ENERCON SERVICES, INC.
An Employee Owned Company

4499 Old William Penn Highway
Murrysville, PA 15668-1809
(724) 733-8711
Fax: (724) 733-4630

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United States Nuclear Regulatory Commission
Attn: Marie Miller, Chief
Decommissioning Branch
Division of Nuclear Materials Safety
475 Allendale Road
King of Prussia, PA 19408

SMB-1541
04608980

Dear Ms. Miller:

By this letter, Heritage Minerals, Inc. (HMI) hereby submits an addendum to its prior remediation reports and license termination request which addresses the United States Nuclear Regulatory Commission's (NRC's) Report entitled *Final Report: Dose Assessment for Unrestricted Future Use Scenarios Following License termination of the Heritage Minerals, Inc. Site: Lakehurst, New Jersey* (August, 2005) conveyed by letter from Ms. Marie Miller dated September 29, 2005. This addendum provides the following categories of statements in response to NRC's Report: (1) editorial comments on Sections 1.0 & 2.0 of the NRC Report, (2) general comments on the inapplicability of the "resident farmer" scenario, and (3) specific comments on the "suburban resident" scenario, which use site conditions after NRC-approved site remediation and dose assessment parameters that provide a more accurate representation of the site and the potential dose to members of the public, assuming unrestricted release after license termination. HMI's analysis of the most likely dose scenario, the suburban resident scenario, generates a potential dose of 23.5 mrem/year, which is below the current NRC decommissioning dose limit of 25 mrem/year. However, as NRC is well-aware, the 25 mrem/year dose limit is not applicable to the HMI site as HMI's NRC-approved decommissioning plan incorporates license termination criteria based upon NRC's Branch Technical Position (BTP)-81 of 10 pCi/g total uranium and 10 pCi/g total thorium.

If you have any questions regarding this letter or its attached addendum, please do not hesitate to contact me at (724) 733-8711, or HMI's attorney, Anthony J. Thompson, Esq. at (202) 496-0780.

Respectfully Submitted,

Gerald E. Williams, P.E.
Project Manager

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NMSS/RGNI MATERIALS-002

ADDENDUM ADDRESSING THE UNITED STATES NUCLEAR REGULATORY COMMISSION REPORT ENTITLED "FINAL REPORT: DOSE ASSESSMENT FOR UNRESTRICTED FUTURE USE SCENARIOS FOLLOWING LICENSE TERMINATION OF THE HERITAGE MINERALS, INC. SITE: LAKEHURST, NEW JERSEY (AUGUST 2005)

1.0 Editorial Comments Regarding NRC's Report

After reviewing the NRC Report, HMI believes that the following editorial comments clarify the Report's statements and reflect an accurate assessment of HMI site conditions and process history:

1.1 NRC Report, Page 2, Section 2.1, Paragraph 1

The first paragraph in Section 2.1 should be modified to include the following language (*** HMI-inserted language in bold and italics, deleted language not denoted):

> "The HMI facility is located in Lakehurst, Manchester Township, Ocean County, New Jersey. It is approximately 50 kilometers (30 miles) southeast of downtown Trenton, NJ. The site is bounded on the north and west by Route 70, ***on the northeast by the Central Railroad tracks and privately-owned properties, and on the south by the State of New Jersey and corporate or privately-owned properties.*** The overall site area is located on the Atlantic Coastal Plain. The area is characterized by sandy deposits that resulted from processes involving surface erosion, transport of eroded materials via slowing streams or water bodies, and deposition by wind creep and saltation in a shallow surface water environment. The deposition processes continued for sometime, accumulating thick deposits reaching a depth of 500 m (1500 feet). The bedrock is not encountered until a depth of 1000 m (3000 feet). The sandy deposits are typically permeable. The uppermost shallow aquifer (the Cohansey aquifer) at the site is reached at a minimum depth of approximately 2 m (6 feet). However, the average depth of shallow wells at the site for industrial water use could reach approximately 8 m (25 feet). The plant manager indicated that the shallow aquifer well water may not be appropriate for drinking without a proper treatment to remove the high content of iron. However, the deep aquifer water at a depth of few hundred feet could be more appropriate for drinking."

1.2 NRC Report, Page 2, Section 2.1, Paragraph 2

The second paragraph in Section 2.1 should be modified to include the following language (*** HMI-inserted language in bold and italics, deleted language not denoted):

> "The area is covered by vegetation, shrubs, and trees. There are some farms located within approximately 3 to 5 km (2-3 miles) of the site. The area ***also adjoins some*** creeks, streams, small lakes, and marshy land."

1.3 NRC Report, Page 2, Section 2.2, Paragraph 1

The first paragraph in Section 2.2 under *ASARCO Operations* should be modified to include the following language (*** HMI-inserted language in bold and italics, deleted language not denoted):

> "From 1973 to 1982, HMI's predecessor company, ASARCO, conducted mining of the sand deposits (e.g., dredging), hydraulic (wet) ***gravity*** processing, and electro-magnetic (dry) separation to extract heavy minerals, such as ilmenite (Fe, Ti 0_2) from the sand. ASARCO mining and wet processing involved creating a pond for the dredge, pumping the dredge sand to a screening barge at a rate of about 1090 metric tons (MT) (1,200 tons) per hour, and then pumping the sand in a slurry to a processing plant where heavy minerals were concentrated using numerous spiral separators. ***This integrated wet gravity process was conducted in the "Wet Mill."***

1.4 NRC Report, Page 3, Section 2.2, Paragraph 2

The second paragraph in Section 2.2 should be deleted in its entirety and be re-written to include the following language (*** HMI-inserted language in bold and italics, deleted language not denoted):

> ***"The wet mill tailings (mostly silica sand water) are normally returned to the moving dredge pond as backfill. However, to enlarge the original dredge pond for adequate space for the dredging and operating equipment, the original one million tons of tailings (referred to as ASARCO wet mill tailings) were stored at the dredge construction site located to the west of the old Central Railroad tracks.***
>
> ***Based on its history, the radionuclide concentration of these mine tailings is below the natural background concentration of the area and, hence, not licensable source material since all of the heavy mineral fraction that contained monazite has been removed.***
>
> ***The heavy mineral fraction followed a different path downward through the spirals and was de-watered and stockpiled outside the Wet Mill for further processing at the rate of about forty-five (45) metric tons per hour.***
>
> ***The excess wash water containing the suspended clay washed from the heavy mineral fraction was processed through the Wet Mill holding tanks (sumps) to a series of large area settling ponds located to the north of the Wet Mill and identified as the "Blue Area."***

1.5 NRC Report, Page 3, Section 2.2, Paragraph 3

The third paragraph in Section 2.2 under *ASARCO Operations* should be modified to include the following language (*** HMI-inserted language in bold and italics, deleted language not denoted):

> "The stockpiled heavy fraction contained monazite (Fe, Ce, U, Th, PO_4 ***and ZrSiO4***), the concentration of which had been increased by a factor of 24. The factor of 24 is calculated by dividing the 1090 MT (1,200 tons) of dredged sand per hour by the 45 MT (50 tons) of heavy fraction produced per hour. The ***drained*** heavy mineral concentrate was transferred into a storage silo, and then fed by a conveyor into an oil-fired rotary kiln for drying at 167.5 ° C (300° F). The dried heavy sand fraction was then transferred to the Dry Mill for high-tension electrostatic separation and high-intensity magnetic separation."

