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# Derivation and Use of Radionuclide Screening Action Levels

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## ACRONYMS

| | |
|---|---|
| ALARA | as low as reasonably achievable |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| DOE | US Department of Energy |
| DOE-AL | US Department of Energy/Albuquerque Office |
| EPA | US Environmental Protection Agency |
| ER | environmental restoration |
| NRC | US Nuclear Regulatory Commission |
| PRS | potential release site |
| SAL | screening action level |

## 1.0 INTRODUCTION

This paper documents the calculation of Environmental Restoration (ER) Project screening action levels (SALs) for radionuclides in soils at Los Alamos National Laboratory (the Laboratory). It also describes the use of the RESRAD computer code for calculating SAL values and the assumptions governing those calculations. These SAL calculations are based on a residential exposure scenario, which includes exposure pathways for incidental soil ingestion, dust inhalation, plant ingestion, radon inhalation, and external irradiation. Radionuclide SAL values are tabulated in Attachment 1. RESRAD input parameter values are provided in Attachment 2.

The RESRAD computer code was developed by Argonne National Laboratory for the US Department of Energy (DOE). RESRAD incorporates the dose assessment methodology described in DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (DOE 1990, 58980) and is used to implement residual radioactive material guidelines contained in this DOE Order. As stated in a DOE Albuquerque Operations Office (DOE-AL) memorandum regarding release of property with residual radioactive materials, "DOE requires the use of RESRAD computer models for evaluating potential doses resulting from the presence of residual contamination" (DOE-AL 2000, 67153).

The RESRAD code has been continually revised and improved since it was issued in 1989. The most recent manual describing its use was published as a working draft in September 1993 (Yu et al. 1993, 58695), when the RESRAD code existed as Version 5.0. Since Version 5.0, approximately 30 revisions have been made to the code. The current version, used for the SAL calculations described in this document, is Version 5.95. Major changes since Version 5.0 that affect the calculation of dose-based soil guidelines include the US Environmental Protection Agency (EPA) dose-conversion factors from two federal guidance reports (Number 11 [EPA 1988, 50123] and Number 12 [EPA 1993, 62798]) and the introduction of a new area factor model for the inhalation pathway.

Soil guideline values are calculated in RESRAD as the sum of the products of several "pathway factors." A pathway factor is a model of the connection between environmental compartments (e.g., air, plants, and soil) among which radionuclides can be transported. A complete exposure pathway model is the product of a group of pathway factors. For example, the inhalation pathway contains the air/soil concentration ratio; the area, cover, depth, and occupancy factors; and annual intake of air. The individual exposure pathways, such as plant ingestion and external irradiation, can be activated independently to create a site-specific land-use scenario.

The radiation dose that is the basis of the soil guidelines calculated using RESRAD is the effective dose equivalent for external irradiation and the committed effective dose equivalent for internal irradiation. A dose equivalent is defined as a radiation dose absorbed by a tissue multiplied by a dimensionless quality factor that represents the biological effectiveness of the radiation type (i.e., alpha particles, photons) for causing stochastic biological effects such as cancer or hereditary effects (EPA 1989, 08021). The effective dose equivalent is the weighted sum of the dose equivalents to different organs and tissues, where the weighting factor is the ratio of stochastic risk for an individual tissue to the total stochastic risk for all tissue following whole body irradiation (ICRP 1977, 68750). The committed effective dose equivalent for internal irradiation is the total effective dose equivalent deposited in the body in a 50-yr period following the intake of a radionuclide (ICRP 1977, 68750).

## 2.0 OBJECTIVES

The primary purpose of this paper is to document the input and assumptions for SAL calculations for radionuclides in soils. Soils may include hillside colluvium and fine-grained material in outfall areas, as well as true soils and fill on mesa tops. For the ER Project, radionuclide SALs are used as an initial screening tool to determine whether radionuclide soil concentrations could be associated with dose rates that are greater than target limits under residential land-use conditions. The primary audience for this document consists of the health physicists, risk assessors, and other qualified ER Project individuals who use radionuclide SALs in screening assessments for potential release sites (PRSs). Although the complete methodology for the application of SALs in ER Project dose assessments is not provided here, sufficient information about assumptions and conditions of use is provided to enable independent stakeholder review of the project's methodology for calculating SALs.

These SAL values are subject to review annually (at the start of each new fiscal year (October)). However, they are revised only if a new version of the RESRAD code had been published during the previous fiscal year, and if changes to the new RESRAD code affect the SAL values documented here. The ER Project will start using the revised SALs at the beginning of the fiscal year; the new values will not be retroactive.

## 3.0 APPLICABLE REGULATIONS AND GUIDANCE

The Organization Act of 1977 authorizes the DOE to protect the public from radiation and radioactive materials that result from research, development, and production activities at DOE facilities. DOE has published health and safety orders of which DOE Order 5400.5, "Radiation Protection of the Public and the Environment" is most pertinent to development and application of cleanup guidelines (DOE 1990, 59980.1). DOE Order 5400.5 requires the reduction of all DOE-source radiation doses to a level as low as reasonably achievable (ALARA) below the primary dose limit of 100 mrem/yr above background. DOE approves limits developed by its project offices, authorizing approval on a case-by-case basis and in accord with the primary dose limit and ALARA. Where achievement of an authorized limit is impractical or inappropriate, DOE may approve a supplemental limit that also complies with the basic dose limit of 100 mrem/yr above background.

DOE-AL has published guidance that addresses the selection of annual dose limits for dose assessments under its jurisdiction (DOE-AL 2000, 67153). This guidance states, "DOE-AL staff will approve proposed releases of real property where the modeled dose is up to and including 15 mrem/yr. Proposed releases resulting in doses greater than 15 mrem/yr require concurrence with DOE-HQ."

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authorizes the EPA to regulate hazardous substances, including radionuclides, that are released or may be released into the environment. Although ER Project PRSs are not subject to CERCLA, EPA guidance under CERCLA may be useful in defining soil cleanup levels. EPA has published guidelines for establishing cleanup levels for radionuclides under CERCLA that state that 15 mrem/yr should "generally be the maximum dose limit for humans" (EPA 1997, 58693). A second EPA standard that potentially is applicable to the ER Project is found in the Clean Air Act (40 CFR 61, Subpart H). This regulation limits exposure of any member of the public via the inhalation pathway to 10 mrem/yr.

The Atomic Energy Act of 1954 authorizes the US Nuclear Regulatory Commission (NRC) to regulate commercial, research, and medical uses of nuclear materials as well as their transport, storage, and disposal. One such NRC regulation is 10 CFR Part 20, "Standards for Protection Against Radiation." In Subpart E of 10 CFR Part 20, "Radiological Criteria for License Termination," NRC proposed an annual

dose limit of 25 mrem/yr above background for the average member of a critical group for restricted or unrestricted use of a site.

## 4.0 TARGET DOSE LIMIT

To approve cleanup guidelines for releasing sites for unrestricted public use, DOE-AL requires that the site-specific modeled dose does not exceed 15 mrem/yr (DOE-AL 2000, 67153). A 15-mrem/yr target dose limit is consistent with published EPA guidance and is well below the basic dose limit of 100 mrem/yr above background established in DOE Order 5400.5 (DOE 1990, 58980.1). The EPA has determined that a target dose limit of 15 mrem/yr equates to an approximate increased lifetime cancer risk of 10-4, and "is consistent with levels generally considered protective in other governmental actions, particularly regulations and guidance developed by EPA in other radiation control programs" (EPA 1997, 58693). For these reasons, the ER Project uses a target dose limit of 15 mrem/yr to calculate radionuclide SALs.

Using conservative RESRAD default values, a residential-exposure scenario, and this target dose limit, the ER Project satisfies the DOE ALARA goal. That is, if radionuclides present in soil could result in a total dose of less than 15 mrem/yr above background, any additional activity to reduce soil concentrations would not significantly reduce that dose. However, cost-benefit considerations under ALARA may lead to the selection (with DOE Headquarters approval) of a target dose limit that exceeds 15 mrem/yr above background but that complies with the 100-mrem/yr public dose limit stipulated in DOE Order 5400.5 (DOE 1990, 58980).

## 5.0 EXPOSURE SCENARIO, MEDIA, AND PATHWAYS

Three exposure scenarios have been identified for current and future land use at the Laboratory: residential, recreational, and commercial/industrial. The residential scenario typically is most appropriate for townsite properties. The recreational scenario typically is most appropriate for buffer areas or areas where development is topographically limited. The commercial/industrial scenario typically is most appropriate for areas that are subject to continued Laboratory use or for locations where commercial development is foreseen. The SAL values described in this document are associated with residential land use, which is associated with greater exposure to soil than the other land-use scenarios. Therefore, sites screened and released on the basis of residential land use are also safe for recreational and commercial/industrial activities.

The SAL values described in this document were developed primarily for application to surface and near-surface soil at mesa-top PRSs. Below depths at which construction activities reasonably may be expected to occur (approximately 12 ft), and in solid environmental media (e.g., tuff), SAL values are applied at the discretion of the ER Project risk assessor. SAL values also should be appropriate for screening exposures to soil on mesa slopes. However, SAL values have been designed to predict the maximal on-site soil dose over time, but these values do not account for radionuclide migration with surface water and/or infiltration to groundwater. Radionuclide migration with water may be of equal or greater concern as soil dose at some canyon-bottom sites and at mesa-top sites where potentially contaminated water discharged. Therefore, at these types of sites in particular, SAL values for site screening may need to be supplemented with an evaluation of migration potential. An approach for assessing radionuclide migration and dose for canyon-bottom sites is documented in ER Project Canyons Focus Area reports, including Reneau et al. (1998, 65406; 1998, 65407; 1998, 59667), Katzman et al. (1999, 63915), and Reneau et al. (2000, 66867).

The exposure pathways used to calculate radionuclide SALs are incidental soil ingestion, inhalation of suspended soil, external irradiation, and ingestion of garden produce. Unique exposure pathways for a gaseous form of tritium (as water vapor) include ambient inhalation of tritiated water vapor and absorption of tritiated water vapor through the skin. Ingestion of garden produce is a pathway that is commonly evaluated in radionuclide dose assessments but generally is excluded in screening-level chemical risk assessment calculations (e.g., plant ingestion is not included in the soil-screening criteria published by EPA Regions 3, 6, and 9). In keeping with common practice and because certain radionuclides (particularly strontium-90) known to occur at some sites are susceptible to plant uptake, ingestion of garden produce is included among the pathways the ER Project uses to calculate radionuclide SALs.

The primary sources of exposure parameters used in the SAL calculations are EPA's standard default exposure factors (EPA 1991, 56140) and EPA's exposure factors handbook (EPA 1997, 66597; EPA 1997, 66598). The parameter values are intended to provide estimates of "reasonable maximum exposure" for an exposure scenario that incorporates EPA pathways (EPA 1991, 56140). Exposure-parameter assumptions, values, and references are provided in Attachment 2.

## 6.0 KEY INPUT PARAMETERS AND ASSUMPTIONS

Certain parameters listed in Attachment 2 are critical to defining site conditions and how those conditions may change over time. These parameters generally are subject to great site-specific variability. Those parameters include the size, thickness, and soil erosion rate of the contaminated zone; the evapotranspiration coefficient at the site; and the site-related soil particulate concentration in air. In addition, the length of the modeling period can influence radionuclide SALs for certain radionuclides associated with ingrowth of radioactive progeny. These parameter values have been defined so that the calculation of radionuclide SALs effectively results in static soil conditions. As a result, radionuclides in soil are modeled so that they do not leach from the contaminated zone or become depleted due to erosion.

The size of the contaminated area may affect exposure by incidental soil ingestion, dust inhalation, and external gamma irradiation. RESRAD modifies daily soil and air intake values to reflect the potential contribution to total daily intake associated with a site. These modifications are based on land-use assumptions that are consistent with a resident-farmer exposure scenario. Both the area of 405,000 $m^2$ used for the SAL calculations and the RESRAD default area of 10,000 $m^2$ result in infinite ingestion and external irradiation exposure pathways. However, the area factor model for inhalation exposure calculates an area factor of approximately 0.15 with an area of 405,000 $m^2$ and a Laboratory-specific wind speed of 3 m/sec (Chang et al. 1998, 68749). Hence, only 15% of the suspended dust at the theoretical site used in the SAL calculations originates on the site. An area of 405,000 $m^2$ corresponds to approximately a 100-ac site. In practice, very few ER Project sites are likely to exceed this size. Increases in the area factor with increasing size of the contaminated zone are also relatively small (a 1000-ac site would still have an area factor of less than 0.2 with a wind speed of 3 m/sec).

The thickness, erosion rate, and infiltration rate of the contaminated zone can affect radionuclide SALs for which ingrowth of progeny results in an increased dose over time. The ER Project soil-erosion rate has been set at zero for the SAL calculations. The combination of no infiltration and no erosion creates a static contaminated zone, which in turn results in a maximum on-site dose over time. Under the static site conditions achieved in the calculation of radionuclide SALs (i.e., the contaminated zone is not depleted by erosion or infiltration of water), progeny continue to ingrow in soil at a rate that is proportional to the half-life of the daughters.

The evapotranspiration coefficient for calculating radionuclide SALs has been set at the RESRAD limit of 0.999, effectively eliminating leaching of radionuclides from the contaminated zone by water, thereby maximizing the retention of radionuclides in surface soil over time. Because the value used for the evapotranspiration coefficient results in no infiltration, RESRAD vadose and saturated zone hydrogeologic parameters have no influence on the radionuclide SAL values. A value of 0.999 is unrealistic for any individual site (plant growth would be impossible) but has the utility of simplicity and conservatism for these calculations. A local precipitation rate value is used in the calculations because that parameter influences the SAL for tritium, but all hydrological parameters are set to RESRAD default values.

Radionuclide SALs are calculated within a 1000-yr time frame. One thousand years is the time limit for dose calculations based on two regulations that address radionuclides in soil: the proposed 40 CFR 196, "Radiation Site Cleanup Regulation," and 10 CFR Part 20, Subpart E, "Radiological Criteria for License Termination." For most radionuclides, maximum exposure (dose) occurs at the beginning of this 1000-yr time interval, but two of the radionuclides for which SALs are calculated (uranium-234 and uranium-235) contribute their maximum dose at the end of the modeling period due to their slow ingrowth of radioactive progeny.

Although the contaminated zone is modeled as static with respect to loss of radionuclides through erosion and leaching, RESRAD accounts for radon and tritium diffusing as gases from contaminated soil (lost to the atmosphere). As a result, the modeled tritium dose declines rapidly over time. Radon isotopes, however, will be in equilibrium with their parent nuclides; changes over time for dose rates through radon inhalation will depend on site-specific conditions with respect to the concentrations of these parent nuclides. Radon dose rates also can be influenced by many radon pathway-specific parameters that govern the diffusion of radon through soil and into a building. Tritium diffusion from soil as water vapor (resulting in the inhalation dose) is greatly affected by the absolute humidity of the air above the contaminated zone (a local value for absolute humidity is used in SAL calculations).

## 7.0 APPLICATION OF RADIONUCLIDE SCREENING ACTION LEVELS

To determine if radionuclide SALs are applicable to a particular site it is necessary to determine if the assumptions underlying their calculation are consistent with the site conceptual model. The site conceptual model includes what is known or assumed regarding the spatial distribution of radionuclides in soil, the potential for radionuclide migration over time, and characteristics of the applicable receptor population. If potentially important site-specific transport or exposure pathways are not included in the derivation of the radionuclide SALs, a comparison of site data to radionuclide SALs may be either inappropriate or require site-specific calculation of screening values that are representative of the site. If screening is determined to be inappropriate for a site, a site-specific dose assessment should be conducted.

Radionuclide migration from a contaminated site may occur by dissolution in surface or groundwater, erosion of soil, resuspension as airborne particulate, through biotic uptake, and/or by volitization as a vapor. Radionuclide migration to an off-site location is not incorporated in the radionuclide SALs and RESRAD does not directly support such evaluations. Although potential off-site radionuclide concentrations generally should be lower than those observed on the site, modeling remote concentrations over time may be important because of (1) public concerns, (2) different routes and/or intensities of exposure than are considered for on-site receptors, and (3) regulatory requirements to assess off-site impacts. An example of a potentially significant off-site impact is strontium-90 uptake by plants rooted in contaminated soil and the subsequent redistribution in leaf litter or in line particulates if

the plant or plant material burns. Appendix K of Yu et al. (1993, 58695) provides guidance for evaluating off-site migration using RESRAD output.

Radionuclide SALs are calculated for individual radionuclides such that a receptor will not receive a dose greater than 15 mrem/yr when the contaminated zone contains a uniform radionuclide concentration equal to the SAL. When two or more radionuclides have been released, however, it is necessary to determine whether their collective impact may result in a total annual dose greater than the target dose limit. If no SAL is exceeded, the soil concentration of each radionuclide is divided by the SAL for that radionuclide to produce a ratio. These ratios then are summed. If the sum exceeds unity, the dose for a receptor exceeds 15 mrem/yr under the exposure conditions described in Attachment 2 for the radionuclide SALs, even though all radionuclides are present at concentrations below their individual SALs.

It should be noted that the modeling times for some radionuclides from which the SAL values were obtained may differ, specifically, uranium-234 and uranium-235 (see Attachment 1). However, summing the quotients derived with SALs for uranium-234 or uranium-235 with quotients derived with the SALs for the other radionuclides is protective of human health because the SALs for the uranium isotopes assume a 1000-yr period of ingrowth for their progeny compared with zero years for the others.

## 8.0 SUMMARY

In summary, ER Project radionuclide SALs are applicable for screening contaminated soil at most PRSs and are conservatively biased within the bounds of the assumptions used in their calculations. The user must determine if concerns outside these bounds warrant evaluation at a specific site. A comparison of the applicability of the SAL values can be established by comparing the underlying radionuclide SAL assumptions with site-specific conditions.

## 9.0 REFERENCES

The following list includes all references cited in this document. The parenthetical information following the reference provides the author, publication date, and ER Project identification (ER ID) number. This information is also included in the citation in the text and can be used to locate the document.

ER ID numbers are assigned by the Laboratory's ER Project to track all material associated with Laboratory PRSs. These numbers can be used to locate copies of the documents at the ER Project's Records Processing Facility.

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# Attachment 1

*Radionuclide Screening Action Levels*

Table A.1-1
RADIONUCLIDE SCREENING ACTION LEVELS
(RESRAD Version 5.95)
November 2000

| Analyte Code | Radionuclide | SAL Value (pCi/g) | SAL w/o Indoor Radon Inhalation[a] Pathway (pCi/g) | SAL Value w/o Plant Ingestion Pathway[a] (pCi/g) | Time at which SAL Value Applies[b] (year) |
|---|---|---|---|---|---|
| Am-241 | americium-241 | 39 | 39 | 85 | 0.0 |
| Co-60 | cobalt-60 | 1.2 | 1.2 | 1.2 | 0.0 |
| Cs-137 | cesium-137+D[c] | 5.3 | 5.3 | 5.5 | 0.0 |
| Eu-152 | europium-152 | 2.7 | 2.7 | 2.7 | 0.0 |
| Eu-154 | europium-154 | 2.5 | 2.5 | 2.5 | 0.0 |
| Eu-155 | europium-155 | 110 | 110 | 110 | 0.0 |
| H-3 | tritium | 880 | 880 | 6,600 | 0.0 |
| I-129 | iodine-129 | 45 | 45 | 740 | 0.0 |
| K-40 | potassium-40 | 13 | 13 | 18 | 0.0 |
| Na-22 | sodium-22 | 1.5 | 1.5 | 1.5 | 0.0 |
| Np-237 | neptunium-237+D | 2.4 | 2.4 | 14 | 0.0 |
| Pu-238 | plutonium-238 | 49 | 49 | 120 | 0.0 |
| Pu-239 | plutonium-239[d] | 44 | 44 | 110 | 0.0 |
| Ra-226 | radium-226+D[e] | 5 | n/a[f] | n/a | n/a |
| Ra-228 | radium-228+D[e] | 5 | n/a | n/a | n/a |
| Ru-106 | ruthenium-106+D | 19 | 19 | 20 | 0.0 |
| Sr-90 | strontium-90+D | 5.7 | 5.7 | 600 | 0.0 |
| Tc-99 | technetium-99 | 36 | 36 | 98,000 | 0.0 |
| Th-228 | thorium-228+D | 2.0 | 2.2 | 2.0 | 0.0 |
| Th-230 | thorium-230[e] | 5 | n/a | n/a | n/a |
| Th-232 | thorium-232[e] | 5 | n/a | n/a | n/a |
| U-234 | uranium-234 | 63 | 180 | 81 | 1,000 |
| U-235 | uranium-235+D | 17 | 17 | 22 | 1,000 |
| U-238 | uranium-238+D | 93 | 93 | 120 | 0.0 |

[a] This information is provided to assist users in evaluating the contribution to SAL values of pathways that may not be applicable at some sites.

