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*Date:* March 23, 2000
*Refer to:* E/ER:00-069

2000
RECEIVED

Mr. John Kieling
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

HSWA LANL 4/1049/0/C-00-005

**SUBJECT: PRELIMINARY HUMAN-HEALTH DOSE ASSESSMENT APPROACH FOR ACID CANYON**

Dear Mr. Kieling:

Attached are three copies of a "Preliminary Human-Health Dose Assessment Approach for Acid Canyon". This document presents the process the ER Project is planning to use to prepare a preliminary dose assessment from radionuclides in Acid Canyon. Results from this assessment will be presented to the County of Los Alamos and other stakeholders. This assessment will incorporate all validated data available at this time, including samples collected by the ER Project, by the NMED Oversight Bureau, and by EPA. This is not intended to be a final assessment for Acid Canyon, but an interim assessment to address concerns raised by stakeholders in Fall 1999 and to be used by DOE/UC to make an interim management decision, if necessary.

This document incorporates input by NMED and EPA at a meeting on March 9, 2000, and additional subsequent input by Barbara Toth. The key changes made, following this input, are the following:

1) An "extended backyard" scenario has been added that is tailored to the possibility of a child playing along the stream channel in Acid Canyon. The annual exposure time for this scenario is set at 200 hours following a written recommendation by Barbara Toth, and inhalation and ingestion parameters use EPA recommended values for a child.

2) Dust loading for the extended backyard scenario is set at a value intermediate between the natural dust loading for Los Alamos, as measured at LANL monitoring stations, and the extreme case of a construction site. This incorporates the possibility that the child is generating a large amount of dust while playing, following a verbal recommendation by NMED on March 9.

3) The "trail user" scenario has been modified to be more realistic for someone remaining on the trail, instead of trying to incorporate off-trail activities (which are now included in the "extended backyard" scenario). The annual exposure time for this scenario is set at 100 hours following verbal recommendations on March 9.

7487

4) Attachments to this document list all parameters used in RESRAD modeling runs and provide example RESRAD runs, as requested by Barbara Toth.

We request review and concurrence on this assessment approach by COB March 30, 2000. Following this date the ER Project will proceed with preparing an interim report documenting the results of this assessment, in preparation for briefing stakeholders in April.

If you have any questions, please call Dave McInroy at (505) 667-0819 or Allyn Pratt at (505) 667-4308 of the Los Alamos National Laboratory or Joe Mose at (505) 667-5808 of the Department of Energy.

Sincerely,

Julie A. Canepa, Program Manager
Los Alamos National Laboratory
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
Department of Energy
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JC/TT/RB/jl

Enclosure: Preliminary Human-Health Dose Assessment Approach for Acid Canyon

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**Preliminary Human-Health Dose Assessment Approach for Acid Canyon**

**Canyons Focus Area, Environmental Restoration Project,**
**Los Alamos National Laboratory**
**March 22, 2000**

**Objectives**: The purpose of this document is to present the human-health radiation dose assessment approach for radioactive contaminants in Acid Canyon sediments. Although the approach was developed to address concerns regarding Acid Canyon, this approach will be also applicable to data for other canyons and contaminants. The emphasis of this assessment is to provide information to risk managers that is consistent with requirements and guidance documented in DOE Orders and companion materials (e.g., RESRAD software). The information provided by this assessment will be used by risk managers for decision-making in conjunction with all applicable standards and guidance. This approach will use present-day contaminant concentrations and reasonable present-day exposure scenarios. Assessment of non-radionuclides, assessment of potential ecological risk, and formal documentation of potential dose from radionuclides will be included in a future Surface Aggregate Report for Los Alamos Canyon and Pueblo Canyon.

**Technical Approach**: Radioactive chemicals of potential concern (COPCs) are identified if the reach-specific concentrations exceed background and fallout concentrations. Initial risk-based screening of human-health dose for this assessment is based on a comparison of maximum values for each of the radionuclide COPCs with human health screening values for a child playing along the stream channel (an "extended backyard" scenario) and for an adult using trails in the area (a "trail user" scenario). In previous reports on canyon sediments such screening values were called preliminary remediation goal (PRG) values (Reneau et al. 1998a, Reneau et al. 1998b, Reneau et al. 1998c, Katzman et al. 1999). The PRGs for radionuclides are replaced in this document by single radionuclide soil guidelines (SRSGs) calculated with RESRAD version 5.95 (Yu et al. 1993). This replacement of PRGs with SRSGs makes this preliminary dose assessment directly comparable to assessments performed for other sites administered by DOE/Albuquerque Operations Office. Radionuclides that contribute to a sum of quotients exceeding unity (sum of the ratio of maximum value to SRSG for all radionuclide COPCs) are considered further using area-weighted average calculations and elevated measurement comparisons.

The SRSGs are generated by using the exposure parameters associated with the extended backyard and trail user scenarios, as described below, and computing the contaminant concentration that would result in a dose of 15 mrem/year. The extended backyard and trail user exposure parameters used here are similar to values previously presented in reports on canyon sediments (Reneau et al. 1998a, Reneau et al. 1998b, Reneau et al. 1998c, Katzman et al. 1999), which were tailored to conditions in canyons accessible to the public. These parameters differ in some respects from the default parameters subsequently presented by Mirenda and Soholt (1999), and differences are discussed at the end of the following section. The radiation dose limit of 15 mrem/yr follows proposed Environmental Protection Agency (EPA) guidelines (EPA 1997a), and is more

protective of possible human health effects than the dose limit of 25 mrem/yr proposed by the US Nuclear Regulatory Commission for unrestricted use of a site (10 CFR 20, "Standards for Protection of Radiation") and the limit of 100 mrem/yr in US Department of Energy (DOE) Order 5400.5, "Radiation Protection of the Public and the Environment." DOE has the additional policy of reducing all radiation exposures to levels that are as low as reasonably achievable (ALARA) and ALARA will be considered in any risk management evaluations that follow this preliminary assessment.

**Reasonable Maximum Exposure Scenarios**: There are five human exposure scenarios (resident, Laboratory worker, construction worker, trail user, and resource user) that have been previously developed by the Laboratory for assessing potential effects from exposure to contaminated soil and sediments (Mirenda and Soholt 1999). The Laboratory worker scenario was developed for Laboratory Technical Areas and does not apply to Acid Canyon because it is Los Alamos County property. There are no edible plants in the area of contaminated sediments that would make a "resource user" scenario a reasonable selection, and there is no hunting permitted in this area. There are no residences in the canyon nor planned for the canyon, and therefore a residential exposure scenario is also not reasonable. Lastly, there are no utilities in the area of the contaminated sediments, nor are there any planned trenching activities that would be consistent with a "construction worker" scenario.

Of the five standard human exposure scenarios, only the trail user is applicable to Acid Canyon. A well-used public trail crosses the contaminated sediments in one location, crosses the stream on a bridge in a second location, and lies within 10 m of the contaminated sediments for approximately 200 m. In addition, residential areas occur near Acid Canyon and it is possible that children could use the canyon as an extension to their backyard and play along the stream channel. Therefore, an "extended backyard" scenario for children is developed in this document to supplement the trail user scenario. Because dose conversion factors for populations other than adult workers have not been published by DOE, adult dose conversion factors are applied to children in this assessment.

Both trail users and individuals off the trail along the stream channel could potentially be exposed to contaminated sediments through incidental ingestion, inhalation of suspended particles, and external gamma radiation. This preliminary assessment therefore identifies three exposure routes for radionuclide contaminants in sediments for both scenarios; soil ingestion, dust inhalation, and external irradiation. Water-related exposure pathways are not assessed because the episodic availability of water in ephemeral Acid Canyon reaches is judged insufficient to result in chronic exposures. As noted above, the absence of edible plants or plant products in Acid Canyon precludes use of a plant ingestion pathway, and hunting of animals is prohibited in the area. Consistent with EPA guidance (*Risk Assessment Guidance for Superfund*, EPA 1989), a dermal absorption pathway is not evaluated for radionuclides.

The extended backyard and trail user exposure scenarios were developed using EPA-recommended upper-bound parameter values, when available and applicable, and

constitute reasonable maximum exposure estimates. Primary sources for obtaining exposure parameter values include *Use of Standard Default Exposure Factors* (EPA 1991) and the *Exposure Factors Handbook* (EPA 1997b). Because these scenarios assume the use is entirely along the stream channel and in adjacent contaminated sediments (i.e., largely off trail use), the actual exposure to anyone using the existing trails would be much less.

The extended backyard scenario assumes that a child plays in the canyon bottom, or reach, for 200 hours each year, equivalent to 1 hour per day for approximately seven months out of each year. The trail user scenario assumes that an adult uses this area for hiking or other activities 100 hours per year , equivalent to1 hour per day for 100 days each year. These exposure frequencies are based on professional judgement, incorporating input from NMED. EPA Region 6, for comparison, recommends an exposure frequency of 60 days per year for recreational activities (EPA 1995). The contaminated area is assumed to be 10,000 $m^2$, which is consistent with an infinite source for the external radiation and soil ingestion pathways. These values are consistent with the default area assumption cited in the RESRAD documentation (Yu et al. 1993). The extended backyard scenario has greater exposure time (200 hours compared to 100 hours per year) than the child recreational scenario (Mirenda and Soholt 1999, Table 22, "Values for Mesa-Top Scenario-Specific RESRAD Parameters"). The default recreational user in Mirenda and Soholt (1999) spends 200 days in the contaminated area, for 1 hour per day, which is viewed to be appropriate for a mesa top site with improved recreational facilities (like a picnic area). The 100 hours per year used here for the trail user scenario is considered more appropriate based on knowledge of the use of Acid Canyon and the lack of improvements (other than the trail system itself) that would encourage more active use of the area.

**Changes to Default RESRAD Version 5.95 Parameters for Extended Backyard Scenario to Derive Single Radionuclide Soil Guidelines**

**Dose Limit**: 15 mrem/year, consistent with EPA (1997a), Mirenda and Soholt (1999), and developing guidance from DOE/Albuquerque Operations Office. Note that 15 mrem/year is approximately equal to a carcinogenic risk of 3E-4 for an exposure duration of 30 years (EPA 1997a), and that RESRAD can provide estimates of carcinogenic risk for radionuclides.

**Radionuclides**: Am-241, Cs-137, H-3, Pu-238, Pu-239, Sr-90, U-234, U-235, U-238

**Pathways**: External irradiation, soil ingestion, and dust inhalation. Other pathways are not complete for the extended backyard scenario.

**Leaching**: The evapotranspiration coefficient was set at maximum value of 0.999. The irrigation rate was set to zero. Disabling irrigation and setting evapotranspiration to 0.999 results in no leaching of radionuclides into the vadose zone over time. This maximizes future surface dose (potentially important for the uranium isotopes) and maintains

consistency with the approach used in the reach reports (Reneau et al. 1998a, Reneau et al. 1998b, Reneau et al. 1998c, Katzman et al. 1999).

**Occupancy**: The fraction of a year on-site spent indoors was set to zero. The fraction of a year on-site spent outdoors was set to 0.0228 (200 hours divided by 8760 hours in a year). This occupancy is greater than the value used in the reach reports (Reneau et al. 1998a, Reneau et al. 1998b, Reneau et al. 1998c, Katzman et al. 1999) that is based on assumptions of 1 hour/day, 75 day/year.

**Inhalation Rate**: The extended backyard input of 1.2 $m^3$/hour for a child corresponds to 10,500 $m^3$/year. This inhalation rate was also assumed for the child recreational scenario (Mirenda and Soholt 1999) and pertains to short-term exposures of children under moderate activity levels (EPA 1997b; Table 5-23).

**Dust Mass Loading**: The extended backyard input of 0.0002 g/$m^3$ for a child is based on the geometric mean of three values (0.002, 0.0001, and 0.00002). The highest value is based on assumptions of mechanical disturbance (for example, an activity like trenching that generates large amounts of dust). The middle value is based on the Particulate Emission Model used in the reach reports (Reneau et al. 1998a, Reneau et al. 1998b, Reneau et al. 1998c, Katzman et al. 1999) and is the same value used in Mirenda and Soholt (1999). The lowest value is based on the average of Laboratory-specific measured dust mass loading values (PM-10), presented in Environmental Surveillance Reports. The incorporation of the NRC value reflects an assumption that children playing in the canyon may stir up dust during their activities. The use of a geometric mean is based on the presumption that episodically high levels of dust are relatively infrequent, and therefore actual dust loading levels based on the three estimates provided above may be well-characterized by a skewed (i.e., lognormal) distribution.

**Wind Speed**: The wind speed used in the RESRAD calculations was 3 m/s based on Laboratory meteorological records (Bowen 1990; www.weather.lanl.gov/htmls/climatology.html) which is consistent with the value used in the reach reports (Reneau et al. 1998a, Reneau et al. 1998b, Reneau et al. 1998c, Katzman et al. 1999) and Mirenda and Soholt (1999).

**Humidity**: The humidity used in the RESRAD calculations was 5.5 g/$m^3$ (based on Laboratory meteorological records (Bowen 1990; www.weather.lanl.gov/htmls/climatology.html).

**Soil Ingestion Rate**: The on-site soil ingestion rate was set at 313 g/year. Because RESRAD applies a site utilization fraction when calculating an on-site soil ingestion rate, the RESRAD input must be modified to account for this in order to maintain consistency with the extended backyard scenario description. The value of 313 g for yearly soil intake was calculated as ([0.2 g/day soil ingestion rate / 5.6 hours/day outdoor activity]x 200 hours/year exposure frequency) / 0.0228 year site utilization fraction. The daily soil ingestion of 0.2 g/day is the recommended child soil ingestion value from EPA (1991) and is described as "a conservative estimate of the mean" in a footnote to Table 4-23 in

EPA (1997b). We conservatively assume that 100% of the soil ingested comes from outdoor activity. The amount of time a child spends outdoors, 5.6 hours/day, is an EPA-recommended value for use in exposure assessment (EPA 1997c). We note that the 1 hour per day assumed for the extended backyard implies that a child spends about 18% of their daily outdoor activity time in the reach.

The complete RESRAD summary report for the extended backyard scenario is provided as Attachment A.

**Changes to Default RESRAD Version 5.95 Parameters for Trail User Scenario to Derive Single Radionuclide Soil Guidelines**

**Dose Limit**: Same as for the extended backyard scenario.

**Radionuclides**: Same as for the extended backyard scenario.

**Pathways**: Same as for the extended backyard scenario.

**Leaching**: Same as for the extended backyard scenario.

**Occupancy**: The fraction of a year on-site spent indoors was set to zero. The fraction of a year on-site spent outdoors was set to 0.0114 (0.0114 = 100 hours divided by 8760 hours in a year). This occupancy is greater than the value used in the reach reports (Reneau et al. 1998a, Reneau et al. 1998b, Reneau et al. 1998c, Katzman et al. 1999) that is based on assumptions of 1 hour/day, 75 day/year.

**Inhalation Rate**: The trail user input of 1.6 $m^3$/hour for an adult corresponds to 14,000 $m^3$/year. This inhalation rate is based on the final version of EPA's Exposure Factors Handbook (EPA 1997b) for adult short-term exposure under moderate activity levels.

**Dust Mass Loading**: The trail user input of 0.00002 g/$m^3$ is based on the average of Laboratory-specific measured dust mass loading values (PM-10), presented in Environmental Surveillance Reports. Unlike the extended backyard scenario, it was assumed that adults do not generate appreciable suspended dust during their use of the affected area.