1.6 NRC Report, Page 4, Section 2.2, Paragraph 10

The third paragraph in Section 2.2 under *HMI Operations, Phase I* should be modified to include the following language (*** HMI-inserted language in bold and italics, deleted language not denoted):

> "Back at the Wet Mill, the recycled *Dry Mill titanium circuit* tailings were further refined by a hydraulic classifier and shaking tables. The second Wet Mill product stream was sent to another section of the Dry Mill called the *zircon circuit.* The product of the *zircon circuit* ***was market-grade zircon containing 350 ppm Th+U.*** An NRC sample of the *Dry Mill titanium circuit* product showed that it contained 140 ppm Th+U, or less than the 500 ppm licensable limit. The *zircon circuit* tails, containing zircon and monazite, were fed to high-intensity magnets, which removed monazite, staurolite, and tourmaline. The product of the high-intensity magnets was market-grade zircon containing 350 ppm Th+U."

1.7 NRC Report, Page 4, Section 2.2, Paragraph 11

The fourth paragraph in Section 2.2 under *HMI Operations, Phase I* should be modified to include the following language (*** HMI-inserted language in bold and italics, deleted language not denoted):

> "The tails of the magnetic separation stage, containing monazite, was slurried and returned to the Wet Mill, combined with other tailings and ultimately returned to the *Blue Area.* These tailings contained 120 ppm Th+U, as

determined by NRC inspectors ***and are, therefore, not considered licensable source material."***

1.8 NRC Report, Page 6, Section 2.3, Paragraph 2

The second paragraph in Section 2.3 should be modified to include the following language (*** HMI-inserted language in bold and italics, deleted language not denoted):

> "After the plant cleanup, a gamma survey was performed in early 1991 on the buildings and equipment. In 1996, a survey of the natural background levels of U and Th within the soils was conducted by Radiation Science, Inc. In March, 1997, and July, 1997 Camp Dresser & McKee, Inc. conducted an investigation to characterize the mine tailings at the HMI site. The investigation consisted of surface gamma radiation survey, a subsurface soil investigation, and a groundwater and surface water investigation. The groundwater and surface water investigation ***confirmed*** no significant radionuclide transport or elevated concentrations are occurring in the surface water or the aquifer system at the site."

2.0 Comments on the Inapplicability of the "Resident Farmer" Scenario

(a) Use of the "resident farmer" scenario is misleading and unnecessary since, as NRC Staff's dose assessment acknowledges, the licensee/site owner intends to develop the site for residential use and "the land use patterns and demography of Manchester Township" are not compatible with the "resident farmer" scenario. *See* NRC Report at 8-9. Thus, it is unnecessary to evaluate the "resident farmer" scenario for *completeness*.

(b) The assumption that the groundwater pathway will result in increased radiation exposure is unreasonable since, as noted in NRC Staff's dose assessment, the Camp Dresser & McKee, Inc. report (1997) confirmed "no significant radionuclide transport or elevated concentrations are occurring in the surface water or the aquifer system at the site." *See* NRC Report at 6. Thus, the assumption that the groundwater pathway will result in increased radiation exposure is unreasonably and unrealistically conservative.

(c) Further support for the impropriety of using the groundwater and ingestion pathways is provided by the January, 2003 report entitled *Pathways Analysis and Remediation Planning for ASARCO/HMI Site* prepared by SENES Consultants, Ltd. for presentation to the New Jersey Department of Environmental Protection (NJDEP) on behalf of HMI. As stated in this report, Dr. Douglas Chambers states the following:

> "The heavy mineral fraction which contains virtually all of the naturally occurring radionuclides are very stable compounds such that the radionuclides are *unavailable for transport through the environment (e.g., leaching to groundwater or chemical uptake by vegetation).*"
>
> "The heavy minerals at the HMI site are of a type(s) which are stable chemically and physically such that the radionuclides do not leave the mineral structure under normal environmental conditions after the initial formation of the minerals."
>
> "The heavy minerals are therefore considered stable under environmental conditions and are not available for chemical uptake by vegetation or leaching to groundwater."

3.0 Specific Comments: Suburban Resident Exposure Pathways and Modeling Scenarios

These specific comments on NRC Staff's dose assessment use the most current version of RESRAD (Version 6.3). All significant exposure pathways for the critical population group are considered in these specific comments.

3.1 Specific Comment #1:

The HMI site is a large tract of land that includes more than 7,000 acres. Of the total site area, residential re-development is planned for about 1,000 acres of the site. No industrial development of the land is planned. The 1,000 acres planned for redevelopment will be used primarily to construct single family dwellings on lots approximately one-third of an acre. Regionally, this area of New Jersey shows a significant trend towards development of residential dwellings, therefore, the most representative dose modeling scenario is the suburban resident.

3.2 Specific Comment #2:

As described in the RESRAD Users Manual, Page 2-21, Table 2.2 the following pathways (excluding radon) are considered appropriate for the suburban residential scenario:

Pathway	Included in Dose Assessment
External gamma exposure	Yes
Inhalation of dust	Yes
Ingestion of Plant food	Yes
Ingestion of meat	No
Ingestion of milk	No
Ingestion of fish	No
Ingestion of soil	Yes
Ingestion of water	No

3.3 Specific Comment #3:

In our review of input parameters for these specific comments, it was determined that the standard default parameters for RESRAD would be appropriate in all but a limited number of instances. An overview of each input parameter needed for the dose assessment as well as those input parameters where non-default values are selected is provided below:

- Radionuclide concentration(s);
- Contaminated zone parameters;
- Occupancy, inhalation, and gamma exposure.

Each of these input parameters is discussed in the following sections.

3.3.1 Radionuclide Concentrations

In prior reports, HMI provided the NRC analytical results from soil sample testing. Results were provided for each of the following work activities:

- Remediation of the monazite pile;
- Removal and disposal of fugitive licensable source materials;
- Demolition and disposal of all materials from the wet and dry mills;
- Removal and disposal of stockpiled sands accumulated during demolition of mill buildings.

In addition to the data collected and submitted to the NRC by HMI, ORISE also performed site surveys and testing at the request of the NRC. All of these data was reviewed by NRC and evaluated to determine an average remaining radionuclide concentration. The average values were 2.3 pCi/g for the natural thorium radionuclides (Th-232 and Th-228) and its daughter radionuclide Ra-228, and 2.4 pCi/g for the natural uranium radionuclides (U-238 and U-234) and its daughter radionuclides Th-230, Ra-226, and Pb-210. In developing HMI's specific comments, these values were used.

(a) Contaminated Zone Parameters

Two contaminated zone parameters were modified from the standard default values used in RESRAD. A description of the value selected for that parameter, and the justification to support that selection is provided below.

(i) Area of the Contaminated Zone

The area of the contaminated zone was adjusted from the default value of 20,000 square meters to a more representative value of 2,000 square meters. This reduced value is considered appropriate since this size is a realistic estimate for the size of the monazite pile and assigned buffer area.

