DOCKET No. 040-08006;

LICENSE No. SUB-986

Kerr-McGee Chemical LLC (KMCLLC)

Technical Center

Reponses to NRC Supplemental RAI

With Regards to Derived

Concentration Guideline Levels

March 6, 2002

KERR-McGEE CHEMICAL LLC
KERR- McGEE CENTER • P.O. BOX 25861 • OKLAHOMA CITY, OKLAHOMA 73125

March 6, 2002

D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle Decommissioning Branch
United States Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

Re: Docket No. 040-08006; License No. SUB-986
Kerr-McGee Chemical LLC (KMCLLC) Technical Center
Responses to NRC Supplemental RAI with Regards to Derived Concentration Guideline Levels

Dear Dr. Spitzberg:

I am writing in response to your comments dated January 7, 2002 regarding the KMCLLC Technical Center Decommissioning Plan (D Plan). The attached responses to comments are provided for your consideration and application toward approval of the D Plan. We have not included change pages with this submittal, but will provide these pages once all agency comments are addressed.

Thank you for your assistance with these issues. Please feel free to contact me at (405) 270-2665 if you have any additional questions or concerns.

Sincerely yours,

Russell H. Jones
Project Manager

D/NMSS01

Kerr-McGee Corporation L.L.C. (KMCLLC) Technical Center
Responses to NRC Region IV Supplementary Request for Additional Information

NRC Comment #1:
Use of ICRP 72 dose factors for ingestion along with Federal Guidance Report 11/ICRP 30 dose factors for inhalation. The licensee should further justify the use of these factors, or accept the default values used in current versions of RESRAD and RESRAD-BUILD.

KMCLLC Response:
Kerr-McGee had initially modified only those dose conversion factors in the relevant pathways so that we would be changing as few default parameters as possible. To remedy the NRC's concern, we will use solely the dose conversion factors from ICRP 72. The ICRP 72 dose factors are scientifically recognized as incorporating more recent knowledge of physiology and transport of radionuclides throughout the body. Accordingly, we have attached new submittals of Appendices B, C, and D, incorporating ICPR 72 dose factor guidance. The revised DCGLs resulting from this change will be incorporated into the main text of the D Plan upon acceptance by the NRC.

NRC Comment #2:
Use of an air turnover rate of 10/hr for indoor DCGLs.

KMCLLC Response:
The air turnover rate of 10 per hour submitted in Appendix D of the D Plan is based upon the turnover rate for the building as currently used. The NRC questioned whether the building might be used at some future time in a manner that would employ a lower turnover rate. While it is possible that the building may be used in a different manner in the future, the current use as a laboratory/research facility will remain for the foreseeable future. It is unlikely that the air turnover rate would change unless substantial renovation work is performed to alter both the structure and the installed ventilation systems. In addition, the air exchange rate of 10 per hour is consistent with data presented in NUREG-6697 which shows that certain commercial buildings had measured air exchange rates exceeding 40 per hour (Pandian, et. al., 1993).

While Kerr-McGee believes that the exchange rate of 10 per hour is appropriate, guidance in Appendix C of NUREG-6697 suggests a rate of 1.52 per hour. This is the suggested mean for commercial buildings based upon data from a study by Turk et al., 1987. The data were gathered from 38 commercial buildings studied in the Pacific Northwest during all seasons of the year. The ranges reported are as follows:

Exchange rate (per hour)	# of bldgs
0-0.5	3
0.5-1	10
1-1.5	9
1.5-2	8
2-2.5	6
2.5-3	2
3-3.5	0
3.5-4	1
4-4.5	1

To further improve the RESRAD-BUILD model, a study was performed to determine a removal fraction that was representative of the Kerr-McGee Technical Center laboratories undergoing decommissioning. Characterization data were reviewed to determine where information existed regarding (fixed plus removable) beta measurements as well as beta smear measurements. The data were further reduced by selecting only those data sets that had a fixed plus removable beta reading of 500 dpm/100 cm^2 or higher. The 500 dpm/100 cm^2 threshold was selected to allow sufficient radioactivity so that changes would be reflective of the actual activity of the materials rather than changes due to background or other fluctuations. This data set was then used to calculate a removal fraction that would be representative. The data presented in the attached Table 1 show that the removal fraction calculated for the KMCLLC Technical Center is 0.007 or 0.7% as opposed to the default value of 0.1.

A revised Appendix D incorporating ICRP 72 dose factors (as described in the response to NRC Comment #1), an air exchange rate of 1.52 per hour, and a removal fraction of 0.7% is provided in Appendix D, and replaces the previous version submitted with the D Plan.

NRC Comment #3:
The licensee should include ALARA analysis for all pathways. An acceptable approach for conducting an ALARA analysis is provided in Appendix D of NUREG-1727, "NMSS Decommissioning Standard Review Plan." As noted in Appendix D, "Information submitted should include: (1) a cost-benefit analyses (or qualitative arguments) for the preferred option of removing residual radioactivity to a level that meets or exceeds the applicable limit, and (2) a description of the licensee's preferred method for showing compliance with the ALARA requirement at the time of decommissioning."

KMCLLC Response:
An evaluation was performed to determine the impact of performing additional remediation beyond that necessary to achieve compliance with the proposed DCGLs for soil and building surfaces. The evaluation for soils demonstrated that there are approximately 56,000 m^2 of affected soils survey units. In performing the ALARA evaluation, an assumption was made that any soil areas exceeding the DCGL have been

remediated to an average level of one Fractional Maximum Permissible Concentration (FMPC). The FMPC is calculated in accordance with the unity rule as follows:

$$FMPC = (activity_{U\text{-}total})/DCGL_{U\text{-}total} + (activity_{Ra\text{-}226})/DCGL_{Ra\text{-}226} + (activity_{Th\text{-}232+progeny})/DCGL_{Th\text{-}232+progeny}$$

The overall net fractional maximum permissible concentration (DCGL) for all affected soil survey units was calculated to be negative 0.03 (–0.03), indicating that the net average residual soil radioactivity is essentially equivalent to background. As shown in Table 2, the range of net residual soil radioactivity in terms of the FMPC did not exceed 0.09 over any of the survey units. This indicates that the proposed cleanup criteria are ALARA, since the site overall will be left with residual radioactivity concentrations that will be indistinguishable from background. The survey unit with the highest residual radioactivity will not exceed 10% of the 25 mrem per year regulatory criteria, and will also be essentially indistinguishable from the normal natural background radioactivity of approximately 300 mrem/y received by members of the public.

Table 3 presents a similar analysis performed for building characterization data. For building surfaces, net gross beta measurements (gross beta minus ambient beta background and net beta matrix background) were at levels characteristic of background (-83 dpm/100 cm^2). The highest net gross beta for any building survey unit averaged 206 dpm/100 cm^2. This low activity, assuming all residual activity is due to facility operations and is due to most restrictive radioisotope (Th-232 and progeny), represents less than 2 percent of the proposed DCGL (equivalent to less than 0.5 millirem per year). It would be unreasonable to reduce exposure to residual radioactivity below these levels, as these levels are ALARA.

Groundwater in the test pits was last measured below 80 pCi/L by two independent offsite laboratories, using two methods of analysis, prior to backfilling of the test pit area. This concentration is approximately 30 percent of the proposed DCGL for groundwater, and included the contribution from natural background. The groundwater that has been impacted is expected to attenuate naturally until such time as it is indistinguishable from natural background. Several factors point toward the preferred alternative of continuing the option of natural attenuation rather than any sort of active treatment. First, the shallow groundwater in the vicinity of the Technical Center is not currently used as a source of drinking water and low yields from the formation would most likely preclude its future use as a drinking water source. Second, the drinking water aquifer lies several hundred feet below the site. Third, public water supply systems are used in the area and finally, the proposed widening of Highway 74 will result in an easement that would not generally allow for the extraction of water in the area of the test pits. Therefore, the likelihood of a real dose from the small amounts of residual activity in groundwater is remote. Since the reasonableness test is met for the current conditions, it is ALARA and it would be unreasonable to expend funds for the purpose of removing any remaining residual radioactivity in groundwater at the site.

Table 1
Calculation of Removal Fraction

Room	Net Beta (dpm/100 cm^2)	Smear Results (dpm/100 cm^2)	Ratio (%)
C-1	784	3.02	0.385
C-1	686	8.87	1.293
C-1	504	2.83	0.562
C-1a	602	8.87	1.473
C-1a	714	9.07	1.270
C-1a	798	9.07	1.137
C-1a	994	5.85	0.589
C-1a	1176	5.85	0.497
C-1a	728	12.09	1.661
C-1a	784	9.07	1.157
C-13	1080	9.1	0.843
C-33	840	83.53	9.944
E-2	900	2.45	0.272
E-2	744	2.45	0.329
E-10	888	5.69	0.641
E-10	1464	0	0.000
E-10	1344	8.62	0.641
E-10	1440	2.76	0.192
E-14	1164	14.65	1.259
E-14	756	2.93	0.388
E-28	2544	8.82	0.347
E-28	1848	29.1	1.575
F-12	576	5.83	1.012
F-12	540	14.86	2.752
G-1	1386	0	0.000
G-1	1707	0	0.000
G-1	1229	0	0.000
G-1	1485	0	0.000
G-1	1779	0	0.000
G-1	1379	2.26	0.164
G-1	1379	0	0.000
G-1	1879	0	0.000
G-1	1757	0	0.000
G-1	1693	0	0.000
P-2L	1162	9.11	0.784
P-2L	1162	9.11	0.784
P-2L	1190	6.2	0.521
P-2L	1498	3.1	0.207
P-2L	728	2.91	0.400
P-2L	658	2.91	0.442
S-1	2198	6.04	0.275
S-1	1918	6.04	0.315
S-1	1736	0	0.000
S-1	1848	3.02	0.163
S-1	2268	2.83	0.125
S-1	2114	2.83	0.134
S-1	2016	3.02	0.150
S-1	2338	6.04	0.258
S-1	1316	6.04	0.459
S-1	1428	9.07	0.635
S-1	1274	0	0.000
S-1	532	3.02	0.568
MEAN	1288	6.71	0.70
MAX	2544	83.53	9.94
MIN	504	0.00	0.00

Table 2

KMTC Soil Results Report

3/2/02

Uses MEAN BK values as follows: U: 1.8; Th: 2.3; Ra:0.6 for calculation of Net Activities in pCi/g
Uses DCGLw Values as follows: U: 228; Th: 5.3; Ra: 3.5 for calculation of FMPC

	SampleID	*In (pCi/g):*	*Unet*	*Thnet*	*Ranet*	*FMPCnet*
SSU#:	*01*					
	Mean Values (pCi/g)		2.94	-0.37	0.03	-0.05
SSU#:	*02*					
	Mean Values (pCi/g)		0.68	-0.40	0.04	-0.06
SSU#:	*03*					
	Mean Values (pCi/g)		0.88	-0.18	0.15	0.01
SSU#:	*04*					
	Mean Values (pCi/g)		0.31	-0.49	0.04	-0.08
SSU#:	*05*					
	Mean Values (pCi/g)		0.91	-0.26	0.11	-0.01
SSU#:	*06*					
	Mean Values (pCi/g)		0.82	-0.38	0.14	-0.03
SSU#:	*07*					
	Mean Values (pCi/g)		0.66	-0.47	0.14	-0.04
SSU#:	*08*					
	Mean Values (pCi/g)		-0.64	-1.34	-0.19	-0.31
SSU#:	*09*					
	Mean Values (pCi/g)		-0.04	-1.09	-0.10	-0.23
SSU#:	*10*					
	Mean Values (pCi/g)		0.63	-0.42	0.11	-0.05
SSU#:	*11*					
	Mean Values (pCi/g)		0.76	-0.82	0.19	-0.10
SSU#:	*12*					
	Mean Values (pCi/g)		0.84	-0.80	0.10	-0.12