**Wind Speed**: Same as for the extended backyard scenario.

**Humidity**: Same as for the extended backyard scenario.

**Soil Ingestion Rate**: The on-site soil ingestion rate was set at 292 g/year. Because RESRAD applies a site utilization fraction based on occupancy when calculating an on-site soil ingestion rate, the RESRAD input must be modified to account for this in order to maintain consistency with the trail user scenario described in the reach reports and the extended backyard scenario described above. The value of 292 g for yearly soil intake was calculated as ([0.05 g/day soil ingestion rate / 1.5 hours/day outdoor activity] x 100

hours/year exposure frequency) / 0.0114 year site utilization fraction. The daily soil ingestion of 0.05 g/day is the recommended adult soil ingestion value from EPA (1997b). We conservatively assume that 100% of the soil ingested comes from outdoor activity. The outdoor time value of 1.5 hours/day for adults is recommended for exposure assessment in EPA (1997c). We note that the 1 hour per day assumed for the trail user implies that the receptor spends about 67% of their average daily outdoor activity time in the reach.

The complete RESRAD summary report for the extended backyard scenario is provided as Attachment B.

The resulting RESRAD extended backyard and trail user SRSGs calculated using the preceding parameters are summarized in Table 1.

**Table 1**
**RESRAD Single Radionuclide Soil Guidelines**
**for Extended Backyard and Trail User Scenario Based on 15 mrem/year Dose**

| Radionuclide | Extended Backyard SRSG (pCi/g) | Trail User SRSG (pCi/g) |
|---|---|---|
| americium-241 | 500 | 1200 |
| cesium-137+D | 210 | 420 |
| plutonium-238 | 590 | 1400 |
| plutonium-239 | 530 | 1300 |
| strontium-90+D | 9100 | 19000 |
| tritium | 38000 | 29000 |
| uranium-234 | 5100 | 15000 |
| uranium-235+D | 780 | 1600 |
| uranium-238+D | 2600 | 6200 |

+D indicates "plus daughter radionuclides"

**Data Assessment**: Data collection for the Canyons sediment investigations follows the approved Los Alamos Canyon and Pueblo Canyon Work Plan (LANL, 1995) and the Core Document for Canyons Investigations (LANL, 1997). These plans employ a technical approach that emphasizes geomorphic mapping of potentially contaminated sediments, field radiation screening, and multiple phases of sediment sampling. The sediment samples are analyzed with EPA or DOE approved analytical methods and the analytical data are subject to routine Quality Assurance and Quality Control (QA/QC) analysis. During data review of these phased investigation sample results, focused data review is used to evaluate any suspect values. Analytical results are then subject to a background comparison/detection status evaluation to identify COPCs. The COPCs are then compared to SRSGs to identify analytes that may be risk drivers, which is followed by other assessment steps as outlined below.

Specifically for radionuclides, the process will consist of the following steps:

1) QA/QC of analytical sample results.
2) Identify COPCs by comparing to background/fallout levels.
3) Eliminate radionuclides from further evaluation if the maximum concentration is less than the background/fallout values or if the data are not statistically different from background/fallout concentrations[1] (Ryti et al. 1998). If no radionuclides are identified as COPCs then no further radionuclide dose assessment is needed and the process is concluded at this point.
4) Compare the maximum values for each of the radionuclide COPCs with the extended backyard and trail user SRSGs. Radionuclides with maximum values exceeding SRSGs or radionuclides that contribute to a sum of quotients exceeding unity (sum of the ratio of maximum to SRSG for all radionuclide COPCs) must be considered for further assessment.
5) For radionuclide COPCs identified in step #4, calculate the average concentration in each geomorphic unit, calculating concentrations separately for fine-grained sediment and coarse-grained sediment in the different units. The separation of data for fine-grained and coarse-grained sediments is made because the former generally have higher concentrations and occur at or closer to the ground surface. Use of concentration data for fine-grained sediments also provides a more realistic assessment of dose to the trail user via soil ingestion and dust inhalation pathways because exposure is associated with finer particulates for these routes of intake.. This information will also be useful in establishing the radionuclide contaminant inventory and its relative distribution, which will help understand how various risk management options will affect dose.
6) For radionuclide COPCs identified in step #4, calculate area-weighted average concentrations for the entire reach. These weighted averages are the combined products of the average concentration in each geomorphic unit and the fraction of the total reach area contained in that unit. For example, if 30% of the samples were collected from a geomorphic unit that encompasses 5% of the total area, then the average of these sample data are multiplied by 0.05 in calculating an area-weighted average. Reach reports (Reneau et al. 1998a, Reneau et al. 1998b, Reneau et al. 1998b, Katzman et al. 1999) contain examples of this process of calculating weighted averages for canyon sediments.
7) Compute the sum of SRSG quotients for radionuclide COPCs based on the weighted average computed in step #6. A sum equal to 1 is equivalent to a dose of 15 mrem/yr from all radionuclide contributions to the sum. If the sum is less than 1, then there is typically no need for any further assessment of the potential dose from average reach concentrations.
8) For each geomorphic unit where at least one radionuclide that has an average concentration that exceeds the SRSG, apply the "hot spot" area adjustment factor to each polygon in these geomorphic units from DOE Order 5400.5. The Adjustment Factor $= 1 \Big/ \left(\frac{A}{100}\right)^{0.5}$, where A = area of geomorphic unit in $m^2$ if the area $<25\ m^2$ (for areas $>25\ m^2$, the adjustment factor = 1). For each of the selected

[1] Statistical comparisons are not needed for the radionuclides identified as COPCs in Acid Canyon South Fork.

radionuclide COPCs, modify the SRSG and calculate the adjusted sum of quotients total, and evaluate the sum relative to 1. Per RESRAD guidance (Yu et al. 1993), areas smaller than 1 $m^2$ are assumed to equal 1 $m^2$ for the purposes of calculating the adjustment factor. Thus, adjustment factors vary between 2 (for a 25 $m^2$ area) and 10 (for a 1 $m^2$ area). If the sum is less than 1, then there is no need for any further assessment of the potential dose from "hot spots."

9) Calculate the maximum value to SRSG ratios for comparison to the DOE Order 5400.5 recommendation of taking reasonable actions whenever any location exceeds 30 times the authorized limit (where an authorized limit is interpreted to be the SRSG for the purposes of this preliminary dose assessment).

10) Use the results of steps #1 to #9 to evaluate if there is a need to proceed with further site-specific dose assessment and/or to propose risk management options.

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**Appendix A**
**Summary of RESRAD Parameters for the Extended Backyard Scenario**

| Parameter | Value Selected | Notes |
|---|---|---|
| Dose conversion factors | Default | RESRAD contains current information on the dose conversion factors |
| Concentration ratios, food intake ratios, and bioconcentration factors | Not used | Food pathways were turned off |
| Area of contaminated zone (m**2) | 10,000 | Default value, maximizes exposure via soil ingestion and external gamma |
| Thickness of contaminated zone (m) | 2 | Default value, maximizes exposure via external gamma |
| Basic radiation dose limit (mrem/yr) | 15 | Based on EPA guidance |
| Time since placement of material (yr) | 0 | Default value, does not allow for any radiological decay |
| Initial concentrations of principal radionuclides | Set to 1 pCi/g to calculate SRSG | Will use the weighted average concentrations in the preliminary dose assessment RESRAD run |
| Cover depth (m) | 0 | Default value, assumes exposure to surface geomorphic units |
| Density of contaminated zone (g/cm**3) | 1.5 | Default value, parameter is used in the tritium submodel |
| Physical parameters of the contaminated zone | Default | Transport is not being modeled |
| Evapotranspiration coefficient | 0.999 | Minimizes net infiltration |
| Precipitation (m/yr) | 0.35 | Los Alamos value |
| Irrigation (m/yr) | 0 | Gardening pathway disabled |
| Watershed parameters | Not used | |
| Physical parameters of the saturated zone | Not used | Transport is not being modeled |
| Distribution coefficients | Not used | Transport is not being modeled |
| Inhalation rate (m**3/yr) | 10,500 | Assumes child respiration rate for moderate activity of 1.2 m**3/hr |
| Mass loading for inhalation (g/m**3) | 0.0002 | Geometric mean of 0.002, 0.0001, and 0.00002 |
| Exposure duration (yr) | 6 | Assumes child 6-12 years old |
| Shielding factors | Not used | No residences on site |
| Fraction of time spent outdoors (on site) | 0.0228 | Assume 200 hours out of 8760 in a year |
| Shape factor flag, external gamma | Default value | For circular contaminated zone - will overestimate external dose for non-circular contaminated areas |
| Soil ingestion rate (g/yr) | 313 | After adjusting for occupancy this equals 7.14 g/yr |
| Depth of soil mixing layer (m) | Not used | Plant pathway is turned off |
| Storage times of contaminated foodstuffs (days) | Not used | Food pathways are turned off |

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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 | Cs-137+D | 3.190E-05 | 3.190E-05 | DCF2( 3) |
| B-1 | H-3 | 6.400E-08 | 6.400E-08 | DCF2( 4) |
| B-1 | Np-237+D | 5.400E-01 | 5.400E-01 | DCF2( 5) |
| B-1 | Pa-231 | 1.280E+00 | 1.280E+00 | DCF2( 6) |
| B-1 | Pb-210+D | 2.320E-02 | 2.320E-02 | DCF2( 7) |
| B-1 | Pu-238 | 3.920E-01 | 3.920E-01 | DCF2( 8) |
| B-1 | Pu-239 | 4.290E-01 | 4.290E-01 | DCF2( 9) |
| B-1 | Ra-226+D | 8.600E-03 | 8.600E-03 | DCF2(10) |
| B-1 | Sr-90+D | 1.310E-03 | 1.310E-03 | DCF2(11) |
| B-1 | Th-229+D | 2.160E+00 | 2.160E+00 | DCF2(12) |
| B-1 | Th-230 | 3.260E-01 | 3.260E-01 | DCF2(13) |
| B-1 | U-233 | 1.350E-01 | 1.350E-01 | DCF2(14) |
| B-1 | U-234 | 1.320E-01 | 1.320E-01 | DCF2(15) |
| B-1 | U-235+D | 1.230E-01 | 1.230E-01 | DCF2(16) |
| B-1 | U-238+D | 1.180E-01 | 1.180E-01 | DCF2(17) |
| | | | | |
| 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 | Cs-137+D | 5.000E-05 | 5.000E-05 | DCF3( 3) |
| D-1 | H-3 | 6.400E-08 | 6.400E-08 | DCF3( 4) |
| D-1 | Np-237+D | 4.440E-03 | 4.440E-03 | DCF3( 5) |
| D-1 | Pa-231 | 1.060E-02 | 1.060E-02 | DCF3( 6) |
| D-1 | Pb-210+D | 7.270E-03 | 7.270E-03 | DCF3( 7) |
| D-1 | Pu-238 | 3.200E-03 | 3.200E-03 | DCF3( 8) |
| D-1 | Pu-239 | 3.540E-03 | 3.540E-03 | DCF3( 9) |
| D-1 | Ra-226+D | 1.330E-03 | 1.330E-03 | DCF3(10) |
| D-1 | Sr-90+D | 1.530E-04 | 1.530E-04 | DCF3(11) |
| D-1 | Th-229+D | 4.030E-03 | 4.030E-03 | DCF3(12) |
| D-1 | Th-230 | 5.480E-04 | 5.480E-04 | DCF3(13) |
| D-1 | U-233 | 2.890E-04 | 2.890E-04 | DCF3(14) |
| D-1 | U-234 | 2.830E-04 | 2.830E-04 | DCF3(15) |
| D-1 | U-235+D | 2.670E-04 | 2.670E-04 | DCF3(16) |
| D-1 | U-238+D | 2.690E-04 | 2.690E-04 | DCF3(17) |
| | | | | |
| 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 | | | | |
| 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 | | | | |
| D-34 | Cs-137+D , plant/soil concentration ratio, dimensionless | 4.000E-02 | 4.000E-02 | RTF( 3,1) |
| D-34 | Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.000E-02 | 3.000E-02 | RTF( 3,2) |
| D-34 | Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 8.000E-03 | 8.000E-03 | RTF( 3,3) |

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

| Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| D-34 | H-3 , plant/soil concentration ratio, dimensionless | 4.800E+00 | 4.800E+00 | RTF( 4,1) |
| D-34 | H-3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.200E-02 | 1.200E-02 | RTF( 4,2) |
| D-34 | H-3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-02 | 1.000E-02 | RTF( 4,3) |
| D-34 | | | | |
| D-34 | Np-237+D , plant/soil concentration ratio, dimensionless | 2.000E-02 | 2.000E-02 | RTF( 5,1) |
| D-34 | Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF( 5,2) |
| D-34 | Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF( 5,3) |
| D-34 | | | | |
| D-34 | Pa-231 , plant/soil concentration ratio, dimensionless | 1.000E-02 | 1.000E-02 | RTF( 6,1) |
| D-34 | Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 5.000E-03 | 5.000E-03 | RTF( 6,2) |
| D-34 | Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF( 6,3) |
| D-34 | | | | |
| D-34 | Pb-210+D , plant/soil concentration ratio, dimensionless | 1.000E-02 | 1.000E-02 | RTF( 7,1) |
| D-34 | Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 8.000E-04 | 8.000E-04 | RTF( 7,2) |
| D-34 | Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 3.000E-04 | 3.000E-04 | RTF( 7,3) |
| D-34 | | | | |
| D-34 | Pu-238 , plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF( 8,1) |
| D-34 | Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF( 8,2) |
| D-34 | Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-06 | 1.000E-06 | RTF( 8,3) |
| D-34 | | | | |
| D-34 | Pu-239 , plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF( 9,1) |
| D-34 | Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF( 9,2) |
| D-34 | Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-06 | 1.000E-06 | RTF( 9,3) |
| D-34 | | | | |
| D-34 | Ra-226+D , plant/soil concentration ratio, dimensionless | 4.000E-02 | 4.000E-02 | RTF(10,1) |
| D-34 | Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF(10,2) |
| D-34 | Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF(10,3) |
| D-34 | | | | |
| D-34 | Sr-90+D , plant/soil concentration ratio, dimensionless | 3.000E-01 | 3.000E-01 | RTF(11,1) |
| D-34 | Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 8.000E-03 | 8.000E-03 | RTF(11,2) |
| D-34 | Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 2.000E-03 | 2.000E-03 | RTF(11,3) |
| D-34 | | | | |
| D-34 | Th-229+D , plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF(12,1) |
| D-34 | Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(12,2) |
| D-34 | Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF(12,3) |
| D-34 | | | | |
| D-34 | Th-230 , plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF(13,1) |
| D-34 | Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(13,2) |
| D-34 | Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF(13,3) |
| D-34 | | | | |
| D-34 | U-233 , plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(14,1) |
| D-34 | U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(14,2) |
| D-34 | U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(14,3) |
| D-34 | | | | |
| D-34 | U-234 , plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(15,1) |
| D-34 | U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(15,2) |
| D-34 | U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(15,3) |
| D-34 | | | | |