(ii) Thickness of the Contaminated Zone

Unlike the final evaluations by NRC, HMI has selected the thickness of the contaminated zone as 0.15 meters (6 inches). During prior work to remove the monazite pile and the removal

and disposal of fugitive licensable source material, all elevated soils were excavated until the surface beneath the monazite pile and assigned buffer area was less than the *NRC-approved* site release criteria of 10 pCi/g total thorium and 10 pCi/g total uranium. Indeed, given that the monazite pile consisted of 1,400 tons of monazite and some 3,385 tons of material (not including some 800 tons of additional materials excavated as "fugitive" source material) were removed and transported to Utah for final disposition, it is unreasonable to assume a contaminated zone of 1.0 meter.

Final results confirmed that fugitive licensable source materials were removed. As part of this effort, verification samples were collected on the surface adjacent to the excavation locations. These samples showed surface radionuclide concentrations at or slightly above background. This data shows that even in those locations with fugitive licensable source material that were remediated, the surrounding surface soils were not significantly elevated in concentration on the surface or at depth.

Finally, it is noted that the RESRAD Users Manual, page 3-8 discusses allowance for variations and non-homogeneity of sample concentrations by assuming a contaminated zone thickness layer of 0.15 meters. Based on the site-specific conditions discussed above and RESRAD's consideration of surface soil variability, we believe that selection of 0.15 meters depth for a 2,000 square meter area is an appropriate selection for the contaminated zone.

(b) <u>Occupancy, Inhalation, and Gamma Exposure</u>

NRC Staff's dose assessment uses outdoor fraction values (time spent outdoors by an on-site individual) of 25% for the "resident farmer" or "suburban resident," 6% for an industrial worker, and 0.6% for recreationist. This outdoor fraction for a "resident farmer/suburban resident" equates to 6 hours per day spent outdoors every day on or near the contaminated zone.

HMI believes that it is unrealistic to use such a high number of hours as the outdoor fraction value in the only likely dose assessment scenario, that being the "suburban resident" scenario.

Each suburban resident's outdoor time will not be spent exclusively on or near the contaminated zone. Additionally, a portion of each residential property will include non-impacted areas of the site as well as other areas such paved driveways or patios that will reduce potential gamma exposure from any underlying radionuclide contamination.

The RESRAD Users Manual, Page 2-22, footnote (d) to Table 2.3 notes that the EPA Exposure Factor Handbook assumes that a suburban resident will spend an average of 2 hours per day outdoors compared to the default RESRAD assumption of 6 hours per day. We believe this is a more realistic assumption for the average time spent outdoors by a suburban resident. Using an average outdoor time of 2 hours per day, a value for the outdoor fraction of 0.0833 was selected. This value (2 hours per day for 365 days for a total of 730 hours) falls between the industrial worker outdoor fraction (2 hours per day for 250 days for a total of 500 hours) and the resident farmer outdoor fraction (6 hours per day for 365 days for a total of 2,190 hours). Thus, 0.0833 represents a realistic, practical estimate of the outdoor fraction.

The modified dose assessment parameters selected (i.e., size and depth of the contaminated zone and the realistic outdoor fraction) are more representative of existing site conditions and expected future use of the site after license termination. With these two (2) modifications, the expected dose to a suburban resident is 23.5 mrem/year. However, we again restate that the 25 mrem/year standard does not apply for HMI to have unrestricted use upon license termination. Attachment A to this addendum presents the results of the HMI's dose model assessment.

1.0 Executive Summary

This dose assessment report is submitted as an addendum to the prior remediation reports and the license termination request submitted by Heritage Minerals, Inc. (HMI) to the Nuclear Regulatory Commission (NRC) Region 1. This report uses site conditions after remediation, and dose assessment parameters that HMI believes are the most accurate representation of the site usage after license termination to analyze the dose that would be received by a member of the public after unrestricted release of the site's NRC license. Our analysis shows the expected dose to be 23.5 mrerm per year. This is below the current NRC's criteria of 25 mrerm per year for a site to achieve license termination for unrestricted release which is not applicable to the Heritage's license which is grandfathered from that standard. It is also noted that the HMI site has been approved for license termination criteria under BTP-81 of 10 pCi/g total uranium and 10 pCi/g total thorium, and therefore the dose assessment is not required for license termination.

2.0 Exposure Pathways and Modeling Scenarios

The dose assessment was completed using the most current version of RESRAD (Version 6.3). All significant exposure pathways for the critical population group were considered in the analysis. These pathways included the following:

- Direct exposure to external radiation from remaining radionuclides in the soil
- Internal dose from inhalation of airborne radionuclides
- Internal dose from ingestion of plant food, met and milk from livestock feed and water with contaminated fodder and water, drinking water from a contaminated water source, and contaminated soil

When selecting the appropriate pathways for the dose assessment, there are four recognized uses for a site after unrestricted release. These uses are resident farmer, suburban resident, industrial worker, and recreational. Appropriate selection of the future property use should be based on the historical past use and the intended future use of the site.

When operational, the HMI site was a mineral recovery operation located away from all other local agricultural operations, residential developments, industrial centers, and recreational facilities. The site is a large tract of land that includes more than 7,000 acres. Of the total site

area, residential re-development is planned for about 1000 acres of the site. No industrial development of the land is planned. The 1,000 acres planned for re-development will be used to construct primarily single family dwellings on lots approximately one-third of an acre. Regionally, this area of New Jersey is also showing a significant trend to the development of residential dwellings and a decrease in farming and agriculture. Based on this review, it was concluded that most representative dose modeling scenario is the suburban resident. This intended site usage is consistent with the regional trend of increasing residential population while decreasing agriculture and industrial use.

As described in the RESRAD Users Manual, Page 2-21, Table 2.2 the following pathways (excluding radon) are considered appropriate for the suburban residential scenario:

Pathway	Included in Dose Assessment
External gamma exposure	Yes
Inhalation of dust	Yes
Ingestion of Plant food	Yes
Ingestion of meat	No
Ingestion of milk	No
Ingestion of fish	No
Ingestion of soil	Yes
Ingestion of water	No

3.0 Selection of Key Input Parameters for Dose Modeling

In our review of input parameters for the dose assessment, it was determined that the standard default parameters for RESRAD would be appropriate in all but a limited number of instances. An overview of each input parameter needed for the dose assessment as well as those input parameters where non-default values were selected is provided below.

- Radionuclide concentration(s)
- Contaminated zone parameters
- Occupancy, inhalation, and gamma exposure

Each of these is discussed in the following sections.

3.1 Radionuclide Concentrations

In prior reports, HMI provided the NRC analytical results from soil sample testing. Results were provided for each of the following work activities:

- Remediation of the monazite pile
- Removal and disposal of fugitive licensable source materials
- Demolition and disposal of all materials from the wet and dry mills
- Removal and disposal of stockpiled sands accumulated during mill building demolitions

In addition to the data collected and submitted to the NRC by HMI, ORISE also performed site surveys and testing at the request of the NRC. All of this data was reviewed by NRC and evaluated to determine an average remaining radionuclide concentration. The average values were 2.3pCi/g for the natural thorium radionuclides (Th-232 and Th-228) and its daughter radionuclide Ra-228, and 2.4pCi/g for the natural uranium radionuclides (U-238 and U-234) and its daughter radionuclides Th-230, Ra-226, and Pb-210. In performing our dose assessment, we used these values.

