ENVIRON

April 25, 2006

Via Federal Express

Dr. Peter Lee
U.S. NRC Region III
801 Warrenville Road
Lisle, IL 60532-4351

Re: Revised Dose Assessment Methodology
Breckenridge Disposal Site, St. Louis, Michigan

Dear Dr. Lee:

As a precursor to the submittal of a Revised Work Plan for Supplemental Site Characterization, ENVIRON International Corporation (ENVIRON) requests your review and approval of the attached changes to the dose assessment assumptions used to developed the Derived Concentration Guideline Levels (DCGLs) at the Breckenridge Disposal Site (the "Site"). ENVIRON believes changes to a number of assumptions are necessary to reflect new Site information obtained during the Fall 2004 Remedial Activities (RA).

Prior to the Fall 2004 RA, available information suggested that the filter cake waste was confined to distinct areas. As such, many assumptions were made in the development of the 2004 DCGLs prepared by Scientech (the "2004 DCGLs"), such as the development of a single DCGL instead of a surface and a subsurface DCGL. However, information obtained during the Fall 2004 RA indicated that many of the assumptions were not valid, and/or overly conservative. Any attempt to remediate the Site using the 2004 DCGLs would be fiscally irresponsible. ENVIRON proposes changes to assumptions used in the dose assessment to develop updated site specific DCGL that will be fully protective of human health (the total effective does will be less than 25 mrem/yr).

CONCEPTUAL SITE MODEL

The following Conceptual Site Model (CSM) has been developed to reflect the information obtained during the Fall 2004 RA. This CSM will assist in the development of the Remedial Action Plan and provided guidance on selection of input parameters for the attached dose assessment used to develop the DCGLs.

Current Contamination Distribution

RAs in Fall 2004 showed that filter cake is present in other areas beyond the previously identified nine waste areas. Figure 1 shows the estimated extent of filter cake disposal areas based on the Fall 2004 RA. Based on this new information, ENVIRON estimates that subsurface filter cake is present at the Site over an area of 600 square meters (see Figure 1). This value will be used in the dose assessment as the area of subsurface contamination.

Post Remediation Residual Contamination[1]

The samples collected during the Fall 2004 RA from the overburden material exhibited much less activity then was previously assumed. The previous assumption was that for every one cubic

[1] Data collected during the Fall 2004 RA showed that not all filter cake exhibits activity. The remedial efforts will focus on the removal of filter cake disposal areas and other consolidated filter cake deposits at the Site. Filter cake that exhibits no activity will not be removed. Filter cake commingled with soils will be remediated based solely on comparison with the DCGLs.

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meter of filter cake removed, one cubic meter of overburden with activities approaching the DCGLs would be placed back in the excavation. This assumption is not supported by the data collected during the Fall 2004 RA. The amount of contaminated material (residual contamination) to be placed back in the excavation was overestimated. Based on the Fall 2004 RA data, less than a 1-foot thickness of material exhibiting activity levels at the DCGLs, let alone any detectable activity, will be placed back in the excavations. Therefore, for dose assessment purposes, it is conservatively assumed that a 2 feet thickness of material with activity at the DCGLs will be placed back in the excavation. The remaining overburden and imported fill will act as a cover. It is conservatively assumed that the cover thickness is 5 feet.

Equilibrium
As discussed in the attached, ENVIRON does not believe that U-238 and Ra-226 are at equilibrium. Therefore it is assumed that Ra-226 and U-238 are at 50% equilibrium.

Unsaturated Zone Depth
Excavations during the Fall 2004 RA at the Site extended approximately 16 feet below ground surface (bgs) and remained dry. Borings completed during the 1982 Radiological Assessment of the Site encountered groundwater at 6 meters (approximately 20 feet) bgs. Therefore, a value of 6 meters will be used as the depth of the unsaturated zone.

Miscellaneous
A number of other adjustments to the assumptions and input parameters were made to the dose assessment. As discussed in the attached, intake parameters and partition coefficients will be updated to reflect more recent guidance than was previously used. Additionally, both surface and subsurface DCGLs will be developed.

CONCLUSIONS
As evident by the results of the Fall 2004 RA, the 2004 DCGLs were based on assumptions that were overly conservative. As discussed in the attached, ENVIRON and IEM-Inc have reevaluated the DCGLs using the best information currently available. The revised DCGLs are protective of human health and will allow the Site to be released for unrestricted use in the most cost effective manner possible. ENVIRON requests approval of the DCGLs presented in Table 6 of the attached so ENVIRON can move forward with the Supplemental Site Characterization Work Plan and further RAs.

ENVIRON request that a meeting be held between the NRC and ENVIRON to discuss and finalize these changes to the DCGLs. David Heidlauf will be in touch with you in the next few days to discuss the meeting coordination details.

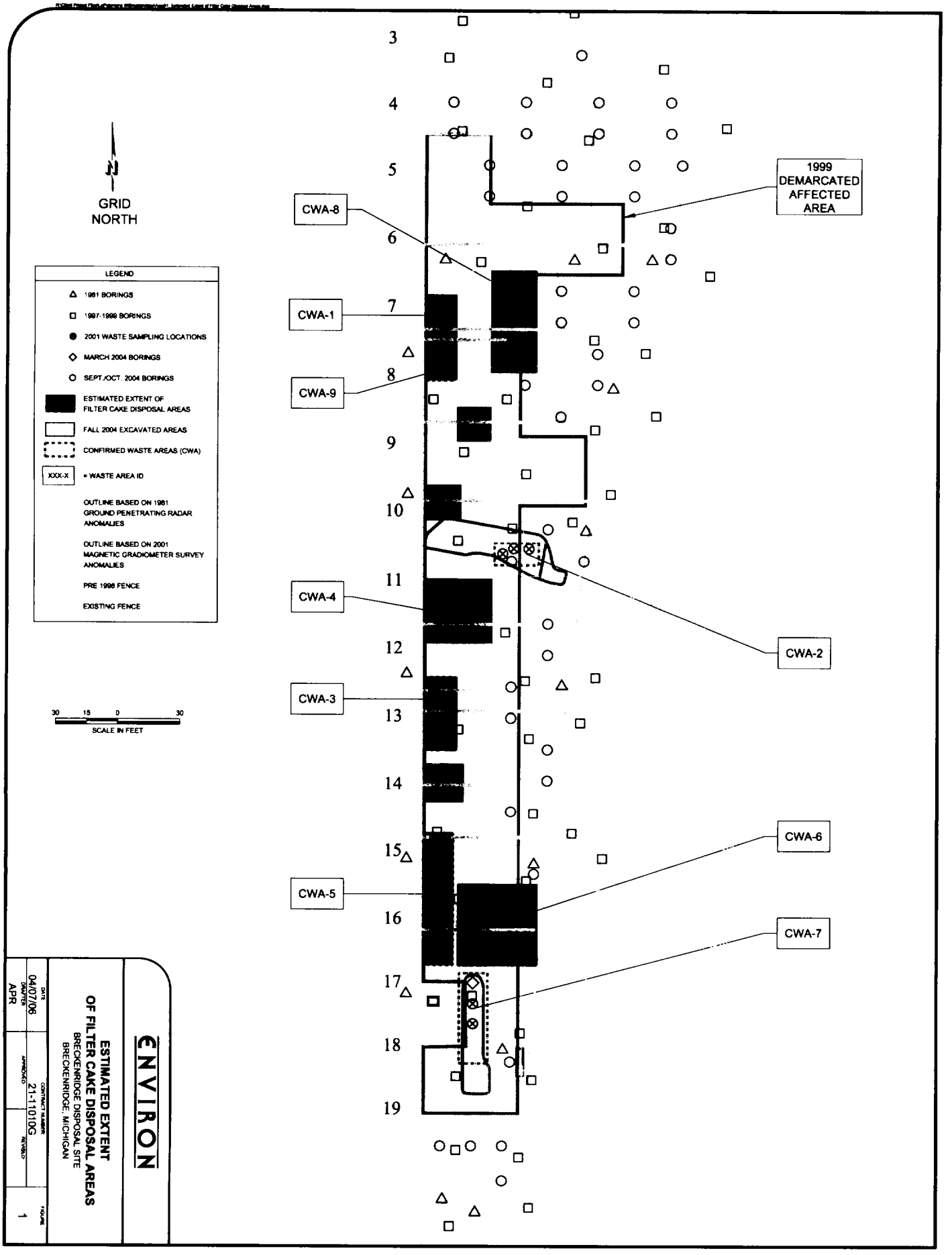
Sincerely,

ENVIRON International Corporation

Mark Travers
Principal

David Heidlauf
Senior Manager

cc: Bill Thomas – IEM-Inc.
Jay A. Steinberg, not individually, but solely as President of LePetomane III, Inc., not individually, but solely in the representative capacity of Custodial Trustee.
Christopher Greco – ENVIRON International Corporation


GRID NORTH
LEGEND
1981 BORINGS
1997-1998 BORINGS
2001 WASTE SAMPLING LOCATIONS
MARCH 2004 BORINGS
SEPT./OCT. 2004 BORINGS
ESTIMATED EXTENT OF FILTER CAKE DISPOSAL AREAS
FALL 2004 EXCAVATED AREAS
CONFIRMED WASTE AREAS (CWA)
XXX-X = WASTE AREA ID
OUTLINE BASED ON 1981 GROUND PENETRATING RADAR ANOMALIES
OUTLINE BASED ON 2001 MAGNETIC GRADIOMETER SURVEY ANOMALIES
PRE 1998 FENCE
EXISTING FENCE
30 15 0 30
SCALE IN FEET
3
4
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19
CWA-8
CWA-1
CWA-9
CWA-4
CWA-3
CWA-5
CWA-2
CWA-6
CWA-7
1999 DEMARCATED AFFECTED AREA
ENVIRON
ESTIMATED EXTENT OF FILTER CAKE DISPOSAL AREAS
BRECKENRIDGE DISPOSAL SITE
BRECKENRIDGE, MICHIGAN
DATE 04/07/06
DRAFTER APR
APPROVED
CONTRACT NUMBER 21-11010G
REVISED
FIGURE 1

ATTACHMENT

RADIATION DOSE MODELING FOR THE BRECKENRIDGE DISPOSAL SITE

DOSE MODELING EVALUATION

1.0 Introduction

The Breckenridge Site is located on Madison Road about 4 miles east of downtown St Louis, Bethany Township, Michigan.[1] The Breckenridge property is a narrow triangular-shaped 2.2-acre parcel of land that is mostly flat and grassy with scattered large trees. The property is bounded by Madison Road on the north, by Bush Creek on the east, and by farmland on the west. The nearest residence is located approximately 0.2 kilometers to the east across Bush Creek. A six-foot high chain-link fence controls access to the Site. The site is located in a rural area surrounded by farms.

A previous dose assessment was prepared by SCIENTECH, LLC. (SCIENTECH) to compare the estimated dose from the buried filtercake to a hypothetical future on-site residential receptor.[2] The assessment compared the estimated radiation dose to the dose limit established by the U.S. Nuclear Regulatory Commission (USNRC) for unrestricted release of the radiologically contaminated areas.[3] The radiation dose limit is 25 millirem per year (mrem/yr) total effective dose equivalent (TEDE). The regulation also stipulates that the dose should also be as low as reasonably achievable (ALARA). A number of assumptions made by Scientech were found to be inconsistent with the site conditions that were encountered during the remedial activities in 2004.[4]

The purpose of this radiation dose assessment was to establish the derived concentration guideline levels (DCGLs) consistent with site conditions to be used to remediate the site and satisfy the radiation dose criteria established by the USNRC. The sections provided below define the input parameters that were used to establish the DCGLs.

2.0 Assessment Methodology

The process of assessing the radiation dose potential for the Breckenridge Disposal site involves defining the source(s), preparing a site conceptual model, identifying the likely pathways for potential human exposure, and assessing the availability of a receptor to receive a dose. However, the relationships between these factors are complex and often interdependent. Therefore, a computer

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[1] Scientech, LLC, *Remedial Work Plan - Waste Excavation and Site Restoration*, Breckenridge Disposal Site, Document Number 82A9514, August 17, 2004.

[2] Scientech, LLC, *Dose Assessment Report, Breckenridge Disposal Site*, Revision 0, April 16, 2002.

[3] US Nuclear Regulatory Commission, *Radiological Criteria for Unrestricted Use*, Title 10 CFR 20.1402, July 21, 1997.

[4] Letter from Mr. Mark Travers, ENVIRON, to Dr. Peter Lee, USNRC Region III, *Fall 2004 Breckenridge Disposal Site Remedial Activities*, May 3, 2005.

program to model the plausible human exposure scenarios and to perform the complex sets of computations was employed.

The computer code, RESRAD (Version 6.3) was used to model radionuclide fate and transport of residual radioactivity at the site and to assess the radiation dose incurred by hypothetical receptors who may be impacted by the site after decommissioning is complete.[5] This code provides an estimate of the annual radiation dose beginning immediately after decommissioning is complete and extending for 1,000 years into the future.[6] It is widely-accepted as an industry-standard tool for performing radiological dose assessments and for deriving DCGLs. However, there are several important features of the code that should be taken into account in interpreting any results that are generated. These include the following:

- The radiation dose conversion factors (DCFs) used in RESRAD 6.32 are taken from Federal Guidance Reports (FGRs) No. 11 and 12, which are derived from outdated dosimetry model promulgated by the International Commission on Radiation Protection (ICRP);[7,8,9,10]

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[5] Yu, C, Zielen, A.J, et al, *User's Manual for RESRAD Version 6*, ANL/EAD-4, Argonne National Laboratory, Argonne, Illinois, July, 2001.

[6] The RESRAD code was chosen primarily because it can adequately depict the key site-specific features of the Breckenridge site. It is also able to derive values for exposure parameters based on built-in fate and transport computations using well-defined site-specific data. In addition, the code is able to integrate radiation dose projections over time taking into account transient conditions that may occur.

[7] U.S. Environmental Protection Agency, *Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion*, Federal Guidance Report Number 11, EPA 520/1-88-20, September, 1988.

[8] U.S. Environmental Protection Agency, *External Exposure to Radionuclides in Air, Water and Soil*, Federal Guidance Report Number 12, EPA 402 R-93-081, September, 1993.

[9] International Council on Radiation Protection, *Report of the Task Force on Reference Man*, ICRP Report 23, 1981.

[10] The bio-kinetic dosimetry model accounts for particle fractioning that might occur following exposure. For example, the DCFs for particle inhalation account for the dose to the GI tract from the fraction of respired particles that are ingested. As a result, there is no need to independently account for biological fractioning in the dose calculations.

- Short-lived radioactive progeny (e.g. halflife less than 180 days) are accounted for using the "parent+D" DCFs;
- RESRAD integrates and normalizes exposure factors based on the fraction of time a receptor is exposed over the exposure period;[11] and
- RESRAD uses single-point estimates for values of every parameter to evaluate complete pathways in the deterministic module of the code.

The RESRAD code was used to calculate a deterministic result and capture the reasonable maximum exposure (RME) condition for a receptor using single point estimates of parameter values used to calculate dose. Such a calculation provides a single point estimate of radiation dose that could result from a given concentration of radioactivity. For the purposes of modeling radiation doses for the Breckenridge site, a deterministic approach was used to establish the acceptable concentrations of uranium and thorium in the surface soil as well as the subsurface component of the site.

The remainder of this Chapter summarizes the various dose assessments as follows: Section 3 describes the site conceptual model, the radioactive source term and the physical parameters of the Breckenridge site that are used as input to the computer modeling; Section 4 describes the exposure scenarios that were evaluated; and Section 5 presents the results of the dose modeling performed for the Breckenridge facility.

3.0 Site Conceptual Model

A site conceptual model has three fundamental components that must be described in order to calculate (or model) the potential future dose to a receptor at or near the decommissioned Breckenridge site. The first component is the source term itself.[12] The second is the physical characteristics of the site.[13] And the third is the range of realistic (plausible) human exposure scenarios, described primarily by factors that are associated with human behavior and metabolic physics. Each of these fundamental components is discussed in the subsections that follow. The source term abstraction used by the RESRAD code to project potential future dose is derived from knowledge about the source material itself, and previously completed radiological assessments of

[11] For example, a soil ingestion rate of 100 mg/d for a receptor who is exposed on Site for only 50-percent of one day would result in an ingestion intake of 50 mg.

[12] The size, thickness, and radiological composition of the source must be conceptualized in the source term abstraction.

[13] The site must be described in a physical abstraction that includes physical and hydraulic characteristics of the site and its potentially impacted environment.

the residual radioactivity at the Breckenridge site. The source term is defined by its radionuclide composition, as well as its lateral and vertical extent (spatial configuration).

3.1 Values Used to Describe the Source Term

The source term is the residual concentrations of radioactive materials that will be allowed to remain after remediation is complete. That concentration is bounded by an upper limit on radiation dose of 25 millirem, TEDE, and applies to the surface and the subsurface of the Breckenridge Disposal site.

The radiological contaminants of concern at the disposal site include processed uranium and thorium.[14,15] The release criteria (DCGLs) were developed in units of picocuries per gram (pCi/g) for uranium 238, uranium 235, thorium 232, and the associated decay progeny. The filter cake that was disposed in the Breckenridge facility was processed such that the uranium and thorium were not in equilibrium with the decay progeny, including radium. For the thorium decay chain, more than ninety percent (90%) of secular equilibrium will be reached in 20 years. Since the material has been in the ground for more than 35 years, it is reasonable to assume that the progeny are in equilibrium with the parent, thorium 232. For the uranium decay chain, the time required to reach secular equilibrium is more than 75,000 years. The existing analytical data are inconsistent regarding the ratio of uranium to radium; most samples indicate the ratio of radium activity is less than 50% of the uranium activity.[16] In order to be conservative, the DCGLs were developed assuming that the activity of radium 226 was 50% of the uranium 238 and uranium 234 activity. Table 1 describes the activity of the key radionuclides present in the filtercake that were used for the radiation dose modeling.

In describing the source term for input to RESRAD, the area (size) of the contaminated zone parameter for the surface is equal to the surface area of the disposal site or 3,800 square meters (m^2).[17] The thickness of the surface contaminated zone is assumed to be 15 centimeters (cm) and no cover (0 m) is assumed to be present. The area of the subsurface contaminated zone is defined

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[14] Letter from Mr. David Heidlauf, ENVIRON, to Dr. Peter Lee, USNRC Region III, *Waste Characterization Sampling Results, Breckenridge Disposal Site*, April 16, 2004.

[15] Scientech, LLC, *Buried Filtercake Waste Characterization Report, Breckenridge Disposal Site*, Report Number 82A9433, March 1, 2002.

[16] Letter from Mr. David Heidlauf, ENVIRON, to Dr. Peter Lee, USNRC Region III, *Waste Characterization Sampling Results, Breckenridge Disposal Site*, April 16, 2004.

[17] Letter from Mr. David Heidlauf, ENVIRON, to Dr. Peter Lee, USNRC Region III, *Fall 2004 Breckenridge Disposal Site Remedial Activities*, May 3, 2005.

as the area of the waste pits or 600 m^2. The thickness of the subsurface contaminated zone is 0.6 meters (2 feet) and the subsurface material is assumed to be located at least 1.5 m below the surface. The input parameters used to describe the surface and subsurface areas are summarized in Tables 3 and 4; Table 5 lists the parameters that are common to both the surface and subsurface exposure scenario.