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

| Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| D-34 | U-235+D , plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(16,1) |
| D-34 | U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(16,2) |
| D-34 | U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(16,3) |
| D-34 | | | | |
| D-34 | U-238+D , plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(17,1) |
| D-34 | U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(17,2) |
| D-34 | U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(17,3) |
| | | | | |
| D-5 | Bioaccumulation factors, fresh water, L/kg: | | | |
| D-5 | Ac-227+D , fish | 1.500E+01 | 1.500E+01 | BIOFAC( 1,1) |
| D-5 | Ac-227+D , crustacea and mollusks | 1.000E+03 | 1.000E+03 | BIOFAC( 1,2) |
| D-5 | | | | |
| D-5 | Am-241 , fish | 3.000E+01 | 3.000E+01 | BIOFAC( 2,1) |
| D-5 | Am-241 , crustacea and mollusks | 1.000E+03 | 1.000E+03 | BIOFAC( 2,2) |
| D-5 | | | | |
| D-5 | Cs-137+D , fish | 2.000E+03 | 2.000E+03 | BIOFAC( 3,1) |
| D-5 | Cs-137+D , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC( 3,2) |
| D-5 | | | | |
| D-5 | H-3 , fish | 1.000E+00 | 1.000E+00 | BIOFAC( 4,1) |
| D-5 | H-3 , crustacea and mollusks | 1.000E+00 | 1.000E+00 | BIOFAC( 4,2) |
| D-5 | | | | |
| D-5 | Np-237+D , fish | 3.000E+01 | 3.000E+01 | BIOFAC( 5,1) |
| D-5 | Np-237+D , crustacea and mollusks | 4.000E+02 | 4.000E+02 | BIOFAC( 5,2) |
| D-5 | | | | |
| D-5 | Pa-231 , fish | 1.000E+01 | 1.000E+01 | BIOFAC( 6,1) |
| D-5 | Pa-231 , crustacea and mollusks | 1.100E+02 | 1.100E+02 | BIOFAC( 6,2) |
| D-5 | | | | |
| D-5 | Pb-210+D , fish | 3.000E+02 | 3.000E+02 | BIOFAC( 7,1) |
| D-5 | Pb-210+D , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC( 7,2) |
| D-5 | | | | |
| D-5 | Pu-238 , fish | 3.000E+01 | 3.000E+01 | BIOFAC( 8,1) |
| D-5 | Pu-238 , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC( 8,2) |
| D-5 | | | | |
| D-5 | Pu-239 , fish | 3.000E+01 | 3.000E+01 | BIOFAC( 9,1) |
| D-5 | Pu-239 , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC( 9,2) |
| D-5 | | | | |
| D-5 | Ra-226+D , fish | 5.000E+01 | 5.000E+01 | BIOFAC(10,1) |
| D-5 | Ra-226+D , crustacea and mollusks | 2.500E+02 | 2.500E+02 | BIOFAC(10,2) |
| D-5 | | | | |
| D-5 | Sr-90+D , fish | 6.000E+01 | 6.000E+01 | BIOFAC(11,1) |
| D-5 | Sr-90+D , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC(11,2) |
| D-5 | | | | |
| D-5 | Th-229+D , fish | 1.000E+02 | 1.000E+02 | BIOFAC(12,1) |
| D-5 | Th-229+D , crustacea and mollusks | 5.000E+02 | 5.000E+02 | BIOFAC(12,2) |
| D-5 | | | | |
| D-5 | Th-230 , fish | 1.000E+02 | 1.000E+02 | BIOFAC(13,1) |
| D-5 | Th-230 , crustacea and mollusks | 5.000E+02 | 5.000E+02 | BIOFAC(13,2) |
| D-5 | | | | |
| D-5 | U-233 , fish | 1.000E+01 | 1.000E+01 | BIOFAC(14,1) |
| D-5 | U-233 , crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(14,2) |

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

| Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| D-5 | U-234 , fish | 1.000E+01 | 1.000E+01 | BIOFAC(15,1) |
| D-5 | U-234 , crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(15,2) |
| D-5 | | | | |
| D-5 | U-235+D , fish | 1.000E+01 | 1.000E+01 | BIOFAC(16,1) |
| D-5 | U-235+D , crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(16,2) |
| D-5 | | | | |
| D-5 | U-238+D , fish | 1.000E+01 | 1.000E+01 | BIOFAC(17,1) |
| D-5 | U-238+D , crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(17,2) |

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) | 1.000E+04 | 1.000E+04 | --- | AREA |
| R011 | Thickness of contaminated zone (m) | 2.000E+00 | 2.000E+00 | --- | THICK0 |
| R011 | Length parallel to aquifer flow (m) | not used | 1.000E+02 | --- | LCZPAQ |
| R011 | Basic radiation dose limit (mrem/yr) | 1.500E+01 | 3.000E+01 | --- | BRDL |
| R011 | Time since placement of material (yr) | 0.000E+00 | 0.000E+00 | --- | TI |
| R011 | Times for calculations (yr) | 3.000E+01 | 1.000E+00 | --- | T( 2) |
| R011 | Times for calculations (yr) | not used | 3.000E+00 | --- | T( 3) |
| R011 | Times for calculations (yr) | not used | 1.000E+01 | --- | T( 4) |
| R011 | Times for calculations (yr) | not used | 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+00 | 0.000E+00 | --- | S1( 2) |
| R012 | Initial principal radionuclide (pCi/g): Cs-137 | 1.000E+00 | 0.000E+00 | --- | S1( 3) |
| R012 | Initial principal radionuclide (pCi/g): H-3 | 1.000E+00 | 0.000E+00 | --- | S1( 4) |
| R012 | Initial principal radionuclide (pCi/g): Pu-238 | 1.000E+00 | 0.000E+00 | --- | S1( 8) |
| R012 | Initial principal radionuclide (pCi/g): Pu-239 | 1.000E+00 | 0.000E+00 | --- | S1( 9) |
| R012 | Initial principal radionuclide (pCi/g): Sr-90 | 1.000E+00 | 0.000E+00 | --- | S1(11) |
| R012 | Initial principal radionuclide (pCi/g): U-234 | 1.000E+00 | 0.000E+00 | --- | S1(15) |
| R012 | Initial principal radionuclide (pCi/g): U-235 | 1.000E+00 | 0.000E+00 | --- | S1(16) |
| R012 | Initial principal radionuclide (pCi/g): U-238 | 1.000E+00 | 0.000E+00 | --- | S1(17) |
| R012 | Concentration in groundwater (pCi/L): Am-241 | not used | 0.000E+00 | --- | W1( 2) |
| R012 | Concentration in groundwater (pCi/L): Cs-137 | not used | 0.000E+00 | --- | W1( 3) |
| R012 | Concentration in groundwater (pCi/L): H-3 | not used | 0.000E+00 | --- | W1( 4) |
| R012 | Concentration in groundwater (pCi/L): Pu-238 | not used | 0.000E+00 | --- | W1( 8) |
| R012 | Concentration in groundwater (pCi/L): Pu-239 | not used | 0.000E+00 | --- | W1( 9) |
| R012 | Concentration in groundwater (pCi/L): Sr-90 | not used | 0.000E+00 | --- | W1(11) |
| R012 | Concentration in groundwater (pCi/L): U-234 | not used | 0.000E+00 | --- | W1(15) |
| R012 | Concentration in groundwater (pCi/L): U-235 | not used | 0.000E+00 | --- | W1(16) |
| R012 | Concentration in groundwater (pCi/L): U-238 | not used | 0.000E+00 | --- | W1(17) |
| R013 | Cover depth (m) | 0.000E+00 | 0.000E+00 | --- | COVER0 |
| R013 | Density of cover material (g/cm**3) | not used | 1.500E+00 | --- | DENSCV |
| R013 | Cover depth erosion rate (m/yr) | not used | 1.000E-03 | --- | VCV |
| R013 | Density of contaminated zone (g/cm**3) | 1.500E+00 | 1.500E+00 | --- | DENSCZ |
| R013 | Contaminated zone erosion rate (m/yr) | 1.000E-03 | 1.000E-03 | --- | VCZ |
| R013 | Contaminated zone total porosity | 4.000E-01 | 4.000E-01 | --- | TPCZ |
| R013 | Contaminated zone field capacity | 2.000E-01 | 2.000E-01 | --- | FCCZ |
| R013 | Contaminated zone hydraulic conductivity (m/yr) | 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) | 5.500E+00 | 8.000E+00 | --- | HUMID |
| R013 | Evapotranspiration coefficient | 9.990E-01 | 5.000E-01 | --- | EVAPTR |
| R013 | Precipitation (m/yr) | 3.500E-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 |

Site-Specific Parameter Summary (continued)

| Menu | Parameter | User Input | Default | Used by RESRAD (If different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R013 | Watershed area for nearby stream or pond (m**2) | not used | 1.000E+06 | --- | WAREA |
| R013 | Accuracy for water/soil computations | not used | 1.000E-03 | --- | EPS |
| | | | | | |
| R014 | Density of saturated zone (g/cm**3) | not used | 1.500E+00 | --- | DENSAQ |
| R014 | Saturated zone total porosity | not used | 4.000E-01 | --- | TPSZ |
| R014 | Saturated zone effective porosity | not used | 2.000E-01 | --- | EPSZ |
| R014 | Saturated zone field capacity | not used | 2.000E-01 | --- | FCSZ |
| R014 | Saturated zone hydraulic conductivity (m/yr) | not used | 1.000E+02 | --- | HCSZ |
| R014 | Saturated zone hydraulic gradient | not used | 2.000E-02 | --- | HGWT |
| R014 | Saturated zone b parameter | not used | 5.300E+00 | --- | BSZ |
| R014 | Water table drop rate (m/yr) | not used | 1.000E-03 | --- | VWT |
| R014 | Well pump intake depth (m below water table) | not used | 1.000E+01 | --- | DWIBWT |
| R014 | Model: Nondispersion (ND) or Mass-Balance (MB) | not used | ND | --- | MODEL |
| R014 | Well pumping rate (m**3/yr) | not used | 2.500E+02 | --- | UW |
| | | | | | |
| R015 | Number of unsaturated zone strata | not used | 1 | --- | NS |
| R015 | Unsat. zone 1, thickness (m) | not used | 4.000E+00 | --- | H(1) |
| R015 | Unsat. zone 1, soil density (g/cm**3) | not used | 1.500E+00 | --- | DENSUZ(1) |
| R015 | Unsat. zone 1, total porosity | not used | 4.000E-01 | --- | TPUZ(1) |
| R015 | Unsat. zone 1, effective porosity | not used | 2.000E-01 | --- | EPUZ(1) |
| R015 | Unsat. zone 1, field capacity | not used | 2.000E-01 | --- | FCUZ(1) |
| R015 | Unsat. zone 1, soil-specific b parameter | not used | 5.300E+00 | --- | BUZ(1) |
| R015 | Unsat. zone 1, hydraulic conductivity (m/yr) | not used | 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) | not used | 2.000E+01 | --- | DCNUCU( 2,1) |
| R016 | Saturated zone (cm**3/g) | not used | 2.000E+01 | --- | DCNUCS( 2) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 4.636E-06 | ALEACH( 2) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 2) |
| | | | | | |
| R016 | Distribution coefficients for Cs-137 | | | | |
| R016 | Contaminated zone (cm**3/g) | 1.000E+03 | 1.000E+03 | --- | DCNUCC( 3) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 1.000E+03 | --- | DCNUCU( 3,1) |
| R016 | Saturated zone (cm**3/g) | not used | 1.000E+03 | --- | DCNUCS( 3) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 9.332E-08 | ALEACH( 3) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 3) |
| | | | | | |
| R016 | Distribution coefficients for H-3 | | | | |
| R016 | Contaminated zone (cm**3/g) | 0.000E+00 | 0.000E+00 | --- | DCNUCC( 4) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 0.000E+00 | --- | DCNUCU( 4,1) |
| R016 | Saturated zone (cm**3/g) | not used | 0.000E+00 | --- | DCNUCS( 4) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 7.000E-04 | ALEACH( 4) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 4) |
| | | | | | |
| R016 | Distribution coefficients for Pu-238 | | | | |
| R016 | Contaminated zone (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCC( 8) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 2.000E+03 | --- | DCNUCU( 8,1) |
| R016 | Saturated zone (cm**3/g) | not used | 2.000E+03 | --- | DCNUCS( 8) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 4.666E-08 | ALEACH( 8) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 8) |

Site-Specific Parameter Summary (continued)

| Menu | Parameter | User Input | Default | Used by RESRAD (If different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R016 | Distribution coefficients for Pu-239 | | | | |
| R016 | Contaminated zone (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCC( 9) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 2.000E+03 | --- | DCNUCU( 9,1) |
| R016 | Saturated zone (cm**3/g) | not used | 2.000E+03 | --- | DCNUCS( 9) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 4.666E-08 | ALEACH( 9) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 9) |
| R016 | Distribution coefficients for Sr-90 | | | | |
| R016 | Contaminated zone (cm**3/g) | 3.000E+01 | 3.000E+01 | --- | DCNUCC(11) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 3.000E+01 | --- | DCNUCU(11,1) |
| R016 | Saturated zone (cm**3/g) | not used | 3.000E+01 | --- | DCNUCS(11) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 3.097E-06 | ALEACH(11) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(11) |
| R016 | Distribution coefficients for U-234 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(15) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 5.000E+01 | --- | DCNUCU(15,1) |
| R016 | Saturated zone (cm**3/g) | not used | 5.000E+01 | --- | DCNUCS(15) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.862E-06 | ALEACH(15) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(15) |
| R016 | Distribution coefficients for U-235 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(16) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 5.000E+01 | --- | DCNUCU(16,1) |
| R016 | Saturated zone (cm**3/g) | not used | 5.000E+01 | --- | DCNUCS(16) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.862E-06 | ALEACH(16) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(16) |
| R016 | Distribution coefficients for U-238 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(17) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 5.000E+01 | --- | DCNUCU(17,1) |
| R016 | Saturated zone (cm**3/g) | not used | 5.000E+01 | --- | DCNUCS(17) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.862E-06 | ALEACH(17) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(17) |
| 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) | not used | 2.000E+01 | --- | DCNUCU( 1,1) |
| R016 | Saturated zone (cm**3/g) | not used | 2.000E+01 | --- | DCNUCS( 1) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 4.636E-06 | ALEACH( 1) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 1) |
| R016 | Distribution coefficients for daughter Np-237 | | | | |
| R016 | Contaminated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 2.574E+02 | DCNUCC( 5) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | -1.000E+00 | --- | DCNUCU( 5,1) |
| R016 | Saturated zone (cm**3/g) | not used | -1.000E+00 | --- | DCNUCS( 5) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 3.624E-07 | ALEACH( 5) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 5) |

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( 6) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 5.000E+01 | --- | DCNUCU( 6,1) |
| R016 | Saturated zone (cm**3/g) | not used | 5.000E+01 | --- | DCNUCS( 6) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.862E-06 | ALEACH( 6) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 6) |
| | | | | | |
| R016 | Distribution coefficients for daughter Pb-210 | | | | |
| R016 | Contaminated zone (cm**3/g) | 1.000E+02 | 1.000E+02 | --- | DCNUCC( 7) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 1.000E+02 | --- | DCNUCU( 7,1) |
| R016 | Saturated zone (cm**3/g) | not used | 1.000E+02 | --- | DCNUCS( 7) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 9.321E-07 | ALEACH( 7) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 7) |
| | | | | | |
| R016 | Distribution coefficients for daughter Ra-226 | | | | |
| R016 | Contaminated zone (cm**3/g) | 7.000E+01 | 7.000E+01 | --- | DCNUCC(10) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 7.000E+01 | --- | DCNUCU(10,1) |
| R016 | Saturated zone (cm**3/g) | not used | 7.000E+01 | --- | DCNUCS(10) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.331E-06 | ALEACH(10) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(10) |
| | | | | | |
| R016 | Distribution coefficients for daughter Th-229 | | | | |
| R016 | Contaminated zone (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCC(12) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 6.000E+04 | --- | DCNUCU(12,1) |
| R016 | Saturated zone (cm**3/g) | not used | 6.000E+04 | --- | DCNUCS(12) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.556E-09 | ALEACH(12) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(12) |
| | | | | | |
| R016 | Distribution coefficients for daughter Th-230 | | | | |
| R016 | Contaminated zone (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCC(13) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 6.000E+04 | --- | DCNUCU(13,1) |
| R016 | Saturated zone (cm**3/g) | not used | 6.000E+04 | --- | DCNUCS(13) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.556E-09 | ALEACH(13) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(13) |
| | | | | | |
| R016 | Distribution coefficients for daughter U-233 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(14) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 5.000E+01 | --- | DCNUCU(14,1) |
| R016 | Saturated zone (cm**3/g) | not used | 5.000E+01 | --- | DCNUCS(14) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.862E-06 | ALEACH(14) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(14) |
| | | | | | |
| R017 | Inhalation rate (m**3/yr) | 1.050E+04 | 8.400E+03 | --- | INHALR |
| R017 | Mass loading for inhalation (g/m**3) | 2.000E-04 | 1.000E-04 | --- | MLINH |
| R017 | Exposure duration | 6.000E+00 | 3.000E+01 | --- | ED |
| R017 | Shielding factor, inhalation | 4.000E-01 | 4.000E-01 | --- | SHF3 |
| R017 | Shielding factor, external gamma | 7.000E-01 | 7.000E-01 | --- | SHF1 |
| R017 | Fraction of time spent indoors | 0.000E+00 | 5.000E-01 | --- | FIND |
| R017 | Fraction of time spent outdoors (on site) | 2.280E-02 | 2.500E-01 | --- | FOTD |
| R017 | Shape factor flag, external gamma | 1.000E+00 | 1.000E+00 | >0 shows circular AREA. | FS |