3.2 Contaminated Zone Parameters

Two contaminated zone parameters were modified from the standard default values used in RESRAD. A description of the value selected for that parameter, and the justification to support that selection is provided below.

3.2.1 Area of the Contaminated Zone

The area of the contaminated zone was adjusted from the default value of 20,000 square meters to a more representative value of 2,000 square meters. This reduced value is considered appropriate since this size is a realistic estimate for the size of the monazite pile and assigned buffer area.

3.2.2 Thickness of the Contaminated Zone

Unlike the final evaluations by the NRC, we have selected the thickness of the contaminated zone as 0.15 meters (6 inches). During prior work to remove the monazite pile and the removal and disposal of fugitive licensable source material, all elevated soils were excavated until the bottom was less than the site release criteria of 10 pCi/g total thorium and 10 pCi/g total uranium.

Final results confirmed that fugitive licensable source materials were removed. As part of this effort, verification samples were collected on the surface adjacent to the excavation locations.

These samples showed surface radionuclide concentrations at or slightly above background. This data shows that even in those locations with fugitive licensable source material that were remediated, the surrounding surface soils were not significantly elevated in concentration or depth.

Finally, it is noted that the RESRAD Users Manual, page 3-8 discusses allowance for variations and non-homogeneity of sample concentrations by assuming a contaminated zone thickness layer of 0.15 meters. Based on the data discussed above and RESRAD's consideration of surface soil variability, we believe that selection of 0.15 meters depth for a 2,000 square meter area is an appropriate selection for the contaminated zone.

3.3 Occupancy, Inhalation, and Gamma Exposure

Depending on the site use scenario, recognized outdoor fraction values (time spent outdoors by an on-site individual) are 25% for a resident farmer or suburban resident, 6% for an industrial worker, and 0.6% for recreationist. This outdoor fraction for a resident farmer/suburban equates to 6 hours per day spent outdoors every day on or near the contaminated material. We believe that it is unrealistic to use such a high number of hours as the outdoor fraction value in the dose assessment.

Each resident's outdoor time will not be spent exclusively on or near contaminated materials. A portion of each residential property will include non-impacted areas of the site as well as other areas such paved driveways or patios that will reduce potential gamma exposure from any underlying radionuclide contamination.

The RESRAD Users Manual, Page 2-22, footnote (d) to Table 2.3 notes that the EPA Exposure Factor Handbook assumes that a resident will spend an average of 2 hours per day outdoors compared to the default RESRAD assumption of 6 hours per day. We believe this is a more realistic expectation for the average time spent outdoors by a suburban resident. Using an average outdoor time of 2 hours per day, a value for the outdoor fraction of 0.0833 was selected. This value (2 hours per day for 365 days for a total of 730 hours) is between the industrial worker outdoor fraction (2 hours per day for 250 days for a total of 500 hours) and the resident farmer outdoor fraction (6 hours per day for 365 days for a total of 2,190 hours). We believe this represents a realistic, practical estimate of the outdoor fraction, and 0.0833 was selected as the outdoor fraction for this dose assessment.

4.0 Conclusion

Dose assessment parameters were selected to be representative of existing site conditions and expected future use of the site after license termination. The results of this evaluation showed an expected dose of 23.5 mrem per year to a suburban resident. However, we again restate that the 25 mrem/year standard does not apply for HMI to have unrestricted use upon license termination. Attachment 1 provides the results of our dose model assessment.

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

Menu	Parameter	Current Value	Base Case*	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(3)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(5)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(6)
B-1	U-234	1.320E-01	1.320E-01	DCF2(7)
B-1	U-238	1.180E-01	1.180E-01	DCF2(8)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(5)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(6)
D-1	U-234	2.830E-04	2.830E-04	DCF3(7)
D-1	U-238	2.550E-04	2.550E-04	DCF3(8)
D-1	U-238+D	2.687E-04	2.550E-04	DCF3(9)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)
D-34				

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

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

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.000E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	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): Pb-210	2.300E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Ra-226	2.300E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Ra-228	2.400E+00	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Th-228	2.400E+00	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Th-230	2.300E+00	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Th-232	2.400E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-234	2.300E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	2.300E+00	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
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)	1.400E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	2.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.200E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	2.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	2.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.758E-02	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.938E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.938E-02	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.603E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.603E-05	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.603E-05	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.508E-02	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.508E-02	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	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	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	8.330E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	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)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E-01	-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)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	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	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	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
C14	DCF correction factor for gaseous forms of C14	not used	0.000E+00	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for risk	1	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions	
Area:	2000.00 square meters
Thickness:	0.15 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Pb-210	2.300E+00
Ra-226	2.300E+00
Ra-228	2.400E+00
Th-228	2.400E+00
Th-230	2.300E+00
Th-232	2.400E+00
U-234	2.300E+00
U-238	2.300E+00

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

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	2.352E+01	2.281E+01	2.139E+01	1.747E+01	1.219E+01	5.750E+00	3.925E-02	2.607E-02
M(t):	9.409E-01	9.124E-01	8.557E-01	6.986E-01	4.878E-01	2.300E-01	1.570E-03	1.043E-03

Maximum TDOSE(t): 2.352E+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.
Pb-210	5.417E-03	0.0002	1.762E-03	0.0001	0.000E+00	0.0000	4.706E-01	0.0200	0.000E+00	0.0000	0.000E+00	0.0000	3.449E-01	0.0147
Ra-226	8.514E+00	0.3620	6.862E-04	0.0000	0.000E+00	0.0000	3.535E-01	0.0150	0.000E+00	0.0000	0.000E+00	0.0000	6.854E-02	0.0029
Ra-228	5.772E+00	0.2454	4.680E-03	0.0002	0.000E+00	0.0000	3.734E-01	0.0159	0.000E+00	0.0000	0.000E+00	0.0000	7.416E-02	0.0032
Th-228	6.585E+00	0.2800	2.365E-02	0.0010	0.000E+00	0.0000	4.736E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	3.455E-02	0.0015
Th-230	2.974E-03	0.0001	2.549E-02	0.0011	0.000E+00	0.0000	3.738E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	2.676E-02	0.0011
Th-232	3.337E-01	0.0142	1.340E-01	0.0057	0.000E+00	0.0000	4.071E-02	0.0017	0.000E+00	0.0000	0.000E+00	0.0000	1.435E-01	0.0061
U-234	3.671E-04	0.0000	1.004E-02	0.0004	0.000E+00	0.0000	4.596E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.344E-02	0.0006
U-238	1.230E-01	0.0052	8.982E-03	0.0004	0.000E+00	0.0000	4.364E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.276E-02	0.0005
Total	2.134E+01	0.9072	2.093E-01	0.0089	0.000E+00	0.0000	1.256E+00	0.0534	0.000E+00	0.0000	0.000E+00	0.0000	7.186E-01	0.0306