3.2 Values Used to Describe the Site Physical Parameters

The second major conceptual component of a dose assessment is the physical abstraction of the site, which must capture and express the important physical, hydraulic, and geological conditions at the site. It is also used to place the source term in the context of the ENVIRONment and systems that surround it. The RESRAD computer model uses information about the physical characteristics of the site to estimate the potential migration of radionuclides and the ultimate distribution of the radioactive materials in the pathways for exposure of the receptor (in this case, a "resident farm family") over the course of 1,000 years. Specific parameters are provided in Tables 3,4, and 5.

In recognition of the relatively flat topographic features present at the site, the general meteorological signature for the area, and the non-invasive nature of the future use scenario, all of which argue for lower than average soil erosion potentials, the subsurface contaminated zone erosion rate was conservatively modeled with a deterministic value of 0.001 m/yr (1 m/1,000 years), equivalent to the RESRAD default value. Annual dose estimates are not particularly sensitive to this parameter since the peak annual dose occurs in the first year after deposition, and decreases each year thereafter, regardless of the surface soil erosion rate used.

For the subsurface zone or the excavated waste pits, there are four "layers", all of which are important to the dose modeling objective. These are:

- Cover - a thick layer of unimpacted native soil, topsoil and vegetation from the site to form a cover over the contaminated zone and underlying waste layer;
- Contaminated Zone Layer - a layer generally lying just beneath the cover in which radionuclide-bearing materials are consolidated;
- Undisturbed Surface Layer - a relatively thick, dense, undisturbed native deposit of siltey clay and clayey silt;[18] and
- Saturated Zone Layer - the saturated layer located beneath the unsaturated zone.

[18] Letter from Mr. David Heidlauf, ENVIRON, to Dr. Peter Lee, USNRC Region III, *Fall 2004 Breckenridge Disposal Site Remedial Activities*, May 3, 2005.

3.2.1 Cover

The work plan requires that each waste pit be excavated and the filtercake be removed for shipment offsite. The walls of the excavation will be surveyed to verify that the concentration of the remaining filtercake is less than the derived concentration guideline levels (DCGLs) described in Table 6. Each excavation is backfilled using soil from the surface of the site and soil transported to the site from a non impacted borrow area. It is assumed that the cover (backfill) is at least 1.5 m thick (approximately 5 feet thick). This thickness is likely to much greater than 4 feet because each of the waste pits are different depths. The thickness of 5 feet was selected in order to be conservative and able to reduce the potential radiation lower than the dose calculated in Section 5 of this report.

It is assumed that the larger area, the surface of the Breckenridge site, does not have any cover that may attenuate the gamma exposure rates. The surface is assumed to be approximately 15 cm (6 inches) thick.

3.2.2 Contaminated Zone Layer

The filter cake is buried in pits spread over 600 m^2 of the Breckenridge site. Each waste pit is more than 4 feet deep and will be excavated during remedial activities. The density of the filtercake is assumed to be 1.4 g/cm^3 and a hydraulic conductivity of 89 m/yr.[19] Other parameters related to the geotechnical parameters that were used in the RESRAD model are provided in Tables 3,4, and 5.

The chemical characteristics of the filtercake were not studied. Specifically, the likelihood that the uranium, thorium and radium may leach from the waste pits has not been tested. A review of published studies indicate that the movement of these elements is a function of the type of soil and the availability of groundwater. Conservative partition coefficients (K_d) were selected for each element and used as input to the RESRAD code.[20,21] The coefficients for uranium, thorium, radium, lead, and actinium are provided in Table 5. It was assumed that the soil surrounding the waste pits, the unsaturated layer and the saturated layer were composed of siltey clay and clayey silt; the K_d for each element was selected for a soil type of clay.

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[19] Scientech, LLC, *Breckenridge Disposal Site, Buried Filtercake Waste Characterization Report*, Document Number 82A9433, March 1, 2002.

[20] Sheppard, Marsha I. And D.H. Thibault, *Default Soil Solid/liquid Partition Coefficients, Kds, for Four Major Soil Types: a Compendium*, Health Physics Journal, Volume 59, No. 4, pp. 471-482, October, 1990.

[21] U.S. Nuclear Regulatory Commission, *Development of Probabilistic RESRAD 6.0 and RESRAD-Build 3.0 Computer Codes*, NUREG/CR-6697, November, 2000.

3.2.3 Undisturbed Subsurface Layer

The third layer is the undisturbed native deposits of siltey clay and clayey silt that is estimated to have a thickness of 20 feet (6 meters).[22] RESRAD identifies this layer as the "unsaturated layer" when modeling the source term. The soil density is 1.4 g/cm^3 and hydraulic conductivity is 89 m/yr.[23] The radionuclide distribution coefficients described in Section 3.2.2 were used for all elements.

3.2.4 Saturated Zone Layer

The saturated layer is estimated to be more than 6 meters beneath the waste pits. The soil density is 1.4 g/cm^3 and the hydraulic conductivity is 289 m/yr.[24] The radionuclide distribution coefficients described in Section 3.2.2 were used for all elements.

4.0 Exposure Scenarios

In order to demonstrate compliance with applicable requirements for both the surface and subsurface portions of the Breckenridge site, and to ensure a realistic correlation between radiation dose and residual radioactivity, it is critical that the model portrayed in the RESRAD code be sufficiently representative of actual (site-specific) cases. The input parameters to the RESRAD code were established after envisioning and then characterizing ed the most realistic exposure scenarios applicable to future (post-decommissioning) receptors.

For this assessment, it was assumed that the "agricultural farm family" scenario is applicable. In this scenario, a hypothetical family is assumed to move into a house built on the Breckenridge property after the waste pits are excavated and the impacted soil is shipped offsite. For this scenario, it is assumed that a fictitious family builds a home and raises all of the crops and livestock for family consumption on the property. These fictitious family members may thus incur a radiation dose by <u>all</u> of the following pathways (see Table 2):

- Inhalation of re-suspended radioactivity;
- Ingestion of food from crops grown in the location of the residual radioactivity;

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[22] Oak Ridge Associated University, *Radiological Assessment of the Breckenridge Disposal Site, Velsicol Chemical Corporation, St. Louis, Michigan*, Final Report, July, 1982.

[23] Scientech, 2004.

[24] Scientech, 2004.

- Ingestion of milk from livestock that grazes in the location of the residual radioactivity;
- Ingestion of meat from livestock that grazes in the location of the residual radioactivity;
- Ingestion of fish from an on-site pond contaminated by water percolating through the residual radioactivity; and
- Ingestion of water from a well on the property that is contaminated by water percolating through the residual radioactivity.

The reason for selecting the agricultural farm family scenario for this dose assessment is that exposure of permanent residents is long-term in nature, generally involves a greater number of exposure pathways than for non-residents, and results in a high, or conservative, estimate of potential radiation dose. This scenario is conservative because the site is small and not large enough to support a family for as many as 1,000 years. However, the scenario is considered to be the most sensitive and results in the highest potential radiation exposure.[25]

For dose modeling the Breckenridge site, the following key assumptions were made:

- The critical group is a resident farm family who lives at the site full time, ingests meat, plants and milk from livestock raised on the site, as specified in the manual for RESRAD;[26]
- Ground water is used for drinking purposes; and
- Radioactive materials have been remediated to concentrations below the DCGLs established in this section.

These assumptions were used to select the specific parameters that were used in the RESRAD model for the resident farm family and serve as the basis for the calculation of the DCGLs. Table 3

[25] U.S. Nuclear Regulatory Commission, *Comparison of the Models and Assumptions used in DandD 1.0, RESRAD 5.61, and RESRAD 1.50 Computer Codes with respect to the Residential Farmer and Industrial Occupant Scenarios Provided in NUREG/CR 5512*, NUREG/CR-5512, Volume 4, August, 1999.

[26] Yu, C, Zielen, A.J, et al, *User's Manual for RESRAD Version 6*, Table 2.2, ANL/EAD-4, Argonne National Laboratory, Argonne, Illinois, July, 2001.

describes the parameters used in the RESRAD model to depict the physical parameters of the residual radioactivity in the surface soil after decommissioning is complete.[27] Table 4 describes the parameters used in the RESRAD model to depict the physical parameters of the residual radioactivity in the subsurface soil (i.e waste pits that have been excavated and backfilled) after decommissioning is complete. The parameters that are common to each of the scenarios are described in Table 5.

Relevant data were obtained from USNRC-sponsored references, including NUREG-5512, NUREG 6697 and combined with a literature search.[28,29,30,31] Only data provided directly from the USNRC or obtained from readily available, citable, published sources were used as input parameters for the RESRAD code.

5.0 Results

The RESRAD code was iteratively run for both the surface and subsurface impacted soil to arrive at the highest uniform concentration of residual radioactivity in soil that resulted in a peak mean annual dose estimate to a single receptor in the critical exposure group that equal to the regulatory limit of 25 mrem/year for the resident farm scenario. The DCGLs for the surface were found to contribute to the radiation dose of the resident farm family during the early years of occupancy, less than 200 years. The DCGLs for the waste pits were found to have their maximum impact after 1,000 years when activity in the water was at a maximum; the ingestion of impacted plants and water contributed to the radiation dose after 1,000 years.

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[27] A more comprehensive list of the input parameters used in the execution of the RESRAD dose modeling code to evaluate the potential future radiation dose for each scenario is provided in the RESRAD summary reports (see Table 3,4 and 5).

[28] U.S. Nuclear Regulatory Commission, *Residual Radioactive Contamination from Decommissioning – Parameter Analysis*, NUREG 5512, Volume 3, October, 1999.

[29] U.S. Nuclear Regulatory Commission, *Development of Probabilistic RESRAD 6.0 and RESRAD-Build 3.0 Computer Codes*, NUREG/CR 6697, November, 2000.

[30] U.S. Nuclear Regulatory Commission, *Probabilistic Dose Analysis Using Parameter Distributions Developed for RESRAD and RESRAD-BUILD Codes*, NUREG 6676, May, 2000.

[31] U.S. Nuclear Regulatory Commission, *Residual Radioactive Contamination from Decommissioning - Technical Basis for Translating Contamination Levels to Annual Total Effective Dose Equivalent*, NUREG/CR 5512, Volume 1, September, 1992.

The DCGLs provided in Table 6 reflect the concentration of radionuclides in soil that may be present in the surface soil to ensure a maximum exposure of less than 25 millirem per year over background. The presence of these isotopes will be verified after the remediation is completed and the final status survey is implemented. As described in Section 4.0, a resident farm family exposure scenario was used to develop the DCGLs. The RESRAD summary report is provided in the Appendix (Breckenridge Surface 080412.rad, Breckenridge Subsurface 080411.rad).

The RESRAD code was used to generate DCGLs in the soil by inputting unit activity concentrations and running the code to determine the resulting dose rate. This dose factor (millirem/year per pCi/g) is divided into the release criteria (25 mrem/yr) to yield the DCGL. For ^{232}Th+D, the concentration of 0.51 pCi/g was used for the key isotopes, ^{232}Th, ^{228}Th and ^{228}Ra. The ratios of the uranium isotopes, ^{238}U, ^{235}U and ^{234}U, were used for the unit activity concentrations. For ^{238}U, the fraction of 0.32 was used, 0.02 for ^{235}U and 0.32 for ^{234}U. The filtercake exhibits concentrations of ^{226}Ra, and ^{210}Pb; the fraction 0.16 was used for each of these isotopes, assuming 50% equilibrium. This fractional source term was entered directly into the RESRAD code; the short-lived progeny were calculated by RESRAD according to their respective parents. The resulting dose, 3.3 mrem/yr was derived from the unit activity for all contributing isotopes to the surface radiation dose. The DCGLs were calculated by multiplying the unit activities by the fraction of 25 mrem/3.3 mrem or multiplied by a factor of 7.6. The resulting dose, 0.0075 mrem/yr was derived from the unit activity for all contributing isotopes to the subsurface radiation dose. The DCGLs were calculated by multiplying the unit activities by the fraction of 25 mrem/0.0075 mrem or multiplied by a factor of 133.3. The DCGLs are summarized in Table 6.

Thorium 232 is present in equilibrium with its decay progeny. The DCGL established for ^{232}Th applies to any isotope in the decay chain. The DCGL of 3.9 pCi/gram in the surface soil and 34 pCi/gram in the subsurface soil represent a maximum of 25 mrem/yr in any one year over 1,000 years. Exposure to ^{228}Th and ^{228}Ra represents the principal exposure from time 0 to approximately 40 years. Exposure to ^{232}Th represents the principal exposure after 40 years to approximately 200 years. External radiation represents the predominant exposure pathway contributing approximately 90% of the total dose for the surface DCGLs. For the subsurface soil, external exposure contributes 76% of the exposure combined with 24% of exposure from the ingestion of impacted plants. Thorium 232 contributes the majority (72%) of the radiation exposure for the subsurface soil.

Uranium 238 is in secular equilibrium with its decay progeny, Uranium 234, but not the radium nor lead decay progeny. The DCGL established for ^{238}U and ^{234}U of 2.5 pCi/gram in the surface and 21.5 pCi/gram in the subsurface soil represents a maximum exposure of 25 mrem/yr in any one year over 1,000 years. Exposure to ^{226}Ra represents the principal exposure from the surface soil from time 0 to approximately 200 years. External radiation represents the predominant exposure pathway contributing approximately 90% of the total dose (17% from ^{226}Ra in Year 0) for the surface DCGLs. For the subsurface soil, external exposure contributes 76% of the exposure combined with 24% of

exposure from the ingestion of impacted plants. Radium 226 contributes the majority of the radiation exposure from the uranium chain (12%) for the subsurface soil.

To verify that exposures in any given year were less than 25 millrem/year, the calculated exposures for both the surface and subsurface DCGLs were summed. The results in Table 7 indicate that the DCGLs are conservative and establish the criteria such that no exposure is greater than 25 mrem/yr for any one year, over an exposure period of 1,000 years. As described in Table 7, the predicted radiation exposure decreases to less than 0.1 mrem/yr after 200 years and increases to 25 mrem/yr after 1,000 years.

TABLES

Table 1 - Radioactivity in the Filtercake

Isotope	Activity (pCi/g)[32]	Comments
Uranium 238[a]	133	Average of 9 composite samples
Uranium 235	8	Average of 9 composite samples
Thorium 232[b]	212	Average of 9 composite samples
Radium 226	67	Activity is assumed to be less than 50% of the activity of U238.

a - For the uranium decay chain, the time required to reach secular equilibrium is more than 75,000 years. It is assumed that U234 and long lived progeny that decay before Ra226 are in secular equilibrium with U238. For Ra226 and subsequent progeny, it is assumed that the activity is less than 50% of secular equilibrium.[33,34]

b - For the thorium decay chain, more than ninety percent (90%) of secular equilibrium is achieved in approximately 20 years. Since the filtercake has been buried for more than 35 years, it is reasonable to assume that the progeny are in equilibrium with the parent, thorium 232.

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[32] Letter from Mr. David Heidlauf, ENVIRON, to Dr. Peter Lee, USNRC Region III, *Waste Characterization Sampling Results, Breckenridge Disposal Site*, April 16, 2004.

[33] Letter from Mr. David Heidlauf, ENVIRON, to Dr. Peter Lee, USNRC Region III, *Waste Characterization Sampling Results, Breckenridge Disposal Site*, April 16, 2004.

[34] Oak Ridge Associated University, *Radiological Assessment of the Breckenridge Disposal Site, Velsicol Chemical Corporation, St. Louis, Michigan*, Final Report, July, 1982.

Table 2 - RESRAD Exposure Pathways

Pathway	Retained	Comments
Direct Exposure	Yes	The source term found in the site soils produces penetrating gamma radiation. Exposure from direct penetrating radiation is expected to be a significant contributor to the overall potential dose.
Particulate Inhalation	Yes	Allowance is made for soils containing radiological constituents of the source being liberated and suspended in the breathing air of the members of the farm family .
Radon	No	Radon is specifically excluded from consideration within the framework of the governing regulations. In addition, the source term found is not a significant producer of radon due to the relatively long half-life of the thorium isotopes found in the filtercake
Plant Ingestion	Yes	Ingestion of plant foods addresses those plant foods grown in the surface soil radioactivity may be consumed by the resident farm family.
Drinking Water	Yes	It is assumed that ground water may be used for consumption at some time in the future.
Meat Ingestion	Yes	The farm family may ingest livestock that graze on the property. No animals exist on the property at this time.
Milk Ingestion	Yes	Livestock is not allowed to graze on the property currently. However, the scenario of a resident farm family includes the ingestion of milk from livestock that graze on the property.
Aquatic Foods Ingestion	Yes	While there are no surface water ponds on the property currently, it is reasonable to assume that a pond stocked with fish may be added in the future.
Direct Ingestion	Yes	Members of the farm family spend approximately 11% of their time outdoors. They may ingest relatively small amounts of soil through incidental oral contact with their hands.

