-08
U-235	P	9.81E-10	2.99E-10
U-236	P	2.34E-08	7.17E-09
U-238	P	1.90E-08	5.80E-09
Zr-93	P	3.11E-10	7.82E-09
Co-60(Crud)	crud	5.66E-04	1.39E-04
Fe-55(Crud)	crud	2.70E-05	1.91E-05
total		5.34E-03	5.17E-02

	Evaluated Fuel		x			Evaluated Fuel
	Fuel Type	Stable Metal	Stable Metal	Stable Metal	Stable Metal	Stable Metal
	Condition	Intact	Intact	Intact	Intact	Intact
	Fuel Name	PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs	BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs	PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs	BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs	BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs
	# of canisters	1.00	1.00	1.00	1.00	1.00
Isotope	Material Type	(Ci/FA)	(Ci/FA)	(Ci/FA)	(Ci/FA)	(Ci/FA)
Ac-227	P	1.61E-05	0.00E+00	1.04E-05	0.00E+00	0.00E+00
Am-241	P	1.98E+03	5.58E+02	8.71E+02	2.66E+02	5.58E+02
Am-242m	P	6.39E+00	2.17E+00	1.02E+01	3.41E+00	2.17E+00
Am-243	P	2.20E+01	5.34E+00	5.21E+01	1.93E+01	5.34E+00
C-14	P	3.32E-01	1.76E-01	4.89E-01	3.16E-01	1.76E-01
Cd-113m	P	7.66E+00	2.26E+00	3.82E+01	1.39E+01	2.26E+00
Cl-36	P	6.80E-03	2.93E-03	9.69E-03	4.99E-03	2.93E-03
Cm-242	P	5.26E+00	1.78E+00	3.43E+01	1.13E+01	1.78E+00
Cm-243	P	1.03E+01	2.47E+00	3.83E+01	1.12E+01	2.47E+00
Cm-244	P	1.36E+03	2.55E+02	1.12E+04	3.94E+03	2.55E+02
Cm-245	P	3.07E-01	4.03E-02	1.41E+00	3.53E-01	4.03E-02
Cm-246	P	1.04E-01	1.45E-02	8.37E-01	2.96E-01	1.45E-02
Cm-247	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	P	3.13E+02	4.39E+01	5.66E+03	8.53E+02	4.39E+01
Cs-134	C	2.52E+01	6.32E+00	3.72E+04	1.15E+04	6.32E+00
Cs-135	C	3.50E-01	1.39E-01	5.99E-01	2.82E-01	1.39E-01
Cs-137	C	4.11E+04	1.39E+04	9.87E+04	3.87E+04	1.39E+04
Eu-154	P	6.71E+02	1.75E+02	5.77E+03	1.80E+03	1.75E+02
Eu-155	P	5.15E+01	1.60E+01	1.68E+03	6.28E+02	1.60E+01
Fe-55	P	3.46E+00	1.09E+00	6.84E+02	2.34E+02	1.09E+00
H-3	G	1.14E+02	3.95E+01	4.72E+02	1.76E+02	3.95E+01
I-129	G	2.19E-02	7.42E-03	3.38E-02	1.36E-02	7.42E-03
Kr-85	G	1.13E+03	3.81E+02	5.63E+03	2.03E+03	3.81E+02
Nb-93m	P	1.30E+01	4.73E-01	4.53E+01	1.22E+00	4.73E-01
Nb-94	P	8.39E-01	1.87E-02	1.27E+00	3.38E-02	1.87E-02
Ni-59	P	2.09E+00	5.02E-01	2.78E+00	7.78E-01	5.02E-01
Ni-63	P	2.52E+02	5.86E+01	4.16E+02	1.16E+02	5.86E+01
Np-237	P	2.47E-01	6.88E-02	3.84E-01	1.33E-01	6.88E-02
Pa-231	P	2.97E-05	1.39E-05	4.25E-05	2.94E-05	1.39E-05
Pb-210	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pd-107	P	8.41E-02	2.65E-02	1.45E-01	5.69E-02	2.65E-02
Pm-147	P	1.19E+02	3.98E+01	2.34E+04	7.46E+03	3.98E+01
Pu-238	P	2.29E+03	5.85E+02	6.15E+03	2.11E+03	5.85E+02
Pu-239	P	1.77E+02	5.35E+01	1.85E+02	5.36E+01	5.35E+01
Pu-240	P	3.18E+02	1.14E+02	3.90E+02	1.48E+02	1.14E+02
Pu-241	P	2.46E+04	6.78E+03	7.90E+04	2.25E+04	6.78E+03
Pu-242	P	1.64E+00	5.08E-01	3.01E+00	1.26E+00	5.08E-01
Ra-226	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ra-228	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-106	P	1.23E-02	3.00E-03	1.27E+04	3.29E+03	3.00E-03
Sb-125	P	9.71E+00	2.89E+00	2.04E+03	6.21E+02	2.89E+00
Se-79	P	4.57E-02	1.59E-02	6.94E-02	2.88E-02	1.59E-02
Sm-147	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sm-151	P	2.11E+02	5.39E+01	3.13E+02	8.22E+01	5.39E+01
Sn-126	P	3.85E-01	1.27E-01	6.28E-01	2.52E-01	1.27E-01
Sr-90	P	2.72E+04	9.54E+03	6.30E+04	2.52E+04	9.54E+03
Tc-99	P	8.98E+00	3.20E+00	1.28E+01	5.35E+00	3.20E+00
Th-229	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Th-230	P	1.48E-04	6.09E-05	3.57E-05	2.05E-05	6.09E-05
Th-232	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
U-232	P	2.04E-02	4.63E-03	5.31E-02	2.00E-02	4.63E-03
U-233	P	3.79E-05	1.06E-05	2.33E-05	0.00E+00	1.06E-05
U-234	P	6.77E-01	2.50E-01	5.47E-01	2.26E-01	2.50E-01
U-235	P	7.37E-03	2.62E-03	4.16E-03	9.43E-04	2.62E-03
U-236	P	1.72E-01	6.26E-02	2.24E-01	9.55E-02	6.26E-02
U-238	P	1.48E-01	6.32E-02	1.43E-01	6.07E-02	6.32E-02
Zr-93	P	8.94E-01	3.38E-01	1.34E+00	6.03E-01	3.38E-01
Crud						
Co-60(Crud)	P	1.17E+00	3.94E+00	1.63E+01	5.46E+01	3.94E+00
Fe-55(Crud)	P	4.64E+00	2.18E+00	7.45E+02	3.50E+02	2.18E+00

Commercial SNF Release Fractions				
Material Type	Airborne Release Fraction (ARF)	Respirable Fraction (RF)	Total Release Fraction (ARF x RF)	HEPA Filter LPF
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	3.00E-05	5.00E-03	1.50E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Crud				
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Release fractions for Commercial SNF are from CRWMS M&O 1999c, <i>Commercial SNF Accident Release Fractions</i> , ANL-WHS-SE-000002 REV 00.				
BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs				
Stable Metal				
Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	3.00E-05	5.00E-03	1.50E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Breathing Rate:	3.33E-04	[m ³ /s]		
Gound Level Dispersion Factor				
distance [m]	x/Q [sec/m ³]			
11000	2.17E-05	99.5% worst-sector		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs							
Stable Metal	Intact						
Isotope	Curies (entire fuel inventory)	$f_{inv} = 1/n_{Can}$	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Am-241	5.58E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.67E-02	8.37E-05
Am-242m	2.17E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.51E-05	3.26E-07
Am-243	5.34E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.60E-04	8.01E-07
C-14	1.76E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	5.28E-06	2.64E-08
Cd-113m	2.26E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.78E-05	3.39E-07
Cl-36	2.93E-03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	8.79E-08	4.40E-10
Cm-242	1.78E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	5.34E-05	2.67E-07
Cm-243	2.47E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.41E-05	3.71E-07
Cm-244	2.55E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.65E-03	3.83E-05
Cm-245	4.03E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.21E-06	6.05E-09
Cm-246	1.45E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.35E-07	2.18E-09
Cm-247	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Co-60	4.39E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.32E-03	6.59E-06
Cs-134	6.32E+00	1.00E+00	2.00E-04	1.00E+00	1.00E+00	1.26E-03	1.26E-03
Cs-135	1.39E-01	1.00E+00	2.00E-04	1.00E+00	1.00E+00	2.78E-05	2.78E-05
Cs-137	1.39E+04	1.00E+00	2.00E-04	1.00E+00	1.00E+00	2.78E+00	2.78E+00
Eu-154	1.75E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	5.25E-03	2.63E-05
Eu-155	1.60E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.80E-04	2.40E-06
Fe-55	1.09E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.27E-05	1.64E-07
H-3	3.95E+01	1.00E+00	3.00E-01	1.00E+00	1.00E+00	1.19E+01	1.19E+01
I-129	7.42E-03	1.00E+00	3.00E-01	1.00E+00	1.00E+00	2.23E-03	2.23E-03
Kr-85	3.81E+02	1.00E+00	3.00E-01	1.00E+00	1.00E+00	1.14E+02	1.14E+02
Nb-93m	4.73E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.42E-05	7.10E-08
Nb-94	1.87E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	5.61E-07	2.81E-09
Ni-59	5.02E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.51E-05	7.53E-08
Ni-63	5.86E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.76E-03	8.79E-06
Np-237	6.88E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.06E-06	1.03E-08
Pa-231	1.39E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.17E-10	2.09E-12
Pb-210	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Pd-107	2.65E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.95E-07	3.98E-09
Pm-147	3.98E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.19E-03	5.97E-06
Pu-238	5.85E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.76E-02	8.78E-05
Pu-239	5.35E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.61E-03	8.03E-06
Pu-240	1.14E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.42E-03	1.71E-05
Pu-241	6.78E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.03E-01	1.02E-03
Pu-242	5.08E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.52E-05	7.62E-08
Ra-226	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Ra-228	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Ru-106	3.00E-03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	9.00E-08	4.50E-10
Sb-125	2.89E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	8.67E-05	4.34E-07
Se-79	1.59E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.77E-07	2.39E-09
Sm-147	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Sm-151	5.39E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.62E-03	8.09E-06
Sn-126	1.27E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.81E-06	1.91E-08
Sr-90	9.54E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.86E-01	1.43E-03
Tc-99	3.20E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	9.60E-05	4.80E-07
Th-229	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Th-230	6.09E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.83E-09	9.14E-12
Th-232	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
U-232	4.63E-03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.39E-07	6.95E-10
U-233	1.06E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.18E-10	1.59E-12
U-234	2.50E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.50E-06	3.75E-08
U-235	2.62E-03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.86E-08	3.93E-10
U-236	6.26E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.88E-06	9.39E-09
U-238	6.32E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.90E-06	9.48E-09
Zr-93	3.38E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.01E-05	5.07E-08
crud							
Co-60(Crud)	3.94E+00	1.00E+00	1.00E+00	3.00E-01	1.00E+00	3.94E+00	1.18E+00
Fe-55(Crud)	2.18E+00	1.00E+00	1.00E+00	3.00E-01	1.00E+00	2.18E+00	6.54E-01