[b] Modeling period is 1000 yr.

[c] Includes contribution to dose of radionuclide daughters.

[d] Plutonium-239 and plutonium-240 typically are unresolved in laboratory analysis. SAL values for the two isotopes are identical.

[e] SAL is the generic soil guideline published in DOE Order 5400.5; 5 pCi/g applies to the concentration averaged over the first 15 cm of soil below the surface; for subsequent 15-cm-thick layers the generic soil guideline is 15 pCi/g. If both thorium-230 and radium-226 or both thorium-232 and radium-228 are present and not in secular equilibrium, or if other mixtures of radionuclides occur, refer to DOE Order 5400.5 for guidance.

[f] n/a = Not applicable; SAL value is not calculated with RESRAD.

# Attachment 2

*RESRAD Exposure Input Parameter Values*

This attachment provides exposure input parameter values for the RESRAD code. Table 2.1-1 provides selected parameters, references, and/or comments. Table 2.2-2 is the summary report generated in RESRAD that documents input to the SAL calculations.

**Table A.2-1**
**Selected Resrad Exposure Input Parameter References and Comments**

| Parameter | Unit | RESRAD Default | SAL Value | Reference | Comments |
|---|---|---|---|---|---|
| dose conversion factors | | | | EPA 1997, 66598; EPA 1997, 66597 | RESRAD default values are from EPA federal guidance reports (numbers 11 and 12). |
| plant/soil concentration ratios | | | | Wang et al. 1993, 59979 | Contains RESRAD default values. |
| radiation dose limit | mrem/yr | 30 | 15 | Sections 3.0 and 4.0 of this document | 15 mrem/yr is consistent with DOE-AL and EPA guidance, and is below the NRC 25-mrem/yr limit. |
| maximum time for dose evaluation | yr | 1000 | 1000 | Section 6.0 of this document | EPA and NRC use 1000 yr in relevant regulations. |
| area of contaminated zone | $m^2$ | 10,000 | 405,000 | | 405,000 $m^2$ area is equal to a 100-ac site. Larger area than default increases dose via inhalation pathway; some ER Project sites are larger than the 10,000 $m^2$ (2.5 ac) default in RESRAD. |
| thickness of contaminated zone | m | 2 | 2 | | Any thickness >15 cm should produce approximately equivalent results because leaching and erosion are defeated; 2-m depth provides infinite source for gamma irradiation. |
| time since placement of material | yr | 0 | 0 | | Radioactive decay since time of data collection may need to be addressed for particular sites. |
| cover depth | m | 0 | 0 | | Uniform layer of contamination is assumed from ground surface to an effectively infinite depth. |
| density of contaminated zone | $g/cm^3$ | 1.5 | 1.6 | | Best professional judgment of ER Project geologists for soils across Laboratory. |
| contaminated zone erosion rate | m/yr | 0.001 | 0.0 | | Eliminating soil-erosion results in maximum on-site dose over time; specific sites may experience erosion or accumulation of surface soils. |
| wind speed | m/sec | 2 | 3 | www.weather.lanl.gov/html/climatology.html | Annual average wind speed at Laboratory is 2.5 m/sec, with sustained winds over 4 m/sec occurring 20% of the time between mid-March and early June. |
| humidity in air | $g/m^3$ | 8 | 5.55 | www.weather.lanl.gov/html/climatology.html | Range is 2.4 (January) to 8.7 $g/m^3$ (July-August) over year; 5.55 $g/m^3$ is range midpoint. |

Table A.2-1 (continued)

| Parameter | Unit | RESRAD Default | SAL Value | Reference | Comments |
|---|---|---|---|---|---|
| evapo-transpiration coefficient | | 0.5 | 0.939 | | 0.999 is maximum allowed value in RESRAD; this defeats infiltration of water through contaminated zone, thereby maximizing on-site dose from soil |
| precipitation | m/yr | 1 | 0.476 | www.weather.lanl.gov/html/climatology.html | This parameter used to calculate tritium SAL. |
| inhalation rate | $m^3$/yr | 8400 | 7,300 | EPA 1991, 56140 | Based on recommended long-term inhalation rate of 20 $m^3$/day. |
| mass loading for inhalation | g/$m^3$ | 1E-04 | 2E-05 | environmental surveillance report data | 2E-05 g/$m^3$ is average of 15 PM-10 measurements between 1990 and 1998. |
| exposure duration | yr | 30 | 30 | EPA 1991, 56140 | Does not affect annual dose rate. This parameter is used to calculate excess cancer risk. |
| shielding factor, inhalation | | 0.4 | 1.0 | | A value of 1.0 results in no attenuation of dust concentrations in the indoor environment. |
| shielding factor, external gamma | | 0.7 | 0.8 | EPA 1991, 58234 | EPA default value for gamma shielding factor. |
| fraction of time spent outdoors | 0.25 | | 0.24 | EPA 1997, 66598, Table 15-132, page 15-148 | Equivalent to 6-hr/day spent outdoors: the 90th percentile for time spent outdoors; assumes 350 day/yr on the site. |
| fraction of time spent indoors | | 0.5 | 0.719 | EPA 1991, 56140 | Assumption that time indoors is 18 hr/day is derived from the amount of time spent outdoors. |
| shape factor, external gamma | | 1 | 1 | | Circular contaminated zone is modeled for external gamma irradiation. |
| fruits, vegetables and grain consumption | kg/yr | 160 | 57 | EPA 1997, 66597, Tables 13-33, 13-6, and 13-7 | Based on 75th percentile of seasonally adjusted consumer-only intake of homegrown fruits and vegetables for western United States. Higher percentile was not chosen due to relatively short growing season. Vegetable values corrected by 18% average preparation loss for corn, pumpkin, peppers, and tomatoes; fruit corrected by 23% average preparation loss for apples, pears, and peaches. |

Table A.2-1 (continued)

| Parameter | Unit | RESRAD Default | SAL Value | Reference | Comments |
|---|---|---|---|---|---|
| leafy vegetable consumption | kg/yr | 14 | 0 | | Separate intake values for leafy vegetables not evaluated. Assumes minor consumption of homegrown leafy vegetables compared to other vegetables and fruits. |
| soil ingestion rate | g/yr | 36.5 | 36.5 | EPA 1991, 56140 | Based on daily incidental soil ingestion rate of 100 mg/day for adults. |
| contamination fraction of plant food | | based on area | 1 | | Vegetable and fruit intake values based on homegrown produce. |
| mass loading for foliar deposition | g/m3 | 0.0001 | 0.0001 | | |
| depth of soil mixing layer | m | 0.15 | 0.15 | | This mixing depth originates with plow depth and assumes cultivation of land; this does not affect SALs as contaminated zone is assumed to be 2 m deep. |
| depth of roots | m | 0.9 | 0.9 | | Rooting depths of vegetables likely much less; this does not affect SALs as contaminated zone is assumed to be 2 m deep. |
| storage time for fruits, vegetables and grain | day | 14 | 1 | | Assumes produce from home garden is eaten soon after harvesting. This parameter has minimal effect on SALs due to relatively long half-lives of radionuclides for which SALs are calculated. |
| building depth below ground surface | | -1 | 0 | | Assumes slab-on-grade construction. |

## Table A2-2
## RESRAD Summary Report for Radionuclide SALs

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Dose Conversion Factor (and Related) Parameter Summary
File: Default.LIB

| Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| B-1 | Dose conversion factors for inhalation, mrem/pCi: | | | |
| B-1 | Ac-227+D | 6.720E+00 | 6.720E+00 | DCF2( 1) |
| B-1 | Am-241 | 4.440E-01 | 4.440E-01 | DCF2( 2) |
| B-1 | Co-60 | 2.190E-04 | 2.190E-04 | DCF2( 3) |
| B-1 | Cs-137+D | 3.190E-05 | 3.190E-05 | DCF2( 4) |
| B-1 | Eu-152 | 2.210E-04 | 2.210E-04 | DCF2( 5) |
| B-1 | Eu-154 | 2.860E-04 | 2.860E-04 | DCF2( 7) |
| B-1 | Eu-155 | 4.140E-05 | 4.140E-05 | DCF2( 8) |
| B-1 | Gd-152 | 2.430E-01 | 2.430E-01 | DCF2( 9) |
| B-1 | H-3 | 6.400E-08 | 6.400E-08 | DCF2(10) |
| B-1 | I-129 | 1.740E-04 | 1.740E-04 | DCF2(11) |
| B-1 | K-40 | 1.240E-05 | 1.240E-05 | DCF2(12) |
| B-1 | Na-22 | 7.660E-06 | 7.660E-06 | DCF2(13) |
| B-1 | Np-237+D | 5.400E-01 | 5.400E-01 | DCF2(14) |
| B-1 | Pa-231 | 1.280E+00 | 1.280E+00 | DCF2(15) |
| B-1 | Pb-210+D | 2.320E-02 | 2.320E-02 | DCF2(16) |
| B-1 | Pu-238 | 3.920E-01 | 3.920E-01 | DCF2(17) |
| B-1 | Pu-239 | 4.290E-01 | 4.290E-01 | DCF2(18) |
| B-1 | Pu-240 | 4.290E-01 | 4.290E-01 | DCF2(19) |
| B-1 | Ra-226+D | 8.600E-03 | 8.600E-03 | DCF2(20) |
| B-1 | Ra-228+D | 5.080E-03 | 5.080E-03 | DCF2(21) |
| B-1 | Ru-106+D | 4.770E-04 | 4.770E-04 | DCF2(22) |
| B-1 | Sr-90+D | 1.310E-03 | 1.310E-03 | DCF2(23) |
| B-1 | Tc-99 | 8.230E-06 | 8.230E-06 | DCF2(24) |
| B-1 | Th-228+D | 3.450E-01 | 3.450E-01 | DCF2(25) |
| B-1 | Th-229+D | 2.160E+00 | 2.160E+00 | DCF2(26) |
| B-1 | Th-230 | 3.260E-01 | 3.260E-01 | DCF2(27) |
| B-1 | Th-232 | 1.640E+00 | 1.640E+00 | DCF2(28) |
| B-1 | U-233 | 1.350E-01 | 1.350E-01 | DCF2(29) |
| B-1 | U-234 | 1.320E-01 | 1.320E-01 | DCF2(30) |
| B-1 | U-235+D | 1.230E-01 | 1.230E-01 | DCF2(31) |
| B-1 | U-236 | 1.250E-01 | 1.250E-01 | DCF2(32) |
| B-1 | U-238+D | 1.180E-01 | 1.180E-01 | DCF2(33) |
| D-1 | Dose conversion factors for ingestion, mrem/pCi: | | | |
| D-1 | Ac-227+D | 1.480E-02 | 1.480E-02 | DCF3( 1) |
| D-1 | Am-241 | 3.640E-03 | 3.640E-03 | DCF3( 2) |
| D-1 | Co-60 | 2.690E-05 | 2.690E-05 | DCF3( 3) |
| D-1 | Cs-137+D | 5.000E-05 | 5.000E-05 | DCF3( 4) |
| D-1 | Eu-152 | 6.480E-06 | 6.480E-06 | DCF3( 5) |
| D-1 | Eu-154 | 9.550E-06 | 9.550E-06 | DCF3( 7) |
| D-1 | Eu-155 | 1.530E-06 | 1.530E-06 | DCF3( 8) |
| D-1 | Gd-152 | 1.610E-04 | 1.610E-04 | DCF3( 9) |
| D-1 | H-3 | 6.400E-08 | 6.400E-08 | DCF3(10) |
| D-1 | I-129 | 2.760E-04 | 2.760E-04 | DCF3(11) |
| D-1 | K-40 | 1.860E-05 | 1.860E-05 | DCF3(12) |
| D-1 | Na-22 | 1.150E-05 | 1.150E-05 | DCF3(13) |
| D-1 | Np-237+D | 4.440E-03 | 4.440E-03 | DCF3(14) |
| D-1 | Pa-231 | 1.060E-02 | 1.060E-02 | DCF3(15) |
| D-1 | Pb-210+D | 7.270E-03 | 7.270E-03 | DCF3(16) |
| D-1 | Pu-238 | 3.200E-03 | 3.200E-03 | DCF3(17) |

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Dose Conversion Factor (and Related) Parameter Summary (continued)
File: Default.LIB

| 0 Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| D-1 | Pu-239 | 3.540E-03 | 3.540E-03 | DCF3(18) |
| D-1 | Pu-240 | 3.540E-03 | 3.540E-03 | DCF3(19) |
| D-1 | RA-226+D | 1.330E-03 | 1.330E-03 | DCF3(20) |
| D-1 | Ra-228+D | 1.440E-03 | 1.440E-03 | DCF3(21) |
| D-1 | Ru-106+D | 2.740E-05 | 2.740E-05 | DCF3(22) |
| D-1 | Sr-90+D | 1.530E-04 | 1.530E-04 | DCF3(23) |
| D-1 | Tc-99 | 1.460E-06 | 1.460E-06 | DCF3(24) |
| D-1 | Th-228+D | 8.080E-04 | 8.080E-04 | DCF3(25) |
| D-1 | Th-229+D | 4.010E-03 | 4.010E-03 | DCF3(26) |
| D-1 | Th-230 | 5.480E-04 | 5.480E-04 | DCF3(27) |
| D-1 | Th-232 | 2.730E-03 | 2.730E-03 | DCF3(28) |
| D-1 | U-233 | 2.890E-04 | 2.890E-04 | DCF3(29) |
| D-1 | U-234 | 2.830E-04 | 2.830E-04 | DCF3(30) |
| D-1 | U-235+D | 2.670E-04 | 2.670E-04 | DCF3(31) |
| D-1 | U-236 | 2.650E-04 | 2.650E-04 | DCF3(32) |
| D-1 | U-238+D | 2.690E-04 | 2.690E-04 | DCF3(33) |
| D-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) |
| D-34 | Ac-227+D . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 2.000E-05 | 2.000E-05 | RTF( 1,3) |
| D-34 | Am-241 . plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF( 2,1) |
| D-34 | Am-241 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 5.000E-05 | 5.000E-05 | RTF( 2,2) |
| D-34 | Am-241 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 2.000E-06 | 2.000E-06 | RTF( 2,3) |
| D-34 | Co-60 . plant/soil concentration ratio, dimensionless | 8.000E-02 | 8.000E-02 | RTF( 3,1) |
| D-34 | Co-60 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-02 | 2.000E-02 | RTF( 3,2) |
| D-34 | Co-60 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 2.000E-03 | 2.000E-03 | RTF( 3,3) |
| D-34 | Cs-137+D . plant/soil concentration ratio, dimensionless | 4.000E-02 | 4.000E-02 | RTF( 4,1) |
| D-34 | Cs-137+D . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.000E-02 | 3.000E-02 | RTF( 4,2) |
| D-34 | Cs-137+D . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 8.000E-03 | 8.000E-03 | RTF( 4,3) |
| D-34 | Eu-152 . plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF( 5,1) |
| D-34 | Eu-152 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-03 | 2.000E-03 | RTF( 5,2) |
| D-34 | Eu-152 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 2.000E-05 | 2.000E-05 | RTF( 5,3) |
| D-34 | Eu-154 . plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF( 7,1) |
| D-34 | Eu-154 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-03 | 2.000E-03 | RTF( 7,2) |
| D-34 | Eu-154 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 2.000E-05 | 2.000E-05 | RTF( 7,3) |
| D-34 | Eu-155 . plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF( 8,1) |
| D-34 | Eu-155 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-03 | 2.000E-03 | RTF( 8,2) |
| D-34 | Eu-155 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 2.000E-05 | 2.000E-05 | RTF( 8,3) |
| D-34 | Gd-152 . plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF( 9,1) |
| D-34 | Gd-152 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-03 | 2.000E-03 | RTF( 9,2) |
| D-34 | Gd-152 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 2.000E-05 | 2.000E-05 | RTF( 9,3) |

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Dose Conversion Factor (and Related) Parameter Summary (continued)
File: Default.LIB

| 0 Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| D-34 | H-3 , plant/soil concentration ratio, dimensionless | 4.800E+00 | 4.800E+00 | RTF(10,1) |
| D-34 | H-3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.200E-02 | 1.200E-02 | RTF(10,2) |
| D-34 | H-3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-02 | 1.000E-02 | RTF(10,3) |
| D-34 | | | | |
| D-34 | I-129 , plant/soil concentration ratio, dimensionless | 2.000E-02 | 2.000E-02 | RTF(11,1) |
| D-34 | I-129 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 7.000E-03 | 7.000E-03 | RTF(11,2) |
| D-34 | I-129 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-02 | 1.000E-02 | RTF(11,3) |
| D-34 | | | | |
| D-34 | K-40 , plant/soil concentration ratio, dimensionless | 3.000E-01 | 3.000E-01 | RTF(12,1) |
| D-34 | K-40 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-02 | 2.000E-02 | RTF(12,2) |
| D-34 | K-40 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 7.000E-03 | 7.000E-03 | RTF(12,3) |
| D-34 | | | | |
| D-34 | Na-22 , plant/soil concentration ratio, dimensionless | 5.000E-02 | 5.000E-02 | RTF(13,1) |
| D-34 | Na-22 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 8.000E-02 | 8.000E-02 | RTF(13,2) |
| D-34 | Na-22 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 4.000E-02 | 4.000E-02 | RTF(13,3) |
| D-34 | | | | |
| D-34 | Np-237+D , plant/soil concentration ratio, dimensionless | 2.000E-02 | 2.000E-02 | RTF(14,1) |
| D-34 | Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF(14,2) |
| D-34 | Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF(14,3) |
| D-34 | | | | |
| D-34 | Pa-231 , plant/soil concentration ratio, dimensionless | 1.000E-02 | 1.000E-02 | RTF(15,1) |
| D-34 | Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 5.000E-03 | 5.000E-03 | RTF(15,2) |
| D-34 | Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF(15,3) |
| D-34 | | | | |
| D-34 | Pb-210+D , plant/soil concentration ratio, dimensionless | 1.000E-02 | 1.000E-02 | RTF(16,1) |
| D-34 | Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 8.000E-04 | 8.000E-04 | RTF(16,2) |
| D-34 | Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 3.000E-04 | 3.000E-04 | RTF(16,3) |
| D-34 | | | | |
| D-34 | Pu-238 , plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF(17,1) |
| D-34 | Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(17,2) |
| D-34 | Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-06 | 1.000E-06 | RTF(17,3) |
| D-34 | | | | |
| D-34 | Pu-239 , plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF(18,1) |
| D-34 | Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(18,2) |
| D-34 | Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-06 | 1.000E-06 | RTF(18,3) |
| D-34 | | | | |
| D-34 | Pu-240 , plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF(19,1) |
| D-34 | Pu-240 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(19,2) |
| D-34 | Pu-240 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-06 | 1.000E-06 | RTF(19,3) |
| D-34 | | | | |
| D-34 | Ra-226+D , plant/soil concentration ratio, dimensionless | 4.000E-02 | 4.000E-02 | RTF(20,1) |
| D-34 | Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF(20,2) |
| D-34 | Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF(20,3) |
| D-34 | | | | |
| D-34 | Ra-228+D , plant/soil concentration ratio, dimensionless | 4.000E-02 | 4.000E-02 | RTF(21,1) |
| D-34 | Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF(21,2) |
| D-34 | Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF(21,3) |
| D-34 | | | | |
| D-34 | Ru-106+D , plant/soil concentration ratio, dimensionless | 3.000E-02 | 3.000E-02 | RTF(22,1) |
| D-34 | Ru-106+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-03 | 2.000E-03 | RTF(22,2) |
| D-34 | Ru-106+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 3.300E-06 | 3.300E-06 | RTF(22,3) |