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	SampleID In (pCi/g):	*Unet*	*Thnet*	*Ranet*	*FMPCnet*
SSU#:	*13*				
	Mean Values (pCi/g)	0.77	-0.34	0.09	-0.03
SSU#:	*14*				
	Mean Values (pCi/g)	0.70	-0.17	0.09	0.00
SSU#:	*15*				
	Mean Values (pCi/g)	0.77	-0.81	0.00	-0.15
SSU#:	*16*				
	Mean Values (pCi/g)	1.00	-0.34	0.27	0.02
SSU#:	*17*				
	Mean Values (pCi/g)	1.52	-0.28	0.35	0.05
SSU#:	*18*				
	Mean Values (pCi/g)	1.20	-0.30	0.28	0.03
SSU#:	*19*				
	Mean Values (pCi/g)	0.37	0.04	0.06	0.03
SSU#:	*20*				
	Mean Values (pCi/g)	1.09	-0.25	0.06	-0.03
SSU#:	*21*				
	Mean Values (pCi/g)	0.51	0.06	0.26	0.09
SSU#:	*22*				
	Mean Values (pCi/g)	0.58	0.06	0.26	0.09
SSU#:	*23*				
	Mean Values (pCi/g)	0.81	-0.09	0.23	0.05
SSU#:	*24*				
	Mean Values (pCi/g)	0.71	-0.30	0.11	-0.02
Site Wide Values:					
	Mean Values (pCi/g)	0.88	-0.36	0.11	-0.03
	Std Deviation (pCi/g)	2.37	0.53	0.30	0.15

Table 3

KMTC Surface Beta Report (units of dpm/100 cm^2) 3/2/02

		Gross Beta incl. bkg.	Net Beta
C-1			
	Room Average	241	3
C-13			
	Room Average	228	25
C-13c			
	Room Average	228	21
C-17			
	Room Average	9	-70
C-19			
	Room Average	238	145
C-1a			
	Room Average	417	206
C-21			
	Room Average	-50	-118
C-23			
	Room Average	-57	-200
C-25			
	Room Average	-64	-331
C-27			
	Room Average	89	-132
C-29a			
	Room Average	58	-152
C-29b			
	Room Average	54	-151

Table 3, page 2

C-33			
	Room Average	133	-80
C-39			
	Room Average	106	-110
E-10			
	Room Average	302	133
E-12			
	Room Average	65	-27
E-14			
	Room Average	-16	-132
E-2			
	Room Average	148	-72
E-22			
	Room Average	197	-25
E-28			
	Room Average	255	-9
E-30			
	Room Average	6	-169
E-8			
	Room Average	96	-119
F-12			
	Room Average	227	3
F-2&4			
	Room Average	168	-107

Table 3, page 3

F-4a			
	Room Average	188	-269
G-1			
	Room Average	1,003	196
P-1			
	Room Average	570	-176
P-2L			
	Room Average	542	-65
P-2U			
	Room Average	47	-259
S-1			
	Room Average	1,043	-53
T-1			
	Room Average	-46	-187
	Building Average:	186	-83
	Standard Deviation:	431	348

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TECHNICAL MEMORANDUM

March 6, 2002

Originator: Harry J. Newman, CHP, Technical Director

Subject: Subsurface Uranium DCGLw for KMTC Test Pit Area

Revision: 2

ENDORSEMENT: This document contains the results of research and technical analysis which have been reviewed and approved for publication by the Technical Director, NEXTEP Environmental, Inc.

H Newman by W. C. Rogers — 3-6-02

Harry J. Newman, CHP, Technical Director — Date

Introduction

The unrestricted uranium release limit (DCGLw) for total uranium in subsurface soils in the test pit area is calculated and outlined in this technical memo.

General Method for Calculating Release Limits

The software code RESRAD[1] was used to provide pathway modeling, incorporating guidance on parameter values contained in NRC Policy and Guidance Directive PG-8-08[2] and the "Method for Surveying and Averaging Concentrations of Thorium in Contaminated Subsurface Soil"[3]. Where specific guidance was not provided, and sufficient justification for appropriate alternate parameter values are presented and justified, conservative modeling parameters were selected such as the default values from RESRAD. The computer code DandD[4] is acknowledged as the default code for performing calculations to support release criteria for decommissioning activities by the USNRC. However, the DandD code lacks the ability to model complex soil columns for contaminant transport considerations, thus making the RESRAD code the preferred code for the Technical Center analysis.

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[1] Yu, C., A.J. Zielen, J.J. Cheng, Y.C. Yuan, L.G. Jones, D.J. LePoire, Y.Y. Wang, C.O. Loureiro, E. Gnanapragasam, E. Faillace, A. Wallo III, W.A. Williams, and H. Peterson, *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.61*, ANL/EAD/LD-2, Argonne National laboratory, Argonne, Illinois, 1993.

[2] USNRC. Scenarios for Assessing Potential Doses Associated with Residual Radioactivity. Policy and Guidance Directive PG-8-08.

[3] USNRC. Method for Surveying and Averaging Concentrations of Thorium in contaminated Subsurface Soil. Prepared by NRC staff in connection with the review of the AAR "Site Remediation Plan for the former Brooks and Perkins, Inc. Site". 1997.

[4] USNRC. DandD computer code to support license termination, version 1.0. Sandia National Laboratory.

The following bullets describe key parameters and criteria used for this modeling.

- **ICRP 72 Ingestion and Inhalation Dose Coefficients**[5] – The ingestion and inhalation dose conversion factors (DCFs) from ICRP 56+ documents are summarized in ICRP 72 and applied in this analysis. The ICRP 72 DCFs were developed specifically for calculation of dose to members of the public. ICRP 72 retains the gastrointestinal tract model used in ICRP 30, but also utilizes the updated tissue weighting factors presented in ICRP 60, and revised biokinetic information to reflect increased knowledge in the uptake and retention of various elements in the body. ICRP 72 inhalation factors represent the application of an updated lung uptake and retention model.

- **Subsurface modeling** – The depth criteria for subsurface soil access is usually limited to 3 meters as it is based upon the depth one would expect an individual to dig while building a house with a basement. This 3 meter depth for a basement is itself conservative as recent building code requirements for access and egress from a basement dictate that a seven-foot excavation (excluding footings) depth is reasonable for new construction homes. The residual contamination within the Technical Center Test Pit area is at least 12 feet below the ground surface. Therefore, the material should remain essentially in place at the present location. This reduces the potential for external exposure of individuals and limits the available material that could be inhaled or ingested to waterborne pathways.

- **Saturated hydraulic conductivity** –The bottom of the Test Pit lies within the Renfrow Series, which are naturally well drained with low permeability. These upper zone soils result in a water bearing zone that produces little water and movement. Beneath the Hennessey Group shales lies the Garber-Wellington aquifer. This layer is described as orange-brown to red-brown fine-grained sandstone, irregularly bedded with red-brown shale and some chert and mudstone conglomerate[6]. This highly compacted layer is characterized as a sandy clay with a hydraulic conductivity of less than 100 ft/year[7]. In this analysis, a conservative saturated hydraulic conductivity value of 70 m/y[8] is used to account for potentially greater velocities due to fractured flow.

- **Distribution coefficient (Kd)** – NUREG 5512 default Kd values are used, except for the lower unsaturated soil layer, where the recommended Kd value for clay from Sheppard and Thibault[9] is used.

  In order to aid in more accurately classifying the unsaturated soil layers, a grain size and hydrometer analysis was performed on an upper soil sample representing the top meter of soil and a lower soil sample above the saturated soil column. The results of this analysis are included as Attachment 1. Classifying the soils in a manner similar to Sheppard and Thibault, the upper soil is classified as a clay loam with similar sized fractions of sand, clay and silt. The lower soil of the unsaturated soil column is similarly classified as a silty clay with a silt sized fraction of 58% and a

[5] ICRP, Age-Dependent Doses to Members of the Public From Intake of Radionuclides: Part 5 Compilation of Ingestion and Inhalation Dose Coefficients, ICRP Publication 72, Oxford, Pergamon Press, 1995.
[6] Decommissioning Plan for Kerr-McGee Technical Center, March 2001.
[7] Personal communication with Roy Widman and Jim Crawford, Kerr-McGee, 12/6/00.
[8] Table E.2, RESRAD manual.
[9] Sheppard, M.I. and Thibault, D.H. Default soil solid/liquid partition coefficients, Kds, for four major soil types: a compendium. Health Physics. Vol. 59 (4), pp. 471-482. 1990. This reference is predominately used as the reference for the Kd recommendations from RESRAD.

clay sized fraction of 40%. The limited permeability and significant fraction of silt and clay sized particles in the unsaturated soil column provide an indication of the conservative nature of the use of the default Kds for the upper soil column.

Soil Release Limit for bottom of the Uranium Test Pit

The test pit and associated test cylinder removal area encompass an area of 22.7 m x 2.2 m, or 50 m^2 at a depth below ground surface of approximately 3.66 m. Attachment 2 provides the output of the RESRAD run supporting the dose concentration guide level (DCGLw) for the modeling of the residual contamination at the bottom of the Test Pit area. The results predict a peak dose of 0.1507 mrem/y/pCi/g total uranium (in equilibrium), or an 165 pCi/g limit to meet a 25 mrem/y standard.

Conclusions/Recommendations

The results for the release limit (DCGLw) for the Test Pit bottom are summarized in Table 1.

Table 1
Subsurface Uranium Release Limits for KMTC Test Pit

Application	Dose Conversion Factor (mrem/y/pCi/g)	Concentration for a 25 mrem/y limit (pCi/g)
Uranium Test Pit	0.1507	165

The assumptions used in calculating the dose from a given concentration of uranium are intended to apply to the average member of a critical group (resident farmer). The groundwater pathway is the most significant exposure pathway for this case. Dose in this case is limited by the volume of material that is potentially contaminated at the bottom of the test pit area.