Table 3
Input Parameters for Surface Soil

Parameter			Default	Value Selected	Justification
Description	Code	Unit			
Area of contaminated zone	Area	m^2	No default	3,800	The area of the disposal site is approximately 3,800 m^2. ENVIRON, 2005
Length parallel to aquifer flow	LCZPAQ	m	No default	61.6	This parameter is derived as the square root of the contaminated area. NUREG 6697
Thickness of the contaminated zone	THICK0	m	No default	0.15	The surface is defined by the USNRC as the top 15 cm. NUREG 6697.
Cover depth	COVER0	m	No default	0	It is assumed that there is no cover on the surface soil by definition
Actinium-227	S1(1)	pCi/g	0.02	0.1	Unit Activity to derive DCGL
Protactinium-231	S1(2)	pCi/g	0.02	0.1	Unit Activity to derive DCGL
Lead-210	S1(3)	pCi/g	0.16	1.3	Unit Activity to derive DCGL
Radium-226	S1(4)	pCi/g	0.16	1.3	Unit Activity to derive DCGL
Radium-228	S1(5)	pCi/g	0.51	3.9	Unit Activity to derive DCGL
Thorium-228	S1 (6)	pCi/g	0.51	3.9	Unit Activity to derive DCGL
Thorium-230	S1(7)	pCi/g	0.32	2.5	Unit Activity to derive DCGL
Thorium-232	S1(8)	pCi/g	0.51	3.9	Unit Activity to derive DCGL
Uranium-234	S1(9)	pCi/g	0.32	2.5	Unit Activity to derive DCGL
Uranium-235	S1(10)	pCi/g	0.02	0.1	Unit Activity to derive DCGL
Uranium-238	S1(11)	pCi/g	0.32	2.5	Unit Activity to derive DCGL

Table 4
Input Parameters for Subsurface Soil

Parameter			Default	Value Selected	Justification
Description	**Code**	**Unit**			
Area of contaminated zone	Area	m^2	No default	600	The are of the waste pits is approximately 600 m^2. ENVIRON, 2005.
Length parallel to aquifer flow	LCZPAQ	m	No default	24.5	This parameter is derived as the square root of the contaminated area. NUREG 6697
Thickness of the contaminated zone	THICK0	m	No default	0.6	It is assumed that the layer of impacted soil remaining in the waste pits after remediation is less than 0.6 meters thick. ENVIRON, 2005
Cover depth	COVER0	m	No default	1.5	It is assumed that there is at least 5 feet of cover soil. It is projected that most of the waste pits are deeper than 5 feet. This value is conservative; the radiation dose will decrease as the depth of the clean cover increases. ENVIRON, 2005
Actinium-227	S1(1)	pCi/g	0.02	1.5	Unit Activity to derive DCGL
Protactinium-231	S1(2)	pCi/g	0.02	1.5	Unit Activity to derive DCGL
Lead-210	S1(3)	pCi/g	0.16	10.5	Unit Activity to derive DCGL
Radium-226	S1(4)	pCi/g	0.16	10.5	Unit Activity to derive DCGL
Radium-228	S1(5)	pCi/g	0.51	34	Unit Activity to derive DCGL
Thorium-228	S1 (6)	pCi/g	0.51	34	Unit Activity to derive DCGL
Thorium-230	S1(7)	pCi/g	0.32	21.5	Unit Activity to derive DCGL
Thorium-232	S1(8)	pCi/g	0.51	34	Unit Activity to derive DCGL
Uranium-234	S1(9)	pCi/g	0.32	21.5	Unit Activity to derive DCGL
Uranium-235	S1(10)	pCi/g	0.02	1.5	Unit Activity to derive DCGL
Uranium-238	S1(11)	pCi/g	0.32	21.5	Unit Activity to derive DCGL

Table 5 - Common Input Parameters

Parameter			Default	Value Selected	Justification
Description	Code	Unit			
Dose Conversion Factors	DCFX(n)	mrem/pCi	All DCFs used are RESRAD defaults		RESRAD defaults from FGR#11 and FGR#12 and are derived using ICRP 30 dosimetry model.[35,36] Short-lived (<180 days) radioactive progeny isotopes are accounted for through the use of the "parent+D" DCFs.
Time since placement	T(n)	Yrs.	1 10 100 300 500 700 900 1000	1 10 100 300 500 700 900 1000	Evaluation at these time segments allows for consideration of the potential for conditions at the Site to evolve from the initial conditions specified (e.g., soil erosion impacts the cover thickness) and projects the changing Site conditions to the required 1000-year outlook.[37,38]
Radionuclide concentration in groundwater (for each isotope)	TI	pCi/L	Not assigned	Not assigned	This parameter was not used for the calculation. Partition coefficients were used assuming placement at t=0 years while the filtercake has been placed in the waste pits for more than 30 years.
Cover Depth (thickness)	COVER0	m	Not assigned	1.5	A cover is assumed for the subsurface soil. Each waste pit is filled with at least five feet of soil after the filtercake is excavated. No cover is present for the surface soil.
Density of cover material	DENSCV	g/cm^3	1.5	1.5	A cover is assumed for the subsurface soil. No cover is present for the surface soil.

[35] U.S. Environmental Protection Agency, *Limiting Values of Radionuclide Intake and Air Concentrations and Dose Conversion Factors for Inhalation, Submersion, and Ingestion*, Federal Guidance Report Number 11, EPA 520/1-88-020, September, 1988.

[36] U.S. Environmental Protection Agency, *External Exposure to Radionuclides in Air, Water and Soil*, Federal Guidance Report Number 12, EPA 402 R-93-081, September, 1993.

[37] U.S. Nuclear Regulatory Commission, *Radiological Criteria for License Termination*, Volume 62, Federal Register, page 39058, July 21, 1997.

[38] U.S. Nuclear Regulatory Commission, *NMSS Decommissioning Standard Review Plan*, NUREG-1727, September, 2000.

Parameter			Default	Value Selected	Justification
Description	Code	Unit			
Cover depth erosion rate	VCV	m/yr	0.001	0.001	The erosion of the surface soil was selected as a default of the RESRAD code. This value is conservative and likely to be lower at Breckenridge because the area is relatively flat and humid ambient conditions. A value of $3x10^{-6}$ was predicted for humid sites including, Michigan, Ohio and New York.
Contaminated Zone Density	DENSCZ	g/cm^3	1.3	1.4	The density of the soil in the waste pits. Scientech, 2004
Contaminated Zone Erosion Rate	VCZ	m/yr	0.001	0.001	The erosion of the surface soil was selected as a default of the RESRAD code.[39] This value is conservative and likely to be lower at Breckenridge because the area is relatively flat and humid ambient conditions. A value of $3x10^{-6}$ was predicted for humid sites including, Michigan, Ohio and New York.[40]
Contaminated Zone Total Porosity	TPCZ	Unitless 0 to 1	0.4	0.4	Porosity of sandy soil is used to model the surface soil. RESRAD default. This value is likely to be lower because it is assumed that the physical properties are equivalent to clay rather than sandy soil.
Contaminated Zone Field Capacity	FCCZ	Unitless, 0 to 1	0.2	0.2	Field capacity for sandy soil is calculated using total and effective porosity. RESRAD default
Contaminated Zone Hydraulic Conductivity	HCCZ	m/yr	10	89	The default value, 10 m/yr, corresponds to the measured hydraulic conductivity in sandy soils. The subsurface geology is more typical of clayey silt rather than sandy soil. Scientech, 2002.
Contaminated Zone B-Parameter	BCZ	Unitless	2.88	5.3	The B-parameter was selected for clay. The value is likely to be higher; empirical data ranges from 4 to 22. NUREG 6697

[39] Argonne National Laboratory, *User's Manual for RESRAD Version 6*, July, 2001.

[40] Argonne National Laboratory, *The Effects of Soil Erosion on the Long Term Stability of FUSRAP Near Surface Waste Burial Sites*, ANL/EIS-18, 1983.

Parameter			Default	Value Selected	Justification
Description	Code	Unit			
Average Annual Wind Speed	WIND	m/sec	4.25	4.65	The site- specific annual average value is used for this input value.[41]
Humidity in air	HUMID	g/m^3	Not assigned	NA	Tritium is not present at the site.
Evapotranspiration Coefficient	EVAPTR	Unitless, 0 to 1	0.5	0.5	Typical values in humid climates east of the Mississippi River are approximately 0.7.[42] RESRAD Default
Precipitation Rate	PRECIP	m/year	1.05	0.754	Annual average in the Michigan area. Equals 29 inches per year.[43]
Irrigation rate	RI	m/yr	0.2	0.5	USNRC, 1999.[44]
Irrigation mode	IDITCH	unitless	Overhead	Overhead	Site specific mode of irrigation
Runoff Coefficient	RUNOFF	Unitless, 0 to 1	0.45	0.2	The fraction of total annual precipitation that sheds off the surface and drains to Site watershed drainage without percolating through the soil. The value typically ranges from 0.3 to 0.5. For conservatism, the value is reduced. NUREG 6697
Watershed Area for Nearby Stream or Pond	WAREA	m^2	1,000,000	1,000,000	The watershed area is used to calculate dilution factors for contaminant concentrations in surface water bodies in the vicinity of the site. NUREG 6697
Accuracy for water/soil computations	EPS	unitless	0.001	0.001	RESRAD default parameter
Density, Saturated Zone	DENSAQ	g/cm^3	1.52	1.4	The unsaturated zone was determined to be a clay soil type soil during the Remedial Investigation. Scientech, 2004

41 U.S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Gratiot County, Michigan*, 1979.

42 Argonne National Laboratory, *User's Manual for RESRAD Version 6*, July, 2001.

43 National Climate Data Center.

44 U.S. Nuclear Regulatory Commission, *Preliminary Guidelines for Evaluating Dose Assessment in Support of Decommissioning*, March, 1999.

Parameter			Default	Value Selected	Justification
Description	Code	Unit			
Total Porosity Saturated Zone	TPSZ	Unitless,0 to 1	0.4	0.4	The total porosity was selected for sandy soil. RESRAD Default. This value is likely to be lower because of the presence of clay in the unsaturated layer. Scientech, 2004
Effective Porosity, Saturated Zone	EPSZ	Unitless, 0 to 1	0.2	0.2	The total porosity was selected for sandy soil. RESRAD Default. This value is likely to be lower because of the presence of clay in the unsaturated layer. Scientech, 2004
Field Capacity, Saturated Zone	FCSZ	Unitless, 0 to 1	0.2	0.2	Field capacity of sandy soil was derived for the effective and total porosity. RESRAD Default
Hydraulic Conductivity, Saturated Zone	HCSZ	m/yr	10	289	Scientech, 2004
Hydraulic Gradient	HGWT	Unitless	0.02	0.02	NUREG 6697
Saturated Zone B-Parameter	BSZ	Unitless	5.3	5.3	The B-parameter was selected for clay soil type RESRAD Default NUREG 6697
Water table drop rate	VWT	m/yr	0.001	0.001	NUREG 6697
Water model: non dispersion or mass balance	Model	Unitless	ND	ND	The non dispersal model applies to the site.
Water table intake depth below the water table	DWIBWT	m	10	35.3	Oberlitner Well Drilling, Gratiot County, 1999. Scientech, 2004.
water well pumping rate	UW	m^3/yr	250	250	NUREG 6697
Thickness Unsaturated Layer	H1	m	4	6	ORAU, 1982.
Density, Unsaturated Layer	DENSUZ	g/cm^3	1.5	1.4	The unsaturated zone was determined to be a clayey silt soil type during the Remedial Investigation. Scientech, 2004
Total Porosity Unsaturated Layer	TPUZ	Unitless 0 to 1	0.4	0.4	The total porosity was selected for sandy soil. RESRAD Default. This value is likely to be lower because of the presence of clay in the unsaturated layer. Scientech, 2004

Parameter			Default	Value Selected	Justification
Description	Code	Unit			
Effective Porosity of Unsaturated Layer	EPUZ	Unitless, 0 to 1	0.2	0.2	The total porosity was selected for sandy soil. RESRAD Default. This value is likely to be lower because of the presence of clay in the unsaturated layer. Scientech, 2004
Field Capacity Unsaturated Layer	FCUZ	Unitless, 0 to 1	0.2	0.2	The field capacity was derived using the values for total and effective porosity for sandy soil. RESRAD Default
Unsaturated Layer 1, B-Parameter	BUZ(1)	Unitless	5.3	5.3	The B-parameter was selected for clay soil type RESRAD Default NUREG 6697
Hydraulic Conductivity Unsaturated Layer	HCUZ	m/yr	10	89	Scientech, 2004
Kd (Lead)	DCACT (n)	cm^3/g	100	550	Selected the published value for clay soil type. Sheppard and Thibault 1990 NUREG 6697
Kd (Uranium)	DCACT(n)	cm^3/g	50	1600	Selected the published value for clay soil type. Sheppard and Thibault 1990 NUREG 6697
Kd (Radium)	DCACT(n)	cm^3/g	70	9100	Selected the published value for clay soil type. Sheppard and Thibault 1990 NUREG 6697
Kd (Thorium)	DCACT(n)	cm^3/g	60,000	5800	Selected the published value for clay soil type. Sheppard and Thibault 1990 NUREG 6697
Inhalation Rate	INHALR	m^3/yr	8400	11,690	Assume adult breathing 20 liters /min for 365 days. 24 hours per day [45] This value is conservative; more typical breathing rate is 8,400 m^3 based on different breathing rates according to different activities. NUREG 6697. NUREG 5512
Mass Loading for Inhalation	MLINH	g/m^3	0.00003	3.14e-6	Site specific value for this parameter is not available. Selected parameter for outdoor airborne dust NUREG 5512
Shielding factor inhalation	SHF3	unitless	0.4	0.4	Filtration of dust indoors. RESRAD default. NUREG 6697

[45] U.S. Environmental Protection Agency, *Exposure Factors Handbook, Volume I, General Factors*, EPA 600/P-95-002Fa, August, 1997.

Parameter			Default	Value Selected	Justification
Description	**Code**	**Unit**			
Shielding factor external gamma	SHF1	unitless	0.7	0.55	Attenuation of external radiation inside the occupied building. This value, as calculated using Microshield, is less than 0.01. This value is conservative likely to result in a lower radiation exposure. Selected value from USEPA[46]
Exposure Frequency (Total)	EF	Days per year	Not assigned	350	Assumes number of days per year of time living at the Breckenridge site
Exposure Time	ET	hours per day	Not assigned	24	Assumes that each day is 24 hours long.
Indoor Time Fraction	FIND	Unitless, 0 to 1	0.5	0.657	The fraction of a total year (8,760hr) that is spent indoors on site. Assumes that 66% (15.77 hr/day for 350 days/yr) of the exposure occur indoors. NUREG 5512
Outdoor Time Fraction	FOTD	Unitless, 0 to 1	0.25	0.12	The fraction of a total year (8760hr) that is spent outdoors on Site. Equals 2.9 hrs/day for 350 days per year) outdoors on Site divided by 8760 hours. NUREG 5512
shape factor flag, external gamma	FS	unitless	Circular	Circular	RESRAD default. Representative of the impacted area with an area factor
Fractions of annular areas within AREA	RADSHAPE(n)	unitless	Not assigned	Not assigned	The shape of the impacted area is modeled as a circle. This parameter is not used in the calculation of the DCGL.
Fruits, vegetables and grain consumption	Diet(1)	kg/yr	160	112	Value selected from NUREG 6697. Likely to be lower. USEPA selected 43 kg/yr. USEPA, 2000
leafy vegetable consumption	DIET(2)	kg/yr	14	21.4	Value selected from NUREG 6697. Likely to be lower. USEPA selected 4.7 kg/yr. USEPA, 2000
milk consumption	DIET(3)	L/yr	92	233	NUREG 6697
meat and poultry consumption	DIET(4)	kg/yr	63	65.1	NUREG 6697

[46] U.S. Environmental Protection Agency, *Soil Screening Guidance for Radionuclides: User Guide*, EPA/540-R-00-007, October, 2000.

Parameter			Default	Value Selected	Justification
Description	Code	Unit			
Fish consumption	DIET(5)	kg/yr	5.4	20.6	Value selected from NUREG 6697. Likely to be lower. USEPA selected 7.3 kg/yr. USEPA, 2000
Other seafood consumption	DIET(6)	kg/yr	0.9	0	No other seafood is likely to be consumed by members of the resident farm family
Soil Ingestion Rate	SOIL	g/y	36.5	18.2	A member of the resident farm family may ingest soil as a result of incidental contact with the soil. USNRC default for adults engaged in non contact intensive activities. NUREG 6697
drinking water intake	DWI	L/yr	510	478.5	Average intake by member of the resident farm family. 1.3 L/day NUREG 6697
contamination fraction drinking water	FIRW	unitless	1	1	RESRAD default for resident farm family scenario. NUREG 6697
contamination fraction household water	FIRW	unitless	1	1	RESRAD default for resident farm family scenario. NUREG 6697
contamination fraction livestock water	FIRW	unitless	1	1	RESRAD default for resident farm family scenario. NUREG 6697
contamination fraction irrigation water	FIRW	unitless	1	1	RESRAD default for resident farm family scenario. NUREG 6697
contamination fraction aquatic food	FIRW	unitless	0.5	0.5	RESRAD default for resident farm family scenario. NUREG 6697
contamination fraction plant food	FIRW	unitless	-1	-1	RESRAD default for resident farm family scenario. NUREG 6697
contamination fraction meat	FIRW	unitless	-1	-1	RESRAD default for resident farm family scenario. NUREG 6697
contamination fraction milk	FIRW	unitless	-1	-1	RESRAD default for resident farm family scenario. NUREG 6697
livestock fodder intake for meat	LW15	kg/day	68	68	RESRAD Default. NUREG 6697

Parameter			Default	Value Selected	Justification
Description	Code	Unit			
livestock fodder intake for milk	LF16	kg/day	55	55	RESRAD Default. NUREG 6697
livestock water intake for meat	LW15	L/day	50	50	RESRAD Default. NUREG 6697
livestock water intake for milk	LW16	L/day	160	160	RESRAD Default. NUREG 6697
livestock soil intake	LSI	kg/day	0.5	0.5	RESRAD Default. NUREG 6697
mass loading for foliar deposition	MLFD	g/m^3	0.0001	0.0001	RESRAD Default. NUREG 6697
Depth of Soil Mixing Layer	DM	m	0.15	0.15	NUREG 6697. RESRAD Default.[47]
Depth of Roots	DROOT	m	0.9	0.9	There are no restrictions for plants and the depth of roots in the impacted area. The depth of roots for edible plants is less than 0.9 m. Grass on the impacted area likely to be less than 0.3 m.[48] NUREG 6697
drinking water fraction from ground water	FGWDW	unitless	1	1	RESRAD default for resident farm family
household water fraction from ground water	FGWHH	unitless	1	1	RESRAD Default. NUREG 5512
livestock water fraction from ground water	FGWLW	unitless	1	1	RESRAD Default. NUREG 6697
irrigation fraction from ground water	FGWIR	unitless	1	1	It is assumed that the property will be irrigated with rainwater, surface runoff and supplemented by impacted groundwater
wet weight crop yield for non leafy plants	YV(1)	kg/m^2	0.7	0.7	RESRAD Default. NUREG 6697

[47] Argonne National Laboratory, *User's Manual for RESRAD Version 6*, July, 2001.

[48] Argonne National Laboratory, *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil*, ANL/EAIS-8, April, 1993.

Parameter			Default	Value Selected	Justification
Description	Code	Unit			
wet weight crop yield for leafy plants	YV(2)	kg/m^2	1.5	1.5	RESRAD Default. NUREG 6697
wet weight crop yield for fodder	YV(3)	kg/m^2	1.1	1.1	RESRAD Default. NUREG 6697
growing season for non leafy years	TE(1)	years	0.17	0.17	RESRAD Default. NUREG 6697
growing season for leafy years	TE(2)	years	1.5	1.58	RESRAD Default. NUREG 6697
growing season for fodder years	TE(3)	years	1.1	1.1	RESRAD Default. NUREG 6697
translocation factor for non-leaf plants	TIV(1)	unitless	0.1	0.1	RESRAD Default. NUREG 5512
translocation factor for leafy plants	TIV(2)	unitless	0.25	0.25	RESRAD Default. NUREG 5512
translocation factor for fodder	TIV(3)	unitless	0.25	0.25	RESRAD Default. NUREG 5512
dry foliar interception fraction for non leafy vegetables	RDRY(1)	unitless	0.25	0.25	RESRAD Default. NUREG 6697
dry foliar interception fraction for leafy plants	RDRY(2)	unitless	0.25	0.25	RESRAD Default. NUREG 6697
dry foliar interception fraction for fodder	RDRY(3)	unitless	0.25	0.25	RESRAD Default. NUREG 6697
wet foliar interception fraction for non leafy plants	RWET(1)	unitless	0.25	0.25	RESRAD Default
wet foliar interception fraction for leafy plants	RWET(2)	unitless	0.25	0.25	RESRAD Default
wet foliar interception fraction for fodder	RWET(3)	unitless	0.25	0.25	RESRAD Default

Parameter			Default	Value Selected	Justification
Description	Code	Unit			
weathering removal constant for vegetation	WLAM	unitless	20	20	RESRAD Default. NUREG 6697
Storage time fruits, non-leafy vegetables and grain	STOR_T(1)	days	14	14	RESRAD Default. NUREG 5512
Storage time leafy vegetables	STOR_T(2)	days	1	1	RESRAD Default. NUREG 5512
Storage time milk	STOR_T(3)	days	1	1	RESRAD Default. NUREG 5512
Storage time meat and poultry	STOR_T(4)	days	20	20	RESRAD Default. NUREG 5512
Storage time fish	STOR_T(5)	days	7	7	RESRAD Default. NUREG 5512
Storage time crustacea and mollusks	STOR_T(6)	days	7	7	RESRAD Default. NUREG 5512
Storage time well water	STOR_T(7)	days	1	1	RESRAD Default. NUREG 5512
Storage time surface water	STOR_T(8)	days	1	1	RESRAD Default. NUREG 5512
Storage time livestock fodder	STOR_T(9)	days	45	45	RESRAD Default. NUREG 5512
Radon, building interior area factor	FAI	unitless	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, total porosity of the cover material	TPCV	unitless	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, total porosity of the building foundation	TPFL	unitless	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, diffusion coefficient for radon in foundation material	DIFFL	m/sec	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.