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Dose Conversion Factor (and Related) Parameter Summary (continued)
File: Default.LIB

| 0 Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| D-34 | Sr-90+D . plant/soil concentration ratio, dimensionless | 3.000E-01 | 3.000E-01 | RTF(23,1) |
| D-34 | Sr-90+D . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 8.000E-03 | 8.000E-03 | RTF(23,2) |
| D-34 | Sr-90+D . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 2.000E-03 | 2.000E-03 | RTF(23,3) |
| D-34 | | | | |
| D-34 | Tc-99 . plant/soil concentration ratio, dimensionless | 5.000E+00 | 5.000E+00 | RTF(24,1) |
| D-34 | Tc-99 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(24,2) |
| D-34 | Tc-99 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF(24,3) |
| D-34 | | | | |
| D-34 | Th-228+D . plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF(25,1) |
| D-34 | Th-228+D . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(25,2) |
| D-34 | Th-228+D . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF(25,3) |
| D-34 | | | | |
| D-34 | Th-229+D . plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF(26,1) |
| D-34 | Th-229+D . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(26,2) |
| D-34 | Th-229+D . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF(26,3) |
| D-34 | | | | |
| D-34 | Th-230 . plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF(27,1) |
| D-34 | Th-230 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(27,2) |
| D-34 | Th-230 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF(27,3) |
| D-34 | | | | |
| D-34 | Th-232 . plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF(28,1) |
| D-34 | Th-232 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(28,2) |
| D-34 | Th-232 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF(28,3) |
| D-34 | | | | |
| D-34 | U-233 . plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(29,1) |
| D-34 | U-233 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(29,2) |
| D-34 | U-233 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(29,3) |
| D-34 | | | | |
| D-34 | U-234 . plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(30,1) |
| D-34 | U-234 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(30,2) |
| D-34 | U-234 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(30,3) |
| D-34 | | | | |
| D-34 | U-235+D . plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(31,1) |
| D-34 | U-235+D . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(31,2) |
| D-34 | U-235+D . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(31,3) |
| D-34 | | | | |
| D-34 | U-236 . plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(32,1) |
| D-34 | U-236 . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(32,2) |
| D-34 | U-236 . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(32,3) |
| D-34 | | | | |
| D-34 | U-238+D . plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(33,1) |
| D-34 | U-238+D . beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(33,2) |
| D-34 | U-238+D . milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(33,3) |
| D-5 | Bioaccumulation factors, fresh water, L/kg: | | | |
| D-5 | Ac-227+D . fish | 1.500E+01 | 1.500E+01 | BIOFAC(1,2) |
| D-5 | Ac-227+D . crustacea and mollusks | 1.000E+03 | 1.000E+03 | BIOFAC(1,3) |
| D-5 | | | | |
| D-5 | Am-241 . fish | 3.000E+01 | 3.000E+01 | BIOFAC(2,2) |
| D-5 | Am-241 . crustacea and mollusks | 1.000E+03 | 1.000E+03 | BIOFAC(2,3) |
| D-5 | | | | |

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Dose Conversion Factor (and Related) Parameter Summary (continued)
File: Default.LIB

| Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| D-5 | Co-60 , fish | 3.000E+02 | 3.000E+02 | BIOFAC( 3,1) |
| D-5 | Co-60 , crustacea and mollusks | 2.000E+02 | 2.000E+02 | BIOFAC( 3,2) |
| D-5 | Cs-137+D , fish | 2.000E+03 | 2.000E+03 | BIOFAC( 4,1) |
| D-5 | Cs-137+D , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC( 4,2) |
| D-5 | Eu-152 , fish | 5.000E+01 | 5.000E+01 | BIOFAC( 5,1) |
| D-5 | Eu-152 , crustacea and mollusks | 1.000E+03 | 1.000E+03 | BIOFAC( 5,2) |
| D-5 | Eu-154 , fish | 5.000E+01 | 5.000E+01 | BIOFAC( 7,1) |
| D-5 | Eu-154 , crustacea and mollusks | 1.000E+03 | 1.000E+03 | BIOFAC( 7,2) |
| D-5 | Eu-155 , fish | 5.000E+01 | 5.000E+01 | BIOFAC( 8,1) |
| D-5 | Eu-155 , crustacea and mollusks | 1.000E+03 | 1.000E+03 | BIOFAC( 8,2) |
| D-5 | Gd-152 , fish | 2.500E+01 | 2.500E+01 | BIOFAC( 9,1) |
| D-5 | Gd-152 , crustacea and mollusks | 1.000E+03 | 1.000E+03 | BIOFAC( 9,2) |
| D-5 | H-3 , fish | 1.000E+00 | 1.000E+00 | BIOFAC(10,1) |
| D-5 | H-3 , crustacea and mollusks | 1.000E+00 | 1.000E+00 | BIOFAC(10,2) |
| D-5 | I-129 , fish | 4.000E+01 | 4.000E+01 | BIOFAC(11,1) |
| D-5 | I-129 , crustacea and mollusks | 5.000E+00 | 5.000E+00 | BIOFAC(11,2) |
| D-5 | K-40 , fish | 1.000E+03 | 1.000E+03 | BIOFAC(12,1) |
| D-5 | K-40 , crustacea and mollusks | 2.000E+02 | 2.000E+02 | BIOFAC(12,2) |
| D-5 | Na-22 , fish | 2.000E+01 | 2.000E+01 | BIOFAC(13,1) |
| D-5 | Na-22 , crustacea and mollusks | 2.000E+02 | 2.000E+02 | BIOFAC(13,2) |
| D-5 | Np-237+D , fish | 3.000E+01 | 3.000E+01 | BIOFAC(14,1) |
| D-5 | Np-237+D , crustacea and mollusks | 4.000E+02 | 4.000E+02 | BIOFAC(14,2) |
| D-5 | Pa-231 , fish | 1.000E+01 | 1.000E+01 | BIOFAC(15,1) |
| D-5 | Pa-231 , crustacea and mollusks | 1.100E+02 | 1.100E+02 | BIOFAC(15,2) |
| D-5 | Pb-210+D , fish | 3.000E+02 | 3.000E+02 | BIOFAC(16,1) |
| D-5 | Pb-210+D , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC(16,2) |
| D-5 | Pu-238 , fish | 3.000E+01 | 3.000E+01 | BIOFAC(17,1) |
| D-5 | Pu-238 , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC(17,2) |
| D-5 | Pu-239 , fish | 3.000E+01 | 3.000E+01 | BIOFAC(18,1) |
| D-5 | Pu-239 , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC(18,2) |
| D-5 | Pu-240 , fish | 3.000E+01 | 3.000E+01 | BIOFAC(19,1) |
| D-5 | Pu-240 , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC(19,2) |
| D-5 | Ra-226+D , fish | 5.000E+01 | 5.000E+01 | BIOFAC(20,1) |
| D-5 | Ra-226+D , crustacea and mollusks | 2.500E+02 | 2.500E+02 | BIOFAC(20,2) |

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Dose Conversion Factor (and Related) Parameter Summary (continued)
File: Default.LIB

| Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| D-5 | Ra-228+D . fish | 5.000E+01 | 5.000E+01 | BIOFAC(21.1) |
| D-5 | Ra-228+D . crustacea and mollusks | 2.500E+02 | 2.500E+02 | BIOFAC(21.2) |
| D-5 | Ru-106+D . fish | 1.000E+01 | 1.000E+01 | BIOFAC(22.1) |
| D-5 | Ru-106+D . crustacea and mollusks | 3.000E+02 | 3.000E+02 | BIOFAC(22.2) |
| D-5 | Sr-90+D . fish | 4.000E+01 | 4.000E+01 | BIOFAC(23.1) |
| D-5 | Sr-90+D . crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC(23.2) |
| D-5 | Tc-99 . fish | 2.000E+01 | 2.000E+01 | BIOFAC(24.1) |
| D-5 | Tc-99 . crustacea and mollusks | 5.000E+00 | 5.000E+00 | BIOFAC(24.2) |
| D-5 | Th-228+D . fish | 1.000E+02 | 1.000E+02 | BIOFAC(25.1) |
| D-5 | Th-228+D . crustacea and mollusks | 5.000E+02 | 5.000E+02 | BIOFAC(25.2) |
| D-5 | Th-229+D . fish | 1.000E+02 | 1.000E+02 | BIOFAC(26.1) |
| D-5 | Th-229+D . crustacea and mollusks | 5.000E+02 | 5.000E+02 | BIOFAC(26.2) |
| D-5 | Th-230 . fish | 1.000E+02 | 1.000E+02 | BIOFAC(27.1) |
| D-5 | Th-230 . crustacea and mollusks | 5.000E+02 | 5.000E+02 | BIOFAC(27.2) |
| D-5 | Th-232 . fish | 1.000E+02 | 1.000E+02 | BIOFAC(28.1) |
| D-5 | Th-232 . crustacea and mollusks | 5.000E+02 | 5.000E+02 | BIOFAC(28.2) |
| D-5 | U-233 . fish | 1.000E+01 | 1.000E+01 | BIOFAC(29.1) |
| D-5 | U-233 . crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(29.2) |
| D-5 | U-234 . fish | 1.000E+01 | 1.000E+01 | BIOFAC(30.1) |
| D-5 | U-234 . crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(30.2) |
| D-5 | U-235+D . fish | 1.000E+01 | 1.000E+01 | BIOFAC(31.1) |
| D-5 | U-235+D . crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(31.2) |
| D-5 | U-236 . fish | 1.000E+01 | 1.000E+01 | BIOFAC(32.1) |
| D-5 | U-236 . crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(32.2) |
| D-5 | U-238+D . fish | 1.000E+01 | 1.000E+01 | BIOFAC(33.1) |
| D-5 | U-238+D . crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(33.2) |

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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) | 4.050E+05 | 1.000E+04 | -- | AREA |
| R011 | Thickness of contaminated zone (m) | 2.000E+00 | 2.000E+00 | --- | THICK0 |
| R011 | Length parallel to aquifer flow (m) | 1.000E+02 | 1.000E+02 | -- | LCZPAQ |
| R011 | Basic radiation dose limit (mrem/yr) | 1.500E+01 | 3.000E+02 | --- | 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) |
| R011 | Times for calculations (yr) | 3.000E+01 | 3.000E+00 | --- | T( 3) |
| R011 | Times for calculations (yr) | 1.000E+02 | 1.000E+01 | --- | T( 4) |
| R011 | Times for calculations (yr) | 1.000E+03 | 3.000E+01 | --- | T( 5) |
| R011 | Times for calculations (yr) | not used | 1.000E+02 | --- | T( 6) |
| R011 | Times for calculations (yr) | not used | 3.000E+02 | --- | T( 7) |
| R011 | Times for calculations (yr) | not used | 1.000E+03 | --- | T( 8) |
| R011 | Times for calculations (yr) | not used | 0.000E+00 | --- | T( 9) |
| R011 | Times for calculations (yr) | not used | 0.000E+00 | --- | T(10) |
| R012 | Initial principal radionuclide (pCi/g): Am-241 | 1.000E+01 | 0.000E+00 | --- | S1( 2) |
| R012 | Initial principal radionuclide (pCi/g): Co-60 | 1.000E+01 | 0.000E+00 | --- | S1( 3) |
| R012 | Initial principal radionuclide (pCi/g): Cs-137 | 1.000E+01 | 0.000E+00 | --- | S1( 4) |
| R012 | Initial principal radionuclide (pCi/g): Eu-152 | 1.000E+01 | 0.000E+00 | --- | S1( 5) |
| R012 | Initial principal radionuclide (pCi/g): Eu-154 | 1.000E+01 | 0.000E+00 | -- | S1( 7) |
| R012 | Initial principal radionuclide (pCi/g): Eu-155 | 1.000E+01 | 0.000E+00 | -- | S1( 8) |
| R012 | Initial principal radionuclide (pCi/g): H-3 | 1.000E+01 | 0.000E+00 | --- | S1(10) |
| R012 | Initial principal radionuclide (pCi/g): I-129 | 1.000E+01 | 0.000E+00 | --- | S1(11) |
| R012 | Initial principal radionuclide (pCi/g): K-40 | 1.000E+01 | 0.000E+00 | --- | S1(12) |
| R012 | Initial principal radionuclide (pCi/g): Na-22 | 1.000E+01 | 0.000E+00 | -- | S1(13) |
| R012 | Initial principal radionuclide (pCi/g): Np-237 | 1.000E+01 | 0.000E+00 | -- | S1(14) |
| R012 | Initial principal radionuclide (pCi/g): Pu-238 | 1.000E+01 | 0.000E+00 | -- | S1(17) |
| R012 | Initial principal radionuclide (pCi/g): Pu-239 | 1.000E+01 | 0.000E+00 | -- | S1(18) |
| R012 | Initial principal radionuclide (pCi/g): Pu-240 | 1.000E+01 | 0.000E+00 | --- | S1(19) |
| R012 | Initial principal radionuclide (pCi/g): Ra-226 | 1.000E+01 | 0.000E+00 | -- | S1(20) |
| R012 | Initial principal radionuclide (pCi/g): Ra-228 | 1.000E+01 | 0.000E+00 | -- | S1(21) |
| R012 | Initial principal radionuclide (pCi/g): Ru-106 | 1.000E+01 | 0.000E+00 | -- | S1(22) |
| R012 | Initial principal radionuclide (pCi/g): Sr-90 | 1.000E+01 | 0.000E+00 | - | S1(23) |
| R012 | Initial principal radionuclide (pCi/g): Tc-99 | 1.000E+01 | 0.000E+00 | --- | S1(24) |
| R012 | Initial principal radionuclide (pCi/g): Th-228 | 1.000E+01 | 0.000E+00 | --- | S1(25) |
| R012 | Initial principal radionuclide (pCi/g): Th-230 | 1.000E+01 | 0.000E+00 | --- | S1(27) |
| R012 | Initial principal radionuclide (pCi/g): Th-232 | 1.000E+01 | 0.000E+00 | --- | S1(28) |
| R012 | Initial principal radionuclide (pCi/g): U-234 | 1.000E+01 | 0.000E+00 | --- | S1(30) |
| R012 | Initial principal radionuclide (pCi/g): U-235 | 1.000E+01 | 0.000E+00 | - | S1(31) |
| R012 | Initial principal radionuclide (pCi/g): U-238 | 1.000E+01 | 0.000E+00 | -- | S1(33) |
| R012 | Concentration in groundwater (pCi/L): Am-241 | not used | 0.000E+00 | -- | W1( 2) |
| R012 | Concentration in groundwater (pCi/L): Co-60 | not used | 0.000E+00 | - | W1( 3) |
| R012 | Concentration in groundwater (pCi/L): Cs-137 | not used | 0.000E+00 | --- | W1( 4) |
| R012 | Concentration in groundwater (pCi/L): Eu-152 | not used | 0.000E+00 | --- | W1( 5) |
| R012 | Concentration in groundwater (pCi/L): Eu-154 | not used | 0.000E+00 | --- | W1( 7) |
| R012 | Concentration in groundwater (pCi/L): Eu-155 | not used | 0.000E+00 | --- | W1( 8) |
| R012 | Concentration in groundwater (pCi/L): H-3 | not used | 0.000E+00 | --- | W1(10) |
| R012 | Concentration in groundwater (pCi/L): I-129 | not used | 0.000E+00 | - | W1(11) |
| R012 | Concentration in groundwater (pCi/L): K-40 | not used | 0.000E+00 | --- | W1(12) |
| R012 | Concentration in groundwater (pCi/L): Na-22 | not used | 0.000E+00 | --- | W1(13) |
| R012 | Concentration in groundwater (pCi/L): Np-237 | not used | 0.000E+00 | --- | W1(14) |

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Site-Specific Parameter Summary (continued)

| Menu | Parameter | User Input | Default | Used by RESRAD (If different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R012 | Concentration in groundwater (pCi/L): Pu-238 | not used | 0.000E+00 | ... | W1(17) |
| R012 | Concentration in groundwater (pCi/L): Pu-239 | not used | 0.000E+00 | ... | W1(18) |
| R012 | Concentration in groundwater (pCi/L): Pu-240 | not used | 0.000E+00 | ... | W1(19) |
| R012 | Concentration in groundwater (pCi/L): Ra-226 | not used | 0.000E+00 | ... | W1(20) |
| R012 | Concentration in groundwater (pCi/L): Ra-228 | not used | 0.000E+00 | ... | W1(21) |
| R012 | Concentration in groundwater (pCi/L): Pu-106 | not used | 0.000E+00 | ... | W1(22) |
| R012 | Concentration in groundwater (pCi/L): Sr-90 | not used | 0.000E+00 | ... | W1(23) |
| R012 | Concentration in groundwater (pCi/L): Tc-99 | not used | 0.000E+00 | ... | W1(24) |
| R012 | Concentration in groundwater (pCi/L): Th-228 | not used | 0.000E+00 | ... | W1(25) |
| R012 | Concentration in groundwater (pCi/L): Th-210 | not used | 0.000E+00 | ... | W1(27) |
| R012 | Concentration in groundwater (pCi/L): Th-232 | not used | 0.000E+00 | ... | W1(28) |
| R012 | Concentration in groundwater (pCi/L): U-234 | not used | 0.000E+00 | ... | W1(30) |
| R012 | Concentration in groundwater (pCi/L): U-235 | not used | 0.000E+00 | ... | W1(31) |
| R012 | Concentration in groundwater (pCi/L): U-238 | not used | 0.000E+00 | ... | W1(33) |
| R013 | Cover depth (m) | 0.000E+00 | 0.000E+00 | ... | COVERJ |
| R013 | Density of cover material (g/cm**3) | not used | 1.500E+00 | ... | DENSCV |
| R013 | Cover depth erosion rate (m/yr) | not used | 1.000E-01 | ... | VCV |
| R013 | Density of contaminated zone (g/cm**3) | 1.600E+00 | 1.500E+00 | ... | DENSCZ |
| R013 | Contaminated zone erosion rate (m/yr) | 0.000E+00 | 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) | 1.000E-01 | 1.000E-01 | ... | HCCZ |
| R013 | Contaminated zone b parameter | 5.300E+00 | 5.300E+00 | ... | BCZ |
| R013 | Average annual wind speed (m/sec) | 3.000E+00 | 2.000E+00 | ... | WIND |
| R013 | Humidity in air (g/m**3) | 5.550E+00 | 8.000E+00 | ... | HUMID |
| R013 | Evapotranspiration coefficient | 9.990E-01 | 5.000E-01 | ... | EVAPTR |
| R013 | Precipitation (m/yr) | 4.760E-01 | 1.000E+00 | ... | PRECIP |
| R013 | Irrigation (m/yr) | 0.000E+00 | 2.000E-01 | ... | RI |
| R013 | 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 |
| R013 | Accuracy for water/soil computations | 1.000E-03 | 1.000E-03 | ... | EPS |
| R014 | Density of saturated zone (g/cm**3) | 1.500E+00 | 1.500E+00 | ... | DENSAQ |
| R014 | Saturated zone total porosity | 4.000E-01 | 4.000E-01 | ... | TPSZ |
| R014 | 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) | 1.000E+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 |
| R014 | Water table drop rate (m/yr) | 1.000E-03 | 1.000E-03 | ... | VWT |
| R014 | Well pump intake depth (m below water table) | 1.000E-01 | 1.000E-01 | ... | DWIBWT |
| R014 | Model: Nondispersion (ND) or Mass-Balance (MB) | ND | ND | ... | MODEL |
| R014 | Well pumping rate (m**3/yr) | 2.500E-02 | 2.500E-02 | ... | UW |
| R015 | Number of unsaturated zone strata | 1 | 1 | ... | NS |

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Site-Specific Parameter Summary (continued)

| Menu | Parameter | User Input | Default | Used by RESRAD (If different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R015 | Unsat. zone 1, thickness (m) | 4.000E+00 | 4.000E+00 | --- | H(1) |
| R015 | Unsat. zone 1, soil density (g/cm**3) | 1.500E+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) |
| R015 | Unsat. zone 1, field capacity | 2.000E-01 | 2.000E-01 | --- | FCUZ(1) |
| R015 | Unsat. zone 1, soil-specific b parameter | 5.300E+00 | 5.300E+00 | --- | BUZ(1) |
| R015 | Unsat. zone 1, hydraulic conductivity (m/yr) | 1.000E+01 | 1.000E+01 | --- | HCUZ(1) |
| R016 | Distribution coefficients for Am-241 | | | | |
| R016 | Contaminated zone (cm**3/g) | 2.000E+01 | 2.000E+01 | --- | DCNUCC( 2) |
| R016 | Unsaturated zone 1 (cm**3/g) | 2.000E+01 | 2.000E+01 | --- | DCNUCU( 2,1) |
| R016 | Saturated zone (cm**3/g) | 2.000E+01 | 2.000E+01 | --- | DCNUCS( 2) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 5.913E-06 | ALEACH( 2) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 2) |
| R016 | Distribution coefficients for Co-60 | | | | |
| R016 | Contaminated zone (cm**3/g) | 1.000E+03 | 1.000E+03 | --- | DCNUCC( 3) |
| R016 | Unsaturated zone 1 (cm**3/g) | 1.000E+03 | 1.000E+03 | --- | DCNUCU( 3,1) |
| R016 | Saturated zone (cm**3/g) | 1.000E+03 | 1.000E+03 | --- | DCNUCS( 3) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.190E-07 | ALEACH( 3) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 3) |
| R016 | Distribution coefficients for Cs-137 | | | | |
| R016 | Contaminated zone (cm**3/g) | 1.000E+03 | 1.000E+03 | --- | DCNUCC( 4) |
| R016 | Unsaturated zone 1 (cm**3/g) | 1.000E+03 | 1.000E+03 | --- | DCNUCU( 4,1) |
| R016 | Saturated zone (cm**3/g) | 1.000E+03 | 1.000E+03 | --- | DCNUCS( 4) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.190E-07 | ALEACH( 4) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 4) |
| R016 | Distribution coefficients for Eu-152 | | | | |
| R016 | Contaminated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E+02 | DCNUCC( 5) |
| R016 | Unsaturated zone 1 (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E+02 | DCNUCU( 5,1) |
| R016 | Saturated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E+02 | DCNUCS( 5) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.442E-07 | ALEACH( 5) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 5) |
| R016 | Distribution coefficients for Eu-154 | | | | |
| R016 | Contaminated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E+02 | DCNUCC( 7) |
| R016 | Unsaturated zone 1 (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E+02 | DCNUCU( 7,1) |
| R016 | Saturated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E+02 | DCNUCS( 7) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.442E-07 | ALEACH( 7) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 7) |
| R016 | Distribution coefficients for Eu-155 | | | | |
| R016 | Contaminated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E+02 | DCNUCC( 8) |
| R016 | Unsaturated zone 1 (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E+02 | DCNUCU( 8,1) |
| R016 | Saturated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E+02 | DCNUCS( 8) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.442E-07 | ALEACH( 8) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 8) |

