Phase II Final Status Survey Report
Mallinckrodt Columbium-Tantalum Plant

St. Louis, Missouri

Chapter 24

Project No. 137131 **Revision 0**

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ABBREVIATIONS AND ACRONYMS

%	percent
σ	sigma; standard deviation
Ac	actinium
AECOM	AECOM Technical Services
bgs	below grade surface
C-T	columbium-tantalum
CFR	Code of Federal Regulations
cm	centimeter
cpm	counts per minute
DCGL	derived concentration guideline level
DP	decommissioning plan
Energy*Solutions*	Energy*Solutions*, LLC
FSS	Final Status Survey
FSSR	Final Status Survey Report
GWS	gamma walk-over survey
m	meter
m^2	square meters
MDC	minimum detectable concentration
mrem/yr	millirem per year
NIST	National Institute of Standards and Technology
NRC	U.S. Nuclear Regulatory Commission
Pa	protactinium
Pb	lead
pCi/g	picoCuries per gram
Ra	radium
SOF	sum of fractions
Th	thorium
U	uranium

24.0 RESULTS SUMMARY FOR PLANT 5 SUBSURFACE SU18

This chapter of the Final Status Survey Report (FSSR) presents the results from characterization surveys and a dose assessment for Plant 5 subsurface survey unit SU18. Characterization data were collected from this survey unit and the data provided in Chapter 4 of the C-T Phase II DP. Additional characterization data were also collected by AECOM Technical Services (AECOM) in November 2011 and a gamma scan performed by Energy*Solutions*, LLC (Energy*Solutions*) in 2013. Together, the characterization data serve as the FSS data set as allowed per C-T Phase II DP Section 14.4.3.6. A final status survey (FSS) of SU18 was therefore not performed because the characterization data were adequate as input to the dose assessment. As discussed in Chapter 3 of this FSSR, a dose assessment is a justified change to the decommissioning process, as evaluated using the criteria specified in Columbium-Tantalum (C-T) Phase II Decommissioning Plan (DP) Section 9.5.

24.1 OVERVIEW

SU18 is a Class 2 survey unit in the northeastern portion of C-T Plant 5 and was created to address the small area of soil contamination southeast of Building 245, as discussed in C-T Phase II DP Appendix H. The survey unit is approximately 248 square meters (m^2) in size, which is less than the size limit of 10,000 m^2 for Class 2 survey units for subsurface material (per C-T Phase II DP, Table 14-4). Figure 24-1 shows the location of SU18 within the Plant 5 area.

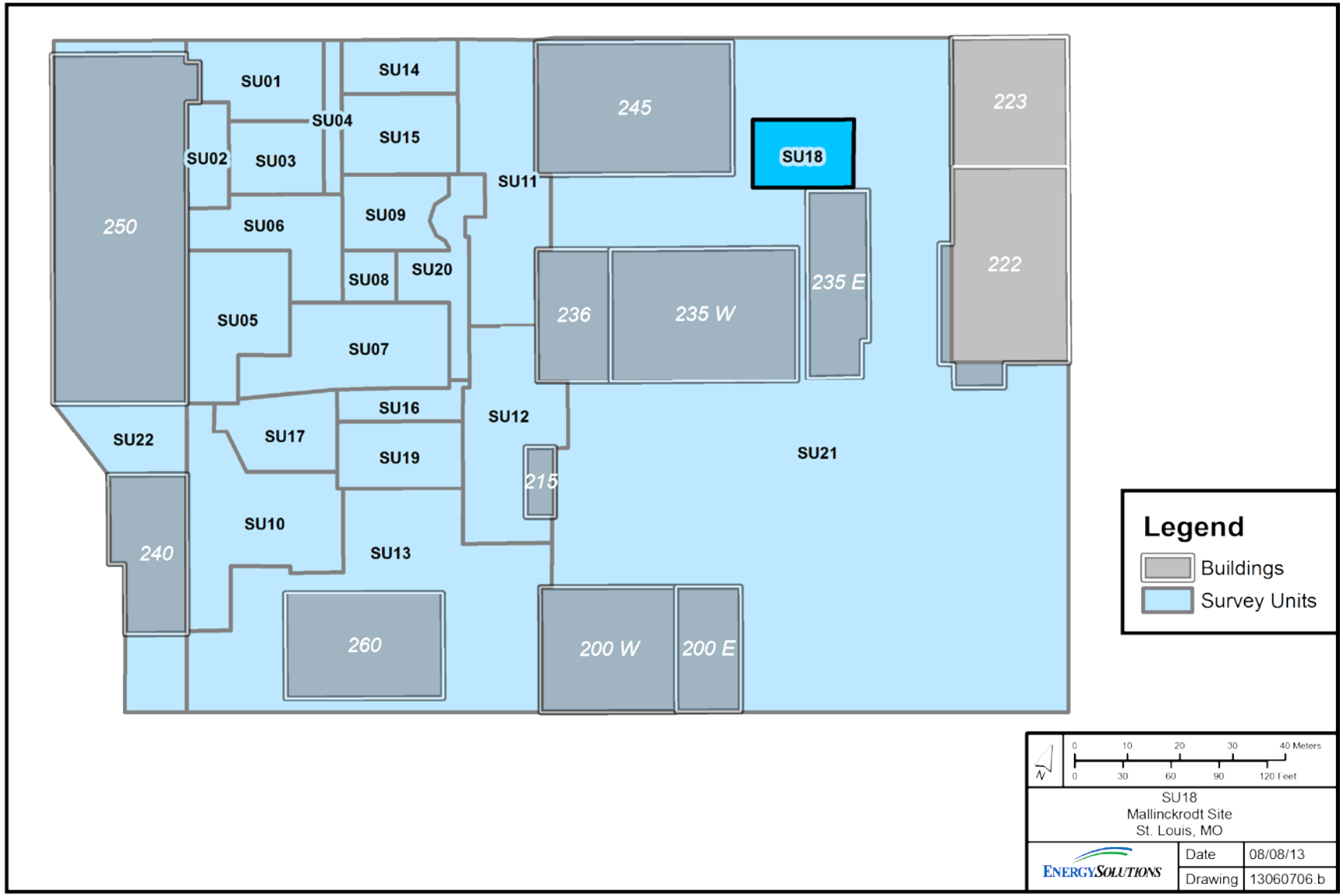

Figure 24-1 Location of SU18 in C-T Plant 5

24.2 CHARACTERIZATION DATA SUMMARY

24.2.1 Sum of Fractions

The sum of fractions (SOF) was calculated for each sample. The C-T Phase II DP, Table 4-17, provided mean background activity levels of 1.3, 2.5, and 4.4 picoCuries per gram (pCi/g) for thorium-232 (^{232}Th), radium-226 (^{226}Ra), and uranium-238 (^{238}U), respectively. These values were used to calculate the net SOF values for each individual sample results—note that when measured activity concentration levels were less than the background mean, resulting in a negative value, the net activity concentration was set equal to zero for the net SOF calculation.

24.2.2 Historic

Tables 4-7 and 4-16 from the C-T Phase II DP provided characterization borehole results from the Plant 5 area. Of the locations provided in the tables, two were collected within the extent of SU18: BH-043 and JA-30. Table 24-1 provides the data for these locations. Of these two locations, elevated activity was found at the surface at location BH-043.

Table 24-1 Historic Characterization Borehole Results from SU18

Location ID	Sample Depth (m)	Activity Concentration (pCi/g) [a]			SOF [b]	
		^{232}Th	^{226}Ra	^{238}U	Gross	Net [c]
BH-043	0.2 - 0.3	1.20	50.50	3.70	**1.77**	**1.63**
	0.6 - 0.9	1.67	24.80	10.20	**0.93**	**0.78**
	0.9 - 1.2	1.62	2.21	*4.10*	0.15	0.01
	1.2 - 1.5	1.10	11.80	4.40	0.45	0.32
	3 - 3.4	1.00	0.91	5.20	0.08	0.00
JA-30	0 - 3	0.62	2.49	4.01	0.12	0.00

[a] Italicized results indicate <MDC.
[b] **Bolded orange** SOF values indicate a result >0.5 but ≤1 and **bolded red** SOF values indicate a result >1.
[c] Calculated as discussed in Section 24.2.1.

Historic characterization samples from locations BH-068, BH-120, BH-Z-03, and BH-Z-09 from survey unit SU21 demonstrate that the elevated contamination associated with location BH-043 was likely encompassed within the boundary of SU18 (see Figure 24-2 for approximate locations). Table 24-2 provides these SU21 results.

Table 24-2 Select Historic Characterization Borehole Results from SU21

Location ID	Sample Depth (m)	Activity Concentration (pCi/g)			SOF	
		^{232}Th	^{226}Ra	^{238}U	Gross	Net [a]
BH-068	0 - 0.5	1.12	3.74	11.63	0.19	0.05
BH-120	0 - 2.7	1.04	3.00	2.40	0.15	0.02
BH-Z-03	0 - 0.3	1.01	0.25	7.52	0.06	0.00
	0.3 - 0.9	1.05	0.13	7.58	0.06	0.00
	0.9 - 1.8	1.08	0.37	4.36	0.06	0.00
	1.8 - 2.7	1.13	0.41	4.66	0.07	0.00
	2.7 - 3.7	0.94	0.29	3.49	0.05	0.00

Table 24-2 Select Historic Characterization Borehole Results from SU21 (continued)

Location ID	Sample Depth (m)	Activity Concentration (pCi/g)			SOF	
		^{232}Th	^{226}Ra	^{238}U	Gross	Net [a]
BH-Z-09	0 - 0.3	0.89	0.27	11.24	0.06	0.01
	0.3 - 0.9	1.15	0.26	7.36	0.07	0.00
	0.9 - 1.8	1.07	0.30	4.59	0.06	0.00
	1.8 - 2.7	0.60	0.45	4.19	0.05	0.00
	2.7 - 3.7	0.94	0.25	4.30	0.05	0.00

[a] Calculated as discussed in Section 24.2.1.

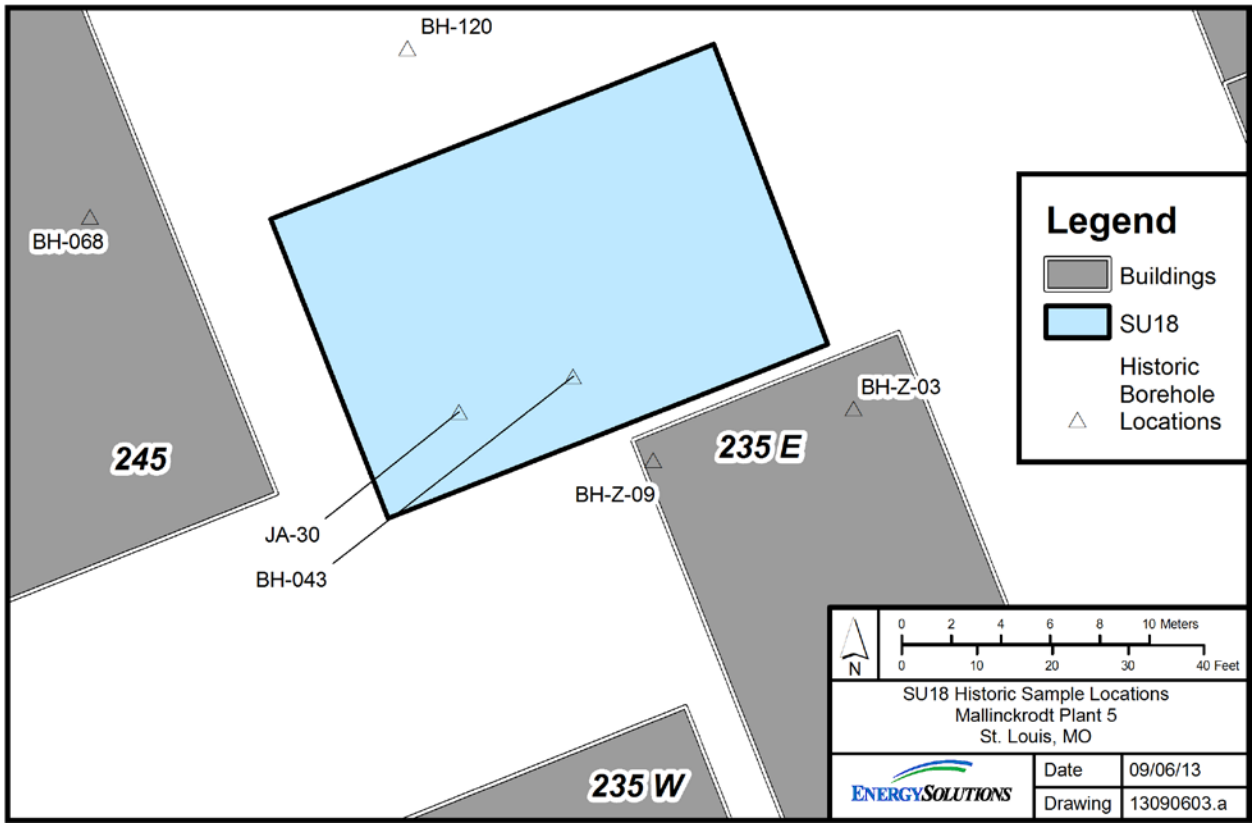

Figure 24-2 Historical Sample Locations

Additional samples were collected by AECOM to further bound BH-043.

24.2.3 AECOM

AECOM Technical Services (AECOM) collected several supplemental characterization core boring samples within the extent of SU18. Table 24-3 provides these results. These samples further bounded the elevated contamination as identified at borehole BH-043 within the extent of SU18. Review of the additional sampling indicates that the conclusion as stated in Appendix H of the C-T Phase II DP that the contamination was limited to the shallow surface soil was not accurate. Contamination at depth was identified at location SA-01 adjacent to borehole BH-043.

Figure 24-3 shows all the approximate characterization sampling locations including both the historical and AECOM locations.

Table 24-3 AECOM Supplemental Characterization Borehole Results

Location ID	Sample ID	Sample Depth (m)	Activity Concentration (pCi/g)			Sample SOF [a]		Column SOF [a, b]	
			^{232}Th	^{226}Ra	^{238}U	Gross	Net [c]	Gross	Net [c]
SA-01	4596	0-1	1.25	21.35	6.65	**0.79**	**0.64**	**0.79**	**0.64**
	4597	1-2	3.91	204.78	6.20	**7.14**	**6.99**	**3.96**	**3.82**
	4598	2-3	2.56	100.47	8.94	**3.54**	**3.39**	**3.82**	**3.68**
	4599	3-4	5.80	234.62	9.24	**8.24**	**8.09**	**4.92**	**4.78**
	4600	4-5	2.62	93.47	3.60	**3.29**	**3.15**	**4.60**	**4.45**
	Clay layer not reached								
SA-02	4601	0 - 1	1.26	1.69	2.83	0.11	0.00	0.11	0.00
	4602	1 - 2	1.44	3.74	3.35	0.19	0.05	0.15	0.01
	4603	2 - 3	1.32	2.66	2.26	0.15	0.01	0.15	0.01
	4604	3 - 4	1.36	4.06	3.63	0.20	0.06	0.16	0.02
	4605	4 - 5	1.02	2.46	3.38	0.13	0.00	0.16	0.01
	Clay layer not reached								
SA-03	4711	0-1	1.32	6.89	2.86	0.29	0.15	0.29	0.15
	4712	1-2	3.33	4.99	1.37	0.31	0.17	0.30	0.16
	4713	2-3	1.04	5.86	1.93	0.25	0.11	0.28	0.14
	4714	3-4	4.93	4.56	1.52	0.36	0.22	0.30	0.16
	4715	4-5	0.95	4.96	2.38	0.21	0.08	0.28	0.14
	Clay layer not reached								
SA-04	4706	0-1	2.71	2.35	1.26	0.20	0.06	0.20	0.06
	4707	1-2	1.05	3.52	2.09	0.17	0.03	0.18	0.04
	4708	2-3	4.15	1.95	1.76	0.24	0.12	0.20	0.06
	4709	3-4	0.78	3.92	2.51	0.17	0.05	0.19	0.05
	4710	4-5	3.18	1.81	1.83	0.20	0.08	0.19	0.05
	Clay layer reached at 15 ft bgs								
SA-05	4716	0 - 1	7.05	7.03	3.89	**0.54**	0.39	**0.54**	0.39
	4717	1 - 2	0.69	2.40	2.68	0.11	0.00	0.33	0.18
	4718	2 - 3	4.14	2.97	1.93	0.28	0.13	0.31	0.17
	4719	3 - 4	1.08	4.19	2.22	0.19	0.06	0.28	0.14
	4720	4 - 5	1.41	3.95	3.66	0.20	0.05	0.26	0.12
	Clay layer not reached								

[a] **Bolded orange** SOF values indicate a result >0.5 but ≤1 and **bolded red** SOF values indicate a result >1.
[b] Calculated per Section 14.4.3.7 of C-T Phase II DP.
[c] Calculated as discussed in Section 24.2.1.

All AECOM characterization soil samples were analyzed on site via gamma spectroscopy analysis. Any remaining sieved material from each sample was analyzed separately to verify residual radioactivity was consistent with sample results. The radiological screening process did not identify any significant levels of radioactivity in the sieved materials removed from samples.

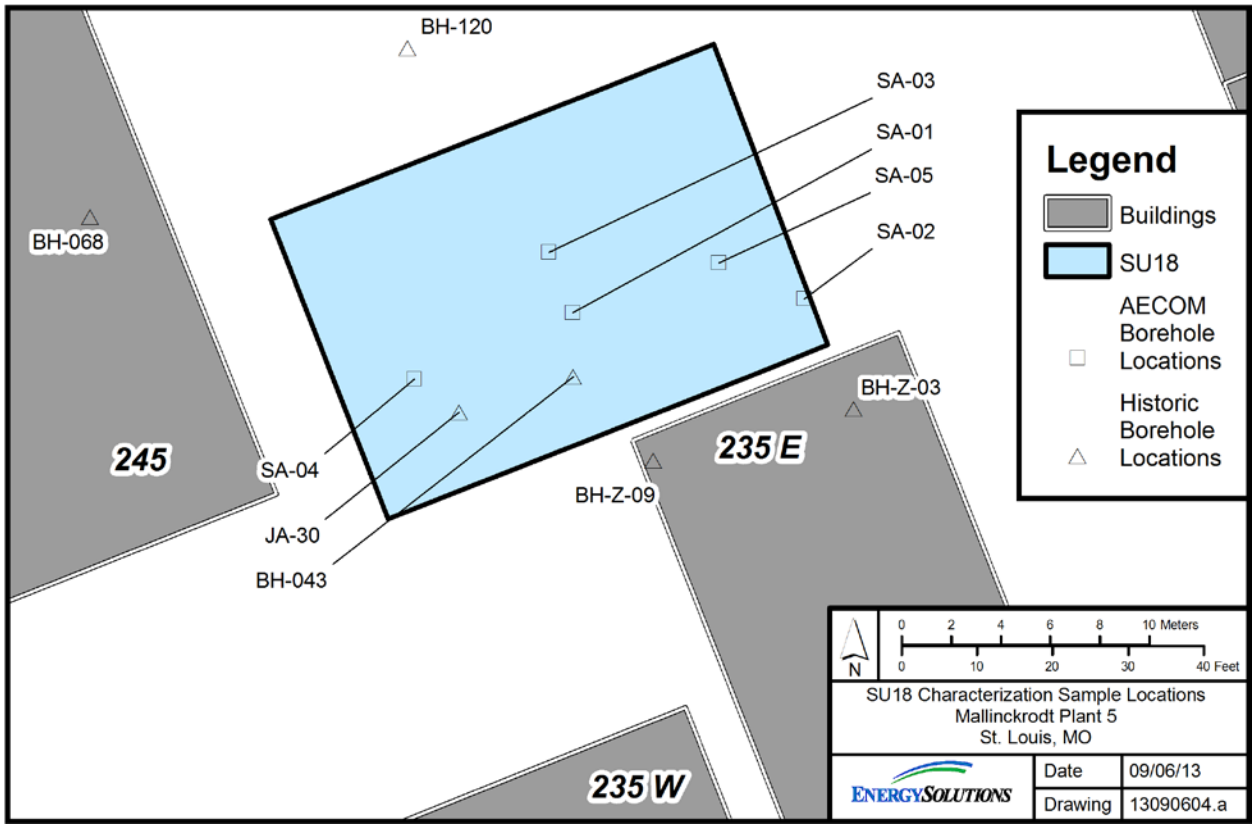

Figure 24-3 Characterization Sampling Locations

24.2.4 Energy*Solutions*

A gamma walkover survey (GWS) was performed by Energy*Solutions* over the accessible areas of the survey unit to locate any radiation anomalies that might indicate areas with elevated residual radioactivity where further data collection (i.e., additional biased soil sampling) was warranted. Due to overhead obstructions, the GPS signal was inadequate for most of the survey due to poor satellite reception. As a result, a 1-meter (m) grid survey was performed over the majority of the survey unit in October of 2013 and a 1-minute scalar count collected over the center of each grid. The recorded survey results ranged from 4,035 to 6,403 counts per minute (cpm) with a mean of 5,022 cpm and a median of 4,924 cpm. The diagram for the gamma survey including the gamma measurements is provided as Figure 24-4. No areas of concern were identified by the gamma survey requirement additional sampling.