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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.227E-01	0.0350
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.937E+00	0.3800
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.225E+00	0.2646
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.648E+00	0.2827
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.896E-02	0.0025
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.519E-01	0.0277
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	2.845E-02	0.0012
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.491E-01	0.0063
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.352E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	5.105E-03	0.0002	1.650E-03	0.0001	0.000E+00	0.0000	4.409E-01	0.0193	0.000E+00	0.0000	0.000E+00	0.0000	3.231E-01	0.0142
Ra-226	8.161E+00	0.3578	7.068E-04	0.0000	0.000E+00	0.0000	3.516E-01	0.0154	0.000E+00	0.0000	0.000E+00	0.0000	7.556E-02	0.0033
Ra-228	6.742E+00	0.2956	1.053E-02	0.0005	0.000E+00	0.0000	3.179E-01	0.0139	0.000E+00	0.0000	0.000E+00	0.0000	7.237E-02	0.0032
Th-228	4.571E+00	0.2004	1.635E-02	0.0007	0.000E+00	0.0000	3.274E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	2.389E-02	0.0010
Th-230	6.575E-03	0.0003	2.532E-02	0.0011	0.000E+00	0.0000	3.864E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	2.661E-02	0.0012
Th-232	1.095E+00	0.0480	1.341E-01	0.0059	0.000E+00	0.0000	8.167E-02	0.0036	0.000E+00	0.0000	0.000E+00	0.0000	1.514E-01	0.0066
U-234	3.474E-04	0.0000	9.443E-03	0.0004	0.000E+00	0.0000	4.322E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.263E-02	0.0006
U-238	1.162E-01	0.0051	8.443E-03	0.0004	0.000E+00	0.0000	4.104E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.200E-02	0.0005
Total	2.070E+01	0.9074	2.065E-01	0.0091	0.000E+00	0.0000	1.208E+00	0.0529	0.000E+00	0.0000	0.000E+00	0.0000	6.975E-01	0.0306

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.707E-01	0.0338
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.589E+00	0.3766
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.143E+00	0.3132
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.614E+00	0.2023
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.237E-02	0.0027
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.462E+00	0.0641
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	2.675E-02	0.0012
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.407E-01	0.0062
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.281E+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+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.
Pb-210	4.534E-03	0.0002	1.448E-03	0.0001	0.000E+00	0.0000	3.868E-01	0.0181	0.000E+00	0.0000	0.000E+00	0.0000	2.835E-01	0.0133
Ra-226	7.498E+00	0.3505	7.356E-04	0.0000	0.000E+00	0.0000	3.448E-01	0.0161	0.000E+00	0.0000	0.000E+00	0.0000	8.679E-02	0.0041
Ra-228	6.837E+00	0.3196	1.452E-02	0.0007	0.000E+00	0.0000	2.291E-01	0.0107	0.000E+00	0.0000	0.000E+00	0.0000	6.205E-02	0.0029
Th-228	2.201E+00	0.1029	7.813E-03	0.0004	0.000E+00	0.0000	1.565E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.142E-02	0.0005
Th-230	1.331E-02	0.0006	2.498E-02	0.0012	0.000E+00	0.0000	4.112E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	2.632E-02	0.0012
Th-232	2.756E+00	0.1289	1.354E-01	0.0063	0.000E+00	0.0000	1.455E-01	0.0068	0.000E+00	0.0000	0.000E+00	0.0000	1.655E-01	0.0077
U-234	3.111E-04	0.0000	8.344E-03	0.0004	0.000E+00	0.0000	3.819E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.116E-02	0.0005
U-238	1.037E-01	0.0048	7.461E-03	0.0003	0.000E+00	0.0000	3.626E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	1.060E-02	0.0005
Total	1.941E+01	0.9076	2.007E-01	0.0094	0.000E+00	0.0000	1.119E+00	0.0523	0.000E+00	0.0000	0.000E+00	0.0000	6.573E-01	0.0307

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+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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.762E-01	0.0316
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.930E+00	0.3707
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.143E+00	0.3339
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.222E+00	0.1039
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.872E-02	0.0032
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.203E+00	0.1497
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	2.364E-02	0.0011
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.253E-01	0.0059
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.139E+01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+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.
Pb-210	2.992E-03	0.0002	9.144E-04	0.0001	0.000E+00	0.0000	2.443E-01	0.0140	0.000E+00	0.0000	0.000E+00	0.0000	1.790E-01	0.0102
Ra-226	5.566E+00	0.3187	7.428E-04	0.0000	0.000E+00	0.0000	3.053E-01	0.0175	0.000E+00	0.0000	0.000E+00	0.0000	1.042E-01	0.0060
Ra-228	3.141E+00	0.1799	7.807E-03	0.0004	0.000E+00	0.0000	7.189E-02	0.0041	0.000E+00	0.0000	0.000E+00	0.0000	2.410E-02	0.0014
Th-228	1.705E-01	0.0098	5.888E-04	0.0000	0.000E+00	0.0000	1.179E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.603E-04	0.0000
Th-230	3.252E-02	0.0019	2.378E-02	0.0014	0.000E+00	0.0000	4.880E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	2.534E-02	0.0015
Th-232	6.880E+00	0.3939	1.386E-01	0.0079	0.000E+00	0.0000	2.498E-01	0.0143	0.000E+00	0.0000	0.000E+00	0.0000	1.915E-01	0.0110
U-234	2.123E-04	0.0000	5.405E-03	0.0003	0.000E+00	0.0000	2.473E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	7.231E-03	0.0004
U-238	6.949E-02	0.0040	4.832E-03	0.0003	0.000E+00	0.0000	2.348E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	6.864E-03	0.0004
Total	1.586E+01	0.9082	1.827E-01	0.0105	0.000E+00	0.0000	8.811E-01	0.0504	0.000E+00	0.0000	0.000E+00	0.0000	5.390E-01	0.0309

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.272E-01	0.0245
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.976E+00	0.3422
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.245E+00	0.1858
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.721E-01	0.0099
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.652E-02	0.0050
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.460E+00	0.4271
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	1.532E-02	0.0009
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.354E-02	0.0048
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	1.747E+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.
Pb-210	9.083E-04	0.0001	2.423E-04	0.0000	0.000E+00	0.0000	6.474E-02	0.0053	0.000E+00	0.0000	0.000E+00	0.0000	4.744E-02	0.0039
Ra-226	2.350E+00	0.1927	4.700E-04	0.0000	0.000E+00	0.0000	1.669E-01	0.0137	0.000E+00	0.0000	0.000E+00	0.0000	7.608E-02	0.0062
Ra-228	1.311E-01	0.0107	3.093E-04	0.0000	0.000E+00	0.0000	2.522E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	8.957E-04	0.0001
Th-228	1.130E-04	0.0000	3.592E-07	0.0000	0.000E+00	0.0000	7.195E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.248E-07	0.0000
Th-230	6.157E-02	0.0050	2.035E-02	0.0017	0.000E+00	0.0000	6.038E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	2.244E-02	0.0018
Th-232	8.651E+00	0.7094	1.238E-01	0.0102	0.000E+00	0.0000	2.583E-01	0.0212	0.000E+00	0.0000	0.000E+00	0.0000	1.793E-01	0.0147
U-234	7.533E-05	0.0000	1.541E-03	0.0001	0.000E+00	0.0000	7.047E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	2.061E-03	0.0002
U-238	2.197E-02	0.0018	1.376E-03	0.0001	0.000E+00	0.0000	6.686E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	1.954E-03	0.0002
Total	1.122E+01	0.9198	1.481E-01	0.0121	0.000E+00	0.0000	4.999E-01	0.0410	0.000E+00	0.0000	0.000E+00	0.0000	3.302E-01	0.0271