Attachment 2

RESRAD, Version 6.0   T« Limit = 30 days   03/06/2002 11:20
Page   1
Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
File   : TESTPI1A.RAD

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Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
File   : TESTPI1A.RAD

Dose Conversion Factor (and Related) Parame
ter Summary
File: 79450625.LIB

³ ³
Current ³ ³ Parameter
Menu ³ Parameter ³
Value ³ Default ³ Name
ÄÄÄÄÄÅÄÄÅÄ
ÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÅÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
B-1 ³ Dose conversion factors for inhalation, mrem/pCi: ³
³ ³

```
 B-1  ³ Ac-227+D                                                        ³
6.720E+00 ³ 6.720E+00 ³ DCF2( 1)
 B-1  ³ Pa-231                                                          ³
1.280E+00 ³ 1.280E+00 ³ DCF2( 2)
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1.380E-02 ³ 1.380E-02 ³ DCF2( 3)
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8.600E-03 ³ 8.600E-03 ³ DCF2( 5)
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          ³             ³
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          ³             ³
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2.000E-05 ³ 2.000E-05 ³ RTF( 1,2)
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```
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2.000E-05 ³ 2.000E-05 ³ RTF( 1,3)
 D-34 ³                                                              ³
          ³            ³
 D-34 ³ Pa-231   , plant/soil concentration ratio, dimensionless     ³
1.000E-02 ³ 1.000E-02 ³ RTF( 2,1)
 D-34 ³ Pa-231   , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)     ³
5.000E-03 ³ 5.000E-03 ³ RTF( 2,2)
 D-34 ³ Pa-231   , milk/livestock-intake ratio, (pCi/L)/(pCi/d)      ³
5.000E-06 ³ 5.000E-06 ³ RTF( 2,3)
 D-34 ³                                                              ³
          ³            ³
 D-34 ³ Pb-210+D , plant/soil concentration ratio, dimensionless      ³
1.000E-02 ³ 1.000E-02 ³ RTF( 3,1)
 D-34 ³ Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)     ³
8.000E-04 ³ 8.000E-04 ³ RTF( 3,2)
 D-34 ³ Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)      ³
3.000E-04 ³ 3.000E-04 ³ RTF( 3,3)
 D-34 ³                                                              ³
          ³            ³
 D-34 ³ Po-210   , plant/soil concentration ratio, dimensionless      ³
1.000E-03 ³ 1.000E-03 ³ RTF( 4,1)
 D-34 ³ Po-210   , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)     ³
5.000E-03 ³ 5.000E-03 ³ RTF( 4,2)
 D-34 ³ Po-210   , milk/livestock-intake ratio, (pCi/L)/(pCi/d)      ³
3.400E-04 ³ 3.400E-04 ³ RTF( 4,3)
 D-34 ³                                                              ³
          ³            ³
 D-34 ³ Ra-226+D , plant/soil concentration ratio, dimensionless      ³
4.000E-02 ³ 4.000E-02 ³ RTF( 5,1)
 D-34 ³ Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)     ³
1.000E-03 ³ 1.000E-03 ³ RTF( 5,2)
 D-34 ³ Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)      ³
1.000E-03 ³ 1.000E-03 ³ RTF( 5,3)
 D-34 ³                                                              ³
          ³            ³
 D-34 ³ Th-230   , plant/soil concentration ratio, dimensionless      ³
1.000E-03 ³ 1.000E-03 ³ RTF( 6,1)
 D-34 ³ Th-230   , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)     ³
1.000E-04 ³ 1.000E-04 ³ RTF( 6,2)
 D-34 ³ Th-230   , milk/livestock-intake ratio, (pCi/L)/(pCi/d)      ³
5.000E-06 ³ 5.000E-06 ³ RTF( 6,3)
 D-34 ³                                                              ³
          ³            ³
 D-34 ³ U-234    , plant/soil concentration ratio, dimensionless      ³
2.500E-03 ³ 2.500E-03 ³ RTF( 7,1)
 D-34 ³ U-234    , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)     ³
3.400E-04 ³ 3.400E-04 ³ RTF( 7,2)
```

D-34 ³ U-234   , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   ³
6.000E-04 ³ 6.000E-04 ³ RTF(7,3)

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Dose Conversion Factor (and Related) Parameter Su
mmary (continued)
File: 79450625.LIB
³ ³
Current ³ ³ Parameter
Menu ³ Parameter ³
Value ³ Default ³ Name
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D-34 ³ U-235+D   , plant/soil concentration ratio, dimensionless   ³
2.500E-03 ³ 2.500E-03 ³ RTF(8,1)
D-34 ³ U-235+D   , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   ³
3.400E-04 ³ 3.400E-04 ³ RTF(8,2)
D-34 ³ U-235+D   , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   ³
6.000E-04 ³ 6.000E-04 ³ RTF(8,3)
D-34 ³ ³
³ ³
D-34 ³ U-238+D   , plant/soil concentration ratio, dimensionless   ³
2.500E-03 ³ 2.500E-03 ³ RTF(9,1)
D-34 ³ U-238+D   , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   ³
3.400E-04 ³ 3.400E-04 ³ RTF(9,2)
D-34 ³ U-238+D   , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   ³
6.000E-04 ³ 6.000E-04 ³ RTF(9,3)
³ ³
³ ³
D-5 ³ Bioaccumulation factors, fresh water, L/kg: ³
³ ³
D-5 ³ Ac-227+D , fish   ³
1.500E+01 ³ 1.500E+01 ³ BIOFAC(1,1)
D-5 ³ Ac-227+D , crustacea and mollusks   ³
1.000E+03 ³ 1.000E+03 ³ BIOFAC(1,2)
D-5 ³ ³
³ ³
D-5 ³ Pa-231   , fish   ³
1.000E+01 ³ 1.000E+01 ³ BIOFAC(2,1)
D-5 ³ Pa-231   , crustacea and mollusks   ³
1.100E+02 ³ 1.100E+02 ³ BIOFAC(2,2)
D-5 ³ ³

```
             ³             ³
 D-5  ³ Pb-210+D , fish                                                ³
3.000E+02 ³ 3.000E+02 ³ BIOFAC( 3,1)
 D-5  ³ Pb-210+D , crustacea and mollusks                              ³
1.000E+02 ³ 1.000E+02 ³ BIOFAC( 3,2)
 D-5  ³                                                                ³
             ³             ³

 D-5  ³ Po-210   , fish                                                ³
1.000E+02 ³ 1.000E+02 ³ BIOFAC( 4,1)
 D-5  ³ Po-210   , crustacea and mollusks                              ³
2.000E+04 ³ 2.000E+04 ³ BIOFAC( 4,2)
 D-5  ³                                                                ³
             ³             ³

 D-5  ³ Ra-226+D , fish                                                ³
5.000E+01 ³ 5.000E+01 ³ BIOFAC( 5,1)
 D-5  ³ Ra-226+D , crustacea and mollusks                              ³
2.500E+02 ³ 2.500E+02 ³ BIOFAC( 5,2)
 D-5  ³                                                                ³
             ³             ³

 D-5  ³ Th-230   , fish                                                ³
1.000E+02 ³ 1.000E+02 ³ BIOFAC( 6,1)
 D-5  ³ Th-230   , crustacea and mollusks                              ³
5.000E+02 ³ 5.000E+02 ³ BIOFAC( 6,2)
 D-5  ³                                                                ³
             ³             ³

 D-5  ³ U-234    , fish                                                ³
1.000E+01 ³ 1.000E+01 ³ BIOFAC( 7,1)
 D-5  ³ U-234    , crustacea and mollusks                              ³
6.000E+01 ³ 6.000E+01 ³ BIOFAC( 7,2)
 D-5  ³                                                                ³
             ³             ³

 D-5  ³ U-235+D  , fish                                                ³
1.000E+01 ³ 1.000E+01 ³ BIOFAC( 8,1)
 D-5  ³ U-235+D  , crustacea and mollusks                              ³
6.000E+01 ³ 6.000E+01 ³ BIOFAC( 8,2)
 D-5  ³                                                                ³
             ³             ³

 D-5  ³ U-238+D  , fish                                                ³
1.000E+01 ³ 1.000E+01 ³ BIOFAC( 9,1)
 D-5  ³ U-238+D  , crustacea and mollusks                              ³
6.000E+01 ³ 6.000E+01 ³ BIOFAC( 9,2)
 ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
File    : TESTPI1A.RAD

                                                  Site-Specific Paramet
er Summary
    ³                                                      ³   User     ³
         ³            Used by RESRAD         ³  Parameter
Menu ³                     Parameter                         ³   Input    ³
 Default  ³  (If different from user input) ³    Name
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R011 ³ Area of contaminated zone (m**2)                    ³ 1.000E+02 ³
1.000E+04 ³             ---                ³ AREA
R011 ³ Thickness of contaminated zone (m)                  ³ 5.000E-01 ³
2.000E+00 ³             ---                ³ THICK0
R011 ³ Length parallel to aquifer flow (m)                 ³ 1.000E+02 ³
1.000E+02 ³             ---                ³ LCZPAQ
R011 ³ Basic radiation dose limit (mrem/yr)                ³ 2.500E+01 ³
2.500E+01 ³             ---                ³ BRDL
R011 ³ Time since placement of material (yr)               ³ 2.000E+01 ³
0.000E+00 ³             ---                ³ TI
R011 ³ Times for calculations (yr)                         ³ 1.000E+00 ³
1.000E+00 ³             ---                ³ T( 2)
R011 ³ Times for calculations (yr)                         ³ 3.000E+00 ³
3.000E+00 ³             ---                ³ T( 3)
R011 ³ Times for calculations (yr)                         ³ 1.000E+01 ³
1.000E+01 ³             ---                ³ T( 4)
R011 ³ Times for calculations (yr)                         ³ 3.000E+01 ³
3.000E+01 ³             ---                ³ T( 5)
R011 ³ Times for calculations (yr)                         ³ 1.000E+02 ³
1.000E+02 ³             ---                ³ T( 6)
R011 ³ Times for calculations (yr)                         ³ 3.000E+02 ³
3.000E+02 ³             ---                ³ T( 7)
R011 ³ Times for calculations (yr)                         ³ 1.000E+03 ³
1.000E+03 ³             ---                ³ T( 8)
R011 ³ Times for calculations (yr)                         ³ not used  ³
0.000E+00 ³             ---                ³ T( 9)
R011 ³ Times for calculations (yr)                         ³ not used  ³
0.000E+00 ³             ---                ³ T(10)
     ³                                                     ³           ³
          ³                                ³
R012 ³ Initial principal radionuclide (pCi/g):  Ac-227  ³ 2.250E-02 ³
0.000E+00 ³             ---                ³ S1( 1)
R012 ³ Initial principal radionuclide (pCi/g):  Pa-231  ³ 2.250E-02 ³
0.000E+00 ³             ---                ³ S1( 2)
R012 ³ Initial principal radionuclide (pCi/g):  Pb-210  ³ 4.890E-01 ³
0.000E+00 ³             ---                ³ S1( 3)
R012 ³ Initial principal radionuclide (pCi/g):  Po-210  ³ 4.890E-01 ³
```