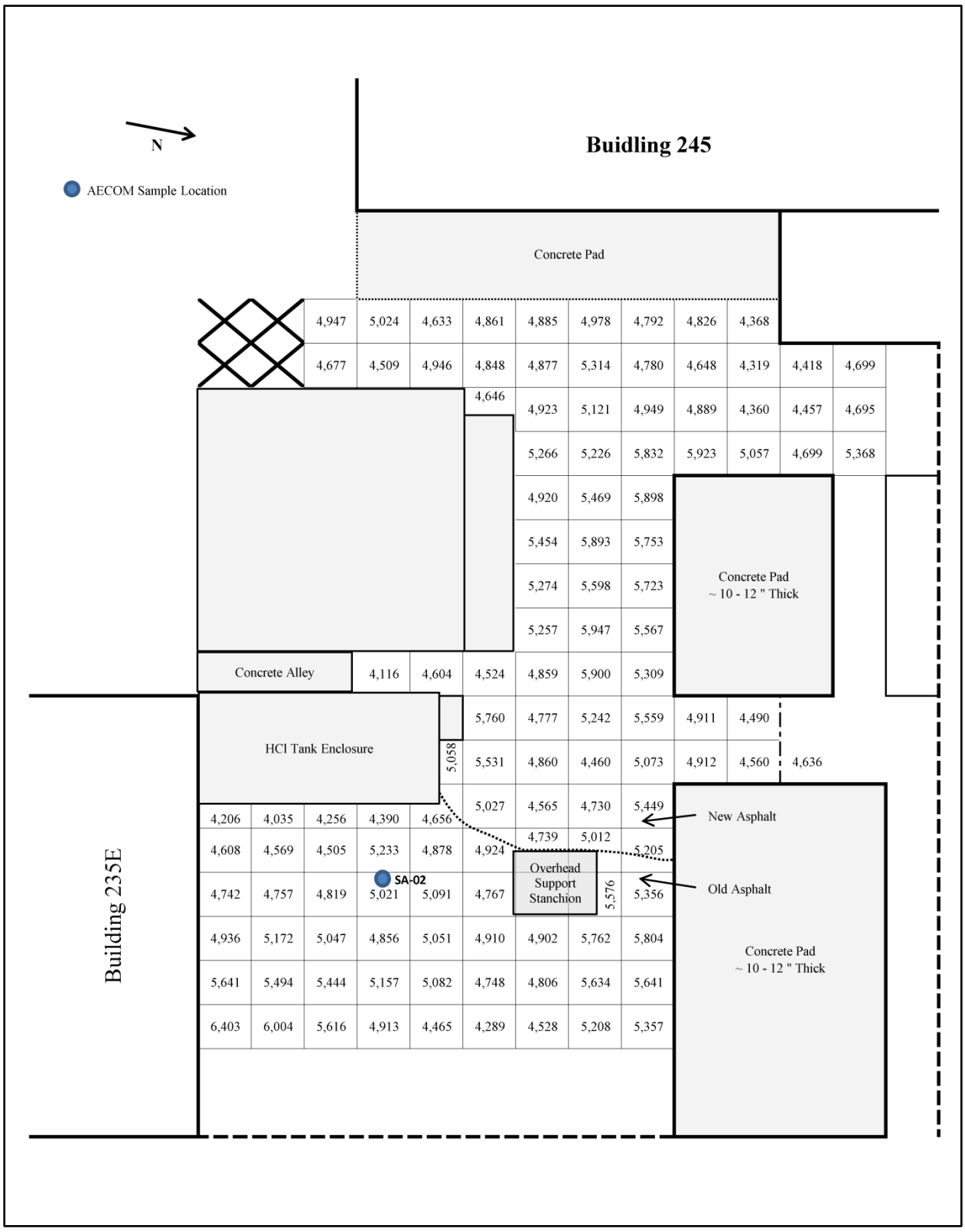

Figure 24-4 Gamma Survey (1-m Grid)

24.2.5 Summary

In accordance with Table 14-5 of the C-T Phase II DP, the Class 2 subsurface investigation level is the derived concentration guideline level ($DCGL_W$ [1 SOF]) plus the mean of background (0.15 SOF) plus two standard deviations of background (2 × 0.09 SOF = 0.18 SOF), using data from Tables 4-17 and B-1. This evaluates to a gross SOF of 1.33. All characterization borehole samples, with the exception of historical BH-043 and AECOM SA-01, were below this investigation level. The elevated contamination identified in C-T Phase II DP Appendix H has been investigated and the extent and radionuclide concentrations determined.

Gamma scans in areas of SU18 outside of the elevated area bounding samples did not indicate further characterization sampling was warranted. Therefore, the remaining areas of SU18 are considered to be similar to the surrounding Class 3 survey unit SU21.

24.3 DOSE ASSESSMENT

SU18 was created to address the small area of soil contamination southeast of Building 245, as discussed in C-T Phase II DP Appendix H. This section presents the results of a dose assessment performed to evaluate the dose to a member of the critical group as a result of the remaining soil contamination using the characterization data as the FSS data set as allowed per C-T Phase II DP Section 14.4.3.6. The dose assessment approach was used because it was not practical to perform remediation in the area without significant plant operation disruptions.

24.3.1 Verification of RESRAD v6.5

C-T Phase II DP Chapter 5 presented three dose models (cases) in the development of the DCGLs. 408guti, 407guti, and 399guti were the RESRAD v6.4 cases for the thorium series, natural uranium, and "6 ^{230}Th + ^{226}Ra + ^{210}Pb," respectively. Energy*Solutions* was currently using RESRAD v6.5; therefore, to ensure comparable results, the three cases mentioned were run in the later version. Section 17.5.1 of this FSSR documents the results of the comparison. In conclusion, RESRAD v6.5 provided identical or comparable results to RESRAD v6.4 and therefore RESRAD v6.5 was used to perform the dose assessment for SU18.

24.3.2 Elevated Area Characterization

24.3.2.1 Elevated Area Size

The historic and AECOM characterization data were used to bound the maximum extent of the contaminated soil remaining within SU18. Figure 24-5 shows that the elevated area was determined to be approximately 75 m^2 based upon the sampling results. The presence of any widespread contamination was disproved by the gamma survey that was performed in the area. The survey did not identify any additional areas of concern requiring additional investigation and sampling as shown in Figure 24-4.

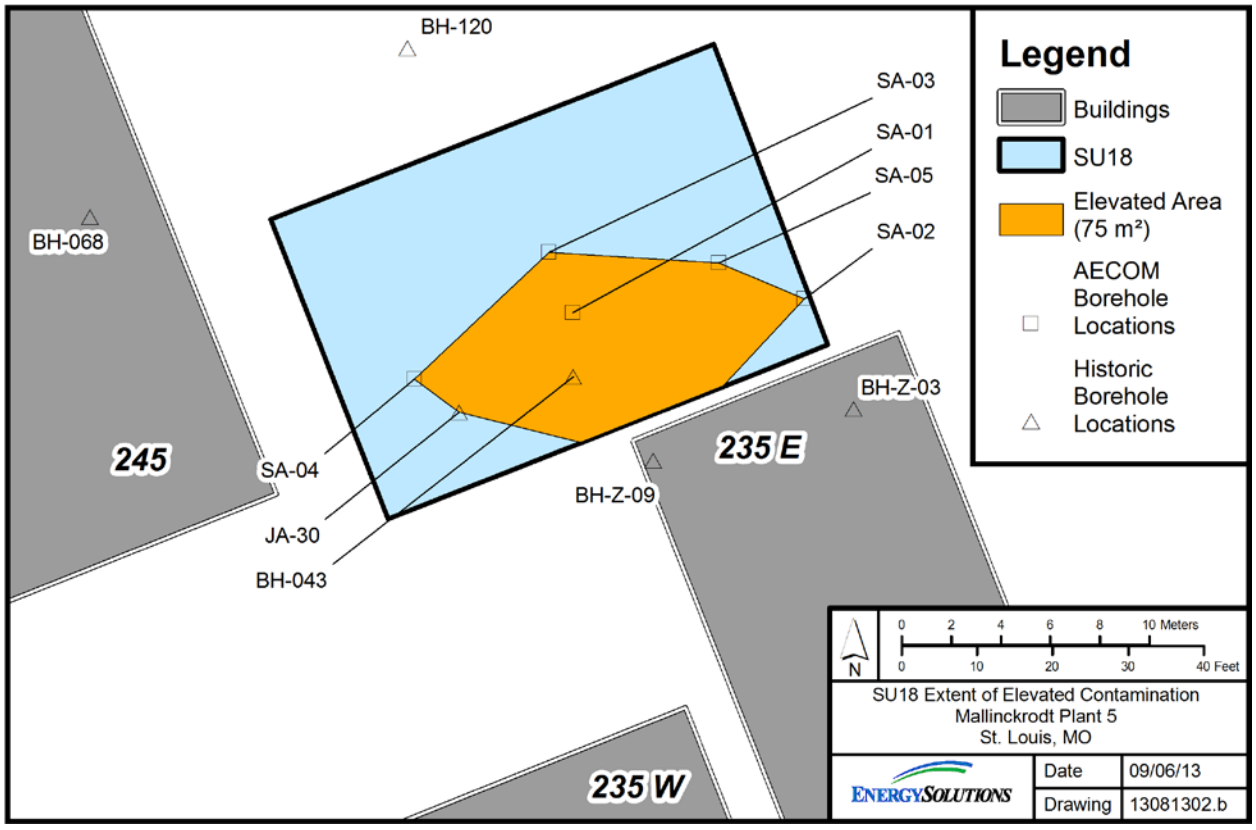

Figure 24-5 Extent of Elevated Contamination

24.3.2.2 Radionuclide Concentrations

The results for sample locations BH-043 and SA-01 were used to determine the radionuclide concentrations for the dose assessment. The radionuclide concentrations were grouped into two datasets or contamination zones based upon the levels of contamination including surface (0-1 m) and subsurface (below 1m bgs) layers. There was a significant increase in radionuclide concentrations below 1 m bgs down to a depth of 5 m bgs. As a result, these were modeled as two separate contaminated zones as specified.

The results for sample locations BH-043 and SA-01, being the only locations with significant surface contamination, were averaged for 0-1 m bgs; however, the samples at borehole location BH-043 were not collected in 1 m segments. The results of the first three samples were weighted to determine the average for the location representing the top 1 meter composite. The weighted average for BH-043 was then averaged with the SA-01 result for 0-1 m. Table 24-4 provides the radionuclide concentrations for the surface layer.

Table 24-4 Average Radionuclide Concentrations for Surface Layer (0-1 m)

Sample Location	Sample ID	Sample Depth (m)	Thickness in 0-1 m	Fraction of 0-1 m	Concentration (pCi/g)		
					^{232}Th	^{226}Ra	^{238}U
BH-043	--	0.2 - 0.3	0.1	0.2	1.20	50.50	3.70
	--	0.6 - 0.9	0.3	0.6	1.67	24.80	10.20
	--	0.9 - 1.2	0.1	0.2	1.62	2.21	4.10
	Weighted Average for 0-1 m:				*1.57*	*25.42*	*7.68*
SA-01	4596	0 - 1	--	--	1.25	21.35	6.65
Average for Surface Layer (0-1 m):					**1.41**	**23.39**	**7.16**

The four subsurface sample results between 1 and 5 m bgs collected at sample location SA-01 were averaged representing the subsurface contaminated zone. Table 24-5 provides the radionuclide concentrations for this subsurface layer.

Table 24-5 Average Radionuclide Concentrations for Subsurface Layer (1-5 m)

Sample Location	Sample ID	Sample Depth (m)	Concentration (pCi/g)		
			^{232}Th	^{226}Ra	^{238}U
SA-01	4597	1 - 2	3.91	204.78	6.20
	4598	2 - 3	2.56	100.47	8.94
	4599	3 - 4	5.80	234.62	9.24
	4600	4 - 5	2.62	93.47	3.60
Average for Subsurface Layer (1-5 m):			**3.72**	**158.34**	**7.00**

24.3.3 *In Situ* Models and Results

24.3.3.1 RESRAD Models

The C-T Phase II DP Chapter 5 RESRAD models 408guti, 407guti, and 399guti were identical except for the entered radionuclide concentrations. Three models were run in order to develop independent DCGLs. For this elevated area, the actual radionuclide concentrations were established based on sampling and therefore independent models were not required. However, there were two distinct layers of differing radionuclide concentrations and therefore two separate models were required as RESRAD only allows for one contaminated zone. The first model was for the surface (0-1 m) contamination and the second model was for the subsurface contamination (1-5 m). Table 24-6 and Table 24-7 provide the RESRAD *in situ* model parameters for surface and subsurface layers, respectively, that were changed from the C-T Phase II DP Chapter 5 RESRAD models and the justification for each change.

Table 24-6 RESRAD *In Situ* Surface Layer Model Parameter Values

Parameter	Value	Justification
Soil Concentrations		
^{228}Ra, ^{228}Th, and ^{232}Th	1.41 pCi/g	Thorium series in secular equilibrium per C-T Phase II DP Section 5.8.2. Average net ^{232}Th concentration from Table 24-4.
^{226}Ra and ^{210}Pb	23.39 pCi/g	^{226}Ra and progeny in secular equilibrium per C-T Phase II DP Section 5.8.4. Average net ^{226}Ra concentration from Table 24-4.
^{230}Th	140.3 pCi/g	^{230}Th was not measured in FSS samples. The ^{230}Th / ^{226}Ra ratio of 6 was assumed per C-T Phase II DP Section 5.8.4.
^{238}U and ^{234}U	7.16 pCi/g	For natural uranium, the concentrations of ^{238}U and ^{234}U are equal per C-T Phase II DP Section 5.8.3. Average net ^{238}U concentration from Table 24-4.
^{235}U, ^{231}Pa, and ^{227}Ac	0.33 pCi/g	^{235}U and progeny in naturally-occurring proportion (^{235}U / ^{238}U = 0.0455) per C-T Phase II DP Section 5.8.3.
Contaminated Zone		
Area	75 m^2	Bounding area as discussed in Section 24.3.2.1.
Thickness	1 m	Thickness for the surface (0-1 m) contaminated strata as discussed in Section 24.3.2.1.

Table 24-7 RESRAD *In Situ* Subsurface Layer Model Parameter Values

Parameter	Value	Justification
Soil Concentrations		
^{228}Ra, ^{228}Th, and ^{232}Th	3.72 pCi/g	Thorium series in secular equilibrium per C-T Phase II DP Section 5.8.2. Average net ^{232}Th concentration from Table 24-5.
^{226}Ra and ^{210}Pb	158.34 pCi/g	^{226}Ra and progeny in secular equilibrium per C-T Phase II DP Section 5.8.4. Average net ^{226}Ra concentration from Table 24-5.
^{230}Th	950.0 pCi/g	^{230}Th was not measured in FSS samples. The ^{230}Th / ^{226}Ra ratio of 6 was assumed per C-T Phase II DP Section 5.8.4.
^{238}U and ^{234}U	7.00 pCi/g	For natural uranium, the concentrations of ^{238}U and ^{234}U are equal per C-T Phase II DP Section 5.8.3. Average net ^{238}U concentration from Table 24-5.
^{235}U, ^{231}Pa, and ^{227}Ac	0.32 pCi/g	^{235}U and progeny in naturally-occurring proportion (^{235}U / ^{238}U = 0.0455) per C-T Phase II DP Section 5.8.3.
Contaminated Zone		
Area	75 m^2	Bounding area as discussed in Section 24.3.2.1.
Thickness	4 m	Thickness for the subsurface (1-5 m) contaminated strata as discussed in Section 24.3.2.1.
Cover/Hydrol.		
Cover depth	1 m	Represents the surface (0-1 m) *in situ* model.

Table 24-7 RESRAD *In Situ* Subsurface Layer Model Parameter Values (continued)

Parameter	Value	Justification
Cover erosion rate	3E-06 m/yr	Maximum range value for natural succession vegetation on a 2% slope from RESRAD User's Manual Page A-9. Permanent pasture and row-crop agriculture ranges not applicable for industrial worker scenario. NOTE: The calculated maximum dose was not sensitive to this parameter (or similarly the contaminated zone erosion rate) for the DCGL calculations presented in the C-T Phase II DP and *in situ* dose assessment presented in this chapter of the FSSR. However, for this model, the maximum dose was sensitive to this parameter. The default value of 0.001 m/yr was re-evaluated and based on published literature, was too conservative for the industrial worker scenario.

24.3.3.2 Result

The maximum dose for the surface model was 17.00 millirem per year (mrem/yr) at year 0. The maximum dose for the subsurface model was 2.593E-03 mrem/yr at year 1,000. The total dose from both the surface and subsurface models was 17 mrem/yr. Appendix A provides the RESRAD summary reports.

24.3.4 Subsurface Excavation Scenario Model and Results

In addition to evaluating the dose from the contaminated area *in situ*, an excavation scenario was developed to evaluate the dose if the contaminated material was exposed. It is unlikely, based on the future use scenario described in C-T Phase II DP Chapter 5, that large areas of contaminated material would be exposed during future site activities. No building foundations or basements are expected to be installed at the site, so excavation to expose the entire elevated area is unlikely. Utility systems could be installed and most systems are installed in the 6 ft bgs depth range; however, the specific depth of the elevated area is not evaluated in this scenario.

Because the radionuclide concentrations are greater in the subsurface layer than the surface layer, the scenario assumes that a 3-ft (0.9-m) wide trench is excavated to the subsurface depth (1 m) of the elevated area. The length of the trench, assumed to be equivalent to the diameter of a circle with the area equal to the elevated area size of 75 m^2, is 9.8 m. Therefore, the area of the trench (excavation) is 8.8 m^2 and this is the size of the elevated area for which the critical receptor will be exposed. The critical receptor is an industrial worker, but not the same individual as that evaluated using the DCGLs, e.g. a contractor is performing the work.

The model assumes that the industrial worker will spend a total of 0.5 hours per meter of trench. Examples of activities being performed include trench bottom preparation, such as leveling aggregate, and pipe joining, such as welding. Total time in this trench would be 4.9 hours (0.5 hours per meter of trench × 9.8 m length). RESRAD evaluates dose on an annual basis.

Therefore, 4.9 hours out of a year's time would be an outdoor time fraction of 0.00056 hours (4.9 hours / 8,766 hours). Indoor time fraction is zero since this is not an indoor scenario.

24.3.4.1 RESRAD Model

With respect to radionuclides and similar to the *in situ* model discussed in Section 24.3.3.1, one RESRAD model was developed for the excavation scenario. However, only one layer (subsurface) was modeled and therefore only one RESRAD model was required unlike with the *in situ* evaluation. Table 24-8 provides the RESRAD excavation scenario model parameters that were changed from the C-T Phase II DP Chapter 5 RESRAD models and the justification for each change.

Table 24-8 RESRAD Excavation Scenario Model Parameter Values

Parameter	Value	Justification
Soil Concentrations		
^{228}Ra, ^{228}Th, and ^{232}Th	3.72 pCi/g	Thorium series in secular equilibrium per C-T Phase II DP Section 5.8.2. Average net ^{232}Th concentration from Table 24-5.
^{226}Ra and ^{210}Pb	158.34 pCi/g	^{226}Ra and progeny in secular equilibrium per C-T Phase II DP Section 5.8.4. Average net ^{226}Ra concentration from Table 24-5.
^{230}Th	950.0 pCi/g	^{230}Th was not measured in FSS samples. The ^{230}Th / ^{226}Ra ratio of 6 was assumed per C-T Phase II DP Section 5.8.4.
^{238}U and ^{234}U	7.00 pCi/g	For natural uranium, the concentrations of ^{238}U and ^{234}U are equal per C-T Phase II DP Section 5.8.3. Average net ^{238}U concentration from Table 24-5.
^{235}U, ^{231}Pa, and ^{227}Ac	0.32 pCi/g	^{235}U and progeny in naturally-occurring proportion (^{235}U / ^{238}U = 0.0455) per C-T Phase II DP Section 5.8.3.
Contaminated Zone		
Area	8.8 m^2	Trench area of 8.8 m^2 assuming 3-ft (0.9-m) wide trench and 9.8 m long trench.
Thickness	0.30 m	C-T Phase II DP Appendix D, Page D-17, documents that for the radionuclide mixture used to develop the DCGLs that the maximum dose rate by direct radiation is reached asymptotically when the contaminated zone thickness reaches about 30 cm. Additional contaminated zone thickness does not result in additional dose.
Occupancy, Inhalation, and External Gamma Data		
Indoor time fraction	0	No internal exposure applicable for the critical receptor within a trench.
Outdoor time fraction	0.00056 hours	4.9 hours for this length of trench within any given modeled year.