Parameter			Default	Value Selected	Justification
Description	Code	Unit			
Radon, volumetric water content of the foundation	PH2OFL	unitless	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, bulk density of building foundation	DENSFL	g/cm^3	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, thickness of building foundation	FLOOR1	m	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, volumetric water content of the cover material	PH2OCV	unitless	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, diffusion coefficient for radon in cover material	DIFCV	m/sec	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, building depth below ground surface	DMFL	m	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, emanating power of Rn 220 gas	EMANA(2)	unitless	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, emanating power of Rn 222 gas	EMANA(1)	unitless	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, height of the building room	HRM	m	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, average building air exchange rate	REXG	L/hr	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
Radon, diffusion coefficient for radon in contaminated zone soil	DIFCZ	m/sec	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.
radon vertical dimension of mixing	HMIX	m	Not assigned	Not assigned	No pathway for radon gas. This parameter is not applicable.

Table 6
Derived Concentration Guideline Levels

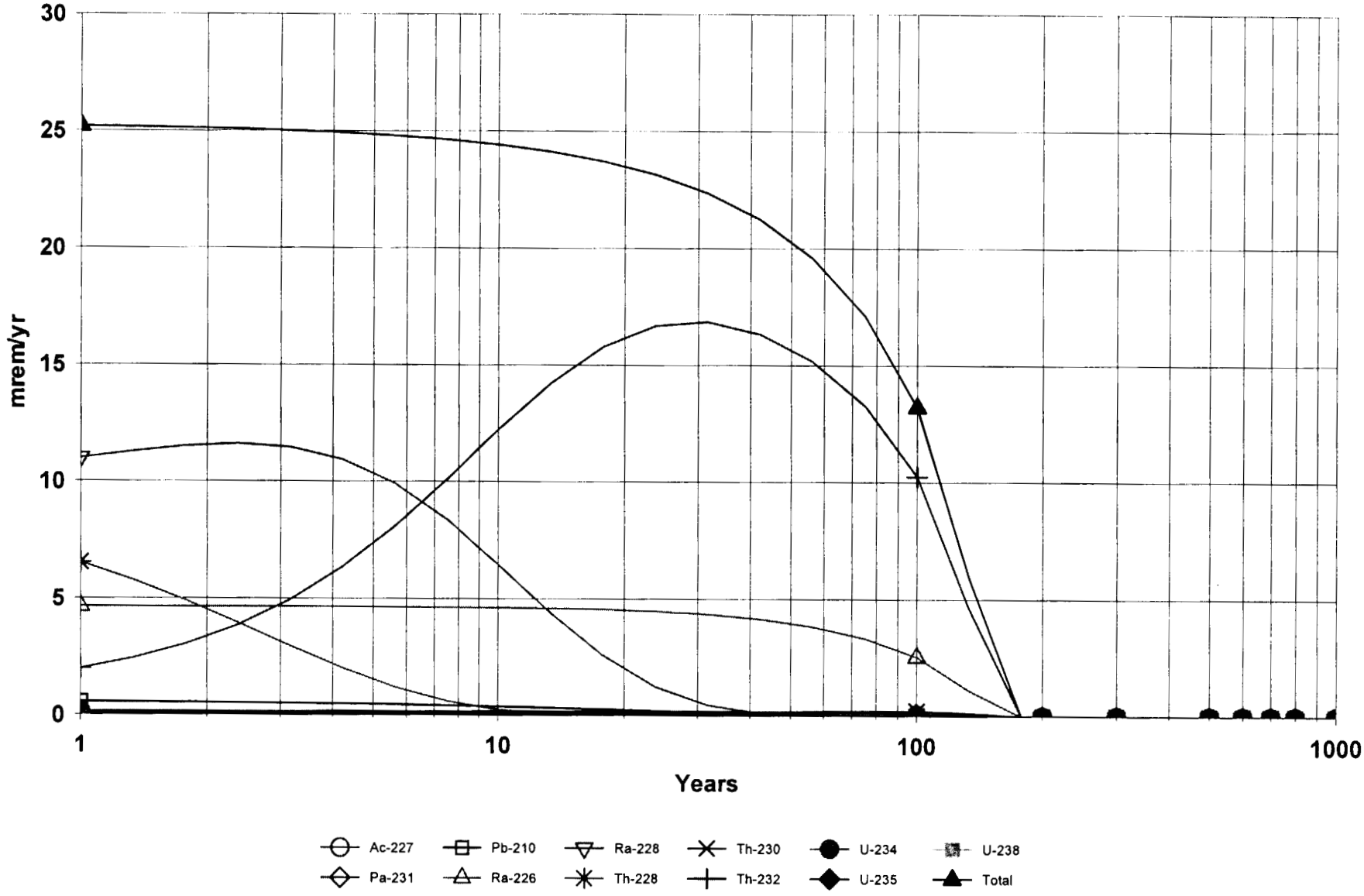
Isotope	DCGL (pCi/gram)	
	Surface	Subsurface
Thorium 232+D	3.9	34.0
Uranium 238 and U234	2.5	21.5
Radium 226 and Lead 210	1.3	10.5

Table 7
Annual Radiation Exposures Resulting From the DCGLs
(mrem/yr)

Year	0	100	200	300	400	500	600	700	800	900	1,000
Surface	25	13	0	0	0	0	0	0	0	0	0
SubSurface	0	0	0	0	0	0.01	0.05	6.0	12.0	18.7	24.7
Total	25	13	0	0	0	0.01	0.05	6.0	12.0	18.7	24.5

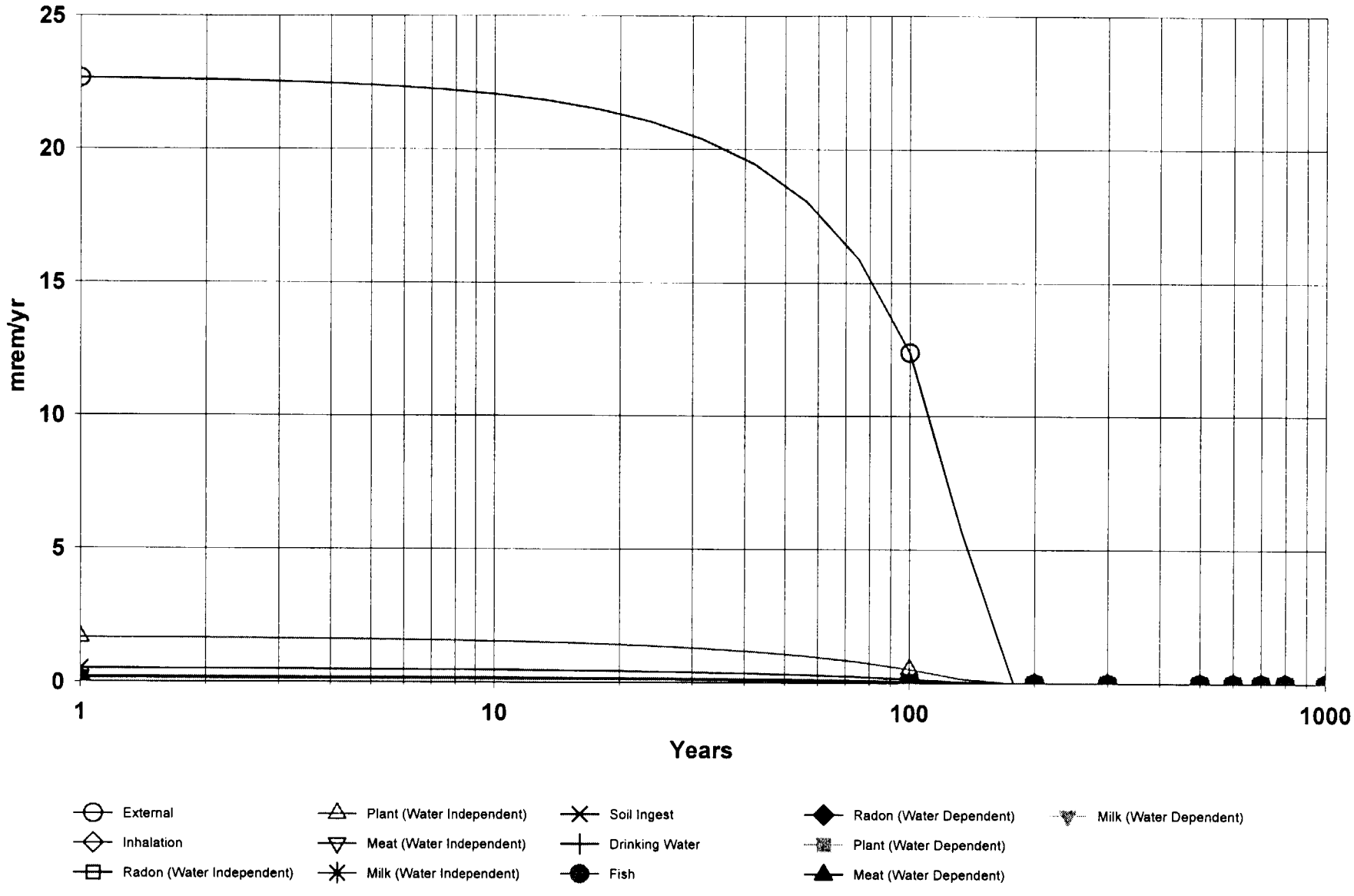
FIGURES

DOSE: All Nuclides Summed, All Pathways Summed



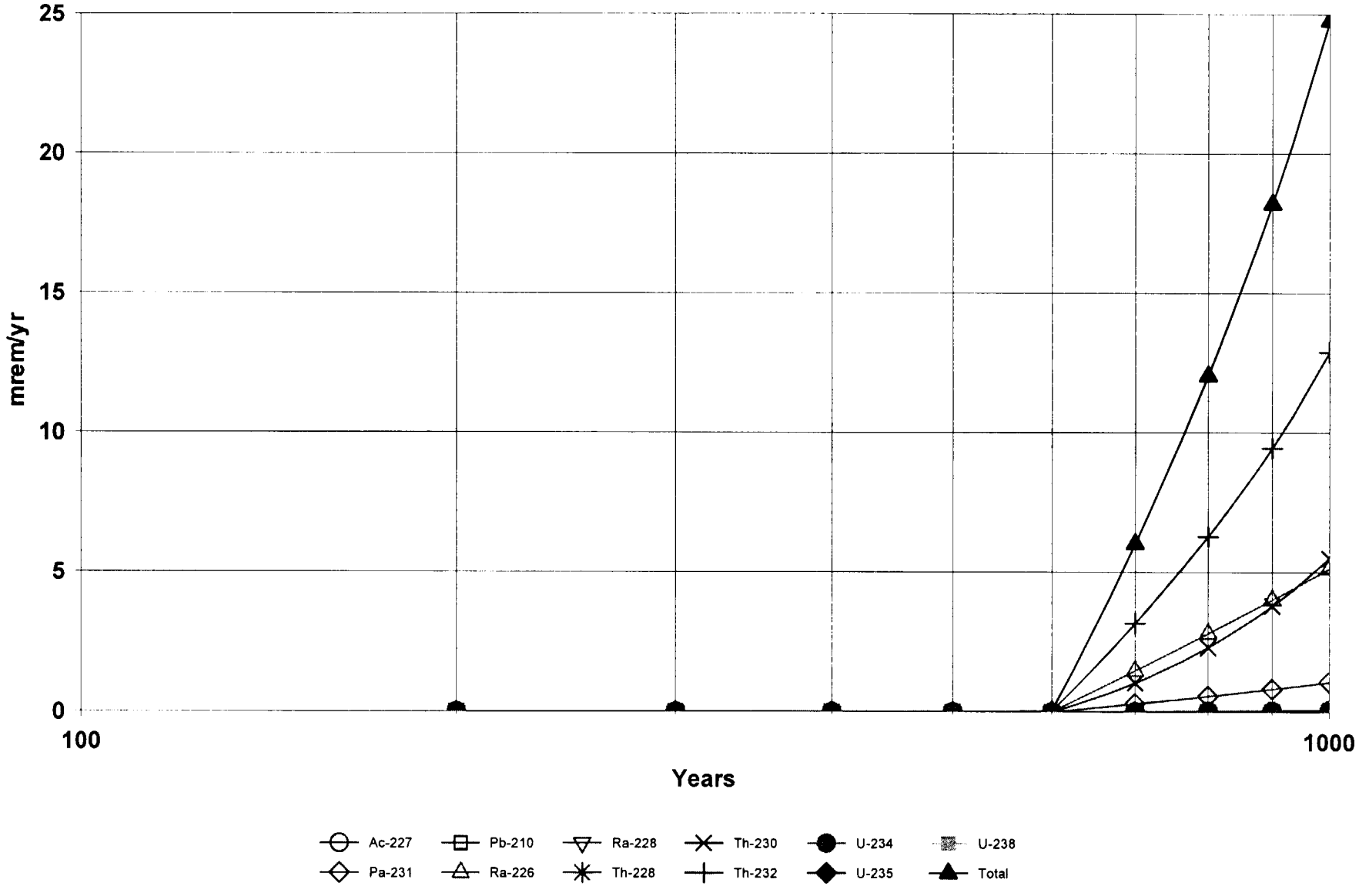
Breckenridge Surface 12.RAD 04/10/2006 21:49 GRAPHICS.ASC Includes All Pathways

DOSE: All Nuclides Summed, Component Pathways



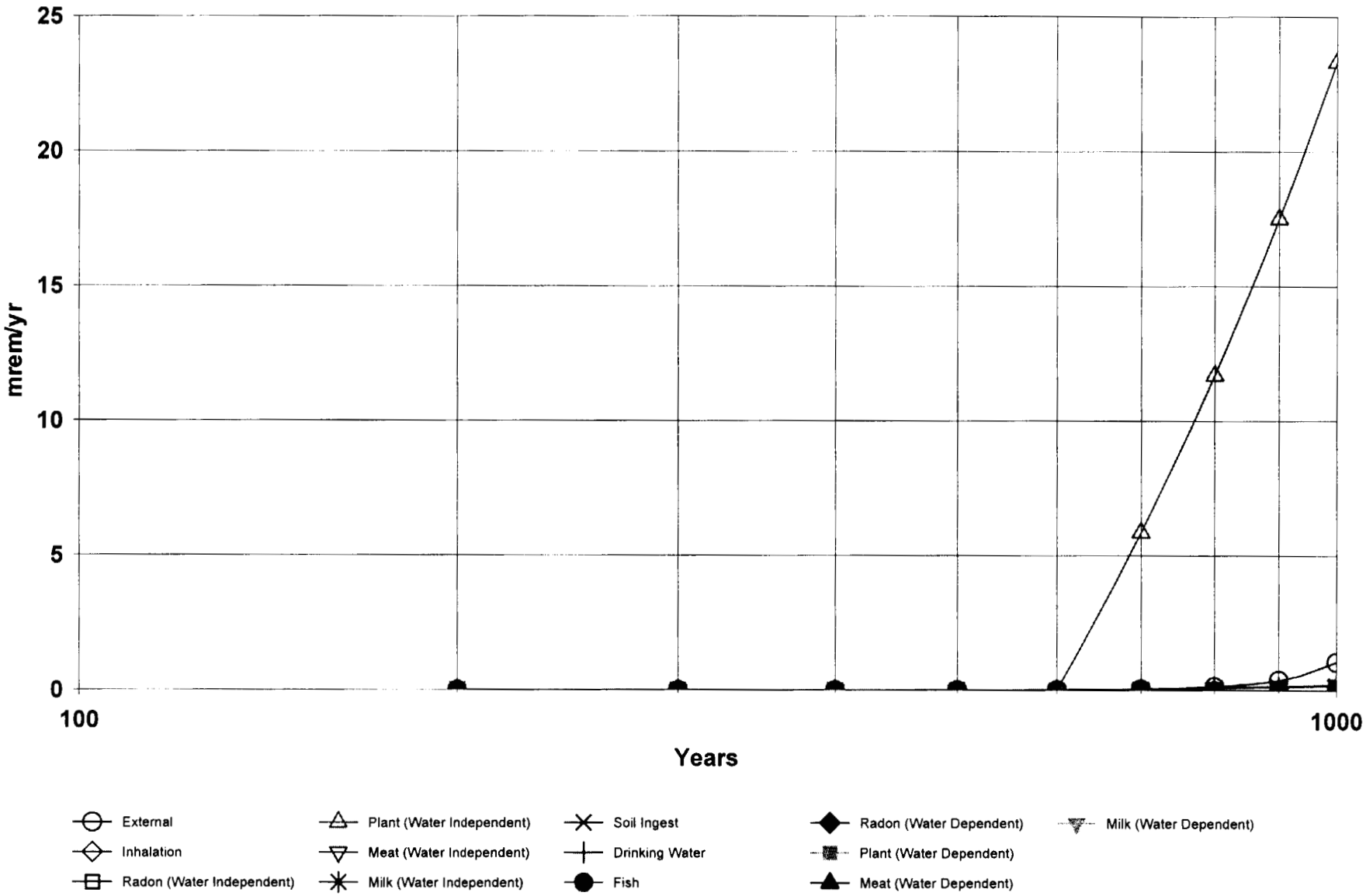
Breckenridge Surface 12.RAD 04/10/2006 21:49 GRAPHICS.ASC

DOSE: All Nuclides Summed, All Pathways Summed



Breckenridge Subsurface 11.RAD 04/10/2006 21:39 GRAPHICS.ASC Includes All Pathways

DOSE: All Nuclides Summed, Component Pathways



Breckenridge Subsurface 11.RAD 04/10/2006 21:39 GRAPHICS.ASC

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Dose Conversion Factor (and Related) Parameter Summary
File: FGR 13 MORBIDITY

enu	Parameter	Current Value	Base Case*	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.724E+00	6.700E+00	DCF2(1)
-1	Pa-231	1.280E+00	1.280E+00	DCF2(2)
-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(3)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(4)
-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(5)
-1	Th-228+D	3.454E-01	3.420E-01	DCF2(6)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(7)
-1	Th-232	1.640E+00	1.640E+00	DCF2(8)
-1	U-234	1.320E-01	1.320E-01	DCF2(9)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(10)
B-1	U-238	1.180E-01	1.180E-01	DCF2(11)
-1	U-238+D	1.180E-01	1.180E-01	DCF2(12)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
-1	Ac-227+D	1.480E-02	1.410E-02	DCF3(1)
-1	Pa-231	1.060E-02	1.060E-02	DCF3(2)
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(3)
-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(4)
-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(5)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(6)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(7)
-1	Th-232	2.730E-03	2.730E-03	DCF3(8)
-1	U-234	2.830E-04	2.830E-04	DCF3(9)
D-1	U-235+D	2.673E-04	2.660E-04	DCF3(10)
-1	U-238	2.550E-04	2.550E-04	DCF3(11)
-1	U-238+D	2.687E-04	2.550E-04	DCF3(12)
D-34	Food transfer factors:			
-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
-34				
-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(5,1)
-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: FGR 13 MORBIDITY

Menu	Parameter	Current Value	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(8,3)
D-34				
-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
-34				
-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(5,1)
-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(5,2)
-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)
-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(7,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(7,2)
-5				

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: FGR 13 MORBIDITY

Menu	Parameter	Current Value	Base Case*	Parameter Name
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(8,2)
-5				
-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)
-5				
-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(10,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(10,2)
-5				
-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(11,2)
D-5				
-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(12,1)
-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)

Base Case means Default.Lib w/o Associate Nuclide contributions.