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0.000E+00 ³                    ---                    ³ S1( 4)
R012 ³ Initial principal radionuclide (pCi/g):  Ra-226  ³ 4.890E-01 ³
0.000E+00 ³                    ---                    ³ S1( 5)
R012 ³ Initial principal radionuclide (pCi/g):  Th-230  ³ 4.890E-01 ³
0.000E+00 ³                    ---                    ³ S1( 6)
R012 ³ Initial principal radionuclide (pCi/g):  U-234   ³ 4.890E-01 ³
0.000E+00 ³                    ---                    ³ S1( 7)
R012 ³ Initial principal radionuclide (pCi/g):  U-235   ³ 2.250E-02 ³
0.000E+00 ³                    ---                    ³ S1( 8)
R012 ³ Initial principal radionuclide (pCi/g):  U-238   ³ 4.890E-01 ³
0.000E+00 ³                    ---                    ³ S1( 9)
R012 ³ Concentration in groundwater   (pCi/L):  Ac-227  ³ not used  ³
0.000E+00 ³                    ---                    ³ W1( 1)
R012 ³ Concentration in groundwater   (pCi/L):  Pa-231  ³ not used  ³
0.000E+00 ³                    ---                    ³ W1( 2)
R012 ³ Concentration in groundwater   (pCi/L):  Pb-210  ³ not used  ³
0.000E+00 ³                    ---                    ³ W1( 3)
R012 ³ Concentration in groundwater   (pCi/L):  Po-210  ³ not used  ³
0.000E+00 ³                    ---                    ³ W1( 4)
R012 ³ Concentration in groundwater   (pCi/L):  Ra-226  ³ not used  ³
0.000E+00 ³                    ---                    ³ W1( 5)
R012 ³ Concentration in groundwater   (pCi/L):  Th-230  ³ not used  ³
0.000E+00 ³                    ---                    ³ W1( 6)
R012 ³ Concentration in groundwater   (pCi/L):  U-234   ³ not used  ³
0.000E+00 ³                    ---                    ³ W1( 7)
R012 ³ Concentration in groundwater   (pCi/L):  U-235   ³ not used  ³
0.000E+00 ³                    ---                    ³ W1( 8)
R012 ³ Concentration in groundwater   (pCi/L):  U-238   ³ not used  ³
0.000E+00 ³                    ---                    ³ W1( 9)
     ³                                                 ³           ³
          ³                                            ³
R013 ³ Cover depth (m)                                  ³ 3.660E+00 ³
0.000E+00 ³                    ---                    ³ COVER0
R013 ³ Density of cover material (g/cm**3)              ³ 1.630E+00 ³
1.500E+00 ³                    ---                    ³ DENSCV
R013 ³ Cover depth erosion rate (m/yr)                  ³ 1.000E-03 ³
1.000E-03 ³                    ---                    ³ VCV
R013 ³ Density of contaminated zone (g/cm**3)           ³ 1.630E+00 ³
1.500E+00 ³                    ---                    ³ DENSCZ
R013 ³ Contaminated zone erosion rate (m/yr)            ³ 1.000E-05 ³
1.000E-03 ³                    ---                    ³ VCZ
R013 ³ Contaminated zone total porosity                 ³ 3.000E-01 ³
4.000E-01 ³                    ---                    ³ TPCZ
R013 ³ Contaminated zone field capacity                 ³ 2.000E-01 ³
2.000E-01 ³                    ---                    ³ FCCZ
R013 ³ Contaminated zone hydraulic conductivity (m/yr)  ³ 1.000E+01 ³
1.000E+01 ³                    ---                    ³ HCCZ
R013 ³ Contaminated zone b parameter                    ³ 5.300E+00 ³
```

```
5.300E+00 ³                    ---              ³ BCZ
R013 ³ Average annual wind speed (m/sec)                     ³ 2.000E+00 ³
2.000E+00 ³                    ---              ³ WIND
R013 ³ Humidity in air (g/m**3)                              ³ not used  ³
8.000E+00 ³                    ---              ³ HUMID
R013 ³ Evapotranspiration coefficient                        ³ 5.000E-01 ³
5.000E-01 ³                    ---              ³ EVAPTR
R013 ³ Precipitation (m/yr)                                  ³ 1.000E+00 ³
1.000E+00 ³                    ---              ³ PRECIP
R013 ³ Irrigation (m/yr)                                     ³ 7.600E-01 ³
2.000E-01 ³                    ---              ³ RI
R013 ³ Irrigation mode                                       ³ overhead  ³
overhead  ³                    ---              ³ IDITCH
R013 ³ Runoff coefficient                                    ³ 2.000E-01 ³
2.000E-01 ³                    ---              ³ RUNOFF


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                                                 Site-Specific Parameter Sum
mary (continued)
     ³                                                       ³   User     ³
          ³            Used by RESRAD         ³   Parameter
Menu ³                         Parameter                      ³   Input    ³
 Default  ³ (If different from user input) ³     Name
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 R013 ³ Watershed area for nearby stream or pond (m**2)  ³ 1.000E+06 ³
 1.000E+06 ³                    ---              ³ WAREA
 R013 ³ Accuracy for water/soil computations                 ³ 1.000E-03 ³
 1.000E-03 ³                    ---              ³ EPS
      ³                                                      ³           ³
           ³                                     ³
 R014 ³ Density of saturated zone (g/cm**3)                  ³ 1.630E+00 ³
 1.500E+00 ³                    ---              ³ DENSAQ
 R014 ³ Saturated zone total porosity                        ³ 3.000E-01 ³
 4.000E-01 ³                    ---              ³ TPSZ
 R014 ³ Saturated zone effective porosity                    ³ 2.000E-01 ³
 2.000E-01 ³                    ---              ³ EPSZ
 R014 ³ Saturated zone field capacity                        ³ 2.000E-01 ³
 2.000E-01 ³                    ---              ³ FCSZ
 R014 ³ Saturated zone hydraulic conductivity (m/yr)         ³ 7.000E+01 ³
 1.000E+02 ³                    ---              ³ HCSZ
 R014 ³ Saturated zone hydraulic gradient                    ³ 2.000E-02 ³
```

```
2.000E-02 ³                 ---                 ³ HGWT
R014 ³ Saturated zone b parameter                                   ³ not used  ³
5.300E+00 ³                 ---                 ³ BSZ
R014 ³ Water table drop rate (m/yr)                                 ³ 0.000E+00 ³
1.000E-03 ³                 ---                 ³ VWT
R014 ³ Well pump intake depth (m below water table)                 ³ 1.000E+01 ³
1.000E+01 ³                 ---                 ³ DWIBWT
R014 ³ Model: Nondispersion (ND) or Mass-Balance (MB)               ³ ND        ³
ND        ³                 ---                 ³ MODEL
R014 ³ Well pumping rate (m**3/yr)                                  ³ 2.500E+02 ³
2.500E+02 ³                 ---                 ³ UW
     ³                                                              ³           ³
          ³                                      ³
R015 ³ Number of unsaturated zone strata                            ³ 0         ³
1         ³                 ---                 ³ NS
     ³                                                              ³           ³
          ³                                      ³
R016 ³ Distribution coefficients for Ac-227                         ³           ³
          ³                                      ³
R016 ³   Contaminated zone (cm**3/g)                                ³ 4.200E+02 ³
2.000E+01 ³                 ---                 ³ DCNUCC( 1)
R016 ³   Saturated zone (cm**3/g)                                   ³ 4.200E+02 ³
2.000E+01 ³                 ---                 ³ DCNUCS( 1)
R016 ³   Leach rate (/yr)                                           ³ 0.000E+00 ³
0.000E+00 ³             2.278E-03               ³ ALEACH( 1)
R016 ³   Solubility constant                                        ³ 0.000E+00 ³
0.000E+00 ³             not used                ³ SOLUBK( 1)
     ³                                                              ³           ³
          ³                                      ³
R016 ³ Distribution coefficients for Pa-231                         ³           ³
          ³                                      ³
R016 ³   Contaminated zone (cm**3/g)                                ³ 5.100E+02 ³
5.000E+01 ³                 ---                 ³ DCNUCC( 2)
R016 ³   Saturated zone (cm**3/g)                                   ³ 5.100E+02 ³
5.000E+01 ³                 ---                 ³ DCNUCS( 2)
R016 ³   Leach rate (/yr)                                           ³ 0.000E+00 ³
0.000E+00 ³             1.876E-03               ³ ALEACH( 2)
R016 ³   Solubility constant                                        ³ 0.000E+00 ³
0.000E+00 ³             not used                ³ SOLUBK( 2)
     ³                                                              ³           ³
          ³                                      ³
R016 ³ Distribution coefficients for Pb-210                         ³           ³
          ³                                      ³
R016 ³   Contaminated zone (cm**3/g)                                ³ 2.700E+02 ³
1.000E+02 ³                 ---                 ³ DCNUCC( 3)
R016 ³   Saturated zone (cm**3/g)                                   ³ 2.700E+02 ³
1.000E+02 ³                 ---                 ³ DCNUCS( 3)
R016 ³   Leach rate (/yr)                                           ³ 0.000E+00 ³
```

```
 0.000E+00 ³          3.543E-03           ³ ALEACH( 3)
 R016 ³   Solubility constant                         ³ 0.000E+00 ³
 0.000E+00 ³          not used            ³ SOLUBK( 3)
      ³                                               ³           ³
           ³                              ³
 R016 ³ Distribution coefficients for Po-210          ³           ³
           ³                              ³
 R016 ³   Contaminated zone (cm**3/g)                 ³ 1.500E+02 ³
 1.000E+01 ³          ---                 ³ DCNUCC( 4)
 R016 ³   Saturated zone (cm**3/g)                    ³ 1.500E+02 ³
 1.000E+01 ³          ---                 ³ DCNUCS( 4)
 R016 ³   Leach rate (/yr)                            ³ 0.000E+00 ³
 0.000E+00 ³          6.374E-03           ³ ALEACH( 4)
 R016 ³   Solubility constant                         ³ 0.000E+00 ³
 0.000E+00 ³          not used            ³ SOLUBK( 4)
      ³                                               ³           ³
           ³                              ³
 R016 ³ Distribution coefficients for Ra-226          ³           ³
           ³                              ³
 R016 ³   Contaminated zone (cm**3/g)                 ³ 5.000E+02 ³
 7.000E+01 ³          ---                 ³ DCNUCC( 5)
 R016 ³   Saturated zone (cm**3/g)                    ³ 5.000E+02 ³
 7.000E+01 ³          ---                 ³ DCNUCS( 5)
 R016 ³   Leach rate (/yr)                            ³ 0.000E+00 ³
 0.000E+00 ³          1.914E-03           ³ ALEACH( 5)
 R016 ³   Solubility constant                         ³ 0.000E+00 ³
 0.000E+00 ³          not used            ³ SOLUBK( 5)


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 Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
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                                                  Site-Specific Parameter Sum
mary (continued)
     ³                                                 ³   User    ³
          ³           Used by RESRAD          ³  Parameter
 Menu ³                     Parameter                  ³   Input   ³
  Default  ³ (If different from user input) ³    Name
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 R016 ³ Distribution coefficients for Th-230          ³           ³
           ³                              ³
 R016 ³   Contaminated zone (cm**3/g)                 ³ 3.200E+03 ³
 6.000E+04 ³          ---                 ³ DCNUCC( 6)
 R016 ³   Saturated zone (cm**3/g)                    ³ 3.200E+03 ³
```