24.3.4.2 Result

The maximum dose was 0.4019 mrem/yr at year 0. Appendix B provides the RESRAD summary report. Excavating into the surface layer to expose the subsurface layer, the side walls of the excavation would be expected to contribute dose less than or equal to the excavation floor. Therefore, the total dose associated with the excavation scenario could be up to 3-times the calculated dose, or up to 1.2 mrem/yr.

24.3.5 Conclusion

The total *in situ* dose was 17 mrem/yr, accounting for both the surface (0-1 m) and subsurface (1-5 m) contaminated zones or layers.

The independently-evaluated excavation scenario dose was 0.4019 mrem/yr. When considering the dose contribution of the excavation walls, the total dose could be up to 1.2 mrem/yr.

24.4 DEVIATIONS

In accordance with the second bullet in Section 14.5 of the C-T Phase II DP, the FSSR is required to list changes made in the FSS from what was proposed in the DP. Because an FSS was not performed, there are no deviations to present.

24.5 NRC INSPECTIONS

A summary of U.S. Nuclear Regulatory Commission (NRC) inspections applicable to the FSS are provided in Section 5.8 of this FSSR. The scope of the inspections included, but was not limited to: review of project plans, interviewing of project personnel, and evaluation of the on-site laboratory. No violations were identified. No findings of significance were identified.

24.6 CONCLUSION

Characterization data were verified to be reliable, appropriately documented, and technically defensible. Specifically, the following conclusions are made:

- The instruments used to collect the data were capable of detecting the radiation type (i.e., gamma) at or below the release criteria (described in Sections 4.4 and 4.5 of this FSSR).
- The calibration of the instruments used to collect the data was current and radioactive sources used for calibration were National Institute of Standards and Technology (NIST) traceable (described in Section 5.4 of this FSSR). Specific records available upon request.
- Instrument response was checked before instrument use each day, at minimum (described in Section 5.4 of this FSSR). Specific records available upon request.
- The survey methods used to collect the data were appropriate for the media and type of radiation being measured (described in Section 4.4, 4.5, and 4.6 of this FSSR).

- The custody of samples collected for laboratory analysis was tracked from the point of collection until final results were obtained (described in Section 5.5.2 of this FSSR). Specific records available upon request.
- The survey data consist of qualified measurement results that are representative of the area of interest.
- Areas identified with elevated residual radioactivity (i.e. SOF > 1.0) were appropriately investigated.

Results exceeding the Class 2 investigation level were properly investigated; however, the survey unit was not re-classified to Class 1 due to the relatively small size of the survey unit and because the amount of data collected was determined to be adequate for dose assessment. A separate FSS was not performed and the characterization data collected were used to support the dose assessment based on an industrial use scenario. The dose assessment demonstrated that SU18 satisfies the unrestricted release provisions of Title 10, Code of Federal Regulations (CFR), Part 20, Subpart E.

24.7 REFERENCES

Argonne National Laboratory, *User's Manual for RESRAD Version 6*, ANL/EAD-4, July 2001.

Mallinckrodt, *Mallinckrodt Columbium-Tantalum Phase II Decommissioning Plan*, Revision 2, August 2008.

APPENDIX A

RESRAD v6.5 Summary Reports for *In Situ* Model

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Part I: Mixture Sums and Single Radionuclide Guidelines

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: FGR 12)	4.951E-04	4.951E-04	DCF1(1)
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(2)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(3)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(4)
A-1	Bi-211 (Source: FGR 12)	2.559E-01	2.559E-01	DCF1(5)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(6)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(7)
A-1	Fr-223 (Source: FGR 12)	1.980E-01	1.980E-01	DCF1(8)
A-1	Pa-231 (Source: FGR 12)	1.906E-01	1.906E-01	DCF1(9)
A-1	Pa-234 (Source: FGR 12)	1.155E+01	1.155E+01	DCF1(10)
A-1	Pa-234m (Source: FGR 12)	8.967E-02	8.967E-02	DCF1(11)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(12)
A-1	Pb-211 (Source: FGR 12)	3.064E-01	3.064E-01	DCF1(13)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(14)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(15)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(16)
A-1	Po-211 (Source: FGR 12)	4.764E-02	4.764E-02	DCF1(17)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(18)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(19)
A-1	Po-215 (Source: FGR 12)	1.016E-03	1.016E-03	DCF1(20)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(21)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(22)
A-1	Ra-223 (Source: FGR 12)	6.034E-01	6.034E-01	DCF1(23)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(24)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(25)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(26)
A-1	Rn-219 (Source: FGR 12)	3.083E-01	3.083E-01	DCF1(27)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(28)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(29)
A-1	Th-227 (Source: FGR 12)	5.212E-01	5.212E-01	DCF1(30)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(31)
A-1	Th-230 (Source: FGR 12)	1.209E-03	1.209E-03	DCF1(32)
A-1	Th-231 (Source: FGR 12)	3.643E-02	3.643E-02	DCF1(33)
A-1	Th-232 (Source: FGR 12)	5.212E-04	5.212E-04	DCF1(34)
A-1	Th-234 (Source: FGR 12)	2.410E-02	2.410E-02	DCF1(35)
A-1	Tl-207 (Source: FGR 12)	1.980E-02	1.980E-02	DCF1(36)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(37)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(38)
A-1	U-234 (Source: FGR 12)	4.017E-04	4.017E-04	DCF1(39)
A-1	U-235 (Source: FGR 12)	7.211E-01	7.211E-01	DCF1(40)
A-1	U-238 (Source: FGR 12)	1.031E-04	1.031E-04	DCF1(41)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.724E+00	6.700E+00	DCF2(1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(2)
B-1	Pb-210+D	1.380E-02	1.360E-02	DCF2(3)
B-1	Po-210	9.400E-03	9.400E-03	DCF2(4)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(5)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(6)

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(7)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(8)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(9)
B-1	U-234	1.320E-01	1.320E-01	DCF2(10)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(11)
B-1	U-238	1.180E-01	1.180E-01	DCF2(12)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(13)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.410E-02	DCF3(1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(2)
D-1	Pb-210+D	5.376E-03	5.370E-03	DCF3(3)
D-1	Po-210	1.900E-03	1.900E-03	DCF3(4)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(5)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(6)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(7)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(8)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(9)
D-1	U-234	2.830E-04	2.830E-04	DCF3(10)
D-1	U-235+D	2.673E-04	2.660E-04	DCF3(11)
D-1	U-238	2.550E-04	2.550E-04	DCF3(12)
D-1	U-238+D	2.687E-04	2.550E-04	DCF3(13)
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	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(4,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF(4,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(5,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(6,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(6,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(6,3)
D-34				

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(8,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(9,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
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	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC(4,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(5,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(5,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(6,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(6,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(7,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(7,2)
D-5				

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(8,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(9,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(9,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(10,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(10,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(11,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(12,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	7.500E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.000E+00	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	not used	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): Ac-227	3.300E-01	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	3.300E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	2.339E+01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	2.339E+01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Ra-228	1.410E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Th-228	1.410E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Th-230	1.403E+02	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Th-232	1.410E+00	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): U-234	7.160E+00	0.000E+00	---	S1(10)
R012	Initial principal radionuclide (pCi/g): U-235	3.300E-01	0.000E+00	---	S1(11)
R012	Initial principal radionuclide (pCi/g): U-238	7.160E+00	0.000E+00	---	S1(12)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(10)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(11)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(12)
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)	4.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID

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Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	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
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 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	1.319E-02	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.311E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.661E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

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R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.798E-03	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.798E-03	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.444E-06	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.444E-06	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.444E-06	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.311E-03	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.311E-03	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)

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R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.311E-03	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter Po-210				
R016	Contaminated zone (cm**3/g)	1.000E+01	1.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.612E-02	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	1.227E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.500E-05	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	6.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	1.700E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.825E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	4.563E-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)
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)

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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)	3.650E+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	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
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

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Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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
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	1	---	---	KYMAX

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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	active

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Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	75.00 square meters	Ac-227	3.300E-01
Thickness:	1.00 meters	Pa-231	3.300E-01
Cover Depth:	0.00 meters	Pb-210	2.339E+01
		Ra-226	2.339E+01
		Ra-228	1.410E+00
		Th-228	1.410E+00
		Th-230	1.403E+02
		Th-232	1.410E+00
		U-234	7.160E+00
		U-235	3.300E-01
		U-238	7.160E+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):	1.700E+01	1.698E+01	1.693E+01	1.673E+01	1.624E+01	1.486E+01	1.259E+01	0.000E+00
M(t):	6.800E-01	6.793E-01	6.770E-01	6.693E-01	6.496E-01	5.946E-01	5.034E-01	0.000E+00

Maximum TDOSE(t): 1.700E+01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.872E-02	0.0023	7.847E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.982E-03	0.0002
Pa-231	4.349E-03	0.0003	1.649E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.226E-03	0.0001
Pb-210	8.433E-03	0.0005	1.570E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.196E-02	0.0054
Ra-226	1.515E+01	0.8913	7.484E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.063E-02	0.0012
Ra-228	5.895E-01	0.0347	2.964E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.304E-03	0.0001
Th-228	6.979E-01	0.0411	1.477E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.973E-04	0.0000
Th-230	3.009E-02	0.0018	1.654E-01	0.0097	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.804E-02	0.0028
Th-232	3.378E-02	0.0020	8.376E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.482E-03	0.0001
U-234	1.789E-04	0.0000	3.409E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.262E-03	0.0001
U-235	1.515E-02	0.0009	1.464E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.497E-05	0.0000
U-238	6.348E-02	0.0037	3.048E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.198E-03	0.0001
Total	1.663E+01	0.9784	1.940E-01	0.0114	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.727E-01	0.0102

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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.955E-02	0.0029
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.224E-03	0.0005
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	1.020E-01	0.0060
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.517E+01	0.8925
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.911E-01	0.0348
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.000E-01	0.0412
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.436E-01	0.0143
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	4.464E-02	0.0026
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	4.850E-03	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.536E-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	6.773E-02	0.0040
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	1.700E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.702E-02	0.0022	7.501E-03	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.851E-03	0.0002
Pa-231	5.528E-03	0.0003	1.884E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.307E-03	0.0001
Pb-210	8.180E-03	0.0005	1.812E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.918E-02	0.0058
Ra-226	1.509E+01	0.8885	7.991E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.356E-02	0.0014
Ra-228	7.193E-01	0.0424	6.824E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.322E-03	0.0001
Th-228	4.858E-01	0.0286	1.028E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.157E-04	0.0000
Th-230	6.938E-02	0.0041	1.654E-01	0.0097	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.810E-02	0.0028
Th-232	1.136E-01	0.0067	8.437E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.641E-03	0.0002
U-234	1.779E-04	0.0000	3.391E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.255E-03	0.0001
U-235	1.507E-02	0.0009	1.457E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.473E-05	0.0000
U-238	6.315E-02	0.0037	3.032E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.192E-03	0.0001
Total	1.660E+01	0.9778	1.941E-01	0.0114	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.829E-01	0.0108

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.737E-02	0.0028
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.719E-03	0.0006
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	1.092E-01	0.0064
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.511E+01	0.8899
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	7.213E-01	0.0425
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	4.872E-01	0.0287
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.829E-01	0.0167
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.247E-01	0.0073
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	4.825E-03	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.527E-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	6.737E-02	0.0040
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	1.698E+01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Ac-227	3.383E-02	0.0020	6.855E-03	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.605E-03	0.0002
Pa-231	7.711E-03	0.0005	2.318E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.455E-03	0.0001
Pb-210	7.651E-03	0.0005	1.745E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.451E-02	0.0056
Ra-226	1.496E+01	0.8839	9.033E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.938E-02	0.0017
Ra-228	7.793E-01	0.0460	9.945E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.218E-03	0.0001
Th-228	2.354E-01	0.0139	4.982E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.014E-04	0.0000
Th-230	1.475E-01	0.0087	1.654E-01	0.0098	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.823E-02	0.0028
Th-232	2.981E-01	0.0176	8.648E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.950E-03	0.0002
U-234	1.762E-04	0.0000	3.356E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.242E-03	0.0001
U-235	1.491E-02	0.0009	1.442E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.425E-05	0.0000
U-238	6.248E-02	0.0037	3.000E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.179E-03	0.0001
Total	1.655E+01	0.9777	1.939E-01	0.0115	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.840E-01	0.0109

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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.329E-02	0.0026
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.248E-02	0.0007
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	1.039E-01	0.0061
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.499E+01	0.8857
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	7.815E-01	0.0462
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	2.361E-01	0.0139
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.611E-01	0.0213
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	3.097E-01	0.0183
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	4.774E-03	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.511E-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	6.666E-02	0.0039
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	1.693E+01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+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.
Ac-227	2.468E-02	0.0015	5.002E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.901E-03	0.0001
Pa-231	1.377E-02	0.0008	3.518E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.854E-03	0.0002
Pb-210	6.041E-03	0.0004	1.379E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.466E-02	0.0045
Ra-226	1.453E+01	0.8682	1.210E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.657E-02	0.0028
Ra-228	4.481E-01	0.0268	6.741E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.140E-04	0.0000
Th-228	1.863E-02	0.0011	3.944E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.595E-05	0.0000
Th-230	4.156E-01	0.0248	1.654E-01	0.0099	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.893E-02	0.0029
Th-232	8.294E-01	0.0496	9.404E-03	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.714E-03	0.0002
U-234	1.706E-04	0.0000	3.234E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.197E-03	0.0001
U-235	1.437E-02	0.0009	1.394E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.266E-05	0.0000
U-238	6.020E-02	0.0036	2.891E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.136E-03	0.0001
Total	1.636E+01	0.9776	1.929E-01	0.0115	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.816E-01	0.0109

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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.158E-02	0.0019
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.014E-02	0.0012
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	8.208E-02	0.0049
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.457E+01	0.8710
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	4.493E-01	0.0269
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	1.869E-02	0.0011
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	6.299E-01	0.0377
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.425E-01	0.0504
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	4.601E-03	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.456E-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	6.423E-02	0.0038
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	1.673E+01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Ac-227	1.003E-02	0.0006	2.032E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.723E-04	0.0000
Pa-231	2.212E-02	0.0014	5.138E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.316E-03	0.0002
Pb-210	3.076E-03	0.0002	7.023E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.802E-02	0.0023
Ra-226	1.335E+01	0.8220	1.707E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.500E-02	0.0046
Ra-228	3.960E-02	0.0024	6.101E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.307E-05	0.0000
Th-228	1.328E-05	0.0000	2.811E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.136E-08	0.0000
Th-230	1.139E+00	0.0702	1.655E-01	0.0102	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.218E-02	0.0032
Th-232	1.243E+00	0.0766	1.004E-02	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.273E-03	0.0003
U-234	1.603E-04	0.0000	2.909E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.077E-03	0.0001
U-235	1.293E-02	0.0008	1.272E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.862E-05	0.0000
U-238	5.413E-02	0.0033	2.600E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.022E-03	0.0001
Total	1.587E+01	0.9774	1.908E-01	0.0117	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.758E-01	0.0108

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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.283E-02	0.0008
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.058E-02	0.0019
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	4.180E-02	0.0026
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.343E+01	0.8267
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	3.972E-02	0.0024
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.332E-05	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	1.357E+00	0.0836
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	1.258E+00	0.0774
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	4.146E-03	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.311E-02	0.0008
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	5.775E-02	0.0036
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	1.624E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.289E-04	0.0000	8.691E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.303E-05	0.0000
Pa-231	2.043E-02	0.0014	4.590E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.683E-03	0.0002
Pb-210	2.899E-04	0.0000	6.618E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.582E-03	0.0002
Ra-226	9.929E+00	0.6680	1.750E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.178E-02	0.0055
Ra-228	6.573E-06	0.0000	1.013E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.807E-09	0.0000
Th-228	1.283E-16	0.0000	2.717E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.098E-19	0.0000
Th-230	3.239E+00	0.2179	1.656E-01	0.0111	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.744E-02	0.0045
Th-232	1.281E+00	0.0862	1.009E-02	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.323E-03	0.0003
U-234	1.724E-04	0.0000	2.010E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.439E-04	0.0001
U-235	8.944E-03	0.0006	9.403E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.733E-05	0.0000
U-238	3.733E-02	0.0025	1.793E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.048E-04	0.0000
Total	1.452E+01	0.9766	1.861E-01	0.0125	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.613E-01	0.0109

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.488E-04	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.770E-02	0.0019
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.938E-03	0.0003
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.001E+01	0.6736
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	6.591E-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	1.287E-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	3.472E+00	0.2336
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	1.296E+00	0.0872
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	2.926E-03	0.0002
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	9.076E-03	0.0006
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	3.982E-02	0.0027
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	1.486E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	5.261E-08	0.0000	1.066E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.052E-09	0.0000
Pa-231	7.150E-03	0.0006	1.604E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.326E-04	0.0001
Pb-210	3.398E-07	0.0000	7.758E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.200E-06	0.0000
Ra-226	4.259E+00	0.3384	7.805E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.670E-02	0.0029
Ra-228	1.040E-16	0.0000	1.603E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.394E-19	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	6.705E+00	0.5328	1.658E-01	0.0132	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.693E-02	0.0077
Th-232	1.279E+00	0.1016	1.008E-02	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.320E-03	0.0003
U-234	3.713E-04	0.0000	7.038E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.619E-04	0.0000
U-235	3.122E-03	0.0002	3.930E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.685E-05	0.0000
U-238	1.290E-02	0.0010	6.202E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.438E-04	0.0000
Total	1.227E+01	0.9746	1.797E-01	0.0143	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.394E-01	0.0111

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.733E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.686E-03	0.0008
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	4.617E-06	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.296E+00	0.3414
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	1.043E-16	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	6.968E+00	0.5536
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	1.294E+00	0.1028
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	1.337E-03	0.0001
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.178E-03	0.0003
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	1.377E-02	0.0011
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	1.259E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

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

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

Water Dependent Pathways

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

*Sum of all water independent and dependent pathways.