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
011	Area of contaminated zone (m**2)	3.800E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	6.160E+01	1.000E+02	---	LCZPAQ
011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
011	Times for calculations (yr)	1.000E+02	3.000E+00	---	T(3)
011	Times for calculations (yr)	2.000E+02	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+02	3.000E+01	---	T(5)
011	Times for calculations (yr)	5.000E+02	1.000E+02	---	T(6)
011	Times for calculations (yr)	6.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	7.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	8.000E+02	0.000E+00	---	T(9)
011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ac-227	1.400E-01	0.000E+00	---	S1(1)
012	Initial principal radionuclide (pCi/g): Pa-231	1.400E-01	0.000E+00	---	S1(2)
012	Initial principal radionuclide (pCi/g): Pb-210	1.300E+00	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.300E+00	0.000E+00	---	S1(4)
012	Initial principal radionuclide (pCi/g): Ra-228	3.900E+00	0.000E+00	---	S1(5)
012	Initial principal radionuclide (pCi/g): Th-228	3.900E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Th-230	2.500E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Th-232	3.900E+00	0.000E+00	---	S1(8)
012	Initial principal radionuclide (pCi/g): U-234	2.500E+00	0.000E+00	---	S1(9)
012	Initial principal radionuclide (pCi/g): U-235	1.000E-01	0.000E+00	---	S1(10)
R012	Initial principal radionuclide (pCi/g): U-238	2.500E+00	0.000E+00	---	S1(11)
012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(4)
012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(7)
012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(8)
012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(10)
012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(11)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.400E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCCZ
013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
013	Average annual wind speed (m/sec)	4.650E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
013	Precipitation (m/yr)	7.540E-01	1.000E+00	---	PRECIP

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C13	Irrigation (m/yr)	5.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
014	Density of saturated zone (g/cm**3)	1.400E+00	1.500E+00	---	DENSAQ
014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
014	Saturated zone hydraulic conductivity (m/yr)	2.890E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
014	Well pump intake depth (m below water table)	3.530E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
015	Unsat. zone 1, thickness (m)	6.000E+00	4.000E+00	---	H(1)
015	Unsat. zone 1, soil density (g/cm**3)	1.400E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCUZ(1)
016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	2.400E+03	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.400E+03	2.000E+01	---	DCNUCU(1,1)
016	Saturated zone (cm**3/g)	2.400E+03	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.094E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	2.700E+03	5.000E+01	---	DCNUCC(2)
016	Unsaturated zone 1 (cm**3/g)	2.700E+03	5.000E+01	---	DCNUCU(2,1)
016	Saturated zone (cm**3/g)	2.700E+03	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.728E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCC(3)
016	Unsaturated zone 1 (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCU(3,1)
016	Saturated zone (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.774E-03	ALEACH(3)
016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.886E-04	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.886E-04	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.529E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.529E-04	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.529E-04	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.641E-03	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.641E-03	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(11,1)
016	Saturated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.641E-03	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	4.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
017	Ring 4	not used	0.000E+00	---	FRACA(4)
017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
017	Ring 7	not used	0.000E+00	---	FRACA(7)
017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
018	Fruits, vegetables and grain consumption (kg/yr)	4.270E+01	1.600E+02	---	DIET(1)
018	Leafy vegetable consumption (kg/yr)	4.660E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
018	Fish consumption (kg/yr)	7.340E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	0.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL
018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
018	Contamination fraction of aquatic food	0.000E+00	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
018	Contamination fraction of meat	-1	-1	0.190E+00	FMEAT
018	Contamination fraction of milk	-1	-1	0.190E+00	FMILK
019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	0.000E+00	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
TOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
TOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
TOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
021	Diffusion coefficient for radon gas (m/sec):				
021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
021	Building interior area factor	not used	0.000E+00	---	FAI
021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
ITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions	
Area:	3800.00 square meters
Thickness:	0.15 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Ac-227	1.400E-01
Pa-231	1.400E-01
Pb-210	1.300E+00
Ra-226	1.300E+00
Ra-228	3.900E+00
Th-228	3.900E+00
Th-230	2.500E+00
Th-232	3.900E+00
U-234	2.500E+00
U-235	1.000E-01
U-238	2.500E+00

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	1.000E+02	2.000E+02	3.000E+02	5.000E+02	6.000E+02	7.000E+02	8.000E+02	1.000E+03
TDOSE(t):	2.529E+01	2.520E+01	1.319E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
M(t):	1.011E+00	1.008E+00	5.276E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Maximum TDOSE(t): 2.529E+01 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	9.147E-02	0.0036	8.024E-04	0.0000	0.000E+00	0.0000	2.007E-02	0.0008	2.656E-04	0.0000	3.714E-04	0.0000	2.845E-02	0.0011
Pa-231	1.027E-02	0.0004	1.680E-04	0.0000	0.000E+00	0.0000	5.875E-02	0.0023	5.624E-02	0.0022	8.255E-05	0.0000	2.116E-02	0.0008
Pb-210	2.704E-03	0.0001	2.567E-05	0.0000	0.000E+00	0.0000	3.657E-01	0.0145	5.626E-02	0.0022	2.874E-02	0.0011	1.297E-01	0.0051
Ra-226	4.289E+00	0.1696	1.008E-05	0.0000	0.000E+00	0.0000	2.769E-01	0.0110	2.125E-02	0.0008	2.643E-02	0.0010	2.599E-02	0.0010
Ra-228	8.343E+00	0.3299	1.964E-04	0.0000	0.000E+00	0.0000	8.406E-01	0.0332	6.324E-02	0.0025	8.010E-02	0.0032	8.078E-02	0.0032
Th-228	9.353E+00	0.3699	9.791E-04	0.0000	0.000E+00	0.0000	1.044E-02	0.0004	1.668E-03	0.0001	1.174E-04	0.0000	3.693E-02	0.0015
Th-230	2.844E-03	0.0001	7.061E-04	0.0000	0.000E+00	0.0000	5.512E-03	0.0002	8.710E-04	0.0000	7.071E-05	0.0000	1.913E-02	0.0008
Th-232	4.795E-01	0.0190	5.550E-03	0.0002	0.000E+00	0.0000	9.052E-02	0.0036	9.853E-03	0.0004	4.926E-03	0.0002	1.535E-01	0.0061
U-234	3.558E-04	0.0000	2.857E-04	0.0000	0.000E+00	0.0000	6.961E-03	0.0003	1.567E-03	0.0001	3.865E-03	0.0002	9.870E-03	0.0004
U-235	2.585E-02	0.0010	1.065E-05	0.0000	0.000E+00	0.0000	2.635E-04	0.0000	5.957E-05	0.0000	1.461E-04	0.0000	3.731E-04	0.0000
U-238	1.198E-01	0.0047	2.555E-04	0.0000	0.000E+00	0.0000	6.610E-03	0.0003	1.487E-03	0.0001	3.670E-03	0.0001	9.372E-03	0.0004
Total	2.272E+01	0.8984	8.989E-03	0.0004	0.000E+00	0.0000	1.682E+00	0.0665	2.128E-01	0.0084	1.485E-01	0.0059	5.153E-01	0.0204

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.414E-01	0.0056
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.467E-01	0.0058
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.832E-01	0.0231
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.640E+00	0.1835
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.408E+00	0.3721
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.403E+00	0.3719
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.914E-02	0.0012
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.438E-01	0.0294
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.290E-02	0.0009
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.670E-02	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.412E-01	0.0056
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.529E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	8.836E-02	0.0035	7.713E-04	0.0000	0.000E+00	0.0000	1.929E-02	0.0008	2.553E-04	0.0000	3.570E-04	0.0000	2.738E-02	0.0011
Pa-231	1.310E-02	0.0005	1.917E-04	0.0000	0.000E+00	0.0000	5.894E-02	0.0023	5.584E-02	0.0022	9.349E-05	0.0000	2.169E-02	0.0009
Pb-210	2.607E-03	0.0001	2.460E-05	0.0000	0.000E+00	0.0000	3.505E-01	0.0139	5.392E-02	0.0021	2.755E-02	0.0011	1.243E-01	0.0049
Ra-226	4.276E+00	0.1697	1.078E-05	0.0000	0.000E+00	0.0000	2.861E-01	0.0114	2.283E-02	0.0009	2.712E-02	0.0011	2.973E-02	0.0012
Ra-228	1.004E+01	0.3982	4.503E-04	0.0000	0.000E+00	0.0000	7.437E-01	0.0295	5.624E-02	0.0022	7.055E-02	0.0028	8.157E-02	0.0032
Th-228	6.489E+00	0.2575	6.766E-04	0.0000	0.000E+00	0.0000	7.213E-03	0.0003	1.153E-03	0.0000	8.110E-05	0.0000	2.552E-02	0.0010
Th-230	6.401E-03	0.0003	7.010E-04	0.0000	0.000E+00	0.0000	5.706E-03	0.0002	8.829E-04	0.0000	9.227E-05	0.0000	1.902E-02	0.0008
Th-232	1.597E+00	0.0634	5.550E-03	0.0002	0.000E+00	0.0000	1.844E-01	0.0073	1.683E-02	0.0007	1.385E-02	0.0005	1.621E-01	0.0064
U-234	3.552E-04	0.0000	2.834E-04	0.0000	0.000E+00	0.0000	6.904E-03	0.0003	1.554E-03	0.0001	3.833E-03	0.0002	9.788E-03	0.0004
U-235	2.578E-02	0.0010	1.057E-05	0.0000	0.000E+00	0.0000	2.622E-04	0.0000	5.991E-05	0.0000	1.448E-04	0.0000	3.704E-04	0.0000
U-238	1.194E-01	0.0047	2.534E-04	0.0000	0.000E+00	0.0000	6.555E-03	0.0003	1.475E-03	0.0001	3.639E-03	0.0001	9.294E-03	0.0004
Total	2.265E+01	0.8989	8.924E-03	0.0004	0.000E+00	0.0000	1.670E+00	0.0663	2.110E-01	0.0084	1.473E-01	0.0058	5.110E-01	0.0203

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.364E-01	0.0054
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.501E-01	0.0060
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.589E-01	0.0222
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.642E+00	0.1842
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.099E+01	0.4360
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.524E+00	0.2589
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.280E-02	0.0013
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.980E+00	0.0786
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.272E-02	0.0009
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.663E-02	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.407E-01	0.0056
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.520E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	2.185E-03	0.0002	9.869E-06	0.0000	0.000E+00	0.0000	2.469E-04	0.0000	3.270E-06	0.0000	4.568E-06	0.0000	3.500E-04	0.0000
Pa-231	5.681E-02	0.0043	2.803E-04	0.0000	0.000E+00	0.0000	2.338E-02	0.0018	1.696E-02	0.0013	1.312E-04	0.0000	1.450E-02	0.0011
Pb-210	6.077E-05	0.0000	2.356E-07	0.0000	0.000E+00	0.0000	3.358E-03	0.0003	5.169E-04	0.0000	2.639E-04	0.0000	1.191E-03	0.0001
Ra-226	2.264E+00	0.1716	9.891E-06	0.0000	0.000E+00	0.0000	1.821E-01	0.0138	2.146E-02	0.0016	1.575E-02	0.0012	4.231E-02	0.0032
Ra-228	7.091E-05	0.0000	3.112E-09	0.0000	0.000E+00	0.0000	1.605E-06	0.0000	1.234E-07	0.0000	1.504E-07	0.0000	2.547E-07	0.0000
Th-228	9.137E-16	0.0000	5.703E-20	0.0000	0.000E+00	0.0000	6.083E-19	0.0000	9.727E-20	0.0000	6.836E-21	0.0000	2.151E-18	0.0000
Th-230	1.928E-01	0.0146	2.239E-04	0.0000	0.000E+00	0.0000	1.503E-02	0.0011	1.765E-03	0.0001	1.188E-03	0.0001	8.880E-03	0.0007
Th-232	9.796E+00	0.7427	2.129E-03	0.0002	0.000E+00	0.0000	2.986E-01	0.0226	2.372E-02	0.0018	2.697E-02	0.0020	8.586E-02	0.0065
U-234	3.358E-04	0.0000	8.045E-05	0.0000	0.000E+00	0.0000	1.963E-03	0.0001	4.412E-04	0.0000	1.086E-03	0.0001	2.779E-03	0.0002
U-235	1.506E-02	0.0011	3.314E-06	0.0000	0.000E+00	0.0000	1.060E-04	0.0000	4.154E-05	0.0000	4.119E-05	0.0000	1.229E-04	0.0000
U-238	6.374E-02	0.0048	7.181E-05	0.0000	0.000E+00	0.0000	1.859E-03	0.0001	4.184E-04	0.0000	1.032E-03	0.0001	2.634E-03	0.0002
Total	1.239E+01	0.9394	2.809E-03	0.0002	0.000E+00	0.0000	5.267E-01	0.0399	6.532E-02	0.0050	4.647E-02	0.0035	1.586E-01	0.0120

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.799E-03	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.121E-01	0.0085
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.391E-03	0.0004
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.525E+00	0.1914
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.305E-05	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.167E-16	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.199E-01	0.0167
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.023E+01	0.7758
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.686E-03	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.537E-02	0.0012
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.976E-02	0.0053
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.319E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
b-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
a-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
otal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000
b-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E-00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-234	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
otal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 6.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
b-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
a-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
otal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 6.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
b-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
otal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 7.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 7.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 8.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
b-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
a-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
otal	0.000E-00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 8.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
b-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
otal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
b-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
a-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
otal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
b-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
otal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	1.000E+02	2.000E+02	3.000E+02	5.000E+02	6.000E+02	7.000E+02	8.000E+02	1.000E+03
Ac-227+D	Ac-227+D	1.000E+00	1.010E+00	9.743E-01	1.999E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
a-231	Pa-231	1.000E+00	1.030E+00	1.023E+00	3.263E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
a-231	Ac-227+D	1.000E+00	1.740E-02	4.905E-02	4.741E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	∑DSR(j)		1.048E+00	1.072E+00	8.004E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
b-210+D	Pb-210+D	1.000E+00	4.486E-01	4.300E-01	4.147E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
a-226+D	Ra-226+D	1.000E+00	3.561E+00	3.549E+00	1.821E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
a-226+D	Pb-210+D	1.000E+00	7.978E-03	2.169E-02	1.220E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-226+D	∑DSR(j)		3.569E+00	3.571E+00	1.943E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
a-228+D	Ra-228+D	1.000E+00	1.967E+00	1.738E+00	6.026E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
a-228+D	Th-228+D	1.000E+00	4.457E-01	1.080E+00	1.270E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-228+D	∑DSR(j)		2.412E+00	2.817E+00	1.873E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
h-228+D	Th-228+D	1.000E+00	2.411E+00	1.673E+00	2.350E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
h-230	Th-230	1.000E+00	1.089E-02	1.081E-02	3.628E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
h-230	Ra-226+D	1.000E+00	7.674E-04	2.302E-03	8.031E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	Pb-210+D	1.000E+00	1.226E-06	7.684E-06	4.014E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	∑DSR(j)		1.166E-02	1.312E-02	8.795E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
h-232	Th-232	1.000E+00	5.233E-02	5.195E-02	1.665E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	Ra-228+D	1.000E+00	1.197E-01	3.418E-01	1.083E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
h-232	Th-228+D	1.000E+00	1.866E-02	1.139E-01	1.525E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
h-232	∑DSR(j)		1.907E-01	5.076E-01	2.624E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-234	U-234	1.000E+00	9.162E-03	9.087E-03	2.635E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-234	Th-230	1.000E+00	5.023E-08	1.473E-07	3.095E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-234	Ra-226+D	1.000E+00	2.295E-09	1.608E-08	3.508E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	Pb-210+D	1.000E+00	2.887E-12	3.850E-11	1.434E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-234	∑DSR(j)		9.162E-03	9.087E-03	2.674E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235+D	U-235+D	1.000E+00	2.670E-01	2.663E-01	1.524E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-235+D	Pa-231	1.000E+00	1.019E-05	3.163E-05	6.715E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-235+D	Ac-227+D	1.000E+00	1.277E-07	8.330E-07	7.178E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235+D	∑DSR(j)		2.670E-01	2.663E-01	1.537E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-238	U-238	5.400E-05	4.409E-07	4.372E-07	1.250E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238+D	U-238+D	9.999E-01	5.650E-02	5.626E-02	2.790E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-238+D	U-234	9.999E-01	1.297E-08	3.862E-08	7.507E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-238+D	Th-230	9.999E-01	4.824E-14	3.276E-13	4.323E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238+D	Ra-226+D	9.999E-01	1.622E-15	2.437E-14	3.273E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-238+D	Pb-210+D	9.999E-01	1.698E-18	4.655E-17	1.137E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-238+D	∑DSR(j)		5.650E-02	5.626E-02	2.790E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	1.000E+02	2.000E+02	3.000E+02	5.000E+02	6.000E+02	7.000E+02	8.000E+02	1.000E+03
Ac-227	2.475E+01	2.566E+01	1.250E+03	*7.232E+13	*7.232E+13	*7.232E+13	*7.232E+13	*7.232E+13	*7.232E+13	*7.232E+13
Pa-231	2.386E+01	2.333E+01	3.123E+01	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10	*4.723E+10
b-210	5.573E+01	5.815E+01	6.029E+03	*7.634E+13	*7.634E+13	*7.634E+13	*7.634E+13	*7.634E+13	*7.634E+13	*7.634E+13
a-226	7.004E+00	7.002E+00	1.287E+01	*9.885E+11	*9.885E+11	*9.885E+11	*9.885E+11	*9.885E+11	*9.885E+11	*9.885E+11
Ra-228	1.036E+01	8.873E+00	1.335E+06	*2.726E+14	*2.726E+14	*2.726E+14	*2.726E+14	*2.726E+14	*2.726E+14	*2.726E+14
h-228	1.037E+01	1.494E+01	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14
h-230	2.145E+03	1.905E+03	2.843E+02	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10	*2.018E+10
Th-232	1.311E+02	4.925E+01	9.528E+00	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05
-234	2.729E+03	2.751E+03	9.348E+03	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09
-235	9.362E+01	9.388E+01	1.626E+02	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06
U-238	4.425E+02	4.444E+02	8.960E+02	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05