```
6.000E+04 ³                 ---                  ³ DCNUCS( 6)
R016 ³   Leach rate (/yr)                                    ³ 0.000E+00 ³
0.000E+00 ³              2.991E-04               ³ ALEACH( 6)
R016 ³   Solubility constant                                 ³ 0.000E+00 ³
0.000E+00 ³              not used                ³ SOLUBK( 6)
     ³                                                       ³           ³
          ³                                      ³
R016 ³ Distribution coefficients for U-234                   ³           ³
          ³                                      ³
R016 ³   Contaminated zone (cm**3/g)                         ³ 1.500E+01 ³
5.000E+01 ³                 ---                  ³ DCNUCC( 7)
R016 ³   Saturated zone (cm**3/g)                            ³ 1.500E+01 ³
5.000E+01 ³                 ---                  ³ DCNUCS( 7)
R016 ³   Leach rate (/yr)                                    ³ 0.000E+00 ³
0.000E+00 ³              6.316E-02               ³ ALEACH( 7)
R016 ³   Solubility constant                                 ³ 0.000E+00 ³
0.000E+00 ³              not used                ³ SOLUBK( 7)
     ³                                                       ³           ³
          ³                                      ³
R016 ³ Distribution coefficients for U-235                   ³           ³
          ³                                      ³
R016 ³   Contaminated zone (cm**3/g)                         ³ 1.500E+01 ³
5.000E+01 ³                 ---                  ³ DCNUCC( 8)
R016 ³   Saturated zone (cm**3/g)                            ³ 1.500E+01 ³
5.000E+01 ³                 ---                  ³ DCNUCS( 8)
R016 ³   Leach rate (/yr)                                    ³ 0.000E+00 ³
0.000E+00 ³              6.316E-02               ³ ALEACH( 8)
R016 ³   Solubility constant                                 ³ 0.000E+00 ³
0.000E+00 ³              not used                ³ SOLUBK( 8)
     ³                                                       ³           ³
          ³                                      ³
R016 ³ Distribution coefficients for U-238                   ³           ³
          ³                                      ³
R016 ³   Contaminated zone (cm**3/g)                         ³ 1.500E+01 ³
5.000E+01 ³                 ---                  ³ DCNUCC( 9)
R016 ³   Saturated zone (cm**3/g)                            ³ 1.500E+01 ³
5.000E+01 ³                 ---                  ³ DCNUCS( 9)
R016 ³   Leach rate (/yr)                                    ³ 0.000E+00 ³
0.000E+00 ³              6.316E-02               ³ ALEACH( 9)
R016 ³   Solubility constant                                 ³ 0.000E+00 ³
0.000E+00 ³              not used                ³ SOLUBK( 9)
     ³                                                       ³           ³
          ³                                      ³
R017 ³ Inhalation rate (m**3/yr)                             ³ 8.400E+03 ³
8.400E+03 ³                 ---                  ³ INHALR
R017 ³ Mass loading for inhalation (g/m**3)                  ³ 2.000E-04 ³
1.000E-04 ³                 ---                  ³ MLINH
R017 ³ Exposure duration                                     ³ 5.000E+01 ³
```

```
3.000E+01 ³                 ---                 ³ ED
R017 ³ Shielding factor, inhalation                          ³ 5.000E-01 ³
4.000E-01 ³                 ---                 ³ SHF3
R017 ³ Shielding factor, external gamma                      ³ 3.300E-01 ³
7.000E-01 ³                 ---                 ³ SHF1
R017 ³ Fraction of time spent indoors                        ³ 5.500E-01 ³
5.000E-01 ³                 ---                 ³ FIND
R017 ³ Fraction of time spent outdoors (on site)             ³ 2.100E-01 ³
2.500E-01 ³                 ---                 ³ FOTD
R017 ³ Shape factor flag, external gamma                     ³ 1.000E+00 ³
1.000E+00 ³    >0 shows circular AREA.          ³ FS
R017 ³ Radii of shape factor array (used if FS = -1):        ³           ³
          ³                                     ³
R017 ³   Outer annular radius (m), ring  1:                  ³ not used  ³
5.000E+01 ³                 ---                 ³ RAD_SHAPE( 1)
R017 ³   Outer annular radius (m), ring  2:                  ³ not used  ³
7.071E+01 ³                 ---                 ³ RAD_SHAPE( 2)
R017 ³   Outer annular radius (m), ring  3:                  ³ not used  ³
0.000E+00 ³                 ---                 ³ RAD_SHAPE( 3)
R017 ³   Outer annular radius (m), ring  4:                  ³ not used  ³
0.000E+00 ³                 ---                 ³ RAD_SHAPE( 4)
R017 ³   Outer annular radius (m), ring  5:                  ³ not used  ³
0.000E+00 ³                 ---                 ³ RAD_SHAPE( 5)
R017 ³   Outer annular radius (m), ring  6:                  ³ not used  ³
0.000E+00 ³                 ---                 ³ RAD_SHAPE( 6)
R017 ³   Outer annular radius (m), ring  7:                  ³ not used  ³
0.000E+00 ³                 ---                 ³ RAD_SHAPE( 7)
R017 ³   Outer annular radius (m), ring  8:                  ³ not used  ³
0.000E+00 ³                 ---                 ³ RAD_SHAPE( 8)
R017 ³   Outer annular radius (m), ring  9:                  ³ not used  ³
0.000E+00 ³                 ---                 ³ RAD_SHAPE( 9)
R017 ³   Outer annular radius (m), ring 10:                  ³ not used  ³
0.000E+00 ³                 ---                 ³ RAD_SHAPE(10)
R017 ³   Outer annular radius (m), ring 11:                  ³ not used  ³
0.000E+00 ³                 ---                 ³ RAD_SHAPE(11)
R017 ³   Outer annular radius (m), ring 12:                  ³ not used  ³
0.000E+00 ³                 ---                 ³ RAD_SHAPE(12)
     ³                                                       ³           ³
          ³                                     ³
```


Site-Specific Parameter Summary (continued)

```
    ³                                                 ³   User     ³
        ³          Used by RESRAD          ³  Parameter
Menu ³                 Parameter                      ³   Input    ³
 Default  ³  (If different from user input) ³    Name
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R017 ³  Fractions of annular areas within AREA:              ³            ³
         ³                               ³

R017 ³    Ring  1                                           ³  not used  ³
1.000E+00 ³            ---                ³  FRACA( 1)
R017 ³    Ring  2                                           ³  not used  ³
2.732E-01 ³            ---                ³  FRACA( 2)
R017 ³    Ring  3                                           ³  not used  ³
0.000E+00 ³            ---                ³  FRACA( 3)
R017 ³    Ring  4                                           ³  not used  ³
0.000E+00 ³            ---                ³  FRACA( 4)
R017 ³    Ring  5                                           ³  not used  ³
0.000E+00 ³            ---                ³  FRACA( 5)
R017 ³    Ring  6                                           ³  not used  ³
0.000E+00 ³            ---                ³  FRACA( 6)
R017 ³    Ring  7                                           ³  not used  ³
0.000E+00 ³            ---                ³  FRACA( 7)
R017 ³    Ring  8                                           ³  not used  ³
0.000E+00 ³            ---                ³  FRACA( 8)
R017 ³    Ring  9                                           ³  not used  ³
0.000E+00 ³            ---                ³  FRACA( 9)
R017 ³    Ring 10                                           ³  not used  ³
0.000E+00 ³            ---                ³  FRACA(10)
R017 ³    Ring 11                                           ³  not used  ³
0.000E+00 ³            ---                ³  FRACA(11)
R017 ³    Ring 12                                           ³  not used  ³
0.000E+00 ³            ---                ³  FRACA(12)
     ³                                                      ³            ³
         ³                               ³

R018 ³  Fruits, vegetables and grain consumption (kg/yr) ³  1.660E+02 ³
1.600E+02 ³            ---                ³  DIET(1)
R018 ³  Leafy vegetable consumption (kg/yr)                 ³  1.100E+01 ³
1.400E+01 ³            ---                ³  DIET(2)
R018 ³  Milk consumption (L/yr)                             ³  1.000E+02 ³
9.200E+01 ³            ---                ³  DIET(3)
R018 ³  Meat and poultry consumption (kg/yr)                ³  6.300E+01 ³
6.300E+01 ³            ---                ³  DIET(4)
R018 ³  Fish consumption (kg/yr)                            ³  5.400E+00 ³
5.400E+00 ³            ---                ³  DIET(5)
R018 ³  Other seafood consumption (kg/yr)                   ³  9.000E-01 ³
9.000E-01 ³            ---                ³  DIET(6)
R018 ³  Soil ingestion rate (g/yr)                          ³  1.825E+01 ³
3.650E+01 ³            ---                ³  SOIL
```

```
R018 ³ Drinking water intake (L/yr)                          ³ 7.300E+02 ³
5.100E+02 ³                ---                ³ DWI
R018 ³ Contamination fraction of drinking water              ³ 1.000E+00 ³
1.000E+00 ³                ---                ³ FDW
R018 ³ Contamination fraction of household water             ³ not used  ³
1.000E+00 ³                ---                ³ FHHW
R018 ³ Contamination fraction of livestock water             ³ 1.000E+00 ³
1.000E+00 ³                ---                ³ FLW
R018 ³ Contamination fraction of irrigation water            ³ 1.000E+00 ³
1.000E+00 ³                ---                ³ FIRW
R018 ³ Contamination fraction of aquatic food                ³ 5.000E-01 ³
5.000E-01 ³                ---                ³ FR9
R018 ³ Contamination fraction of plant food                  ³ -1        ³
-1        ³            0.500E-01             ³ FPLANT
R018 ³ Contamination fraction of meat                        ³ -1        ³
-1        ³            0.500E-02             ³ FMEAT
R018 ³ Contamination fraction of milk                        ³ -1        ³
-1        ³            0.500E-02             ³ FMILK
     ³                                                       ³           ³
          ³                                   ³
R019 ³ Livestock fodder intake for meat (kg/day)             ³ 6.800E+01 ³
6.800E+01 ³                ---                ³ LFI5
R019 ³ Livestock fodder intake for milk (kg/day)             ³ 5.500E+01 ³
5.500E+01 ³                ---                ³ LFI6
R019 ³ Livestock water intake for meat (L/day)               ³ 5.000E+01 ³
5.000E+01 ³                ---                ³ LWI5
R019 ³ Livestock water intake for milk (L/day)               ³ 1.600E+02 ³
1.600E+02 ³                ---                ³ LWI6
R019 ³ Livestock soil intake (kg/day)                        ³ 5.000E-01 ³
5.000E-01 ³                ---                ³ LSI
R019 ³ Mass loading for foliar deposition (g/m**3)           ³ 1.000E-04 ³
1.000E-04 ³                ---                ³ MLFD
R019 ³ Depth of soil mixing layer (m)                        ³ 1.500E-01 ³
1.500E-01 ³                ---                ³ DM
R019 ³ Depth of roots (m)                                    ³ 9.000E-01 ³
9.000E-01 ³                ---                ³ DROOT
R019 ³ Drinking water fraction from ground water             ³ 1.000E+00 ³
1.000E+00 ³                ---                ³ FGWDW
R019 ³ Household water fraction from ground water            ³ not used  ³
1.000E+00 ³                ---                ³ FGWHH
R019 ³ Livestock water fraction from ground water            ³ 1.000E+00 ³
1.000E+00 ³                ---                ³ FGWLW
R019 ³ Irrigation fraction from ground water                 ³ 1.000E+00 ³
1.000E+00 ³                ---                ³ FGWIR
     ³                                                       ³           ³
          ³                                   ³
R19B ³ Wet weight crop yield for Non-Leafy (kg/m**2)         ³ 7.000E-01 ³
7.000E-01 ³                ---                ³ YV(1)
```