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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
Ac-227+D	Ac-227+D	1.000E+00	1.501E-01	1.435E-01	1.312E-01	9.571E-02	3.889E-02	1.663E-03	2.040E-07	0.000E+00
Pa-231	Pa-231	1.000E+00	2.252E-02	2.240E-02	2.216E-02	2.135E-02	1.919E-02	1.321E-02	4.548E-03	0.000E+00
Pa-231	Ac-227+D	1.000E+00	2.404E-03	7.052E-03	1.567E-02	3.968E-02	7.347E-02	7.072E-02	2.480E-02	0.000E+00
Pa-231	∑DSR(j)		2.492E-02	2.945E-02	3.783E-02	6.103E-02	9.266E-02	8.394E-02	2.935E-02	0.000E+00
Pb-210+D	Pb-210+D	1.000E+00	3.710E-03	3.587E-03	3.352E-03	2.647E-03	1.348E-03	1.270E-04	1.489E-07	0.000E+00
Pb-210+D	Po-210	1.000E+00	6.496E-04	1.081E-03	1.090E-03	8.622E-04	4.390E-04	4.137E-05	4.850E-08	0.000E+00
Pb-210+D	∑DSR(j)		4.359E-03	4.667E-03	4.442E-03	3.509E-03	1.787E-03	1.684E-04	1.974E-07	0.000E+00
Ra-226+D	Ra-226+D	1.000E+00	6.486E-01	6.459E-01	6.404E-01	6.218E-01	5.713E-01	4.248E-01	1.822E-01	0.000E+00
Ra-226+D	Pb-210+D	1.000E+00	5.789E-05	1.708E-04	3.840E-04	1.013E-03	2.072E-03	2.463E-03	1.114E-03	0.000E+00
Ra-226+D	Po-210	1.000E+00	7.650E-06	3.660E-05	1.048E-04	3.101E-04	6.569E-04	7.888E-04	3.570E-04	0.000E+00
Ra-226+D	∑DSR(j)		6.487E-01	6.461E-01	6.409E-01	6.231E-01	5.740E-01	4.281E-01	1.837E-01	0.000E+00
Ra-228+D	Ra-228+D	1.000E+00	3.278E-01	2.895E-01	2.257E-01	9.453E-02	7.862E-03	1.304E-06	2.064E-17	0.000E+00
Ra-228+D	Th-228+D	1.000E+00	9.141E-02	2.221E-01	3.285E-01	2.242E-01	2.031E-02	3.371E-06	5.331E-17	0.000E+00
Ra-228+D	∑DSR(j)		4.192E-01	5.115E-01	5.543E-01	3.187E-01	2.817E-02	4.675E-06	7.396E-17	0.000E+00
Th-228+D	Th-228+D	1.000E+00	4.964E-01	3.456E-01	1.674E-01	1.325E-02	9.446E-06	9.129E-17	0.000E+00	0.000E+00
Th-230	Th-230	1.000E+00	1.595E-03	1.595E-03	1.595E-03	1.595E-03	1.595E-03	1.593E-03	1.589E-03	0.000E+00
Th-230	Ra-226+D	1.000E+00	1.406E-04	4.210E-04	9.782E-04	2.892E-03	8.056E-03	2.303E-02	4.776E-02	0.000E+00
Th-230	Pb-210+D	1.000E+00	8.387E-09	5.808E-08	2.996E-07	2.461E-06	1.647E-05	9.157E-05	2.412E-04	0.000E+00
Th-230	Po-210	1.000E+00	8.959E-10	1.003E-08	7.135E-08	7.145E-07	5.112E-06	2.910E-05	7.704E-05	0.000E+00
Th-230	∑DSR(j)		1.736E-03	2.016E-03	2.574E-03	4.490E-03	9.672E-03	2.475E-02	4.966E-02	0.000E+00
Th-232	Th-232	1.000E+00	7.669E-03	7.669E-03	7.668E-03	7.668E-03	7.668E-03	7.665E-03	7.658E-03	0.000E+00
Th-232	Ra-228+D	1.000E+00	2.017E-02	5.732E-02	1.191E-01	2.463E-01	3.303E-01	3.378E-01	3.374E-01	0.000E+00
Th-232	Th-228+D	1.000E+00	3.823E-03	2.343E-02	9.290E-02	3.435E-01	5.540E-01	5.734E-01	5.724E-01	0.000E+00
Th-232	∑DSR(j)		3.166E-02	8.842E-02	2.197E-01	5.975E-01	8.919E-01	9.189E-01	9.176E-01	0.000E+00
U-234	U-234	1.000E+00	6.774E-04	6.738E-04	6.667E-04	6.423E-04	5.776E-04	3.982E-04	1.376E-04	0.000E+00
U-234	Th-230	1.000E+00	7.168E-09	2.145E-08	4.979E-08	1.466E-07	4.043E-07	1.117E-06	2.150E-06	0.000E+00
U-234	Ra-226+D	1.000E+00	4.215E-10	2.942E-09	1.546E-08	1.352E-07	1.071E-06	9.356E-06	4.672E-05	0.000E+00
U-234	Pb-210+D	1.000E+00	1.889E-14	2.808E-13	3.209E-12	7.906E-11	1.579E-09	3.038E-08	2.202E-07	0.000E+00
U-234	Po-210	1.000E+00	1.699E-15	4.125E-14	6.819E-13	2.188E-11	4.817E-10	9.600E-09	7.023E-08	0.000E+00
U-234	∑DSR(j)		6.774E-04	6.738E-04	6.667E-04	6.426E-04	5.790E-04	4.087E-04	1.867E-04	0.000E+00
U-235+D	U-235+D	1.000E+00	4.653E-02	4.629E-02	4.580E-02	4.412E-02	3.968E-02	2.736E-02	9.458E-03	0.000E+00
U-235+D	Pa-231	1.000E+00	2.380E-07	7.107E-07	1.641E-06	4.743E-06	1.239E-05	2.812E-05	2.901E-05	0.000E+00
U-235+D	Ac-227+D	1.000E+00	1.700E-08	1.171E-07	5.975E-07	4.717E-06	2.839E-05	1.156E-04	1.449E-04	0.000E+00
U-235+D	∑DSR(j)		4.653E-02	4.629E-02	4.580E-02	4.413E-02	3.972E-02	2.750E-02	9.632E-03	0.000E+00
U-238	U-238	5.400E-05	3.193E-08	3.176E-08	3.143E-08	3.028E-08	2.723E-08	1.878E-08	6.490E-09	0.000E+00

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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
U-238+D	U-238+D	9.999E-01	9.459E-03	9.409E-03	9.310E-03	8.970E-03	8.066E-03	5.562E-03	1.923E-03	0.000E+00
U-238+D	U-234	9.999E-01	9.593E-10	2.864E-09	6.614E-09	1.912E-08	4.994E-08	1.135E-07	1.172E-07	0.000E+00
U-238+D	Th-230	9.999E-01	6.767E-15	4.723E-14	2.479E-13	2.164E-12	1.701E-11	1.451E-10	6.824E-10	0.000E+00
U-238+D	Ra-226+D	9.999E-01	2.985E-16	4.464E-15	5.171E-14	1.336E-12	3.036E-11	8.408E-10	1.113E-08	0.000E+00
U-238+D	Pb-210+D	9.999E-01	1.072E-20	3.295E-19	8.149E-18	5.961E-16	3.514E-14	2.306E-12	4.871E-11	0.000E+00
U-238+D	Po-210	9.999E-01	8.338E-22	4.246E-20	1.568E-18	1.577E-16	1.053E-14	7.249E-13	1.551E-11	0.000E+00
U-238+D	∑DSR(j)		9.459E-03	9.409E-03	9.310E-03	8.970E-03	8.066E-03	5.562E-03	1.923E-03	0.000E+00

The DSR includes contributions from associated (half-life ≤ 30 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
Ac-227	1.665E+02	1.742E+02	1.906E+02	2.612E+02	6.428E+02	1.503E+04	1.225E+08	*7.232E+13
Pa-231	1.003E+03	8.489E+02	6.608E+02	4.096E+02	2.698E+02	2.978E+02	8.517E+02	*4.723E+10
Pb-210	5.735E+03	5.356E+03	5.628E+03	7.124E+03	1.399E+04	1.485E+05	1.267E+08	*7.634E+13
Ra-226	3.854E+01	3.869E+01	3.901E+01	4.012E+01	4.355E+01	5.840E+01	1.361E+02	*9.885E+11
Ra-228	5.964E+01	4.887E+01	4.510E+01	7.845E+01	8.876E+02	5.348E+06	*2.726E+14	*2.726E+14
Th-228	5.036E+01	7.235E+01	1.493E+02	1.886E+03	2.647E+06	*8.195E+14	*8.195E+14	*8.195E+14
Th-230	1.440E+04	1.240E+04	9.713E+03	5.568E+03	2.585E+03	1.010E+03	5.034E+02	*2.018E+10
Th-232	7.897E+02	2.827E+02	1.138E+02	4.184E+01	2.803E+01	2.721E+01	2.725E+01	*1.097E+05
U-234	3.691E+04	3.710E+04	3.750E+04	3.890E+04	4.317E+04	6.117E+04	1.339E+05	*6.247E+09
U-235	5.373E+02	5.401E+02	5.459E+02	5.665E+02	6.294E+02	9.090E+02	2.596E+03	*2.161E+06
U-238	2.643E+03	2.657E+03	2.685E+03	2.787E+03	3.099E+03	4.495E+03	1.300E+04	*3.361E+05

*At specific activity limit

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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)
Ac-227	3.300E-01	0.000E+00	1.501E-01	1.665E+02	1.501E-01	1.665E+02
Pa-231	3.300E-01	49.00 ± 0.10	9.866E-02	2.534E+02	2.492E-02	1.003E+03
Pb-210	2.339E+01	1.007 ± 0.002	4.667E-03	5.356E+03	4.359E-03	5.735E+03
Ra-226	2.339E+01	0.000E+00	6.487E-01	3.854E+01	6.487E-01	3.854E+01
Ra-228	1.410E+00	2.641 ± 0.005	5.558E-01	4.498E+01	4.192E-01	5.964E+01
Th-228	1.410E+00	0.000E+00	4.964E-01	5.036E+01	4.964E-01	5.036E+01
Th-230	1.403E+02	668 ± 1	6.269E-02	3.988E+02	1.736E-03	1.440E+04
Th-232	1.410E+00	82.6 ± 0.2	9.189E-01	2.721E+01	3.166E-02	7.897E+02
U-234	7.160E+00	0.000E+00	6.774E-04	3.691E+04	6.774E-04	3.691E+04
U-235	3.300E-01	0.000E+00	4.653E-02	5.373E+02	4.653E-02	5.373E+02
U-238	7.160E+00	0.000E+00	9.460E-03	2.643E+03	9.460E-03	2.643E+03

RESRAD, Version 6.5 T½ Limit = 30 days 08/12/2013 11:22 Page 25
Summary : SU18 Surface Strata In Situ
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 SURFACE IN SITU.RAD

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
Ac-227	Ac-227	1.000E+00	4.955E-02	4.737E-02	4.329E-02	3.158E-02	1.283E-02	5.488E-04	6.733E-08	0.000E+00
Ac-227	Pa-231	1.000E+00	7.932E-04	2.327E-03	5.171E-03	1.310E-02	2.425E-02	2.334E-02	8.185E-03	0.000E+00
Ac-227	U-235	1.000E+00	5.610E-09	3.866E-08	1.972E-07	1.557E-06	9.367E-06	3.816E-05	4.782E-05	0.000E+00
Ac-227	∑DOSE(j)		5.034E-02	4.970E-02	4.846E-02	4.468E-02	3.709E-02	2.393E-02	8.233E-03	0.000E+00
Pa-231	Pa-231	1.000E+00	7.431E-03	7.392E-03	7.313E-03	7.045E-03	6.333E-03	4.360E-03	1.501E-03	0.000E+00
Pa-231	U-235	1.000E+00	7.855E-08	2.345E-07	5.415E-07	1.565E-06	4.088E-06	9.281E-06	9.573E-06	0.000E+00
Pa-231	∑DOSE(j)		7.431E-03	7.392E-03	7.314E-03	7.047E-03	6.337E-03	4.369E-03	1.510E-03	0.000E+00
Pb-210	Pb-210	1.000E+00	8.677E-02	8.389E-02	7.841E-02	6.192E-02	3.153E-02	2.971E-03	3.483E-06	0.000E+00
Pb-210	Ra-226	1.000E+00	1.354E-03	3.995E-03	8.982E-03	2.368E-02	4.848E-02	5.761E-02	2.606E-02	0.000E+00
Pb-210	Th-230	1.000E+00	1.177E-06	8.148E-06	4.204E-05	3.452E-04	2.310E-03	1.285E-02	3.384E-02	0.000E+00
Pb-210	U-234	1.000E+00	1.353E-13	2.010E-12	2.297E-11	5.661E-10	1.131E-08	2.175E-07	1.576E-06	0.000E+00
Pb-210	U-238	9.999E-01	7.674E-20	2.359E-18	5.834E-17	4.268E-15	2.516E-13	1.651E-11	3.488E-10	0.000E+00
Pb-210	∑DOSE(j)		8.812E-02	8.789E-02	8.744E-02	8.595E-02	8.232E-02	7.343E-02	5.990E-02	0.000E+00
Po-210	Pb-210	1.000E+00	1.519E-02	2.528E-02	2.549E-02	2.017E-02	1.027E-02	9.676E-04	1.134E-06	0.000E+00
Po-210	Ra-226	1.000E+00	1.789E-04	8.560E-04	2.451E-03	7.253E-03	1.536E-02	1.845E-02	8.351E-03	0.000E+00
Po-210	Th-230	1.000E+00	1.257E-07	1.407E-06	1.001E-05	1.002E-04	7.172E-04	4.082E-03	1.081E-02	0.000E+00
Po-210	U-234	1.000E+00	1.217E-14	2.953E-13	4.883E-12	1.567E-10	3.449E-09	6.874E-08	5.029E-07	0.000E+00
Po-210	U-238	9.999E-01	5.970E-21	3.040E-19	1.123E-17	1.129E-15	7.541E-14	5.191E-12	1.111E-10	0.000E+00
Po-210	∑DOSE(j)		1.537E-02	2.614E-02	2.795E-02	2.752E-02	2.635E-02	2.350E-02	1.916E-02	0.000E+00
Ra-226	Ra-226	1.000E+00	1.517E+01	1.511E+01	1.498E+01	1.454E+01	1.336E+01	9.937E+00	4.262E+00	0.000E+00
Ra-226	Th-230	1.000E+00	1.973E-02	5.907E-02	1.372E-01	4.057E-01	1.130E+00	3.232E+00	6.700E+00	0.000E+00
Ra-226	U-234	1.000E+00	3.018E-09	2.107E-08	1.107E-07	9.683E-07	7.665E-06	6.699E-05	3.345E-04	0.000E+00
Ra-226	U-238	9.999E-01	2.137E-15	3.196E-14	3.702E-13	9.568E-12	2.174E-10	6.020E-09	7.972E-08	0.000E+00
Ra-226	∑DOSE(j)		1.519E+01	1.517E+01	1.512E+01	1.495E+01	1.449E+01	1.317E+01	1.096E+01	0.000E+00
Ra-228	Ra-228	1.000E+00	4.622E-01	4.081E-01	3.183E-01	1.333E-01	1.108E-02	1.839E-06	2.911E-17	0.000E+00
Ra-228	Th-232	1.000E+00	2.843E-02	8.082E-02	1.679E-01	3.473E-01	4.657E-01	4.763E-01	4.758E-01	0.000E+00
Ra-228	∑DOSE(j)		4.906E-01	4.890E-01	4.862E-01	4.806E-01	4.768E-01	4.763E-01	4.758E-01	0.000E+00
Th-228	Ra-228	1.000E+00	1.289E-01	3.131E-01	4.633E-01	3.161E-01	2.863E-02	4.753E-06	7.517E-17	0.000E+00
Th-228	Th-228	1.000E+00	7.000E-01	4.872E-01	2.361E-01	1.869E-02	1.332E-05	1.287E-16	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	5.390E-03	3.303E-02	1.310E-01	4.844E-01	7.811E-01	8.085E-01	8.071E-01	0.000E+00
Th-228	∑DOSE(j)		8.343E-01	8.334E-01	8.303E-01	8.191E-01	8.097E-01	8.085E-01	8.071E-01	0.000E+00
Th-230	Th-230	1.000E+00	2.238E-01	2.238E-01	2.238E-01	2.238E-01	2.237E-01	2.235E-01	2.229E-01	0.000E+00
Th-230	U-234	1.000E+00	5.132E-08	1.536E-07	3.565E-07	1.050E-06	2.895E-06	8.001E-06	1.539E-05	0.000E+00
Th-230	U-238	9.999E-01	4.845E-14	3.381E-13	1.775E-12	1.549E-11	1.218E-10	1.039E-09	4.886E-09	0.000E+00
Th-230	∑DOSE(j)		2.238E-01	2.238E-01	2.238E-01	2.238E-01	2.237E-01	2.235E-01	2.229E-01	0.000E+00
Th-232	Th-232	1.000E+00	1.081E-02	1.081E-02	1.081E-02	1.081E-02	1.081E-02	1.081E-02	1.080E-02	0.000E+00
U-234	U-234	1.000E+00	4.850E-03	4.824E-03	4.773E-03	4.599E-03	4.135E-03	2.851E-03	9.850E-04	0.000E+00
U-234	U-238	9.999E-01	6.868E-09	2.051E-08	4.735E-08	1.369E-07	3.576E-07	8.123E-07	8.394E-07	0.000E+00
U-234	∑DOSE(j)		4.850E-03	4.824E-03	4.773E-03	4.599E-03	4.136E-03	2.852E-03	9.858E-04	0.000E+00
U-235	U-235	1.000E+00	1.536E-02	1.527E-02	1.511E-02	1.456E-02	1.309E-02	9.028E-03	3.121E-03	0.000E+00

RESRAD, Version 6.5 T½ Limit = 30 days 08/12/2013 11:22 Page 26
Summary : SU18 Surface Strata In Situ
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 SURFACE IN SITU.RAD

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
U-238	U-238	5.400E-05	2.286E-07	2.274E-07	2.250E-07	2.168E-07	1.950E-07	1.344E-07	4.647E-08	0.000E+00
U-238	U-238	9.999E-01	6.773E-02	6.737E-02	6.666E-02	6.423E-02	5.775E-02	3.982E-02	1.377E-02	0.000E+00
U-238	∑DOSE(j)		6.773E-02	6.737E-02	6.666E-02	6.423E-02	5.775E-02	3.982E-02	1.377E-02	0.000E+00

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

RESRAD, Version 6.5 T½ Limit = 30 days 08/12/2013 11:22 Page 27
Summary : SU18 Surface Strata In Situ
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 SURFACE IN SITU.RAD