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| Menu | Parameter | User Input | Default | Used by RESRAD (if different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R016 | Distribution coefficients for H-3 | | | | |
| R016 | Contaminated zone (cm**3/g) | 0.000E+00 | 0.000E+00 | --- | DCNUCC(10) |
| R016 | Unsaturated zone 1 (cm**3/g) | 0.000E+00 | 0.000E+00 | --- | DCNUCU(10,1) |
| R016 | Saturated zone (cm**3/g) | 0.000E+00 | 0.000E+00 | --- | DCNUCS(10) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 5.475E-01 | ALEACH(10) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(10) |
| R016 | Distribution coefficients for I-129 | | | | |
| R016 | Contaminated zone (cm**3/g) | 1.000E+01 | 1.000E+01 | --- | DCNUCC(11) |
| R016 | Unsaturated zone 1 (cm**3/g) | 1.000E+01 | 1.000E+01 | --- | DCNUCU(11,1) |
| R016 | Saturated zone (cm**3/g) | 1.000E+01 | 1.000E+01 | --- | DCNUCS(11) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 5.284E-04 | ALEACH(11) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(11) |
| R016 | Distribution coefficients for P-32 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.500E+00 | 5.500E+00 | --- | DCNUCC(12) |
| R016 | Unsaturated zone 1 (cm**3/g) | 5.500E+00 | 5.500E+00 | --- | DCNUCU(12,1) |
| R016 | Saturated zone (cm**3/g) | 5.500E+00 | 5.500E+00 | --- | DCNUCS(12) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 2.324E-04 | ALEACH(12) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(12) |
| R016 | Distribution coefficients for Na-22 | | | | |
| R016 | Contaminated zone (cm**3/g) | 1.000E+01 | 1.000E+01 | --- | DCNUCC(13) |
| R016 | Unsaturated zone 1 (cm**3/g) | 1.000E+01 | 1.000E+01 | --- | DCNUCU(13,1) |
| R016 | Saturated zone (cm**3/g) | 1.000E+01 | 1.000E+01 | --- | DCNUCS(13) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.175E-04 | ALEACH(13) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(13) |
| R016 | Distribution coefficients for Np-237 | | | | |
| R016 | Contaminated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 2.574E-02 | DCNUCC(14) |
| R016 | Unsaturated zone 1 (cm**3/g) | -1.000E+00 | -1.000E+00 | 2.574E-02 | DCNUCU(14,1) |
| R016 | Saturated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 2.574E-02 | DCNUCS(14) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 4.420E-07 | ALEACH(14) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(14) |
| R016 | Distribution coefficients for Pu-238 | | | | |
| R016 | Contaminated zone (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCC(17) |
| R016 | Unsaturated zone 1 (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCU(17,1) |
| R016 | Saturated zone (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCS(17) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 9.955E-09 | ALEACH(17) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(17) |
| R016 | Distribution coefficients for Pu-239 | | | | |
| R016 | Contaminated zone (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCC(18) |
| R016 | Unsaturated zone 1 (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCU(18,1) |
| R016 | Saturated zone (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCS(18) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 5.452E-08 | ALEACH(18) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(18) |

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| Menu | Parameter | User Input | Default | Used by RESRAD (If different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R016 | Distribution coefficients for Pu-240 | | | | |
| R016 | Contaminated zone (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCC(19) |
| R016 | Unsaturated zone 1 (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCU(19,1) |
| R016 | Saturated zone (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCS(19) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 5.950E-08 | ALEACH(19) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(19) |
| R016 | Distribution coefficients for Ra-226 | | | | |
| R016 | Contaminated zone (cm**3/g) | 7.000E+01 | 7.000E+01 | --- | DCNUCC(20) |
| R016 | Unsaturated zone 1 (cm**3/g) | 7.000E+01 | 7.000E+01 | --- | DCNUCU(20,1) |
| R016 | Saturated zone (cm**3/g) | 7.000E+01 | 7.000E+01 | --- | DCNUCS(20) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.697E-06 | ALEACH(20) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(20) |
| R016 | Distribution coefficients for Ra-228 | | | | |
| R016 | Contaminated zone (cm**3/g) | 7.000E+01 | 7.000E+01 | --- | DCNUCC(21) |
| R016 | Unsaturated zone 1 (cm**3/g) | 7.000E+01 | 7.000E+01 | --- | DCNUCU(21,1) |
| R016 | Saturated zone (cm**3/g) | 7.000E+01 | 7.000E+01 | --- | DCNUCS(21) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.697E-06 | ALEACH(21) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(21) |
| R016 | Distribution coefficients for Pb-210 | | | | |
| R016 | Contaminated zone (cm**3/g) | 0.000E+00 | 0.000E+00 | --- | DCNUCC(22) |
| R016 | Unsaturated zone 1 (cm**3/g) | 0.000E+00 | 0.000E+00 | --- | DCNUCU(22,1) |
| R016 | Saturated zone (cm**3/g) | 0.000E+00 | 0.000E+00 | --- | DCNUCS(22) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 9.520E-04 | ALEACH(22) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(22) |
| R016 | Distribution coefficients for Sr-90 | | | | |
| R016 | Contaminated zone (cm**3/g) | 3.000E+01 | 3.000E+01 | --- | DCNUCC(23) |
| R016 | Unsaturated zone 1 (cm**3/g) | 3.000E+01 | 3.000E+01 | --- | DCNUCU(23,1) |
| R016 | Saturated zone (cm**3/g) | 3.000E+01 | 3.000E+01 | --- | DCNUCS(23) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 5.950E-08 | ALEACH(23) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(23) |
| R016 | Distribution coefficients for Tc-99 | | | | |
| R016 | Contaminated zone (cm**3/g) | 0.000E+00 | 0.000E+00 | --- | DCNUCC(24) |
| R016 | Unsaturated zone 1 (cm**3/g) | 0.000E+00 | 0.000E+00 | --- | DCNUCU(24,1) |
| R016 | Saturated zone (cm**3/g) | 0.000E+00 | 0.000E+00 | --- | DCNUCS(24) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 4.520E-04 | ALEACH(24) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(24) |
| R016 | Distribution coefficients for Th-228 | | | | |
| R016 | Contaminated zone (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCC(25) |
| R016 | Unsaturated zone 1 (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCU(25,1) |
| R016 | Saturated zone (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCS(25) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.983E-04 | ALEACH(25) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(25) |

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Site-Specific Parameter Summary (continued)

| # Menu | Parameter | User Input | Default | Used by RESRAD (if different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R016 | Distribution coefficients for Th-230 | | | | |
| R016 | Contaminated zone (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCC(27) |
| R016 | Unsaturated zone 1 (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCU(27,1) |
| R016 | Saturated zone (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCS(27) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.485E-05 | ALEACH(27) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBF(27) |
| R016 | Distribution coefficients for Th-232 | | | | |
| R016 | Contaminated zone (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCC(28) |
| R016 | Unsaturated zone 1 (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCU(28,1) |
| R016 | Saturated zone (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCS(28) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.485E-05 | ALEACH(28) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBF(28) |
| R016 | Distribution coefficients for U-234 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(30) |
| R016 | Unsaturated zone 1 (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCU(30,1) |
| R016 | Saturated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCS(30) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 2.374E-06 | ALEACH(30) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBF(30) |
| R016 | Distribution coefficients for U-235 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(31) |
| R016 | Unsaturated zone 1 (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCU(31,1) |
| R016 | Saturated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCS(31) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 2.374E-06 | ALEACH(31) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBF(31) |
| R016 | Distribution coefficients for U-238 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(33) |
| R016 | Unsaturated zone 1 (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCU(33,1) |
| R016 | Saturated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCS(33) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 2.374E-06 | ALEACH(33) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBF(33) |
| R016 | Distribution coefficients for daughter Ac-227 | | | | |
| R016 | Contaminated zone (cm**3/g) | 2.000E+01 | 2.000E+01 | --- | DCNUCC( 1) |
| R016 | Unsaturated zone 1 (cm**3/g) | 2.000E+01 | 2.000E+01 | --- | DCNUCU( 1,1) |
| R016 | Saturated zone (cm**3/g) | 2.000E+01 | 2.000E+01 | --- | DCNUCS( 1) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 5.941E-06 | ALEACH( 1) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBF( 1) |
| R016 | Distribution coefficients for daughter Cd-112 | | | | |
| R016 | Contaminated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E-02 | DCNUCC( 9) |
| R016 | Unsaturated zone 1 (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E-02 | DCNUCU( 9,1) |
| R016 | Saturated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 8.249E-02 | DCNUCS( 9) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.342E-07 | ALEACH( 9) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBF( 9) |

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Site-Specific Parameter Summary (continued)

| Menu | Parameter | User Input | Default | Used by RESRAD (if different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R016 | Distribution coefficients for daughter Pa-231 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(15) |
| R016 | Unsaturated zone 1 (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCU(15,1) |
| R016 | Saturated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCS(15) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 2.174E-06 | ALEACH(15) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(15) |
| R016 | Distribution coefficients for daughter Pb-210 | | | | |
| R016 | Contaminated zone (cm**3/g) | 1.000E+02 | 1.000E+02 | --- | DCNUCC(16) |
| R016 | Unsaturated zone 1 (cm**3/g) | 1.000E+02 | 1.000E+02 | --- | DCNUCU(16,1) |
| R016 | Saturated zone (cm**3/g) | 1.000E+02 | 1.000E+02 | --- | DCNUCS(16) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.185E-06 | ALEACH(16) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(16) |
| R016 | Distribution coefficients for daughter Th-229 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+04 | 5.000E+04 | --- | DCNUCC(26) |
| R016 | Unsaturated zone 1 (cm**3/g) | 5.000E+04 | 5.000E+04 | --- | DCNUCU(26,1) |
| R016 | Saturated zone (cm**3/g) | 5.000E+04 | 5.000E+04 | --- | DCNUCS(26) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.953E-09 | ALEACH(26) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(26) |
| R016 | Distribution coefficients for daughter U-233 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(29) |
| R016 | Unsaturated zone 1 (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCU(29,1) |
| R016 | Saturated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCS(29) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 2.174E-06 | ALEACH(29) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(29) |
| R016 | Distribution coefficients for daughter U-236 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(32) |
| R016 | Unsaturated zone 1 (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCU(32,1) |
| R016 | Saturated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCS(32) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 2.174E-06 | ALEACH(32) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(32) |
| R017 | Inhalation rate (m**3/yr) | 7.300E+03 | 8.400E+03 | --- | INHALR |
| R017 | Mass loading for inhalation (g/m**3) | 2.000E-05 | 1.000E-04 | --- | MLINH |
| R017 | Exposure duration | 3.000E+01 | 3.000E+01 | --- | ED |
| R017 | Shielding factor, inhalation | 1.000E+00 | 4.000E-01 | --- | SHF3 |
| R017 | Shielding factor, external gamma | 8.000E-01 | 7.000E-01 | --- | SHF1 |
| R017 | Fraction of time spent indoors | 7.100E-01 | 5.000E-01 | --- | FIND |
| R017 | Fraction of time spent outdoors (on site) | 2.400E-01 | 2.500E-01 | --- | FOTD |
| R017 | Shape factor flag, external gamma | 1.000E+00 | 1.000E+00 | >0 shows circular AREA | FS |

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| Menu | Parameter | User Input | Default | Used by RESRAD (if different from user input) | Parameter Name |
|---|---|---|---|---|---|
| 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 | 1.071E+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) | 5.700E+02 | 1.600E+02 | -- | DIET(1) |
| R018 | Leafy vegetable consumption (kg/yr) | 0.000E+00 | 1.800E+01 | --- | DIET(2) |
| R018 | Milk consumption (L/yr) | not used | 9.200E+01 | --- | DIET(3) |
| R018 | Meat and poultry consumption (kg/yr) | not used | 6.300E+01 | -- | DIET(4) |
| R018 | Fish consumption (kg/yr) | not used | 5.400E+00 | --- | DIET(5) |
| R018 | Other seafood consumption (kg/yr) | not used | 9.000E-01 | --- | DIET(6) |
| R018 | Soil ingestion rate (g/yr) | 3.650E+01 | 3.650E+01 | --- | SOIL |
| R018 | Drinking water intake (L/yr) | not used | 5.100E+02 | --- | DWI |
| R018 | Contamination fraction of drinking water | not used | 1.000E+00 | --- | FDW |
| R018 | Contamination fraction of household water | 1.000E+00 | 1.000E+00 | --- | FHW |
| R018 | Contamination fraction of livestock water | not used | 1.000E+00 | -- | FLW |
| R018 | Contamination fraction of irrigation water | 0.000E+00 | 1.000E+00 | --- | FIPW |
| R018 | Contamination fraction of aquatic food | not used | 5.000E-01 | --- | FR9 |
| R018 | Contamination fraction of plant food | 1.000E+00 | -1 | --- | FPLANT |
| R018 | Contamination fraction of meat | not used | -1 | --- | FMEAT |
| R018 | Contamination fraction of milk | not used | -1 | --- | FMILK |
| R019 | Livestock fodder intake for meat (kg/day) | not used | 6.800E+01 | --- | LFI5 |
| R019 | Livestock fodder intake for milk (kg/day) | not used | 5.400E+01 | --- | LFI6 |
| R019 | Livestock water intake for meat (L/day) | not used | 5.000E+01 | --- | LWI5 |
| R019 | Livestock water intake for milk (L/day) | not used | 1.600E+02 | --- | LWI6 |
| R019 | Livestock soil intake (kg/day) | not used | 5.000E-01 | --- | LSI |
| R019 | Mass loading for foliar deposition (g/m**3) | 1.000E-04 | 1.000E-04 | --- | MLFD |

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Site-Specific Parameter Summary (continued)

| Menu | Parameter | User Input | Default | Used by RESRAD (If different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R019 | Depth of soil mixing layer (m) | 1.500E-01 | 1.500E-01 | --- | DM |
| R019 | Depth of roots (m) | 5.500E-01 | 9.000E-01 | --- | DROOT |
| R019 | Drinking water fraction from ground water | not used | 1.000E+00 | --- | FGWDW |
| R019 | Household water fraction from ground water | 1.000E+00 | 1.000E+00 | --- | FGWHH |
| R019 | Livestock water fraction from ground water | not used | 1.000E+00 | --- | FGWLW |
| R019 | 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) |
| R19B | Wet weight crop yield for Leafy (kg/m**2) | 1.500E+00 | 1.500E+00 | --- | YV(2) |
| R19B | Wet weight crop yield for Fodder (kg/m**2) | not used | 1.100E+00 | --- | YV(3) |
| R19B | Growing Season for Non-Leafy (years) | 1.700E-01 | 1.700E-01 | --- | TS(1) |
| R19B | Growing Season for Leafy (years) | 2.530E-01 | 2.500E-01 | --- | TS(2) |
| R19B | Growing Season for Fodder (years) | not used | 8.000E-02 | --- | TS(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) |
| R19B | Translocation Factor for Fodder | not used | 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) |
| R19B | Dry Foliar Interception Fraction for Fodder | not used | 2.500E-01 | --- | RDRY(3) |
| R19B | 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) |
| R19B | Wet Foliar Interception Fraction for Fodder | not used | 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 |
| 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 |
| C14 | C-14 evasion layer thickness in soil (m) | not used | 3.000E-01 | --- | DEC |
| C14 | 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 | --- | EVCN |
| 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 |
| STOR | Storage times of contaminated foodstuffs (days): | | | | |
| STOR | Fruits, non-leafy vegetables, and grain | 1.000E+00 | 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) | 1.500E-01 | 1.500E-01 | --- | FLOOR1 |
| R021 | Bulk density of building foundation (g/cm**3) | 2.400E+00 | 2.400E+00 | --- | DENSFL |
| R021 | Total porosity of the cover material | not used | 4.000E-01 | --- | TPCV |
| R021 | Total porosity of the building foundation | 1.900E-01 | 1.800E-01 | --- | TPFL |
| R021 | Volumetric water content of the cover material | not used | 5.000E-02 | --- | PHICV |
| R021 | Volumetric water content of the foundation | 3.000E-02 | 3.000E-02 | --- | PHIFL |

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Site-Specific Parameter Summary (continued)

| Menu | Parameter | User Input | Default | Used by RESRAD (if different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R021 | Diffusion coefficient for radon gas (m/sec): | | | | |
| R021 | in cover material | not used | 2.000E-06 | --- | DIFCV |
| R021 | in foundation material | 1.000E-07 | 1.000E-07 | --- | DIFFL |
| R021 | in contaminated zone soil | 2.000E-06 | 2.000E-06 | --- | DIFCZ |
| R021 | Radon vertical dimension of mixing (m) | 2.000E+00 | 2.000E+00 | --- | HMIX |
| R021 | Average building air exchange rate (1/hr) | 5.000E-01 | 5.000E-01 | --- | REXG |
| R021 | Height of the building (room) (m) | 2.500E+00 | 2.500E+00 | --- | HRM |
| R021 | Building interior area factor | 0.000E+00 | 0.000E+00 | code computes (time dependent) | FAI |
| R021 | Building depth below ground surface (m) | 0.000E+00 | -1.000E+00 | --- | DHRM |
| R021 | Emanating power of Rn-222 gas | 2.500E-01 | 2.500E-01 | --- | EMANA(1): |
| R021 | Emanating power of Rn-220 gas | 1.500E-01 | 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 | 5 | --- | --- | 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 | suppressed |
| 5 -- milk ingestion | suppressed |
| 6 -- aquatic foods | suppressed |
| 7 -- drinking water | suppressed |
| 8 -- soil ingestion | active |
| 9 -- radon | active |
| Find peak pathway doses | active |

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**Contaminated Zone Dimensions**

| | | |
|---|---|---|
| Area: | 405000.00 | square meters |
| Thickness: | 2.00 | meters |
| Cover Depth: | 0.00 | meters |

**Initial Soil Concentrations, pCi/g**

| | |
|---|---|
| Am-241 | 1.000E+01 |
| Co-60 | 1.000E+01 |
| Cs-137 | 1.000E+01 |
| Eu-152 | 1.000E+01 |
| Eu-154 | 1.000E+01 |
| Eu-155 | 1.000E+01 |
| H-3 | 1.000E+01 |
| I-129 | 1.000E+01 |
| K-40 | 1.000E+01 |
| Na-22 | 1.000E+01 |
| Np-237 | 1.000E+01 |
| Pu-238 | 1.000E+01 |
| Pu-239 | 1.000E+01 |
| Pu-240 | 1.000E+01 |
| Ra-226 | 1.000E+01 |
| Ra-228 | 1.000E+01 |
| Ru-106 | 1.000E+01 |
| Sr-90 | 1.000E+01 |
| Tc-99 | 1.000E+01 |
| Th-228 | 1.000E+01 |
| Th-230 | 1.000E+01 |
| Th-232 | 1.000E+01 |
| U-234 | 1.000E+01 |
| U-235 | 1.000E+01 |
| U-238 | 1.000E+01 |