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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.133E-01	0.0093
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.594E+00	0.2127
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.348E-01	0.0111
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.140E-04	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.104E-01	0.0091
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.212E+00	0.7554
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	4.382E-03	0.0004
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	2.597E-02	0.0021
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	1.219E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	1.240E-05	0.0000	1.653E-06	0.0000	0.000E+00	0.0000	4.418E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.236E-04	0.0001
Ra-226	8.912E-02	0.0155	1.947E-05	0.0000	0.000E+00	0.0000	6.259E-03	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	3.405E-03	0.0006
Ra-228	1.102E-06	0.0000	1.765E-09	0.0000	0.000E+00	0.0000	1.437E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.107E-09	0.0000
Th-228	6.611E-16	0.0000	1.434E-18	0.0000	0.000E+00	0.0000	2.875E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.096E-18	0.0000
Th-230	5.263E-02	0.0092	8.400E-03	0.0015	0.000E+00	0.0000	3.327E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	9.675E-03	0.0017
Th-232	5.343E+00	0.9292	5.121E-02	0.0089	0.000E+00	0.0000	1.075E-01	0.0187	0.000E+00	0.0000	0.000E+00	0.0000	7.430E-02	0.0129
U-234	9.517E-06	0.0000	1.485E-05	0.0000	0.000E+00	0.0000	6.697E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.960E-05	0.0000
U-238	3.097E-04	0.0001	1.206E-05	0.0000	0.000E+00	0.0000	5.864E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.713E-05	0.0000
Total	5.485E+00	0.9539	5.966E-02	0.0104	0.000E+00	0.0000	1.175E-01	0.0204	0.000E+00	0.0000	0.000E+00	0.0000	8.774E-02	0.0153

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.795E-04	0.0001
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.881E-02	0.0172
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.123E-06	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.650E-16	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.403E-02	0.0129
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.576E+00	0.9697
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.066E-05	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.447E-04	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.750E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

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

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.041E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.041E-07	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.366E-02	0.8576	0.000E+00	0.0000	0.000E+00	0.0000	3.366E-02	0.8576
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.683E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.683E-18	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.120E-04	0.0181	0.000E+00	0.0000	0.000E+00	0.0000	7.120E-04	0.0181
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.430E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.430E-14	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.502E-03	0.0637	0.000E+00	0.0000	0.000E+00	0.0000	2.502E-03	0.0637
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.376E-03	0.0605	0.000E+00	0.0000	0.000E+00	0.0000	2.376E-03	0.0605
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.925E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.925E-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 = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

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

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.737E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.737E-16	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.525E-02	0.9688	0.000E+00	0.0000	0.000E+00	0.0000	2.525E-02	0.9688
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.573E-04	0.0291	0.000E+00	0.0000	0.000E+00	0.0000	7.573E-04	0.0291
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.291E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.291E-19	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.600E-05	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	5.600E-05	0.0021
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.339E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.339E-08	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.607E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.607E-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)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210+D	Pb-210+D	1.000E+00	3.577E-01	3.351E-01	2.940E-01	1.857E-01	4.927E-02	3.389E-04	8.872E-08	3.799E-16
Ra-226+D	Ra-226+D	1.000E+00	3.880E+00	3.718E+00	3.414E+00	2.531E+00	1.064E+00	3.980E-02	3.019E-03	2.247E-03
Ra-226+D	Pb-210+D	1.000E+00	6.115E-03	1.645E-02	3.361E-02	6.743E-02	6.329E-02	3.161E-03	1.162E-02	8.732E-03
Ra-226+D	∑DSR(j)		3.886E+00	3.734E+00	3.448E+00	2.598E+00	1.128E+00	4.296E-02	1.464E-02	1.098E-02
Ra-228+D	Ra-228+D	1.000E+00	2.089E+00	1.775E+00	1.282E+00	4.098E-01	1.559E-02	1.299E-07	6.963E-19	0.000E+00
Ra-228+D	Th-228+D	1.000E+00	5.047E-01	1.201E+00	1.694E+00	9.424E-01	4.057E-02	3.382E-07	4.977E-21	0.000E+00
Ra-228+D	∑DSR(j)		2.594E+00	2.976E+00	2.976E+00	1.352E+00	5.616E-02	4.681E-07	7.013E-19	0.000E+00
Th-228+D	Th-228+D	1.000E+00	2.770E+00	1.923E+00	9.259E-01	7.171E-02	4.750E-05	2.771E-16	0.000E+00	0.000E+00
Th-230	Th-230	1.000E+00	2.479E-02	2.463E-02	2.430E-02	2.315E-02	1.987E-02	8.385E-03	0.000E+00	0.000E+00
Th-230	Ra-226+D	1.000E+00	8.436E-04	2.484E-03	5.549E-03	1.428E-02	2.739E-02	2.313E-02	6.883E-05	6.743E-05
Th-230	Pb-210+D	1.000E+00	9.397E-07	5.873E-06	2.765E-05	1.847E-04	7.328E-04	6.739E-04	2.407E-04	2.618E-04
Th-230	∑DSR(j)		2.564E-02	2.712E-02	2.988E-02	3.762E-02	4.800E-02	3.219E-02	3.095E-04	3.292E-04
Th-232	Th-232	1.000E+00	1.218E-01	1.210E-01	1.194E-01	1.137E-01	9.730E-02	4.026E-02	0.000E+00	0.000E+00
Th-232	Ra-228+D	1.000E+00	1.286E-01	3.602E-01	7.223E-01	1.344E+00	1.528E+00	9.298E-01	5.916E-15	9.483E-20
Th-232	Th-228+D	1.000E+00	2.119E-02	1.280E-01	4.928E-01	1.650E+00	2.213E+00	1.353E+00	4.048E-17	6.470E-22
Th-232	∑DSR(j)		2.716E-01	6.092E-01	1.334E+00	3.108E+00	3.838E+00	2.323E+00	5.957E-15	9.547E-20
U-234	U-234	1.000E+00	1.237E-02	1.163E-02	1.028E-02	6.659E-03	1.900E-03	1.692E-05	1.086E-03	0.000E+00
U-234	Th-230	1.000E+00	1.101E-07	3.193E-07	6.965E-07	1.662E-06	2.644E-06	1.366E-06	2.727E-09	1.026E-08
U-234	Ra-226+D	1.000E+00	2.501E-09	1.703E-08	8.435E-08	5.972E-07	2.642E-06	3.639E-06	3.498E-07	5.205E-06
U-234	Pb-210+D	1.000E+00	2.187E-12	2.882E-11	2.926E-10	5.513E-09	5.568E-08	1.015E-07	1.074E-06	1.913E-05
U-234	∑DSR(j)		1.237E-02	1.163E-02	1.028E-02	6.661E-03	1.905E-03	2.203E-05	1.088E-03	2.435E-05
U-238	U-238	5.400E-05	5.946E-07	5.590E-07	4.940E-07	3.200E-07	9.115E-08	8.044E-10	5.290E-08	0.000E+00
U-238+D	U-238+D	9.999E-01	6.482E-02	6.118E-02	5.450E-02	3.632E-02	1.129E-02	1.499E-04	1.032E-03	0.000E+00
U-238+D	U-234	9.999E-01	1.735E-08	4.928E-08	1.018E-07	1.981E-07	1.642E-07	4.821E-09	9.258E-07	0.000E+00
U-238+D	Th-230	9.999E-01	1.034E-13	6.939E-13	3.366E-12	2.238E-11	8.375E-11	6.883E-11	1.891E-12	1.563E-11
U-238+D	Ra-226+D	9.999E-01	1.759E-15	2.556E-14	2.765E-13	5.567E-12	6.276E-11	1.719E-10	1.497E-10	5.042E-09
U-238+D	Pb-210+D	9.999E-01	1.278E-18	3.437E-17	7.412E-16	3.983E-14	1.074E-12	4.497E-12	4.321E-10	1.816E-08
U-238+D	∑DSR(j)		6.482E-02	6.118E-02	5.450E-02	3.632E-02	1.129E-02	1.499E-04	1.033E-03	2.321E-08