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
Ac-227	Ac-227	1.000E+00	3.300E-01	3.155E-01	2.883E-01	2.104E-01	8.547E-02	3.655E-03	4.484E-07	9.170E-21
Ac-227	Pa-231	1.000E+00	0.000E+00	1.025E-02	2.924E-02	8.221E-02	1.570E-01	1.523E-01	5.345E-02	1.279E-03
Ac-227	U-235	1.000E+00	0.000E+00	1.091E-07	9.465E-07	9.271E-06	5.950E-05	2.475E-04	3.117E-04	2.666E-05
Ac-227	∑S(j):		3.300E-01	3.257E-01	3.175E-01	2.926E-01	2.425E-01	1.562E-01	5.376E-02	1.306E-03
Pa-231	Pa-231	1.000E+00	3.300E-01	3.282E-01	3.248E-01	3.129E-01	2.812E-01	1.936E-01	6.665E-02	1.595E-03
Pa-231	U-235	1.000E+00	0.000E+00	6.945E-06	2.062E-05	6.620E-05	1.786E-04	4.101E-04	4.244E-04	3.411E-05
Pa-231	∑S(j):		3.300E-01	3.283E-01	3.248E-01	3.129E-01	2.814E-01	1.940E-01	6.707E-02	1.629E-03
Pb-210	Pb-210	1.000E+00	2.339E+01	2.261E+01	2.114E+01	1.669E+01	8.499E+00	8.009E-01	9.388E-04	5.179E-14
Pb-210	Ra-226	1.000E+00	0.000E+00	7.134E-01	2.061E+00	6.035E+00	1.275E+01	1.529E+01	6.921E+00	3.580E-01
Pb-210	Th-230	1.000E+00	0.000E+00	9.328E-04	8.187E-03	8.346E-02	5.957E-01	3.385E+00	8.961E+00	1.288E+01
Pb-210	U-234	1.000E+00	0.000E+00	1.431E-10	3.781E-09	1.300E-07	2.866E-06	5.703E-05	4.169E-04	1.068E-03
Pb-210	U-238	9.999E-01	0.000E+00	1.015E-16	8.066E-15	9.313E-13	6.269E-11	4.307E-09	9.211E-08	5.167E-07
Pb-210	∑S(j):		2.339E+01	2.333E+01	2.321E+01	2.281E+01	2.184E+01	1.948E+01	1.588E+01	1.324E+01
Po-210	Pb-210	1.000E+00	0.000E+00	1.904E+01	2.114E+01	1.676E+01	8.535E+00	8.042E-01	9.428E-04	5.201E-14
Po-210	Ra-226	1.000E+00	0.000E+00	3.854E-01	1.682E+00	5.682E+00	1.245E+01	1.510E+01	6.840E+00	3.538E-01
Po-210	Th-230	1.000E+00	0.000E+00	3.800E-04	5.716E-03	7.433E-02	5.699E-01	3.317E+00	8.825E+00	1.270E+01
Po-210	U-234	1.000E+00	0.000E+00	4.714E-11	2.320E-09	1.101E-07	2.692E-06	5.556E-05	4.100E-04	1.053E-03
Po-210	U-238	9.999E-01	0.000E+00	2.816E-17	4.421E-15	7.521E-13	5.786E-11	4.174E-09	9.045E-08	5.093E-07
Po-210	∑S(j):		0.000E+00	1.942E+01	2.282E+01	2.252E+01	2.156E+01	1.922E+01	1.567E+01	1.305E+01
Ra-226	Ra-226	1.000E+00	2.339E+01	2.329E+01	2.309E+01	2.242E+01	2.060E+01	1.532E+01	6.573E+00	3.399E-01
Ra-226	Th-230	1.000E+00	0.000E+00	6.065E-02	1.812E-01	5.951E-01	1.712E+00	4.952E+00	1.030E+01	1.401E+01
Ra-226	U-234	1.000E+00	0.000E+00	1.392E-08	1.245E-07	1.352E-06	1.143E-05	1.022E-04	5.138E-04	1.167E-03
Ra-226	U-238	9.999E-01	0.000E+00	1.314E-14	3.522E-13	1.271E-11	3.187E-10	9.141E-09	1.223E-07	5.700E-07
Ra-226	∑S(j):		2.339E+01	2.335E+01	2.328E+01	2.302E+01	2.231E+01	2.027E+01	1.688E+01	1.435E+01
Ra-228	Ra-228	1.000E+00	1.410E+00	1.245E+00	9.710E-01	4.066E-01	3.382E-02	5.610E-06	8.881E-17	0.000E+00
Ra-228	Th-232	1.000E+00	0.000E+00	1.598E-01	4.256E-01	9.727E-01	1.334E+00	1.366E+00	1.365E+00	1.361E+00
Ra-228	∑S(j):		1.410E+00	1.405E+00	1.397E+00	1.379E+00	1.368E+00	1.366E+00	1.365E+00	1.361E+00
Th-228	Ra-228	1.000E+00	0.000E+00	4.015E-01	7.544E-01	5.618E-01	5.145E-02	8.541E-06	1.352E-16	0.000E+00
Th-228	Th-228	1.000E+00	1.410E+00	9.814E-01	4.755E-01	3.764E-02	2.683E-05	2.593E-16	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	2.625E-02	1.746E-01	7.858E-01	1.317E+00	1.366E+00	1.365E+00	1.361E+00
Th-228	∑S(j):		1.410E+00	1.409E+00	1.404E+00	1.385E+00	1.368E+00	1.366E+00	1.365E+00	1.361E+00
Th-230	Th-230	1.000E+00	1.403E+02	1.403E+02	1.403E+02	1.403E+02	1.402E+02	1.401E+02	1.397E+02	1.384E+02
Th-230	U-234	1.000E+00	0.000E+00	6.428E-05	1.918E-04	6.277E-04	1.787E-03	4.996E-03	9.642E-03	1.194E-02
Th-230	U-238	9.999E-01	0.000E+00	9.103E-11	8.135E-10	8.818E-09	7.398E-08	6.460E-07	3.057E-06	6.218E-06
Th-230	∑S(j):		1.403E+02	1.403E+02	1.403E+02	1.403E+02	1.402E+02	1.401E+02	1.397E+02	1.384E+02
Th-232	Th-232	1.000E+00	1.410E+00	1.410E+00	1.410E+00	1.410E+00	1.410E+00	1.409E+00	1.408E+00	1.404E+00
U-234	U-234	1.000E+00	7.160E+00	7.122E+00	7.047E+00	6.789E+00	6.105E+00	4.209E+00	1.454E+00	3.525E-02
U-234	U-238	9.999E-01	0.000E+00	2.019E-05	5.993E-05	1.925E-04	5.192E-04	1.193E-03	1.237E-03	1.001E-04
U-234	∑S(j):		7.160E+00	7.122E+00	7.047E+00	6.790E+00	6.105E+00	4.210E+00	1.455E+00	3.535E-02
U-235	U-235	1.000E+00	3.300E-01	3.283E-01	3.248E-01	3.129E-01	2.814E-01	1.940E-01	6.707E-02	1.629E-03

RESRAD, Version 6.5 T½ Limit = 30 days 08/12/2013 11:22 Page 28
Summary : SU18 Surface Strata In Situ
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 SURFACE IN SITU.RAD

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
U-238	U-238	5.400E-05	3.866E-04	3.846E-04	3.805E-04	3.666E-04	3.297E-04	2.273E-04	7.859E-05	1.909E-06
U-238	U-238	9.999E-01	7.160E+00	7.122E+00	7.046E+00	6.789E+00	6.105E+00	4.210E+00	1.455E+00	3.535E-02
U-238	∑S(j):		7.160E+00	7.122E+00	7.047E+00	6.790E+00	6.105E+00	4.210E+00	1.455E+00	3.535E-02

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

RESCALC.EXE execution time = 2.15 seconds

RESRAD, Version 6.5 T½ Limit = 30 days 08/12/2013 13:18 Page 1
Summary : SU18 Subsurface Strata In Situ
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 SUBSURFACE IN SITU.RAD

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Part I: Mixture Sums and Single Radionuclide Guidelines

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Summary : SU18 Subsurface Strata In Situ
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 SUBSURFACE IN SITU.RAD

Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: FGR 12)	4.951E-04	4.951E-04	DCF1(1)
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(2)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(3)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(4)
A-1	Bi-211 (Source: FGR 12)	2.559E-01	2.559E-01	DCF1(5)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(6)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(7)
A-1	Fr-223 (Source: FGR 12)	1.980E-01	1.980E-01	DCF1(8)
A-1	Pa-231 (Source: FGR 12)	1.906E-01	1.906E-01	DCF1(9)
A-1	Pa-234 (Source: FGR 12)	1.155E+01	1.155E+01	DCF1(10)
A-1	Pa-234m (Source: FGR 12)	8.967E-02	8.967E-02	DCF1(11)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(12)
A-1	Pb-211 (Source: FGR 12)	3.064E-01	3.064E-01	DCF1(13)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(14)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(15)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(16)
A-1	Po-211 (Source: FGR 12)	4.764E-02	4.764E-02	DCF1(17)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(18)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(19)
A-1	Po-215 (Source: FGR 12)	1.016E-03	1.016E-03	DCF1(20)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(21)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(22)
A-1	Ra-223 (Source: FGR 12)	6.034E-01	6.034E-01	DCF1(23)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(24)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(25)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(26)
A-1	Rn-219 (Source: FGR 12)	3.083E-01	3.083E-01	DCF1(27)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(28)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(29)
A-1	Th-227 (Source: FGR 12)	5.212E-01	5.212E-01	DCF1(30)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(31)
A-1	Th-230 (Source: FGR 12)	1.209E-03	1.209E-03	DCF1(32)
A-1	Th-231 (Source: FGR 12)	3.643E-02	3.643E-02	DCF1(33)
A-1	Th-232 (Source: FGR 12)	5.212E-04	5.212E-04	DCF1(34)
A-1	Th-234 (Source: FGR 12)	2.410E-02	2.410E-02	DCF1(35)
A-1	Tl-207 (Source: FGR 12)	1.980E-02	1.980E-02	DCF1(36)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(37)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(38)
A-1	U-234 (Source: FGR 12)	4.017E-04	4.017E-04	DCF1(39)
A-1	U-235 (Source: FGR 12)	7.211E-01	7.211E-01	DCF1(40)
A-1	U-238 (Source: FGR 12)	1.031E-04	1.031E-04	DCF1(41)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.724E+00	6.700E+00	DCF2(1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(2)
B-1	Pb-210+D	1.380E-02	1.360E-02	DCF2(3)
B-1	Po-210	9.400E-03	9.400E-03	DCF2(4)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(5)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(6)

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Summary : SU18 Subsurface Strata In Situ
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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(7)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(8)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(9)
B-1	U-234	1.320E-01	1.320E-01	DCF2(10)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(11)
B-1	U-238	1.180E-01	1.180E-01	DCF2(12)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(13)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.410E-02	DCF3(1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(2)
D-1	Pb-210+D	5.376E-03	5.370E-03	DCF3(3)
D-1	Po-210	1.900E-03	1.900E-03	DCF3(4)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(5)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(6)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(7)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(8)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(9)
D-1	U-234	2.830E-04	2.830E-04	DCF3(10)
D-1	U-235+D	2.673E-04	2.660E-04	DCF3(11)
D-1	U-238	2.550E-04	2.550E-04	DCF3(12)
D-1	U-238+D	2.687E-04	2.550E-04	DCF3(13)
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	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(4,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF(4,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(5,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(6,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(6,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(6,3)
D-34				

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Summary : SU18 Subsurface Strata In Situ
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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(8,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(9,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
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	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC(4,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(5,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(5,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(6,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(6,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(7,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(7,2)
D-5				

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(8,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(9,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(9,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(10,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(10,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(11,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(12,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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Summary : SU18 Subsurface Strata In Situ
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Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	7.500E+01	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	4.000E+00	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	not used	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): Ac-227	3.200E-01	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	3.200E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	1.583E+02	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.583E+02	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Ra-228	3.720E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Th-228	3.720E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Th-230	9.500E+02	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Th-232	3.720E+00	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): U-234	7.000E+00	0.000E+00	---	S1(10)
R012	Initial principal radionuclide (pCi/g): U-235	3.200E-01	0.000E+00	---	S1(11)
R012	Initial principal radionuclide (pCi/g): U-238	7.000E+00	0.000E+00	---	S1(12)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(10)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(11)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(12)
R013	Cover depth (m)	1.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	3.000E-06	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)	4.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	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
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 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	3.299E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.328E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.653E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.495E-04	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.495E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.111E-06	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.111E-06	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.111E-06	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.328E-03	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.328E-03	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.328E-03	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter Po-210				
R016	Contaminated zone (cm**3/g)	1.000E+01	1.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.529E-03	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	1.227E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.500E-05	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	6.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	1.700E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.825E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	4.563E-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)
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)

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	3.650E+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	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
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

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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
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	1	---	---	KYMAX

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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	active

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Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	75.00 square meters	Ac-227	3.200E-01
Thickness:	4.00 meters	Pa-231	3.200E-01
Cover Depth:	1.00 meters	Pb-210	1.583E+02
		Ra-226	1.583E+02
		Ra-228	3.720E+00
		Th-228	3.720E+00
		Th-230	9.500E+02
		Th-232	3.720E+00
		U-234	7.000E+00
		U-235	3.200E-01
		U-238	7.000E+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):	1.590E-03	1.592E-03	1.595E-03	1.607E-03	1.641E-03	1.755E-03	2.030E-03	2.593E-03
M(t):	6.360E-05	6.367E-05	6.380E-05	6.427E-05	6.563E-05	7.019E-05	8.118E-05	1.037E-04

Maximum TDOSE(t): 2.593E-03 mrem/yr at t = 1.000E+03 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.877E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	1.986E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	5.118E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.414E-03	0.8891	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	3.174E-05	0.0200	0.000E+00	0.0000	0.000E+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	1.412E-04	0.0888	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.838E-06	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.440E-06	0.0009	0.000E+00	0.0000	0.000E+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	4.066E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.688E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	8.645E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.590E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.877E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.986E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.118E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.414E-03	0.8891
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	3.174E-05	0.0200
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	1.412E-04	0.0888
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	1.838E-06	0.0012
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.440E-06	0.0009
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	4.066E-14	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.688E-11	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.645E-08	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.590E-03	1.0000

*Sum of all water independent and dependent pathways.

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Summary : SU18 Subsurface Strata In Situ
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 SUBSURFACE IN SITU.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	4.709E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	3.508E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	7.990E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.412E-03	0.8870	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	6.836E-05	0.0429	0.000E+00	0.0000	0.000E+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	9.825E-05	0.0617	0.000E+00	0.0000	0.000E+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	5.510E-06	0.0035	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	7.673E-06	0.0048	0.000E+00	0.0000	0.000E+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	2.842E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.687E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	8.634E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.592E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.709E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.508E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.990E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.412E-03	0.8870
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	6.836E-05	0.0429
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.825E-05	0.0617
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	5.510E-06	0.0035
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	7.673E-06	0.0048
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.842E-13	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.687E-11	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.634E-08	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.592E-03	1.0000

*Sum of all water independent and dependent pathways.

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Summary : SU18 Subsurface Strata In Situ
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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Ac-227	4.390E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	6.391E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	8.044E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.408E-03	0.8827	0.000E+00	0.0000	0.000E+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	9.793E-05	0.0614	0.000E+00	0.0000	0.000E+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	4.761E-05	0.0298	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.284E-05	0.0080	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.859E-05	0.0179	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.499E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.685E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	8.611E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.595E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.390E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.391E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.044E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.408E-03	0.8827
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.793E-05	0.0614
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	4.761E-05	0.0298
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	1.284E-05	0.0080
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.859E-05	0.0179
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	1.499E-12	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.685E-11	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.611E-08	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.595E-03	1.0000

*Sum of all water independent and dependent pathways.

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Summary : SU18 Subsurface Strata In Situ
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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+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.
Ac-227	3.434E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	1.496E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	6.455E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.395E-03	0.8681	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	6.678E-05	0.0416	0.000E+00	0.0000	0.000E+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	3.769E-06	0.0023	0.000E+00	0.0000	0.000E+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	3.834E-05	0.0239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.030E-04	0.0641	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.333E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.686E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	8.534E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.607E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.434E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.496E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.455E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.395E-03	0.8681
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	6.678E-05	0.0416
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	3.769E-06	0.0023
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.834E-05	0.0239
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	1.030E-04	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	1.333E-11	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.686E-11	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.534E-08	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.607E-03	1.0000

*Sum of all water independent and dependent pathways.

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Summary : SU18 Subsurface Strata In Situ
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 SUBSURFACE IN SITU.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Ac-227	1.702E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	3.006E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	3.424E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.358E-03	0.8274	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	6.378E-06	0.0039	0.000E+00	0.0000	0.000E+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	2.688E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	1.099E-04	0.0670	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.668E-04	0.1017	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.105E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	1.742E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	8.317E-08	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.641E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.702E-09	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.006E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.424E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.358E-03	0.8274
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	6.378E-06	0.0039
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	2.688E-09	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	1.099E-04	0.0670
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	1.668E-04	0.1017
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	1.105E-10	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.742E-11	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.317E-08	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.641E-03	1.0000

*Sum of all water independent and dependent pathways.

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Summary : SU18 Subsurface Strata In Situ
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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.460E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	4.070E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	3.721E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	1.235E-03	0.7039	0.000E+00	0.0000	0.000E+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	1.295E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-228	2.604E-20	0.0000	0.000E+00	0.0000	0.000E+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	3.460E-04	0.1972	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.735E-04	0.0988	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-234	1.129E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	2.134E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	7.600E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.755E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.460E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.070E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.721E-11	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.235E-03	0.7039
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	1.295E-09	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	2.604E-20	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.460E-04	0.1972
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	1.735E-04	0.0988
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	1.129E-09	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.134E-11	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.600E-08	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.755E-03	1.0000

*Sum of all water independent and dependent pathways.

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Summary : SU18 Subsurface Strata In Situ
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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.307E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	3.242E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	6.557E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	9.432E-04	0.4647	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-228	3.645E-20	0.0000	0.000E+00	0.0000	0.000E+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	9.118E-04	0.4493	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.744E-04	0.0859	0.000E+00	0.0000	0.000E+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	8.507E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	3.024E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	5.875E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.030E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.307E-13	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.242E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.557E-14	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.432E-04	0.4647
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	3.645E-20	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	9.118E-04	0.4493
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	1.744E-04	0.0859
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.507E-09	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.024E-11	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.875E-08	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.030E-03	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	2.813E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	1.301E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	1.506E-23	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	3.669E-04	0.1415	0.000E+00	0.0000	0.000E+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	2.048E-03	0.7899	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.778E-04	0.0686	0.000E+00	0.0000	0.000E+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	5.369E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	3.179E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	2.390E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.593E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.813E-24	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.301E-09	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.506E-23	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.669E-04	0.1415
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	2.048E-03	0.7899
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	1.778E-04	0.0686
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	5.369E-08	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.179E-11	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.390E-08	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.593E-03	1.0000

*Sum of all water independent and dependent pathways.

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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
Ac-227+D	Ac-227+D	1.000E+00	1.524E-08	1.471E-08	1.372E-08	1.073E-08	5.319E-09	4.561E-10	4.086E-13	8.790E-24
Pa-231	Pa-231	1.000E+00	3.768E-10	3.763E-10	3.754E-10	3.720E-10	3.624E-10	3.310E-10	2.554E-10	1.030E-10
Pa-231	Ac-227+D	1.000E+00	2.439E-10	7.200E-10	1.622E-09	4.305E-09	9.032E-09	1.239E-08	9.875E-09	3.963E-09
Pa-231	∑DSR(j)		6.207E-10	1.096E-09	1.997E-09	4.677E-09	9.395E-09	1.272E-08	1.013E-08	4.066E-09
Pb-210+D	Pb-210+D	1.000E+00	5.117E-13	4.958E-13	4.653E-13	3.728E-13	1.978E-13	2.152E-14	3.806E-17	8.851E-27
Pb-210+D	Po-210	1.000E+00	2.721E-12	4.550E-12	4.615E-12	3.704E-12	1.965E-12	2.135E-13	3.761E-16	8.629E-26
Pb-210+D	∑DSR(j)		3.232E-12	5.046E-12	5.080E-12	4.077E-12	2.162E-12	2.350E-13	4.141E-16	9.514E-26
Ra-226+D	Ra-226+D	1.000E+00	8.928E-06	8.916E-06	8.892E-06	8.809E-06	8.574E-06	7.801E-06	5.957E-06	2.317E-06
Ra-226+D	Pb-210+D	1.000E+00	7.992E-15	2.363E-14	5.339E-14	1.433E-13	3.087E-13	4.439E-13	3.576E-13	1.417E-13
Ra-226+D	Po-210	1.000E+00	3.202E-14	1.539E-13	4.436E-13	1.337E-12	2.982E-12	4.327E-12	3.475E-12	1.358E-12
Ra-226+D	∑DSR(j)		8.928E-06	8.916E-06	8.892E-06	8.809E-06	8.574E-06	7.801E-06	5.957E-06	2.317E-06
Ra-228+D	Ra-228+D	1.000E+00	1.538E-06	1.362E-06	1.069E-06	4.566E-07	4.023E-08	8.169E-12	2.303E-22	0.000E+00
Ra-228+D	Th-228+D	1.000E+00	6.993E-06	1.701E-05	2.526E-05	1.749E-05	1.674E-06	3.399E-10	9.567E-21	0.000E+00
Ra-228+D	∑DSR(j)		8.532E-06	1.838E-05	2.633E-05	1.795E-05	1.715E-06	3.481E-10	9.798E-21	0.000E+00
Th-228+D	Th-228+D	1.000E+00	3.794E-05	2.641E-05	1.280E-05	1.013E-06	7.227E-10	7.001E-21	0.000E+00	0.000E+00
Th-230	Th-230	1.000E+00	5.261E-17	5.261E-17	5.262E-17	5.264E-17	5.272E-17	5.300E-17	5.379E-17	5.665E-17
Th-230	Ra-226+D	1.000E+00	1.934E-09	5.800E-09	1.351E-08	4.036E-08	1.157E-07	3.642E-07	9.598E-07	2.156E-06
Th-230	Pb-210+D	1.000E+00	1.157E-18	8.025E-18	4.153E-17	3.451E-16	2.385E-15	1.475E-14	5.025E-14	1.242E-13
Th-230	Po-210	1.000E+00	3.747E-18	4.208E-17	3.010E-16	3.054E-15	2.258E-14	1.428E-13	4.871E-13	1.189E-12
Th-230	∑DSR(j)		1.934E-09	5.800E-09	1.351E-08	4.036E-08	1.157E-07	3.642E-07	9.598E-07	2.156E-06
Th-232	Th-232	1.000E+00	9.178E-19	9.179E-19	9.180E-19	9.186E-19	9.203E-19	9.263E-19	9.436E-19	1.007E-18
Th-232	Ra-228+D	1.000E+00	9.460E-08	2.692E-07	5.609E-07	1.168E-06	1.583E-06	1.627E-06	1.639E-06	1.681E-06
Th-232	Th-228+D	1.000E+00	2.924E-07	1.793E-06	7.125E-06	2.653E-05	4.325E-05	4.500E-05	4.525E-05	4.612E-05
Th-232	∑DSR(j)		3.870E-07	2.063E-06	7.686E-06	2.770E-05	4.484E-05	4.663E-05	4.689E-05	4.780E-05
U-234	U-234	1.000E+00	5.121E-18	5.114E-18	5.102E-18	5.058E-18	4.933E-18	4.522E-18	3.527E-18	1.477E-18
U-234	Th-230	1.000E+00	2.367E-22	7.097E-22	1.654E-21	4.942E-21	1.419E-20	4.490E-20	1.201E-19	2.831E-19
U-234	Ra-226+D	1.000E+00	5.803E-15	4.059E-14	2.142E-13	1.905E-12	1.578E-11	1.612E-10	1.215E-09	7.670E-09
U-234	Pb-210+D	1.000E+00	2.608E-24	3.884E-23	4.458E-22	1.116E-20	2.332E-19	5.248E-18	5.797E-17	4.314E-16
U-234	Po-210	1.000E+00	7.107E-24	1.731E-22	2.880E-21	9.406E-20	2.168E-18	5.049E-17	5.609E-16	4.130E-15
U-234	∑DSR(j)		5.808E-15	4.060E-14	2.142E-13	1.905E-12	1.578E-11	1.612E-10	1.215E-09	7.670E-09
U-235+D	U-235+D	1.000E+00	5.275E-11	5.269E-11	5.255E-11	5.209E-11	5.079E-11	4.648E-11	3.609E-11	1.488E-11
U-235+D	Pa-231	1.000E+00	3.986E-15	1.194E-14	2.780E-14	8.265E-14	2.340E-13	7.046E-13	1.629E-12	2.204E-12
U-235+D	Ac-227+D	1.000E+00	1.725E-15	1.195E-14	6.164E-14	5.068E-13	3.407E-12	1.952E-11	5.677E-11	8.226E-11
U-235+D	∑DSR(j)		5.276E-11	5.271E-11	5.264E-11	5.268E-11	5.443E-11	6.670E-11	9.449E-11	9.934E-11
U-238	U-238	5.400E-05	1.647E-38	1.645E-38	1.642E-38	1.629E-38	1.592E-38	1.471E-38	1.172E-38	5.298E-39