Site-Specific Parameter Summary (continued)

| 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 | 7.071E+01 | --- | RAD_SHAPE( 2) |
| R017 | Outer annular radius (m), ring 3: | not used | 0.000E+00 | --- | RAD_SHAPE( 3) |
| R017 | Outer annular radius (m), ring 4: | not used | 0.000E+00 | --- | RAD_SHAPE( 4) |
| R017 | Outer annular radius (m), ring 5: | not used | 0.000E+00 | --- | RAD_SHAPE( 5) |
| R017 | Outer annular radius (m), ring 6: | not used | 0.000E+00 | --- | RAD_SHAPE( 6) |
| R017 | Outer annular radius (m), ring 7: | not used | 0.000E+00 | --- | RAD_SHAPE( 7) |
| R017 | Outer annular radius (m), ring 8: | not used | 0.000E+00 | --- | RAD_SHAPE( 8) |
| R017 | Outer annular radius (m), ring 9: | not used | 0.000E+00 | --- | RAD_SHAPE( 9) |
| R017 | Outer annular radius (m), ring 10: | not used | 0.000E+00 | --- | RAD_SHAPE(10) |
| R017 | Outer annular radius (m), ring 11: | not used | 0.000E+00 | --- | RAD_SHAPE(11) |
| R017 | Outer annular radius (m), ring 12: | not used | 0.000E+00 | --- | RAD_SHAPE(12) |
| R017 | Fractions of annular areas within AREA: | | | | |
| R017 | Ring 1 | not used | 1.000E+00 | --- | FRACA( 1) |
| R017 | Ring 2 | not used | 2.732E-01 | --- | FRACA( 2) |
| R017 | Ring 3 | not used | 0.000E+00 | --- | FRACA( 3) |
| R017 | Ring 4 | not used | 0.000E+00 | --- | FRACA( 4) |
| R017 | Ring 5 | not used | 0.000E+00 | --- | FRACA( 5) |
| R017 | Ring 6 | not used | 0.000E+00 | --- | FRACA( 6) |
| R017 | Ring 7 | not used | 0.000E+00 | --- | FRACA( 7) |
| R017 | Ring 8 | not used | 0.000E+00 | --- | FRACA( 8) |
| R017 | Ring 9 | not used | 0.000E+00 | --- | FRACA( 9) |
| R017 | Ring 10 | not used | 0.000E+00 | --- | FRACA(10) |
| R017 | Ring 11 | not used | 0.000E+00 | --- | FRACA(11) |
| R017 | Ring 12 | not used | 0.000E+00 | --- | FRACA(12) |
| R018 | Fruits, vegetables and grain consumption (kg/yr) | not used | 1.600E+02 | --- | DIET(1) |
| R018 | Leafy vegetable consumption (kg/yr) | not used | 1.400E+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) | 3.130E+02 | 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 | not used | 1.000E+00 | --- | FHHW |
| R018 | Contamination fraction of livestock water | not used | 1.000E+00 | --- | FLW |
| R018 | Contamination fraction of irrigation water | not used | 1.000E+00 | --- | FIRW |
| R018 | Contamination fraction of aquatic food | not used | 5.000E-01 | --- | FR9 |
| R018 | Contamination fraction of plant food | not used | -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 | 5.500E+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 |

Site-Specific Parameter Summary (continued)

| Menu | Parameter | User Input | Default | Used by RESRAD (If different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R019 | Mass loading for foliar deposition (g/m**3) | not used | 1.000E-04 | --- | MLFD |
| R019 | Depth of soil mixing layer (m) | 1.500E-01 | 1.500E-01 | --- | DM |
| R019 | Depth of roots (m) | not used | 9.000E-01 | --- | DROOT |
| R019 | Drinking water fraction from ground water | not used | 1.000E+00 | --- | FGWDW |
| R019 | Household water fraction from ground water | not used | 1.000E+00 | --- | FGWHH |
| R019 | Livestock water fraction from ground water | not used | 1.000E+00 | --- | FGWLW |
| R019 | Irrigation fraction from ground water | not used | 1.000E+00 | --- | FGWIR |
| | | | | | |
| R19B | Wet weight crop yield for Non-Leafy (kg/m**2) | not used | 7.000E-01 | --- | YV(1) |
| R19B | Wet weight crop yield for Leafy (kg/m**2) | not used | 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) | not used | 1.700E-01 | --- | TE(1) |
| R19B | Growing Season for Leafy (years) | not used | 2.500E-01 | --- | TE(2) |
| R19B | Growing Season for Fodder (years) | not used | 8.000E-02 | --- | TE(3) |
| R19B | Translocation Factor for Non-Leafy | not used | 1.000E-01 | --- | TIV(1) |
| R19B | Translocation Factor for Leafy | not used | 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 | not used | 2.500E-01 | --- | RDRY(1) |
| R19B | Dry Foliar Interception Fraction for Leafy | not used | 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 | not used | 2.500E-01 | --- | RWET(1) |
| R19B | Wet Foliar Interception Fraction for Leafy | not used | 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 | not used | 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 | --- | DMC |
| 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 | --- | REVSN |
| C14 | Fraction of grain in beef cattle feed | not used | 8.000E-01 | --- | AVFG4 |
| C14 | Fraction of grain in milk cow feed | not used | 2.000E-01 | --- | AVFG5 |
| | | | | | |
| STOR | Storage times of contaminated foodstuffs (days): | | | | |
| STOR | Fruits, non-leafy vegetables, and grain | 1.400E+01 | 1.400E+01 | --- | STOR_T(1) |
| STOR | Leafy vegetables | 1.000E+00 | 1.000E+00 | --- | STOR_T(2) |
| STOR | Milk | 1.000E+00 | 1.000E+00 | --- | STOR_T(3) |
| STOR | Meat and poultry | 2.000E+01 | 2.000E+01 | --- | STOR_T(4) |
| STOR | Fish | 7.000E+00 | 7.000E+00 | --- | STOR_T(5) |
| STOR | Crustacea and mollusks | 7.000E+00 | 7.000E+00 | --- | STOR_T(6) |
| STOR | Well water | 1.000E+00 | 1.000E+00 | --- | STOR_T(7) |
| STOR | Surface water | 1.000E+00 | 1.000E+00 | --- | STOR_T(8) |
| STOR | Livestock fodder | 4.500E+01 | 4.500E+01 | --- | STOR_T(9) |
| | | | | | |
| R021 | Thickness of building foundation (m) | not used | 1.500E-01 | --- | FLOOR1 |
| R021 | Bulk density of building foundation (g/cm**3) | not used | 2.400E+00 | --- | DENSFL |
| R021 | Total porosity of the cover material | not used | 4.000E-01 | --- | TPCV |
| R021 | Total porosity of the building foundation | not used | 1.000E-01 | --- | TPFL |

Site-Specific Parameter Summary (continued)

| Menu | Parameter | User Input | Default | Used by RESRAD (If different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R021 | Volumetric water content of the cover material | not used | 5.000E-02 | --- | PH2OCV |
| R021 | Volumetric water content of the foundation | not used | 3.000E-02 | --- | PH2OFL |
| R021 | Diffusion coefficient for radon gas (m/sec): | | | | |
| R021 | in cover material | not used | 2.000E-06 | --- | DIFCV |
| R021 | in foundation material | not used | 3.000E-07 | --- | DIFFL |
| R021 | in contaminated zone soil | not used | 2.000E-06 | --- | DIFCZ |
| R021 | Radon vertical dimension of mixing (m) | not used | 2.000E+00 | --- | HMIX |
| R021 | Average building air exchange rate (1/hr) | not used | 5.000E-01 | --- | REXG |
| R021 | Height of the building (room) (m) | not used | 2.500E+00 | --- | HRM |
| R021 | Building interior area factor | not used | 0.000E+00 | --- | FAI |
| R021 | Building depth below ground surface (m) | not used | -1.000E+00 | --- | DMFL |
| R021 | Emanating power of Rn-222 gas | not used | 2.500E-01 | --- | EMANA(1) |
| R021 | Emanating power of Rn-220 gas | not used | 1.500E-01 | --- | EMANA(2) |
| | | | | | |
| TITL | Number of graphical time points | 32 | --- | --- | NPTS |
| TITL | Maximum number of integration points for dose | 17 | --- | --- | LYMAX |
| TITL | Maximum number of integration points for risk | 257 | --- | --- | KYMAX |

Summary of Pathway Selections

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

| Contaminated Zone Dimensions | | Initial Soil Concentrations, pCi/g | |
|---|---|---|---|
| Area: | 10000.00 square meters | Am-241 | 1.000E+00 |
| Thickness: | 2.00 meters | Cs-137 | 1.000E+00 |
| Cover Depth: | 0.00 meters | H-3 | 1.000E+00 |
| | | Pu-238 | 1.000E+00 |
| | | Pu-239 | 1.000E+00 |
| | | Sr-90 | 1.000E+00 |
| | | U-234 | 1.000E+00 |
| | | U-235 | 1.000E+00 |
| | | U-238 | 1.000E+00 |

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 | 3.000E+01 |
|---|---|---|
| TDOSE(t): | 1.860E-01 | 1.419E-01 |
| M(t): | 1.240E-02 | 9.463E-03 |

0Maximum TDOSE(t): 1.860E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

| Radio- | Ground | | Inhalation | | Radon | | Plant | | Meat | | Milk | | Soil | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nuclide | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. |
| Am-241 | 9.661E-04 | 0.0052 | 3.128E-03 | 0.0168 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.596E-02 | 0.1395 |
| Cs-137 | 7.194E-02 | 0.3867 | 2.223E-07 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.527E-04 | 0.0019 |
| H-3 | 0.000E+00 | 0.0000 | 3.917E-04 | 0.0021 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.203E-07 | 0.0000 |
| Pu-238 | 3.396E-06 | 0.0000 | 2.753E-03 | 0.0148 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.275E-02 | 0.1223 |
| Pu-239 | 6.459E-06 | 0.0000 | 3.024E-03 | 0.0163 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.526E-02 | 0.1358 |
| Sr-90 | 5.543E-04 | 0.0030 | 9.127E-06 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.079E-03 | 0.0058 |
| U-234 | 8.884E-06 | 0.0000 | 9.306E-04 | 0.0050 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.020E-03 | 0.0109 |
| U-235 | 1.643E-02 | 0.0883 | 8.673E-04 | 0.0047 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.906E-03 | 0.0102 |
| U-238 | 2.946E-03 | 0.0158 | 8.319E-04 | 0.0045 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.920E-03 | 0.0103 |
| Total | 9.286E-02 | 0.4991 | 1.194E-02 | 0.0642 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 8.124E-02 | 0.4367 |

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

Water Dependent Pathways

| Radio- | Water | | Fish | | Radon | | Plant | | Meat | | Milk | | All Pathways* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nuclide | 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 | 3.005E-02 | 0.1615 |
| 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 | 7.229E-02 | 0.3886 |
| 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 | 3.920E-04 | 0.0021 |
| 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 | 2.550E-02 | 0.1371 |
| 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 | 2.829E-02 | 0.1521 |
| 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 | 1.642E-03 | 0.0088 |
| 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 | 2.959E-03 | 0.0159 |
| U-235 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.921E-02 | 0.1032 |
| 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 | 5.697E-03 | 0.0306 |
| 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 | 1.860E-01 | 1.0000 |

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

| Radio- | Ground | | Inhalation | | Radon | | Plant | | Meat | | Milk | | Soil | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nuclide | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. |
| Am-241 | 9.208E-04 | 0.0065 | 2.980E-03 | 0.0210 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.473E-02 | 0.1743 |
| Cs-137 | 3.597E-02 | 0.2534 | 1.112E-07 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.764E-04 | 0.0012 |
| H-3 | 0.000E+00 | 0.0000 | 3.826E-14 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.128E-17 | 0.0000 |
| Pu-238 | 2.680E-06 | 0.0000 | 2.172E-03 | 0.0153 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.795E-02 | 0.1264 |
| Pu-239 | 6.454E-06 | 0.0000 | 3.022E-03 | 0.0213 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.524E-02 | 0.1778 |
| Sr-90 | 2.714E-04 | 0.0019 | 4.468E-06 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.283E-04 | 0.0037 |
| U-234 | 9.324E-06 | 0.0001 | 9.311E-04 | 0.0066 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.020E-03 | 0.0142 |
| U-235 | 1.644E-02 | 0.1159 | 8.839E-04 | 0.0062 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.979E-03 | 0.0139 |
| U-238 | 2.946E-03 | 0.0208 | 8.319E-04 | 0.0059 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.920E-03 | 0.0135 |
| Total | 5.657E-02 | 0.3985 | 1.083E-02 | 0.0763 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 7.454E-02 | 0.5252 |

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

| Radio- | Water | | Fish | | Radon | | Plant | | Meat | | Milk | | All Pathways* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nuclide | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. |
| 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 | 2.863E-02 | 0.2017 |
| 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 | 3.615E-02 | 0.2547 |
| 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 | 3.830E-14 | 0.0000 |
| 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 | 2.012E-02 | 0.1418 |
| 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 | 2.827E-02 | 0.1992 |
| 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 | 8.041E-04 | 0.0057 |
| 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 | 2.961E-03 | 0.0209 |
| U-235 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.931E-02 | 0.1360 |
| 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 | 5.697E-03 | 0.0401 |
| 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 | 1.419E-01 | 1.0000 |

*Sum of all water independent and dependent pathways.