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

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

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	6.989E+01	7.460E+01	8.503E+01	1.346E+02	5.074E+02	7.377E+04	2.818E+08	*7.634E+13
Ra-226	6.434E+00	6.695E+00	7.251E+00	9.622E+00	2.217E+01	5.819E+02	1.708E+03	2.277E+03
Ra-228	9.639E+00	8.400E+00	8.400E+00	1.849E+01	4.451E+02	5.341E+07	*2.726E+14	*2.726E+14
Th-228	9.025E+00	1.300E+01	2.700E+01	3.486E+02	5.263E+05	*8.195E+14	*8.195E+14	*8.195E+14
Th-230	9.752E+02	9.219E+02	8.368E+02	6.646E+02	5.208E+02	7.767E+02	8.076E+04	7.593E+04
Th-232	9.204E+01	4.103E+01	1.873E+01	8.043E+00	6.513E+00	1.076E+01	*1.097E+05	*1.097E+05
U-234	2.021E+03	2.150E+03	2.433E+03	3.753E+03	1.312E+04	1.135E+06	2.298E+04	1.027E+06
U-238	3.857E+02	4.086E+02	4.587E+02	6.883E+02	2.214E+03	1.668E+05	2.420E+04	*3.361E+05

*At specific activity limit

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

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Pb-210	2.300E+00	0.000E+00	3.577E-01	6.989E+01	3.577E-01	6.989E+01
Ra-226	2.300E+00	0.000E+00	3.886E+00	6.434E+00	3.886E+00	6.434E+00
Ra-228	2.400E+00	1.913 ± 0.004	3.066E+00	8.155E+00	2.594E+00	9.639E+00
Th-228	2.400E+00	0.000E+00	2.770E+00	9.025E+00	2.770E+00	9.025E+00
Th-230	2.300E+00	40.52 ± 0.08	4.903E-02	5.099E+02	2.564E-02	9.752E+02
Th-232	2.400E+00	25.02 ± 0.05	3.864E+00	6.469E+00	2.716E-01	9.204E+01
U-234	2.300E+00	0.000E+00	1.237E-02	2.021E+03	1.237E-02	2.021E+03
U-238	2.300E+00	0.000E+00	6.482E-02	3.857E+02	6.482E-02	3.857E+02

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

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	1.000E+00	8.227E-01	7.707E-01	6.762E-01	4.272E-01	1.133E-01	7.795E-04	2.041E-07	8.737E-16
Pb-210	Ra-226	1.000E+00	1.406E-02	3.783E-02	7.731E-02	1.551E-01	1.456E-01	7.271E-03	2.672E-02	2.008E-02
Pb-210	Th-230	1.000E+00	2.161E-06	1.351E-05	6.359E-05	4.249E-04	1.685E-03	1.550E-03	5.537E-04	6.022E-04
Pb-210	U-234	1.000E+00	5.030E-12	6.628E-11	6.729E-10	1.268E-08	1.281E-07	2.334E-07	2.470E-06	4.401E-05
Pb-210	U-238	9.999E-01	2.938E-18	7.905E-17	1.705E-15	9.161E-14	2.471E-12	1.034E-11	9.939E-10	4.176E-08
Pb-210	∑DOSE(j)		8.368E-01	8.086E-01	7.536E-01	5.827E-01	2.606E-01	9.601E-03	2.727E-02	2.073E-02
Ra-226	Ra-226	1.000E+00	8.923E+00	8.551E+00	7.853E+00	5.821E+00	2.448E+00	9.154E-02	6.945E-03	5.168E-03
Ra-226	Th-230	1.000E+00	1.940E-03	5.713E-03	1.276E-02	3.285E-02	6.300E-02	5.320E-02	1.583E-04	1.551E-04
Ra-226	U-234	1.000E+00	5.752E-09	3.918E-08	1.940E-07	1.373E-06	6.077E-06	8.369E-06	8.045E-07	1.197E-05
Ra-226	U-238	9.999E-01	4.045E-15	5.879E-14	6.360E-13	1.280E-11	1.444E-10	3.954E-10	3.443E-10	1.160E-08
Ra-226	∑DOSE(j)		8.925E+00	8.557E+00	7.865E+00	5.854E+00	2.511E+00	1.447E-01	7.104E-03	5.335E-03
Ra-228	Ra-228	1.000E+00	5.013E+00	4.261E+00	3.077E+00	9.836E-01	3.742E-02	3.117E-07	1.671E-18	0.000E+00
Ra-228	Th-232	1.000E+00	3.087E-01	8.645E-01	1.734E+00	3.226E+00	3.666E+00	2.231E+00	1.420E-14	2.276E-19
Ra-228	∑DOSE(j)		5.322E+00	5.125E+00	4.810E+00	4.210E+00	3.704E+00	2.231E+00	1.420E-14	2.276E-19
Th-228	Ra-228	1.000E+00	1.211E+00	2.883E+00	4.066E+00	2.262E+00	9.737E-02	8.117E-07	1.195E-20	0.000E+00
Th-228	Th-228	1.000E+00	6.648E+00	4.614E+00	2.222E+00	1.721E-01	1.140E-04	6.650E-16	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	5.085E-02	3.073E-01	1.183E+00	3.961E+00	5.312E+00	3.248E+00	9.715E-17	1.553E-21
Th-228	∑DOSE(j)		7.910E+00	7.804E+00	7.471E+00	6.394E+00	5.410E+00	3.248E+00	9.716E-17	1.553E-21
Th-230	Th-230	1.000E+00	5.702E-02	5.664E-02	5.589E-02	5.325E-02	4.571E-02	1.928E-02	0.000E+00	0.000E+00
Th-230	U-234	1.000E+00	2.532E-07	7.344E-07	1.602E-06	3.823E-06	6.082E-06	3.142E-06	6.272E-09	2.360E-08
Th-230	U-238	9.999E-01	2.378E-13	1.596E-12	7.742E-12	5.148E-11	1.926E-10	1.583E-10	4.350E-12	3.596E-11
Th-230	∑DOSE(j)		5.702E-02	5.665E-02	5.589E-02	5.325E-02	4.572E-02	1.929E-02	6.277E-09	2.364E-08
Th-232	Th-232	1.000E+00	2.924E-01	2.905E-01	2.865E-01	2.728E-01	2.335E-01	9.663E-02	0.000E+00	0.000E+00
U-234	U-234	1.000E+00	2.845E-02	2.674E-02	2.364E-02	1.532E-02	4.369E-03	3.892E-05	2.499E-03	0.000E+00
U-234	U-238	9.999E-01	3.991E-08	1.133E-07	2.342E-07	4.557E-07	3.777E-07	1.109E-08	2.129E-06	0.000E+00
U-234	∑DOSE(j)		2.845E-02	2.675E-02	2.364E-02	1.532E-02	4.370E-03	3.893E-05	2.501E-03	0.000E+00
U-238	U-238	5.400E-05	1.368E-06	1.286E-06	1.136E-06	7.359E-07	2.097E-07	1.850E-09	1.217E-07	0.000E+00
U-238	U-238	9.999E-01	1.491E-01	1.407E-01	1.253E-01	8.354E-02	2.597E-02	3.447E-04	2.374E-03	0.000E+00
U-238	∑DOSE(j)		1.491E-01	1.407E-01	1.253E-01	8.354E-02	2.597E-02	3.447E-04	2.374E-03	0.000E+00