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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
U-238+D	U-238+D	9.999E-01	1.235E-08	1.233E-08	1.230E-08	1.219E-08	1.188E-08	1.086E-08	8.393E-09	3.409E-09
U-238+D	U-234	9.999E-01	7.257E-24	2.175E-23	5.062E-23	1.505E-22	4.266E-22	1.289E-21	3.005E-21	4.195E-21
U-238+D	Th-230	9.999E-01	2.236E-28	1.564E-27	8.254E-27	7.343E-26	6.093E-25	6.255E-24	4.779E-23	3.158E-22
U-238+D	Ra-226+D	9.999E-01	4.112E-21	6.163E-20	7.177E-19	1.890E-17	4.534E-16	1.515E-14	3.339E-13	6.418E-12
U-238+D	Pb-210+D	9.999E-01	1.480E-30	4.560E-29	1.134E-27	8.446E-26	5.248E-24	4.141E-22	1.461E-20	3.515E-19
U-238+D	Po-210	9.999E-01	3.487E-30	1.782E-28	6.629E-27	6.800E-25	4.791E-23	3.962E-21	1.411E-19	3.363E-18
U-238+D	∑DSR(j)		1.235E-08	1.233E-08	1.230E-08	1.219E-08	1.188E-08	1.086E-08	8.393E-09	3.415E-09

The DSR includes contributions from associated (half-life ≤ 30 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
Ac-227	1.640E+09	1.699E+09	1.823E+09	2.330E+09	4.700E+09	5.481E+10	6.119E+13	*7.232E+13
Pa-231	4.028E+10	2.280E+10	1.252E+10	5.346E+09	2.661E+09	1.965E+09	2.468E+09	6.148E+09
Pb-210	7.735E+12	4.955E+12	4.921E+12	6.132E+12	1.156E+13	*7.634E+13	*7.634E+13	*7.634E+13
Ra-226	2.800E+06	2.804E+06	2.811E+06	2.838E+06	2.916E+06	3.205E+06	4.197E+06	1.079E+07
Ra-228	2.930E+06	1.360E+06	9.497E+05	1.393E+06	1.458E+07	7.182E+10	*2.726E+14	*2.726E+14
Th-228	6.589E+05	9.465E+05	1.954E+06	2.467E+07	3.459E+10	*8.195E+14	*8.195E+14	*8.195E+14
Th-230	1.292E+10	4.311E+09	1.850E+09	6.195E+08	2.161E+08	6.864E+07	2.605E+07	1.160E+07
Th-232	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05	*1.097E+05
U-234	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	*6.247E+09	3.259E+09
U-235	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06	*2.161E+06
U-238	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05

*At specific activity limit

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

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ac-227	3.200E-01	0.000E+00	1.524E-08	1.640E+09	8.790E-24	*7.232E+13
Pa-231	3.200E-01	96.2 ± 0.2	1.272E-08	1.965E+09	4.066E-09	6.148E+09
Pb-210	1.583E+02	1.772 ± 0.004	5.201E-12	4.807E+12	9.514E-26	*7.634E+13
Ra-226	1.583E+02	0.000E+00	8.928E-06	2.800E+06	2.317E-06	1.079E+07
Ra-228	3.720E+00	3.961 ± 0.008	2.696E-05	9.271E+05	0.000E+00	*2.726E+14
Th-228	3.720E+00	0.000E+00	3.794E-05	6.589E+05	0.000E+00	*8.195E+14
Th-230	9.500E+02	1.000E+03	2.156E-06	1.160E+07	2.156E-06	1.160E+07
Th-232	3.720E+00	1.000E+03	4.780E-05	*1.097E+05	4.780E-05	*1.097E+05
U-234	7.000E+00	1.000E+03	7.670E-09	3.259E+09	7.670E-09	3.259E+09
U-235	3.200E-01	636 ± 1	1.082E-10	*2.161E+06	9.934E-11	*2.161E+06
U-238	7.000E+00	0.000E+00	1.235E-08	*3.361E+05	3.415E-09	*3.361E+05

*At specific activity limit

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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
Ac-227	Ac-227	1.000E+00	4.877E-09	4.709E-09	4.390E-09	3.434E-09	1.702E-09	1.460E-10	1.307E-13	2.813E-24
Ac-227	Pa-231	1.000E+00	7.805E-11	2.304E-10	5.190E-10	1.377E-09	2.890E-09	3.964E-09	3.160E-09	1.268E-09
Ac-227	U-235	1.000E+00	5.519E-16	3.822E-15	1.972E-14	1.622E-13	1.090E-12	6.245E-12	1.817E-11	2.632E-11
Ac-227	∑DOSE(j)		4.955E-09	4.939E-09	4.909E-09	4.811E-09	4.593E-09	4.117E-09	3.178E-09	1.295E-09
Pa-231	Pa-231	1.000E+00	1.206E-10	1.204E-10	1.201E-10	1.190E-10	1.160E-10	1.059E-10	8.172E-11	3.297E-11
Pa-231	U-235	1.000E+00	1.275E-15	3.822E-15	8.895E-15	2.645E-14	7.487E-14	2.255E-13	5.213E-13	7.054E-13
Pa-231	∑DOSE(j)		1.206E-10	1.204E-10	1.201E-10	1.191E-10	1.161E-10	1.061E-10	8.224E-11	3.368E-11
Pb-210	Pb-210	1.000E+00	8.103E-11	7.850E-11	7.368E-11	5.902E-11	3.132E-11	3.407E-12	6.026E-15	1.402E-24
Pb-210	Ra-226	1.000E+00	1.265E-12	3.741E-12	8.454E-12	2.268E-11	4.888E-11	7.029E-11	5.662E-11	2.243E-11
Pb-210	Th-230	1.000E+00	1.099E-15	7.624E-15	3.946E-14	3.278E-13	2.266E-12	1.401E-11	4.774E-11	1.180E-10
Pb-210	U-234	1.000E+00	1.826E-23	2.718E-22	3.121E-21	7.811E-20	1.633E-18	3.673E-17	4.058E-16	3.020E-15
Pb-210	U-238	9.999E-01	1.036E-29	3.192E-28	7.935E-27	5.912E-25	3.673E-23	2.899E-21	1.022E-19	2.460E-18
Pb-210	∑DOSE(j)		8.230E-11	8.225E-11	8.217E-11	8.204E-11	8.246E-11	8.771E-11	1.044E-10	1.404E-10
Po-210	Pb-210	1.000E+00	4.308E-10	7.205E-10	7.307E-10	5.865E-10	3.111E-10	3.380E-11	5.955E-14	1.366E-23
Po-210	Ra-226	1.000E+00	5.071E-12	2.436E-11	7.025E-11	2.118E-10	4.722E-10	6.851E-10	5.502E-10	2.150E-10
Po-210	Th-230	1.000E+00	3.560E-15	3.997E-14	2.859E-13	2.901E-12	2.145E-11	1.356E-10	4.628E-10	1.130E-09
Po-210	U-234	1.000E+00	4.975E-23	1.212E-21	2.016E-20	6.584E-19	1.517E-17	3.534E-16	3.926E-15	2.891E-14
Po-210	U-238	9.999E-01	2.441E-29	1.248E-27	4.640E-26	4.760E-24	3.354E-22	2.773E-20	9.875E-19	2.354E-17
Po-210	∑DOSE(j)		4.358E-10	7.449E-10	8.013E-10	8.012E-10	8.047E-10	8.546E-10	1.013E-09	1.345E-09
Ra-226	Ra-226	1.000E+00	1.414E-03	1.412E-03	1.408E-03	1.395E-03	1.358E-03	1.235E-03	9.432E-04	3.669E-04
Ra-226	Th-230	1.000E+00	1.838E-06	5.510E-06	1.284E-05	3.834E-05	1.099E-04	3.460E-04	9.118E-04	2.048E-03
Ra-226	U-234	1.000E+00	4.062E-14	2.841E-13	1.499E-12	1.333E-11	1.105E-10	1.129E-09	8.507E-09	5.369E-08
Ra-226	U-238	9.999E-01	2.878E-20	4.314E-19	5.024E-18	1.323E-16	3.174E-15	1.060E-13	2.337E-12	4.492E-11
Ra-226	∑DOSE(j)		1.416E-03	1.417E-03	1.421E-03	1.433E-03	1.468E-03	1.581E-03	1.855E-03	2.415E-03
Ra-228	Ra-228	1.000E+00	5.723E-06	5.068E-06	3.975E-06	1.699E-06	1.497E-07	3.039E-11	8.567E-22	0.000E+00
Ra-228	Th-232	1.000E+00	3.519E-07	1.002E-06	2.087E-06	4.347E-06	5.888E-06	6.052E-06	6.096E-06	6.253E-06
Ra-228	∑DOSE(j)		6.075E-06	6.070E-06	6.062E-06	6.045E-06	6.038E-06	6.052E-06	6.096E-06	6.253E-06
Th-228	Ra-228	1.000E+00	2.602E-05	6.329E-05	9.396E-05	6.508E-05	6.229E-06	1.265E-09	3.559E-20	0.000E+00
Th-228	Th-228	1.000E+00	1.412E-04	9.825E-05	4.761E-05	3.769E-06	2.688E-09	2.604E-20	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	1.088E-06	6.672E-06	2.651E-05	9.868E-05	1.609E-04	1.674E-04	1.683E-04	1.716E-04
Th-228	∑DOSE(j)		1.683E-04	1.682E-04	1.681E-04	1.675E-04	1.671E-04	1.674E-04	1.683E-04	1.716E-04
Th-230	Th-230	1.000E+00	4.998E-14	4.998E-14	4.999E-14	5.001E-14	5.009E-14	5.035E-14	5.110E-14	5.382E-14
Th-230	U-234	1.000E+00	1.657E-21	4.968E-21	1.158E-20	3.459E-20	9.931E-20	3.143E-19	8.407E-19	1.982E-18
Th-230	U-238	9.999E-01	1.565E-27	1.095E-26	5.778E-26	5.140E-25	4.265E-24	4.379E-23	3.345E-22	2.211E-21
Th-230	∑DOSE(j)		4.998E-14	4.998E-14	4.999E-14	5.001E-14	5.009E-14	5.035E-14	5.110E-14	5.382E-14
Th-232	Th-232	1.000E+00	3.414E-18	3.414E-18	3.415E-18	3.417E-18	3.424E-18	3.446E-18	3.510E-18	3.745E-18
U-234	U-234	1.000E+00	3.585E-17	3.580E-17	3.571E-17	3.540E-17	3.453E-17	3.166E-17	2.469E-17	1.034E-17
U-234	U-238	9.999E-01	5.080E-23	1.522E-22	3.543E-22	1.054E-21	2.986E-21	9.020E-21	2.104E-20	2.937E-20
U-234	∑DOSE(j)		3.585E-17	3.580E-17	3.571E-17	3.540E-17	3.454E-17	3.166E-17	2.471E-17	1.037E-17
U-235	U-235	1.000E+00	1.688E-11	1.686E-11	1.682E-11	1.667E-11	1.625E-11	1.487E-11	1.155E-11	4.761E-12

RESRAD, Version 6.5 T½ Limit = 30 days 08/12/2013 13:18 Page 26
Summary : SU18 Subsurface Strata In Situ
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 SUBSURFACE IN SITU.RAD

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
U-238	U-238	5.400E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	U-238	9.999E-01	8.645E-08	8.634E-08	8.611E-08	8.534E-08	8.317E-08	7.600E-08	5.875E-08	2.386E-08
U-238	∑DOSE(j)		8.645E-08	8.634E-08	8.611E-08	8.534E-08	8.317E-08	7.600E-08	5.875E-08	2.386E-08

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

RESRAD, Version 6.5 T½ Limit = 30 days 08/12/2013 13:18 Page 27
Summary : SU18 Subsurface Strata In Situ
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 SUBSURFACE IN SITU.RAD

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
Ac-227	Ac-227	1.000E+00	3.200E-01	3.090E-01	2.880E-01	2.252E-01	1.115E-01	9.535E-03	8.465E-06	1.765E-16
Ac-227	Pa-231	1.000E+00	0.000E+00	1.000E-02	2.895E-02	8.529E-02	1.845E-01	2.545E-01	2.012E-01	7.826E-02
Ac-227	U-235	1.000E+00	0.000E+00	1.064E-07	9.342E-07	9.531E-06	6.829E-05	3.984E-04	1.154E-03	1.623E-03
Ac-227	∑S(j):		3.200E-01	3.190E-01	3.169E-01	3.105E-01	2.961E-01	2.644E-01	2.023E-01	7.988E-02
Pa-231	Pa-231	1.000E+00	3.200E-01	3.196E-01	3.187E-01	3.157E-01	3.073E-01	2.796E-01	2.135E-01	8.305E-02
Pa-231	U-235	1.000E+00	0.000E+00	6.762E-06	2.023E-05	6.681E-05	1.951E-04	5.923E-04	1.360E-03	1.776E-03
Pa-231	∑S(j):		3.200E-01	3.196E-01	3.187E-01	3.158E-01	3.075E-01	2.802E-01	2.149E-01	8.482E-02
Pb-210	Pb-210	1.000E+00	1.583E+02	1.534E+02	1.440E+02	1.153E+02	6.109E+01	6.619E+00	1.157E-02	2.580E-12
Pb-210	Ra-226	1.000E+00	0.000E+00	4.841E+00	1.405E+01	4.186E+01	9.296E+01	1.344E+02	1.070E+02	4.066E+01
Pb-210	Th-230	1.000E+00	0.000E+00	6.326E-03	5.570E-02	5.742E-01	4.229E+00	2.662E+01	9.005E+01	2.137E+02
Pb-210	U-234	1.000E+00	0.000E+00	1.402E-10	3.721E-09	1.300E-07	2.994E-06	6.939E-05	7.641E-04	5.468E-03
Pb-210	U-238	9.999E-01	0.000E+00	9.951E-17	7.947E-15	9.341E-13	6.620E-11	5.447E-09	1.922E-07	4.453E-06
Pb-210	∑S(j):		1.583E+02	1.582E+02	1.581E+02	1.577E+02	1.583E+02	1.676E+02	1.971E+02	2.544E+02
Po-210	Pb-210	1.000E+00	0.000E+00	1.299E+02	1.453E+02	1.169E+02	6.194E+01	6.711E+00	1.173E-02	2.616E-12
Po-210	Ra-226	1.000E+00	0.000E+00	2.626E+00	1.155E+01	3.977E+01	9.165E+01	1.339E+02	1.067E+02	4.055E+01
Po-210	Th-230	1.000E+00	0.000E+00	2.586E-03	3.915E-02	5.159E-01	4.084E+00	2.634E+01	8.958E+01	2.129E+02
Po-210	U-234	1.000E+00	0.000E+00	4.632E-11	2.296E-09	1.110E-07	2.838E-06	6.824E-05	7.587E-04	5.444E-03
Po-210	U-238	9.999E-01	0.000E+00	2.766E-17	4.377E-15	7.601E-13	6.163E-11	5.326E-09	1.905E-07	4.432E-06
Po-210	∑S(j):		0.000E+00	1.326E+02	1.569E+02	1.572E+02	1.577E+02	1.669E+02	1.963E+02	2.534E+02
Ra-226	Ra-226	1.000E+00	1.583E+02	1.581E+02	1.577E+02	1.562E+02	1.519E+02	1.379E+02	1.046E+02	3.973E+01
Ra-226	Th-230	1.000E+00	0.000E+00	4.113E-01	1.232E+00	4.087E+00	1.209E+01	3.842E+01	1.009E+02	2.216E+02
Ra-226	U-234	1.000E+00	0.000E+00	1.364E-08	1.225E-07	1.353E-06	1.195E-05	1.247E-04	9.399E-04	5.807E-03
Ra-226	U-238	9.999E-01	0.000E+00	1.288E-14	3.472E-13	1.277E-11	3.378E-10	1.166E-08	2.578E-07	4.856E-06
Ra-226	∑S(j):		1.583E+02	1.585E+02	1.589E+02	1.603E+02	1.640E+02	1.763E+02	2.055E+02	2.613E+02
Ra-228	Ra-228	1.000E+00	3.720E+00	3.294E+00	2.584E+00	1.104E+00	9.718E-02	1.968E-05	5.507E-16	0.000E+00
Ra-228	Th-232	1.000E+00	0.000E+00	4.223E-01	1.127E+00	2.596E+00	3.594E+00	3.691E+00	3.690E+00	3.687E+00
Ra-228	∑S(j):		3.720E+00	3.717E+00	3.711E+00	3.700E+00	3.692E+00	3.691E+00	3.690E+00	3.687E+00
Th-228	Ra-228	1.000E+00	0.000E+00	1.061E+00	2.000E+00	1.511E+00	1.461E-01	2.961E-05	8.285E-16	0.000E+00
Th-228	Th-228	1.000E+00	3.720E+00	2.589E+00	1.255E+00	9.932E-02	7.079E-05	6.844E-16	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	6.933E-02	4.620E-01	2.093E+00	3.546E+00	3.691E+00	3.690E+00	3.687E+00
Th-228	∑S(j):		3.720E+00	3.719E+00	3.716E+00	3.703E+00	3.692E+00	3.691E+00	3.690E+00	3.687E+00
Th-230	Th-230	1.000E+00	9.500E+02	9.500E+02	9.500E+02	9.499E+02	9.497E+02	9.490E+02	9.471E+02	9.404E+02
Th-230	U-234	1.000E+00	0.000E+00	6.297E-05	1.887E-04	6.259E-04	1.853E-03	5.897E-03	1.556E-02	3.463E-02
Th-230	U-238	9.999E-01	0.000E+00	8.924E-11	8.017E-10	8.852E-09	7.827E-08	8.175E-07	6.183E-06	3.861E-05
Th-230	∑S(j):		9.500E+02	9.500E+02	9.500E+02	9.499E+02	9.497E+02	9.490E+02	9.471E+02	9.405E+02
Th-232	Th-232	1.000E+00	3.720E+00	3.720E+00	3.720E+00	3.720E+00	3.720E+00	3.720E+00	3.719E+00	3.716E+00
U-234	U-234	1.000E+00	7.000E+00	6.991E+00	6.972E+00	6.907E+00	6.726E+00	6.128E+00	4.696E+00	1.850E+00
U-234	U-238	9.999E-01	0.000E+00	1.982E-05	5.929E-05	1.958E-04	5.720E-04	1.737E-03	3.995E-03	5.253E-03
U-234	∑S(j):		7.000E+00	6.991E+00	6.972E+00	6.908E+00	6.727E+00	6.130E+00	4.700E+00	1.856E+00
U-235	U-235	1.000E+00	3.200E-01	3.196E-01	3.187E-01	3.158E-01	3.075E-01	2.802E-01	2.149E-01	8.482E-02

RESRAD, Version 6.5 T½ Limit = 30 days 08/12/2013 13:18 Page 28
Summary : SU18 Subsurface Strata In Situ
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 SUBSURFACE IN SITU.RAD