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 15 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

| t (years): | 0.000E+00 | 1.000E+00 | 3.000E+01 | 1.000E+02 | 1.000E+03 |
|---|---|---|---|---|---|
| TDOSE(t): | 1.716E+03 | 1.657E+03 | 1.339E+03 | 1.361E+03 | 1.351E+03 |
| M(t): | 1.144E+02 | 1.111E+02 | 9.261E+01 | 9.076E+01 | 9.003E+01 |

Maximum TDOSE(t): 1.716E+03 mrem/yr at t = 0.000E+00 years

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Total Dose Contributions TMODEL(1,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-nuclide | Ground mrem/yr | Ground fract. | Inhalation mrem/yr | Inhalation fract. | Radon mrem/yr | Radon fract. | Plant mrem/yr | Plant fract. | Meat mrem/yr | Meat fract. | Milk mrem/yr | Milk fract. | Soil mrem/yr | Soil fract. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Am-241 | 3.559E-01 | 0.0002 | 1.326E-01 | 0.0001 | 0.000E+00 | 0.0000 | 3.074E-00 | 0.0012 | 0.000E-00 | 0.0000 | 0.000E-00 | 0.0000 | 1.271E-00 | 0.0007 |
| Co-60 | 1.223E-02 | 0.0711 | 6.114E-05 | 0.0000 | 0.000E+00 | 0.0000 | 1.184E-02 | 0.0007 | 0.000E-00 | 0.0000 | 0.000E-00 | 0.0000 | 8.821E-01 | 0.0000 |
| Cs-137 | 2.917E-01 | 0.0156 | 9.425E-04 | 0.0000 | 0.000E+00 | 0.0000 | 1.127E-00 | 0.0007 | 0.000E-00 | 0.0000 | 0.000E-00 | 0.0000 | 1.735E-02 | 0.0000 |
| Eu-152 | 5.530E-01 | 0.0321 | 4.437E-05 | 0.0000 | 0.000E+00 | 0.0000 | 9.002E-03 | 0.0000 | 0.000E-00 | 0.0000 | 0.000E-00 | 0.0000 | 3.016E-01 | 0.0000 |
| Eu-154 | 5.953E-01 | 0.0347 | 8.220E-05 | 0.0000 | 0.000E+00 | 0.0000 | 1.336E-02 | 0.0000 | 0.000E-00 | 0.0000 | 0.000E-00 | 0.0000 | 3.135E-01 | 0.0000 |
| Eu-155 | 1.383E-00 | 0.0000 | 1.151E-04 | 0.0000 | 0.000E+00 | 0.0000 | 2.016E-03 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.996E-02 | 0.0000 |
| H-3 | 0.000E+00 | 0.0000 | 2.257E-02 | 0.0000 | 0.000E+00 | 0.0000 | 1.671E-01 | 0.0001 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.656E-02 | 0.0001 |
| I-129 | 1.051E-01 | 0.0061 | 5.194E-05 | 0.0000 | 0.000E+00 | 0.0000 | 1.147E-00 | 0.0010 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.511E-01 | 0.0000 |
| K-40 | 8.379E+00 | 0.4849 | 3.701E-04 | 0.0000 | 0.000E+00 | 0.0000 | 1.181E+00 | 0.0014 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.336E-01 | 0.0000 |
| Na-22 | 9.695E-01 | 0.0561 | 2.016E-04 | 0.0000 | 0.000E+00 | 0.0000 | 2.877E-01 | 0.0002 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.554E-00 | 0.0009 |
| Np-237 | 8.908E+00 | 0.0552 | 1.614E-01 | 0.0001 | 0.000E+00 | 0.0000 | 5.042E-01 | 0.0295 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.334E+00 | 0.0084 |
| Pa-230 | 1.224E-01 | 0.0007 | 1.167E-01 | 0.0001 | 4.214E-13 | 0.0000 | 1.933E-00 | 0.0011 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.239E-00 | 0.0007 |
| Pa-231 | 2.394E-01 | 0.0000 | 1.282E-01 | 0.0001 | 9.000E-09 | 0.0000 | 2.020E+00 | 0.0012 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.239E-00 | 0.0007 |
| Pa-233 | 1.198E-03 | 0.0000 | 1.282E-01 | 0.0001 | 1.496E-21 | 0.0000 | 2.020E+00 | 0.0012 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.048E-01 | 0.0003 |
| Ra-226 | 9.025E+01 | 0.5526 | 2.637E-03 | 0.0000 | 9.145E-02 | 0.5140 | 3.096E+01 | 0.0183 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.184E-01 | 0.0003 |
| Ra-228 | 5.812E+01 | 0.3139 | 1.938E-03 | 0.0000 | 1.216E+00 | 0.6307 | 3.102E+01 | 0.0191 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.933E-01 | 0.0000 |
| Pu-106 | 7.529E+00 | 0.0044 | 1.031E-04 | 0.0000 | 0.000E+00 | 0.0000 | 1.387E-01 | 0.0002 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.232E-02 | 0.0000 |
| Sr-90 | 1.982E-01 | 0.0001 | 3.869E-04 | 0.0000 | 0.000E+00 | 0.0000 | 2.505E+01 | 0.0151 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.165E-04 | 0.0000 |
| Tc-99 | 1.023E-01 | 0.0000 | 2.469E-06 | 0.0000 | 0.000E+00 | 0.0000 | 4.153E-00 | 0.0024 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.373E-01 | 0.0001 |
| Th-228 | 6.889E+01 | 0.0401 | 8.450E-02 | 0.0001 | 6.556E-00 | 0.0039 | 3.868E-01 | 0.0002 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.918E-02 | 0.0001 |
| Th-230 | 2.959E-02 | 0.0000 | 9.744E-02 | 0.0001 | 1.995E-01 | 0.0001 | 3.174E-01 | 0.0002 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.818E-01 | 0.0006 |
| Th-232 | 3.128E+00 | 0.0019 | 4.909E-01 | 0.0003 | 5.084E-02 | 0.0030 | 3.455E-00 | 0.0020 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.918E-02 | 0.0001 |
| U-234 | 1.274E-01 | 0.0000 | 3.942E-02 | 0.0000 | 5.958E-07 | 0.0000 | 4.035E-01 | 0.0002 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.355E-02 | 0.0001 |
| U-235 | 6.116E-02 | 0.0036 | 3.699E-02 | 0.0000 | 0.000E+00 | 0.0000 | 3.813E-01 | 0.0002 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.818E-02 | 0.0001 |
| U-238 | 1.107E+00 | 0.0006 | 3.537E-02 | 0.0000 | 4.828E-11 | 0.0000 | 3.835E-01 | 0.0022 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | ********* | ****** |
| ******* | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** |
| Total | 6.158E-02 | 0.2587 | 1.497E+00 | 0.0009 | 9.242E-02 | 0.5306 | 1.453E+02 | 0.0843 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.368E-00 | 0.0054 |

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.0000E+00 years

0
0

| Radio-Nuclide | Water | | Fish | | Water Dependent Pathways: Radon | | Plant | | Meat | | Milk | | All Pathways* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. |
| Am-241 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.937E+00 | 0.0022 |
| Co-60 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.235E+02 | 0.0719 |
| Cs-137 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.832E+01 | 0.0165 |
| Eu-152 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.611E+01 | 0.0327 |
| Eu-154 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.954E+01 | 0.0347 |
| Eu-155 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.386E+00 | 0.0008 |
| H-3 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.697E-01 | 0.0001 |
| I-129 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.349E+00 | 0.0020 |
| K-40 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.157E+01 | 0.0067 |
| Na-22 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.924E+01 | 0.0567 |
| Np-237 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.124E+01 | 0.0357 |
| Pu-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 | 3.053E+00 | 0.0018 |
| Pu-239 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.192E+00 | 0.0020 |
| Pu-240 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.389E+00 | 0.0020 |
| 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 | 1.038E+03 | 0.6049 |
| 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 | 9.089E+01 | 0.0530 |
| Ru-106 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 7.874E+00 | 0.0046 |
| Sr-90 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.612E+01 | 0.0152 |
| Tc-99 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.161E+00 | 0.0024 |
| 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 | 7.620E+01 | 0.0444 |
| 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 | 8.167E-01 | 0.0005 |
| 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 | 8.311E+00 | 0.0048 |
| 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 | 5.451E-01 | 0.0003 |
| 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 | 6.650E+00 | 0.0039 |
| 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 | 1.627E+00 | 0.0009 |
| ******* | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** |
| 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 | 1.716E+03 | 1.0000 |

Sum of all water independent and dependent pathways.

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Total Dose Contributions TOCSEL.p.t1 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-Nuclide | Ground mrem/yr | Ground fract. | Inhalation mrem/yr | Inhalation fract. | Radon mrem/yr | Radon fract. | Plant mrem/yr | Plant fract. | Meat mrem/yr | Meat fract. | Milk mrem/yr | Milk fract. | Soil mrem/yr | Soil fract. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Am-241 | 1.552E-01 | 0.0002 | 1.324E-01 | 0.0001 | 0.000E+00 | 0.0000 | 2.072E+00 | 0.0012 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.291E+00 | 0.0008 |
| Co-60 | 1.072E-02 | 0.0043 | 5.378E-05 | 0.0000 | 0.000E+00 | 0.0000 | 1.008E+00 | 0.0006 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 7.736E-03 | 0.0000 |
| Cs-137 | 2.655E+01 | 0.0159 | 9.210E-06 | 0.0000 | 0.000E+00 | 0.0000 | 1.101E+05 | 0.0707 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.693E-02 | 0.0000 |
| Eu-152 | 5.311E-01 | 0.0318 | 6.115E-05 | 0.0000 | 0.000E+00 | 0.0000 | 8.544E-01 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.092E-03 | 0.0000 |
| Eu-154 | 5.591E-01 | 0.0330 | 7.594E-05 | 0.0000 | 0.000E+00 | 0.0000 | 1.210E-02 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.971E-03 | 0.0000 |
| Eu-155 | 1.703E+00 | 0.0007 | 1.008E-05 | 0.0000 | 0.000E+00 | 0.0000 | 1.770E-03 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.344E-04 | 0.0000 |
| H-3 | 0.000E+00 | 0.0000 | 8.221E-03 | 0.0000 | 0.000E+00 | 0.0000 | 5.364E-02 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.139E-04 | 0.0000 |
| I-129 | 1.051E-01 | 0.0001 | 5.197E-05 | 0.0000 | 0.000E+00 | 0.0000 | 1.144E+05 | 0.0019 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.451E-02 | 0.0001 |
| K-40 | 8.379E-02 | 0.0050 | 3.724E-04 | 0.0000 | 0.000E+00 | 0.0000 | 1.181E+00 | 0.0016 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 7.410E-03 | 0.0000 |
| Na-22 | 7.474E-01 | 0.0446 | 1.547E-04 | 0.0000 | 0.000E+00 | 0.0000 | 2.284E-01 | 0.0001 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.707E-03 | 0.0000 |
| Np-237 | 8.904E+00 | 0.0053 | 1.614E-01 | 0.0001 | 0.000E+00 | 0.0000 | 5.042E+01 | 0.0304 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.558E+00 | 0.0009 |
| Pu-238 | 1.218E-03 | 0.0000 | 1.158E-01 | 0.0001 | 4.313E-12 | 0.0000 | 1.995E+00 | 0.0011 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.197E+00 | 0.0007 |
| Pu-239 | 2.394E-01 | 0.0000 | 2.282E-01 | 0.0001 | 0.000E+00 | 0.0000 | 2.030E+02 | 0.0012 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.214E+00 | 0.0007 |
| Pu-240 | 1.198E-03 | 0.0000 | 1.202E-01 | 0.0001 | 1.106E-19 | 0.0000 | 2.030E+00 | 0.0012 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.219E+00 | 0.0007 |
| Ra-226 | 9.021E-01 | 0.0541 | 2.846E-03 | 0.0000 | 9.181E-02 | 0.5495 | 3.220E+01 | 0.0191 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.812E-01 | 0.0003 |
| Ra-228 | 7.117E-01 | 0.0427 | 4.008E-03 | 0.0000 | 2.918E-05 | 0.0018 | 2.761E+01 | 0.0164 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.374E-01 | 0.0003 |
| Ru-106 | 3.782E-05 | 0.0023 | 5.176E-05 | 0.0000 | 0.000E+00 | 0.0000 | 1.701E-01 | 0.0001 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.492E-01 | 0.0000 |
| Sr-90 | 1.935E-01 | 0.0001 | 3.778E-04 | 0.0000 | 0.000E+00 | 0.0000 | 2.575E+01 | 0.0151 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.149E-02 | 0.0000 |
| Tc-99 | 1.022E-03 | 0.0000 | 2.894E-04 | 0.0000 | 3.905E-09 | 0.0000 | 4.155E-01 | 0.0024 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.101E-04 | 0.0000 |
| Th-228 | 4.779E-01 | 0.0288 | 6.021E-02 | 0.0000 | 4.591E-09 | 0.0000 | 2.692E-01 | 0.0002 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.451E-01 | 0.0001 |
| Th-230 | 6.848E-02 | 0.0000 | 9.744E-02 | 0.0001 | 5.955E-01 | 0.0034 | 3.130E-01 | 0.0002 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.922E-01 | 0.0001 |
| Th-232 | 1.121E-01 | 0.0067 | 4.965E-01 | 0.0001 | 1.114E-03 | 0.0062 | 6.983E-03 | 0.0042 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.350E-00 | 0.0006 |
| U-234 | 3.275E-03 | 0.0000 | 3.945E-03 | 0.0000 | 4.170E-04 | 0.0000 | 4.075E-01 | 0.0002 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.920E-02 | 0.0000 |
| U-235 | 6.114E-02 | 0.0017 | 3.478E-02 | 0.0000 | 0.000E+00 | 0.0000 | 3.924E-01 | 0.0002 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.158E-02 | 0.0000 |
| U-238 | 1.107E-03 | 0.0000 | 3.527E-02 | 0.0000 | 6.325E-12 | 0.0000 | 3.835E-01 | 0.0002 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.416E-02 | 0.0000 |
| ******** | ********** | ****** | ********** | ****** | ********** | ****** | ********** | ****** | ********** | ****** | ********** | ****** | ********** | ****** |
| Total | 5.662E-02 | 0.3396 | 1.492E-03 | 0.0009 | 9.244E-02 | 0.5546 | 1.654E+02 | 0.0992 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.404E-03 | 0.0026 |

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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

| Radio-Nuclide | Water mrem/yr | Water fract. | Fish mrem/yr | Fish fract. | Radon mrem/yr | Radon fract. | Plant mrem/yr | Plant fract. | Meat mrem/yr | Meat fract. | Milk mrem/yr | Milk fract. | All Pathways* mrem/yr | All Pathways* fract. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Dependent Pathways | | | | | | | | | | | | | | |
| Am-241 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.831E+00 | 0.0021 |
| Co-60 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.083E+02 | 0.0649 |
| Cs-137 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.767E+01 | 0.0166 |
| Eu-152 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.232E+01 | 0.0314 |
| Eu-154 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.503E+01 | 0.0570 |
| Eu-155 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.205E+00 | 0.0007 |
| H-3 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.186E-02 | 0.0000 |
| I-129 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.347E+00 | 0.0020 |
| K-40 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.157E+01 | 0.0069 |
| Na-22 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 7.450E+01 | 0.0447 |
| Np-237 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.124E+01 | 0.0367 |
| Pu-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 | 3.029E+00 | 0.0018 |
| Pu-239 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.390E+00 | 0.0020 |
| Pu-240 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.385E+00 | 0.0020 |
| 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 | 1.039E+03 | 0.6233 |
| 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 | 1.023E+03 | 0.6614 |
| Ru-106 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.955E+00 | 0.0024 |
| Sr-90 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.549E+01 | 0.0151 |
| Tc-99 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.157E+00 | 0.0025 |
| 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 | 5.334E+01 | 0.0318 |
| 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 | 1.287E+02 | 0.0768 |
| 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 | 2.085E+01 | 0.0124 |
| 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 | 5.453E-01 | 0.0003 |
| 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 | 6.651E+00 | 0.0040 |
| 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 | 1.620E+00 | 0.0010 |
| 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 | 1.667E+03 | 1.0000 |

Sum of all water independent and dependent pathways.

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Total Dose Contributions TDCR(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

| Radio-Nuclide | Ground mrem/yr | Ground fract. | Inhalation mrem/yr | Inhalation fract. | Radon mrem/yr | Radon fract. | Plant mrem/yr | Plant fract. | Meat mrem/yr | Meat fract. | Milk mrem/yr | Milk fract. | Soil mrem/yr | Soil fract. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Am-241 | 1.191E-01 | 0.0002 | 1.261E-01 | 0.0001 | 0.000E+00 | 0.0000 | 1.978E+00 | 0.0018 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.211E-05 | 0.0000 |
| Co-60 | 2.367E-05 | 0.0000 | 1.182E-06 | 0.0000 | 0.000E+00 | 0.0000 | 3.224E-03 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.707E-06 | 0.0000 |
| Cs-137 | 1.359E+01 | 0.0098 | 4.233E-07 | 0.0000 | 0.000E+00 | 0.0000 | 5.635E-01 | 0.0004 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.651E-03 | 0.0000 |
| Eu-152 | 1.155E+01 | 0.0083 | 1.551E-05 | 0.0000 | 0.000E+00 | 0.0000 | 1.492E-03 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.445E-04 | 0.0000 |
| Eu-154 | 5.403E-00 | 0.0040 | 7.918E-06 | 0.0000 | 0.000E+00 | 0.0000 | 1.233E-03 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.021E-04 | 0.0000 |
| Eu-155 | 2.060E-02 | 0.0000 | 1.945E-07 | 0.0000 | 0.000E+00 | 0.0000 | 1.676E-05 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 7.552E-06 | 0.0000 |
| H-3 | 0.000E+00 | 0.0000 | 1.574E-15 | 0.0000 | 0.000E+00 | 0.0000 | 1.328E-11 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.947E-13 | 0.0000 |
| I-129 | 1.035E-01 | 0.0001 | 5.217E-05 | 0.0000 | 0.000E+00 | 0.0000 | 3.096E+00 | 0.0022 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.526E-03 | 0.0000 |
| K-40 | 8.374E+00 | 0.0060 | 1.724E-06 | 0.0000 | 0.000E+00 | 0.0000 | 3.179E-00 | 0.0023 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.926E-03 | 0.0000 |
| Na-22 | 3.278E-02 | 0.0000 | 4.391E-10 | 0.0000 | 0.000E+00 | 0.0000 | 9.729E-05 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.195E-06 | 0.0000 |
| Np-237 | 8.909E+00 | 0.0064 | 1.414E-01 | 0.0001 | 0.000E+00 | 0.0000 | 5.062E-01 | 0.0036 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.554E-00 | 0.0011 |
| Pa-231 | 9.675E-04 | 0.0000 | 9.208E-07 | 0.0001 | 4.501E-09 | 0.0000 | 1.435E-00 | 0.0010 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 8.693E-01 | 0.0006 |
| Pa-233 | 2.393E-03 | 0.0000 | 1.291E-03 | 0.0001 | 0.000E+00 | 0.0000 | 2.018E-00 | 0.0014 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.218E-00 | 0.0009 |
| Pa-240 | 1.194E-03 | 0.0000 | 1.379E-01 | 0.0001 | 3.570E-15 | 0.0000 | 2.014E-09 | 0.0014 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.235E-00 | 0.0009 |
| Ra-226 | 8.911E-01 | 0.0641 | 6.751E-03 | 0.0005 | 9.044E-02 | 0.0512 | 5.513E-01 | 0.0397 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.004E-00 | 0.0014 |
| Ra-228 | 4.335E-00 | 0.0031 | 3.949E-07 | 0.0000 | 2.982E-01 | 0.0202 | 4.491E-01 | 0.0004 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.349E-02 | 0.0000 |
| Ru-106 | 8.052E-09 | 0.0000 | 1.102E-13 | 0.0000 | 0.000E+00 | 0.0000 | 3.623E-10 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 7.817E-12 | 0.0000 |
| Sr-90 | 9.702E-02 | 0.0001 | 1.591E-04 | 0.0000 | 0.000E+00 | 0.0000 | 1.744E-01 | 0.0001 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.591E-02 | 0.0000 |
| Tc-99 | 9.965E-04 | 0.0000 | 2.418E-06 | 0.0000 | 0.000E+00 | 0.0000 | 4.042E-00 | 0.0029 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.944E-04 | 0.0000 |
| Th-228 | 1.311E-03 | 0.0000 | 1.661E-06 | 0.0000 | 1.255E-04 | 0.0000 | 9.361E-06 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.515E-08 | 0.0000 |
| Th-230 | 1.295E+00 | 0.0009 | 9.748E-02 | 0.0001 | 1.281E+01 | 0.0087 | 9.014E-01 | 0.0007 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.097E-01 | 0.0002 |
| Th-232 | 1.266E-02 | 0.0007 | 5.929E-01 | 0.0004 | 7.535E+00 | 0.0054 | 1.401E-01 | 0.0345 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.739E-03 | 0.0012 |
| U-234 | 3.439E-03 | 0.0000 | 3.987E-02 | 0.0000 | 1.655E-03 | 0.0000 | 4.014E-01 | 0.0283 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.832E-02 | 0.0001 |
| U-235 | 6.343E-00 | 0.0044 | 3.767E-02 | 0.0000 | 0.000E+00 | 0.0000 | 4.245E-01 | 0.0003 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.705E-02 | 0.0001 |
| U-238 | 1.107E+00 | 0.0000 | 3.537E-02 | 0.0000 | 4.737E-08 | 0.0000 | 3.835E-01 | 0.0003 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.416E-02 | 0.0001 |
| ******* | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** |
| Total | 2.798E+02 | 0.2000 | 2.447E+00 | 0.0010 | 9.745E-02 | 0.0656 | 1.737E+01 | 0.1351 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.051E+01 | 0.0376 |

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Summary : Radionuclide SALs peer review draft 10-23-00  File: SALS05.RAD

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-01 years

| Radio-Nuclide | Water | | Fish | | Radon | | Water Dependent Pathways: Plant | | Meat | | Milk | | All Pathways* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mrem/yr | fract | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. |
| Am-241 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.657E+00 | 0.3026 |
| Co-60 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.389E+00 | 0.0017 |
| Cs-137 | 0.000E+00 | 0.0000 | 0.000E+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+01 | 0.0102 |
| Eu-152 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.158E+01 | 0.0083 |
| Eu-154 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.605E+00 | 0.0040 |
| Eu-155 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.094E-02 | 0.0000 |
| H-3 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.156E-14 | 0.0000 |
| I-129 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.294E+00 | 0.0024 |
| K-40 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.156E+01 | 0.0083 |
| Na-22 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.288E-02 | 0.0000 |
| Np-237 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.124E-01 | 0.0441 |
| Pu-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 | 2.408E+00 | 0.0017 |
| Pu-239 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.387E-00 | 0.0024 |
| Pu-240 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.372E+00 | 0.0024 |
| 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 | 1.051E+03 | 0.7565 |
| 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 | 5.510E+00 | 0.0040 |
| Ru-106 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 8.423E-09 | 0.0000 |
| Sr-90 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.278E+01 | 0.0092 |
| Tc-99 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.043E+00 | 0.0029 |
| 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 | 2.450E-01 | 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 | 2.444E-01 | 0.0194 |
| 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 | 1.659E+02 | 0.1223 |
| 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 | 5.472E-01 | 0.0004 |
| 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 | 6.702E-00 | 0.0048 |
| 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 | 1.629E-02 | 0.0012 |
| 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 | 1.389E+03 | 1.0000 |

Sum of all water independent and dependent pathways.