```
R19B ³ Wet weight crop yield for Leafy      (kg/m**2)      ³ 1.500E+00 ³
1.500E+00 ³                 ---            ³ YV(2)
R19B ³ Wet weight crop yield for Fodder     (kg/m**2)      ³ 1.100E+00 ³
1.100E+00 ³                 ---            ³ YV(3)
R19B ³ Growing Season for  Non-Leafy (years)               ³ 1.700E-01 ³
1.700E-01 ³                 ---            ³ TE(1)
R19B ³ Growing Season for  Leafy     (years)               ³ 2.500E-01 ³
2.500E-01 ³                 ---            ³ TE(2)
R19B ³ Growing Season for  Fodder    (years)               ³ 8.000E-02 ³
8.000E-02 ³                 ---            ³ TE(3)


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                                              Site-Specific Parameter Sum
mary (continued)
     ³                                                      ³   User     ³
        ³            Used by RESRAD            ³  Parameter
 Menu ³                   Parameter                          ³   Input   ³
  Default  ³ (If different from user input) ³     Name
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 R19B ³ Translocation Factor for  Non-Leafy                  ³ 1.000E-01 ³
 1.000E-01 ³                ---            ³ TIV(1)
 R19B ³ Translocation Factor for  Leafy                      ³ 1.000E+00 ³
 1.000E+00 ³                ---            ³ TIV(2)
 R19B ³ Translocation Factor for  Fodder                     ³ 1.000E+00 ³
 1.000E+00 ³                ---            ³ TIV(3)
 R19B ³ Dry Foliar Interception Fraction for  Non-Leafy      ³ 2.500E-01 ³
 2.500E-01 ³                ---            ³ RDRY(1)
 R19B ³ Dry Foliar Interception Fraction for  Leafy          ³ 2.500E-01 ³
 2.500E-01 ³                ---            ³ RDRY(2)
 R19B ³ Dry Foliar Interception Fraction for  Fodder         ³ 2.500E-01 ³
 2.500E-01 ³                ---            ³ RDRY(3)
 R19B ³ Wet Foliar Interception Fraction for  Non-Leafy      ³ 2.500E-01 ³
 2.500E-01 ³                ---            ³ RWET(1)
 R19B ³ Wet Foliar Interception Fraction for  Leafy          ³ 2.500E-01 ³
 2.500E-01 ³                ---            ³ RWET(2)
 R19B ³ Wet Foliar Interception Fraction for  Fodder         ³ 2.500E-01 ³
 2.500E-01 ³                ---            ³ RWET(3)
 R19B ³ Weathering Removal Constant for Vegetation           ³ 2.000E+01 ³
 2.000E+01 ³                ---            ³ WLAM
      ³                                                      ³           ³
        ³                                      ³
```

```
C14  ³ C-12 concentration in water (g/cm**3)              ³ not used  ³
2.000E-05 ³                 ---                 ³ C12WTR
C14  ³ C-12 concentration in contaminated soil (g/g)      ³ not used  ³
3.000E-02 ³                 ---                 ³ C12CZ
C14  ³ Fraction of vegetation carbon from soil            ³ not used  ³
2.000E-02 ³                 ---                 ³ CSOIL
C14  ³ Fraction of vegetation carbon from air             ³ not used  ³
9.800E-01 ³                 ---                 ³ CAIR
C14  ³ C-14 evasion layer thickness in soil (m)           ³ not used  ³
3.000E-01 ³                 ---                 ³ DMC
C14  ³ C-14 evasion flux rate from soil (1/sec)           ³ not used  ³
7.000E-07 ³                 ---                 ³ EVSN
C14  ³ C-12 evasion flux rate from soil (1/sec)           ³ not used  ³
1.000E-10 ³                 ---                 ³ REVSN
C14  ³ Fraction of grain in beef cattle feed              ³ not used  ³
8.000E-01 ³                 ---                 ³ AVFG4
C14  ³ Fraction of grain in milk cow feed                 ³ not used  ³
2.000E-01 ³                 ---                 ³ AVFG5
C14  ³ DCF correction factor for gaseous forms of C14     ³ not used  ³
1.234E+02 ³                 ---                 ³ CO2F
     ³                                           ³           ³
          ³                                      ³
STOR ³ Storage times of contaminated foodstuffs (days): ³           ³
          ³                                      ³
STOR ³   Fruits, non-leafy vegetables, and grain          ³ 1.400E+01 ³
1.400E+01 ³                 ---                 ³ STOR_T(1)
STOR ³   Leafy vegetables                                 ³ 1.000E+00 ³
1.000E+00 ³                 ---                 ³ STOR_T(2)
STOR ³   Milk                                             ³ 1.000E+00 ³
1.000E+00 ³                 ---                 ³ STOR_T(3)
STOR ³   Meat and poultry                                 ³ 2.000E+01 ³
2.000E+01 ³                 ---                 ³ STOR_T(4)
STOR ³   Fish                                             ³ 7.000E+00 ³
7.000E+00 ³                 ---                 ³ STOR_T(5)
STOR ³   Crustacea and mollusks                           ³ 7.000E+00 ³
7.000E+00 ³                 ---                 ³ STOR_T(6)
STOR ³   Well water                                       ³ 1.000E+00 ³
1.000E+00 ³                 ---                 ³ STOR_T(7)
STOR ³   Surface water                                    ³ 1.000E+00 ³
1.000E+00 ³                 ---                 ³ STOR_T(8)
STOR ³   Livestock fodder                                 ³ 4.500E+01 ³
4.500E+01 ³                 ---                 ³ STOR_T(9)
     ³                                           ³           ³
          ³                                      ³
R021 ³ Thickness of building foundation (m)               ³ not used  ³
1.500E-01 ³                 ---                 ³ FLOOR1
R021 ³ Bulk density of building foundation (g/cm**3)      ³ not used  ³
2.400E+00 ³                 ---                 ³ DENSFL
```

```
R021 ³ Total porosity of the cover material              ³ not used ³
4.000E-01 ³           ---                     ³ TPCV
R021 ³ Total porosity of the building foundation         ³ not used ³
1.000E-01 ³           ---                     ³ TPFL
R021 ³ Volumetric water content of the cover material    ³ not used ³
5.000E-02 ³           ---                     ³ PH2OCV
R021 ³ Volumetric water content of the foundation        ³ not used ³
3.000E-02 ³           ---                     ³ PH2OFL
R021 ³ Diffusion coefficient for radon gas (m/sec):      ³          ³
          ³                                   ³
R021 ³   in cover material                               ³ not used ³
2.000E-06 ³           ---                     ³ DIFCV
R021 ³   in foundation material                          ³ not used ³
3.000E-07 ³           ---                     ³ DIFFL
R021 ³   in contaminated zone soil                       ³ not used ³
2.000E-06 ³           ---                     ³ DIFCZ
R021 ³ Radon vertical dimension of mixing (m)            ³ not used ³
2.000E+00 ³           ---                     ³ HMIX
R021 ³ Average building air exchange rate (1/hr)         ³ not used ³
5.000E-01 ³           ---                     ³ REXG
R021 ³ Height of the building (room) (m)                 ³ not used ³
2.500E+00 ³           ---                     ³ HRM
R021 ³ Building interior area factor                     ³ not used ³
0.000E+00 ³           ---                     ³ FAI
R021 ³ Building depth below ground surface (m)           ³ not used ³
-1.000E+00 ³          ---                     ³ DMFL
R021 ³ Emanating power of Rn-222 gas                     ³ not used ³
2.500E-01 ³           ---                     ³ EMANA(1)
R021 ³ Emanating power of Rn-220 gas                     ³ not used ³
1.500E-01 ³           ---                     ³ EMANA(2)
     ³                                                   ³          ³
          ³                                   ³


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 Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
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                                             Site-Specific Parameter Sum
mary (continued)
     ³                                                  ³   User    ³
          ³          Used by RESRAD         ³  Parameter
 Menu ³                       Parameter                 ³   Input   ³
  Default  ³ (If different from user input) ³     Name
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 TITL ³ Number of graphical time points                 ³    32     ³
```

```
 ---    ³              ---            ³ NPTS
TITL ³ Maximum number of integration points for dose    ³   17       ³
 ---    ³              ---            ³ LYMAX
TITL ³ Maximum number of integration points for risk    ³    1       ³
 ---    ³              ---            ³ KYMAX
ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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```

Summary of Pathway Selections

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

```
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 Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
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```

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	100.00 square meters	Ac-227	2.250E-02
Thickness:	0.50 meters	Pa-231	2.250E-02
Cover Depth:	3.66 meters	Pb-210	4.890E-01
		Po-210	4.890E-01
		Ra-226	4.890E-01
		Th-230	4.890E

```
-01
                                                                      U-234        4.890E
-01
                                                                      U-235        2.250E
-02
                                                                      U-238        4.890E
-01

                                          Total Dose TDOSE(t), mrem/yr

                                    Basic Radiation Dose Limit =  25 mrem/y
r
                 Total Mixture Sum M(t) = Fraction of Basic Dose Limit Re
ceived at Time (t)
                 ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
    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):  1.014E-01  1.013E-01  1.051E-01  1.165E-01  1.322E-01
 1.434E-01  3.139E-02  5.309E-02
         M(t):  4.056E-03  4.052E-03  4.203E-03  4.661E-03  5.288E-03
 5.736E-03  1.256E-03  2.124E-03
Maximum TDOSE(t):  1.507E-01 mrem/yr   at t =   190.5 ñ 0.4 years

                              Total Dose Contributions TDOSE(i,p,t) for Indi
vidual Radionuclides (i) and Pathways (p)
                                          As mrem/yr and Fraction of Total
Dose At t = 1.905E+02 years
                                            Water Independent Pathways (Inh
alation excludes radon)
             Ground               Inhalation               Radon              Pl
ant               Meat                 Milk                 Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
ÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ
 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  2.436E-31 0.0000  0.000E+00 0.0000  0.000E+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  1.001E-30 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Po-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  5.259E-21 0.0000  0.000E+00 0.0000  0.000E+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   5.320E-22 0.0000  0.000E+00 0.0000  0.000E+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    7.083E-26 0.0000  0.000E+00 0.0000  0.000E+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    6.453E-30 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
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ÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total    5.791E-21 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000


RESRAD, Version 6.0       T« Limit = 30 days          03/06/2002  11:20
 Page  11
 Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
 File    : TESTPI1A.RAD