At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
c-227	1.400E-01	0.000E+00	1.010E+00	2.475E+01	1.010E+00	2.475E+01
Pa-231	1.400E-01	31.18 ± 0.06	1.362E+00	1.836E+01	1.048E+00	2.386E+01
b-210	1.300E-00	0.000E+00	4.486E-01	5.573E+01	4.486E-01	5.573E+01
a-226	1.300E-00	2.035 ± 0.004	3.571E+00	7.001E+00	3.569E+00	7.004E+00
Ra-228	3.900E-00	2.364 ± 0.005	2.975E+00	8.404E+00	2.412E+00	1.036E+01
Th-228	3.900E-00	0.000E+00	2.411E+00	1.037E+01	2.411E+00	1.037E+01
h-230	2.500E+00	87.7 ± 0.2	9.028E-02	2.769E+02	1.166E-02	2.145E+03
Th-232	3.900E+00	29.21 ± 0.06	4.329E+00	5.775E+00	1.907E-01	1.311E+02
U-234	2.500E+00	0.000E+00	9.162E-03	2.729E+03	9.162E-03	2.729E+03
-235	1.000E-01	0.000E+00	2.670E-01	9.362E+01	2.670E-01	9.362E+01
-238	2.500E+00	0.000E+00	5.650E-02	4.425E+02	5.650E-02	4.425E+02

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	1.000E+02	2.000E+02	3.000E+02	5.000E+02	6.000E+02	7.000E+02	8.000E+02	1.000E+03
Ac-227	Ac-227	1.000E+00	1.414E-01	1.364E-01	2.799E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ac-227	Pa-231	1.000E+00	2.436E-03	6.867E-03	6.638E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
c-227	U-235	1.000E+00	1.277E-08	8.330E-08	7.178E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00
c-227	∑DOSE(j)		1.439E-01	1.433E-01	6.925E-02	0.000E+00	0.000E+00	0.000E+00	0.000E-00	0.000E+00	0.000E+00	0.000E-00
a-231	Pa-231	1.000E+00	1.442E-01	1.432E-01	4.568E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
a-231	U-235	1.000E+00	1.019E-06	3.163E-06	6.715E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	∑DOSE(j)		1.442E-01	1.432E-01	4.575E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00	0.000E+00	0.000E+00
b-210	Pb-210	1.000E+00	5.832E-01	5.589E-01	5.391E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Ra-226	1.000E+00	1.037E-02	2.819E-02	1.586E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Th-230	1.000E+00	3.066E-06	1.921E-05	1.003E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
b-210	U-234	1.000E+00	7.218E-12	9.625E-11	3.586E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
b-210	U-238	9.999E-01	4.244E-18	1.164E-16	2.842E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	∑DOSE(j)		5.936E-01	5.872E-01	1.740E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
a-226	Ra-226	1.000E+00	4.630E+00	4.614E+00	2.367E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00	0.000E+00	0.000E-00
Ra-226	Th-230	1.000E+00	1.919E-03	5.755E-03	2.008E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00
a-226	U-234	1.000E+00	5.737E-09	4.020E-08	8.769E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00
a-226	U-238	9.999E-01	4.055E-15	6.093E-14	8.183E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00
Ra-226	∑DOSE(j)		4.632E+00	4.619E+00	2.568E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00
a-228	Ra-228	1.000E+00	7.670E+00	6.777E+00	2.350E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00
a-228	Th-232	1.000E-00	4.670E-01	1.333E+00	4.222E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-228	∑DOSE(j)		8.137E+00	8.110E+00	4.222E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00	0.000E+00	0.000E-00
h-228	Ra-228	1.000E+00	1.738E+00	4.211E+00	4.955E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	Th-228	1.000E+00	9.403E+00	6.524E+00	9.167E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00
Th-228	Th-232	1.000E-00	7.277E-02	4.442E-01	5.947E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00
h-228	∑DOSE(j)		1.121E+01	1.118E+01	5.947E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	Th-230	1.000E+00	2.722E-02	2.703E-02	9.070E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00
h-230	U-234	1.000E+00	1.256E-07	3.683E-07	7.738E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E-00
h-230	U-238	9.999E-01	1.206E-13	8.190E-13	1.081E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	∑DOSE(j)		2.722E-02	2.703E-02	9.078E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
h-232	Th-232	1.000E+00	2.041E-01	2.026E-01	6.493E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	U-234	1.000E+00	2.290E-02	2.272E-02	6.587E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-234	U-238	9.999E-01	3.242E-08	9.655E-08	1.877E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	∑DOSE(j)		2.290E-02	2.272E-02	6.589E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-235	U-235	1.000E+00	2.670E-02	2.663E-02	1.524E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	5.400E-05	1.102E-06	1.093E-06	3.126E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-238	U-238	9.999E-01	1.412E-01	1.407E-01	6.975E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
-238	∑DOSE(j)		1.412E-01	1.407E-01	6.975E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	1.000E+02	2.000E+02	3.000E+02	5.000E+02	6.000E+02	7.000E+02	8.000E+02	1.000E+03
Ac-227	Ac-227	1.000E+00	1.400E-01	1.355E-01	5.200E-03	1.932E-04	7.175E-06	9.899E-09	3.677E-10	1.366E-11	5.073E-13	6.999E-16
Ac-227	Pa-231	1.000E+00	0.000E+00	4.382E-03	1.212E-01	1.142E-01	1.036E-01	8.490E-02	7.667E-02	6.960E-02	6.301E-02	5.165E-02
c-227	U-235	1.000E+00	0.000E+00	3.328E-08	1.302E-04	2.759E-04	3.856E-04	5.184E-04	5.524E-04	5.707E-04	5.765E-04	5.616E-04
c-227	∑S(j):		1.400E-01	1.398E-01	1.265E-01	1.147E-01	1.040E-01	8.542E-02	7.742E-02	7.017E-02	6.359E-02	5.222E-02
a-231	Pa-231	1.000E+00	1.400E-01	1.399E-01	1.268E-01	1.148E-01	1.039E-01	8.517E-02	7.711E-02	6.982E-02	6.321E-02	5.182E-02
a-231	U-235	1.000E+00	0.000E+00	2.113E-06	1.855E-04	3.254E-04	4.282E-04	5.498E-04	5.794E-04	5.939E-04	5.965E-04	5.765E-04
Pa-231	∑S(j):		1.400E-01	1.399E-01	1.269E-01	1.151E-01	1.043E-01	8.572E-02	7.769E-02	7.041E-02	6.381E-02	5.239E-02
b-210	Pb-210	1.000E+00	1.300E+00	1.254E+00	3.603E-02	9.987E-04	2.768E-05	2.127E-08	5.895E-10	1.634E-11	4.529E-13	3.479E-16
Pb-210	Ra-226	1.000E+00	0.000E+00	3.968E-02	1.038E+00	9.946E-01	9.261E-01	8.016E-01	7.458E-01	6.939E-01	6.455E-01	5.588E-01
Pb-210	Th-230	1.000E+00	0.000E+00	1.663E-05	6.521E-02	1.456E-01	2.172E-01	3.351E-01	3.829E-01	4.242E-01	4.596E-01	5.146E-01
b-210	U-234	1.000E+00	0.000E+00	5.002E-11	2.316E-05	1.086E-04	2.441E-04	6.084E-04	8.152E-04	1.027E-03	1.239E-03	1.644E-03
b-210	U-238	9.999E-01	0.000E+00	3.551E-17	1.825E-09	1.781E-08	6.079E-08	2.509E-07	3.996E-07	5.806E-07	7.899E-07	1.272E-06
Pb-210	∑S(j):		1.300E+00	1.294E+00	1.139E+00	1.141E+00	1.144E+00	1.137E+00	1.130E+00	1.119E+00	1.106E+00	1.075E+00
a-226	Ra-226	1.000E+00	1.300E+00	1.299E+00	1.209E+00	1.125E+00	1.047E+00	9.061E-01	8.430E-01	7.843E-01	7.297E-01	6.316E-01
Ra-226	Th-230	1.000E+00	0.000E+00	1.082E-03	1.021E-01	1.924E-01	2.721E-01	4.031E-01	4.561E-01	5.017E-01	5.406E-01	6.009E-01
a-226	U-234	1.000E+00	0.000E+00	4.870E-09	4.438E-05	1.617E-04	3.316E-04	7.667E-04	1.008E-03	1.254E-03	1.497E-03	1.959E-03
a-226	U-238	9.999E-01	0.000E+00	4.601E-15	4.120E-09	2.950E-08	8.918E-08	3.317E-07	5.142E-07	7.329E-07	9.825E-07	1.550E-06
Ra-226	∑S(j):		1.300E+00	1.300E+00	1.312E+00	1.318E+00	1.319E+00	1.310E+00	1.300E+00	1.287E+00	1.272E+00	1.235E+00
a-228	Ra-228	1.000E+00	3.900E+00	3.456E+00	2.204E-05	1.246E-10	7.040E-16	2.248E-26	1.271E-31	7.181E-37	4.061E-42	0.000E+00
a-228	Th-232	1.000E+00	0.000E+00	4.427E-01	3.732E+00	3.567E+00	3.409E+00	3.114E+00	2.976E+00	2.844E+00	2.718E+00	2.483E+00
Ra-228	∑S(j):		3.900E+00	3.899E+00	3.732E+00	3.567E+00	3.409E+00	3.114E+00	2.976E+00	2.844E+00	2.718E+00	2.483E+00
h-228	Ra-228	1.000E-00	0.000E+00	1.112E+00	3.301E-05	1.865E-10	1.054E-15	3.367E-26	1.903E-31	1.075E-36	6.077E-42	0.000E+00
Th-228	Th-228	1.000E-00	3.900E+00	2.713E+00	6.858E-16	1.206E-31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	Th-232	1.000E-00	0.000E+00	7.268E-02	3.732E+00	3.567E+00	3.409E+00	3.114E+00	2.976E+00	2.844E+00	2.718E+00	2.483E+00
h-228	∑S(j):		3.900E+00	3.898E+00	3.732E+00	3.567E+00	3.409E+00	3.114E+00	2.976E+00	2.844E+00	2.718E+00	2.483E+00
Th-230	Th-230	1.000E+00	2.500E+00	2.499E+00	2.387E-00	2.279E+00	2.177E+00	1.984E+00	1.895E+00	1.809E+00	1.728E+00	1.575E+00
h-230	U-234	1.000E+00	0.000E+00	2.248E-05	2.027E-03	3.655E-03	4.948E-03	6.743E-03	7.330E-03	7.755E-03	8.046E-03	8.316E-03
h-230	U-238	9.999E-01	0.000E+00	3.186E-11	2.816E-07	9.954E-07	1.981E-06	4.313E-06	5.505E-06	6.649E-06	7.711E-06	9.525E-06
Th-230	∑S(j):		2.500E+00	2.499E+00	2.389E-00	2.283E+00	2.181E+00	1.991E+00	1.902E+00	1.817E+00	1.736E+00	1.584E-00
h-232	Th-232	1.000E+00	3.900E+00	3.898E+00	3.727E+00	3.562E+00	3.405E+00	3.110E+00	2.972E+00	2.840E+00	2.715E+00	2.480E+00
U-234	U-234	1.000E+00	2.500E+00	2.496E+00	2.121E+00	1.799E+00	1.527E+00	1.099E+00	9.321E-01	7.908E-01	6.709E-01	4.829E-01
-234	U-238	9.999E-01	0.000E+00	7.075E-06	6.013E-04	1.020E-03	1.299E-03	1.558E-03	1.587E-03	1.571E-03	1.523E-03	1.371E-03
-234	∑S(j):		2.500E+00	2.496E+00	2.122E+00	1.800E+00	1.528E+00	1.100E+00	9.337E-01	7.924E-01	6.724E-01	4.842E-01
-235	U-235	1.000E+00	1.000E-01	9.984E-02	8.486E-02	7.202E-02	6.111E-02	4.401E-02	3.735E-02	3.169E-02	2.690E-02	1.937E-02
U-238	U-238	5.400E-05	1.350E-04	1.348E-04	1.146E-04	9.722E-05	8.250E-05	5.941E-05	5.042E-05	4.279E-05	3.631E-05	2.615E-05
-238	U-238	9.999E-01	2.500E+00	2.496E+00	2.121E+00	1.800E+00	1.528E+00	1.100E+00	9.337E-01	7.923E-01	6.724E-01	4.842E-01
-238	∑S(j):		2.500E+00	2.496E+00	2.122E+00	1.800E+00	1.528E+00	1.100E+00	9.337E-01	7.924E-01	6.724E-01	4.842E-01

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 6.46 seconds

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Dose Conversion Factor (and Related) Parameter Summary
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menu	Parameter	Current Value	Base Case*	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
-1	Ac-227+D	6.724E+00	6.700E+00	DCF2(1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(2)
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(3)
-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(4)
-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(5)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(6)
-1	Th-230	3.260E-01	3.260E-01	DCF2(7)
-1	Th-232	1.640E+00	1.640E+00	DCF2(8)
B-1	U-234	1.320E-01	1.320E-01	DCF2(9)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(10)
-1	U-238	1.180E-01	1.180E-01	DCF2(11)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(12)
-1	Dose conversion factors for ingestion, mrem/pCi:			
-1	Ac-227+D	1.480E-02	1.410E-02	DCF3(1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(2)
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(3)
-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(4)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(5)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(6)
-1	Th-230	5.480E-04	5.480E-04	DCF3(7)
-1	Th-232	2.730E-03	2.730E-03	DCF3(8)
D-1	U-234	2.830E-04	2.830E-04	DCF3(9)
-1	U-235+D	2.673E-04	2.660E-04	DCF3(10)
-1	U-238	2.550E-04	2.550E-04	DCF3(11)
D-1	U-238+D	2.687E-04	2.550E-04	DCF3(12)
-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
-34				
-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(5,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,3)
-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
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enu	Parameter	Current Value	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-34				
-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
-34				
-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(8,3)
-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
-5				
-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
-5				
-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(5,1)
-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(5,2)
D-5				
-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(7,1)
-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(7,2)
D-5				

Dose Conversion Factor (and Related) Parameter Summary (continued)
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enu	Parameter	Current Value	Base Case*	Parameter Name
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(8,2)
-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(9,1)
-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)
-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(10,1)
-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(10,2)
-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(11,2)
-5				
-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(12,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)

Base Case means Default.Lib w/o Associate Nuclide contributions.

Site-Specific Parameter Summary

menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	6.000E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.000E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	2.450E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	2.000E+02	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+02	3.000E+00	---	T(3)
R011	Times for calculations (yr)	4.000E+02	1.000E+01	---	T(4)
R011	Times for calculations (yr)	5.000E+02	3.000E+01	---	T(5)
R011	Times for calculations (yr)	6.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	7.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	8.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	9.000E+02	0.000E+00	---	T(9)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ac-227	1.500E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	1.500E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	1.050E+01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.050E+01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Ra-228	3.400E+01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Th-228	3.400E+01	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Th-230	2.150E+01	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Th-232	3.400E+01	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): U-234	2.150E+01	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): U-235	1.500E+00	0.000E+00	---	S1(10)
R012	Initial principal radionuclide (pCi/g): U-238	2.150E+01	0.000E+00	---	S1(11)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(10)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(11)
R013	Cover depth (m)	1.500E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.400E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.650E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Precipitation (m/yr)	7.540E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	5.000E-01	2.000E-01	---	RI
013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.400E+00	1.500E+00	---	DENSAQ
014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	2.890E+02	1.000E+02	---	HCSZ
014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
014	Well pump intake depth (m below water table)	3.530E+01	1.000E+01	---	DWIBWT
014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	6.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.400E+00	1.500E+00	---	DENSUZ(1)
015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
015	Unsat. zone 1, hydraulic conductivity (m/yr)	8.900E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ac-227				
016	Contaminated zone (cm**3/g)	2.400E+03	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.400E+03	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.400E+03	2.000E+01	---	DCNUCS(1)
016	Leach rate (/yr)	0.000E+00	0.000E+00	2.736E-04	ALEACH(1)
016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
016	Distribution coefficients for Pa-231				
016	Contaminated zone (cm**3/g)	2.700E+03	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	2.700E+03	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	2.700E+03	5.000E+01	---	DCNUCS(2)
016	Leach rate (/yr)	0.000E+00	0.000E+00	2.432E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
016	Distribution coefficients for Pb-210				
016	Contaminated zone (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCU(3,1)
016	Saturated zone (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCS(3)
016	Leach rate (/yr)	0.000E+00	0.000E+00	1.194E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.216E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.216E-05	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.132E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.132E-04	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.132E-04	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.104E-04	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.104E-04	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.104E-04	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)
R017	Inhalation rate (m**3/yr)	8.600E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	4.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	4.270E+01	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	4.660E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.510E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	7.340E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	0.000E+00	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	---	SOIL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
018	Contamination fraction of aquatic food	0.000E+00	5.000E-01	---	FR9
018	Contamination fraction of plant food	-1	-1	0.300E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.300E-01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.300E-01	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
019	Mass loading for foliar deposition (g/m**3)	0.000E+00	1.000E-04	---	MLFD
019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
14	DCF correction factor for gaseous forms of C14	not used	0.000E+00	---	CO2F

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions	
Area:	600.00 square meters
Thickness:	0.60 meters
Cover Depth:	1.50 meters

Initial Soil Concentrations, pCi/g	
Ac-227	1.500E+00
Pa-231	1.500E+00
Pb-210	1.050E+01
Ra-226	1.050E+01
Ra-228	3.400E+01
Th-228	3.400E+01
Th-230	2.150E+01
Th-232	3.400E+01
U-234	2.150E+01
U-235	1.500E+00
U-238	2.150E+01

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 2.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	2.000E+02	3.000E+02	4.000E+02	5.000E+02	6.000E+02	7.000E+02	8.000E+02	9.000E+02	1.000E+03
TDOSE(t):	6.828E-05	4.513E-04	1.165E-03	3.018E-03	7.857E-03	4.809E-02	6.018E+00	1.204E+01	1.820E+01	2.477E+01
M(t):	2.731E-06	1.805E-05	4.660E-05	1.207E-04	3.143E-04	1.923E-03	2.407E-01	4.816E-01	7.282E-01	9.908E-01

Maximum TDOSE(t): 2.477E+01 mrem/yr at t = 1.000E+03 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	7.284E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
a-231	1.631E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
b-210	3.030E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.651E-06	0.0242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
a-228	1.074E-05	0.1573	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	5.542E-05	0.8117	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	7.336E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	4.595E-07	0.0067	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-234	2.203E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-235	1.246E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.555E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
otal	6.828E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

adio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.284E-11	0.0000
a-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.631E-12	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.030E-13	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.651E-06	0.0242
a-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.074E-05	0.1573
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.542E-05	0.8117
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.336E-10	0.0000
h-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.595E-07	0.0067
-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.203E-15	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.246E-14	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.555E-09	0.0000
otal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.828E-05	1.0000

Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	2.188E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
a-231	1.309E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
b-210	7.164E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.416E-05	0.0314	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	2.081E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
c-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.617E-06	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	4.345E-04	0.9628	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-234	2.346E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-235	5.362E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.110E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
otal	4.513E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.000E+02 years

Water Dependent Pathways

adio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
c-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.188E-12	0.0000
a-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.309E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.164E-15	0.0000
Ra-226	0.000E-00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000	1.416E-05	0.0314
a-228	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000	2.081E-14	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.617E-06	0.0058
h-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.345E-04	0.9628
-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.346E-09	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.362E-12	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.110E-08	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.513E-04	1.0000

Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.823E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	5.551E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	1.110E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	4.146E-05	0.0356	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	3.105E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.171E-05	0.0101	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.112E-03	0.9543	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.568E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	3.651E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	7.780E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.165E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.823E-13	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.551E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.110E-15	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.146E-05	0.0356
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.105E-19	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.171E-05	0.0101
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.112E-03	0.9543
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.568E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.651E-11	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.780E-08	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.165E-03	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 4.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	6.728E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
a-231	2.370E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
b-210	1.740E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.214E-04	0.0402	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	4.639E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	4.663E-05	0.0154	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.850E-03	0.9442	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-234	8.291E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.221E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.870E-07	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.018E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 4.000E+02 years

Water Dependent Pathways

adio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.728E-14	0.0000
a-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.370E-08	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.740E-16	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.214E-04	0.0402
a-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.639E-24	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.663E-05	0.0154
h-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.850E-03	0.9442
-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.291E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.221E-10	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.870E-07	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.018E-03	1.0000

Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.195E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
a-231	1.023E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
b-210	2.785E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	3.557E-04	0.0453	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	6.781E-29	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.741E-04	0.0222	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	7.326E-03	0.9324	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-234	3.855E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
-235	1.299E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	1.059E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
otal	7.857E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 5.000E+02 years

Water Dependent Pathways

adio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
c-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.195E-14	0.0000
a-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.023E-07	0.0000
b-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.785E-17	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.557E-04	0.0453
a-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.781E-29	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.741E-04	0.0222
h-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.326E-03	0.9324
-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.855E-07	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.299E-09	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.059E-06	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.857E-03	1.0000

Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 6.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	2.149E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.715E-12	0.0000	2.321E-16	0.0000	3.004E-16	0.0000	0.000E+00	0.0000
a-231	4.470E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.346E-03	0.0280	3.391E-05	0.0007	1.054E-07	0.0000	0.000E+00	0.0000
b-210	4.618E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.135E-11	0.0000	1.156E-13	0.0000	5.611E-14	0.0000	0.000E+00	0.0000
Ra-226	1.042E-03	0.0217	0.000E+00	0.0000	0.000E+00	0.0000	7.079E-03	0.1472	4.280E-05	0.0009	3.719E-05	0.0008	0.000E+00	0.0000
a-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	6.242E-04	0.0130	0.000E+00	0.0000	0.000E+00	0.0000	4.181E-03	0.0869	2.493E-05	0.0005	2.191E-05	0.0005	0.000E+00	0.0000
Th-232	1.890E-02	0.3930	0.000E+00	0.0000	0.000E+00	0.0000	1.434E-02	0.2981	9.116E-05	0.0019	1.165E-04	0.0024	0.000E+00	0.0000
-234	1.652E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.820E-05	0.0020	2.655E-07	0.0000	5.161E-07	0.0000	0.000E+00	0.0000
-235	7.583E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.193E-05	0.0005	4.258E-07	0.0000	3.154E-08	0.0000	0.000E+00	0.0000
U-238	3.911E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	8.312E-05	0.0017	1.915E-07	0.0000	4.372E-07	0.0000	0.000E+00	0.0000
otal	2.057E-02	0.4278	0.000E+00	0.0000	0.000E+00	0.0000	2.715E-02	0.5645	1.937E-04	0.0040	1.767E-04	0.0037	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 6.000E+02 years

Water Dependent Pathways

adio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
c-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.718E-12	0.0000
a-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.381E-03	0.0287
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.152E-11	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.201E-03	0.1706
a-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.852E-03	0.1009
h-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.344E-02	0.6955
-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.006E-04	0.0021
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.239E-05	0.0005
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.766E-05	0.0018
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.809E-02	1.0000

Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 7.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.923E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.501E-11	0.0000	2.802E-15	0.0000	3.204E-15	0.0000	0.000E+00	0.0000
a-231	1.986E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.829E-01	0.0470	9.817E-03	0.0016	2.638E-05	0.0000	0.000E+00	0.0000
b-210	8.108E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.837E-10	0.0000	1.372E-12	0.0000	5.885E-13	0.0000	0.000E+00	0.0000
Ra-226	3.054E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	1.452E+00	0.2413	1.209E-02	0.0020	9.231E-03	0.0015	0.000E+00	0.0000
a-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.177E-03	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	1.022E+00	0.1699	8.411E-03	0.0014	6.526E-03	0.0011	0.000E+00	0.0000
Th-232	4.898E-02	0.0081	0.000E+00	0.0000	0.000E+00	0.0000	3.059E+00	0.5083	2.679E-02	0.0045	3.026E-02	0.0050	0.000E+00	0.0000
-234	6.697E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.118E-02	0.0035	8.270E-05	0.0000	1.355E-04	0.0000	0.000E+00	0.0000
-235	4.516E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.134E-03	0.0009	1.421E-04	0.0000	8.011E-06	0.0000	0.000E+00	0.0000
U-238	1.445E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.722E-02	0.0029	5.467E-05	0.0000	1.103E-04	0.0000	0.000E+00	0.0000
otal	5.424E-02	0.0090	0.000E+00	0.0000	0.000E+00	0.0000	5.860E+00	0.9737	5.739E-02	0.0095	4.636E-02	0.0077	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 7.000E+02 years

Water Dependent Pathways

adio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.501E-11	0.0000
a-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.927E-01	0.0486
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.837E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.477E+00	0.2454
a-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.039E+00	0.1727
h-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.165E+00	0.5259
-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.141E-02	0.0036
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.284E-03	0.0009
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.740E-02	0.0029
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.018E+00	1.0000

Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 8.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	7.293E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.207E-12	0.0000	2.256E-16	0.0000	2.579E-16	0.0000	0.000E+00	0.0000
a-231	8.997E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.498E-01	0.0457	1.909E-02	0.0016	5.245E-05	0.0000	0.000E+00	0.0000
b-210	1.545E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.454E-11	0.0000	1.087E-13	0.0000	4.658E-14	0.0000	0.000E+00	0.0000
Ra-226	8.956E-03	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	2.755E+00	0.2288	2.296E-02	0.0019	1.763E-02	0.0015	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	7.443E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	2.264E+00	0.1880	1.867E-02	0.0016	1.446E-02	0.0012	0.000E+00	0.0000
Th-232	1.278E-01	0.0106	0.000E+00	0.0000	0.000E+00	0.0000	6.035E+00	0.5012	5.289E-02	0.0044	5.973E-02	0.0050	0.000E+00	0.0000
-234	2.607E-05	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	4.245E-02	0.0035	1.741E-04	0.0000	2.717E-04	0.0000	0.000E+00	0.0000
-235	2.782E-07	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	1.099E-02	0.0009	3.124E-04	0.0000	1.546E-05	0.0000	0.000E+00	0.0000
U-238	5.339E-05	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	3.299E-02	0.0027	1.048E-04	0.0000	2.114E-04	0.0000	0.000E+00	0.0000
otal	1.442E-01	0.0120	0.000E+00	0.0000	0.000E+00	0.0000	1.169E+01	0.9709	1.142E-01	0.0095	9.238E-02	0.0077	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 8.000E+02 years

Water Dependent Pathways

adio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
c-227	0.000E-00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.208E-12	0.0000
a-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.689E-01	0.0472
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.469E-11	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.805E+00	0.2329
a-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.305E+00	0.1914
h-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.275E+00	0.5211
-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.292E-02	0.0036
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.132E-02	0.0009
U-238	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.336E-02	0.0028
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.204E+01	1.0000

Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 9.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.387E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.297E-14	0.0000	1.364E-17	0.0000	1.559E-17	0.0000	0.000E+00	0.0000
a-231	4.171E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.025E-01	0.0441	2.788E-02	0.0015	7.657E-05	0.0000	0.000E+00	0.0000
b-210	3.251E-20	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.640E-13	0.0000	6.459E-15	0.0000	2.769E-15	0.0000	0.000E-00	0.0000
Ra-226	2.629E-02	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	3.926E+00	0.2157	3.273E-02	0.0018	2.513E-02	0.0014	0.000E+00	0.0000
a-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	2.508E-02	0.0014	0.000E+00	0.0000	0.000E+00	0.0000	3.708E+00	0.2037	3.061E-02	0.0017	2.369E-02	0.0013	0.000E+00	0.0000
Th-232	3.359E-01	0.0184	0.000E+00	0.0000	0.000E+00	0.0000	8.943E+00	0.4912	7.840E-02	0.0043	8.854E-02	0.0049	0.000E+00	0.0000
-234	9.843E-05	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	6.419E-02	0.0035	2.763E-04	0.0000	4.109E-04	0.0000	0.000E+00	0.0000
-235	1.783E-06	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	1.749E-02	0.0010	5.080E-04	0.0000	2.240E-05	0.0000	0.000E+00	0.0000
U-238	1.974E-04	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	4.748E-02	0.0026	1.509E-04	0.0000	3.043E-04	0.0000	0.000E+00	0.0000
otal	3.876E-01	0.0213	0.000E+00	0.0000	0.000E+00	0.0000	1.751E+01	0.9618	1.705E-01	0.0094	1.382E-01	0.0076	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 9.000E+02 years

Water Dependent Pathways

adio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
uclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
c-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.301E-14	0.0000
a-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.305E-01	0.0456
Pb-210	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.732E-13	0.0000
Ra-226	0.000E-00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.010E+00	0.2203
a-228	0.000E-00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
h-228	0.000E-00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000
Th-230	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.787E+00	0.2080
h-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.446E+00	0.5189
-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.497E-02	0.0036
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.802E-02	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.814E-02	0.0026
Total	0.000E-00	0.0000	0.000E-00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.820E+01	1.0000

Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	2.706E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.922E-15	0.0000	7.329E-19	0.0000	8.378E-19	0.0000	0.000E+00	0.0000
Pa-231	1.986E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.042E+00	0.0421	3.619E-02	0.0015	9.940E-05	0.0000	0.000E+00	0.0000
Pb-210	7.561E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.566E-14	0.0000	3.414E-16	0.0000	1.463E-16	0.0000	0.000E+00	0.0000
Ra-226	7.728E-02	0.0031	0.000E+00	0.0000	0.000E+00	0.0000	4.975E+00	0.2009	4.147E-02	0.0017	3.185E-02	0.0013	0.000E+00	0.0000
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	8.358E-02	0.0034	0.000E+00	0.0000	0.000E+00	0.0000	5.332E+00	0.2152	4.405E-02	0.0018	3.408E-02	0.0014	0.000E+00	0.0000
Th-232	8.922E-01	0.0360	0.000E+00	0.0000	0.000E+00	0.0000	1.179E+01	0.4758	1.033E-01	0.0042	1.167E-01	0.0047	0.000E+00	0.0000
U-234	3.631E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.662E-02	0.0035	3.908E-04	0.0000	5.545E-04	0.0000	0.000E+00	0.0000
U-235	1.188E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.456E-02	0.0010	7.260E-04	0.0000	2.887E-05	0.0000	0.000E+00	0.0000
U-238	7.304E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.077E-02	0.0025	1.932E-04	0.0000	3.895E-04	0.0000	0.000E+00	0.0000
Total	1.054E+00	0.0426	0.000E+00	0.0000	0.000E+00	0.0000	2.331E+01	0.9409	2.263E-01	0.0091	1.837E-01	0.0074	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.926E-15	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.078E+00	0.0435
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.615E-14	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.126E+00	0.2069
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.493E+00	0.2218
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.290E-01	0.5207
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.793E-02	0.0035
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.533E-02	0.0010
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.208E-02	0.0025
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.477E+01	1.0000

Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	2.000E+02	3.000E+02	4.000E+02	5.000E+02	6.000E+02	7.000E+02	8.000E+02	9.000E+02	1.000E+03
Ac-227+D	Ac-227+D	1.000E+00	4.856E-11	1.459E-12	2.549E-13	4.486E-14	7.969E-15	1.145E-12	1.001E-11	8.053E-13	4.868E-14	2.617E-15
Pa-231	Pa-231	1.000E+00	3.081E-13	9.486E-12	5.264E-11	2.921E-10	1.621E-09	6.873E-04	1.462E-01	2.842E-01	4.148E-01	5.385E-01
Pa-231	Ac-227+D	1.000E+00	7.789E-13	8.630E-10	3.648E-09	1.551E-08	6.655E-08	2.331E-04	4.894E-02	9.511E-02	1.388E-01	1.803E-01
Pa-231	∑DSR(j)		1.087E-12	8.725E-10	3.700E-09	1.580E-08	6.817E-08	9.204E-04	1.952E-01	3.793E-01	5.537E-01	7.188E-01
Pb-210+D	Pb-210+D	1.000E+00	2.886E-14	6.823E-16	1.057E-16	1.657E-17	2.652E-18	2.050E-12	1.769E-11	1.399E-12	8.317E-14	4.395E-15
Ra-226+D	Ra-226+D	1.000E+00	1.572E-07	1.348E-06	3.949E-06	1.157E-05	3.388E-05	3.904E-04	6.028E-02	1.147E-01	1.647E-01	2.129E-01
Ra-226+D	Pb-210+D	1.000E+00	4.518E-16	3.892E-13	1.449E-12	5.445E-12	2.089E-11	3.907E-04	8.037E-02	1.525E-01	2.173E-01	2.753E-01
Ra-226+D	∑DSR(j)		1.572E-07	1.348E-06	3.949E-06	1.157E-05	3.388E-05	7.811E-04	1.407E-01	2.671E-01	3.819E-01	4.882E-01
Ra-228+D	Ra-228+D	1.000E+00	1.490E-08	5.992E-18	1.202E-22	2.411E-27	4.835E-32	1.569E-35	1.885E-38	2.158E-43	0.000E+00	0.000E+00
Ra-228+D	Th-228+D	1.000E+00	3.010E-07	6.062E-16	9.013E-21	1.340E-25	1.994E-30	3.009E-35	9.597E-40	7.006E-45	0.000E+00	0.000E+00
Ra-228+D	∑DSR(j)		3.159E-07	6.121E-16	9.133E-21	1.365E-25	2.043E-30	4.579E-35	1.981E-38	2.228E-43	0.000E+00	0.000E+00
Th-228+D	Th-228+D	1.000E+00	1.630E-06	3.574E-37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	Th-230	1.000E+00	2.104E-22	5.608E-20	9.157E-19	1.495E-17	2.441E-16	3.746E-06	7.986E-04	1.574E-03	2.331E-03	3.069E-03
Th-230	Ra-226+D	1.000E+00	3.412E-11	1.217E-07	5.448E-07	2.169E-06	8.097E-06	1.142E-04	2.098E-02	4.653E-02	7.672E-02	1.124E-01
Th-230	Pb-210+D	1.000E+00	6.550E-20	2.954E-14	1.780E-13	9.356E-13	4.652E-12	1.077E-04	2.657E-02	5.910E-02	9.710E-02	1.400E-01
Th-230	∑DSR(j)		3.412E-11	1.217E-07	5.448E-07	2.169E-06	8.097E-06	2.257E-04	4.835E-02	1.072E-01	1.761E-01	2.555E-01
Th-232	Th-232	1.000E+00	7.613E-25	3.817E-22	8.547E-21	1.914E-19	4.285E-18	1.876E-05	4.004E-03	7.899E-03	1.171E-02	1.543E-02
Th-232	Ra-228+D	1.000E+00	9.178E-10	1.865E-07	6.405E-07	2.199E-06	7.552E-06	4.266E-04	8.595E-02	1.697E-01	2.521E-01	3.344E-01
Th-232	Th-228+D	1.000E+00	1.260E-08	1.259E-05	3.205E-05	8.162E-05	2.079E-04	5.382E-04	3.127E-03	6.953E-03	1.402E-02	2.947E-02
Th-232	∑DSR(j)		1.351E-08	1.278E-05	3.270E-05	8.382E-05	2.155E-04	9.836E-04	9.308E-02	1.846E-01	2.776E-01	3.793E-01
U-234	U-234	1.000E+00	1.213E-23	3.763E-21	6.629E-20	1.168E-18	2.057E-17	4.088E-06	8.482E-04	1.624E-03	2.335E-03	2.987E-03
U-234	Th-230	1.000E+00	9.514E-28	9.833E-23	2.372E-21	5.087E-20	1.023E-18	1.858E-08	4.556E-06	1.012E-05	1.662E-05	2.398E-05
U-234	Ra-226+D	1.000E+00	1.025E-16	1.091E-10	7.294E-10	3.856E-09	1.793E-08	3.024E-07	6.455E-05	1.630E-04	3.011E-04	4.884E-04
U-234	Pb-210+D	1.000E+00	1.477E-25	2.312E-17	2.166E-16	1.546E-15	9.709E-15	2.715E-07	7.834E-05	1.995E-04	3.688E-04	5.905E-04
U-234	∑DSR(j)		1.025E-16	1.091E-10	7.294E-10	3.856E-09	1.793E-08	4.680E-06	9.956E-04	1.996E-03	3.022E-03	4.090E-03
U-235+D	U-235+D	1.000E+00	8.299E-15	4.802E-13	3.652E-12	2.778E-11	2.113E-10	3.870E-06	8.029E-04	1.538E-03	2.213E-03	2.835E-03
U-235+D	Pa-231	1.000E+00	3.269E-18	3.966E-14	3.274E-13	2.404E-12	1.655E-11	8.363E-06	2.060E-03	4.542E-03	7.406E-03	1.060E-02
U-235+D	Ac-227+D	1.000E+00	5.514E-18	3.055E-12	2.036E-11	1.179E-10	6.383E-10	2.694E-06	6.601E-04	1.464E-03	2.398E-03	3.448E-03
U-235+D	∑DSR(j)		8.308E-15	3.575E-12	2.434E-11	1.481E-10	8.662E-10	1.493E-05	3.523E-03	7.544E-03	1.202E-02	1.689E-02
U-238	U-238	5.400E-05	0.000E+00	0.000E+00	1.822E-43	1.111E-40	6.746E-38	1.992E-10	4.135E-08	7.919E-08	1.139E-07	1.457E-07
U-238+D	U-238+D	9.999E-01	7.231E-11	9.814E-10	3.618E-09	1.335E-08	4.925E-08	4.070E-06	8.075E-04	1.548E-03	2.232E-03	2.878E-03
U-238+D	U-234	9.999E-01	1.728E-29	2.140E-24	5.649E-23	1.326E-21	2.920E-20	6.967E-09	1.686E-06	3.689E-06	5.969E-06	8.483E-06
U-238+D	Th-230	9.999E-01	9.010E-34	2.768E-26	9.958E-25	2.833E-23	7.087E-22	1.537E-11	4.373E-09	1.105E-08	2.031E-08	3.239E-08
U-238+D	Ra-226+D	9.999E-01	7.266E-23	2.061E-14	2.061E-13	1.450E-12	8.409E-12	1.699E-10	4.223E-08	1.216E-07	2.523E-07	4.539E-07
U-238+D	Pb-210+D	9.999E-01	8.390E-32	3.885E-21	5.613E-20	5.430E-19	4.307E-18	1.455E-10	4.920E-08	1.436E-07	2.992E-07	5.330E-07
U-238+D	∑DSR(j)		7.231E-11	9.814E-10	3.618E-09	1.335E-08	4.926E-08	4.077E-06	8.093E-04	1.552E-03	2.239E-03	2.887E-03