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Summary : Radionuclide SALs peer review draft 10-23-00  File: SALS07.RAD

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-Nuclide | Ground mrem/yr | Ground fract. | Inhalation mrem/yr | Inhalation fract. | Radon mrem/yr | Radon fract. | Plant mrem/yr | Plant fract. | Meat mrem/yr | Meat fract. | Milk mrem/yr | Milk fract. | Soil mrem/yr | Soil fract. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Am-241 | 1.051E-01 | 0.0002 | 1.124E-01 | 0.0001 | 0.000E+00 | 0.0000 | 1.918E-00 | 0.0013 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.094E-06 | 0.0001 |
| Co-60 | 2.379E-04 | 0.0000 | 1.193E-10 | 0.0000 | 0.000E+00 | 0.0000 | 3.334E-04 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.716E-06 | 0.0000 |
| Cs-137 | 2.694E-00 | 0.0020 | 9.351E-03 | 0.0000 | 0.000E+00 | 0.0000 | 1.118E-01 | 0.0001 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.7348-01 | 0.0000 |
| Eu-152 | 1.040E-01 | 0.0000 | 1.521E-07 | 0.0000 | 0.000E+00 | 0.0000 | 4.967E-05 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.219E-05 | 0.0000 |
| Eu-154 | 2.259E-02 | 0.0000 | 1.119E-08 | 0.0000 | 0.000E+00 | 0.0000 | 4.949E-04 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.336E-04 | 0.0000 |
| Eu-155 | 1.188E-04 | 0.0000 | 9.848E-12 | 0.0000 | 0.000E+00 | 0.0000 | 1.734E-07 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.262E-10 | 0.0000 |
| H-3 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| I-129 | 9.972E-02 | 0.0001 | 4.931E-05 | 0.0000 | 0.000E+00 | 0.0000 | 2.985E-00 | 0.0022 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.141E-01 | 0.0001 |
| K-40 | 8.342E-05 | 0.0001 | 3.698E-06 | 0.0000 | 0.000E+00 | 0.0000 | 3.174E-05 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.493E-03 | 0.0000 |
| Na-22 | 2.811E-10 | 0.0000 | 5.838E-18 | 0.0000 | 0.000E+00 | 0.0000 | 7.750E-13 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.518E-15 | 0.0000 |
| Np-237 | 8.027E-02 | 0.0045 | 1.612E-01 | 0.0001 | 0.000E+00 | 0.0000 | 5.062E-01 | 0.0003 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.551E-05 | 0.0001 |
| Pu-238 | 5.571E-04 | 0.0000 | 2.297E-02 | 0.0000 | 1.405E-04 | 0.0000 | 8.258E-01 | 0.0004 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.644E-01 | 0.0004 |
| Pu-239 | 2.388E-03 | 0.0000 | 1.279E-01 | 0.0001 | 0.000E+00 | 0.0000 | 3.018E-00 | 0.0015 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.336E-00 | 0.0009 |
| Pu-240 | 1.185E-03 | 0.0000 | 1.264E-01 | 0.0001 | 4.522E-14 | 0.0000 | 1.999E-03 | 0.0015 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.224E-00 | 0.0009 |
| Ra-226 | 8.646E+01 | 0.0415 | 8.893E-03 | 0.0000 | 8.775E+02 | 0.4446 | 6.762E+01 | 0.0495 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.093E-05 | 0.0000 |
| Ra-228 | 9.185E-04 | 0.0000 | 8.550E-07 | 0.0000 | 9.457E-05 | 0.0000 | 1.836E-04 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.086E-06 | 0.0000 |
| Pu-241 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Sr-90 | 1.813E-02 | 0.0000 | 3.578E-05 | 0.0000 | 0.000E+00 | 0.0000 | 2.391E-03 | 0.0018 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.641E-04 | 0.0000 |
| Tc-99 | 9.302E-04 | 0.0000 | 2.262E-04 | 0.0000 | 0.000E+00 | 0.0000 | 3.780E-00 | 0.0028 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.365E-17 | 0.0000 |
| Th-228 | 1.268E-14 | 0.0000 | 1.592E-17 | 0.0000 | 1.214E-15 | 0.0000 | 7.117E-17 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.870E-01 | 0.0000 |
| Th-230 | 3.955E-02 | 0.0028 | 9.741E-02 | 0.0001 | 3.404E-01 | 0.0187 | 2.834E-00 | 0.0021 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.782E-03 | 0.0013 |
| Th-232 | 1.303E-02 | 0.0007 | 5.948E-01 | 0.0004 | 7.863E+00 | 0.0432 | 1.847E-01 | 0.0136 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.922E-02 | 0.0001 |
| U-234 | 5.018E-06 | 0.0000 | 1.952E-02 | 0.0000 | 1.779E-02 | 0.0000 | 4.044E-01 | 0.0003 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.293E-01 | 0.0001 |
| U-235 | 6.164E-03 | 0.0000 | 4.054E-02 | 0.0000 | 0.000E+00 | 0.0000 | 5.821E-01 | 0.0003 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.637E-02 | 0.0000 |
| U-238 | 1.107E-03 | 0.0000 | 1.527E-02 | 0.0000 | 1.695E-04 | 0.0000 | 1.834E-01 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.092E-01 | 0.0000 |
| ******** | ******** | ****** | ******** | ****** | ******** | ****** | ******** | ****** | ******** | ****** | ******** | ****** | ******** | ****** |
| Total | 2.486E-02 | 0.1024 | 1.348E-00 | 0.0010 | 9.244E-02 | 0.6795 | 1.762E-02 | 0.1296 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.092E-01 | 0.0000 |

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Summary : Radionuclide SALs peer review draft 10-23-00  File: SALS00.RAD

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

| Radio-Nuclide | Water mrem/yr | Water fract. | Fish mrem/yr | Fish fract. | Water Dependent Pathways: Radon mrem/yr | Radon fract. | Plant mrem/yr | Plant fract. | Meat mrem/yr | Meat fract. | Milk mrem/yr | Milk fract. | All Pathways* mrem/yr | All Pathways* fract. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Am-241 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.268E+00 | 0.0024 |
| Co-60 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.401E-04 | 0.0000 |
| Cs-137 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.809E+00 | 0.0021 |
| Eu-152 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.041E-01 | 0.0002 |
| Eu-154 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.253E-02 | 0.0000 |
| Eu-155 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.182E-04 | 0.0000 |
| H-3 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| I-129 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.177E+00 | 0.0023 |
| K-40 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.154E+01 | 0.0085 |
| Na-22 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.619E-10 | 0.0000 |
| Np-237 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.124E+01 | 0.0450 |
| Pu-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 | 1.385E+00 | 0.0010 |
| Pu-239 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.380E+00 | 0.0025 |
| Pu-240 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.353E+00 | 0.0025 |
| 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 | 1.014E+03 | 0.7546 |
| 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 | 1.191E-01 | 0.0000 |
| Ru-106 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Sr-90 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.414E+00 | 0.0018 |
| Tc-99 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.782E+03 | 0.0028 |
| 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 | 1.402E-14 | 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 | 4.611E+01 | 0.0339 |
| 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 | 1.754E+02 | 0.1288 |
| 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 | 5.461E-01 | 0.0004 |
| 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 | 5.854E+00 | 0.0430 |
| 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 | 1.619E+00 | 0.0012 |
| 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 | 1.361E+01 | 1.0000 |

Sum of all water independent and dependent pathways.

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Summary : Radionuclide SALs peer review draft 10-23-00  File: SALSCO.RAD

Total Dose Contributions TYDZK(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

| Radio-nuclide | Ground mrem/yr | Ground fract. | Inhalation mrem/yr | Inhalation fract. | Radon mrem/yr | Radon fract. | Plant mrem/yr | Plant fract. | Meat mrem/yr | Meat fract. | Milk mrem/yr | Milk fract. | Soil mrem/yr | Soil fract. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Am-241 | 7.257E-02 | 0.0001 | 2.654E-02 | 0.0000 | 0.000E+00 | 0.0000 | 4.232E-01 | 0.0003 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.588E-01 | 0.0002 |
| Co-60 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Cs-137 | 2.538E-09 | 0.0000 | 9.782E-10 | 0.0000 | 0.000E+00 | 0.0000 | 1.041E-10 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.594E-12 | 0.0000 |
| Eu-152 | 1.419E-21 | 0.0000 | 2.502E-15 | 0.0000 | 0.000E+00 | 0.0000 | 7.589E-15 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.942E-15 | 0.0000 |
| Eu-154 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Eu-155 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| H-3 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| I-129 | 4.191E-03 | 0.0000 | 1.044E-05 | 0.0000 | 0.000E+00 | 0.0000 | 1.955E-06 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.441E-02 | 0.0000 |
| K-40 | 8.384E-00 | 0.0041 | 3.024E-06 | 0.0000 | 0.000E+00 | 0.0000 | 3.114E-05 | 0.0001 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 4.174E-03 | 0.0000 |
| Na-22 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Np-237 | 8.904E-00 | 0.0044 | 1.416E-01 | 0.0001 | 0.000E+00 | 0.0000 | 5.058E-01 | 0.0003 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.554E-02 | 0.0000 |
| Pu-238 | 4.487E-05 | 0.0000 | 5.763E-05 | 0.0000 | 4.187E-02 | 0.0000 | 8.571E-04 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.504E-04 | 0.0000 |
| Pu-239 | 2.132E-03 | 0.0000 | 1.246E-01 | 0.0001 | 0.000E+00 | 0.0000 | 1.961E-00 | 0.0015 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.584E-03 | 0.0000 |
| Pu-240 | 1.678E-03 | 0.0000 | 1.151E-01 | 0.0001 | 5.424E-12 | 0.0000 | 1.817E-00 | 0.0013 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.114E-03 | 0.0000 |
| Ra-226 | 5.845E-01 | 0.0233 | 6.215E-03 | 0.0000 | 5.931E-02 | 0.4293 | 4.483E-01 | 0.0347 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.972E-00 | 0.0015 |
| 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 |
| Ru-106 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Sr-90 | 5.973E-12 | 0.0000 | 1.771E-16 | 0.0000 | 0.000E+00 | 0.0000 | 1.184E-09 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.423E-12 | 0.0000 |
| Tc-99 | 1.937E-04 | 0.0000 | 9.574E-07 | 0.0000 | 0.000E+00 | 0.0000 | 1.400E-06 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.965E-04 | 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 | 1.169E-01 | 0.0234 | 9.981E-03 | 0.0001 | 3.264E-02 | 0.2374 | 2.504E-01 | 0.0195 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.222E-00 | 0.0009 |
| Th-232 | 1.301E-02 | 0.0065 | 5.940E-01 | 0.0004 | 7.813E-00 | 0.0568 | 1.894E-01 | 0.0147 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.742E-00 | 0.0013 |
| U-234 | 1.554E-01 | 0.0001 | 8.013E-02 | 0.0000 | 1.528E-00 | 0.0011 | 5.231E-01 | 0.0004 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.651E-01 | 0.0001 |
| U-235 | 4.486E-03 | 0.0000 | 4.533E-03 | 0.0000 | 0.000E+00 | 0.0000 | 2.976E-02 | 0.0015 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.757E-01 | 0.0002 |
| U-238 | 1.104E-00 | 0.0000 | 3.530E-02 | 0.0000 | 1.514E-03 | 0.0000 | 3.634E-01 | 0.0003 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.422E-02 | 0.0001 |
| ******* | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** | ********* | ****** |
| Total | 2.654E+02 | 0.1817 | 1.290E+00 | 0.0010 | 6.233E-02 | 0.4836 | 1.711E+02 | 0.1266 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.595E+00 | 0.0071 |





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Summary : Radionuclide SALs peer review draft 10-23-00  File: SAL500.RAD

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

| Radio-Nuclide | Water mrem/yr | Water fract. | Fish mrem/yr | Fish fract. | Radon mrem/yr | Radon fract. | Plant mrem/yr | Plant fract. | Meat mrem/yr | Meat fract. | Milk mrem/yr | Milk fract. | All Pathways* mrem/yr | All Pathways* fract. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Water Dependent Pathways | | | | | | | | | | | | | |
| Am-241 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 7.771E-01 | 0.0006 |
| Co-60 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Cs-137 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.616E-03 | 0.0000 |
| Eu-152 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.235E-14 | 0.0000 |
| Eu-154 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Eu-155 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| H-3 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| I-129 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.973E+00 | 0.0015 |
| K-40 | 0.000E+00 | 0.0000 | 0.000E+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+01 | 0.0084 |
| Ra-22 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.000E+00 | 0.0000 |
| Np-237 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.120E+01 | 0.0453 |
| Pu-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 | 1.844E-03 | 0.0000 |
| Pu-239 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.293E+00 | 0.0024 |
| Pu-240 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.047E+00 | 0.0021 |
| 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 | 7.006E+02 | 0.5187 |
| 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 |
| Ru-106 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Sr-90 | 0.000E+00 | 0.0000 | 0.000E+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-04 | 0.0000 |
| Tc-99 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.601E+00 | 0.0012 |
| 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 | 3.786E+02 | 0.2303 |
| 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 | 1.754E+02 | 0.1299 |
| 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 | 2.370E+00 | 0.0015 |
| 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 | 8.916E+00 | 0.0056 |
| 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 | 1.615E+01 | 0.0012 |
| 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 | 1.351E+03 | 1.0000 |

Sum of all water independent and dependent pathways.

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Summary : Radionuclide SALs peer review draft 10-23-00  File: SALSOR.RAD

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

| Parent (i) | Product (j) | Branch Fraction* t= | 0.000E+00 | 1.000E+00 | 3.000E+01 | 1.000E+02 | 1.000E+03 |
|---|---|---|---|---|---|---|---|
| | | | DSR(j,t) (mrem/yr)/(pCi/g) | | | | |
| Am-241 | Am-241 | 1.000E+00 | 3.837E-01 | 3.831E-01 | 3.656E-01 | 3.267E-01 | 7.672E-02 |
| Am-241 | Np-237 | 1.000E+00 | 0.000E+00 | 2.967E-06 | 5.904E-05 | 1.841E-04 | 9.856E-04 |
| Am-241 | U-233 | 1.000E+00 | 0.000E+00 | 9.494E-14 | 3.665E-11 | 3.832E-10 | 2.495E-08 |
| Am-241 | Th-229 | 1.000E+00 | 0.000E+00 | 1.447E-16 | 1.081E-12 | 3.752E-11 | 2.627E-08 |
| Am-241 | ΣDSR(j) | | 3.837E-01 | 3.831E-01 | 3.657E-01 | 3.268E-01 | 7.771E-02 |
| Co-60 | Co-60 | 1.000E+00 | 1.235E+01 | 1.083E+01 | 2.389E-01 | 2.401E-05 | 0.000E+00 |
| Cs-137 | Cs-137 | 1.000E+00 | 2.632E+00 | 2.767E+00 | 1.416E+00 | 2.809E-01 | 2.616E-10 |
| Eu-152 | Eu-152 | 7.208E-01 | 3.942E+00 | 3.771E+00 | 9.348E-01 | 2.192E-02 | 1.038E-22 |
| Eu-152 | Eu-152 | 2.792E-01 | 1.539E+00 | 1.461E+00 | 3.233E-01 | 8.489E-03 | 4.020E-23 |
| Eu-152 | Gd-152 | 2.792E-01 | 0.000E+00 | 9.257E-17 | 9.825E-16 | 1.229E-15 | 1.235E-15 |
| Eu-152 | ΣDSR(j) | | 1.539E+00 | 1.461E+00 | 3.233E-01 | 8.489E-03 | 1.235E-15 |
| Eu-154 | Eu-154 | 1.000E+00 | 5.954E+00 | 5.503E+00 | 5.603E-01 | 2.259E-03 | 3.689E-31 |
| Eu-155 | Eu-155 | 1.000E+00 | 1.386E-01 | 1.205E-01 | 2.394E-03 | 1.182E-37 | 0.000E+00 |
| H-3 | H-3 | 1.000E+00 | 1.697E-02 | 6.186E-03 | 1.186E-15 | 0.000E+00 | 0.000E+00 |
| I-129 | I-129 | 1.000E+00 | 3.349E-01 | 3.347E-01 | 3.296E-01 | 3.177E-01 | 1.973E-01 |
| K-40 | K-40 | 1.000E+00 | 1.157E+00 | 1.157E+00 | 1.156E+00 | 1.154E+00 | 1.132E+00 |
| Na-22 | Na-22 | 1.000E+00 | 9.724E+00 | 7.450E+00 | 3.286E-03 | 2.619E-11 | 0.000E+00 |
| Np-237 | Np-237 | 1.000E+00 | 6.124E+00 | 6.124E+00 | 6.124E+00 | 6.124E+00 | 6.119E+00 |
| Np-237 | U-233 | 1.000E+00 | 0.000E+00 | 3.740E-07 | 7.537E-06 | 2.482E-05 | 2.462E-04 |
| Np-237 | Th-229 | 1.000E+00 | 0.000E+00 | 8.341E-10 | 3.320E-07 | 3.596E-06 | 3.457E-04 |
| Np-237 | ΣDSR(j) | | 6.124E+00 | 6.124E+00 | 6.124E+00 | 6.124E+00 | 6.120E+00 |
| Pu-238 | Pu-238 | 1.000E+00 | 3.053E-01 | 3.029E-01 | 2.408E-01 | 1.385E-01 | 1.232E-04 |
| Pu-238 | U-234 | 1.000E+00 | 0.000E+00 | 2.301E-07 | 4.189E-06 | 1.072E-05 | 1.947E-05 |
| Pu-238 | Th-230 | 1.000E+00 | 0.000E+00 | 1.819E-12 | 6.713E-10 | 6.152E-09 | 1.716E-07 |
| Pu-238 | Ra-226 | 1.000E+00 | 0.000E+00 | 7.145E-13 | 5.097E-09 | 1.591E-07 | 4.666E-05 |
| Pu-238 | Pb-210 | 1.000E+00 | 0.000E+00 | 3.931E-16 | 4.344E-12 | 3.234E-09 | 1.970E-06 |
| Pu-238 | ΣDSR(j) | | 3.053E-01 | 3.029E-01 | 2.408E-01 | 1.385E-01 | 1.846E-04 |
| Pu-239 | Pu-239 | 1.000E+00 | 3.390E-01 | 3.390E-01 | 3.387E-01 | 3.380E-01 | 3.293E-01 |
| Pu-239 | U-235 | 1.000E+00 | 0.000E+00 | 9.822E-10 | 1.996E-08 | 6.571E-08 | 6.850E-07 |
| Pu-239 | Pa-231 | 1.000E+00 | 0.000E+00 | 1.602E-13 | 6.400E-11 | 6.960E-10 | 6.766E-05 |
| Pu-239 | Ac-227 | 1.000E+00 | 0.000E+00 | 1.837E-15 | 1.115E-11 | 2.633E-10 | 4.288E-08 |
| Pu-239 | ΣDSR(j) | | 3.390E-01 | 3.390E-01 | 3.387E-01 | 3.380E-01 | 3.293E-01 |