                         Total Dose Contributions TDOSE(i,p,t) for Indi
vidual Radionuclides (i) and Pathways (p)
                                        As mrem/yr and Fraction of Total
Dose At t = 1.905E+02 years
                                                        Water Dependent
Pathways
              Water              Fish               Radon              Pl
ant              Meat               Milk           All Pathways*
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
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 Ac-227   6.102E-07 0.0000  7.321E-10 0.0000  0.000E+00 0.0000  1.200E-
08 0.0000  2.730E-12 0.0000  4.505E-12 0.0000  6.229E-07 0.0000
 Pa-231   3.517E-04 0.0023  3.001E-07 0.0000  0.000E+00 0.0000  6.921E-
06 0.0000  1.359E-07 0.0000  1.930E-09 0.0000  3.591E-04 0.0024
 Pb-210   8.766E-05 0.0006  1.506E-06 0.0000  0.000E+00 0.0000  1.695E-
06 0.0000  6.651E-08 0.0000  1.016E-08 0.0000  9.094E-05 0.0006
 Po-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   2.142E-02 0.1421  3.495E-04 0.0023  0.000E+00 0.0000  4.145E-
04 0.0028  1.562E-05 0.0001  2.731E-06 0.0000  2.220E-02 0.1473
 Th-230   1.155E-03 0.0077  1.840E-05 0.0001  0.000E+00 0.0000  2.237E-
05 0.0001  8.232E-07 0.0000  1.453E-07 0.0000  1.197E-03 0.0079
 U-234    6.320E-02 0.4193  8.545E-06 0.0001  0.000E+00 0.0000  1.243E-
03 0.0082  4.818E-06 0.0000  1.400E-05 0.0001  6.447E-02 0.4277
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 U-235    2.810E-03 0.0186  3.805E-07 0.0000  0.000E+00 0.0000  5.527E-
05 0.0004  2.189E-07 0.0000  6.197E-07 0.0000  2.867E-03 0.0190
 U-238    5.837E-02 0.3873  7.711E-06 0.0001  0.000E+00 0.0000  1.148E-
03 0.0076  4.442E-06 0.0000  1.293E-05 0.0001  5.954E-02 0.3950
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍ
ÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total    1.474E-01 0.9779  3.864E-04 0.0026  0.000E+00 0.0000  2.892E-
03 0.0192  2.612E-05 0.0002  3.044E-05 0.0002  1.507E-01 1.0000
*Sum of all water independent and dependent pathways.


RESRAD, Version 6.0       T« Limit = 30 days        03/06/2002  11:20
 Page  12
 Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
 File    : TESTPI1A.RAD

                         Total Dose Contributions TDOSE(i,p,t) for Indi
vidual Radionuclides (i) and Pathways (p)
                                        As mrem/yr and Fraction of Total
Dose At t = 0.000E+00 years
                                          Water Independent Pathways (Inh
alation excludes radon)
             Ground            Inhalation            Radon             Pl
ant             Meat              Milk              Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
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 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  2.399E-29 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Po-210  2.052E-29 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Ra-226  6.247E-22 0.0000  0.000E+00 0.0000  0.000E+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  1.357E-25 0.0000  0.000E+00 0.0000  0.000E+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   3.401E-26 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
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00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍ
íí ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total   6.249E-22 0.0000  0.000E+00 0.0000  0.000E+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 Indi
vidual Radionuclides (i) and Pathways (p)
                                        As mrem/yr and Fraction of Total
Dose At t = 0.000E+00 years
                                                        Water Dependent
Pathways
              Water              Fish               Radon              Pl
ant              Meat               Milk           All Pathways*
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
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 Ac-227  3.140E-05 0.0003  3.765E-08 0.0000  0.000E+00 0.0000  6.168E-
07 0.0000  1.396E-10 0.0000  2.310E-10 0.0000  3.205E-05 0.0003
 Pa-231  2.765E-05 0.0003  1.904E-08 0.0000  0.000E+00 0.0000  5.436E-
07 0.0000  1.558E-08 0.0000  1.265E-10 0.0000  2.823E-05 0.0003
 Pb-210  4.448E-03 0.0439  7.719E-05 0.0008  0.000E+00 0.0000  8.607E-
05 0.0008  3.450E-06 0.0000  5.172E-07 0.0000  4.615E-03 0.0455
 Po-210  2.811E-03 0.0277  6.373E-05 0.0006  0.000E+00 0.0000  5.522E-
05 0.0005  3.129E-06 0.0000  3.519E-07 0.0000  2.934E-03 0.0289
 Ra-226  1.655E-03 0.0163  2.649E-05 0.0003  0.000E+00 0.0000  3.206E-
05 0.0003  1.201E-06 0.0000  2.232E-07 0.0000  1.715E-03 0.0169
 Th-230  7.895E-06 0.0001  8.979E-08 0.0000  0.000E+00 0.0000  1.535E-
07 0.0000  4.015E-09 0.0000  8.127E-10 0.0000  8.143E-06 0.0001
 U-234   4.589E-02 0.4525  6.060E-06 0.0001  0.000E+00 0.0000  9.021E-
04 0.0089  3.481E-06 0.0000  1.015E-05 0.0001  4.681E-02 0.4616
 U-235   2.030E-03 0.0200  2.682E-07 0.0000  0.000E+00 0.0000  3.991E-
05 0.0004  1.543E-07 0.0000  4.489E-07 0.0000  2.071E-03 0.0204
 U-238   4.234E-02 0.4175  5.592E-06 0.0001  0.000E+00 0.0000  8.323E-
04 0.0082  3.212E-06 0.0000  9.365E-06 0.0001  4.319E-02 0.4259
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍ
íí ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total   9.925E-02 0.9787  1.795E-04 0.0018  0.000E+00 0.0000  1.949E-
03 0.0192  1.465E-05 0.0001  2.106E-05 0.0002  1.014E-01 1.0000
*Sum of all water independent and dependent pathways.
```

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 Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
 File    : TESTPI1A.RAD

                         Total Dose Contributions TDOSE(i,p,t) for Indi
vidual Radionuclides (i) and Pathways (p)
                                        As mrem/yr and Fraction of Total
Dose At t = 1.000E+00 years
                                          Water Independent Pathways (Inh
alation excludes radon)
             Ground          Inhalation          Radon             Pl
ant            Meat              Milk              Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide  mrem/yr  fract.  mrem/yr  fract.  mrem/yr  fract.  mrem/y
r  fract.  mrem/yr  fract.  mrem/yr  fract.  mrem/yr  fract.
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 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  4.057E-29 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Po-210  3.320E-30 0.0000  0.000E+00 0.0000  0.000E+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  6.317E-22 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Th-230  4.114E-25 0.0000  0.000E+00 0.0000  0.000E+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   2.789E-30 0.0000  0.000E+00 0.0000  0.000E+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   3.241E-26 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍ
ÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total   6.322E-22 0.0000  0.000E+00 0.0000  0.000E+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 Indi
vidual Radionuclides (i) and Pathways (p)
                                        As mrem/yr and Fraction of Total
Dose At t = 1.000E+00 years
                                                   Water Dependent
Pathways
             Water           Fish              Radon             Pl
ant            Meat              Milk          All Pathways*
```

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 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Ac-227  3.186E-05 0.0003  3.820E-08 0.0000  0.000E+00 0.0000  6.258E-
07 0.0000  1.416E-10 0.0000  2.343E-10 0.0000  3.252E-05 0.0003
 Pa-231  2.945E-05 0.0003  2.052E-08 0.0000  0.000E+00 0.0000  5.789E-
07 0.0000  1.632E-08 0.0000  1.359E-10 0.0000  3.007E-05 0.0003
 Pb-210  4.509E-03 0.0445  7.788E-05 0.0008  0.000E+00 0.0000  8.701E-
05 0.0009  3.405E-06 0.0000  5.200E-07 0.0000  4.678E-03 0.0462
 Po-210  4.719E-04 0.0047  1.070E-05 0.0001  0.000E+00 0.0000  9.267E-
06 0.0001  5.242E-07 0.0000  5.901E-08 0.0000  4.924E-04 0.0049
 Ra-226  1.785E-03 0.0176  2.849E-05 0.0003  0.000E+00 0.0000  3.447E-
05 0.0003  1.264E-06 0.0000  2.381E-07 0.0000  1.849E-03 0.0183
 Th-230  8.763E-06 0.0001  1.015E-07 0.0000  0.000E+00 0.0000  1.700E-
07 0.0000  4.444E-09 0.0000  9.101E-10 0.0000  9.039E-06 0.0001
 U-234   4.695E-02 0.4635  6.200E-06 0.0001  0.000E+00 0.0000  9.228E-
04 0.0091  3.560E-06 0.0000  1.038E-05 0.0001  4.789E-02 0.4728
 U-235   2.077E-03 0.0205  2.744E-07 0.0000  0.000E+00 0.0000  4.083E-
05 0.0004  1.579E-07 0.0000  4.592E-07 0.0000  2.119E-03 0.0209
 U-238   4.332E-02 0.4277  5.720E-06 0.0001  0.000E+00 0.0000  8.515E-
04 0.0084  3.285E-06 0.0000  9.579E-06 0.0001  4.419E-02 0.4363
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍ
ÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total   9.918E-02 0.9792  1.294E-04 0.0013  0.000E+00 0.0000  1.947E-
03 0.0192  1.222E-05 0.0001  2.124E-05 0.0002  1.013E-01 1.0000
*Sum of all water independent and dependent pathways.


RESRAD, Version 6.0       T« Limit = 30 days          03/06/2002  11:20
 Page  14
 Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
 File    : TESTPI1A.RAD

                         Total Dose Contributions TDOSE(i,p,t) for Indi
vidual Radionuclides (i) and Pathways (p)
                                        As mrem/yr and Fraction of Total
Dose At t = 3.000E+00 years
                                          Water Independent Pathways (Inh
alation excludes radon)
             Ground           Inhalation           Radon              Pl
ant              Meat              Milk              Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
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r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
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 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  4.213E-29 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Po-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  6.460E-22 0.0000  0.000E+00 0.0000  0.000E+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  9.833E-25 0.0000  0.000E+00 0.0000  0.000E+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   1.452E-29 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 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   2.943E-26 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍ
ÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total   6.470E-22 0.0000  0.000E+00 0.0000  0.000E+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

```
                Water              Fish               Radon              Pl
ant              Meat               Milk           All Pathways*
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Ac-227  3.260E-05 0.0003  3.909E-08 0.0000  0.000E+00 0.0000  6.405E-
07 0.0000  1.449E-10 0.0000  2.399E-10 0.0000  3.328E-05 0.0003
 Pa-231  3.313E-05 0.0003  2.359E-08 0.0000  0.000E+00 0.0000  6.512E-
07 0.0000  1.782E-08 0.0000  1.557E-10 0.0000  3.382E-05 0.0003
 Pb-210  4.608E-03 0.0439  7.956E-05 0.0008  0.000E+00 0.0000  8.893E-
05 0.0008  3.481E-06 0.0000  5.317E-07 0.0000  4.781E-03 0.0455
 Po-210  1.321E-05 0.0001  2.994E-07 0.0000  0.000E+00 0.0000  2.594E-
07 0.0000  1.468E-08 0.0000  1.652E-09 0.0000  1.378E-05 0.0001
```

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 Ra-226  2.051E-03 0.0195  3.288E-05 0.0003  0.000E+00 0.0000  3.963E-
05 0.0004  1.458E-06 0.0000  2.719E-07 0.0000  2.126E-03 0.0202
 Th-230  1.068E-05 0.0001  1.287E-07 0.0000  0.000E+00 0.0000  2.070E-
07 0.0000  5.646E-09 0.0000  1.139E-09 0.0000  1.102E-05 0.0001
 U-234   4.888E-02 0.4652  6.455E-06 0.0001  0.000E+00 0.0000  9.608E-
04 0.0091  3.708E-06 0.0000  1.081E-05 0.0001  4.986E-02 0.4745
 U-235   2.162E-03 0.0206  2.857E-07 0.0000  0.000E+00 0.0000  4.251E-
05 0.0004  1.645E-07 0.0000  4.782E-07 0.0000  2.206E-03 0.0210
 U-238   4.510E-02 0.4292  5.956E-06 0.0001  0.000E+00 0.0000  8.866E-
04 0.0084  3.422E-06 0.0000  9.976E-06 0.0001  4.601E-02 0.4379
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍ
ÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total   1.029E-01 0.9793  1.256E-04 0.0012  0.000E+00 0.0000  2.020E-
03 0.0192  1.227E-05 0.0001  2.207E-05 0.0002  1.051E-01 1.0000
*Sum of all water independent and dependent pathways.