The DSR includes contributions from associated (half-life ≤ 180 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	2.000E+02	3.000E+02	4.000E+02	5.000E+02	6.000E+02	7.000E+02	8.000E+02	9.000E+02	1.000E+03
Ac-227	5.148E+11	1.714E+13	*7.232E+13	*7.232E+13	*7.232E+13	2.183E+13	2.498E+12	3.104E+13	*7.232E+13	*7.232E+13
Pa-231	*4.723E+10	2.865E+10	6.756E+09	1.582E+09	3.667E+08	2.716E+04	1.281E+02	6.591E+01	4.515E+01	3.478E+01
Pb-210	*7.634E+13	*7.634E+13	*7.634E+13	*7.634E+13	*7.634E+13	1.220E+13	1.414E+12	1.787E+13	*7.634E+13	*7.634E+13
Ra-226	1.590E+08	1.854E+07	6.331E+06	2.162E+06	7.380E+05	3.201E+04	1.777E+02	9.359E+01	6.546E+01	5.121E+01
Ra-228	7.913E+07	*2.726E+14	*2.726E+14	*2.726E+14	*2.726E+14	*2.726E+14	*2.726E+14	*2.726E+14	*2.726E+14	*2.726E+14
Th-228	1.534E+07	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14	*8.195E+14
Th-230	*2.018E+10	2.054E+08	4.589E+07	1.153E+07	3.088E+06	1.108E+05	5.171E+02	2.332E+02	1.419E+02	9.785E+01
Th-232	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	2.542E+04	2.686E+02	1.355E+02	8.999E+01	6.590E+01
U-234	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	1.394E+09	5.341E+06	2.511E+04	1.252E+04	8.273E+03	6.113E+03
U-235	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	1.675E+06	7.096E+03	3.314E+03	2.080E+03	1.480E+03
U-238	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	3.089E+04	1.611E+04	1.117E+04	8.658E+03

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.000E+03 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ac-227	1.500E+00	0.000E+00	4.856E-11	5.148E+11	2.617E-15	*7.232E+13
Pa-231	1.500E+00	1.000E+03	7.188E-01	3.478E+01	7.188E-01	3.478E+01
Pb-210	1.050E+01	630 ± 1	5.137E-11	4.867E+11	4.395E-15	*7.634E+13
Ra-226	1.050E+01	1.000E+03	4.882E-01	5.121E+01	4.882E-01	5.121E+01
Ra-228	3.400E+01	0.000E+00	3.159E-07	7.913E+07	0.000E+00	*2.726E+14
Th-228	3.400E+01	0.000E+00	1.630E-06	1.534E+07	0.000E+00	*8.195E+14
Th-230	2.150E+01	1.000E+03	2.555E-01	9.785E+01	2.555E-01	9.785E+01
Th-232	3.400E+01	1.000E+03	3.793E-01	6.590E+01	3.793E-01	6.590E+01
U-234	2.150E+01	1.000E+03	4.090E-03	6.113E+03	4.090E-03	6.113E+03
U-235	1.500E+00	1.000E+03	1.689E-02	1.480E+03	1.689E-02	1.480E+03
U-238	2.150E-01	1.000E+03	2.887E-03	8.658E+03	2.887E-03	8.658E+03

*At specific activity limit

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	2.000E+02	3.000E+02	4.000E+02	5.000E+02	6.000E+02	7.000E+02	8.000E+02	9.000E+02	1.000E+03
Ac-227	Ac-227	1.000E+00	7.284E-11	2.188E-12	3.823E-13	6.728E-14	1.195E-14	1.718E-12	1.501E-11	1.208E-12	7.301E-14	3.926E-15
Ac-227	Pa-231	1.000E+00	1.168E-12	1.295E-09	5.472E-09	2.326E-08	9.982E-08	3.497E-04	7.341E-02	1.427E-01	2.083E-01	2.705E-01
Ac-227	U-235	1.000E+00	8.271E-18	4.582E-12	3.054E-11	1.768E-10	9.575E-10	4.041E-06	9.901E-04	2.196E-03	3.597E-03	5.172E-03
Ac-227	∑DOSE(j)		7.401E-11	1.301E-09	5.503E-09	2.344E-08	1.008E-07	3.537E-04	7.440E-02	1.449E-01	2.119E-01	2.757E-01
Pa-231	Pa-231	1.000E+00	4.622E-13	1.423E-11	7.896E-11	4.381E-10	2.431E-09	1.031E-03	2.193E-01	4.263E-01	6.222E-01	8.077E-01
Pa-231	U-235	1.000E+00	4.903E-18	5.949E-14	4.912E-13	3.606E-12	2.482E-11	1.254E-05	3.090E-03	6.813E-03	1.111E-02	1.591E-02
Pa-231	∑DOSE(j)		4.622E-13	1.429E-11	7.945E-11	4.417E-10	2.456E-09	1.043E-03	2.224E-01	4.331E-01	6.333E-01	8.236E-01
Pb-210	Pb-210	1.000E+00	3.030E-13	7.164E-15	1.110E-15	1.740E-16	2.785E-17	2.152E-11	1.857E-10	1.469E-11	8.732E-13	4.615E-14
Pb-210	Ra-226	1.000E+00	4.744E-15	4.087E-12	1.521E-11	5.717E-11	2.194E-10	4.102E-03	8.439E-01	1.601E+00	2.281E+00	2.891E+00
Pb-210	Th-230	1.000E+00	1.408E-18	6.351E-13	3.827E-12	2.011E-11	1.000E-10	2.316E-03	5.712E-01	1.271E+00	2.088E+00	3.010E+00
Pb-210	U-234	1.000E+00	3.176E-24	4.970E-16	4.656E-15	3.324E-14	2.088E-13	5.837E-06	1.684E-03	4.289E-03	7.929E-03	1.270E-02
Pb-210	U-238	9.999E-01	0.000E+00	8.352E-20	1.207E-18	1.168E-17	9.259E-17	3.129E-09	1.058E-06	3.087E-06	6.434E-06	1.146E-05
Pb-210	∑DOSE(j)		3.077E-13	4.730E-12	1.904E-11	7.732E-11	3.196E-10	6.424E-03	1.417E+00	2.876E+00	4.377E+00	5.913E+00
Ra-226	Ra-226	1.000E+00	1.651E-06	1.416E-05	4.146E-05	1.214E-04	3.557E-04	4.099E-03	6.330E-01	1.204E+00	1.729E+00	2.235E+00
Ra-226	Th-230	1.000E+00	7.336E-10	2.617E-06	1.171E-05	4.663E-05	1.741E-04	2.456E-03	4.511E-01	1.000E+00	1.649E+00	2.417E+00
Ra-226	U-234	1.000E+00	2.203E-15	2.346E-09	1.568E-08	8.291E-08	3.855E-07	6.501E-06	1.386E-03	3.504E-03	6.474E-03	1.050E-02
Ra-226	U-238	9.999E-01	1.562E-21	4.430E-13	4.431E-12	3.117E-11	1.808E-10	3.653E-09	9.079E-07	2.615E-06	5.425E-06	9.759E-06
Ra-226	∑DOSE(j)		1.651E-06	1.678E-05	5.319E-05	1.681E-04	5.302E-04	6.561E-03	1.086E+00	2.208E+00	3.365E+00	4.663E+00
Ra-228	Ra-228	1.000E+00	5.065E-07	2.037E-16	4.086E-21	8.196E-26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-228	Th-232	1.000E+00	3.121E-08	6.342E-06	2.178E-05	7.478E-05	2.568E-04	1.451E-02	2.922E+00	5.770E+00	8.571E+00	1.137E+01
Ra-228	∑DOSE(j)		5.377E-07	6.342E-06	2.178E-05	7.478E-05	2.568E-04	1.451E-02	2.922E+00	5.770E+00	8.571E+00	1.137E+01
Th-228	Ra-228	1.000E+00	1.024E-05	2.061E-14	3.064E-19	4.557E-24	6.781E-29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	Th-228	1.000E+00	5.542E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	4.283E-07	4.281E-04	1.090E-03	2.775E-03	7.069E-03	1.830E-02	1.063E-01	2.364E-01	4.766E-01	1.002E+00
Th-228	∑DOSE(j)		6.608E-05	4.281E-04	1.090E-03	2.775E-03	7.069E-03	1.830E-02	1.063E-01	2.364E-01	4.766E-01	1.002E+00
Th-230	Th-230	1.000E+00	4.524E-21	1.206E-18	1.969E-17	3.214E-16	5.247E-15	8.053E-05	1.717E-02	3.384E-02	5.011E-02	6.598E-02
Th-230	U-234	1.000E+00	2.045E-26	2.114E-21	5.099E-20	1.094E-18	2.200E-17	3.995E-07	9.796E-05	2.176E-04	3.574E-04	5.156E-04
Th-230	U-238	9.999E-01	0.000E+00	5.951E-25	2.141E-23	6.091E-22	1.524E-20	3.305E-10	9.403E-08	2.375E-07	4.366E-07	6.964E-07
Th-230	∑DOSE(j)		4.524E-21	1.208E-18	1.974E-17	3.225E-16	5.269E-15	8.093E-05	1.727E-02	3.406E-02	5.047E-02	6.649E-02
Th-232	Th-232	1.000E+00	2.588E-23	1.298E-20	2.906E-19	6.507E-18	1.457E-16	6.379E-04	1.361E-01	2.686E-01	3.960E-01	5.245E-01
U-234	U-234	1.000E+00	2.608E-22	8.091E-20	1.425E-18	2.510E-17	4.422E-16	8.789E-05	1.824E-02	3.491E-02	5.021E-02	6.421E-02
U-234	U-238	9.999E-01	3.714E-28	4.600E-23	1.215E-21	2.852E-20	6.278E-19	1.498E-07	3.625E-05	7.932E-05	1.283E-04	1.824E-04
U-234	∑DOSE(j)		2.608E-22	8.096E-20	1.426E-18	2.513E-17	4.428E-16	8.804E-05	1.827E-02	3.499E-02	5.034E-02	6.440E-02
U-235	U-235	1.000E+00	1.245E-14	7.202E-13	5.478E-12	4.167E-11	3.169E-10	5.805E-06	1.204E-03	2.306E-03	3.319E-03	4.252E-03
U-238	U-238	5.400E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.284E-09	8.890E-07	1.703E-06	2.449E-06	3.133E-06
U-238	U-238	9.999E-01	1.555E-09	2.110E-08	7.779E-08	2.869E-07	1.059E-06	8.750E-05	1.736E-02	3.328E-02	4.799E-02	6.187E-02
U-238	∑DOSE(j)		1.555E-09	2.110E-08	7.779E-08	2.869E-07	1.059E-06	8.750E-05	1.736E-02	3.328E-02	4.799E-02	6.187E-02

THF(i) is the thread fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	2.000E+02	3.000E+02	4.000E+02	5.000E+02	6.000E+02	7.000E+02	8.000E+02	9.000E+02	1.000E+03
Ac-227	Ac-227	1.000E+00	1.500E+00	2.439E-03	9.833E-05	3.965E-06	1.599E-07	6.446E-09	2.599E-10	1.048E-11	4.226E-13	1.704E-14
Ac-227	Pa-231	1.000E+00	0.000E+00	1.420E+00	1.385E+00	1.349E+00	1.314E+00	1.280E+00	1.246E+00	1.214E+00	1.182E+00	1.151E+00
Ac-227	U-235	1.000E+00	0.000E+00	5.011E-03	7.718E-03	1.024E-02	1.259E-02	1.477E-02	1.679E-02	1.867E-02	2.040E-02	2.200E-02
Ac-227	∑S(j):		1.500E+00	1.427E+00	1.393E+00	1.359E+00	1.326E+00	1.294E+00	1.263E+00	1.232E+00	1.202E+00	1.173E+00
Pa-231	Pa-231	1.000E+00	1.500E+00	1.423E+00	1.386E+00	1.349E+00	1.314E+00	1.280E+00	1.247E+00	1.214E+00	1.182E+00	1.152E+00
Pa-231	U-235	1.000E+00	0.000E+00	5.934E-03	8.605E-03	1.109E-02	1.341E-02	1.556E-02	1.755E-02	1.940E-02	2.110E-02	2.267E-02
Pa-231	∑S(j):		1.500E+00	1.429E+00	1.394E+00	1.361E+00	1.328E+00	1.296E+00	1.264E+00	1.233E+00	1.204E+00	1.174E+00
Pb-210	Pb-210	1.000E+00	1.050E+01	1.651E-02	6.546E-04	2.595E-05	1.029E-06	4.081E-08	1.618E-09	6.416E-11	2.544E-12	1.009E-13
Pb-210	Ra-226	1.000E+00	0.000E+00	9.269E+00	8.827E+00	8.392E+00	7.979E+00	7.586E+00	7.212E+00	6.856E+00	6.518E+00	6.197E+00
Pb-210	Th-230	1.000E+00	0.000E+00	1.436E+00	2.216E+00	2.948E+00	3.634E+00	4.276E+00	4.876E+00	5.437E+00	5.960E+00	6.448E+00
Pb-210	U-234	1.000E+00	0.000E+00	1.121E-03	2.692E-03	4.866E-03	7.576E-03	1.076E-02	1.437E-02	1.834E-02	2.262E-02	2.718E-02
Pb-210	U-238	9.999E-01	0.000E+00	1.878E-07	6.964E-07	1.707E-06	3.357E-06	5.761E-06	9.014E-06	1.319E-05	1.834E-05	2.452E-05
Pb-210	∑S(j):		1.050E+01	1.072E+01	1.105E+01	1.135E+01	1.162E+01	1.187E+01	1.210E+01	1.231E+01	1.250E+01	1.267E+01
Ra-226	Ra-226	1.000E+00	1.050E+01	9.491E+00	9.023E+00	8.578E+00	8.155E+00	7.754E+00	7.371E+00	7.008E+00	6.663E+00	6.334E+00
Ra-226	Th-230	1.000E+00	0.000E+00	1.750E+00	2.545E+00	3.289E+00	3.987E+00	4.640E+00	5.250E+00	5.820E+00	6.352E+00	6.847E+00
Ra-226	U-234	1.000E+00	0.000E+00	1.565E-03	3.401E-03	5.842E-03	8.819E-03	1.227E-02	1.614E-02	2.037E-02	2.492E-02	2.973E-02
Ra-226	U-238	9.999E-01	0.000E+00	2.948E-07	9.595E-07	2.194E-06	4.132E-06	6.888E-06	1.055E-05	1.519E-05	2.087E-05	2.762E-05
Ra-226	∑S(j):		1.050E+01	1.124E+01	1.157E+01	1.187E+01	1.215E+01	1.241E+01	1.264E+01	1.285E+01	1.304E+01	1.321E+01
Ra-228	Ra-228	1.000E+00	3.400E+01	1.134E-09	6.549E-15	3.782E-20	2.184E-25	1.261E-30	7.285E-36	4.207E-41	0.000E+00	0.000E+00
Ra-228	Th-232	1.000E+00	0.000E+00	3.325E+01	3.288E+01	3.251E+01	3.214E+01	3.178E+01	3.142E+01	3.107E+01	3.072E+01	3.037E+01
Ra-228	∑S(j):		3.400E+01	3.325E+01	3.288E+01	3.251E+01	3.214E+01	3.178E+01	3.142E+01	3.107E+01	3.072E+01	3.037E+01
Th-228	Ra-228	1.000E+00	0.000E+00	1.699E-09	9.812E-15	5.667E-20	3.273E-25	1.890E-30	1.092E-35	6.303E-41	0.000E+00	0.000E+00
Th-228	Th-228	1.000E+00	3.400E+01	1.125E-30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	3.325E+01	3.288E+01	3.251E+01	3.214E+01	3.178E+01	3.142E+01	3.107E+01	3.072E+01	3.037E+01
Th-228	∑S(j):		3.400E+01	3.325E+01	3.288E+01	3.251E+01	3.214E+01	3.178E+01	3.142E+01	3.107E+01	3.072E+01	3.037E+01
Th-230	Th-230	1.000E+00	2.150E+01	2.098E+01	2.073E+01	2.047E+01	2.023E+01	1.998E+01	1.974E+01	1.950E+01	1.926E+01	1.903E+01
Th-230	U-234	1.000E+00	0.000E+00	3.670E-02	5.360E-02	6.959E-02	8.472E-02	9.902E-02	1.125E-01	1.253E-01	1.373E-01	1.486E-01
Th-230	U-238	9.999E-01	0.000E+00	1.030E-05	2.247E-05	3.871E-05	5.861E-05	8.181E-05	1.079E-04	1.366E-04	1.676E-04	2.006E-04
Th-230	∑S(j):		2.150E+01	2.102E+01	2.078E+01	2.054E+01	2.031E+01	2.008E+01	1.985E+01	1.962E+01	1.940E+01	1.918E+01
Th-232	Th-232	1.000E+00	3.400E+01	3.324E+01	3.286E+01	3.249E+01	3.213E+01	3.177E+01	3.141E+01	3.106E+01	3.071E+01	3.036E+01
U-234	U-234	1.000E+00	2.150E+01	1.979E+01	1.899E+01	1.822E+01	1.749E+01	1.678E+01	1.610E+01	1.545E+01	1.482E+01	1.422E+01
U-234	U-238	9.999E-01	0.000E+00	1.123E-02	1.616E-02	2.068E-02	2.480E-02	2.856E-02	3.198E-02	3.507E-02	3.787E-02	4.038E-02
U-234	∑S(j):		2.150E+01	1.981E+01	1.901E+01	1.825E+01	1.751E+01	1.681E+01	1.613E+01	1.548E+01	1.486E+01	1.426E+01
U-235	U-235	1.000E+00	1.500E+00	1.382E+00	1.326E+00	1.273E+00	1.222E+00	1.173E+00	1.125E+00	1.080E+00	1.037E+00	9.951E-01
U-238	U-238	5.400E-05	1.161E-03	1.070E-03	1.027E-03	9.852E-04	9.456E-04	9.076E-04	8.711E-04	8.361E-04	8.025E-04	7.702E-04
U-238	U-238	9.999E-01	2.150E+01	1.980E+01	1.901E+01	1.824E+01	1.751E+01	1.681E+01	1.613E+01	1.548E+01	1.486E+01	1.426E+01
U-238	∑S(j):		2.150E+01	1.981E+01	1.901E+01	1.825E+01	1.751E+01	1.681E+01	1.613E+01	1.548E+01	1.486E+01	1.426E+01

THF(i) is the thread fraction of the parent nuclide.

RESCALC.EXE execution time = 4.97 seconds

From: Origin ID: (312)853-9430
David Heidlauf
ENVIRON CORPORATION
123 N. Wacker Dr., Suite 250

Chicago, IL 60606

CLS022306/16/20

Ship Date: 25APR06
ActWgt: 1 LB
System#: 2442812/INET2400
Account#: S *********

REF: 2111010G

Delivery Address Bar Code

SHIP TO: (312)853-9430 **BILL SENDER**

Dr. Peter Lee
U.S. NRC Region III
801 Warrenville Road

Lisle, IL 60532

PRIORITY OVERNIGHT

WED
Deliver By:
26APR06

TRK# 7919 2469 4278 FORM 0201

ORD A2

60532 -IL-US

79 ENLA

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