Inhalation Doses

BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs													
Stable Metal	Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Ac-227	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60(Crud)	57.06%	Am-241	34.16%
Am-241	7.27E-05	5.98E-09	4.12E-05	3.89E-04	4.86E-03	3.58E-09	1.75E-04	2.69E-04	0.00E+00	Cs-137	19.60%	Pu-238	31.36%
Am-242m	2.79E-07	1.20E-11	3.66E-08	1.47E-06	1.84E-05	4.91E-12	6.51E-07	1.00E-06	0.00E+00	Am-241	8.20%	Cm-244	8.42%
Am-243	6.98E-07	3.26E-10	3.81E-07	3.70E-06	4.65E-05	1.78E-10	1.66E-06	2.55E-06	0.00E+00	Pu-238	7.60%	Pu-241	8.03%
C-14	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	3.98E-13	0.00E+00	Cm-244	2.09%	Pu-240	6.79%
Cd-113m	3.01E-10	3.01E-10	3.71E-09	3.01E-10	3.01E-10	3.01E-10	1.18E-08	3.74E-09	0.00E+00	Pu-241	1.85%	Cs-137	4.15%
Cl-36	5.92E-15	5.92E-15	5.36E-13	5.92E-15	5.92E-15	5.92E-15	6.30E-15	6.97E-14	0.00E+00	Pu-240	1.62%	Pu-239	3.18%
Cm-242	4.07E-09	6.74E-12	1.11E-07	2.78E-08	3.48E-07	6.72E-12	1.75E-08	3.33E-08	0.00E+00	Pu-239	0.76%	Co-60(Crud)	3.00%
Cm-243	2.05E-07	6.23E-11	1.92E-07	1.17E-06	1.46E-05	3.79E-11	5.71E-07	8.22E-07	0.00E+00	Sr-90	0.41%	Am-243	0.33%
Cm-244	1.63E-05	1.06E-09	1.97E-05	9.59E-05	1.20E-03	1.03E-09	4.89E-05	6.85E-05	0.00E+00	Fe-55(Crud)	0.39%	Sr-90	0.20%
Cm-245	5.45E-09	1.08E-12	2.91E-09	2.89E-08	3.62E-07	5.95E-13	1.29E-08	1.99E-08	0.00E+00	H-3	0.17%	Am-242m	0.13%
Cm-246	1.94E-09	2.33E-13	1.06E-09	1.04E-08	1.29E-07	1.31E-13	4.62E-09	7.09E-09	0.00E+00	I-129	0.09%	Cm-243	0.10%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-243	0.08%	Fe-55(Crud)	0.06%
Co-60	8.38E-10	3.24E-09	6.07E-08	3.03E-09	2.38E-09	2.85E-09	6.34E-09	1.04E-08	0.00E+00	Am-242m	0.03%	H-3	0.04%
Cs-134	4.39E-07	3.65E-07	3.99E-07	3.99E-07	3.72E-07	3.75E-07	4.70E-07	4.22E-07	0.00E+00	Cm-243	0.03%	Pu-242	0.03%
Cs-135	8.92E-10	8.92E-10	1.05E-09	8.92E-10	8.92E-10	8.92E-10	8.92E-10	9.14E-10	0.00E+00	Cs-134	0.01%	Np-237	0.01%
Cs-137	6.51E-04	5.83E-04	6.56E-04	6.17E-04	5.90E-04	5.89E-04	6.78E-04	6.41E-04	0.00E+00	Pu-242	0.01%	Cs-134	0.00%
Eu-154	8.21E-09	1.09E-08	5.56E-08	7.44E-08	3.67E-07	5.01E-09	7.93E-08	5.43E-08	0.00E+00	Eu-154	0.00%	Eu-154	0.00%
Eu-155	2.28E-11	3.94E-11	7.64E-10	9.18E-10	9.75E-09	1.54E-11	7.12E-10	7.19E-10	0.00E+00	Np-237	0.00%	Cm-245	0.00%
Fe-55	2.29E-12	2.23E-12	4.63E-12	2.26E-12	2.25E-12	2.37E-12	5.29E-12	3.17E-12	0.00E+00	U-234	0.00%	Cm-242	0.00%
H-3	5.48E-06	5.48E-06	5.48E-06	5.48E-06	5.48E-06	5.48E-06	5.48E-06	5.48E-06	0.00E+00	Cm-242	0.00%	Cm-246	0.00%
I-129	5.17E-09	1.24E-08	1.87E-08	8.33E-09	8.21E-09	9.28E-05	7.02E-09	2.79E-06	0.00E+00	Cm-245	0.00%	Sm-151	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60	0.00%	Pm-147	0.00%
Nb-93m	7.89E-13	8.27E-14	1.22E-10	5.41E-13	1.41E-12	5.77E-14	7.49E-13	1.50E-11	0.00E+00	U-236	0.00%	U-234	0.00%
Nb-94	3.57E-13	1.68E-12	5.61E-11	1.69E-12	1.48E-12	1.66E-12	3.34E-12	8.40E-12	0.00E+00	U-238	0.00%	Eu-155	0.00%
Ni-59	7.23E-13	6.97E-13	2.42E-12	7.13E-13	7.07E-13	7.59E-13	7.31E-13	7.21E-13	0.00E+00	Cm-246	0.00%	I-129	0.00%
Ni-63	1.93E-10	1.93E-10	7.21E-10	1.93E-10	1.93E-10	1.93E-10	2.02E-10	1.97E-10	0.00E+00	Cd-113m	0.00%	Zr-93	0.00%
Np-237	8.17E-09	4.66E-12	4.44E-09	7.23E-08	9.02E-07	3.70E-12	6.46E-09	4.03E-08	0.00E+00	U-232	0.00%	U-236	0.00%
Pa-231	3.85E-16	4.90E-16	4.16E-11	3.89E-11	4.85E-10	4.26E-16	1.60E-14	1.93E-11	0.00E+00	Sm-151	0.00%	U-238	0.00%
Pb-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pm-147	0.00%	Co-60	0.00%
Pd-107	1.00E-16	1.00E-16	3.03E-12	5.43E-16	1.45E-15	1.00E-16	2.28E-14	3.67E-13	0.00E+00	Cs-135	0.00%	U-232	0.00%
Pm-147	3.00E-15	5.75E-15	1.24E-08	1.30E-09	1.63E-08	3.16E-15	9.40E-10	1.69E-09	0.00E+00	Eu-155	0.00%	Cs-135	0.00%
Pu-238	6.57E-05	2.35E-09	7.51E-04	3.57E-04	4.46E-03	2.26E-09	1.65E-04	2.49E-04	0.00E+00	U-235	0.00%	Th-230	0.00%
Pu-239	6.82E-06	1.98E-10	6.93E-05	3.63E-05	4.53E-04	1.94E-10	1.62E-05	2.49E-05	0.00E+00	Ni-63	0.00%	Pa-231	0.00%
Pu-240	1.45E-05	4.35E-10	1.48E-04	7.73E-05	9.65E-04	4.14E-10	3.46E-05	5.30E-05	0.00E+00	Zr-93	0.00%	Cd-113m	0.00%
Pu-241	1.85E-05	8.32E-10	8.65E-05	9.14E-05	1.14E-03	3.37E-10	3.56E-05	6.06E-05	0.00E+00	Sb-125	0.00%	Ni-63	0.00%
Pu-242	6.15E-08	1.93E-12	6.25E-07	3.28E-07	4.10E-06	1.79E-12	1.46E-07	2.26E-07	0.00E+00	Tc-99	0.00%	U-235	0.00%
Ra-226	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-230	0.00%	Sn-126	0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pa-231	0.00%	Sb-125	0.00%
Ru-106	1.66E-13	1.65E-13	1.25E-11	1.65E-13	1.65E-13	1.65E-13	2.03E-13	1.55E-12	0.00E+00	Nb-93m	0.00%	Fe-55	0.00%
Sb-125	4.17E-12	4.82E-12	2.52E-10	7.52E-12	3.16E-11	3.76E-12	1.68E-11	3.82E-11	0.00E+00	Sn-126	0.00%	Nb-94	0.00%
Se-79	4.33E-14	4.33E-14	6.26E-13	4.33E-14	4.33E-14	4.33E-14	2.70E-13	1.70E-13	0.00E+00	Nb-94	0.00%	Nb-93m	0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Fe-55	0.00%	Ni-59	0.00%
Sm-151	8.71E-15	3.22E-14	7.05E-10	2.38E-09	2.85E-08	2.85E-15	1.62E-09	1.75E-09	0.00E+00	U-233	0.00%	Tc-99	0.00%
Sn-126	7.28E-12	7.18E-12	7.70E-11	2.86E-11	6.01E-11	6.67E-12	8.97E-12	1.37E-11	0.00E+00	Ru-106	0.00%	U-233	0.00%
Sr-90	1.01E-07	1.01E-07	1.09E-04	1.29E-05	2.78E-05	1.01E-07	2.19E-07	1.34E-05	0.00E+00	Ni-59	0.00%	C-14	0.00%

Inhalation Doses

BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs													
Stable Metal	Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Tc-99	5.80E-13	5.80E-13	2.14E-10	5.80E-13	5.80E-13	1.55E-11	8.03E-12	2.89E-11	0.00E+00	C-14	0.00%	Ru-106	0.00%
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pd-107	0.00%	Se-79	0.00%
Th-230	9.96E-14	9.96E-14	7.33E-11	4.23E-11	5.28E-10	9.96E-14	2.56E-13	2.15E-11	0.00E+00	Se-79	0.00%	Cl-36	0.00%
Th-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cl-36	0.00%	Pd-107	0.00%
U-232	1.49E-12	1.50E-12	2.75E-08	7.54E-11	1.19E-09	1.46E-12	5.77E-11	3.31E-09	0.00E+00	Ac-227	0.00%	Ac-227	0.00%
U-233	1.08E-15	1.08E-15	1.29E-11	3.03E-14	4.76E-13	1.08E-15	4.00E-14	1.56E-12	0.00E+00	Cm-247	0.00%	Cm-247	0.00%
U-234	2.51E-11	2.51E-11	2.99E-07	7.00E-10	1.09E-08	2.51E-11	9.28E-10	3.59E-08	0.00E+00	Kr-85	0.00%	Kr-85	0.00%
U-235	2.49E-13	2.50E-13	2.90E-09	6.91E-12	1.06E-10	2.49E-13	9.03E-12	3.49E-10	0.00E+00	Pb-210	0.00%	Pb-210	0.00%
U-236	5.95E-12	5.95E-12	7.08E-08	1.66E-10	2.61E-09	5.95E-12	2.20E-10	8.51E-09	0.00E+00	Ra-226	0.00%	Ra-226	0.00%
U-238	5.65E-12	5.65E-12	6.74E-08	1.67E-10	2.48E-09	5.63E-12	2.08E-10	8.11E-09	0.00E+00	Ra-228	0.00%	Ra-228	0.00%
Zr-93	2.96E-14	6.34E-14	1.18E-10	2.40E-10	2.96E-09	2.36E-14	2.35E-13	1.18E-10	0.00E+00	Sm-147	0.00%	Sm-147	0.00%
crud										Th-229	0.00%	Th-229	0.00%
Co-60(Crud)	1.50E-04	5.81E-04	1.09E-02	5.44E-04	4.27E-04	5.12E-04	1.14E-03	1.87E-03	0.00E+00	Th-232	0.00%	Th-232	0.00%
Fe-55(Crud)	9.15E-06	8.90E-06	1.85E-05	9.04E-06	8.99E-06	9.48E-06	2.12E-05	1.27E-05	0.00E+00				
total	1.01E-03	1.18E-03	1.28E-02	2.24E-03	1.42E-02	1.21E-03	2.32E-03	3.27E-03	0.00E+00	total	1.00E+00	total	1.00E+00