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	1.000E+00	2.300E+00	2.169E+00	1.929E+00	1.279E+00	3.958E-01	6.517E-03	5.232E-08	7.672E-26
Pb-210	Ra-226	1.000E+00	0.000E+00	6.806E-02	1.850E-01	4.376E-01	4.962E-01	6.005E-02	2.459E-05	1.951E-17
Pb-210	Th-230	1.000E+00	0.000E+00	1.499E-05	1.264E-04	1.123E-03	5.576E-03	1.253E-02	1.308E-02	1.258E-02
Pb-210	U-234	1.000E+00	0.000E+00	4.472E-11	1.119E-09	3.182E-08	4.175E-07	1.884E-06	2.139E-06	2.058E-06
Pb-210	U-238	9.999E-01	0.000E+00	3.159E-17	2.354E-15	2.178E-13	7.925E-12	8.329E-11	1.102E-10	1.060E-10
Pb-210	∑S(j):		2.300E+00	2.237E+00	2.114E+00	1.718E+00	8.975E-01	7.909E-02	1.310E-02	1.258E-02
Ra-226	Ra-226	1.000E+00	2.300E+00	2.210E+00	2.041E+00	1.545E+00	6.967E-01	4.294E-02	1.497E-05	1.183E-17
Ra-226	Th-230	1.000E+00	0.000E+00	9.768E-04	2.817E-03	8.217E-03	1.743E-02	2.446E-02	2.465E-02	2.372E-02
Ra-226	U-234	1.000E+00	0.000E+00	4.345E-09	3.673E-08	3.290E-07	1.663E-06	3.845E-06	4.033E-06	3.881E-06
Ra-226	U-238	9.999E-01	0.000E+00	4.082E-15	1.023E-13	2.928E-12	3.899E-11	1.814E-10	2.078E-10	1.999E-10
Ra-226	∑S(j):		2.300E+00	2.211E+00	2.044E+00	1.553E+00	7.142E-01	6.740E-02	2.467E-02	2.373E-02
Ra-228	Ra-228	1.000E+00	2.400E+00	2.045E+00	1.485E+00	4.849E-01	1.980E-02	2.722E-07	3.501E-21	0.000E+00
Ra-228	Th-232	1.000E+00	0.000E+00	2.674E-01	6.893E-01	1.443E+00	1.792E+00	1.801E+00	1.785E+00	1.728E+00
Ra-228	∑S(j):		2.400E+00	2.313E+00	2.175E+00	1.928E+00	1.812E+00	1.801E+00	1.785E+00	1.728E+00
Th-228	Ra-228	1.000E+00	0.000E+00	6.709E-01	1.210E+00	7.533E-01	3.535E-02	4.871E-07	6.265E-21	0.000E+00
Th-228	Th-228	1.000E+00	2.400E+00	1.670E+00	8.093E-01	6.405E-02	4.561E-05	4.396E-16	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	4.416E-02	2.867E-01	1.193E+00	1.780E+00	1.801E+00	1.785E+00	1.728E+00
Th-228	∑S(j):		2.400E+00	2.385E+00	2.306E+00	2.010E+00	1.816E+00	1.801E+00	1.785E+00	1.728E+00
Th-230	Th-230	1.000E+00	2.300E+00	2.300E+00	2.300E+00	2.299E+00	2.296E+00	2.287E+00	2.262E+00	2.177E+00
Th-230	U-234	1.000E+00	0.000E+00	2.014E-05	5.725E-05	1.591E-04	3.036E-04	3.727E-04	3.701E-04	3.561E-04
Th-230	U-238	9.999E-01	0.000E+00	2.829E-11	2.367E-10	2.050E-09	9.508E-09	1.877E-08	1.907E-08	1.835E-08
Th-230	∑S(j):		2.300E+00	2.300E+00	2.300E+00	2.299E+00	2.297E+00	2.288E+00	2.263E+00	2.177E+00
Th-232	Th-232	1.000E+00	2.400E+00	2.400E+00	2.400E+00	2.399E+00	2.397E+00	2.389E+00	2.367E+00	2.292E+00
U-234	U-234	1.000E+00	2.300E+00	2.177E+00	1.950E+00	1.326E+00	4.406E-01	9.321E-03	1.531E-07	2.749E-24
U-234	U-238	9.999E-01	0.000E+00	6.171E-06	1.658E-05	3.759E-05	3.747E-05	2.643E-06	1.303E-10	7.805E-27
U-234	∑S(j):		2.300E+00	2.177E+00	1.950E+00	1.326E+00	4.406E-01	9.324E-03	1.532E-07	2.757E-24
U-238	U-238	5.400E-05	1.242E-04	1.175E-04	1.053E-04	7.160E-05	2.379E-05	5.035E-07	8.275E-12	1.489E-28
U-238	U-238	9.999E-01	2.300E+00	2.177E+00	1.950E+00	1.326E+00	4.406E-01	9.324E-03	1.532E-07	2.757E-24
U-238	∑S(j):		2.300E+00	2.177E+00	1.950E+00	1.326E+00	4.406E-01	9.324E-03	1.532E-07	2.757E-24

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

RESCALC.EXE execution time = 4.59 seconds