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
U-238	U-238	5.400E-05	3.780E-04	3.775E-04	3.765E-04	3.730E-04	3.632E-04	3.310E-04	2.538E-04	1.002E-04
U-238	U-238	9.999E-01	7.000E+00	6.990E+00	6.972E+00	6.907E+00	6.726E+00	6.129E+00	4.700E+00	1.855E+00
U-238	∑S(j):		7.000E+00	6.991E+00	6.972E+00	6.908E+00	6.727E+00	6.130E+00	4.700E+00	1.856E+00

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

RESCALC.EXE execution time = 1.36 seconds

APPENDIX B

RESRAD v6.5 Summary Report for Excavation Scenario Model

RESRAD, Version 6.5 T½ Limit = 30 days 08/12/2013 13:46 Page 1
Summary : SU18 Excavation
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 EXCAVATION.RAD

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Part I: Mixture Sums and Single Radionuclide Guidelines

RESRAD, Version 6.5 T½ Limit = 30 days 08/12/2013 13:46 Page 2
Summary : SU18 Excavation
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 EXCAVATION.RAD

Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: FGR 12)	4.951E-04	4.951E-04	DCF1(1)
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(2)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(3)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(4)
A-1	Bi-211 (Source: FGR 12)	2.559E-01	2.559E-01	DCF1(5)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(6)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(7)
A-1	Fr-223 (Source: FGR 12)	1.980E-01	1.980E-01	DCF1(8)
A-1	Pa-231 (Source: FGR 12)	1.906E-01	1.906E-01	DCF1(9)
A-1	Pa-234 (Source: FGR 12)	1.155E+01	1.155E+01	DCF1(10)
A-1	Pa-234m (Source: FGR 12)	8.967E-02	8.967E-02	DCF1(11)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(12)
A-1	Pb-211 (Source: FGR 12)	3.064E-01	3.064E-01	DCF1(13)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(14)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(15)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(16)
A-1	Po-211 (Source: FGR 12)	4.764E-02	4.764E-02	DCF1(17)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(18)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(19)
A-1	Po-215 (Source: FGR 12)	1.016E-03	1.016E-03	DCF1(20)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(21)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(22)
A-1	Ra-223 (Source: FGR 12)	6.034E-01	6.034E-01	DCF1(23)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(24)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(25)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(26)
A-1	Rn-219 (Source: FGR 12)	3.083E-01	3.083E-01	DCF1(27)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(28)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(29)
A-1	Th-227 (Source: FGR 12)	5.212E-01	5.212E-01	DCF1(30)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(31)
A-1	Th-230 (Source: FGR 12)	1.209E-03	1.209E-03	DCF1(32)
A-1	Th-231 (Source: FGR 12)	3.643E-02	3.643E-02	DCF1(33)
A-1	Th-232 (Source: FGR 12)	5.212E-04	5.212E-04	DCF1(34)
A-1	Th-234 (Source: FGR 12)	2.410E-02	2.410E-02	DCF1(35)
A-1	Tl-207 (Source: FGR 12)	1.980E-02	1.980E-02	DCF1(36)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(37)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(38)
A-1	U-234 (Source: FGR 12)	4.017E-04	4.017E-04	DCF1(39)
A-1	U-235 (Source: FGR 12)	7.211E-01	7.211E-01	DCF1(40)
A-1	U-238 (Source: FGR 12)	1.031E-04	1.031E-04	DCF1(41)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.724E+00	6.700E+00	DCF2(1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(2)
B-1	Pb-210+D	1.380E-02	1.360E-02	DCF2(3)
B-1	Po-210	9.400E-03	9.400E-03	DCF2(4)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(5)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(6)

RESRAD, Version 6.5 T½ Limit = 30 days 08/12/2013 13:46 Page 3
Summary : SU18 Excavation
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 EXCAVATION.RAD

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(7)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(8)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(9)
B-1	U-234	1.320E-01	1.320E-01	DCF2(10)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(11)
B-1	U-238	1.180E-01	1.180E-01	DCF2(12)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(13)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.410E-02	DCF3(1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(2)
D-1	Pb-210+D	5.376E-03	5.370E-03	DCF3(3)
D-1	Po-210	1.900E-03	1.900E-03	DCF3(4)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(5)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(6)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(7)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(8)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(9)
D-1	U-234	2.830E-04	2.830E-04	DCF3(10)
D-1	U-235+D	2.673E-04	2.660E-04	DCF3(11)
D-1	U-238	2.550E-04	2.550E-04	DCF3(12)
D-1	U-238+D	2.687E-04	2.550E-04	DCF3(13)
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	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Po-210 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(4,2)
D-34	Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.400E-04	3.400E-04	RTF(4,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(5,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(5,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(6,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(6,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(6,3)
D-34				

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(7,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(8,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(9,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(10,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(10,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(10,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(11,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(11,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(11,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(13,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(13,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(13,3)
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	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Po-210 , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Po-210 , crustacea and mollusks	2.000E+04	2.000E+04	BIOFAC(4,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(5,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(5,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(6,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(6,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(7,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(7,2)
D-5				

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Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(8,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(8,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(9,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(9,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(10,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(10,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(11,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(11,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(12,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(13,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(13,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	8.800E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.000E-01	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	not used	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): Ac-227	3.200E-01	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	3.200E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	1.583E+02	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.583E+02	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Ra-228	3.720E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): Th-228	3.720E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Th-230	9.500E+02	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Th-232	3.720E+00	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): U-234	7.000E+00	0.000E+00	---	S1(10)
R012	Initial principal radionuclide (pCi/g): U-235	3.200E-01	0.000E+00	---	S1(11)
R012	Initial principal radionuclide (pCi/g): U-238	7.000E+00	0.000E+00	---	S1(12)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(10)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(11)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(12)
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)	4.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	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
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 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	4.398E-02	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.770E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.870E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.266E-02	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.266E-02	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.481E-05	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.481E-05	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.481E-05	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.770E-02	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.770E-02	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.770E-02	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R016	Distribution coefficients for daughter Po-210				
R016	Contaminated zone (cm**3/g)	1.000E+01	1.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.706E-02	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R017	Inhalation rate (m**3/yr)	1.227E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	3.500E-05	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	6.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	1.700E-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)	5.600E-04	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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)	3.650E+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	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
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

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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
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	1	---	---	KYMAX

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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	active

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Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	8.80 square meters	Ac-227	3.200E-01
Thickness:	0.30 meters	Pa-231	3.200E-01
Cover Depth:	0.00 meters	Pb-210	1.583E+02
		Ra-226	1.583E+02
		Ra-228	3.720E+00
		Th-228	3.720E+00
		Th-230	9.500E+02
		Th-232	3.720E+00
		U-234	7.000E+00
		U-235	3.200E-01
		U-238	7.000E+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):	4.019E-01	3.975E-01	3.890E-01	3.608E-01	2.941E-01	1.594E-01	0.000E+00	0.000E+00
M(t):	1.607E-02	1.590E-02	1.556E-02	1.443E-02	1.176E-02	6.378E-03	0.000E+00	0.000E+00

Maximum TDOSE(t): 4.019E-01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.494E-04	0.0004	2.136E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.202E-07	0.0000
Pa-231	1.687E-05	0.0000	4.527E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.179E-07	0.0000
Pb-210	2.387E-04	0.0006	3.008E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.783E-04	0.0004
Ra-226	3.838E-01	0.9550	1.438E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.005E-05	0.0001
Ra-228	5.851E-03	0.0146	2.222E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.868E-07	0.0000
Th-228	6.707E-03	0.0167	1.111E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.539E-07	0.0000
Th-230	7.979E-04	0.0020	3.193E-03	0.0079	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.369E-05	0.0002
Th-232	3.367E-04	0.0008	6.299E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.886E-06	0.0000
U-234	7.492E-07	0.0000	9.441E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.532E-07	0.0000
U-235	6.000E-05	0.0001	4.022E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.526E-08	0.0000
U-238	2.429E-04	0.0006	8.443E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.354E-07	0.0000
Total	3.982E-01	0.9909	3.358E-03	0.0084	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.176E-04	0.0008

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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.716E-04	0.0004
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.202E-05	0.0001
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	4.472E-04	0.0011
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.838E-01	0.9552
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.855E-03	0.0146
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	6.719E-03	0.0167
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.084E-03	0.0102
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	4.015E-04	0.0010
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	1.054E-05	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.042E-05	0.0002
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	2.517E-04	0.0006
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.019E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.385E-04	0.0003	1.980E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.603E-07	0.0000
Pa-231	2.111E-05	0.0001	5.097E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.320E-07	0.0000
Pb-210	2.300E-04	0.0006	3.432E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.905E-04	0.0005
Ra-226	3.785E-01	0.9523	1.521E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.531E-05	0.0001
Ra-228	7.018E-03	0.0177	5.093E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.924E-07	0.0000
Th-228	4.665E-03	0.0117	7.733E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.159E-07	0.0000
Th-230	1.788E-03	0.0045	3.193E-03	0.0080	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.380E-05	0.0002
Th-232	1.121E-03	0.0028	6.344E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.006E-06	0.0000
U-234	7.361E-07	0.0000	9.276E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.470E-07	0.0000
U-235	5.893E-05	0.0001	3.953E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.500E-08	0.0000
U-238	2.386E-04	0.0006	8.294E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.295E-07	0.0000
Total	3.938E-01	0.9907	3.361E-03	0.0085	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.350E-04	0.0008

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.590E-04	0.0004
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.684E-05	0.0001
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	4.548E-04	0.0011
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.786E-01	0.9524
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	7.024E-03	0.0177
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	4.673E-03	0.0118
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	5.074E-03	0.0128
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	1.186E-03	0.0030
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	1.036E-05	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.934E-05	0.0001
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	2.472E-04	0.0006
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.975E-01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Ac-227	1.189E-04	0.0003	1.701E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.534E-07	0.0000
Pa-231	2.839E-05	0.0001	6.068E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.541E-07	0.0000
Pb-210	2.124E-04	0.0005	3.257E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.790E-04	0.0005
Ra-226	3.683E-01	0.9469	1.688E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.552E-05	0.0001
Ra-228	7.443E-03	0.0191	7.346E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.010E-07	0.0000
Th-228	2.256E-03	0.0058	3.746E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.531E-07	0.0000
Th-230	3.725E-03	0.0096	3.192E-03	0.0082	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.406E-05	0.0002
Th-232	2.898E-03	0.0075	6.501E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.236E-06	0.0000
U-234	7.107E-07	0.0000	8.954E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.349E-07	0.0000
U-235	5.686E-05	0.0001	3.818E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.451E-08	0.0000
U-238	2.301E-04	0.0006	8.006E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.180E-07	0.0000
Total	3.853E-01	0.9905	3.358E-03	0.0086	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.338E-04	0.0009

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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.366E-04	0.0004
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.511E-05	0.0001
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	4.239E-04	0.0011
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.684E-01	0.9471
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	7.451E-03	0.0192
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	2.260E-03	0.0058
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	7.012E-03	0.0180
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.966E-03	0.0076
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	9.999E-06	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.726E-05	0.0001
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	2.384E-04	0.0006
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.890E-01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+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.
Ac-227	6.980E-05	0.0002	1.001E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.843E-07	0.0000
Pa-231	4.422E-05	0.0001	8.112E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.834E-07	0.0000
Pb-210	1.604E-04	0.0004	2.464E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.353E-04	0.0004
Ra-226	3.345E-01	0.9271	2.130E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.306E-05	0.0002
Ra-228	4.030E-03	0.0112	4.754E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.307E-07	0.0000
Th-228	1.776E-04	0.0005	2.966E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.212E-08	0.0000
Th-230	1.008E-02	0.0279	3.192E-03	0.0088	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.532E-05	0.0003
Th-232	7.807E-03	0.0216	7.047E-05	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.788E-06	0.0000
U-234	6.307E-07	0.0000	7.911E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.959E-07	0.0000
U-235	5.017E-05	0.0001	3.383E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.291E-08	0.0000
U-238	2.027E-04	0.0006	7.073E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.810E-07	0.0000
Total	3.571E-01	0.9898	3.347E-03	0.0093	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.186E-04	0.0009

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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.019E-05	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.302E-05	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.204E-04	0.0009
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.346E-01	0.9274
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	4.035E-03	0.0112
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	1.779E-04	0.0005
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	1.337E-02	0.0371
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	7.880E-03	0.0218
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.838E-06	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.053E-05	0.0001
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	2.100E-04	0.0006
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.608E-01	1.0000

*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Ac-227	1.523E-05	0.0001	2.197E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.436E-08	0.0000
Pa-231	4.915E-05	0.0002	8.334E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.810E-07	0.0000
Pb-210	7.191E-05	0.0002	1.108E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.087E-05	0.0002
Ra-226	2.537E-01	0.8627	2.551E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.140E-04	0.0004
Ra-228	2.951E-04	0.0010	3.635E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.132E-08	0.0000
Th-228	1.243E-07	0.0000	2.113E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.633E-12	0.0000
Th-230	2.500E-02	0.0850	3.192E-03	0.0109	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.006E-04	0.0003
Th-232	1.116E-02	0.0379	7.469E-05	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.160E-06	0.0000
U-234	4.625E-07	0.0000	5.556E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.078E-07	0.0000
U-235	3.509E-05	0.0001	2.405E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.291E-09	0.0000
U-238	1.409E-04	0.0005	4.964E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.972E-07	0.0000
Total	2.905E-01	0.9877	3.325E-03	0.0113	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.798E-04	0.0010

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.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.751E-05	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.806E-05	0.0002
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	1.439E-04	0.0005
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	2.538E-01	0.8632
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	2.955E-04	0.0010
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	1.245E-07	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.829E-02	0.0962
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	1.124E-02	0.0382
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.226E-06	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.534E-05	0.0001
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	1.460E-04	0.0005
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	2.941E-01	1.0000

*Sum of all water independent and dependent pathways.

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File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 EXCAVATION.RAD

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	7.296E-08	0.0000	1.089E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.181E-10	0.0000
Pa-231	1.603E-05	0.0001	2.752E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.811E-07	0.0000
Pb-210	4.320E-06	0.0000	6.761E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.714E-06	0.0000
Ra-226	9.417E-02	0.5906	1.455E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.947E-05	0.0004
Ra-228	2.425E-08	0.0000	3.246E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.795E-12	0.0000
Th-228	1.098E-18	0.0000	2.041E-21	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.338E-23	0.0000
Th-230	5.120E-02	0.3211	3.190E-03	0.0200	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.181E-04	0.0007
Th-232	1.053E-02	0.0660	7.494E-05	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.185E-06	0.0000
U-234	2.447E-07	0.0000	1.617E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.047E-08	0.0000
U-235	9.968E-06	0.0001	7.361E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.955E-09	0.0000
U-238	3.886E-05	0.0002	1.438E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.712E-08	0.0000
Total	1.560E-01	0.9782	3.287E-03	0.0206	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.948E-04	0.0012

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.427E-08	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.897E-05	0.0001
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	8.710E-06	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	9.425E-02	0.5911
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	2.428E-08	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	1.100E-18	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.451E-02	0.3419
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	1.061E-02	0.0665
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	1.922E-06	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.004E-05	0.0001
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.035E-05	0.0003
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	1.594E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

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

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

Water Dependent Pathways

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

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

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

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

Water Dependent Pathways

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

*Sum of all water independent and dependent pathways.

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File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 EXCAVATION.RAD

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
Ac-227+D	Ac-227+D	1.000E+00	5.362E-04	4.969E-04	4.268E-04	2.506E-04	5.471E-05	2.633E-07	0.000E+00	0.000E+00
Pa-231	Pa-231	1.000E+00	6.021E-05	5.914E-05	5.706E-05	5.032E-05	3.512E-05	9.895E-06	0.000E+00	0.000E+00
Pa-231	Ac-227+D	1.000E+00	8.592E-06	2.473E-05	5.267E-05	1.154E-04	1.463E-04	4.937E-05	0.000E+00	0.000E+00
Pa-231	∑DSR(j)		6.880E-05	8.387E-05	1.097E-04	1.657E-04	1.814E-04	5.927E-05	0.000E+00	0.000E+00
Pb-210+D	Pb-210+D	1.000E+00	2.589E-06	2.487E-06	2.296E-06	1.735E-06	7.788E-07	4.710E-08	0.000E+00	0.000E+00
Pb-210+D	Po-210	1.000E+00	2.350E-07	3.848E-07	3.811E-07	2.886E-07	1.298E-07	7.905E-09	0.000E+00	0.000E+00
Pb-210+D	∑DSR(j)		2.824E-06	2.872E-06	2.677E-06	2.023E-06	9.086E-07	5.501E-08	0.000E+00	0.000E+00
Ra-226+D	Ra-226+D	1.000E+00	2.424E-03	2.391E-03	2.326E-03	2.112E-03	1.602E-03	5.944E-04	0.000E+00	0.000E+00
Ra-226+D	Pb-210+D	1.000E+00	4.033E-08	1.182E-07	2.617E-07	6.539E-07	1.143E-06	7.560E-07	0.000E+00	0.000E+00
Ra-226+D	Po-210	1.000E+00	2.772E-09	1.308E-08	3.668E-08	1.025E-07	1.857E-07	1.250E-07	0.000E+00	0.000E+00
Ra-226+D	∑DSR(j)		2.424E-03	2.391E-03	2.326E-03	2.113E-03	1.603E-03	5.952E-04	0.000E+00	0.000E+00
Ra-228+D	Ra-228+D	1.000E+00	1.242E-03	1.087E-03	8.316E-04	3.259E-04	2.241E-05	1.868E-09	0.000E+00	0.000E+00
Ra-228+D	Th-228+D	1.000E+00	3.315E-04	8.014E-04	1.172E-03	7.588E-04	5.703E-05	4.660E-09	0.000E+00	0.000E+00
Ra-228+D	∑DSR(j)		1.574E-03	1.888E-03	2.003E-03	1.085E-03	7.944E-05	6.528E-09	0.000E+00	0.000E+00
Th-228+D	Th-228+D	1.000E+00	1.806E-03	1.256E-03	6.076E-04	4.782E-05	3.346E-08	2.958E-19	0.000E+00	0.000E+00
Th-230	Th-230	1.000E+00	3.773E-06	3.773E-06	3.773E-06	3.772E-06	3.769E-06	3.761E-06	0.000E+00	0.000E+00
Th-230	Ra-226+D	1.000E+00	5.262E-07	1.568E-06	3.608E-06	1.030E-05	2.600E-05	5.357E-05	0.000E+00	0.000E+00
Th-230	Pb-210+D	1.000E+00	5.849E-12	4.033E-11	2.060E-10	1.634E-09	9.923E-09	4.094E-08	0.000E+00	0.000E+00
Th-230	Po-210	1.000E+00	3.256E-13	3.608E-12	2.525E-11	2.429E-10	1.577E-09	6.699E-09	0.000E+00	0.000E+00
Th-230	∑DSR(j)		4.299E-06	5.341E-06	7.381E-06	1.407E-05	2.978E-05	5.738E-05	0.000E+00	0.000E+00
Th-232	Th-232	1.000E+00	1.754E-05	1.754E-05	1.754E-05	1.753E-05	1.753E-05	1.751E-05	0.000E+00	0.000E+00
Th-232	Ra-228+D	1.000E+00	7.653E-05	2.166E-04	4.461E-04	8.986E-04	1.157E-03	1.099E-03	0.000E+00	0.000E+00
Th-232	Th-228+D	1.000E+00	1.387E-05	8.475E-05	3.336E-04	1.202E-03	1.846E-03	1.734E-03	0.000E+00	0.000E+00
Th-232	∑DSR(j)		1.079E-04	3.189E-04	7.972E-04	2.118E-03	3.020E-03	2.851E-03	0.000E+00	0.000E+00
U-234	U-234	1.000E+00	1.506E-06	1.480E-06	1.428E-06	1.262E-06	8.854E-07	2.563E-07	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00	1.688E-11	5.025E-11	1.152E-10	3.253E-10	7.999E-10	1.591E-09	0.000E+00	0.000E+00
U-234	Ra-226+D	1.000E+00	1.573E-12	1.091E-11	5.647E-11	4.684E-10	3.187E-09	1.673E-08	0.000E+00	0.000E+00
U-234	Pb-210+D	1.000E+00	1.315E-17	1.943E-16	2.191E-15	5.146E-14	8.970E-13	1.098E-11	0.000E+00	0.000E+00
U-234	Po-210	1.000E+00	6.174E-19	1.483E-17	2.404E-16	7.309E-15	1.402E-13	1.789E-12	0.000E+00	0.000E+00
U-234	∑DSR(j)		1.506E-06	1.480E-06	1.428E-06	1.263E-06	8.894E-07	2.746E-07	0.000E+00	0.000E+00
U-235+D	U-235+D	1.000E+00	1.888E-04	1.855E-04	1.789E-04	1.579E-04	1.103E-04	3.128E-05	0.000E+00	0.000E+00
U-235+D	Pa-231	1.000E+00	6.351E-10	1.875E-09	4.224E-09	1.118E-08	2.267E-08	2.106E-08	0.000E+00	0.000E+00
U-235+D	Ac-227+D	1.000E+00	6.080E-11	4.123E-10	2.029E-09	1.412E-08	6.049E-08	8.739E-08	0.000E+00	0.000E+00
U-235+D	∑DSR(j)		1.888E-04	1.855E-04	1.789E-04	1.579E-04	1.104E-04	3.139E-05	0.000E+00	0.000E+00
U-238	U-238	5.400E-05	6.929E-11	6.807E-11	6.571E-11	5.805E-11	4.074E-11	1.180E-11	0.000E+00	0.000E+00