Air Submersion Doses

BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs											
Stable Metal		Intact									
Air Submersion Doses [rem]										Isotope % of Dose	
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes	% of Total Skin Dose
Ac-227	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Kr-85	68.41%
Am-241	1.15E-09	1.44E-09	9.06E-10	7.00E-10	3.86E-09	1.05E-09	8.52E-10	1.10E-09	1.72E-09	Co-60(Crud)	25.90%
Am-242m	1.99E-13	3.14E-13	8.99E-14	8.99E-14	4.15E-13	1.54E-13	1.01E-13	1.66E-13	7.11E-13	Cs-137	5.54%
Am-243	2.82E-11	3.36E-11	2.47E-11	1.99E-11	9.61E-11	2.69E-11	2.30E-11	2.80E-11	3.54E-11	Sr-90	0.12%
C-14	1.10E-16	1.49E-16	6.49E-17	5.13E-17	2.99E-16	9.28E-17	6.53E-17	9.50E-17	1.03E-13	Eu-154	0.02%
Cd-113m	3.90E-14	4.77E-14	3.23E-14	2.73E-14	1.14E-13	3.68E-14	3.06E-14	3.78E-14	4.62E-11	Co-60	0.01%
Cl-36	1.58E-16	1.88E-16	1.43E-16	1.28E-16	3.97E-16	1.55E-16	1.36E-16	1.57E-16	1.04E-13	Cs-134	0.01%
Cm-242	3.36E-14	6.35E-14	4.84E-15	8.10E-15	4.54E-14	2.11E-14	9.73E-15	2.44E-14	1.84E-13	Am-241	0.00%
Cm-243	3.43E-11	3.97E-11	3.27E-11	2.97E-11	8.92E-11	3.43E-11	3.09E-11	3.50E-11	5.82E-11	I-129	0.00%
Cm-244	4.24E-12	8.17E-12	4.35E-13	8.97E-13	5.42E-12	2.57E-12	1.11E-12	3.02E-12	2.40E-11	Sb-125	0.00%
Cm-245	3.77E-13	4.42E-13	3.52E-13	3.08E-13	1.15E-12	3.73E-13	3.30E-13	3.84E-13	5.20E-13	Eu-155	0.00%
Cm-246	2.18E-16	4.19E-16	2.44E-17	4.72E-17	2.85E-16	1.33E-16	5.83E-17	1.56E-16	1.22E-15	Pm-147	0.00%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-243	0.00%
Co-60	1.30E-08	1.47E-08	1.31E-08	1.30E-08	1.88E-08	1.34E-08	1.27E-08	1.33E-08	1.53E-08	Pu-238	0.00%
Cs-134	7.51E-09	8.56E-09	7.48E-09	7.30E-09	1.22E-08	7.68E-09	7.16E-09	7.68E-09	9.59E-09	Cd-113m	0.00%
Cs-135	1.40E-15	1.84E-15	9.35E-16	7.46E-16	4.04E-15	1.23E-15	9.13E-16	1.26E-15	2.02E-12	Sn-126	0.00%
Cs-137	5.96E-06	6.80E-06	5.91E-06	5.77E-06	9.78E-06	6.08E-06	5.66E-06	6.08E-06	9.80E-06	Am-243	0.00%
Eu-154	2.53E-08	2.87E-08	2.52E-08	2.47E-08	3.97E-08	2.59E-08	2.42E-08	2.59E-08	3.49E-08	Cm-244	0.00%
Eu-155	9.60E-11	1.14E-10	8.56E-11	7.13E-11	3.12E-10	9.29E-11	7.98E-11	9.60E-11	1.31E-10	Tc-99	0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-240	0.00%
H-3	0.00E+00	0.00E+00	2.62E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.15E-10	0.00E+00	Nb-94	0.00%
I-129	8.63E-11	1.19E-10	3.82E-11	2.93E-11	1.97E-10	6.90E-11	4.11E-11	6.79E-11	1.97E-10	Pu-239	0.00%
Kr-85	1.07E-06	1.23E-06	1.05E-06	1.00E-06	2.02E-06	1.08E-06	1.00E-06	1.09E-06	1.21E-04	Cs-135	0.00%
Nb-93m	7.21E-15	1.49E-14	2.91E-16	1.34E-15	7.88E-15	3.91E-15	1.55E-15	5.06E-15	4.88E-14	Pu-241	0.00%
Nb-94	3.40E-12	3.86E-12	3.38E-12	3.31E-12	5.36E-12	3.48E-12	3.24E-12	3.47E-12	4.29E-12	Ru-106	0.00%
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-242m	0.00%
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-245	0.00%
Np-237	1.72E-13	2.09E-13	1.49E-13	1.27E-13	5.30E-13	1.65E-13	1.41E-13	1.71E-13	2.55E-13	Np-237	0.00%
Pa-231	5.73E-17	6.66E-17	5.42E-17	5.09E-17	1.22E-16	5.69E-17	5.16E-17	5.76E-17	8.17E-17	Cm-242	0.00%
Pb-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cl-36	0.00%
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	C-14	0.00%
Pm-147	7.17E-14	9.16E-14	5.22E-14	4.28E-14	2.09E-13	6.47E-14	5.04E-14	6.64E-14	7.77E-11	U-235	0.00%
Pu-238	9.24E-12	1.79E-11	1.49E-12	2.37E-12	1.31E-11	5.65E-12	2.80E-12	6.88E-12	5.76E-11	Nb-93m	0.00%
Pu-239	6.24E-13	9.73E-13	3.41E-13	3.44E-13	1.22E-12	5.00E-13	3.69E-13	5.46E-13	2.40E-12	Pu-242	0.00%
Pu-240	1.75E-12	3.38E-12	2.99E-13	4.53E-13	2.54E-12	1.08E-12	5.38E-13	1.30E-12	1.08E-11	U-234	0.00%
Pu-241	1.17E-12	1.42E-12	1.06E-12	9.19E-13	3.58E-12	1.14E-12	9.95E-13	1.18E-12	1.91E-12	Sm-151	0.00%
Pu-242	6.53E-15	1.26E-14	1.19E-15	1.75E-15	9.67E-15	4.06E-15	2.06E-15	4.91E-15	4.00E-14	Se-79	0.00%
Ra-226	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236	0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-238	0.00%
Ru-106	7.30E-14	8.38E-14	7.30E-14	7.05E-14	1.24E-13	7.44E-14	6.96E-14	7.52E-14	7.88E-13	Cm-246	0.00%
Sb-125	1.38E-10	1.58E-10	1.36E-10	1.30E-10	2.46E-10	1.40E-10	1.29E-10	1.41E-10	1.84E-10	U-232	0.00%
Se-79	1.33E-17	1.79E-17	8.08E-18	6.40E-18	3.68E-17	1.13E-17	8.04E-18	1.16E-17	1.42E-14	Pa-231	0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-230	0.00%
Sm-151	6.75E-15	1.14E-14	9.19E-16	1.47E-15	9.20E-15	4.65E-15	1.93E-15	4.69E-15	2.47E-14	U-233	0.00%
Sn-126	2.31E-11	2.64E-11	2.29E-11	2.21E-11	4.00E-11	2.35E-11	2.19E-11	2.36E-11	4.00E-11	Ac-227	0.00%
Sr-90	1.79E-10	2.18E-10	1.48E-10	1.25E-10	5.24E-10	1.68E-10	1.40E-10	1.73E-10	2.11E-07	Cm-247	0.00%
Tc-99	1.34E-14	1.70E-14	9.94E-15	8.09E-15	3.98E-14	1.21E-14	9.56E-15	1.25E-14	2.11E-11	Fe-55	0.00%
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Fe-55(Crud)	0.00%
Th-230	2.64E-18	3.49E-18	2.10E-18	1.79E-18	7.76E-18	2.39E-18	2.01E-18	2.55E-18	6.62E-18	H-3	0.00%
Th-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ni-59	0.00%
U-232	1.73E-16	2.59E-16	1.10E-16	1.00E-16	4.30E-16	1.44E-16	1.12E-16	1.58E-16	6.60E-16	Ni-63	0.00%
U-233	4.31E-19	5.67E-19	3.45E-19	3.17E-19	1.05E-18	3.96E-19	3.34E-19	4.16E-19	1.17E-18	Pb-210	0.00%
U-234	5.29E-15	8.67E-15	2.64E-15	2.53E-15	1.20E-14	4.03E-15	2.89E-15	4.59E-15	2.56E-14	Pd-107	0.00%
U-235	4.45E-14	5.12E-14	4.26E-14	3.88E-14	1.16E-13	4.45E-14	4.02E-14	4.54E-14	5.45E-14	Ra-226	0.00%
U-236	9.20E-16	1.66E-15	3.29E-16	3.51E-16	1.79E-15	6.32E-16	4.07E-16	7.55E-16	5.38E-15	Ra-228	0.00%
U-238	6.68E-16	1.30E-15	1.52E-16	1.89E-16	1.13E-15	4.14E-16	2.30E-16	5.19E-16	4.43E-15	Sm-147	0.00%
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-229	0.00%
crud										Th-232	0.00%
Co-60(Crud)	3.89E-05	4.40E-05	3.92E-05	3.89E-05	5.63E-05	4.02E-05	3.80E-05	3.99E-05	4.59E-05	Zr-93	0.00%
Fe-55(Crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
total	4.60E-05	5.21E-05	4.62E-05	4.57E-05	6.82E-05	4.74E-05	4.47E-05	4.71E-05	1.77E-04	total	1.00E+00

BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs

Stable Metal Intact

	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	1.01E-03		4.60E-05			
Breast	1.18E-03		5.21E-05			
Lung	1.28E-02		4.62E-05			
R Marrow	2.24E-03		4.57E-05			
B Surface	1.42E-02	<CDE	6.82E-05			
Thyroid	1.21E-03		4.74E-05			
Remainder	2.32E-03		4.47E-05			
Whole Body	3.27E-03	<CEDE	4.71E-05	<DDE	3.32E-03	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	1.77E-04	<SKIN	1.77E-04	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					1.43E-02	<CDE + DDE

Summary of Offsite Dose

BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs

Isotope	Material Type	Offsite Doses [rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	0.00E+00	0.00E+00
Am-241	P	2.69E-04	4.86E-03
Am-242m	P	1.00E-06	1.84E-05
Am-243	P	2.55E-06	4.65E-05
C-14	P	3.98E-13	3.98E-13
Cd-113m	P	3.74E-09	3.01E-10
Cl-36	P	6.98E-14	6.08E-15
Cm-242	P	3.33E-08	3.48E-07
Cm-243	P	8.22E-07	1.46E-05
Cm-244	P	6.85E-05	1.20E-03
Cm-245	P	1.99E-08	3.62E-07
Cm-246	P	7.09E-09	1.29E-07
Cm-247	P	0.00E+00	0.00E+00
Co-60	P	2.37E-08	1.57E-08
Cs-134	C	4.30E-07	3.79E-07
Cs-135	C	9.14E-10	8.92E-10
Cs-137	C	6.48E-04	5.96E-04
Eu-154	P	8.01E-08	3.93E-07
Eu-155	P	8.15E-10	9.85E-09
Fe-55	P	3.17E-12	2.25E-12
H-3	G	5.48E-06	5.48E-06
I-129	G	2.79E-06	8.28E-09
Kr-85	G	1.09E-06	1.09E-06
Nb-93m	P	1.50E-11	1.41E-12
Nb-94	P	1.19E-11	4.95E-12
Ni-59	P	7.21E-13	7.07E-13
Ni-63	P	1.97E-10	1.93E-10
Np-237	P	4.03E-08	9.02E-07
Pa-231	P	1.93E-11	4.85E-10
Pb-210	P	0.00E+00	0.00E+00
Pd-107	P	3.67E-13	1.45E-15
Pm-147	P	1.69E-09	1.63E-08
Pu-238	P	2.49E-04	4.46E-03
Pu-239	P	2.49E-05	4.53E-04
Pu-240	P	5.30E-05	9.65E-04
Pu-241	P	6.06E-05	1.14E-03
Pu-242	P	2.26E-07	4.10E-06
Ra-226	P	0.00E+00	0.00E+00
Ra-228	P	0.00E+00	0.00E+00
Ru-106	P	1.63E-12	2.40E-13
Sb-125	P	1.79E-10	1.72E-10
Se-79	P	1.70E-13	4.33E-14
Sm-147	P	0.00E+00	0.00E+00
Sm-151	P	1.75E-09	2.98E-08
Sn-126	P	3.73E-11	8.37E-11
Sr-90	P	1.34E-05	2.78E-05
Tc-99	P	2.89E-11	5.93E-13
Th-229	P	0.00E+00	0.00E+00
Th-230	P	2.15E-11	5.28E-10
Th-232	P	0.00E+00	0.00E+00
U-232	P	3.31E-09	1.19E-09
U-233	P	1.56E-12	4.76E-13
U-234	P	3.59E-08	1.09E-08
U-235	P	3.49E-10	1.06E-10
U-236	P	8.51E-09	2.61E-09
U-238	P	8.11E-09	2.48E-09
Zr-93	P	1.18E-10	2.96E-09
Co-60(Crud)	crud	1.91E-03	4.66E-04
Fe-55(Crud)	crud	1.27E-05	8.99E-06
total		3.32E-03	1.43E-02

	Evaluated Fuel			x		Evaluated Fuel
	Fuel Type	Stable Metal	Stable Metal	Stable Metal	Stable Metal	Stable Metal
	Condition	Intact	Intact	Intact	Intact	Intact
	Fuel Name	PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs	BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs	PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs	BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs	PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs
	# of canisters	1.00	1.00	1.00	1.00	1.00
Isotope	Material Type	(Ci/FA)	(Ci/FA)	(Ci/FA)	(Ci/FA)	(Ci/FA)
Ac-227	P	1.61E-05	0.00E+00	1.04E-05	0.00E+00	1.04E-05
Am-241	P	1.98E+03	5.58E+02	8.71E+02	2.66E+02	8.71E+02
Am-242m	P	6.39E+00	2.17E+00	1.02E+01	3.41E+00	1.02E+01
Am-243	P	2.20E+01	5.34E+00	5.21E+01	1.93E+01	5.21E+01
C-14	P	3.32E-01	1.76E-01	4.89E-01	3.16E-01	4.89E-01
Cd-113m	P	7.66E+00	2.26E+00	3.82E+01	1.39E+01	3.82E+01
Cl-36	P	6.80E-03	2.93E-03	9.69E-03	4.99E-03	9.69E-03
Cm-242	P	5.26E+00	1.78E+00	3.43E+01	1.13E+01	3.43E+01
Cm-243	P	1.03E+01	2.47E+00	3.83E+01	1.12E+01	3.83E+01
Cm-244	P	1.36E+03	2.55E+02	1.12E+04	3.94E+03	1.12E+04
Cm-245	P	3.07E-01	4.03E-02	1.41E+00	3.53E-01	1.41E+00
Cm-246	P	1.04E-01	1.45E-02	8.37E-01	2.96E-01	8.37E-01
Cm-247	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	P	3.13E+02	4.39E+01	5.66E+03	8.53E+02	5.66E+03
Cs-134	C	2.52E+01	6.32E+00	3.72E+04	1.15E+04	3.72E+04
Cs-135	C	3.50E-01	1.39E-01	5.99E-01	2.82E-01	5.99E-01
Cs-137	C	4.11E+04	1.39E+04	9.87E+04	3.87E+04	9.87E+04
Eu-154	P	6.71E+02	1.75E+02	5.77E+03	1.80E+03	5.77E+03
Eu-155	P	5.15E+01	1.60E+01	1.68E+03	6.28E+02	1.68E+03
Fe-55	P	3.46E+00	1.09E+00	6.84E+02	2.34E+02	6.84E+02
H-3	G	1.14E+02	3.95E+01	4.72E+02	1.76E+02	4.72E+02
I-129	G	2.19E-02	7.42E-03	3.38E-02	1.36E-02	3.38E-02
Kr-85	G	1.13E+03	3.81E+02	5.63E+03	2.03E+03	5.63E+03
Nb-93m	P	1.30E+01	4.73E-01	4.53E+01	1.22E+00	4.53E+01
Nb-94	P	8.39E-01	1.87E-02	1.27E+00	3.38E-02	1.27E+00
Ni-59	P	2.09E+00	5.02E-01	2.78E+00	7.78E-01	2.78E+00
Ni-63	P	2.52E+02	5.86E+01	4.16E+02	1.16E+02	4.16E+02
Np-237	P	2.47E-01	6.88E-02	3.84E-01	1.33E-01	3.84E-01
Pa-231	P	2.97E-05	1.39E-05	4.25E-05	2.94E-05	4.25E-05
Pb-210	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pd-107	P	8.41E-02	2.65E-02	1.45E-01	5.69E-02	1.45E-01
Pm-147	P	1.19E+02	3.98E+01	2.34E+04	7.46E+03	2.34E+04
Pu-238	P	2.29E+03	5.85E+02	6.15E+03	2.11E+03	6.15E+03
Pu-239	P	1.77E+02	5.35E+01	1.85E+02	5.36E+01	1.85E+02
Pu-240	P	3.18E+02	1.14E+02	3.90E+02	1.48E+02	3.90E+02
Pu-241	P	2.46E+04	6.78E+03	7.90E+04	2.25E+04	7.90E+04
Pu-242	P	1.64E+00	5.08E-01	3.01E+00	1.26E+00	3.01E+00
Ra-226	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ra-228	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-106	P	1.23E-02	3.00E-03	1.27E+04	3.29E+03	1.27E+04
Sb-125	P	9.71E+00	2.89E+00	2.04E+03	6.21E+02	2.04E+03
Se-79	P	4.57E-02	1.59E-02	6.94E-02	2.88E-02	6.94E-02
Sm-147	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sm-151	P	2.11E+02	5.39E+01	3.13E+02	8.22E+01	3.13E+02
Sn-126	P	3.85E-01	1.27E-01	6.28E-01	2.52E-01	6.28E-01
Sr-90	P	2.72E+04	9.54E+03	6.30E+04	2.52E+04	6.30E+04
Tc-99	P	8.98E+00	3.20E+00	1.28E+01	5.35E+00	1.28E+01
Th-229	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Th-230	P	1.48E-04	6.09E-05	3.57E-05	2.05E-05	3.57E-05
Th-232	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
U-232	P	2.04E-02	4.63E-03	5.31E-02	2.00E-02	5.31E-02
U-233	P	3.79E-05	1.06E-05	2.33E-05	0.00E+00	2.33E-05
U-234	P	6.77E-01	2.50E-01	5.47E-01	2.26E-01	5.47E-01
U-235	P	7.37E-03	2.62E-03	4.16E-03	9.43E-04	4.16E-03
U-236	P	1.72E-01	6.26E-02	2.24E-01	9.55E-02	2.24E-01
U-238	P	1.48E-01	6.32E-02	1.43E-01	6.07E-02	1.43E-01
Zr-93	P	8.94E-01	3.38E-01	1.34E+00	6.03E-01	1.34E+00
Crud						
Co-60(Crud)	P	1.17E+00	3.94E+00	1.63E+01	5.46E+01	1.63E+01
Fe-55(Crud)	P	4.64E+00	2.18E+00	7.45E+02	3.50E+02	7.45E+02