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

| Parent (i) | Product (j) | Branch Fraction* | DSR(j,t) t= 0.000E+00 | (mrem/yr)/(pCi/g) 3.000E+01 |
|---|---|---|---|---|
| Am-241 | Am-241 | 1.000E+00 | 3.005E-02 | 2.863E-02 |
| Am-241 | Np-237 | 1.000E+00 | 0.000E+00 | 5.712E-07 |
| Am-241 | U-233 | 1.000E+00 | 0.000E+00 | 1.974E-12 |
| Am-241 | Th-229 | 1.000E+00 | 0.000E+00 | 4.903E-14 |
| Am-241 | äDSR(j) | | 3.005E-02 | 2.863E-02 |
| Cs-137 | Cs-137 | 1.000E+00 | 7.229E-02 | 3.615E-02 |
| H-3 | H-3 | 1.000E+00 | 3.920E-04 | 3.830E-14 |
| Pu-238 | Pu-238 | 1.000E+00 | 2.550E-02 | 2.012E-02 |
| Pu-238 | U-234 | 1.000E+00 | 0.000E+00 | 2.274E-07 |
| Pu-238 | Th-230 | 1.000E+00 | 0.000E+00 | 6.841E-11 |
| Pu-238 | Ra-226 | 1.000E+00 | 0.000E+00 | 1.228E-11 |
| Pu-238 | Pb-210 | 1.000E+00 | 0.000E+00 | 5.140E-13 |
| Pu-238 | äDSR(j) | | 2.550E-02 | 2.012E-02 |
| Pu-239 | Pu-239 | 1.000E+00 | 2.829E-02 | 2.827E-02 |
| Pu-239 | U-235 | 1.000E+00 | 0.000E+00 | 5.766E-10 |
| Pu-239 | Pa-231 | 1.000E+00 | 0.000E+00 | 8.604E-13 |
| Pu-239 | Ac-227 | 1.000E+00 | 0.000E+00 | 4.913E-13 |
| Pu-239 | äDSR(j) | | 2.829E-02 | 2.827E-02 |
| Sr-90 | Sr-90 | 1.000E+00 | 1.642E-03 | 8.041E-04 |
| U-234 | U-234 | 1.000E+00 | 2.959E-03 | 2.959E-03 |
| U-234 | Th-230 | 1.000E+00 | 0.000E+00 | 1.712E-06 |
| U-234 | Ra-226 | 1.000E+00 | 0.000E+00 | 4.515E-07 |
| U-234 | Pb-210 | 1.000E+00 | 0.000E+00 | 2.390E-08 |
| U-234 | äDSR(j) | | 2.959E-03 | 2.961E-03 |
| U-235 | U-235 | 1.000E+00 | 1.920E-02 | 1.920E-02 |
| U-235 | Pa-231 | 1.000E+00 | 0.000E+00 | 5.729E-05 |
| U-235 | Ac-227 | 1.000E+00 | 0.000E+00 | 4.563E-05 |
| U-235 | äDSR(j) | | 1.920E-02 | 1.931E-02 |
| U-238 | U-238 | 1.000E+00 | 5.697E-03 | 5.697E-03 |
| U-238 | U-234 | 1.000E+00 | 0.000E+00 | 2.558E-07 |
| U-238 | Th-230 | 1.000E+00 | 0.000E+00 | 7.401E-11 |
| U-238 | Ra-226 | 1.000E+00 | 0.000E+00 | 1.303E-11 |
| U-238 | Pb-210 | 1.000E+00 | 0.000E+00 | 5.397E-13 |
| U-238 | äDSR(j) | | 5.697E-03 | 5.697E-03 |

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ó 0.5 yr) daughters.

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

| Nuclide (i) | t= 0.000E+00 | 3.000E+01 |
|---|---|---|
| Am-241 | 4.992E+02 | 5.238E+02 |
| Cs-137 | 2.075E+02 | 4.150E+02 |
| H-3 | 3.826E+04 | 3.917E+14 |
| Pu-238 | 5.882E+02 | 7.455E+02 |
| Pu-239 | 5.302E+02 | 5.306E+02 |
| Sr-90 | 9.133E+03 | 1.865E+04 |
| U-234 | 5.069E+03 | 5.066E+03 |
| U-235 | 7.810E+02 | 7.769E+02 |
| U-238 | 2.633E+03 | 2.633E+03 |

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+00 | 0.000E+00 | 3.005E-02 | 4.992E+02 | 3.005E-02 | 4.992E+02 |
| Cs-137 | 1.000E+00 | 0.000E+00 | 7.229E-02 | 2.075E+02 | 7.229E-02 | 2.075E+02 |
| H-3 | 1.000E+00 | 0.000E+00 | 3.920E-04 | 3.826E+04 | 3.920E-04 | 3.826E+04 |
| Pu-238 | 1.000E+00 | 0.000E+00 | 2.550E-02 | 5.882E+02 | 2.550E-02 | 5.882E+02 |
| Pu-239 | 1.000E+00 | 0.000E+00 | 2.829E-02 | 5.302E+02 | 2.829E-02 | 5.302E+02 |
| Sr-90 | 1.000E+00 | 0.000E+00 | 1.642E-03 | 9.133E+03 | 1.642E-03 | 9.133E+03 |
| U-234 | 1.000E+00 | 3.000E+01 | 2.961E-03 | 5.066E+03 | 2.959E-03 | 5.069E+03 |
| U-235 | 1.000E+00 | 3.000E+01 | 1.931E-02 | 7.769E+02 | 1.921E-02 | 7.810E+02 |
| U-238 | 1.000E+00 | 0.000E+00 | 5.697E-03 | 2.633E+03 | 5.697E-03 | 2.633E+03 |

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 | 3.000E+01 |
|---|---|---|---|---|
| Am-241 | Am-241 | 1.000E+00 | 3.005E-02 | 2.863E-02 |
| Np-237 | Am-241 | 1.000E+00 | 9.591E-09 | 5.712E-07 |
| U-233 | Am-241 | 1.000E+00 | 7.185E-16 | 1.974E-12 |
| Th-229 | Am-241 | 1.000E+00 | 4.381E-19 | 4.903E-14 |
| Cs-137 | Cs-137 | 1.000E+00 | 7.229E-02 | 3.615E-02 |
| H-3 | H-3 | 1.000E+00 | 3.920E-04 | 3.830E-14 |
| Pu-238 | Pu-238 | 1.000E+00 | 2.550E-02 | 2.012E-02 |
| U-234 | Pu-238 | 1.000E+00 | 4.183E-09 | 2.274E-07 |
| U-234 | U-234 | 1.000E+00 | 2.959E-03 | 2.959E-03 |
| U-234 | U-238 | 1.000E+00 | 4.194E-09 | 2.558E-07 |
| U-234 | äDOSE(j): | | 2.959E-03 | 2.959E-03 |
| Th-230 | Pu-238 | 1.000E+00 | 2.647E-14 | 6.841E-11 |
| Th-230 | U-234 | 1.000E+00 | 2.807E-08 | 1.712E-06 |
| Th-230 | U-238 | 1.000E+00 | 2.652E-14 | 7.401E-11 |
| Th-230 | äDOSE(j): | | 2.807E-08 | 1.712E-06 |
| Ra-226 | Pu-238 | 1.000E+00 | 1.150E-16 | 1.228E-11 |
| Ra-226 | U-234 | 1.000E+00 | 1.625E-10 | 4.515E-07 |
| Ra-226 | U-238 | 1.000E+00 | 1.307E-16 | 1.303E-11 |
| Ra-226 | äDOSE(j): | | 1.625E-10 | 4.515E-07 |
| Pb-210 | Pu-238 | 1.000E+00 | 1.476E-19 | 5.140E-13 |
| Pb-210 | U-234 | 1.000E+00 | 2.619E-13 | 2.390E-08 |
| Pb-210 | U-238 | 1.000E+00 | 0.000E+00 | 5.397E-13 |
| Pb-210 | äDOSE(j): | | 2.619E-13 | 2.390E-08 |
| Pu-239 | Pu-239 | 1.000E+00 | 2.829E-02 | 2.827E-02 |
| U-235 | Pu-239 | 1.000E+00 | 9.457E-12 | 5.766E-10 |
| U-235 | U-235 | 1.000E+00 | 1.920E-02 | 1.920E-02 |
| U-235 | äDOSE(j): | | 1.920E-02 | 1.920E-02 |
| Pa-231 | Pu-239 | 1.000E+00 | 3.084E-16 | 8.604E-13 |
| Pa-231 | U-235 | 1.000E+00 | 9.395E-07 | 5.729E-05 |
| Pa-231 | äDOSE(j): | | 9.395E-07 | 5.729E-05 |
| Ac-227 | Pu-239 | 1.000E+00 | 5.391E-18 | 4.913E-13 |
| Ac-227 | U-235 | 1.000E+00 | 2.187E-08 | 4.563E-05 |
| Ac-227 | äDOSE(j): | | 2.187E-08 | 4.563E-05 |
| Sr-90 | Sr-90 | 1.000E+00 | 1.642E-03 | 8.041E-04 |

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 | 3.000E+01 |
|---|---|---|---|---|
| U-238 | U-238 | 1.000E+00 | 5.697E-03 | 5.697E-03 |

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

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 | 3.000E+01 |
|---|---|---|---|---|
| Am-241 | Am-241 | 1.000E+00 | 1.000E+00 | 9.529E-01 |
| Np-237 | Am-241 | 1.000E+00 | 0.000E+00 | 9.486E-06 |
| U-233 | Am-241 | 1.000E+00 | 0.000E+00 | 6.272E-10 |
| Th-229 | Am-241 | 1.000E+00 | 0.000E+00 | 5.943E-13 |
| Cs-137 | Cs-137 | 1.000E+00 | 1.000E+00 | 5.000E-01 |
| H-3 | H-3 | 1.000E+00 | 1.000E+00 | 9.861E-11 |
| Pu-238 | Pu-238 | 1.000E+00 | 1.000E+00 | 7.890E-01 |
| U-234 | Pu-238 | 1.000E+00 | 0.000E+00 | 7.572E-05 |
| U-234 | U-234 | 1.000E+00 | 1.000E+00 | 9.999E-01 |
| U-234 | U-238 | 1.000E+00 | 0.000E+00 | 8.504E-05 |
| U-234 | äS(j): | | 1.000E+00 | 1.000E+00 |
| Th-230 | Pu-238 | 1.000E+00 | 0.000E+00 | 1.063E-08 |
| Th-230 | U-234 | 1.000E+00 | 0.000E+00 | 2.700E-04 |
| Th-230 | U-238 | 1.000E+00 | 0.000E+00 | 1.148E-08 |
| Th-230 | äS(j): | | 0.000E+00 | 2.700E-04 |
| Ra-226 | Pu-238 | 1.000E+00 | 0.000E+00 | 4.678E-11 |
| Ra-226 | U-234 | 1.000E+00 | 0.000E+00 | 1.747E-06 |
| Ra-226 | U-238 | 1.000E+00 | 0.000E+00 | 4.958E-11 |
| Ra-226 | äS(j): | | 0.000E+00 | 1.747E-06 |
| Pb-210 | Pu-238 | 1.000E+00 | 0.000E+00 | 9.249E-12 |
| Pb-210 | U-234 | 1.000E+00 | 0.000E+00 | 4.372E-07 |
| Pb-210 | U-238 | 1.000E+00 | 0.000E+00 | 9.704E-12 |
| Pb-210 | äS(j): | | 0.000E+00 | 4.373E-07 |
| Pu-239 | Pu-239 | 1.000E+00 | 1.000E+00 | 9.991E-01 |
| U-235 | Pu-239 | 1.000E+00 | 0.000E+00 | 2.953E-08 |
| U-235 | U-235 | 1.000E+00 | 1.000E+00 | 9.999E-01 |
| U-235 | äS(j): | | 1.000E+00 | 9.999E-01 |
| Pa-231 | Pu-239 | 1.000E+00 | 0.000E+00 | 9.372E-12 |
| Pa-231 | U-235 | 1.000E+00 | 0.000E+00 | 6.345E-04 |
| Pa-231 | äS(j): | | 0.000E+00 | 6.345E-04 |
| Ac-227 | Pu-239 | 1.000E+00 | 0.000E+00 | 2.388E-12 |
| Ac-227 | U-235 | 1.000E+00 | 0.000E+00 | 2.258E-04 |
| Ac-227 | äS(j): | | 0.000E+00 | 2.258E-04 |
| Sr-90 | Sr-90 | 1.000E+00 | 1.000E+00 | 4.896E-01 |

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 | 3.000E+01 |
|---|---|---|---|---|
| U-238 | U-238 | 1.000E+00 | 1.000E+00 | 9.999E-01 |

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

RESMAIN5.EXE execution time = 82.54 seconds

**Appendix B**
**Summary of RESRAD Parameters for the Trail User Scenario**

| Parameter | Value Selected | Notes |
|---|---|---|
| Dose conversion factors | Default | RESRAD contains current information on the dose conversion factors |
| Concentration ratios, food intake ratios, and bioconcentration factors | Not used | Food pathways were turned off |
| Area of contaminated zone (m**2) | 10,000 | Default value, maximizes exposure via soil ingestion and external gamma |
| Thickness of contaminated zone (m) | 2 | Default value, maximizes exposure via external gamma |
| Basic radiation dose limit (mrem/yr) | 15 | Based on EPA guidance |
| Time since placement of material (yr) | 0 | Default value, does not allow for any radiological decay |
| Initial concentrations of principal radionuclides | Set to 1 pCi/g to calculate SRSG | Will use the weighted average concentrations in the preliminary dose assessment RESRAD run |
| Cover depth (m) | 0 | Default value, assumes exposure to surface geomorphic units |
| Density of contaminated zone (g/cm**3) | 1.5 | Default value, parameter is used in the tritium submodel |
| Physical parameters of the contaminated zone | Default | Transport is not being modeled |
| Evapotranspiration coefficient | 0.999 | Minimizes net infiltration |
| Precipitation (m/yr) | 0.35 | Los Alamos value |
| Irrigation (m/yr) | 0 | Gardening pathway disabled |
| Watershed parameters | Not used | |
| Physical parameters of the saturated zone | Not used | Transport is not being modeled |
| Distribution coefficients | Not used | Transport is not being modeled |
| Inhalation rate (m**3/yr) | 14,000 | Assumes adult respiration rate for moderate activity of 1.6 m**3/hr |
| Mass loading for inhalation (g/m**3) | 0.00002 | Measured value from Laboratory Environmental Surveillance reports |
| Exposure duration (yr) | 30 | Assumes adult averaging time |
| Shielding factors | Not used | No residences on site |
| Fraction of time spent outdoors (on site) | 0.0114 | Assume 100 hours out of 8760 in a year |
| Shape factor flag, external gamma | Default value | For circular contaminated zone - will overestimate external dose for non-circular contaminated areas |
| Soil ingestion rate (g/yr) | 292 | After adjusting for occupancy this equals 3.33 g/yr |
| Depth of soil mixing layer (m) | Not used | Plant pathway is turned off |
| Storage times of contaminated foodstuffs (days) | Not used | Food pathways are turned off |

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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 | Cs-137+D | 3.190E-05 | 3.190E-05 | DCF2( 3) |
| B-1 | H-3 | 6.400E-08 | 6.400E-08 | DCF2( 4) |
| B-1 | Np-237+D | 5.400E-01 | 5.400E-01 | DCF2( 5) |
| B-1 | Pa-231 | 1.280E+00 | 1.280E+00 | DCF2( 6) |
| B-1 | Pb-210+D | 2.320E-02 | 2.320E-02 | DCF2( 7) |
| B-1 | Pu-238 | 3.920E-01 | 3.920E-01 | DCF2( 8) |
| B-1 | Pu-239 | 4.290E-01 | 4.290E-01 | DCF2( 9) |
| B-1 | Ra-226+D | 8.600E-03 | 8.600E-03 | DCF2(10) |
| B-1 | Sr-90+D | 1.310E-03 | 1.310E-03 | DCF2(11) |
| B-1 | Th-229+D | 2.160E+00 | 2.160E+00 | DCF2(12) |
| B-1 | Th-230 | 3.260E-01 | 3.260E-01 | DCF2(13) |
| B-1 | U-233 | 1.350E-01 | 1.350E-01 | DCF2(14) |
| B-1 | U-234 | 1.320E-01 | 1.320E-01 | DCF2(15) |
| B-1 | U-235+D | 1.230E-01 | 1.230E-01 | DCF2(16) |
| B-1 | U-238+D | 1.180E-01 | 1.180E-01 | DCF2(17) |
| | | | | |
| 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 | Cs-137+D | 5.000E-05 | 5.000E-05 | DCF3( 3) |
| D-1 | H-3 | 6.400E-08 | 6.400E-08 | DCF3( 4) |
| D-1 | Np-237+D | 4.440E-03 | 4.440E-03 | DCF3( 5) |
| D-1 | Pa-231 | 1.060E-02 | 1.060E-02 | DCF3( 6) |
| D-1 | Pb-210+D | 7.270E-03 | 7.270E-03 | DCF3( 7) |
| D-1 | Pu-238 | 3.200E-03 | 3.200E-03 | DCF3( 8) |
| D-1 | Pu-239 | 3.540E-03 | 3.540E-03 | DCF3( 9) |
| D-1 | Ra-226+D | 1.330E-03 | 1.330E-03 | DCF3(10) |
| D-1 | Sr-90+D | 1.530E-04 | 1.530E-04 | DCF3(11) |
| D-1 | Th-229+D | 4.030E-03 | 4.030E-03 | DCF3(12) |
| D-1 | Th-230 | 5.480E-04 | 5.480E-04 | DCF3(13) |
| D-1 | U-233 | 2.890E-04 | 2.890E-04 | DCF3(14) |
| D-1 | U-234 | 2.830E-04 | 2.830E-04 | DCF3(15) |
| D-1 | U-235+D | 2.670E-04 | 2.670E-04 | DCF3(16) |
| D-1 | U-238+D | 2.690E-04 | 2.690E-04 | DCF3(17) |
| | | | | |
| 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 | | | | |
| 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 | | | | |
| D-34 | Cs-137+D , plant/soil concentration ratio, dimensionless | 4.000E-02 | 4.000E-02 | RTF( 3,1) |
| D-34 | Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.000E-02 | 3.000E-02 | RTF( 3,2) |
| D-34 | Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 8.000E-03 | 8.000E-03 | RTF( 3,3) |
| D-34 | | | | |