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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
U-238+D	U-238+D	9.999E-01	3.596E-05	3.531E-05	3.406E-05	3.000E-05	2.086E-05	5.764E-06	0.000E+00	0.000E+00
U-238+D	U-234	9.999E-01	2.129E-12	6.286E-12	1.417E-11	3.755E-11	7.656E-11	7.302E-11	0.000E+00	0.000E+00
U-238+D	Th-230	9.999E-01	1.591E-17	1.102E-16	5.694E-16	4.695E-15	3.149E-14	1.628E-13	0.000E+00	0.000E+00
U-238+D	Ra-226+D	9.999E-01	1.113E-18	1.651E-17	1.880E-16	4.563E-15	8.667E-14	1.296E-12	0.000E+00	0.000E+00
U-238+D	Pb-210+D	9.999E-01	7.453E-24	2.275E-22	5.542E-21	3.835E-19	1.927E-17	7.348E-16	0.000E+00	0.000E+00
U-238+D	Po-210	9.999E-01	3.029E-25	1.525E-23	5.518E-22	5.214E-20	2.964E-18	1.192E-16	0.000E+00	0.000E+00
U-238+D	∑DSR(j)		3.596E-05	3.531E-05	3.406E-05	3.000E-05	2.086E-05	5.764E-06	0.000E+00	0.000E+00

The DSR includes contributions from associated (half-life ≤ 30 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
Ac-227	4.662E+04	5.031E+04	5.857E+04	9.976E+04	4.569E+05	9.493E+07	*7.232E+13	*7.232E+13
Pa-231	3.634E+05	2.981E+05	2.278E+05	1.509E+05	1.378E+05	4.218E+05	*4.723E+10	*4.723E+10
Pb-210	8.853E+06	8.704E+06	9.338E+06	1.236E+07	2.752E+07	4.545E+08	*7.634E+13	*7.634E+13
Ra-226	1.031E+04	1.046E+04	1.075E+04	1.183E+04	1.560E+04	4.200E+04	*9.885E+11	*9.885E+11
Ra-228	1.589E+04	1.324E+04	1.248E+04	2.305E+04	3.147E+05	3.830E+09	*2.726E+14	*2.726E+14
Th-228	1.384E+04	1.990E+04	4.115E+04	5.228E+05	7.471E+08	*8.195E+14	*8.195E+14	*8.195E+14
Th-230	5.815E+06	4.681E+06	3.387E+06	1.777E+06	8.394E+05	4.357E+05	*2.018E+10	*2.018E+10
Th-232	*1.097E+05	7.840E+04	3.136E+04	1.180E+04	8.277E+03	8.768E+03	*1.097E+05	*1.097E+05
U-234	1.660E+07	1.689E+07	1.750E+07	1.980E+07	2.811E+07	9.104E+07	*6.247E+09	*6.247E+09
U-235	1.324E+05	1.348E+05	1.397E+05	1.583E+05	2.264E+05	7.965E+05	*2.161E+06	*2.161E+06
U-238	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05

*At specific activity limit

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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)
Ac-227	3.200E-01	0.000E+00	5.362E-04	4.662E+04	5.362E-04	4.662E+04
Pa-231	3.200E-01	21.18 ± 0.04	1.891E-04	1.322E+05	6.880E-05	3.634E+05
Pb-210	1.583E+02	0.603 ± 0.001	2.886E-06	8.663E+06	2.824E-06	8.853E+06
Ra-226	1.583E+02	0.000E+00	2.424E-03	1.031E+04	2.424E-03	1.031E+04
Ra-228	3.720E+00	2.436 ± 0.005	2.017E-03	1.239E+04	1.574E-03	1.589E+04
Th-228	3.720E+00	0.000E+00	1.806E-03	1.384E+04	1.806E-03	1.384E+04
Th-230	9.500E+02	143.8 ± 0.3	6.113E-05	4.090E+05	4.299E-06	5.815E+06
Th-232	3.720E+00	39.06 ± 0.08	3.046E-03	8.208E+03	1.079E-04	*1.097E+05
U-234	7.000E+00	0.000E+00	1.506E-06	1.660E+07	1.506E-06	1.660E+07
U-235	3.200E-01	0.000E+00	1.888E-04	1.324E+05	1.888E-04	1.324E+05
U-238	7.000E+00	0.000E+00	3.596E-05	*3.361E+05	3.596E-05	*3.361E+05

*At specific activity limit

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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
Ac-227	Ac-227	1.000E+00	1.716E-04	1.590E-04	1.366E-04	8.019E-05	1.751E-05	8.427E-08	0.000E+00	0.000E+00
Ac-227	Pa-231	1.000E+00	2.749E-06	7.913E-06	1.686E-05	3.691E-05	4.682E-05	1.580E-05	0.000E+00	0.000E+00
Ac-227	U-235	1.000E+00	1.945E-11	1.319E-10	6.492E-10	4.517E-09	1.936E-08	2.796E-08	0.000E+00	0.000E+00
Ac-227	∑DOSE(j)		1.743E-04	1.669E-04	1.534E-04	1.171E-04	6.435E-05	1.591E-05	0.000E+00	0.000E+00
Pa-231	Pa-231	1.000E+00	1.927E-05	1.892E-05	1.826E-05	1.610E-05	1.124E-05	3.166E-06	0.000E+00	0.000E+00
Pa-231	U-235	1.000E+00	2.032E-10	6.000E-10	1.352E-09	3.577E-09	7.255E-09	6.740E-09	0.000E+00	0.000E+00
Pa-231	∑DOSE(j)		1.927E-05	1.893E-05	1.826E-05	1.611E-05	1.125E-05	3.173E-06	0.000E+00	0.000E+00
Pb-210	Pb-210	1.000E+00	4.099E-04	3.939E-04	3.635E-04	2.747E-04	1.233E-04	7.458E-06	0.000E+00	0.000E+00
Pb-210	Ra-226	1.000E+00	6.385E-06	1.871E-05	4.144E-05	1.035E-04	1.810E-04	1.197E-04	0.000E+00	0.000E+00
Pb-210	Th-230	1.000E+00	5.557E-09	3.831E-08	1.957E-07	1.552E-06	9.427E-06	3.889E-05	0.000E+00	0.000E+00
Pb-210	U-234	1.000E+00	9.206E-17	1.360E-15	1.534E-14	3.602E-13	6.279E-12	7.686E-11	0.000E+00	0.000E+00
Pb-210	U-238	9.999E-01	5.217E-23	1.593E-21	3.880E-20	2.684E-18	1.349E-16	5.144E-15	0.000E+00	0.000E+00
Pb-210	∑DOSE(j)		4.163E-04	4.126E-04	4.052E-04	3.798E-04	3.138E-04	1.661E-04	0.000E+00	0.000E+00
Po-210	Pb-210	1.000E+00	3.721E-05	6.093E-05	6.035E-05	4.570E-05	2.055E-05	1.252E-06	0.000E+00	0.000E+00
Po-210	Ra-226	1.000E+00	4.389E-07	2.072E-06	5.808E-06	1.624E-05	2.940E-05	1.979E-05	0.000E+00	0.000E+00
Po-210	Th-230	1.000E+00	3.093E-10	3.427E-09	2.399E-08	2.308E-07	1.498E-06	6.364E-06	0.000E+00	0.000E+00
Po-210	U-234	1.000E+00	4.321E-18	1.038E-16	1.683E-15	5.117E-14	9.816E-13	1.252E-11	0.000E+00	0.000E+00
Po-210	U-238	9.999E-01	2.120E-24	1.068E-22	3.863E-21	3.649E-19	2.075E-17	8.344E-16	0.000E+00	0.000E+00
Po-210	∑DOSE(j)		3.765E-05	6.300E-05	6.618E-05	6.216E-05	5.145E-05	2.740E-05	0.000E+00	0.000E+00
Ra-226	Ra-226	1.000E+00	3.838E-01	3.786E-01	3.683E-01	3.345E-01	2.536E-01	9.411E-02	0.000E+00	0.000E+00
Ra-226	Th-230	1.000E+00	4.998E-04	1.490E-03	3.428E-03	9.783E-03	2.470E-02	5.089E-02	0.000E+00	0.000E+00
Ra-226	U-234	1.000E+00	1.101E-11	7.638E-11	3.953E-10	3.279E-09	2.231E-08	1.171E-07	0.000E+00	0.000E+00
Ra-226	U-238	9.999E-01	7.790E-18	1.156E-16	1.316E-15	3.194E-14	6.067E-13	9.073E-12	0.000E+00	0.000E+00
Ra-226	∑DOSE(j)		3.843E-01	3.801E-01	3.717E-01	3.442E-01	2.783E-01	1.450E-01	0.000E+00	0.000E+00
Ra-228	Ra-228	1.000E+00	4.621E-03	4.043E-03	3.093E-03	1.212E-03	8.335E-05	6.948E-09	0.000E+00	0.000E+00
Ra-228	Th-232	1.000E+00	2.847E-04	8.058E-04	1.659E-03	3.343E-03	4.305E-03	4.089E-03	0.000E+00	0.000E+00
Ra-228	∑DOSE(j)		4.906E-03	4.848E-03	4.753E-03	4.555E-03	4.389E-03	4.089E-03	0.000E+00	0.000E+00
Th-228	Ra-228	1.000E+00	1.233E-03	2.981E-03	4.358E-03	2.823E-03	2.122E-04	1.734E-08	0.000E+00	0.000E+00
Th-228	Th-228	1.000E+00	6.719E-03	4.673E-03	2.260E-03	1.779E-04	1.245E-07	1.100E-18	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	5.161E-05	3.153E-04	1.241E-03	4.473E-03	6.865E-03	6.452E-03	0.000E+00	0.000E+00
Th-228	∑DOSE(j)		8.003E-03	7.969E-03	7.859E-03	7.473E-03	7.078E-03	6.452E-03	0.000E+00	0.000E+00
Th-230	Th-230	1.000E+00	3.584E-03	3.584E-03	3.584E-03	3.583E-03	3.581E-03	3.573E-03	0.000E+00	0.000E+00
Th-230	U-234	1.000E+00	1.182E-10	3.517E-10	8.066E-10	2.277E-09	5.599E-09	1.114E-08	0.000E+00	0.000E+00
Th-230	U-238	9.999E-01	1.113E-16	7.715E-16	3.986E-15	3.287E-14	2.204E-13	1.139E-12	0.000E+00	0.000E+00
Th-230	∑DOSE(j)		3.584E-03	3.584E-03	3.584E-03	3.583E-03	3.581E-03	3.573E-03	0.000E+00	0.000E+00
Th-232	Th-232	1.000E+00	6.524E-05	6.523E-05	6.523E-05	6.523E-05	6.521E-05	6.514E-05	0.000E+00	0.000E+00
U-234	U-234	1.000E+00	1.054E-05	1.036E-05	9.998E-06	8.832E-06	6.198E-06	1.794E-06	0.000E+00	0.000E+00
U-234	U-238	9.999E-01	1.490E-11	4.400E-11	9.916E-11	2.629E-10	5.359E-10	5.112E-10	0.000E+00	0.000E+00
U-234	∑DOSE(j)		1.054E-05	1.036E-05	9.998E-06	8.833E-06	6.199E-06	1.794E-06	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	6.042E-05	5.934E-05	5.726E-05	5.052E-05	3.531E-05	1.001E-05	0.000E+00	0.000E+00

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Summary : SU18 Excavation
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 EXCAVATION.RAD

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
U-238	U-238	5.400E-05	4.850E-10	4.765E-10	4.599E-10	4.063E-10	2.852E-10	8.259E-11	0.000E+00	0.000E+00
U-238	U-238	9.999E-01	2.517E-04	2.472E-04	2.384E-04	2.100E-04	1.460E-04	4.035E-05	0.000E+00	0.000E+00
U-238	∑DOSE(j)		2.517E-04	2.472E-04	2.384E-04	2.100E-04	1.460E-04	4.035E-05	0.000E+00	0.000E+00

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

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Summary : SU18 Excavation
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 EXCAVATION.RAD

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
Ac-227	Ac-227	1.000E+00	3.200E-01	2.966E-01	2.549E-01	1.499E-01	3.291E-02	1.631E-04	4.237E-11	3.787E-34
Ac-227	Pa-231	1.000E+00	0.000E+00	9.723E-03	2.659E-02	6.472E-02	8.501E-02	2.971E-02	8.603E-04	3.518E-09
Ac-227	U-235	1.000E+00	0.000E+00	1.039E-07	8.686E-07	7.506E-06	3.445E-05	5.227E-05	5.163E-06	7.392E-11
Ac-227	∑S(j):		3.200E-01	3.064E-01	2.815E-01	2.147E-01	1.180E-01	2.992E-02	8.655E-04	3.592E-09
Pa-231	Pa-231	1.000E+00	3.200E-01	3.144E-01	3.034E-01	2.680E-01	1.880E-01	5.437E-02	1.570E-03	6.420E-09
Pa-231	U-235	1.000E+00	0.000E+00	6.652E-06	1.926E-05	5.672E-05	1.194E-04	1.152E-04	9.996E-06	1.373E-10
Pa-231	∑S(j):		3.200E-01	3.144E-01	3.034E-01	2.681E-01	1.881E-01	5.449E-02	1.580E-03	6.557E-09
Pb-210	Pb-210	1.000E+00	1.583E+02	1.521E+02	1.405E+02	1.062E+02	4.776E+01	2.914E+00	9.867E-04	7.050E-16
Pb-210	Ra-226	1.000E+00	0.000E+00	4.793E+00	1.364E+01	3.786E+01	6.845E+01	4.610E+01	3.605E+00	3.772E-04
Pb-210	Th-230	1.000E+00	0.000E+00	6.284E-03	5.461E-02	5.377E-01	3.490E+00	1.484E+01	2.362E+01	2.394E+01
Pb-210	U-234	1.000E+00	0.000E+00	1.389E-10	3.622E-09	1.187E-07	2.287E-06	2.920E-05	8.329E-05	8.979E-05
Pb-210	U-238	9.999E-01	0.000E+00	9.847E-17	7.699E-15	8.408E-13	4.833E-11	1.946E-09	1.176E-08	1.440E-08
Pb-210	∑S(j):		1.583E+02	1.569E+02	1.541E+02	1.446E+02	1.197E+02	6.385E+01	2.723E+01	2.394E+01
Po-210	Pb-210	1.000E+00	0.000E+00	1.256E+02	1.364E+02	1.035E+02	4.656E+01	2.841E+00	9.619E-04	6.873E-16
Po-210	Ra-226	1.000E+00	0.000E+00	2.556E+00	1.088E+01	3.470E+01	6.503E+01	4.426E+01	3.465E+00	3.625E-04
Po-210	Th-230	1.000E+00	0.000E+00	2.533E-03	3.737E-02	4.663E-01	3.243E+00	1.410E+01	2.254E+01	2.285E+01
Po-210	U-234	1.000E+00	0.000E+00	4.539E-11	2.184E-09	9.811E-08	2.090E-06	2.764E-05	7.946E-05	8.571E-05
Po-210	U-238	9.999E-01	0.000E+00	2.712E-17	4.158E-15	6.637E-13	4.344E-11	1.833E-09	1.121E-08	1.374E-08
Po-210	∑S(j):		0.000E+00	1.282E+02	1.474E+02	1.387E+02	1.148E+02	6.121E+01	2.601E+01	2.285E+01
Ra-226	Ra-226	1.000E+00	1.583E+02	1.563E+02	1.522E+02	1.389E+02	1.069E+02	4.275E+01	3.116E+00	3.259E-04
Ra-226	Th-230	1.000E+00	0.000E+00	4.089E-01	1.211E+00	3.857E+00	1.021E+01	2.291E+01	3.065E+01	3.075E+01
Ra-226	U-234	1.000E+00	0.000E+00	1.351E-08	1.191E-07	1.233E-06	9.084E-06	5.256E-05	1.100E-04	1.153E-04
Ra-226	U-238	9.999E-01	0.000E+00	1.274E-14	3.358E-13	1.143E-11	2.432E-10	4.056E-09	1.601E-08	1.849E-08
Ra-226	∑S(j):		1.583E+02	1.567E+02	1.535E+02	1.428E+02	1.171E+02	6.566E+01	3.376E+01	3.075E+01
Ra-228	Ra-228	1.000E+00	3.720E+00	3.256E+00	2.495E+00	9.818E-01	6.839E-02	6.101E-06	1.641E-17	0.000E+00
Ra-228	Th-232	1.000E+00	0.000E+00	4.198E-01	1.109E+00	2.478E+00	3.303E+00	3.362E+00	3.352E+00	3.317E+00
Ra-228	∑S(j):		3.720E+00	3.676E+00	3.604E+00	3.460E+00	3.372E+00	3.362E+00	3.352E+00	3.317E+00
Th-228	Ra-228	1.000E+00	0.000E+00	1.054E+00	1.961E+00	1.396E+00	1.080E-01	9.648E-06	2.595E-17	0.000E+00
Th-228	Th-228	1.000E+00	3.720E+00	2.589E+00	1.254E+00	9.930E-02	7.076E-05	6.834E-16	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	6.906E-02	4.566E-01	2.013E+00	3.267E+00	3.362E+00	3.352E+00	3.317E+00
Th-228	∑S(j):		3.720E+00	3.713E+00	3.672E+00	3.508E+00	3.376E+00	3.362E+00	3.352E+00	3.317E+00
Th-230	Th-230	1.000E+00	9.500E+02	9.500E+02	9.499E+02	9.498E+02	9.493E+02	9.477E+02	9.432E+02	9.276E+02
Th-230	U-234	1.000E+00	0.000E+00	6.246E-05	1.841E-04	5.774E-04	1.466E-03	2.949E-03	3.521E-03	3.480E-03
Th-230	U-238	9.999E-01	0.000E+00	8.827E-11	7.759E-10	7.943E-09	5.685E-08	3.008E-07	5.496E-07	5.580E-07
Th-230	∑S(j):		9.500E+02	9.500E+02	9.499E+02	9.498E+02	9.493E+02	9.477E+02	9.432E+02	9.276E+02
Th-232	Th-232	1.000E+00	3.720E+00	3.720E+00	3.720E+00	3.719E+00	3.718E+00	3.714E+00	3.704E+00	3.665E+00
U-234	U-234	1.000E+00	7.000E+00	6.877E+00	6.638E+00	5.864E+00	4.115E+00	1.192E+00	3.453E-02	1.430E-07
U-234	U-238	9.999E-01	0.000E+00	1.950E-05	5.645E-05	1.662E-04	3.500E-04	3.378E-04	2.938E-05	4.060E-10
U-234	∑S(j):		7.000E+00	6.877E+00	6.638E+00	5.864E+00	4.116E+00	1.192E+00	3.456E-02	1.434E-07
U-235	U-235	1.000E+00	3.200E-01	3.144E-01	3.034E-01	2.681E-01	1.881E-01	5.449E-02	1.580E-03	6.557E-09

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Summary : SU18 Excavation
File : C:\RESRAD_FAMILY\RESRAD\USERFILES\SU18 EXCAVATION.RAD

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
U-238	U-238	5.400E-05	3.780E-04	3.714E-04	3.584E-04	3.167E-04	2.222E-04	6.436E-05	1.866E-06	7.746E-12
U-238	U-238	9.999E-01	7.000E+00	6.877E+00	6.638E+00	5.864E+00	4.115E+00	1.192E+00	3.456E-02	1.434E-07
U-238	∑S(j):		7.000E+00	6.877E+00	6.638E+00	5.864E+00	4.116E+00	1.192E+00	3.456E-02	1.434E-07

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

RESCALC.EXE execution time = 1.53 seconds