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Summary : Radionuclide SALs peer review draft 10-23-00  File: SALS00.RAD

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

| Parent (i) | Product (j) | Branch Fraction* | DSR(j,t) [mrem/yr]/[pCi/g] t= 0.000E+00 | 1.000E+00 | 3.000E+01 | 1.000E+02 | 1.000E+03 |
|---|---|---|---|---|---|---|---|
| Pu-240 | Pu-240 | 1.000E+00 | 3.389E-01 | 3.389E-01 | 3.378E-01 | 3.353E-01 | 3.047E-01 |
| Pu-240 | U-236 | 1.000E+00 | 0.000E+00 | 2.293E-09 | 4.658E-08 | 1.529E-07 | 1.450E-06 |
| Pu-240 | Th-232 | 1.000E+00 | 0.000E+00 | 5.139E-19 | 3.041E-16 | 2.211E-15 | 2.121E-13 |
| Pu-240 | Ra-228 | 1.000E+00 | 0.000E+00 | 8.526E-19 | 3.322E-15 | 5.086E-14 | 5.657E-12 |
| Pu-240 | Th-228 | 1.000E+00 | 0.000E+00 | 1.279E-19 | 2.979E-15 | 5.341E-14 | 6.269E-12 |
| Pu-240 | ΣDSR(j) | | 3.389E-01 | 3.388E-01 | 3.378E-01 | 3.353E-01 | 3.047E-01 |
| Ra-226 | Ra-226 | 1.000E+00 | 1.038E+02 | 1.037E+02 | 1.024E+02 | 9.934E+01 | 6.716E+01 |
| Ra-226 | Pb-210 | 1.000E+00 | 0.000E+00 | 2.015E-01 | 2.678E+00 | 4.080E+00 | 2.892E+00 |
| Ra-226 | ΣDSR(j) | | 1.038E+02 | 1.039E+02 | 1.051E+02 | 1.034E+02 | 7.006E+01 |
| Ra-228 | Ra-228 | 1.000E+00 | 7.683E+00 | 6.810E+00 | 2.065E-01 | 4.468E-05 | 0.000E+00 |
| Ra-228 | Th-228 | 1.000E+00 | 0.000E+00 | 3.421E+00 | 3.445E-01 | 7.459E-05 | 0.000E+00 |
| Ra-228 | ΣDSR(j) | | 7.683E+00 | 1.023E+01 | 5.510E-01 | 1.193E-04 | 0.000E+00 |
| Ru-106 | Ru-106 | 1.000E+00 | 7.874E-01 | 3.955E-01 | 8.423E-10 | 9.857E-31 | 0.000E+00 |
| Sr-90 | Sr-90 | 1.000E+00 | 2.611E+00 | 2.549E+00 | 1.278E+00 | 2.414E-01 | 1.195E-15 |
| Tc-99 | Tc-99 | 1.000E+00 | 4.161E-01 | 4.157E-01 | 4.043E-01 | 3.782E-01 | 1.601E-01 |
| Th-228 | Th-228 | 1.000E+00 | 7.620E+00 | 5.304E+00 | 1.450E-04 | 1.492E-15 | 0.000E+00 |
| Th-230 | Th-230 | 1.000E+00 | 6.118E-02 | 6.118E-02 | 6.117E-02 | 6.113E-02 | 6.063E-02 |
| Th-230 | Ra-226 | 1.000E+00 | 0.000E+00 | 6.741E-02 | 1.362E+00 | 4.419E+00 | 3.630E+01 |
| Th-230 | Pb-210 | 1.000E+00 | 0.000E+00 | 6.873E-05 | 2.051E-02 | 1.308E-01 | 1.501E+00 |
| Th-230 | ΣDSR(j) | | 6.118E-02 | 1.287E-01 | 1.444E+00 | 4.611E+00 | 3.786E+01 |
| Th-232 | Th-232 | 1.000E+00 | 3.008E-01 | 3.008E-01 | 3.008E-01 | 3.008E-01 | 3.008E-01 |
| Th-232 | Ra-228 | 1.000E+00 | 0.000E+00 | 1.344E+00 | 7.547E+00 | 8.154E+00 | 8.154E+00 |
| Th-232 | Th-228 | 1.000E+00 | 0.000E+00 | 3.606E-01 | 8.740E+00 | 9.085E+00 | 9.085E+00 |
| Th-232 | ΣDSR(j) | | 3.008E-01 | 2.905E+00 | 1.699E+01 | 1.754E+01 | 1.754E+01 |
| U-234 | U-234 | 1.000E+00 | 5.452E-02 | 5.452E-02 | 5.452E-02 | 5.450E-02 | 5.424E-02 |
| U-234 | Th-230 | 1.000E+00 | 0.000E+00 | 8.273E-07 | 1.680E-05 | 5.531E-05 | 5.471E-04 |
| U-234 | Ra-226 | 1.000E+00 | 0.000E+00 | 4.720E-07 | 1.874E-04 | 2.013E-03 | 1.753E-01 |
| U-234 | Pb-210 | 1.000E+00 | 0.000E+00 | 3.342E-10 | 2.019E-06 | 4.762E-05 | 7.006E-03 |
| U-234 | ΣDSR(j) | | 5.452E-02 | 5.453E-02 | 5.472E-02 | 5.661E-02 | 2.370E-01 |
| U-235 | U-235 | 1.000E+00 | 6.649E-01 | 6.649E-01 | 6.649E-01 | 6.648E-01 | 6.633E-01 |
| U-235 | Pa-231 | 1.000E+00 | 0.000E+00 | 2.894E-04 | 4.262E-03 | 1.401E-02 | 1.381E-01 |
| U-235 | Ac-227 | 1.000E+00 | 0.000E+00 | 3.461E-06 | 1.036E-03 | 6.629E-03 | 8.623E-02 |
| U-235 | ΣDSR(j) | | 6.649E-01 | 6.651E-01 | 6.702E-01 | 6.854E-01 | 8.916E-01 |

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Summary : Radionuclide SALs peer review draft 10-23-00  File: SALS00.PAD

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

| OParent (i) | Product (j) | Branch Fraction* | t= 0.000E+00 | 1.000E+00 | 3.000E+01 | 1.000E+02 | 3.000E+03 |
|---|---|---|---|---|---|---|---|
| | | | DSR(j,t) (mrem/yr)/(pCi/g) | | | | |
| U-238 | U-238 | 1.000E+00 | 1.620E-01 | 1.620E-01 | 1.620E-01 | 1.619E-01 | 1.616E-01 |
| U-238 | U-234 | 1.000E+00 | 0.000E+00 | 2.319E-07 | 4.714E-06 | 1.553E-05 | 1.541E-04 |
| U-238 | Th-230 | 1.000E+00 | 0.000E+00 | 1.827E-12 | 7.263E-10 | 7.351E-09 | 7.772E-07 |
| U-238 | Ra-226 | 1.000E+00 | 0.000E+00 | 7.160E-13 | 5.408E-09 | 1.919E-07 | 1.716E-04 |
| U-238 | Pb-210 | 1.000E+00 | 0.000E+00 | 5.166E-16 | 4.561E-11 | 3.806E-07 | 6.648E-06 |
| U-238 | ΣDSR(j) | | 1.620E-01 | 1.620E-01 | 1.620E-01 | 1.619E-01 | 1.619E-01 |

*Branch Fraction is the cumulative factor for the i'th principal radionuclide daughter: CUMBRF(i) = BRF(1)*BRF(2)* ... BRF(i).
The DSR includes contributions from associated (half-life > 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 15 mrem/yr

| ONuclide (i) | t= 0.000E+00 | 1.000E+00 | 3.000E+01 | 1.000E+02 | 3.000E+03 |
|---|---|---|---|---|---|
| Am-241 | 3.909E+01 | 3.916E+01 | 4.102E+01 | 4.569E+01 | 1.930E+02 |
| Co-60 | 1.215E+00 | 1.386E+00 | 6.279E+01 | 6.246E+05 | *1.131E+15 |
| Cs-137 | 5.297E+00 | 5.471E+00 | 1.059E+01 | 5.339E+01 | 5.734E+10 |
| Eu-152 | 2.722E+00 | 2.867E+00 | 1.295E+01 | 4.933E+02 | *1.765E+14 |
| Eu-154 | 2.519E+00 | 2.726E+00 | 2.676E+01 | 6.639E+03 | *3.619E+14 |
| Eu-155 | 1.082E+02 | 1.245E+02 | 7.164E+03 | 1.269E+08 | *4.651E+14 |
| H-3 | 8.838E+02 | 2.425E+03 | *9.594E+15 | *9.594E+15 | *9.594E+15 |
| I-129 | 4.479E+01 | 4.481E+01 | 4.550E+01 | 4.722E+01 | 7.601E+01 |
| K-40 | 1.297E+01 | 1.297E+01 | 1.298E+01 | 1.300E+01 | 1.329E+01 |
| Na-22 | 1.543E+00 | 2.013E+00 | 4.562E+03 | 5.727E+11 | *2.244E+15 |
| Np-237 | 2.449E+00 | 2.449E+00 | 2.449E+00 | 2.449E+00 | 2.451E+00 |
| Pu-238 | 4.914E+01 | 4.553E+01 | 6.228E+01 | 1.083E+02 | 8.133E+04 |
| Pu-239 | 4.425E+01 | 4.425E+01 | 4.429E+01 | 4.438E+01 | 4.555E+01 |
| Pu-240 | 4.427E+01 | 4.427E+01 | 4.441E+01 | 4.474E+01 | 4.922E+01 |
| Ra-226 | 1.445E+01 | 1.444E+01 | 1.427E+01 | 1.450E+01 | 2.141E+01 |
| Ra-228 | 1.650E+00 | 1.466E+00 | 2.722E+01 | 1.258E+05 | *2.724E+14 |
| Ru-106 | 1.905E+01 | 3.792E+01 | 1.781E+10 | *3.347E+15 | *3.347E+15 |
| Sr-90 | 5.746E+00 | 5.884E+00 | 1.171E+02 | 6.213E+01 | 1.255E+11 |
| Tc-99 | 3.605E+01 | 3.603E+01 | 3.710E+01 | 3.967E+01 | 5.371E+01 |
| Th-228 | 1.969E+00 | 2.828E+00 | 1.034E+05 | *9.192E+14 | *8.192E+14 |
| Th-230 | 1.793E+02 | 1.166E+02 | 1.039E+01 | 3.253E+00 | 3.962E+01 |
| Th-232 | 1.805E+01 | 7.481E+00 | 9.829E+01 | 9.552E+01 | 8.552E+01 |
| U-234 | 2.751E+02 | 2.751E+02 | 2.741E+02 | 2.650E+02 | 6.328E+01 |
| U-235 | 2.256E+01 | 2.255E+01 | 2.238E+01 | 2.168E+01 | 1.682E+01 |
| U-238 | 9.261E+01 | 9.261E+01 | 9.261E+01 | 9.262E+01 | 9.264E+01 |

*At specific activity limit

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Summary : Radionuclide SALs peer review draft 10-23-00  File: SALS00.RAD

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) |
|---|---|---|---|---|---|---|
| Am-241 | 1.000E+01 | 0.000E+00 | 3.837E-01 | 3.909E+01 | 3.837E-01 | 3.909E+01 |
| Co-60 | 1.000E+01 | 0.000E+00 | 1.235E+01 | 1.215E+00 | 1.235E+01 | 1.215E+00 |
| Cs-137 | 1.000E+01 | 0.000E+00 | 2.832E+00 | 5.297E+00 | 2.832E+00 | 5.297E+00 |
| Eu-152 | 1.000E+01 | 0.000E+00 | 5.511E+00 | 2.722E+00 | 5.511E+00 | 2.722E+00 |
| Eu-154 | 1.000E+01 | 0.000E+00 | 5.954E+00 | 2.519E+00 | 5.954E+00 | 2.519E+00 |
| Eu-155 | 1.000E+01 | 0.000E+00 | 1.386E-01 | 1.082E+02 | 1.386E-01 | 1.082E+02 |
| H-3 | 1.000E+01 | 0.000E+00 | 1.697E-02 | 8.838E+02 | 1.697E-02 | 8.838E+02 |
| I-129 | 1.000E+01 | 0.000E+00 | 3.349E-01 | 4.479E+01 | 3.349E-01 | 4.479E+01 |
| K-40 | 1.000E+01 | 0.000E+00 | 1.157E+00 | 1.297E+01 | 1.157E+00 | 1.297E+01 |
| Na-22 | 1.000E+01 | 0.000E+00 | 9.724E+00 | 1.543E+00 | 9.724E+00 | 1.543E+00 |
| Np-237 | 1.000E+01 | 0.000E+00 | 6.124E+00 | 2.449E+00 | 6.124E+00 | 2.449E+00 |
| Pu-238 | 1.000E+01 | 0.000E+00 | 3.053E-01 | 4.914E+01 | 3.053E-01 | 4.914E+01 |
| Pu-239 | 1.000E+01 | 0.000E+00 | 3.390E-01 | 4.425E+01 | 3.390E-01 | 4.425E+01 |
| Pu-240 | 1.000E+01 | 0.000E+00 | 3.389E-01 | 4.427E+01 | 3.389E-01 | 4.427E+01 |
| Ra-226 | 1.000E+01 | 34.73 ± 0.07 | 1.051E+02 | 1.427E-01 | 1.038E+02 | 1.445E-01 |
| Ra-228 | 1.000E+01 | 2.130 ± 0.004 | 1.059E+01 | 1.417E+00 | 9.089E+00 | 1.650E+00 |
| Ru-106 | 1.000E+01 | 0.000E+00 | 7.874E-01 | 1.905E+01 | 7.874E-01 | 1.905E+01 |
| Sr-90 | 1.000E+01 | 0.000E+00 | 2.611E+00 | 5.746E+00 | 2.611E+00 | 5.746E+00 |
| Tc-99 | 1.000E+01 | 0.000E+00 | 4.161E-01 | 3.605E+01 | 4.161E-01 | 3.605E+01 |
| Th-228 | 1.000E+01 | 0.000E+00 | 7.620E+00 | 1.969E+00 | 7.620E+00 | 1.969E+00 |
| Th-230 | 1.000E+01 | 1.000E+03 | 3.786E+01 | 3.962E-01 | 8.367E-02 | 1.793E+02 |
| Th-232 | 1.000E+01 | 149.0 ± 0.3 | 1.754E+01 | 8.552E-01 | 8.311E-01 | 1.805E+01 |
| U-234 | 1.000E+01 | 1.000E+03 | 2.370E-01 | 6.328E+01 | 5.453E-02 | 2.751E+02 |
| U-235 | 1.000E+01 | 1.000E+03 | 8.916E-01 | 1.682E+02 | 6.650E-01 | 2.256E+01 |
| U-238 | 1.000E+01 | 0.000E+00 | 1.620E-01 | 9.261E+01 | 1.620E-01 | 9.261E+01 |
| ****** | ******** | ********** | ******** | ******** | ******** | ******** |

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Summary : Radionuclide SALs peer review draft 10-23-00  File: SALGCD.PAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated
DOSE(j),t), mrem/yr

| Nuclide (j) | Parent (i) | BRF(i) | t= 0.000E+00 | 1.000E+00 | 3.000E+01 | 1.000E+02 | 1.000E+03 |
|---|---|---|---|---|---|---|---|
| Am-241 | Am-241 | 1.000E+00 | 3.837E-09 | 3.831E-09 | 3.656E-09 | 3.367E-09 | 7.672E-01 |
| Np-237 | Am-241 | 1.000E+00 | 9.877E-06 | 2.367E-05 | 5.904E-04 | 1.841E-03 | 9.556E-03 |
| Np-237 | Np-237 | 1.000E+00 | 6.124E-01 | 6.124E-01 | 6.124E-01 | 6.124E-01 | 6.119E-01 |
| Np-237 | ΣDOSE(j): | | 6.124E-01 | 6.124E-01 | 6.124E-01 | 6.124E-01 | 6.120E-01 |
| U-233 | Am-241 | 1.000E+00 | 1.388E-13 | 9.494E-13 | 3.665E-10 | 3.832E-09 | 2.495E-07 |
| U-233 | Np-237 | 1.000E+00 | 1.265E-06 | 3.740E-06 | 7.537E-05 | 2.482E-04 | 2.462E-03 |
| U-233 | ΣDOSE(j): | | 1.265E-06 | 3.740E-06 | 7.537E-05 | 2.482E-04 | 2.463E-03 |
| Th-229 | Np-237 | 1.000E+00 | 5.632E-17 | 1.447E-15 | 1.081E-11 | 3.757E-10 | 3.627E-07 |
| Th-229 | Np-237 | 1.000E+00 | 1.193E-09 | 8.341E-09 | 3.320E-06 | 3.596E-05 | 3.457E-03 |
| Th-229 | ΣDOSE(j): | | 1.193E-09 | 8.341E-09 | 3.320E-06 | 3.596E-05 | 3.457E-03 |
| Co-60 | Co-60 | 1.000E+00 | 1.235E-02 | 1.081E-02 | 2.389E-03 | 2.401E-04 | 0.000E+00 |
| Cs-137 | Cs-137 | 1.000E+00 | 2.832E-01 | 2.767E-01 | 1.416E-01 | 2.809E-00 | 2.616E-07 |
| Eu-152 | Eu-152 | 7.208E-01 | 3.372E-01 | 3.771E-01 | 8.345E-03 | 2.192E-01 | 1.039E-21 |
| Eu-152 | Eu-152 | 2.792E-01 | 1.539E-01 | 1.161E-01 | 3.233E-00 | 8.489E-02 | 4.020E-22 |
| Eu-152 | ΣDOSE(j): | | 5.511E-01 | 5.232E-01 | 1.158E-01 | 3.041E-01 | 1.440E-21 |
| Gd-152 | Eu-152 | 2.792E-01 | 3.157E-16 | 9.237E-16 | 9.825E-15 | 1.239E-14 | 1.235E-16 |
| Eu-154 | Eu-154 | 1.000E+00 | 5.954E-01 | 5.503E-01 | 5.605E-00 | 2.259E-02 | 0.000E+00 |
| Eu-155 | Eu-155 | 1.000E+00 | 1.386E-00 | 1.205E-00 | 2.094E-02 | 1.182E-06 | 0.000E+00 |
| H-3 | H-3 | 1.000E+00 | 1.697E-01 | 6.186E-02 | 1.186E-14 | 0.000E+00 | 0.000E+00 |
| I-129 | I-129 | 1.000E+00 | 3.349E-00 | 3.347E-00 | 3.296E-00 | 3.177E-00 | 1.973E-00 |
| K-40 | K-40 | 1.000E+00 | 1.157E-01 | 1.157E-01 | 1.156E-01 | 1.153E-01 | 1.132E-01 |
| Na-22 | Na-22 | 1.000E+00 | 9.724E-01 | 7.450E-01 | 3.268E-02 | 2.619E-10 | 0.000E+00 |
| Pu-238 | Pu-238 | 1.000E+00 | 3.053E-09 | 3.029E-00 | 2.408E-00 | 1.385E-00 | 1.132E-03 |
| U-234 | Pu-238 | 1.000E+00 | 7.693E-07 | 2.303E-06 | 4.189E-05 | 1.072E-04 | 1.947E-04 |
| U-234 | U-234 | 1.000E+00 | 5.452E-01 | 5.452E-01 | 5.452E-01 | 5.450E-01 | 5.424E-01 |
| U-234 | U-238 | 1.000E+00 | 7.729E-07 | 2.312E-06 | 4.714E-05 | 1.553E-04 | 1.541E-03 |
| U-234 | ΣDOSE(j): | | 5.453E-01 | 5.453E-01 | 5.453E-01 | 5.452E-01 | 5.442E-01 |
| Th-230 | Pu-238 | 1.000E+00 | 2.613E-12 | 1.819E-11 | 6.713E-09 | 6.152E-08 | 1.716E-06 |
| Th-230 | Th-230 | 1.000E+00 | 6.118E-01 | 6.118E-01 | 5.117E-01 | 6.113E-01 | 6.063E-01 |
| Th-230 | U-234 | 1.000E+00 | 2.764E-06 | 8.273E-06 | 1.680E-04 | 5.531E-04 | 5.471E-03 |
| Th-230 | U-238 | 1.000E+00 | 2.619E-12 | 1.827E-11 | 7.261E-09 | 7.081E-08 | 7.722E-06 |
| Th-230 | ΣDOSE(j): | | 6.118E-01 | 6.118E-01 | 6.118E-01 | 6.118E-01 | 6.118E-01 |