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

| Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| D-34 | H-3 , plant/soil concentration ratio, dimensionless | 4.800E+00 | 4.800E+00 | RTF( 4,1) |
| D-34 | H-3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.200E-02 | 1.200E-02 | RTF( 4,2) |
| D-34 | H-3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-02 | 1.000E-02 | RTF( 4,3) |
| D-34 | | | | |
| D-34 | Np-237+D , plant/soil concentration ratio, dimensionless | 2.000E-02 | 2.000E-02 | RTF( 5,1) |
| D-34 | Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF( 5,2) |
| D-34 | Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF( 5,3) |
| D-34 | | | | |
| D-34 | Pa-231 , plant/soil concentration ratio, dimensionless | 1.000E-02 | 1.000E-02 | RTF( 6,1) |
| D-34 | Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 5.000E-03 | 5.000E-03 | RTF( 6,2) |
| D-34 | Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF( 6,3) |
| D-34 | | | | |
| D-34 | Pb-210+D , plant/soil concentration ratio, dimensionless | 1.000E-02 | 1.000E-02 | RTF( 7,1) |
| D-34 | Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 8.000E-04 | 8.000E-04 | RTF( 7,2) |
| D-34 | Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 3.000E-04 | 3.000E-04 | RTF( 7,3) |
| D-34 | | | | |
| D-34 | Pu-238 , plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF( 8,1) |
| D-34 | Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF( 8,2) |
| D-34 | Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-06 | 1.000E-06 | RTF( 8,3) |
| D-34 | | | | |
| D-34 | Pu-239 , plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF( 9,1) |
| D-34 | Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF( 9,2) |
| D-34 | Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-06 | 1.000E-06 | RTF( 9,3) |
| D-34 | | | | |
| D-34 | Ra-226+D , plant/soil concentration ratio, dimensionless | 4.000E-02 | 4.000E-02 | RTF(10,1) |
| D-34 | Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF(10,2) |
| D-34 | Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 1.000E-03 | 1.000E-03 | RTF(10,3) |
| D-34 | | | | |
| D-34 | Sr-90+D , plant/soil concentration ratio, dimensionless | 3.000E-01 | 3.000E-01 | RTF(11,1) |
| D-34 | Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 8.000E-03 | 8.000E-03 | RTF(11,2) |
| D-34 | Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 2.000E-03 | 2.000E-03 | RTF(11,3) |
| D-34 | | | | |
| D-34 | Th-229+D , plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF(12,1) |
| D-34 | Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(12,2) |
| D-34 | Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF(12,3) |
| D-34 | | | | |
| D-34 | Th-230 , plant/soil concentration ratio, dimensionless | 1.000E-03 | 1.000E-03 | RTF(13,1) |
| D-34 | Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04 | 1.000E-04 | RTF(13,2) |
| D-34 | Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 5.000E-06 | 5.000E-06 | RTF(13,3) |
| D-34 | | | | |
| D-34 | U-233 , plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(14,1) |
| D-34 | U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(14,2) |
| D-34 | U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(14,3) |
| D-34 | | | | |
| D-34 | U-234 , plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(15,1) |
| D-34 | U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(15,2) |
| D-34 | U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(15,3) |
| D-34 | | | | |
| D-34 | U-235+D , plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(16,1) |
| D-34 | U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(16,2) |
| D-34 | U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(16,3) |

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

| Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| D-34 | U-238+D , plant/soil concentration ratio, dimensionless | 2.500E-03 | 2.500E-03 | RTF(17,1) |
| D-34 | U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.400E-04 | 3.400E-04 | RTF(17,2) |
| D-34 | U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) | 6.000E-04 | 6.000E-04 | RTF(17,3) |
| D-5 | Bioaccumulation factors, fresh water, L/kg: | | | |
| D-5 | Ac-227+D , fish | 1.500E+01 | 1.500E+01 | BIOFAC( 1,1) |
| D-5 | Ac-227+D , crustacea and mollusks | 1.000E+03 | 1.000E+03 | BIOFAC( 1,2) |
| D-5 | Am-241 , fish | 3.000E+01 | 3.000E+01 | BIOFAC( 2,1) |
| D-5 | Am-241 , crustacea and mollusks | 1.000E+03 | 1.000E+03 | BIOFAC( 2,2) |
| D-5 | Cs-137+D , fish | 2.000E+03 | 2.000E+03 | BIOFAC( 3,1) |
| D-5 | Cs-137+D , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC( 3,2) |
| D-5 | H-3 , fish | 1.000E+00 | 1.000E+00 | BIOFAC( 4,1) |
| D-5 | H-3 , crustacea and mollusks | 1.000E+00 | 1.000E+00 | BIOFAC( 4,2) |
| D-5 | Np-237+D , fish | 3.000E+01 | 3.000E+01 | BIOFAC( 5,1) |
| D-5 | Np-237+D , crustacea and mollusks | 4.000E+02 | 4.000E+02 | BIOFAC( 5,2) |
| D-5 | Pa-231 , fish | 1.000E+01 | 1.000E+01 | BIOFAC( 6,1) |
| D-5 | Pa-231 , crustacea and mollusks | 1.100E+02 | 1.100E+02 | BIOFAC( 6,2) |
| D-5 | Pb-210+D , fish | 3.000E+02 | 3.000E+02 | BIOFAC( 7,1) |
| D-5 | Pb-210+D , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC( 7,2) |
| D-5 | Pu-238 , fish | 3.000E+01 | 3.000E+01 | BIOFAC( 8,1) |
| D-5 | Pu-238 , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC( 8,2) |
| D-5 | Pu-239 , fish | 3.000E+01 | 3.000E+01 | BIOFAC( 9,1) |
| D-5 | Pu-239 , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC( 9,2) |
| D-5 | Ra-226+D , fish | 5.000E+01 | 5.000E+01 | BIOFAC(10,1) |
| D-5 | Ra-226+D , crustacea and mollusks | 2.500E+02 | 2.500E+02 | BIOFAC(10,2) |
| D-5 | Sr-90+D , fish | 6.000E+01 | 6.000E+01 | BIOFAC(11,1) |
| D-5 | Sr-90+D , crustacea and mollusks | 1.000E+02 | 1.000E+02 | BIOFAC(11,2) |
| D-5 | Th-229+D , fish | 1.000E+02 | 1.000E+02 | BIOFAC(12,1) |
| D-5 | Th-229+D , crustacea and mollusks | 5.000E+02 | 5.000E+02 | BIOFAC(12,2) |
| D-5 | Th-230 , fish | 1.000E+02 | 1.000E+02 | BIOFAC(13,1) |
| D-5 | Th-230 , crustacea and mollusks | 5.000E+02 | 5.000E+02 | BIOFAC(13,2) |
| D-5 | U-233 , fish | 1.000E+01 | 1.000E+01 | BIOFAC(14,1) |
| D-5 | U-233 , crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(14,2) |
| D-5 | U-234 , fish | 1.000E+01 | 1.000E+01 | BIOFAC(15,1) |
| D-5 | U-234 , crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(15,2) |

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

| Menu | Parameter | Current Value | Default | Parameter Name |
|---|---|---|---|---|
| D-5 | U-235+D , fish | 1.000E+01 | 1.000E+01 | BIOFAC(16,1) |
| D-5 | U-235+D , crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(16,2) |
| D-5 | | | | |
| D-5 | U-238+D , fish | 1.000E+01 | 1.000E+01 | BIOFAC(17,1) |
| D-5 | U-238+D , crustacea and mollusks | 6.000E+01 | 6.000E+01 | BIOFAC(17,2) |

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) | 1.000E+04 | 1.000E+04 | --- | AREA |
| R011 | Thickness of contaminated zone (m) | 2.000E+00 | 2.000E+00 | --- | THICK0 |
| R011 | Length parallel to aquifer flow (m) | not used | 1.000E+02 | --- | LCZPAQ |
| R011 | Basic radiation dose limit (mrem/yr) | 1.500E+01 | 3.000E+01 | --- | BRDL |
| R011 | Time since placement of material (yr) | 0.000E+00 | 0.000E+00 | --- | TI |
| R011 | Times for calculations (yr) | 3.000E+01 | 1.000E+00 | --- | T( 2) |
| R011 | Times for calculations (yr) | not used | 3.000E+00 | --- | T( 3) |
| R011 | Times for calculations (yr) | not used | 1.000E+01 | --- | T( 4) |
| R011 | Times for calculations (yr) | not used | 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+00 | 0.000E+00 | --- | S1( 2) |
| R012 | Initial principal radionuclide (pCi/g): Cs-137 | 1.000E+00 | 0.000E+00 | --- | S1( 3) |
| R012 | Initial principal radionuclide (pCi/g): H-3 | 1.000E+00 | 0.000E+00 | --- | S1( 4) |
| R012 | Initial principal radionuclide (pCi/g): Pu-238 | 1.000E+00 | 0.000E+00 | --- | S1( 8) |
| R012 | Initial principal radionuclide (pCi/g): Pu-239 | 1.000E+00 | 0.000E+00 | --- | S1( 9) |
| R012 | Initial principal radionuclide (pCi/g): Sr-90 | 1.000E+00 | 0.000E+00 | --- | S1(11) |
| R012 | Initial principal radionuclide (pCi/g): U-234 | 1.000E+00 | 0.000E+00 | --- | S1(15) |
| R012 | Initial principal radionuclide (pCi/g): U-235 | 1.000E+00 | 0.000E+00 | --- | S1(16) |
| R012 | Initial principal radionuclide (pCi/g): U-238 | 1.000E+00 | 0.000E+00 | --- | S1(17) |
| R012 | Concentration in groundwater (pCi/L): Am-241 | not used | 0.000E+00 | --- | W1( 2) |
| R012 | Concentration in groundwater (pCi/L): Cs-137 | not used | 0.000E+00 | --- | W1( 3) |
| R012 | Concentration in groundwater (pCi/L): H-3 | not used | 0.000E+00 | --- | W1( 4) |
| R012 | Concentration in groundwater (pCi/L): Pu-238 | not used | 0.000E+00 | --- | W1( 8) |
| R012 | Concentration in groundwater (pCi/L): Pu-239 | not used | 0.000E+00 | --- | W1( 9) |
| R012 | Concentration in groundwater (pCi/L): Sr-90 | not used | 0.000E+00 | --- | W1(11) |
| R012 | Concentration in groundwater (pCi/L): U-234 | not used | 0.000E+00 | --- | W1(15) |
| R012 | Concentration in groundwater (pCi/L): U-235 | not used | 0.000E+00 | --- | W1(16) |
| R012 | Concentration in groundwater (pCi/L): U-238 | not used | 0.000E+00 | --- | W1(17) |
| | | | | | |
| R013 | Cover depth (m) | 0.000E+00 | 0.000E+00 | --- | COVER0 |
| R013 | Density of cover material (g/cm**3) | not used | 1.500E+00 | --- | DENSCV |
| R013 | Cover depth erosion rate (m/yr) | not used | 1.000E-03 | --- | VCV |
| R013 | Density of contaminated zone (g/cm**3) | 1.500E+00 | 1.500E+00 | --- | DENSCZ |
| R013 | Contaminated zone erosion rate (m/yr) | 1.000E-03 | 1.000E-03 | --- | VCZ |
| R013 | Contaminated zone total porosity | 4.000E-01 | 4.000E-01 | --- | TPCZ |
| R013 | Contaminated zone field capacity | 2.000E-01 | 2.000E-01 | --- | FCCZ |
| R013 | Contaminated zone hydraulic conductivity (m/yr) | 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) | 5.500E+00 | 8.000E+00 | --- | HUMID |
| R013 | Evapotranspiration coefficient | 9.990E-01 | 5.000E-01 | --- | EVAPTR |
| R013 | Precipitation (m/yr) | 3.500E-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) | not used | 1.000E+06 | --- | WAREA |

Site-Specific Parameter Summary (continued)

| Menu | Parameter | User Input | Default | Used by RESRAD (If different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R013 | Accuracy for water/soil computations | not used | 1.000E-03 | --- | EPS |
| R014 | Density of saturated zone (g/cm**3) | not used | 1.500E+00 | --- | DENSAQ |
| R014 | Saturated zone total porosity | not used | 4.000E-01 | --- | TPSZ |
| R014 | Saturated zone effective porosity | not used | 2.000E-01 | --- | EPSZ |
| R014 | Saturated zone field capacity | not used | 2.000E-01 | --- | FCSZ |
| R014 | Saturated zone hydraulic conductivity (m/yr) | not used | 1.000E+02 | --- | HCSZ |
| R014 | Saturated zone hydraulic gradient | not used | 2.000E-02 | --- | HGWT |
| R014 | Saturated zone b parameter | not used | 5.300E+00 | --- | BSZ |
| R014 | Water table drop rate (m/yr) | not used | 1.000E-03 | --- | VWT |
| R014 | Well pump intake depth (m below water table) | not used | 1.000E+01 | --- | DWIBWT |
| R014 | Model: Nondispersion (ND) or Mass-Balance (MB) | not used | ND | --- | MODEL |
| R014 | Well pumping rate (m**3/yr) | not used | 2.500E+02 | --- | UW |
| R015 | Number of unsaturated zone strata | not used | 1 | --- | NS |
| R015 | Unsat. zone 1, thickness (m) | not used | 4.000E+00 | --- | H(1) |
| R015 | Unsat. zone 1, soil density (g/cm**3) | not used | 1.500E+00 | --- | DENSUZ(1) |
| R015 | Unsat. zone 1, total porosity | not used | 4.000E-01 | --- | TPUZ(1) |
| R015 | Unsat. zone 1, effective porosity | not used | 2.000E-01 | --- | EPUZ(1) |
| R015 | Unsat. zone 1, field capacity | not used | 2.000E-01 | --- | FCUZ(1) |
| R015 | Unsat. zone 1, soil-specific b parameter | not used | 5.300E+00 | --- | BUZ(1) |
| R015 | Unsat. zone 1, hydraulic conductivity (m/yr) | not used | 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) | not used | 2.000E+01 | --- | DCNUCU( 2,1) |
| R016 | Saturated zone (cm**3/g) | not used | 2.000E+01 | --- | DCNUCS( 2) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 4.636E-06 | ALEACH( 2) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 2) |
| R016 | Distribution coefficients for Cs-137 | | | | |
| R016 | Contaminated zone (cm**3/g) | 1.000E+03 | 1.000E+03 | --- | DCNUCC( 3) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 1.000E+03 | --- | DCNUCU( 3,1) |
| R016 | Saturated zone (cm**3/g) | not used | 1.000E+03 | --- | DCNUCS( 3) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 9.332E-08 | ALEACH( 3) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 3) |
| R016 | Distribution coefficients for H-3 | | | | |
| R016 | Contaminated zone (cm**3/g) | 0.000E+00 | 0.000E+00 | --- | DCNUCC( 4) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 0.000E+00 | --- | DCNUCU( 4,1) |
| R016 | Saturated zone (cm**3/g) | not used | 0.000E+00 | --- | DCNUCS( 4) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 7.000E-04 | ALEACH( 4) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 4) |
| R016 | Distribution coefficients for Pu-238 | | | | |
| R016 | Contaminated zone (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCC( 8) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 2.000E+03 | --- | DCNUCU( 8,1) |
| R016 | Saturated zone (cm**3/g) | not used | 2.000E+03 | --- | DCNUCS( 8) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 4.666E-08 | ALEACH( 8) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 8) |