Commercial SNF Release Fractions				
Material Type	Airborne Release Fraction (ARF)	Respirable Fraction (RF)	Total Release Fraction (ARF x RF)	HEPA Filter LPF
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	3.00E-05	5.00E-03	1.50E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Crud				
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Release fractions for Commercial SNF are from CRWMS M&O 1999c, <i>Commercial SNF Accident Release Fractions</i> , ANL-WHS-SE-000002 REV 00.				
PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs				
Stable Metal				
Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	3.00E-05	5.00E-03	1.50E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Breathing Rate:	3.33E-04	[m ³ /s]		
Gound Level Dispersion Factor				
distance [m]	x/Q [sec/m ³]			
11000	2.17E-05	99.5% worst-sector		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs							
Stable Metal	Intact						
Isotope	Curies (entire fuel inventory)	$f_{inv} = 1/n_{Can}$	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	1.04E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.12E-10	1.56E-12
Am-241	8.71E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.61E-02	1.31E-04
Am-242m	1.02E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.06E-04	1.53E-06
Am-243	5.21E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.56E-03	7.82E-06
C-14	4.89E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.47E-05	7.34E-08
Cd-113m	3.82E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.15E-03	5.73E-06
Cl-36	9.69E-03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.91E-07	1.45E-09
Cm-242	3.43E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.03E-03	5.15E-06
Cm-243	3.83E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.15E-03	5.75E-06
Cm-244	1.12E+04	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.36E-01	1.68E-03
Cm-245	1.41E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.23E-05	2.12E-07
Cm-246	8.37E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.51E-05	1.26E-07
Cm-247	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Co-60	5.66E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.70E-01	8.49E-04
Cs-134	3.72E+04	1.00E+00	2.00E-04	1.00E+00	1.00E+00	7.44E+00	7.44E+00
Cs-135	5.99E-01	1.00E+00	2.00E-04	1.00E+00	1.00E+00	1.20E-04	1.20E-04
Cs-137	9.87E+04	1.00E+00	2.00E-04	1.00E+00	1.00E+00	1.97E+01	1.97E+01
Eu-154	5.77E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.73E-01	8.66E-04
Eu-155	1.68E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	5.04E-02	2.52E-04
Fe-55	6.84E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.05E-02	1.03E-04
H-3	4.72E+02	1.00E+00	3.00E-01	1.00E+00	1.00E+00	1.42E+02	1.42E+02
I-129	3.38E-02	1.00E+00	3.00E-01	1.00E+00	1.00E+00	1.01E-02	1.01E-02
Kr-85	5.63E+03	1.00E+00	3.00E-01	1.00E+00	1.00E+00	1.69E+03	1.69E+03
Nb-93m	4.53E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.36E-03	6.80E-06
Nb-94	1.27E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.81E-05	1.91E-07
Ni-59	2.78E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	8.34E-05	4.17E-07
Ni-63	4.16E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.25E-02	6.24E-05
Np-237	3.84E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.15E-05	5.76E-08
Pa-231	4.25E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.28E-09	6.38E-12
Pb-210	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Pd-107	1.45E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.35E-06	2.18E-08
Pm-147	2.34E+04	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.02E-01	3.51E-03
Pu-238	6.15E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.85E-01	9.23E-04
Pu-239	1.85E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	5.55E-03	2.78E-05
Pu-240	3.90E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.17E-02	5.85E-05
Pu-241	7.90E+04	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.37E+00	1.19E-02
Pu-242	3.01E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	9.03E-05	4.52E-07
Ra-226	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Ra-228	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Ru-106	1.27E+04	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.81E-01	1.91E-03
Sb-125	2.04E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.12E-02	3.06E-04
Se-79	6.94E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.08E-06	1.04E-08
Sm-147	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Sm-151	3.13E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	9.39E-03	4.70E-05
Sn-126	6.28E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.88E-05	9.42E-08
Sr-90	6.30E+04	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.89E+00	9.45E-03
Tc-99	1.28E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.84E-04	1.92E-06
Th-229	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Th-230	3.57E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.07E-09	5.36E-12
Th-232	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
U-232	5.31E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.59E-06	7.97E-09
U-233	2.33E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.99E-10	3.50E-12
U-234	5.47E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.64E-05	8.21E-08
U-235	4.16E-03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.25E-07	6.24E-10
U-236	2.24E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.72E-06	3.36E-08
U-238	1.43E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.29E-06	2.15E-08
Zr-93	1.34E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.02E-05	2.01E-07
crud							
Co-60(Crud)	1.63E+01	1.00E+00	1.00E+00	3.00E-01	1.00E+00	1.63E+01	4.89E+00
Fe-55(Crud)	7.45E+02	1.00E+00	1.00E+00	3.00E-01	1.00E+00	7.45E+02	2.24E+02

Inhalation Doses

PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs													
Stable Metal	Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Ac-227	1.65E-11	2.78E-15	6.42E-11	1.07E-10	1.34E-09	1.50E-15	6.13E-11	7.55E-11	0.00E+00	Co-60(Crud)	29.33%	Cm-244	38.23%
Am-241	1.14E-04	9.33E-09	6.43E-05	6.08E-04	7.58E-03	5.59E-09	2.73E-04	4.19E-04	0.00E+00	Cs-137	17.29%	Pu-238	34.09%
Am-242m	1.31E-06	5.65E-11	1.72E-07	6.91E-06	8.67E-05	2.31E-11	3.06E-06	4.70E-06	0.00E+00	Fe-55(Crud)	16.47%	Pu-241	9.68%
Am-243	6.81E-06	3.18E-09	3.72E-06	3.61E-05	4.53E-04	1.73E-09	1.62E-05	2.49E-05	0.00E+00	Cm-244	11.42%	Am-241	5.51%
C-14	1.11E-12	1.11E-12	1.11E-12	1.11E-12	1.11E-12	1.11E-12	1.11E-12	1.11E-12	0.00E+00	Pu-238	9.92%	Cs-137	3.05%
Cd-113m	5.09E-09	5.09E-09	6.27E-08	5.09E-09	5.09E-09	5.09E-09	1.99E-07	6.33E-08	0.00E+00	Cs-134	9.44%	Pu-240	2.40%
Cl-36	1.96E-14	1.96E-14	1.77E-12	1.96E-14	1.96E-14	1.96E-14	2.08E-14	2.30E-13	0.00E+00	Pu-241	2.68%	Fe-55(Crud)	2.23%
Cm-242	7.84E-08	1.30E-10	2.13E-06	5.36E-07	6.70E-06	1.29E-10	3.37E-07	6.42E-07	0.00E+00	Am-241	1.59%	Cs-134	1.59%
Cm-243	3.18E-06	9.66E-10	2.98E-06	1.81E-05	2.26E-04	5.88E-10	8.85E-06	1.27E-05	0.00E+00	Pu-240	0.69%	Co-60(Crud)	1.28%
Cm-244	7.14E-04	4.67E-08	8.67E-04	4.21E-03	5.26E-02	4.54E-08	2.15E-03	3.01E-03	0.00E+00	Sr-90	0.34%	Pu-239	1.14%
Cm-245	1.91E-07	3.78E-11	1.02E-07	1.01E-06	1.27E-05	2.08E-11	4.50E-07	6.96E-07	0.00E+00	Pu-239	0.33%	Am-243	0.33%
Cm-246	1.12E-07	1.34E-11	6.11E-08	5.98E-07	7.45E-06	7.59E-12	2.67E-07	4.10E-07	0.00E+00	H-3	0.25%	Cm-243	0.16%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-243	0.09%	Sr-90	0.13%
Co-60	1.08E-07	4.18E-07	7.83E-06	3.90E-07	3.06E-07	3.68E-07	8.17E-07	1.34E-06	0.00E+00	Cm-243	0.05%	Am-242m	0.06%
Cs-134	2.59E-03	2.15E-03	2.35E-03	2.35E-03	2.19E-03	2.21E-03	2.76E-03	2.49E-03	0.00E+00	I-129	0.05%	H-3	0.05%
Cs-135	3.84E-09	3.84E-09	4.52E-09	3.84E-09	3.84E-09	3.84E-09	3.84E-09	3.94E-09	0.00E+00	Ru-106	0.02%	Pu-242	0.02%
Cs-137	4.62E-03	4.14E-03	4.66E-03	4.38E-03	4.19E-03	4.19E-03	4.81E-03	4.55E-03	0.00E+00	Am-242m	0.02%	Cm-245	0.01%
Eu-154	2.71E-07	3.59E-07	1.83E-06	2.45E-06	1.21E-05	1.65E-07	2.61E-06	1.79E-06	0.00E+00	Eu-154	0.01%	Eu-154	0.01%
Eu-155	2.40E-09	4.14E-09	8.02E-08	9.63E-08	1.02E-06	1.62E-09	7.48E-08	7.55E-08	0.00E+00	Co-60	0.01%	Pm-147	0.01%
Fe-55	1.43E-09	1.40E-09	2.91E-09	1.42E-09	1.41E-09	1.49E-09	3.32E-09	1.99E-09	0.00E+00	Pu-242	0.01%	Cm-246	0.01%
H-3	6.55E-05	6.55E-05	6.55E-05	6.55E-05	6.55E-05	6.55E-05	6.55E-05	6.55E-05	0.00E+00	Pm-147	0.00%	Cm-242	0.00%
I-129	2.36E-08	5.67E-08	8.51E-08	3.80E-08	3.74E-08	4.23E-04	3.20E-08	1.27E-05	0.00E+00	Cm-245	0.00%	Np-237	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-242	0.00%	Eu-155	0.00%
Nb-93m	7.56E-11	7.92E-12	1.17E-08	5.18E-11	1.35E-10	5.52E-12	7.18E-11	1.44E-09	0.00E+00	Cm-246	0.00%	Ru-106	0.00%
Nb-94	2.42E-11	1.14E-10	3.81E-09	1.15E-10	1.00E-10	1.13E-10	2.27E-10	5.70E-10	0.00E+00	Np-237	0.00%	Co-60	0.00%
Ni-59	4.00E-12	3.86E-12	1.34E-11	3.95E-12	3.91E-12	4.20E-12	4.05E-12	3.99E-12	0.00E+00	U-234	0.00%	Sm-151	0.00%
Ni-63	1.37E-09	1.37E-09	5.12E-09	1.37E-09	1.37E-09	1.37E-09	1.43E-09	1.40E-09	0.00E+00	Eu-155	0.00%	I-129	0.00%
Np-237	4.56E-08	2.60E-11	2.48E-08	4.03E-07	5.04E-06	2.06E-11	3.60E-08	2.25E-07	0.00E+00	Cd-113m	0.00%	U-234	0.00%
Pa-231	1.18E-15	1.50E-15	1.27E-10	1.19E-10	1.48E-09	1.30E-15	4.89E-14	5.91E-11	0.00E+00	U-232	0.00%	Sb-125	0.00%
Pb-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236	0.00%	U-232	0.00%
Pd-107	5.50E-16	5.50E-16	1.66E-11	2.97E-15	7.91E-15	5.50E-16	1.25E-13	2.01E-12	0.00E+00	Sb-125	0.00%	Zr-93	0.00%
Pm-147	1.76E-12	3.38E-12	7.26E-06	7.66E-07	9.57E-06	1.86E-12	5.53E-07	9.95E-07	0.00E+00	U-238	0.00%	U-236	0.00%
Pu-238	6.91E-04	2.47E-08	7.89E-03	3.75E-03	4.69E-02	2.37E-08	1.73E-03	2.61E-03	0.00E+00	Sm-151	0.00%	U-238	0.00%
Pu-239	2.36E-05	6.84E-10	2.40E-04	1.25E-04	1.57E-03	6.70E-10	5.61E-05	8.61E-05	0.00E+00	Cs-135	0.00%	Cd-113m	0.00%
Pu-240	4.97E-05	1.49E-09	5.05E-04	2.64E-04	3.30E-03	1.42E-09	1.18E-04	1.81E-04	0.00E+00	Fe-55	0.00%	Cs-135	0.00%
Pu-241	2.16E-04	9.69E-09	1.01E-03	1.06E-03	1.33E-02	3.93E-09	4.15E-04	7.07E-04	0.00E+00	Nb-93m	0.00%	Pa-231	0.00%
Pu-242	3.65E-07	1.14E-11	3.71E-06	1.94E-06	2.43E-05	1.06E-11	8.67E-07	1.34E-06	0.00E+00	Ni-63	0.00%	Fe-55	0.00%
Ra-226	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Nb-94	0.00%	Ni-63	0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-235	0.00%	Ac-227	0.00%
Ru-106	7.03E-07	6.98E-07	5.30E-05	6.98E-07	6.98E-07	6.98E-07	8.61E-07	6.57E-06	0.00E+00	Zr-93	0.00%	Th-230	0.00%
Sb-125	2.95E-09	3.40E-09	1.78E-07	5.31E-09	2.23E-08	2.65E-09	1.19E-08	2.70E-08	0.00E+00	Tc-99	0.00%	Sn-126	0.00%
Se-79	1.89E-13	1.89E-13	2.73E-12	1.89E-13	1.89E-13	1.89E-13	1.18E-12	7.40E-13	0.00E+00	Ac-227	0.00%	U-235	0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sn-126	0.00%	Nb-93m	0.00%
Sm-151	5.06E-14	1.87E-13	4.09E-09	1.38E-08	1.73E-07	1.66E-14	9.43E-09	1.02E-08	0.00E+00	Pa-231	0.00%	Nb-94	0.00%
Sn-126	3.60E-11	3.55E-11	3.81E-10	1.42E-10	2.97E-10	3.30E-11	4.44E-11	6.78E-11	0.00E+00	Th-230	0.00%	Ni-59	0.00%
Sr-90	6.67E-07	6.67E-07	7.23E-04	8.49E-05	1.84E-04	6.67E-07	1.45E-06	8.87E-05	0.00E+00	Ni-59	0.00%	Tc-99	0.00%

PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs													
Stable Metal	Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Bone Surface)
Tc-99	2.32E-12	2.32E-12	8.57E-10	2.32E-12	2.32E-12	6.21E-11	3.21E-11	1.16E-10	0.00E+00	U-233	0.00%	C-14	0.00%
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pd-107	0.00%	U-233	0.00%
Th-230	5.84E-14	5.84E-14	4.30E-11	2.48E-11	3.09E-10	5.84E-14	1.50E-13	1.26E-11	0.00E+00	C-14	0.00%	Se-79	0.00%
Th-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Se-79	0.00%	Cl-36	0.00%
U-232	1.70E-11	1.72E-11	3.15E-07	8.65E-10	1.37E-08	1.67E-11	6.62E-10	3.79E-08	0.00E+00	Cl-36	0.00%	Pd-107	0.00%
U-233	2.37E-15	2.37E-15	2.84E-11	6.65E-14	1.05E-12	2.37E-15	8.78E-14	3.42E-12	0.00E+00	Cm-247	0.00%	Cm-247	0.00%
U-234	5.48E-11	5.48E-11	6.54E-07	1.53E-09	2.39E-08	5.48E-11	2.03E-09	7.85E-08	0.00E+00	Kr-85	0.00%	Kr-85	0.00%
U-235	3.95E-13	3.97E-13	4.60E-09	1.10E-11	1.69E-10	3.95E-13	1.43E-11	5.54E-10	0.00E+00	Pb-210	0.00%	Pb-210	0.00%
U-236	2.13E-11	2.13E-11	2.53E-07	5.93E-10	9.34E-09	2.13E-11	7.88E-10	3.05E-08	0.00E+00	Ra-226	0.00%	Ra-226	0.00%
U-238	1.28E-11	1.28E-11	1.53E-07	3.77E-10	5.61E-09	1.27E-11	4.71E-10	1.84E-08	0.00E+00	Ra-228	0.00%	Ra-228	0.00%
Zr-93	1.17E-13	2.52E-13	4.69E-10	9.51E-10	1.17E-08	9.35E-14	9.30E-13	4.66E-10	0.00E+00	Sm-147	0.00%	Sm-147	0.00%
crud										Th-229	0.00%	Th-229	0.00%
Co-60(Crud)	6.22E-04	2.41E-03	4.51E-02	2.25E-03	1.77E-03	2.12E-03	4.71E-03	7.73E-03	0.00E+00	Th-232	0.00%	Th-232	0.00%
Fe-55(Crud)	3.13E-03	3.04E-03	6.33E-03	3.09E-03	3.07E-03	3.24E-03	7.23E-03	4.34E-03	0.00E+00				
total	1.28E-02	1.18E-02	6.99E-02	2.23E-02	1.37E-01	1.22E-02	2.44E-02	2.63E-02	0.00E+00				

Air Submersion Doses

PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs												
Stable Metal		Intact										
	Air Submersion Doses [rem]									Isotope % of Dose		
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes	% of Total Skin Dose	
Ac-227	9.40E-19	1.12E-18	8.46E-19	7.37E-19	2.60E-18	9.15E-19	7.97E-19	9.37E-19	8.23E-18	Kr-85	84.68%	
Am-241	1.80E-09	2.24E-09	1.41E-09	1.09E-09	6.02E-09	1.64E-09	1.33E-09	1.72E-09	2.69E-09	Co-60(Crud)	8.98%	
Am-242m	9.34E-13	1.48E-12	4.23E-13	4.23E-13	1.95E-12	7.25E-13	4.77E-13	7.79E-13	3.34E-12	Cs-137	3.29%	
Am-243	2.75E-10	3.28E-10	2.41E-10	1.95E-10	9.37E-10	2.62E-10	2.25E-10	2.74E-10	3.45E-10	Cs-134	2.67%	
C-14	3.05E-16	4.15E-16	1.80E-16	1.43E-16	8.32E-16	2.58E-16	1.81E-16	2.64E-16	2.86E-13	Ru-106	0.16%	
Cd-113m	6.60E-13	8.06E-13	5.46E-13	4.61E-13	1.93E-12	6.22E-13	5.18E-13	6.39E-13	7.80E-10	Co-60	0.09%	
Cl-36	5.23E-16	6.21E-16	4.71E-16	4.22E-16	1.31E-15	5.11E-16	4.48E-16	5.20E-16	3.43E-13	Sr-90	0.07%	
Cm-242	6.47E-13	1.22E-12	9.34E-14	1.56E-13	8.76E-13	4.06E-13	1.88E-13	4.70E-13	3.54E-12	Eu-154	0.05%	
Cm-243	5.32E-10	6.16E-10	5.07E-10	4.61E-10	1.38E-09	5.31E-10	4.79E-10	5.42E-10	9.03E-10	Sb-125	0.01%	
Cm-244	1.86E-10	3.59E-10	1.91E-11	3.94E-11	2.38E-10	1.13E-10	4.88E-11	1.32E-10	1.05E-09	Pm-147	0.00%	
Cm-245	1.32E-11	1.55E-11	1.23E-11	1.08E-11	4.01E-11	1.30E-11	1.15E-11	1.34E-11	1.82E-11	Eu-155	0.00%	
Cm-246	1.26E-14	2.42E-14	1.41E-15	2.72E-15	1.65E-14	7.70E-15	3.37E-15	8.99E-15	7.04E-14	Am-241	0.00%	
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-244	0.00%	
Co-60	1.68E-06	1.90E-06	1.69E-06	1.68E-06	2.43E-06	1.73E-06	1.64E-06	1.72E-06	1.98E-06	Cm-243	0.00%	
Cs-134	4.42E-05	5.04E-05	4.40E-05	4.30E-05	7.17E-05	4.52E-05	4.22E-05	4.52E-05	5.65E-05	I-129	0.00%	
Cs-135	6.04E-15	7.92E-15	4.03E-15	3.21E-15	1.74E-14	5.29E-15	3.93E-15	5.43E-15	8.71E-12	Cd-113m	0.00%	
Cs-137	4.23E-05	4.83E-05	4.20E-05	4.09E-05	6.95E-05	4.32E-05	4.02E-05	4.32E-05	6.96E-05	Pu-238	0.00%	
Eu-154	8.34E-07	9.46E-07	8.33E-07	8.16E-07	1.31E-06	8.55E-07	7.99E-07	8.53E-07	1.15E-06	Am-243	0.00%	
Eu-155	1.01E-08	1.19E-08	8.98E-09	7.49E-09	3.27E-08	9.75E-09	8.38E-09	1.01E-08	1.37E-08	Nb-94	0.00%	
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Sn-126	0.00%	
H-3	0.00E+00	0.00E+00	3.13E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.76E-09	0.00E+00	Tc-99	0.00%	
I-129	3.93E-10	5.42E-10	1.74E-10	1.34E-10	8.96E-10	3.14E-10	1.87E-10	3.09E-10	8.96E-10	Pu-240	0.00%	
Kr-85	1.59E-05	1.82E-05	1.55E-05	1.48E-05	2.98E-05	1.60E-05	1.48E-05	1.61E-05	1.79E-03	Pu-241	0.00%	
Nb-93m	6.91E-13	1.43E-12	2.78E-14	1.29E-13	7.55E-13	3.74E-13	1.48E-13	4.84E-13	4.67E-12	Cm-245	0.00%	
Nb-94	2.31E-10	2.62E-10	2.30E-10	2.25E-10	3.64E-10	2.36E-10	2.20E-10	2.36E-10	2.91E-10	Cs-135	0.00%	
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-239	0.00%	
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Nb-93m	0.00%	
Np-237	9.62E-13	1.17E-12	8.34E-13	7.11E-13	2.96E-12	9.19E-13	7.86E-13	9.53E-13	1.42E-12	Cm-242	0.00%	
Pa-231	1.75E-16	2.04E-16	1.66E-16	1.56E-16	3.73E-16	1.74E-16	1.58E-16	1.76E-16	2.50E-16	Am-242m	0.00%	
Pb-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Np-237	0.00%	
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cl-36	0.00%	
Pm-147	4.22E-11	5.39E-11	3.07E-11	2.51E-11	1.23E-10	3.80E-11	2.96E-11	3.91E-11	4.57E-08	C-14	0.00%	
Pu-238	9.72E-11	1.88E-10	1.57E-11	2.49E-11	1.38E-10	5.94E-11	2.95E-11	7.23E-11	6.06E-10	Pu-242	0.00%	
Pu-239	2.16E-12	3.36E-12	1.18E-12	1.19E-12	4.22E-12	1.73E-12	1.27E-12	1.89E-12	8.29E-12	Sm-151	0.00%	
Pu-240	5.97E-12	1.16E-11	1.02E-12	1.55E-12	8.70E-12	3.68E-12	1.84E-12	4.46E-12	3.68E-11	U-235	0.00%	
Pu-241	1.37E-11	1.65E-11	1.23E-11	1.07E-11	4.17E-11	1.33E-11	1.16E-11	1.38E-11	2.23E-11	Cm-246	0.00%	
Pu-242	3.87E-14	7.47E-14	7.03E-15	1.04E-14	5.73E-14	2.41E-14	1.22E-14	2.91E-14	2.37E-13	Se-79	0.00%	
Ra-226	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-234	0.00%	
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236	0.00%	
Ru-106	3.09E-07	3.55E-07	3.09E-07	2.98E-07	5.26E-07	3.15E-07	2.95E-07	3.18E-07	3.33E-06	U-238	0.00%	
Sb-125	9.73E-08	1.12E-07	9.58E-08	9.19E-08	1.73E-07	9.88E-08	9.14E-08	9.93E-08	1.30E-07	U-232	0.00%	
Se-79	5.80E-17	7.81E-17	3.53E-17	2.79E-17	1.60E-16	4.95E-17	3.51E-17	5.07E-17	6.20E-14	Pa-231	0.00%	
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ac-227	0.00%	
Sm-151	3.92E-14	6.63E-14	5.34E-15	8.52E-15	5.35E-14	2.70E-14	1.12E-14	2.72E-14	1.43E-13	Th-230	0.00%	
Sn-126	1.14E-10	1.30E-10	1.13E-10	1.09E-10	1.98E-10	1.16E-10	1.08E-10	1.17E-10	1.98E-10	U-233	0.00%	
Sr-90	1.18E-09	1.44E-09	9.77E-10	8.26E-10	3.46E-09	1.11E-09	9.27E-10	1.14E-09	1.40E-06	Cm-247	0.00%	
Tc-99	5.36E-14	6.78E-14	3.98E-14	3.24E-14	1.59E-13	4.84E-14	3.82E-14	4.99E-14	8.45E-11	Fe-55	0.00%	
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Fe-55(Crud)	0.00%	
Th-230	1.55E-18	2.05E-18	1.23E-18	1.05E-18	4.55E-18	1.40E-18	1.18E-18	1.50E-18	3.88E-18	H-3	0.00%	
Th-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ni-59	0.00%	
U-232	1.98E-15	2.97E-15	1.26E-15	1.15E-15	4.94E-15	1.65E-15	1.28E-15	1.82E-15	7.57E-15	Ni-63	0.00%	
U-233	9.48E-19	1.25E-18	7.58E-19	6.96E-19	2.31E-18	8.70E-19	7.35E-19	9.15E-19	2.56E-18	Pb-210	0.00%	
U-234	1.16E-14	1.90E-14	5.77E-15	5.53E-15	2.62E-14	8.81E-15	6.32E-15	1.01E-14	5.60E-14	Pd-107	0.00%	
U-235	7.06E-14	8.13E-14	6.76E-14	6.16E-14	1.84E-13	7.06E-14	6.38E-14	7.21E-14	8.66E-14	Ra-226	0.00%	
U-236	3.29E-15	5.94E-15	1.18E-15	1.26E-15	6.42E-15	2.26E-15	1.46E-15	2.70E-15	1.93E-14	Ra-228	0.00%	
U-238	1.51E-15	2.94E-15	3.43E-16	4.27E-16	2.55E-15	9.37E-16	5.20E-16	1.17E-15	1.00E-14	Sm-147	0.00%	
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-229	0.00%	
crud										Th-232	0.00%	
Co-60(Crud)	1.61E-04	1.82E-04	1.62E-04	1.61E-04	2.33E-04	1.66E-04	1.57E-04	1.65E-04	1.90E-04	Zr-93	0.00%	
Fe-55(Crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00			
total	2.66E-04	3.02E-04	2.67E-04	2.63E-04	4.08E-04	2.74E-04	2.57E-04	2.72E-04	2.11E-03	total	1.00E+00	

PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs

		Stable Metal		Intact		
	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	1.28E-02		2.66E-04			
Breast	1.18E-02		3.02E-04			
Lung	6.99E-02		2.67E-04			
R Marrow	2.23E-02		2.63E-04			
B Surface	1.37E-01	<CDE	4.08E-04			
Thyroid	1.22E-02		2.74E-04			
Remainder	2.44E-02		2.57E-04			
Whole Body	2.63E-02	<CEDE	2.72E-04	<DDE	2.66E-02	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	2.11E-03	<SKIN	2.11E-03	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					1.38E-01	<CDE + DDE

Summary of Offsite Dose

PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs

Isotope	Material Type	Offsite Doses [rem]	
		TEDE	Bone Surface CDE + DDE
Ac-227	P	7.55E-11	1.34E-09
Am-241	P	4.19E-04	7.58E-03
Am-242m	P	4.70E-06	8.67E-05
Am-243	P	2.49E-05	4.53E-04
C-14	P	1.11E-12	1.11E-12
Cd-113m	P	6.33E-08	5.09E-09
Cl-36	P	2.31E-13	2.01E-14
Cm-242	P	6.42E-07	6.70E-06
Cm-243	P	1.27E-05	2.26E-04
Cm-244	P	3.01E-03	5.26E-02
Cm-245	P	6.96E-07	1.27E-05
Cm-246	P	4.10E-07	7.45E-06
Cm-247	P	0.00E+00	0.00E+00
Co-60	P	3.06E-06	2.02E-06
Cs-134	C	2.53E-03	2.23E-03
Cs-135	C	3.94E-09	3.84E-09
Cs-137	C	4.60E-03	4.23E-03
Eu-154	P	2.64E-06	1.30E-05
Eu-155	P	8.55E-08	1.03E-06
Fe-55	P	1.99E-09	1.41E-09
H-3	G	6.55E-05	6.55E-05
I-129	G	1.27E-05	3.77E-08
Kr-85	G	1.61E-05	1.61E-05
Nb-93m	P	1.44E-09	1.35E-10
Nb-94	P	8.06E-10	3.36E-10
Ni-59	P	3.99E-12	3.91E-12
Ni-63	P	1.40E-09	1.37E-09
Np-237	P	2.25E-07	5.04E-06
Pa-231	P	5.91E-11	1.48E-09
Pb-210	P	0.00E+00	0.00E+00
Pd-107	P	2.01E-12	7.91E-15
Pm-147	P	9.95E-07	9.57E-06
Pu-238	P	2.61E-03	4.69E-02
Pu-239	P	8.61E-05	1.57E-03
Pu-240	P	1.81E-04	3.30E-03
Pu-241	P	7.07E-04	1.33E-02
Pu-242	P	1.34E-06	2.43E-05
Ra-226	P	0.00E+00	0.00E+00
Ra-228	P	0.00E+00	0.00E+00
Ru-106	P	6.89E-06	1.02E-06
Sb-125	P	1.26E-07	1.22E-07
Se-79	P	7.40E-13	1.89E-13
Sm-147	P	0.00E+00	0.00E+00
Sm-151	P	1.02E-08	1.73E-07
Sn-126	P	1.84E-10	4.14E-10
Sr-90	P	8.87E-05	1.84E-04
Tc-99	P	1.16E-10	2.37E-12
Th-229	P	0.00E+00	0.00E+00
Th-230	P	1.26E-11	3.09E-10
Th-232	P	0.00E+00	0.00E+00
U-232	P	3.79E-08	1.37E-08
U-233	P	3.42E-12	1.05E-12
U-234	P	7.85E-08	2.39E-08
U-235	P	5.54E-10	1.69E-10
U-236	P	3.05E-08	9.34E-09
U-238	P	1.84E-08	5.61E-09
Zr-93	P	4.66E-10	1.17E-08
Co-60(Crud)	crud	7.89E-03	1.93E-03
Fe-55(Crud)	crud	4.34E-03	3.07E-03
total		2.66E-02	1.38E-01

	Evaluated Fuel				x	Evaluated Fuel
	Fuel Type	Stable Metal	Stable Metal	Stable Metal	Stable Metal	Stable Metal
	Condition	Intact	Intact	Intact	Intact	Intact
	Fuel Name	PWR Avg Fuel, Enr=4.0%, Burnup=48 GWd/MTU, 25 Yrs	BWR Avg Fuel, Enr=3.5%, Burnup=40 GWd/MTU, 25 Yrs	PWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs	BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs	BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs
	# of canisters	1.00	1.00	1.00	1.00	1.00
Isotope	Material Type	(Ci/FA)	(Ci/FA)	(Ci/FA)	(Ci/FA)	(Ci/FA)
Ac-227	P	1.61E-05	0.00E+00	1.04E-05	0.00E+00	0.00E+00
Am-241	P	1.98E+03	5.58E+02	8.71E+02	2.66E+02	2.66E+02
Am-242m	P	6.39E+00	2.17E+00	1.02E+01	3.41E+00	3.41E+00
Am-243	P	2.20E+01	5.34E+00	5.21E+01	1.93E+01	1.93E+01
C-14	P	3.32E-01	1.76E-01	4.89E-01	3.16E-01	3.16E-01
Cd-113m	P	7.66E+00	2.26E+00	3.82E+01	1.39E+01	1.39E+01
Cl-36	P	6.80E-03	2.93E-03	9.69E-03	4.99E-03	4.99E-03
Cm-242	P	5.26E+00	1.78E+00	3.43E+01	1.13E+01	1.13E+01
Cm-243	P	1.03E+01	2.47E+00	3.83E+01	1.12E+01	1.12E+01
Cm-244	P	1.36E+03	2.55E+02	1.12E+04	3.94E+03	3.94E+03
Cm-245	P	3.07E-01	4.03E-02	1.41E+00	3.53E-01	3.53E-01
Cm-246	P	1.04E-01	1.45E-02	8.37E-01	2.96E-01	2.96E-01
Cm-247	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	P	3.13E+02	4.39E+01	5.66E+03	8.53E+02	8.53E+02
Cs-134	C	2.52E+01	6.32E+00	3.72E+04	1.15E+04	1.15E+04
Cs-135	C	3.50E-01	1.39E-01	5.99E-01	2.82E-01	2.82E-01
Cs-137	C	4.11E+04	1.39E+04	9.87E+04	3.87E+04	3.87E+04
Eu-154	P	6.71E+02	1.75E+02	5.77E+03	1.80E+03	1.80E+03
Eu-155	P	5.15E+01	1.60E+01	1.68E+03	6.28E+02	6.28E+02
Fe-55	P	3.46E+00	1.09E+00	6.84E+02	2.34E+02	2.34E+02
H-3	G	1.14E+02	3.95E+01	4.72E+02	1.76E+02	1.76E+02
I-129	G	2.19E-02	7.42E-03	3.38E-02	1.36E-02	1.36E-02
Kr-85	G	1.13E+03	3.81E+02	5.63E+03	2.03E+03	2.03E+03
Nb-93m	P	1.30E+01	4.73E-01	4.53E+01	1.22E+00	1.22E+00
Nb-94	P	8.39E-01	1.87E-02	1.27E+00	3.38E-02	3.38E-02
Ni-59	P	2.09E+00	5.02E-01	2.78E+00	7.78E-01	7.78E-01
Ni-63	P	2.52E+02	5.86E+01	4.16E+02	1.16E+02	1.16E+02
Np-237	P	2.47E-01	6.88E-02	3.84E-01	1.33E-01	1.33E-01
Pa-231	P	2.97E-05	1.39E-05	4.25E-05	2.94E-05	2.94E-05
Pb-210	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pd-107	P	8.41E-02	2.65E-02	1.45E-01	5.69E-02	5.69E-02
Pm-147	P	1.19E+02	3.98E+01	2.34E+04	7.46E+03	7.46E+03
Pu-238	P	2.29E+03	5.85E+02	6.15E+03	2.11E+03	2.11E+03
Pu-239	P	1.77E+02	5.35E+01	1.85E+02	5.36E+01	5.36E+01
Pu-240	P	3.18E+02	1.14E+02	3.90E+02	1.48E+02	1.48E+02
Pu-241	P	2.46E+04	6.78E+03	7.90E+04	2.25E+04	2.25E+04
Pu-242	P	1.64E+00	5.08E-01	3.01E+00	1.26E+00	1.26E+00
Ra-226	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ra-228	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-106	P	1.23E-02	3.00E-03	1.27E+04	3.29E+03	3.29E+03
Sb-125	P	9.71E+00	2.89E+00	2.04E+03	6.21E+02	6.21E+02
Se-79	P	4.57E-02	1.59E-02	6.94E-02	2.88E-02	2.88E-02
Sm-147	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sm-151	P	2.11E+02	5.39E+01	3.13E+02	8.22E+01	8.22E+01
Sn-126	P	3.85E-01	1.27E-01	6.28E-01	2.52E-01	2.52E-01
Sr-90	P	2.72E+04	9.54E+03	6.30E+04	2.52E+04	2.52E+04
Tc-99	P	8.98E+00	3.20E+00	1.28E+01	5.35E+00	5.35E+00
Th-229	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Th-230	P	1.48E-04	6.09E-05	3.57E-05	2.05E-05	2.05E-05
Th-232	P	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
U-232	P	2.04E-02	4.63E-03	5.31E-02	2.00E-02	2.00E-02
U-233	P	3.79E-05	1.06E-05	2.33E-05	0.00E+00	0.00E+00
U-234	P	6.77E-01	2.50E-01	5.47E-01	2.26E-01	2.26E-01
U-235	P	7.37E-03	2.62E-03	4.16E-03	9.43E-04	9.43E-04
U-236	P	1.72E-01	6.26E-02	2.24E-01	9.55E-02	9.55E-02
U-238	P	1.48E-01	6.32E-02	1.43E-01	6.07E-02	6.07E-02
Zr-93	P	8.94E-01	3.38E-01	1.34E+00	6.03E-01	6.03E-01
Crud						
Co-60(Crud)	P	1.17E+00	3.94E+00	1.63E+01	5.46E+01	5.46E+01
Fe-55(Crud)	P	4.64E+00	2.18E+00	7.45E+02	3.50E+02	3.50E+02

Commercial SNF Release Fractions				
Material Type	Airborne Release Fraction (ARF)	Respirable Fraction (RF)	Total Release Fraction (ARF x RF)	HEPA Filter LPF
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	3.00E-05	5.00E-03	1.50E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
Crud				
Crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Release fractions for Commercial SNF are from CRWMS M&O 1999c, <i>Commercial SNF Accident Release Fractions</i> , ANL-WHS-SE-000002 REV 00.				
BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs				
Stable Metal				
Intact				
Release Fractions Used in this Calculation				
G	3.00E-01	1.00E+00	3.00E-01	1.00E+00
P	3.00E-05	5.00E-03	1.50E-07	1.00E+00
C	2.00E-04	1.00E+00	2.00E-04	1.00E+00
crud	1.00E+00	3.00E-01	3.00E-01	1.00E+00
Breathing Rate:	3.33E-04	[m ³ /s]		
Gound Level Dispersion Factor				
distance [m]	x/Q [sec/m ³]			
11000	2.17E-05	99.5% worst-sector		
3.70E+12	unit conversion factor			
	Sv/Bq to rem/Ci			

Source Term Calculations							
BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs							
Stable Metal	Intact						
Isotope	Curies (entire fuel inventory)	flnv = 1/nCan	ARF	RF	LPF	Total Source Term [Ci] Released to the Environment	Respirable Source Term [Ci] Released to the Environment
Ac-227	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Am-241	2.66E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.98E-03	3.99E-05
Am-242m	3.41E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.02E-04	5.12E-07
Am-243	1.93E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	5.79E-04	2.90E-06
C-14	3.16E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	9.48E-06	4.74E-08
Cd-113m	1.39E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.17E-04	2.09E-06
Cl-36	4.99E-03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.50E-07	7.49E-10
Cm-242	1.13E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.39E-04	1.70E-06
Cm-243	1.12E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.36E-04	1.68E-06
Cm-244	3.94E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.18E-01	5.91E-04
Cm-245	3.53E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.06E-05	5.30E-08
Cm-246	2.96E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	8.88E-06	4.44E-08
Cm-247	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Co-60	8.53E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.56E-02	1.28E-04
Cs-134	1.15E+04	1.00E+00	2.00E-04	1.00E+00	1.00E+00	2.30E+00	2.30E+00
Cs-135	2.82E-01	1.00E+00	2.00E-04	1.00E+00	1.00E+00	5.64E-05	5.64E-05
Cs-137	3.87E+04	1.00E+00	2.00E-04	1.00E+00	1.00E+00	7.74E+00	7.74E+00
Eu-154	1.80E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	5.40E-02	2.70E-04
Eu-155	6.28E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.88E-02	9.42E-05
Fe-55	2.34E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.02E-03	3.51E-05
H-3	1.76E+02	1.00E+00	3.00E-01	1.00E+00	1.00E+00	5.28E+01	5.28E+01
I-129	1.36E-02	1.00E+00	3.00E-01	1.00E+00	1.00E+00	4.08E-03	4.08E-03
Kr-85	2.03E+03	1.00E+00	3.00E-01	1.00E+00	1.00E+00	6.09E+02	6.09E+02
Nb-93m	1.22E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.66E-05	1.83E-07
Nb-94	3.38E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.01E-06	5.07E-09
Ni-59	7.78E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.33E-05	1.17E-07
Ni-63	1.16E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.48E-03	1.74E-05
Np-237	1.33E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.99E-06	2.00E-08
Pa-231	2.94E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	8.82E-10	4.41E-12
Pb-210	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Pd-107	5.69E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.71E-06	8.54E-09
Pm-147	7.46E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.24E-01	1.12E-03
Pu-238	2.11E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.33E-02	3.17E-04
Pu-239	5.36E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.61E-03	8.04E-06
Pu-240	1.48E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	4.44E-03	2.22E-05
Pu-241	2.25E+04	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.75E-01	3.38E-03
Pu-242	1.26E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	3.78E-05	1.89E-07
Ra-226	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Ra-228	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Ru-106	3.29E+03	1.00E+00	3.00E-05	5.00E-03	1.00E+00	9.87E-02	4.94E-04
Sb-125	6.21E+02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.86E-02	9.32E-05
Se-79	2.88E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	8.64E-07	4.32E-09
Sm-147	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Sm-151	8.22E+01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.47E-03	1.23E-05
Sn-126	2.52E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.56E-06	3.78E-08
Sr-90	2.52E+04	1.00E+00	3.00E-05	5.00E-03	1.00E+00	7.56E-01	3.78E-03
Tc-99	5.35E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.61E-04	8.03E-07
Th-229	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
Th-230	2.05E-05	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.15E-10	3.08E-12
Th-232	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
U-232	2.00E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.00E-07	3.00E-09
U-233	0.00E+00	1.00E+00	3.00E-05	5.00E-03	1.00E+00	0.00E+00	0.00E+00
U-234	2.26E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	6.78E-06	3.39E-08
U-235	9.43E-04	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.83E-08	1.41E-10
U-236	9.55E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	2.87E-06	1.43E-08
U-238	6.07E-02	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.82E-06	9.11E-09
Zr-93	6.03E-01	1.00E+00	3.00E-05	5.00E-03	1.00E+00	1.81E-05	9.05E-08
crud							
Co-60(Crud)	5.46E+01	1.00E+00	1.00E+00	3.00E-01	1.00E+00	5.46E+01	1.64E+01
Fe-55(Crud)	3.50E+02	1.00E+00	1.00E+00	3.00E-01	1.00E+00	3.50E+02	1.05E+02

BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs													
Stable Metal	Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Lung)
Ac-227	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Co-60(Crud)	78.58%	Co-60(Crud)	94.12%
Am-241	3.47E-05	2.85E-09	1.96E-05	1.86E-04	2.31E-03	1.71E-09	8.34E-05	1.28E-04	0.00E+00	Fe-55(Crud)	6.19%	Fe-55(Crud)	1.85%
Am-242m	4.39E-07	1.89E-11	5.74E-08	2.31E-06	2.90E-05	7.71E-12	1.02E-06	1.57E-06	0.00E+00	Cs-137	5.42%	Pu-238	1.69%
Am-243	2.52E-06	1.18E-09	1.38E-06	1.34E-05	1.68E-04	6.42E-10	5.99E-06	9.21E-06	0.00E+00	Cm-244	3.21%	Cs-137	1.14%
C-14	7.15E-13	7.15E-13	7.15E-13	7.15E-13	7.15E-13	7.15E-13	7.15E-13	7.15E-13	0.00E+00	Pu-238	2.72%	Cs-134	0.45%
Cd-113m	1.85E-09	1.85E-09	2.28E-08	1.85E-09	1.85E-09	1.85E-09	7.25E-08	2.30E-08	0.00E+00	Cs-134	2.33%	Cm-244	0.19%
Cl-36	1.01E-14	1.01E-14	9.13E-13	1.01E-14	1.01E-14	1.01E-14	1.07E-14	1.19E-13	0.00E+00	Pu-241	0.61%	Sr-90	0.18%
Cm-242	2.58E-08	4.28E-11	7.02E-07	1.77E-07	2.21E-06	4.26E-11	1.11E-07	2.12E-07	0.00E+00	Am-241	0.39%	Pu-241	0.18%
Cm-243	9.30E-07	2.83E-10	8.71E-07	5.30E-06	6.60E-05	1.72E-10	2.59E-06	3.73E-06	0.00E+00	Pu-240	0.21%	Pu-240	0.12%
Cm-244	2.51E-04	1.64E-08	3.05E-04	1.48E-03	1.85E-02	1.60E-08	7.55E-04	1.06E-03	0.00E+00	Sr-90	0.11%	Pu-239	0.04%
Cm-245	4.77E-08	9.47E-12	2.55E-08	2.53E-07	3.17E-06	5.21E-12	1.13E-07	1.74E-07	0.00E+00	Pu-239	0.08%	H-3	0.02%
Cm-246	3.96E-08	4.75E-12	2.16E-08	2.11E-07	2.64E-06	2.68E-12	9.43E-08	1.45E-07	0.00E+00	H-3	0.07%	Am-241	0.01%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Am-243	0.03%	Ru-106	0.01%
Co-60	1.63E-08	6.29E-08	1.18E-06	5.88E-08	4.62E-08	5.54E-08	1.23E-07	2.02E-07	0.00E+00	I-129	0.02%	Pm-147	0.00%
Cs-134	7.99E-04	6.64E-04	7.26E-04	7.26E-04	6.76E-04	6.83E-04	8.55E-04	7.69E-04	0.00E+00	Cm-243	0.01%	Pu-242	0.00%
Cs-135	1.81E-09	1.81E-09	2.13E-09	1.81E-09	1.81E-09	1.81E-09	1.81E-09	1.85E-09	0.00E+00	Ru-106	0.01%	Am-243	0.00%
Cs-137	1.81E-03	1.62E-03	1.83E-03	1.72E-03	1.64E-03	1.64E-03	1.89E-03	1.79E-03	0.00E+00	Am-242m	0.00%	Co-60	0.00%
Eu-154	8.45E-08	1.12E-07	5.72E-07	7.65E-07	3.78E-06	5.15E-08	8.16E-07	5.58E-07	0.00E+00	Pu-242	0.00%	Cm-243	0.00%
Eu-155	8.97E-10	1.55E-09	3.00E-08	3.60E-08	3.83E-07	6.04E-10	2.80E-08	2.82E-08	0.00E+00	Eu-154	0.00%	Cm-242	0.00%
Fe-55	4.91E-10	4.78E-10	9.95E-10	4.85E-10	4.82E-10	5.09E-10	1.14E-09	6.81E-10	0.00E+00	Pm-147	0.00%	Eu-154	0.00%
H-3	2.44E-05	2.44E-05	2.44E-05	2.44E-05	2.44E-05	2.44E-05	2.44E-05	2.44E-05	0.00E+00	Cm-242	0.00%	U-234	0.00%
I-129	9.48E-09	2.28E-08	3.43E-08	1.53E-08	1.51E-08	1.70E-04	1.29E-08	5.12E-06	0.00E+00	Co-60	0.00%	U-232	0.00%
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-245	0.00%	U-236	0.00%
Nb-93m	2.04E-12	2.13E-13	3.16E-10	1.39E-12	3.64E-12	1.49E-13	1.93E-12	3.87E-11	0.00E+00	Cm-246	0.00%	U-238	0.00%
Nb-94	6.45E-13	3.04E-12	1.01E-10	3.06E-12	2.67E-12	3.01E-12	6.03E-12	1.52E-11	0.00E+00	Np-237	0.00%	Am-242m	0.00%
Ni-59	1.12E-12	1.08E-12	3.74E-12	1.10E-12	1.10E-12	1.18E-12	1.13E-12	1.12E-12	0.00E+00	U-234	0.00%	Sb-125	0.00%
Ni-63	3.82E-10	3.82E-10	1.43E-09	3.82E-10	3.82E-10	3.82E-10	4.00E-10	3.90E-10	0.00E+00	Eu-155	0.00%	I-129	0.00%
Np-237	1.58E-08	9.01E-12	8.59E-09	1.40E-07	1.74E-06	7.15E-12	1.25E-08	7.79E-08	0.00E+00	Cd-113m	0.00%	Eu-155	0.00%
Pa-231	8.14E-16	1.04E-15	8.81E-11	8.22E-11	1.03E-09	9.01E-16	3.38E-14	4.09E-11	0.00E+00	U-232	0.00%	Cm-245	0.00%
Pb-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236	0.00%	Cd-113m	0.00%
Pd-107	2.16E-16	2.16E-16	6.50E-12	1.17E-15	3.10E-15	2.16E-16	4.91E-14	7.87E-13	0.00E+00	Sb-125	0.00%	Cm-246	0.00%
Pm-147	5.62E-13	1.08E-12	2.32E-06	2.44E-07	3.05E-06	5.92E-13	1.76E-07	3.17E-07	0.00E+00	U-238	0.00%	Np-237	0.00%
Pu-238	2.37E-04	8.46E-09	2.71E-03	1.29E-03	1.61E-02	8.14E-09	5.94E-04	8.97E-04	0.00E+00	Sm-151	0.00%	Cs-135	0.00%
Pu-239	6.84E-06	1.98E-10	6.94E-05	3.63E-05	4.54E-04	1.94E-10	1.63E-05	2.49E-05	0.00E+00	Cs-135	0.00%	Ni-63	0.00%
Pu-240	1.89E-05	5.64E-10	1.92E-04	1.00E-04	1.25E-03	5.37E-10	4.49E-05	6.89E-05	0.00E+00	Fe-55	0.00%	Sm-151	0.00%
Pu-241	6.15E-05	2.76E-09	2.87E-04	3.03E-04	3.79E-03	1.12E-09	1.18E-04	2.01E-04	0.00E+00	Ni-63	0.00%	U-235	0.00%
Pu-242	1.53E-07	4.78E-12	1.55E-06	8.14E-07	1.02E-05	4.44E-12	3.63E-07	5.61E-07	0.00E+00	Zr-93	0.00%	Fe-55	0.00%
Ra-226	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-235	0.00%	Tc-99	0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Tc-99	0.00%	Nb-93m	0.00%
Ru-106	1.82E-07	1.81E-07	1.37E-05	1.81E-07	1.81E-07	1.81E-07	2.23E-07	1.70E-06	0.00E+00	Pa-231	0.00%	Zr-93	0.00%
Sb-125	8.97E-10	1.04E-09	5.40E-08	1.62E-09	6.80E-09	8.07E-10	3.61E-09	8.22E-09	0.00E+00	Nb-93m	0.00%	Sn-126	0.00%
Se-79	7.84E-14	7.84E-14	1.13E-12	7.84E-14	7.84E-14	7.84E-14	4.90E-13	3.07E-13	0.00E+00	Sn-126	0.00%	Nb-94	0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Nb-94	0.00%	Pa-231	0.00%
Sm-151	1.33E-14	4.91E-14	1.07E-09	3.63E-09	4.55E-08	4.35E-15	2.48E-09	2.67E-09	0.00E+00	Th-230	0.00%	Th-230	0.00%
Sn-126	1.45E-11	1.43E-11	1.53E-10	5.68E-11	1.19E-10	1.32E-11	1.78E-11	2.72E-11	0.00E+00	Ni-59	0.00%	Pd-107	0.00%
Sr-90	2.67E-07	2.67E-07	2.89E-04	3.40E-05	7.35E-05	2.67E-07	5.79E-07	3.55E-05	0.00E+00	Pd-107	0.00%	Ni-59	0.00%

BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs													
Stable Metal	Intact												
Inhalation Doses [rem]										Isotope Percentage of Dose			
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotope	% of Effective (CEDE) Dose	Isotope	% of CDE (Lung)
Tc-99	9.70E-13	9.70E-13	3.58E-10	9.70E-13	9.70E-13	2.60E-11	1.34E-11	4.83E-11	0.00E+00	C-14	0.00%	Se-79	0.00%
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Se-79	0.00%	Cl-36	0.00%
Th-230	3.35E-14	3.35E-14	2.47E-11	1.42E-11	1.78E-10	3.35E-14	8.63E-14	7.23E-12	0.00E+00	Cl-36	0.00%	C-14	0.00%
Th-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ac-227	0.00%	Ac-227	0.00%
U-232	6.42E-12	6.46E-12	1.19E-07	3.26E-10	5.15E-09	6.30E-12	2.49E-10	1.43E-08	0.00E+00	Cm-247	0.00%	Cm-247	0.00%
U-233	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Kr-85	0.00%	Kr-85	0.00%
U-234	2.27E-11	2.27E-11	2.70E-07	6.33E-10	9.88E-09	2.27E-11	8.39E-10	3.24E-08	0.00E+00	Pb-210	0.00%	Pb-210	0.00%
U-235	8.96E-14	9.00E-14	1.04E-09	2.49E-12	3.82E-11	8.96E-14	3.25E-12	1.26E-10	0.00E+00	Ra-226	0.00%	Ra-226	0.00%
U-236	9.08E-12	9.08E-12	1.08E-07	2.53E-10	3.98E-09	9.08E-12	3.36E-10	1.30E-08	0.00E+00	Ra-228	0.00%	Ra-228	0.00%
U-238	5.43E-12	5.43E-12	6.48E-08	1.60E-10	2.38E-09	5.40E-12	2.00E-10	7.79E-09	0.00E+00	Sm-147	0.00%	Sm-147	0.00%
Zr-93	5.27E-14	1.13E-13	2.11E-10	4.28E-10	5.27E-09	4.21E-14	4.18E-13	2.10E-10	0.00E+00	Th-229	0.00%	Th-229	0.00%
crud										Th-232	0.00%	Th-232	0.00%
Co-60(Crud)	2.08E-03	8.06E-03	1.51E-01	7.53E-03	5.91E-03	7.09E-03	1.58E-02	2.59E-02	0.00E+00	U-233	0.00%	U-233	0.00%
Fe-55(Crud)	1.47E-03	1.43E-03	2.98E-03	1.45E-03	1.44E-03	1.52E-03	3.40E-03	2.04E-03	0.00E+00				
total	6.80E-03	1.18E-02	1.61E-01	1.49E-02	5.24E-02	1.11E-02	2.36E-02	3.29E-02	0.00E+00				