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Summary : Radionuclide SALs peer review draft 10-23-00 File: SALS00.RAD

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

| DNuclide (j) | Parent (i) | BRF(i) | DOSE(j,t), mrem/yr t= 0.000E+00 | 1.000E+00 | 3.000E+01 | 1.000E+02 | 1.000E+03 |
|---|---|---|---|---|---|---|---|
| Ra-226 | Pa-238 | 1.000E+00 | 4.772E-13 | 7.145E-12 | 5.097E-08 | 1.561E-06 | 4.966E-04 |
| Ra-226 | Ra-226 | 1.000E+00 | 1.038E+03 | 1.037E+03 | 1.024E+03 | 9.934E+02 | 6.716E+02 |
| Ra-226 | Th-230 | 1.000E+00 | 2.247E-01 | 6.741E-01 | 1.362E+01 | 4.819E+01 | 3.630E+02 |
| Ra-226 | U-234 | 1.000E+00 | 6.743E-07 | 4.720E-06 | 1.874E-03 | 2.013E-02 | 1.753E+00 |
| Ra-226 | U-238 | 1.000E+00 | 5.011E-13 | 7.160E-12 | 5.408E-08 | 1.919E-06 | 1.715E-03 |
| Ra-226 | ΣDOSE(j): | | 1.038E+03 | 1.038E+03 | 1.038E+03 | 1.038E+03 | 1.036E+03 |
| Pb-210 | Pu-238 | 1.000E+00 | 1.294E-16 | 3.931E-15 | 4.344E-10 | 3.234E-08 | 1.970E-05 |
| Pb-210 | Ra-226 | 1.000E+00 | 6.864E-01 | 2.015E+00 | 2.678E+01 | 4.080E+01 | 2.352E+01 |
| Pb-210 | Th-230 | 1.000E+00 | 1.003E-04 | 6.873E-04 | 2.051E-01 | 1.388E+00 | 1.501E+01 |
| Pb-210 | U-234 | 1.000E+00 | 2.280E-10 | 3.342E-09 | 2.019E-05 | 4.762E-04 | 7.606E-02 |
| Pb-210 | U-238 | 1.000E+00 | 0.000E+00 | 5.166E-15 | 4.561E-10 | 3.806E-08 | 6.648E-05 |
| Pb-210 | ΣDOSE(j): | | 6.865E-01 | 2.015E+00 | 2.698E+01 | 4.231E+01 | 4.405E+01 |
| Pu-239 | Pu-239 | 1.000E+00 | 3.390E+00 | 3.390E+00 | 3.387E+00 | 3.380E+00 | 3.293E+00 |
| U-235 | Pu-239 | 1.000E+00 | 3.274E-09 | 9.822E-09 | 1.996E-07 | 6.571E-07 | 6.450E-06 |
| U-235 | U-235 | 1.000E+00 | 6.649E+00 | 6.649E+00 | 6.649E+00 | 6.648E+00 | 6.633E+00 |
| U-235 | ΣDOSE(j): | | 6.649E+00 | 6.649E+00 | 6.649E+00 | 6.648E+00 | 6.633E+00 |
| Pa-231 | Pu-239 | 1.000E+00 | 2.282E-13 | 1.602E-12 | 6.409E-10 | 6.940E-09 | 6.766E-07 |
| Pa-231 | U-235 | 1.000E+00 | 6.967E-04 | 2.094E-03 | 4.262E-02 | 1.403E-01 | 1.381E+00 |
| Pa-231 | ΣDOSE(j): | | 6.967E-04 | 2.094E-03 | 4.262E-02 | 1.403E-01 | 1.381E+00 |
| Ac-227 | Pu-239 | 1.000E+00 | 1.244E-15 | 1.837E-14 | 1.115E-10 | 2.633E-09 | 4.288E-07 |
| Ac-227 | U-235 | 1.000E+00 | 5.021E-06 | 3.461E-05 | 1.036E-02 | 6.629E-02 | 9.023E-01 |
| Ac-227 | ΣDOSE(j): | | 5.021E-06 | 3.461E-05 | 1.036E-02 | 6.629E-02 | 9.023E-01 |
| Pu-240 | Pu-240 | 1.000E+00 | 3.389E+00 | 3.388E+00 | 3.378E+00 | 3.353E+00 | 3.047E+00 |
| U-236 | Pu-240 | 1.000E+00 | 7.633E-09 | 2.293E-08 | 4.658E-07 | 1.579E-06 | 1.450E-05 |
| Th-232 | Pu-240 | 1.000E+00 | 7.368E-19 | 5.139E-18 | 2.041E-15 | 2.211E-14 | 2.121E-12 |
| Th-232 | Th-232 | 1.000E+00 | 3.008E+00 | 3.008E+00 | 3.008E+00 | 3.008E+00 | 3.008E+00 |
| Th-232 | ΣDOSE(j): | | 3.008E+00 | 3.008E+00 | 3.008E+00 | 3.008E+00 | 3.008E+00 |
| Ra-228 | Pu-240 | 1.000E+00 | 5.810E-19 | 5.526E-18 | 3.322E-14 | 5.050E-13 | 5.657E-11 |
| Ra-228 | Ra-228 | 1.000E+00 | 7.643E+01 | 6.810E+01 | 2.065E+00 | 4.469E-04 | 0.000E+00 |
| Ra-228 | Th-232 | 1.000E+00 | 4.715E+00 | 1.344E+01 | 7.947E+01 | 8.154E+01 | 8.154E+01 |
| Ra-228 | ΣDOSE(j): | | 8.154E+01 | 8.154E+01 | 8.154E+01 | 8.154E+01 | 8.154E+01 |
| Th-228 | Pu-240 | 1.000E+00 | 4.471E-20 | 1.379E-18 | 2.979E-14 | 5.341E-13 | 6.269E-11 |
| Th-228 | Ra-228 | 1.000E+00 | 1.406E+01 | 3.631E+01 | 3.445E+00 | 7.459E-04 | 0.000E+00 |
| Th-228 | Th-228 | 1.000E+00 | 7.620E-01 | 5.304E+01 | 1.450E-03 | 1.402E-14 | 0.000E+00 |
| Th-228 | Th-232 | 1.000E+00 | 5.883E-01 | 3.606E+00 | 8.740E+01 | 9.085E+01 | 9.085E+01 |
| Th-228 | ΣDOSE(j): | | 9.085E+01 | 9.085E+01 | 9.085E+01 | 9.085E+01 | 9.085E+01 |
| Ru-106 | Ru-106 | 1.000E+00 | 7.874E+00 | 3.955E+00 | 8.423E-09 | 0.000E+00 | 0.000E+00 |
| Sr-90 | Sr 90 | 1.000E+00 | 2.611E+01 | 2.549E+01 | 1.2[illegible]E+01 | 2.414E+00 | 1.195E-03 |

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

| Nuclide (j) | Parent (i) | BRF(i) | DOSE(j,t), mrem/yr t= 0.000E+00 | 1.000E+00 | 3.000E+01 | 1.000E+02 | 1.000E+03 |
|---|---|---|---|---|---|---|---|
| Tc-99 | Tc-99 | 1.000E+00 | 4.161E+00 | 4.157E+00 | 4.043E+00 | 3.762E+00 | 1.601E+00 |
| U-238 | U-238 | 1.000E+00 | 1.620E+00 | 1.620E+00 | 1.620E+00 | 1.619E+00 | 1.616E+00 |

BRF(i) is the branch fraction of the parent nuclide.

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Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

| GNuclide (j) | Parent (i) | BRF(i) | S(j,t), pCi/g t= 0.000E+00 | 1.000E+00 | 3.000E+01 | 1.000E+02 | 1.000E+03 |
|---|---|---|---|---|---|---|---|
| Am-241 | Am-241 | 1.000E+00 | 1.000E+01 | 9.984E+00 | 9.529E+00 | 8.513E+00 | 2.000E+00 |
| Np-237 | Am-241 | 1.000E+00 | 0.000E+00 | 3.216E-06 | 9.486E-05 | 2.992E-04 | 1.609E-03 |
| Np-237 | Np-237 | 1.000E+00 | 1.000E+01 | 1.000E+01 | 1.000E+01 | 9.999E+00 | 9.992E+00 |
| Np-237 | ΣS(j): | | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 | 9.994E+00 |
| U-233 | Am-241 | 1.000E+00 | 0.000E+00 | 7.079E-12 | 6.272E-09 | 6.715E-08 | 4.414E-06 |
| U-233 | Np-237 | 1.000E+00 | 0.000E+00 | 4.372E-05 | 1.312E-03 | 4.372E-03 | 4.357E-02 |
| U-233 | ΣS(j): | | 0.000E+00 | 4.372E-05 | 1.312E-03 | 4.372E-03 | 4.357E-02 |
| Th-229 | Am-241 | 1.000E+00 | 0.000E+00 | 2.231E-16 | 5.943E-12 | 2.137E-10 | 1.517E-07 |
| Th-229 | Np-237 | 1.000E+00 | 0.000E+00 | 2.065E-09 | 1.857E-06 | 2.058E-05 | 1.996E-03 |
| Th-229 | ΣS(j): | | 0.000E+00 | 2.065E-09 | 1.857E-06 | 2.058E-05 | 1.996E-03 |
| Co-60 | Co-60 | 1.000E+00 | 1.000E+01 | 8.768E+00 | 1.935E-01 | 1.945E-05 | 0.000E+00 |
| Cs-137 | Cs-137 | 1.000E+00 | 1.000E+01 | 9.772E+00 | 5.000E+00 | 9.921E-01 | 9.239E-10 |
| Eu-152 | Eu-152 | 7.208E-01 | 7.208E+00 | 6.843E+00 | 1.515E+00 | 3.977E-02 | 1.883E-22 |
| Eu-152 | Eu-152 | 2.792E-01 | 2.792E+00 | 2.651E+00 | 5.867E-01 | 1.540E-02 | 7.294E-23 |
| Eu-152 | ΣS(j): | | 1.000E+01 | 9.493E+00 | 2.101E+00 | 5.517E-02 | 2.612E-22 |
| Gd-152 | Eu-152 | 2.792E-01 | 0.000E+00 | 1.746E-14 | 2.722E-13 | 3.427E-13 | 3.446E-13 |
| Eu-154 | Eu-154 | 1.000E+00 | 1.000E+01 | 9.243E+00 | 9.416E-03 | 3.795E-03 | 6.194E-34 |
| Eu-155 | Eu-155 | 1.000E+00 | 1.000E+01 | 8.690E+00 | 1.511E-01 | 8.520E-06 | 0.000E+00 |
| H-3 | H-3 | 1.000E+00 | 1.000E+01 | 3.643E+00 | 6.982E-13 | 0.000E+00 | 0.000E+00 |
| I-129 | I-129 | 1.000E+00 | 1.000E+01 | 9.995E+00 | 9.863E+00 | 9.485E+00 | 5.897E+00 |
| K-40 | K-40 | 1.000E+00 | 1.000E+01 | 1.000E+01 | 9.994E+00 | 9.979E+00 | 9.791E+00 |
| Na-22 | Na-22 | 1.000E+00 | 1.000E+01 | 7.661E+00 | 3.381E-03 | 2.693E-11 | 0.000E+00 |
| Pu-238 | Pu-238 | 1.000E+00 | 1.000E+01 | 9.921E+00 | 7.890E+00 | 4.538E+00 | 3.767E-03 |
| U-234 | Pu-238 | 1.000E+00 | 0.000E+00 | 2.824E-05 | 7.572E-04 | 1.959E-03 | 3.571E-02 |
| U-234 | U-234 | 1.000E+00 | 1.000E+01 | 1.000E+01 | 9.996E+00 | 9.995E+00 | 9.948E+00 |
| U-234 | U-238 | 1.000E+00 | 0.000E+00 | 2.835E-05 | 8.504E-04 | 2.836E-03 | 2.824E-02 |
| U-234 | ΣS(j): | | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 | 9.980E+00 |
| Th-230 | Pu-238 | 1.000E+00 | 0.000E+00 | 1.273E-10 | 1.063E-07 | 9.966E-07 | 2.804E-05 |
| Th-230 | Th-230 | 1.000E+00 | 1.000E+01 | 1.000E+01 | 9.997E+00 | 9.991E+00 | 9.910E+00 |
| Th-230 | U-234 | 1.000E+00 | 0.000E+00 | 9.004E-05 | 7.700E-03 | 8.996E-03 | 8.938E-02 |
| Th-230 | U-238 | 1.000E+00 | 0.000E+00 | 1.276E-10 | 1.148E-07 | 1.275E-06 | 1.269E-04 |
| Th-230 | ΣS(j): | | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 |

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Individual Nuclide Soil Concentration
Parent Nuclide And Branch Fraction Indicated

| Nuclide (j) | Parent (i) | BRF(i) | S(j,t), pCi/g t= 0.000E+00 | 1.000E+00 | 1.000E+01 | 1.000E+02 | 1.000E+03 |
|---|---|---|---|---|---|---|---|
| Pa-226 | Pu-238 | 1.000E+00 | 0.000E+00 | 1.839E-14 | 4.678E-10 | 1.512E-08 | 4.760E-06 |
| Ra-226 | Ra-226 | 1.000E+00 | 1.000E+01 | 9.936E+00 | 9.870E+00 | 9.574E+00 | 8.473E+00 |
| Pa-226 | Th-230 | 1.000E+00 | 0.000E+00 | 4.331E-03 | 1.291E-01 | 4.337E-01 | 3.496E+00 |
| Ra-226 | U-234 | 1.000E+00 | 0.000E+00 | 1.950E-05 | 1.747E-05 | 1.921E-04 | 1.687E-02 |
| Ra-226 | U-238 | 1.000E+00 | 0.000E+00 | 1.680E-14 | 4.958E-10 | 1.832E-08 | 1.652E-05 |
| Ra-226 | AS(j): | | 1.000E+01 | 1.000E+01 | 9.999E+00 | 9.998E+00 | 9.986E+00 |
| Pb-210 | Pu-238 | 1.000E+00 | 0.000E+00 | 1.419E-16 | 9.249E-11 | 7.216E-09 | 4.466E-06 |
| Pb-210 | Pa-226 | 1.000E+00 | 0.000E+00 | 3.060E-01 | 6.019E+00 | 9.257E+00 | 6.565E+00 |
| Pb-210 | Th-230 | 1.000E+00 | 0.000E+00 | 6.663E-05 | 4.523E-02 | 2.938E-01 | 3.405E+00 |
| Pb-210 | U-234 | 1.000E+00 | 0.000E+00 | 2.004E-10 | 4.372E-06 | 1.067E-04 | 1.589E-02 |
| Pb-210 | U-238 | 1.000E+00 | 0.000E+00 | 0.000E+00 | 9.704E-11 | 8.485E-09 | 1.507E-05 |
| Pb-210 | AS(j): | | 0.000E+00 | 3.060E-01 | 6.064E+00 | 9.552E+00 | 9.986E+00 |
| Pu-239 | Pu-239 | 1.000E+00 | 1.000E+01 | 1.000E+01 | 9.991E+00 | 9.971E+00 | 9.715E+00 |
| U-235 | Pu-239 | 1.000E+00 | 0.000E+00 | 9.848E-09 | 2.953E-07 | 9.833E-07 | 9.696E-06 |
| U-235 | U-235 | 1.000E+00 | 1.000E+01 | 1.000E+01 | 9.999E+00 | 9.998E+00 | 9.976E+00 |
| U-235 | AS(j): | | 1.000E+01 | 1.000E+01 | 9.999E+00 | 9.998E+00 | 9.976E+00 |
| Pa-231 | Pu-239 | 1.000E+00 | 0.000E+00 | 1.042E-13 | 9.372E-11 | 1.040E-09 | 1.023E-07 |
| Pa-231 | U-235 | 1.000E+00 | 0.000E+00 | 2.116E-04 | 6.345E-03 | 2.113E-02 | 2.089E-01 |
| Pa-231 | AS(j): | | 0.000E+00 | 2.116E-04 | 6.345E-03 | 2.113E-02 | 2.089E-01 |
| Ac-227 | Pu-239 | 1.000E+00 | 0.000E+00 | 1.097E-15 | 2.355E-11 | 5.835E-10 | 9.612E-08 |
| Ac-227 | U-235 | 1.000E+00 | 0.000E+00 | 3.333E-06 | 2.256E-03 | 1.477E-02 | 2.023E-01 |
| Ac-227 | AS(j): | | 0.000E+00 | 3.333E-06 | 2.256E-03 | 1.477E-02 | 2.023E-01 |
| Pu-240 | Pu-240 | 1.000E+00 | 1.000E+01 | 9.999E+00 | 9.966E+00 | 9.894E+00 | 9.993E+00 |
| U-236 | Pu-240 | 1.000E+00 | 0.000E+00 | 2.960E-07 | 8.866E-06 | 2.944E-05 | 2.805E-04 |
| Th-232 | Pu-240 | 1.000E+00 | 0.000E+00 | 7.302E-18 | 6.565E-15 | 7.276E-14 | 7.045E-12 |
| Th-232 | Th-232 | 1.000E+00 | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 |
| Th-232 | AS(j): | | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 |
| Ra-228 | Pu-240 | 1.000E+00 | 0.000E+00 | 2.848E-19 | 3.912E-15 | 6.170E-14 | 6.931E-12 |
| Ra-228 | Ra-228 | 1.000E+00 | 1.000E+01 | 8.864E+00 | 2.688E-01 | 5.816E-05 | 0.000E+00 |
| Ra-228 | Th-232 | 1.000E+00 | 0.000E+00 | 1.136E+00 | 9.731E+00 | 1.000E+01 | 1.000E+01 |
| Ra-228 | AS(j): | | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 |
| Th-228 | Pu-240 | 1.000E+00 | 0.000E+00 | 2.419E-20 | 3.136E-15 | 5.814E-14 | 6.893E-12 |
| Th-228 | Ra-228 | 1.000E+00 | 0.000E+00 | 2.553E+00 | 4.025E-01 | 8.716E-05 | 0.000E+00 |
| Th-228 | Th-228 | 1.000E+00 | 1.000E+01 | 6.961E+00 | 1.903E-04 | 1.840E-15 | 0.000E+00 |
| Th-228 | Th-232 | 1.000E+00 | 0.000E+00 | 1.864E-01 | 9.597E+00 | 1.000E+01 | 1.000E+01 |
| Th-228 | AS(j): | | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 | 1.000E+01 |
| Ru-106 | Ru-106 | 1.000E+00 | 1.000E+01 | 5.023E-09 | 1.030E-08 | 1.252E-29 | 0.000E+00 |
| Sr-90 | Sr-90 | 1.000E+00 | 1.000E+01 | 9.765E+00 | 8.596E+00 | 9.249E-01 | 4.578E-10 |



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Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

| Nuclide (j) | Parent (i) | BRF(i) | Sij,t), pCi/g t= 0.000E+00 | 1.000E+00 | 3.000E+01 | 1.000E+02 | 1.000E+03 |
|---|---|---|---|---|---|---|---|
| Tc-99 | Tc-99 | 1.000E+00 | 1.000E+01 | 9.990E+00 | 9.717E+00 | 9.089E+00 | 3.847E+00 |
| U-238 | U-238 | 1.000E+00 | 1.000E+01 | 1.000E+01 | 9.999E+00 | 9.998E+00 | 9.976E+00 |

BRF(i) is the branch fraction of the parent nuclide.

RESMAIN5.EXE execution time = 369.32 seconds