Site-Specific Parameter Summary (continued)

| Menu | Parameter | User Input | Default | Used by RESRAD (If different from user input) | Parameter Name |
|---|---|---|---|---|---|
| R016 | Distribution coefficients for Pu-239 | | | | |
| R016 | Contaminated zone (cm**3/g) | 2.000E+03 | 2.000E+03 | --- | DCNUCC( 9) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 2.000E+03 | --- | DCNUCU( 9,1) |
| R016 | Saturated zone (cm**3/g) | not used | 2.000E+03 | --- | DCNUCS( 9) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 4.666E-08 | ALEACH( 9) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 9) |
| R016 | Distribution coefficients for Sr-90 | | | | |
| R016 | Contaminated zone (cm**3/g) | 3.000E+01 | 3.000E+01 | --- | DCNUCC(11) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 3.000E+01 | --- | DCNUCU(11,1) |
| R016 | Saturated zone (cm**3/g) | not used | 3.000E+01 | --- | DCNUCS(11) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 3.097E-06 | ALEACH(11) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(11) |
| R016 | Distribution coefficients for U-234 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(15) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 5.000E+01 | --- | DCNUCU(15,1) |
| R016 | Saturated zone (cm**3/g) | not used | 5.000E+01 | --- | DCNUCS(15) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.862E-06 | ALEACH(15) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(15) |
| R016 | Distribution coefficients for U-235 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(16) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 5.000E+01 | --- | DCNUCU(16,1) |
| R016 | Saturated zone (cm**3/g) | not used | 5.000E+01 | --- | DCNUCS(16) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.862E-06 | ALEACH(16) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(16) |
| R016 | Distribution coefficients for U-238 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(17) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 5.000E+01 | --- | DCNUCU(17,1) |
| R016 | Saturated zone (cm**3/g) | not used | 5.000E+01 | --- | DCNUCS(17) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.862E-06 | ALEACH(17) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(17) |
| 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) | not used | 2.000E+01 | --- | DCNUCU( 1,1) |
| R016 | Saturated zone (cm**3/g) | not used | 2.000E+01 | --- | DCNUCS( 1) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 4.636E-06 | ALEACH( 1) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 1) |
| R016 | Distribution coefficients for daughter Np-237 | | | | |
| R016 | Contaminated zone (cm**3/g) | -1.000E+00 | -1.000E+00 | 2.574E+02 | DCNUCC( 5) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | -1.000E+00 | --- | DCNUCU( 5,1) |
| R016 | Saturated zone (cm**3/g) | not used | -1.000E+00 | --- | DCNUCS( 5) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 3.624E-07 | ALEACH( 5) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 5) |

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( 6) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 5.000E+01 | --- | DCNUCU( 6,1) |
| R016 | Saturated zone (cm**3/g) | not used | 5.000E+01 | --- | DCNUCS( 6) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.862E-06 | ALEACH( 6) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 6) |
| R016 | Distribution coefficients for daughter Pb-210 | | | | |
| R016 | Contaminated zone (cm**3/g) | 1.000E+02 | 1.000E+02 | --- | DCNUCC( 7) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 1.000E+02 | --- | DCNUCU( 7,1) |
| R016 | Saturated zone (cm**3/g) | not used | 1.000E+02 | --- | DCNUCS( 7) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 9.321E-07 | ALEACH( 7) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK( 7) |
| R016 | Distribution coefficients for daughter Ra-226 | | | | |
| R016 | Contaminated zone (cm**3/g) | 7.000E+01 | 7.000E+01 | --- | DCNUCC(10) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 7.000E+01 | --- | DCNUCU(10,1) |
| R016 | Saturated zone (cm**3/g) | not used | 7.000E+01 | --- | DCNUCS(10) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.331E-06 | ALEACH(10) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(10) |
| R016 | Distribution coefficients for daughter Th-229 | | | | |
| R016 | Contaminated zone (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCC(12) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 6.000E+04 | --- | DCNUCU(12,1) |
| R016 | Saturated zone (cm**3/g) | not used | 6.000E+04 | --- | DCNUCS(12) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.556E-09 | ALEACH(12) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(12) |
| R016 | Distribution coefficients for daughter Th-230 | | | | |
| R016 | Contaminated zone (cm**3/g) | 6.000E+04 | 6.000E+04 | --- | DCNUCC(13) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 6.000E+04 | --- | DCNUCU(13,1) |
| R016 | Saturated zone (cm**3/g) | not used | 6.000E+04 | --- | DCNUCS(13) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.556E-09 | ALEACH(13) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(13) |
| R016 | Distribution coefficients for daughter U-233 | | | | |
| R016 | Contaminated zone (cm**3/g) | 5.000E+01 | 5.000E+01 | --- | DCNUCC(14) |
| R016 | Unsaturated zone 1 (cm**3/g) | not used | 5.000E+01 | --- | DCNUCU(14,1) |
| R016 | Saturated zone (cm**3/g) | not used | 5.000E+01 | --- | DCNUCS(14) |
| R016 | Leach rate (/yr) | 0.000E+00 | 0.000E+00 | 1.862E-06 | ALEACH(14) |
| R016 | Solubility constant | 0.000E+00 | 0.000E+00 | not used | SOLUBK(14) |
| R017 | Inhalation rate (m**3/yr) | 1.400E+04 | 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 | 4.000E-01 | 4.000E-01 | --- | SHF3 |
| R017 | Shielding factor, external gamma | 7.000E-01 | 7.000E-01 | --- | SHF1 |
| R017 | Fraction of time spent indoors | 0.000E+00 | 5.000E-01 | --- | FIND |
| R017 | Fraction of time spent outdoors (on site) | 1.140E-02 | 2.500E-01 | --- | FOTD |
| R017 | Shape factor flag, external gamma | 1.000E+00 | 1.000E+00 | >0 shows circular AREA. | FS |

Site-Specific Parameter Summary (continued)

| 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 | 7.071E+01 | --- | RAD_SHAPE( 2) |
| R017 | Outer annular radius (m), ring 3: | not used | 0.000E+00 | --- | RAD_SHAPE( 3) |
| R017 | Outer annular radius (m), ring 4: | not used | 0.000E+00 | --- | RAD_SHAPE( 4) |
| R017 | Outer annular radius (m), ring 5: | not used | 0.000E+00 | --- | RAD_SHAPE( 5) |
| R017 | Outer annular radius (m), ring 6: | not used | 0.000E+00 | --- | RAD_SHAPE( 6) |
| R017 | Outer annular radius (m), ring 7: | not used | 0.000E+00 | --- | RAD_SHAPE( 7) |
| R017 | Outer annular radius (m), ring 8: | not used | 0.000E+00 | --- | RAD_SHAPE( 8) |
| R017 | Outer annular radius (m), ring 9: | not used | 0.000E+00 | --- | RAD_SHAPE( 9) |
| R017 | Outer annular radius (m), ring 10: | not used | 0.000E+00 | --- | RAD_SHAPE(10) |
| R017 | Outer annular radius (m), ring 11: | not used | 0.000E+00 | --- | RAD_SHAPE(11) |
| R017 | Outer annular radius (m), ring 12: | not used | 0.000E+00 | --- | RAD_SHAPE(12) |
| R017 | Fractions of annular areas within AREA: | | | | |
| R017 | Ring 1 | not used | 1.000E+00 | --- | FRACA( 1) |
| R017 | Ring 2 | not used | 2.732E-01 | --- | FRACA( 2) |
| R017 | Ring 3 | not used | 0.000E+00 | --- | FRACA( 3) |
| R017 | Ring 4 | not used | 0.000E+00 | --- | FRACA( 4) |
| R017 | Ring 5 | not used | 0.000E+00 | --- | FRACA( 5) |
| R017 | Ring 6 | not used | 0.000E+00 | --- | FRACA( 6) |
| R017 | Ring 7 | not used | 0.000E+00 | --- | FRACA( 7) |
| R017 | Ring 8 | not used | 0.000E+00 | --- | FRACA( 8) |
| R017 | Ring 9 | not used | 0.000E+00 | --- | FRACA( 9) |
| R017 | Ring 10 | not used | 0.000E+00 | --- | FRACA(10) |
| R017 | Ring 11 | not used | 0.000E+00 | --- | FRACA(11) |
| R017 | Ring 12 | not used | 0.000E+00 | --- | FRACA(12) |
| R018 | Fruits, vegetables and grain consumption (kg/yr) | not used | 1.600E+02 | --- | DIET(1) |
| R018 | Leafy vegetable consumption (kg/yr) | not used | 1.400E+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) | 2.920E+02 | 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 | not used | 1.000E+00 | --- | FHHW |
| R018 | Contamination fraction of livestock water | not used | 1.000E+00 | --- | FLW |
| R018 | Contamination fraction of irrigation water | not used | 1.000E+00 | --- | FIRW |
| R018 | Contamination fraction of aquatic food | not used | 5.000E-01 | --- | FR9 |
| R018 | Contamination fraction of plant food | not used | -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 | 5.500E+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) | not used | 1.000E-04 | --- | MLFD |

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) | not used | 9.000E-01 | --- | DROOT |
| R019 | Drinking water fraction from ground water | not used | 1.000E+00 | --- | FGWDW |
| R019 | Household water fraction from ground water | not used | 1.000E+00 | --- | FGWHH |
| R019 | Livestock water fraction from ground water | not used | 1.000E+00 | --- | FGWLW |
| R019 | Irrigation fraction from ground water | not used | 1.000E+00 | --- | FGWIR |
| | | | | | |
| R19B | Wet weight crop yield for Non-Leafy (kg/m**2) | not used | 7.000E-01 | --- | YV(1) |
| R19B | Wet weight crop yield for Leafy (kg/m**2) | not used | 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) | not used | 1.700E-01 | --- | TE(1) |
| R19B | Growing Season for Leafy (years) | not used | 2.500E-01 | --- | TE(2) |
| R19B | Growing Season for Fodder (years) | not used | 8.000E-02 | --- | TE(3) |
| R19B | Translocation Factor for Non-Leafy | not used | 1.000E-01 | --- | TIV(1) |
| R19B | Translocation Factor for Leafy | not used | 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 | not used | 2.500E-01 | --- | RDRY(1) |
| R19B | Dry Foliar Interception Fraction for Leafy | not used | 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 | not used | 2.500E-01 | --- | RWET(1) |
| R19B | Wet Foliar Interception Fraction for Leafy | not used | 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 | not used | 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 | --- | DMC |
| 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 | --- | REVSN |
| C14 | Fraction of grain in beef cattle feed | not used | 8.000E-01 | --- | AVFG4 |
| C14 | Fraction of grain in milk cow feed | not used | 2.000E-01 | --- | AVFG5 |
| | | | | | |
| STOR | Storage times of contaminated foodstuffs (days): | | | | |
| STOR | Fruits, non-leafy vegetables, and grain | 1.400E+01 | 1.400E+01 | --- | STOR_T(1) |
| STOR | Leafy vegetables | 1.000E+00 | 1.000E+00 | --- | STOR_T(2) |
| STOR | Milk | 1.000E+00 | 1.000E+00 | --- | STOR_T(3) |
| STOR | Meat and poultry | 2.000E+01 | 2.000E+01 | --- | STOR_T(4) |
| STOR | Fish | 7.000E+00 | 7.000E+00 | --- | STOR_T(5) |
| STOR | Crustacea and mollusks | 7.000E+00 | 7.000E+00 | --- | STOR_T(6) |
| STOR | Well water | 1.000E+00 | 1.000E+00 | --- | STOR_T(7) |
| STOR | Surface water | 1.000E+00 | 1.000E+00 | --- | STOR_T(8) |
| STOR | Livestock fodder | 4.500E+01 | 4.500E+01 | --- | STOR_T(9) |
| | | | | | |
| R021 | Thickness of building foundation (m) | not used | 1.500E-01 | --- | FLOOR1 |
| R021 | Bulk density of building foundation (g/cm**3) | not used | 2.400E+00 | --- | DENSFL |
| R021 | Total porosity of the cover material | not used | 4.000E-01 | --- | TPCV |
| R021 | Total porosity of the building foundation | not used | 1.000E-01 | --- | TPFL |
| R021 | Volumetric water content of the cover material | not used | 5.000E-02 | --- | PH2OCV |
| R021 | Volumetric water content of the foundation | not used | 3.000E-02 | --- | PH2OFL |

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 | not used | 3.000E-07 | --- | DIFFL |
| R021 | in contaminated zone soil | not used | 2.000E-06 | --- | DIFCZ |
| R021 | Radon vertical dimension of mixing (m) | not used | 2.000E+00 | --- | HMIX |
| R021 | Average building air exchange rate (1/hr) | not used | 5.000E-01 | --- | REXG |
| R021 | Height of the building (room) (m) | not used | 2.500E+00 | --- | HRM |
| R021 | Building interior area factor | not used | 0.000E+00 | --- | FAI |
| R021 | Building depth below ground surface (m) | not used | -1.000E+00 | --- | DMFL |
| R021 | Emanating power of Rn-222 gas | not used | 2.500E-01 | --- | EMANA(1) |
| R021 | Emanating power of Rn-220 gas | not used | 1.500E-01 | --- | EMANA(2) |
| TITL | Number of graphical time points | 32 | --- | --- | NPTS |
| TITL | Maximum number of integration points for dose | 17 | --- | --- | LYMAX |
| TITL | Maximum number of integration points for risk | 257 | --- | --- | KYMAX |

Summary of Pathway Selections

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

| Contaminated Zone Dimensions | | Initial Soil Concentrations, pCi/g | |
|---|---|---|---|
| Area: | 10000.00 square meters | Am-241 | 1.000E+00 |
| Thickness: | 2.00 meters | Cs-137 | 1.000E+00 |
| Cover Depth: | 0.00 meters | H-3 | 1.000E+00 |
| | | Pu-238 | 1.000E+00 |
| | | Pu-239 | 1.000E+00 |
| | | Sr-90 | 1.000E+00 |
| | | U-234 | 1.000E+00 |
| | | U-235 | 1.000E+00 |
| | | U-238 | 1.000E+00 |

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 | 3.000E+01 |
| TDOSE(t): | 8.562E-02 | 6.378E-02 |
| M(t): | 5.708E-03 | 4.252E-03 |

Maximum TDOSE(t): 8.562E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

| Radio- | Ground | | Inhalation | | Radon | | Plant | | Meat | | Milk | | Soil | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nuclide | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. |
| Am-241 | 4.831E-04 | 0.0056 | 2.085E-04 | 0.0024 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.211E-02 | 0.1414 |
| Cs-137 | 3.597E-02 | 0.4201 | 1.482E-08 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.645E-04 | 0.0019 |
| H-3 | 0.000E+00 | 0.0000 | 5.223E-04 | 0.0061 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.494E-07 | 0.0000 |
| Pu-238 | 1.698E-06 | 0.0000 | 1.835E-04 | 0.0021 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.061E-02 | 0.1239 |
| Pu-239 | 3.229E-06 | 0.0000 | 2.016E-04 | 0.0024 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.178E-02 | 0.1376 |
| Sr-90 | 2.771E-04 | 0.0032 | 6.084E-07 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 5.033E-04 | 0.0059 |
| U-234 | 4.442E-06 | 0.0001 | 6.204E-05 | 0.0007 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.421E-04 | 0.0110 |
| U-235 | 8.216E-03 | 0.0960 | 5.782E-05 | 0.0007 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 8.892E-04 | 0.0104 |
| U-238 | 1.473E-03 | 0.0172 | 5.546E-05 | 0.0006 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 8.954E-04 | 0.0105 |
| Total | 4.643E-02 | 0.5423 | 1.292E-03 | 0.0151 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.790E-02 | 0.4426 |