Air Submersion Doses

BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs											
Stable Metal		Intact									
	Air Submersion Doses [rem]									Isotope % of Dose	
Isotope	Gonads	Breast	Lungs	Red Marrow	Bone Surface	Thyroid	Remainder	Effective	Skin	Isotopes	% of Total Skin Dose
Ac-227	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Kr-85	48.60%
Am-241	5.50E-10	6.86E-10	4.32E-10	3.34E-10	1.84E-09	5.02E-10	4.06E-10	5.24E-10	8.20E-10	Co-60(Crud)	47.87%
Am-242m	3.12E-13	4.94E-13	1.41E-13	1.41E-13	6.52E-13	2.42E-13	1.59E-13	2.60E-13	1.12E-12	Cs-137	2.06%
Am-243	1.02E-10	1.21E-10	8.93E-11	7.21E-11	3.47E-10	9.72E-11	8.32E-11	1.01E-10	1.28E-10	Cs-134	1.31%
C-14	1.97E-16	2.68E-16	1.16E-16	9.21E-17	5.37E-16	1.67E-16	1.17E-16	1.70E-16	1.85E-13	Ru-106	0.07%
Cd-113m	2.40E-13	2.93E-13	1.99E-13	1.68E-13	7.03E-13	2.26E-13	1.88E-13	2.32E-13	2.84E-10	Sr-90	0.04%
Cl-36	2.69E-16	3.20E-16	2.43E-16	2.18E-16	6.77E-16	2.63E-16	2.31E-16	2.68E-16	1.77E-13	Eu-154	0.03%
Cm-242	2.13E-13	4.03E-13	3.08E-14	5.14E-14	2.89E-13	1.34E-13	6.18E-14	1.55E-13	1.17E-12	Co-60	0.02%
Cm-243	1.56E-10	1.80E-10	1.48E-10	1.35E-10	4.05E-10	1.55E-10	1.40E-10	1.59E-10	2.64E-10	Sb-125	0.00%
Cm-244	6.55E-11	1.26E-10	6.72E-12	1.39E-11	8.37E-11	3.98E-11	1.72E-11	4.66E-11	3.71E-10	Pm-147	0.00%
Cm-245	3.30E-12	3.87E-12	3.09E-12	2.70E-12	1.00E-11	3.27E-12	2.89E-12	3.37E-12	4.56E-12	Eu-155	0.00%
Cm-246	4.45E-15	8.56E-15	4.99E-16	9.63E-16	5.83E-15	2.72E-15	1.19E-15	3.18E-15	2.49E-14	Am-241	0.00%
Cm-247	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-244	0.00%
Co-60	2.53E-07	2.86E-07	2.55E-07	2.53E-07	3.66E-07	2.61E-07	2.47E-07	2.59E-07	2.98E-07	I-129	0.00%
Cs-134	1.37E-05	1.56E-05	1.36E-05	1.33E-05	2.22E-05	1.40E-05	1.30E-05	1.40E-05	1.75E-05	Cd-113m	0.00%
Cs-135	2.84E-15	3.73E-15	1.90E-15	1.51E-15	8.20E-15	2.49E-15	1.85E-15	2.56E-15	4.10E-12	Cm-243	0.00%
Cs-137	1.66E-05	1.89E-05	1.65E-05	1.61E-05	2.72E-05	1.69E-05	1.58E-05	1.69E-05	2.73E-05	Pu-238	0.00%
Eu-154	2.60E-07	2.95E-07	2.60E-07	2.55E-07	4.09E-07	2.67E-07	2.49E-07	2.66E-07	3.59E-07	Am-243	0.00%
Eu-155	3.77E-09	4.46E-09	3.36E-09	2.80E-09	1.22E-08	3.65E-09	3.13E-09	3.77E-09	5.13E-09	Sn-126	0.00%
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Tc-99	0.00%
H-3	0.00E+00	0.00E+00	1.17E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-09	0.00E+00	Pu-240	0.00%
I-129	1.58E-10	2.18E-10	7.01E-11	5.37E-11	3.60E-10	1.26E-10	7.53E-11	1.24E-10	3.60E-10	Nb-94	0.00%
Kr-85	5.72E-06	6.55E-06	5.57E-06	5.33E-06	1.08E-05	5.77E-06	5.33E-06	5.82E-06	6.45E-04	Pu-241	0.00%
Nb-93m	1.86E-14	3.85E-14	7.49E-16	3.47E-15	2.03E-14	1.01E-14	4.00E-15	1.30E-14	1.26E-13	Cm-245	0.00%
Nb-94	6.14E-12	6.98E-12	6.11E-12	5.98E-12	9.69E-12	6.29E-12	5.85E-12	6.27E-12	7.75E-12	Cs-135	0.00%
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pu-239	0.00%
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cm-242	0.00%
Np-237	3.33E-13	4.04E-13	2.89E-13	2.46E-13	1.03E-12	3.18E-13	2.72E-13	3.30E-13	4.93E-13	Am-242m	0.00%
Pa-231	1.21E-16	1.41E-16	1.15E-16	1.08E-16	2.58E-16	1.20E-16	1.09E-16	1.22E-16	1.73E-16	Np-237	0.00%
Pb-210	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	C-14	0.00%
Pd-107	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Cl-36	0.00%
Pm-147	1.34E-11	1.72E-11	9.79E-12	8.01E-12	3.92E-11	1.21E-11	9.45E-12	1.25E-11	1.46E-08	Nb-93m	0.00%
Pu-238	3.33E-11	6.45E-11	5.39E-12	8.54E-12	4.73E-11	2.04E-11	1.01E-11	2.48E-11	2.08E-10	Pu-242	0.00%
Pu-239	6.25E-13	9.75E-13	3.42E-13	3.45E-13	1.22E-12	5.01E-13	3.69E-13	5.47E-13	2.40E-12	Sm-151	0.00%
Pu-240	2.27E-12	4.38E-12	3.89E-13	5.88E-13	3.30E-12	1.40E-12	6.99E-13	1.69E-12	1.40E-11	Se-79	0.00%
Pu-241	3.90E-12	4.70E-12	3.51E-12	3.05E-12	1.19E-11	3.78E-12	3.30E-12	3.93E-12	6.34E-12	Cm-246	0.00%
Pu-242	1.62E-14	3.13E-14	2.94E-15	4.34E-15	2.40E-14	1.01E-14	5.10E-15	1.22E-14	9.92E-14	U-234	0.00%
Ra-226	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-235	0.00%
Ra-228	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	U-236	0.00%
Ru-106	8.00E-08	9.19E-08	8.00E-08	7.73E-08	1.36E-07	8.16E-08	7.63E-08	8.24E-08	8.64E-07	U-238	0.00%
Sb-125	2.96E-08	3.40E-08	2.92E-08	2.80E-08	5.28E-08	3.01E-08	2.78E-08	3.02E-08	3.96E-08	U-232	0.00%
Se-79	2.41E-17	3.24E-17	1.46E-17	1.16E-17	6.66E-17	2.05E-17	1.46E-17	2.10E-17	2.57E-14	Pa-231	0.00%
Sm-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-230	0.00%
Sm-151	1.03E-14	1.74E-14	1.40E-15	2.24E-15	1.40E-14	7.09E-15	2.95E-15	7.15E-15	3.76E-14	Ac-227	0.00%
Sn-126	4.58E-11	5.23E-11	4.54E-11	4.38E-11	7.95E-11	4.67E-11	4.34E-11	4.68E-11	7.93E-11	Cm-247	0.00%
Sr-90	4.72E-10	5.76E-10	3.91E-10	3.30E-10	1.38E-09	4.45E-10	3.71E-10	4.57E-10	5.58E-07	Fe-55	0.00%
Tc-99	2.24E-14	2.84E-14	1.66E-14	1.35E-14	6.66E-14	2.02E-14	1.60E-14	2.09E-14	3.53E-11	Fe-55(Crud)	0.00%
Th-229	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	H-3	0.00%
Th-230	8.89E-19	1.18E-18	7.06E-19	6.02E-19	2.61E-18	8.05E-19	6.76E-19	8.59E-19	2.23E-18	Ni-59	0.00%
Th-232	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Ni-63	0.00%
U-232	7.47E-16	1.12E-15	4.74E-16	4.33E-16	1.86E-15	6.21E-16	4.82E-16	6.84E-16	2.85E-15	Pb-210	0.00%
U-233	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Pd-107	0.00%
U-234	4.78E-15	7.84E-15	2.38E-15	2.29E-15	1.08E-14	3.64E-15	2.61E-15	4.15E-15	2.31E-14	Ra-226	0.00%
U-235	1.60E-14	1.84E-14	1.53E-14	1.40E-14	4.18E-14	1.60E-14	1.45E-14	1.64E-14	1.96E-14	Ra-228	0.00%
U-236	1.40E-15	2.53E-15	5.01E-16	5.36E-16	2.74E-15	9.64E-16	6.21E-16	1.15E-15	8.21E-15	Sm-147	0.00%
U-238	6.42E-16	1.25E-15	1.46E-16	1.81E-16	1.08E-15	3.98E-16	2.21E-16	4.99E-16	4.25E-15	Th-229	0.00%
Zr-93	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Th-232	0.00%
crud										U-233	0.00%
Co-60(Crud)	5.39E-04	6.09E-04	5.44E-04	5.39E-04	7.80E-04	5.57E-04	5.26E-04	5.52E-04	6.36E-04	Zr-93	0.00%
Fe-55(Crud)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
total	5.76E-04	6.51E-04	5.80E-04	5.74E-04	8.41E-04	5.94E-04	5.61E-04	5.90E-04	1.33E-03	total	1.00E+00

BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs

			Stable Metal	Intact		
	Inhalation Dose @ 11 km [rem]	Dose Term for Regulation	Air Submersion Dose @ 11 km [rem]	Dose Term for Regulation		Dose Term for Regulation
Gonad	6.80E-03		5.76E-04			
Breast	1.18E-02		6.51E-04			
Lung	1.61E-01	<CDE	5.80E-04			
R Marrow	1.49E-02		5.74E-04			
B Surface	5.24E-02		8.41E-04			
Thyroid	1.11E-02		5.94E-04			
Remainder	2.36E-02		5.61E-04			
Whole Body	3.29E-02	<CEDE	5.90E-04	<DDE	3.35E-02	<TEDE=CEDE+DDE
Skin	0.00E+00	<SKIN	1.33E-03	<SKIN	1.33E-03	<SKIN
Eye Lens	N/A	<EYE	N/A	<EYE	N/A	<EYE
					1.61E-01	<CDE + DDE

BWR Max Fuel, Enr=5.0%, Burnup=75 GWd/MTU, 5 Yrs

Isotope	Material Type	Offsite Doses [rem]	
		TEDE	Lung CDE + DDE
Ac-227	P	0.00E+00	0.00E+00
Am-241	P	1.28E-04	1.96E-05
Am-242m	P	1.57E-06	5.74E-08
Am-243	P	9.21E-06	1.38E-06
C-14	P	7.15E-13	7.15E-13
Cd-113m	P	2.30E-08	2.28E-08
Cl-36	P	1.19E-13	9.13E-13
Cm-242	P	2.12E-07	7.02E-07
Cm-243	P	3.73E-06	8.72E-07
Cm-244	P	1.06E-03	3.05E-04
Cm-245	P	1.74E-07	2.55E-08
Cm-246	P	1.45E-07	2.16E-08
Cm-247	P	0.00E+00	0.00E+00
Co-60	P	4.61E-07	1.44E-06
Cs-134	C	7.83E-04	7.40E-04
Cs-135	C	1.85E-09	2.13E-09
Cs-137	C	1.80E-03	1.84E-03
Eu-154	P	8.24E-07	8.38E-07
Eu-155	P	3.20E-08	3.37E-08
Fe-55	P	6.81E-10	9.95E-10
H-3	G	2.44E-05	2.44E-05
I-129	G	5.12E-06	3.44E-08
Kr-85	G	5.82E-06	5.82E-06
Nb-93m	P	3.87E-11	3.16E-10
Nb-94	P	2.15E-11	1.08E-10
Ni-59	P	1.12E-12	3.74E-12
Ni-63	P	3.90E-10	1.43E-09
Np-237	P	7.79E-08	8.59E-09
Pa-231	P	4.09E-11	8.81E-11
Pb-210	P	0.00E+00	0.00E+00
Pd-107	P	7.87E-13	6.50E-12
Pm-147	P	3.17E-07	2.32E-06
Pu-238	P	8.97E-04	2.71E-03
Pu-239	P	2.49E-05	6.94E-05
Pu-240	P	6.89E-05	1.92E-04
Pu-241	P	2.01E-04	2.87E-04
Pu-242	P	5.61E-07	1.55E-06
Ra-226	P	0.00E+00	0.00E+00
Ra-228	P	0.00E+00	0.00E+00
Ru-106	P	1.78E-06	1.38E-05
Sb-125	P	3.84E-08	8.43E-08
Se-79	P	3.07E-13	1.13E-12
Sm-147	P	0.00E+00	0.00E+00
Sm-151	P	2.67E-09	1.07E-09
Sn-126	P	7.40E-11	2.00E-10
Sr-90	P	3.55E-05	2.89E-04
Tc-99	P	4.83E-11	3.58E-10
Th-229	P	0.00E+00	0.00E+00
Th-230	P	7.23E-12	2.47E-11
Th-232	P	0.00E+00	0.00E+00
U-232	P	1.43E-08	1.19E-07
U-233	P	0.00E+00	0.00E+00
U-234	P	3.24E-08	2.70E-07
U-235	P	1.26E-10	1.04E-09
U-236	P	1.30E-08	1.08E-07
U-238	P	7.79E-09	6.48E-08
Zr-93	P	2.10E-10	2.11E-10
Co-60(Crud)	crud	2.64E-02	1.52E-01
Fe-55(Crud)	crud	2.04E-03	2.98E-03
total		3.35E-02	1.61E-01