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

Water Dependent Pathways

| Radio- | Water | | Fish | | Radon | | Plant | | Meat | | Milk | | All Pathways* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nuclide | 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 | 1.280E-02 | 0.1495 |
| 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 | 3.613E-02 | 0.4220 |
| 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 | 5.224E-04 | 0.0061 |
| 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 | 1.080E-02 | 0.1261 |
| 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 | 1.199E-02 | 0.1400 |
| 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 | 7.810E-04 | 0.0091 |
| U-234 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.009E-03 | 0.0118 |
| 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 | 9.163E-03 | 0.1070 |
| U-238 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.424E-03 | 0.0283 |
| 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 | 8.562E-02 | 1.0000 |

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

| Radio- | Ground | | Inhalation | | Radon | | Plant | | Meat | | Milk | | Soil | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nuclide | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. |
| Am-241 | 4.604E-04 | 0.0072 | 1.987E-04 | 0.0031 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.154E-02 | 0.1809 |
| Cs-137 | 1.798E-02 | 0.2820 | 7.411E-09 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 8.227E-05 | 0.0013 |
| H-3 | 0.000E+00 | 0.0000 | 5.102E-14 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.459E-17 | 0.0000 |
| Pu-238 | 1.340E-06 | 0.0000 | 1.448E-04 | 0.0023 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 8.371E-03 | 0.1313 |
| Pu-239 | 3.227E-06 | 0.0001 | 2.015E-04 | 0.0032 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.177E-02 | 0.1846 |
| Sr-90 | 1.357E-04 | 0.0021 | 2.979E-07 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.464E-04 | 0.0039 |
| U-234 | 4.662E-06 | 0.0001 | 6.207E-05 | 0.0010 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.424E-04 | 0.0148 |
| U-235 | 8.222E-03 | 0.1289 | 5.893E-05 | 0.0009 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.229E-04 | 0.0145 |
| U-238 | 1.473E-03 | 0.0231 | 5.546E-05 | 0.0009 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 8.955E-04 | 0.0140 |
| Total | 2.828E-02 | 0.4435 | 7.217E-04 | 0.0113 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.477E-02 | 0.5452 |

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

| Radio- | Water | | Fish | | Radon | | Plant | | Meat | | Milk | | All Pathways* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nuclide | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. | mrem/yr | fract. |
| 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 | 1.220E-02 | 0.1912 |
| 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 | 1.807E-02 | 0.2833 |
| 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 | 5.103E-14 | 0.0000 |
| 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 | 8.518E-03 | 0.1336 |
| 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 | 1.198E-02 | 0.1878 |
| 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 | 3.824E-04 | 0.0060 |
| U-234 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.009E-03 | 0.0158 |
| 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 | 9.204E-03 | 0.1443 |
| U-238 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.424E-03 | 0.0380 |
| Total | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.378E-02 | 1.0000 |

*Sum of all water independent and dependent pathways.

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

| Parent (i) | Product (j) | Branch Fraction* | DSR(j,t) t= 0.000E+00 | (mrem/yr)/(pCi/g) 3.000E+01 |
|---|---|---|---|---|
| Am-241 | Am-241 | 1.000E+00 | 1.280E-02 | 1.220E-02 |
| Am-241 | Np-237 | 1.000E+00 | 0.000E+00 | 2.595E-07 |
| Am-241 | U-233 | 1.000E+00 | 0.000E+00 | 6.746E-13 |
| Am-241 | Th-229 | 1.000E+00 | 0.000E+00 | 1.979E-14 |
| Am-241 | äDSR(j) | | 1.280E-02 | 1.220E-02 |
| Cs-137 | Cs-137 | 1.000E+00 | 3.613E-02 | 1.807E-02 |
| H-3 | H-3 | 1.000E+00 | 5.224E-04 | 5.103E-14 |
| Pu-238 | Pu-238 | 1.000E+00 | 1.080E-02 | 8.517E-03 |
| Pu-238 | U-234 | 1.000E+00 | 0.000E+00 | 7.749E-08 |
| Pu-238 | Th-230 | 1.000E+00 | 0.000E+00 | 2.184E-11 |
| Pu-238 | Ra-226 | 1.000E+00 | 0.000E+00 | 6.124E-12 |
| Pu-238 | Pb-210 | 1.000E+00 | 0.000E+00 | 2.392E-13 |
| Pu-238 | äDSR(j) | | 1.080E-02 | 8.518E-03 |
| Pu-239 | Pu-239 | 1.000E+00 | 1.199E-02 | 1.198E-02 |
| Pu-239 | U-235 | 1.000E+00 | 0.000E+00 | 2.751E-10 |
| Pu-239 | Pa-231 | 1.000E+00 | 0.000E+00 | 3.677E-13 |
| Pu-239 | Ac-227 | 1.000E+00 | 0.000E+00 | 1.854E-13 |
| Pu-239 | äDSR(j) | | 1.199E-02 | 1.198E-02 |
| Sr-90 | Sr-90 | 1.000E+00 | 7.810E-04 | 3.824E-04 |
| U-234 | U-234 | 1.000E+00 | 1.009E-03 | 1.008E-03 |
| U-234 | Th-230 | 1.000E+00 | 0.000E+00 | 5.464E-07 |
| U-234 | Ra-226 | 1.000E+00 | 0.000E+00 | 2.251E-07 |
| U-234 | Pb-210 | 1.000E+00 | 0.000E+00 | 1.112E-08 |
| U-234 | äDSR(j) | | 1.009E-03 | 1.009E-03 |
| U-235 | U-235 | 1.000E+00 | 9.163E-03 | 9.162E-03 |
| U-235 | Pa-231 | 1.000E+00 | 0.000E+00 | 2.448E-05 |
| U-235 | Ac-227 | 1.000E+00 | 0.000E+00 | 1.722E-05 |
| U-235 | äDSR(j) | | 9.163E-03 | 9.204E-03 |
| U-238 | U-238 | 1.000E+00 | 2.424E-03 | 2.424E-03 |
| U-238 | U-234 | 1.000E+00 | 0.000E+00 | 8.720E-08 |
| U-238 | Th-230 | 1.000E+00 | 0.000E+00 | 2.363E-11 |
| U-238 | Ra-226 | 1.000E+00 | 0.000E+00 | 6.497E-12 |
| U-238 | Pb-210 | 1.000E+00 | 0.000E+00 | 2.511E-13 |
| U-238 | äDSR(j) | | 2.424E-03 | 2.424E-03 |

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ó 0.5 yr) daughters.

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

| Nuclide (i) | t= 0.000E+00 | 3.000E+01 |
|---|---|---|
| Am-241 | 1.172E+03 | 1.230E+03 |
| Cs-137 | 4.151E+02 | 8.302E+02 |
| H-3 | 2.871E+04 | 2.939E+14 |
| Pu-238 | 1.389E+03 | 1.761E+03 |
| Pu-239 | 1.251E+03 | 1.252E+03 |
| Sr-90 | 1.921E+04 | 3.923E+04 |
| U-234 | 1.487E+04 | 1.486E+04 |
| U-235 | 1.637E+03 | 1.630E+03 |
| U-238 | 6.189E+03 | 6.189E+03 |

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+00 | 0.000E+00 | 1.280E-02 | 1.172E+03 | 1.280E-02 | 1.172E+03 |
| Cs-137 | 1.000E+00 | 0.000E+00 | 3.613E-02 | 4.151E+02 | 3.613E-02 | 4.151E+02 |
| H-3 | 1.000E+00 | 0.000E+00 | 5.224E-04 | 2.871E+04 | 5.224E-04 | 2.871E+04 |
| Pu-238 | 1.000E+00 | 0.000E+00 | 1.080E-02 | 1.389E+03 | 1.080E-02 | 1.389E+03 |
| Pu-239 | 1.000E+00 | 0.000E+00 | 1.199E-02 | 1.251E+03 | 1.199E-02 | 1.251E+03 |
| Sr-90 | 1.000E+00 | 0.000E+00 | 7.810E-04 | 1.921E+04 | 7.810E-04 | 1.921E+04 |
| U-234 | 1.000E+00 | 3.000E+01 | 1.009E-03 | 1.486E+04 | 1.009E-03 | 1.487E+04 |
| U-235 | 1.000E+00 | 3.000E+01 | 9.204E-03 | 1.630E+03 | 9.163E-03 | 1.637E+03 |
| U-238 | 1.000E+00 | 0.000E+00 | 2.424E-03 | 6.189E+03 | 2.424E-03 | 6.189E+03 |

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 | 3.000E+01 |
|---|---|---|---|---|
| Am-241 | Am-241 | 1.000E+00 | 1.280E-02 | 1.220E-02 |
| Np-237 | Am-241 | 1.000E+00 | 4.356E-09 | 2.595E-07 |
| U-233 | Am-241 | 1.000E+00 | 2.456E-16 | 6.746E-13 |
| Th-229 | Am-241 | 1.000E+00 | 1.769E-19 | 1.979E-14 |
| Cs-137 | Cs-137 | 1.000E+00 | 3.613E-02 | 1.807E-02 |
| H-3 | H-3 | 1.000E+00 | 5.224E-04 | 5.103E-14 |
| Pu-238 | Pu-238 | 1.000E+00 | 1.080E-02 | 8.517E-03 |
| U-234 | Pu-238 | 1.000E+00 | 1.426E-09 | 7.749E-08 |
| U-234 | U-234 | 1.000E+00 | 1.009E-03 | 1.008E-03 |
| U-234 | U-238 | 1.000E+00 | 1.430E-09 | 8.720E-08 |
| U-234 | äDOSE(j): | | 1.009E-03 | 1.009E-03 |
| Th-230 | Pu-238 | 1.000E+00 | 8.450E-15 | 2.184E-11 |
| Th-230 | U-234 | 1.000E+00 | 8.960E-09 | 5.464E-07 |
| Th-230 | U-238 | 1.000E+00 | 8.467E-15 | 2.363E-11 |
| Th-230 | äDOSE(j): | | 8.960E-09 | 5.465E-07 |
| Ra-226 | Pu-238 | 1.000E+00 | 5.733E-17 | 6.124E-12 |
| Ra-226 | U-234 | 1.000E+00 | 8.102E-11 | 2.251E-07 |
| Ra-226 | U-238 | 1.000E+00 | 6.515E-17 | 6.497E-12 |
| Ra-226 | äDOSE(j): | | 8.102E-11 | 2.251E-07 |
| Pb-210 | Pu-238 | 1.000E+00 | 6.866E-20 | 2.392E-13 |
| Pb-210 | U-234 | 1.000E+00 | 1.219E-13 | 1.112E-08 |
| Pb-210 | U-238 | 1.000E+00 | 0.000E+00 | 2.511E-13 |
| Pb-210 | äDOSE(j): | | 1.219E-13 | 1.112E-08 |
| Pu-239 | Pu-239 | 1.000E+00 | 1.199E-02 | 1.198E-02 |
| U-235 | Pu-239 | 1.000E+00 | 4.512E-12 | 2.751E-10 |
| U-235 | U-235 | 1.000E+00 | 9.163E-03 | 9.162E-03 |
| U-235 | äDOSE(j): | | 9.163E-03 | 9.162E-03 |
| Pa-231 | Pu-239 | 1.000E+00 | 1.318E-16 | 3.677E-13 |
| Pa-231 | U-235 | 1.000E+00 | 4.015E-07 | 2.448E-05 |
| Pa-231 | äDOSE(j): | | 4.015E-07 | 2.448E-05 |
| Ac-227 | Pu-239 | 1.000E+00 | 2.035E-18 | 1.854E-13 |
| Ac-227 | U-235 | 1.000E+00 | 8.255E-09 | 1.722E-05 |
| Ac-227 | äDOSE(j): | | 8.255E-09 | 1.722E-05 |
| Sr-90 | Sr-90 | 1.000E+00 | 7.810E-04 | 3.824E-04 |

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 | 3.000E+01 |
|---|---|---|---|---|
| U-238 | U-238 | 1.000E+00 | 2.424E-03 | 2.424E-03 |

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

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 | 3.000E+01 |
|---|---|---|---|---|
| Am-241 | Am-241 | 1.000E+00 | 1.000E+00 | 9.529E-01 |
| Np-237 | Am-241 | 1.000E+00 | 0.000E+00 | 9.486E-06 |
| U-233 | Am-241 | 1.000E+00 | 0.000E+00 | 6.272E-10 |
| Th-229 | Am-241 | 1.000E+00 | 0.000E+00 | 5.943E-13 |
| Cs-137 | Cs-137 | 1.000E+00 | 1.000E+00 | 5.000E-01 |
| H-3 | H-3 | 1.000E+00 | 1.000E+00 | 9.861E-11 |
| Pu-238 | Pu-238 | 1.000E+00 | 1.000E+00 | 7.890E-01 |
| U-234 | Pu-238 | 1.000E+00 | 0.000E+00 | 7.572E-05 |
| U-234 | U-234 | 1.000E+00 | 1.000E+00 | 9.999E-01 |
| U-234 | U-238 | 1.000E+00 | 0.000E+00 | 8.504E-05 |
| U-234 | äS(j): | | 1.000E+00 | 1.000E+00 |
| Th-230 | Pu-238 | 1.000E+00 | 0.000E+00 | 1.063E-08 |
| Th-230 | U-234 | 1.000E+00 | 0.000E+00 | 2.700E-04 |
| Th-230 | U-238 | 1.000E+00 | 0.000E+00 | 1.148E-08 |
| Th-230 | äS(j): | | 0.000E+00 | 2.700E-04 |
| Ra-226 | Pu-238 | 1.000E+00 | 0.000E+00 | 4.678E-11 |
| Ra-226 | U-234 | 1.000E+00 | 0.000E+00 | 1.747E-06 |
| Ra-226 | U-238 | 1.000E+00 | 0.000E+00 | 4.958E-11 |
| Ra-226 | äS(j): | | 0.000E+00 | 1.747E-06 |
| Pb-210 | Pu-238 | 1.000E+00 | 0.000E+00 | 9.249E-12 |
| Pb-210 | U-234 | 1.000E+00 | 0.000E+00 | 4.372E-07 |
| Pb-210 | U-238 | 1.000E+00 | 0.000E+00 | 9.704E-12 |
| Pb-210 | äS(j): | | 0.000E+00 | 4.373E-07 |
| Pu-239 | Pu-239 | 1.000E+00 | 1.000E+00 | 9.991E-01 |
| U-235 | Pu-239 | 1.000E+00 | 0.000E+00 | 2.953E-08 |
| U-235 | U-235 | 1.000E+00 | 1.000E+00 | 9.999E-01 |
| U-235 | äS(j): | | 1.000E+00 | 9.999E-01 |
| Pa-231 | Pu-239 | 1.000E+00 | 0.000E+00 | 9.372E-12 |
| Pa-231 | U-235 | 1.000E+00 | 0.000E+00 | 6.345E-04 |
| Pa-231 | äS(j): | | 0.000E+00 | 6.345E-04 |
| Ac-227 | Pu-239 | 1.000E+00 | 0.000E+00 | 2.388E-12 |
| Ac-227 | U-235 | 1.000E+00 | 0.000E+00 | 2.258E-04 |
| Ac-227 | äS(j): | | 0.000E+00 | 2.258E-04 |
| Sr-90 | Sr-90 | 1.000E+00 | 1.000E+00 | 4.896E-01 |

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 | 3.000E+01 |
|---|---|---|---|---|
| U-238 | U-238 | 1.000E+00 | 1.000E+00 | 9.999E-01 |

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

RESMAIN5.EXE execution time = 441.41 seconds