RESRAD, Version 6.0      T« Limit = 30 days        03/06/2002  11:20
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 Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
 File    : TESTPI1A.RAD

                        Total Dose Contributions TDOSE(i,p,t) for Indi
vidual Radionuclides (i) and Pathways (p)
                                     As mrem/yr and Fraction of Total
Dose At t = 1.000E+01 years
                                       Water Independent Pathways (Inh
alation excludes radon)
            Ground          Inhalation          Radon             Pl
ant            Meat              Milk              Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
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 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  3.672E-29 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Po-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  6.986E-22 0.0000  0.000E+00 0.0000  0.000E+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  3.212E-24 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
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00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 U-234   1.237E-28 0.0000  0.000E+00 0.0000  0.000E+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   2.101E-26 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
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 Total   7.019E-22 0.0000  0.000E+00 0.0000  0.000E+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 Indi
vidual Radionuclides (i) and Pathways (p)
                                        As mrem/yr and Fraction of Total
Dose At t = 1.000E+01 years
                                                          Water Dependent
Pathways
              Water              Fish               Radon              Pl
ant              Meat               Milk          All Pathways*
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
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 Ac-227  3.360E-05 0.0003  4.029E-08 0.0000  0.000E+00 0.0000  6.602E-
07 0.0000  1.496E-10 0.0000  2.474E-10 0.0000  3.430E-05 0.0003
 Pa-231  4.658E-05 0.0004  3.506E-08 0.0000  0.000E+00 0.0000  9.160E-
07 0.0000  2.303E-08 0.0000  2.295E-10 0.0000  4.756E-05 0.0004
 Pb-210  4.733E-03 0.0406  8.164E-05 0.0007  0.000E+00 0.0000  9.138E-
05 0.0008  3.580E-06 0.0000  5.467E-07 0.0000  4.910E-03 0.0421
 Po-210  4.584E-11 0.0000  1.040E-12 0.0000  0.000E+00 0.0000  9.011E-
13 0.0000  5.116E-14 0.0000  5.747E-15 0.0000  4.784E-11 0.0000
 Ra-226  3.041E-03 0.0261  4.918E-05 0.0004  0.000E+00 0.0000  5.877E-
05 0.0005  2.183E-06 0.0000  3.966E-07 0.0000  3.151E-03 0.0270
 Th-230  1.930E-05 0.0002  2.553E-07 0.0000  0.000E+00 0.0000  3.740E-
07 0.0000  1.126E-08 0.0000  2.184E-09 0.0000  1.994E-05 0.0002
 U-234   5.400E-02 0.4635  7.132E-06 0.0001  0.000E+00 0.0000  1.062E-
03 0.0091  4.102E-06 0.0000  1.195E-05 0.0001  5.508E-02 0.4728
 U-235   2.389E-03 0.0205  3.159E-07 0.0000  0.000E+00 0.0000  4.698E-
05 0.0004  1.821E-07 0.0000  5.287E-07 0.0000  2.437E-03 0.0209
 U-238   4.983E-02 0.4277  6.581E-06 0.0001  0.000E+00 0.0000  9.797E-
04 0.0084  3.785E-06 0.0000  1.103E-05 0.0001  5.083E-02 0.4363
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍ
ÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total   1.141E-01 0.9792  1.452E-04 0.0012  0.000E+00 0.0000  2.241E-
03 0.0192  1.387E-05 0.0001  2.446E-05 0.0002  1.165E-01 1.0000
```

*Sum of all water independent and dependent pathways.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 11:20
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Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
File : TESTPI1A.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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+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	2.463E-29	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Po-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	8.737E-22	0.0000	0.000E+00	0.0000	0.000E+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	1.191E-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
U-234	9.540E-28	0.0000	0.000E+00	0.0000	0.000E+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	8.014E-27	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	8.856E-22	0.0000	0.000E+00	0.0000	0.000E+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	2.878E-05	0.0002	3.452E-08	0.0000	0.000E+00	0.0000	5.657E-07	0.0000	1.284E-10	0.0000	2.122E-10	0.0000	2.938E-05	0.0002
Pa-231	8.726E-05	0.0007	7.086E-08	0.0000	0.000E+00	0.0000	1.716E-06	0.0000	3.756E-08	0.0000	4.586E-10	0.0000	8.908E-05	0.0007
Pb-210	4.035E-03	0.0305	6.947E-05	0.0005	0.000E+00	0.0000	7.797E-05	0.0006	3.056E-06	0.0000	4.669E-07	0.0000	4.186E-03	0.0317
Po-210	5.202E-27	0.0000	1.180E-28	0.0000	0.000E+00	0.0000	1.022E-28	0.0000	5.820E-30	0.0000	6.529E-31	0.0000	5.429E-27	0.0000
Ra-226	6.015E-03	0.0455	9.826E-05	0.0007	0.000E+00	0.0000	1.163E-04	0.0009	4.368E-06	0.0000	7.693E-07	0.0000	6.235E-03	0.0472
Th-230	6.151E-05	0.0005	9.048E-07	0.0000	0.000E+00	0.0000	1.191E-06	0.0000	4.014E-08	0.0000	7.394E-09	0.0000	6.365E-05	0.0005
U-234	6.060E-02	0.4584	8.008E-06	0.0001	0.000E+00	0.0000	1.192E-03	0.0090	4.610E-06	0.0000	1.342E-05	0.0001	6.182E-02	0.4676
U-235	2.683E-03	0.0203	3.552E-07	0.0000	0.000E+00	0.0000	5.276E-05	0.0004	2.051E-07	0.0000	5.938E-07	0.0000	2.736E-03	0.0207
U-238	5.593E-02	0.4230	7.387E-06	0.0001	0.000E+00	0.0000	1.100E-03	0.0083	4.254E-06	0.0000	1.239E-05	0.0001	5.705E-02	0.4315
Total	1.294E-01	0.9790	1.845E-04	0.0014	0.000E+00	0.0000	2.542E-03	0.0192	1.657E-05	0.0001	2.765E-05	0.0002	1.322E-01	1.0000

*Sum of all water independent and dependent pathways.

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Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
File : TESTPI1A.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 (Inh

```
alation excludes radon)
             Ground            Inhalation            Radon              Pl
ant            Meat               Milk               Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
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 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  4.233E-32 0.0000  0.000E+00 0.0000  0.000E+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  6.094E-30 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Po-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  1.911E-21 0.0000  0.000E+00 0.0000  0.000E+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  9.235E-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
 U-234   1.128E-26 0.0000  0.000E+00 0.0000  0.000E+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   2.748E-28 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
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 Total   2.004E-21 0.0000  0.000E+00 0.0000  0.000E+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 Indi
vidual Radionuclides (i) and Pathways (p)
                                        As mrem/yr and Fraction of Total
Dose At t = 1.000E+02 years
                                                     Water Dependent
Pathways
             Water             Fish              Radon              Pl
ant            Meat               Milk          All Pathways*
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
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 Ac-227  6.847E-06 0.0000  8.214E-09 0.0000  0.000E+00 0.0000  1.346E-
07 0.0000  3.061E-11 0.0000  5.053E-11 0.0000  6.990E-06 0.0000
```

```
 Pa-231  2.178E-04 0.0015  1.858E-07 0.0000  0.000E+00 0.0000  4.286E-
06 0.0000  8.421E-08 0.0000  1.195E-09 0.0000  2.224E-04 0.0016
 Pb-210  9.650E-04 0.0067  1.658E-05 0.0001  0.000E+00 0.0000  1.865E-
05 0.0001  7.317E-07 0.0000  1.118E-07 0.0000  1.001E-03 0.0070
 Po-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  1.446E-02 0.1008  2.367E-04 0.0017  0.000E+00 0.0000  2.797E-
04 0.0020  1.055E-05 0.0001  1.835E-06 0.0000  1.498E-02 0.1045
 Th-230  3.991E-04 0.0028  6.280E-06 0.0000  0.000E+00 0.0000  7.728E-
06 0.0001  2.802E-07 0.0000  4.966E-08 0.0000  4.134E-04 0.0029
 U-234   6.316E-02 0.4405  8.391E-06 0.0001  0.000E+00 0.0000  1.242E-
03 0.0087  4.809E-06 0.0000  1.399E-05 0.0001  6.443E-02 0.4493
 U-235   2.801E-03 0.0195  3.743E-07 0.0000  0.000E+00 0.0000  5.510E-
05 0.0004  2.160E-07 0.0000  6.192E-07 0.0000  2.858E-03 0.0199
 U-238   5.831E-02 0.4066  7.703E-06 0.0001  0.000E+00 0.0000  1.147E-
03 0.0080  4.438E-06 0.0000  1.292E-05 0.0001  5.949E-02 0.4148
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍ
ÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total   1.403E-01 0.9785  2.762E-04 0.0019  0.000E+00 0.0000  2.755E-
03 0.0192  2.111E-05 0.0001  2.953E-05 0.0002  1.434E-01 1.0000
*Sum of all water independent and dependent pathways.


RESRAD, Version 6.0       T« Limit = 30 days        03/06/2002  11:20
 Page  18
 Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
 File    : TESTPI1A.RAD

                         Total Dose Contributions TDOSE(i,p,t) for Indi
vidual Radionuclides (i) and Pathways (p)
                                   As mrem/yr and Fraction of Total
Dose At t = 3.000E+02 years
                                     Water Independent Pathways (Inh
alation excludes radon)
            Ground          Inhalation          Radon             Pl
ant            Meat              Milk              Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.  mrem/yr  fract.  mrem/yr  fract.  mrem/y
r  fract.  mrem/yr  fract.  mrem/yr  fract.  mrem/yr  fract.
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 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  1.596E-30 0.0000  0.000E+00 0.0000  0.000E+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+
```

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00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Po-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  1.789E-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  3.213E-21 0.0000  0.000E+00 0.0000  0.000E+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   4.419E-25 0.0000  0.000E+00 0.0000  0.000E+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   1.908E-29 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍ
ÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total   2.110E-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
```

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

```
                Water                Fish                Radon                Pl
ant                Meat                Milk            All Pathways*
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Ac-227  2.538E-08 0.0000  3.045E-11 0.0000  0.000E+00 0.0000  4.991E-
10 0.0000  1.136E-13 0.0000  1.874E-13 0.0000  2.591E-08 0.0000
 Pa-231  4.822E-04 0.0154  4.105E-07 0.0000  0.000E+00 0.0000  9.489E-
06 0.0003  1.874E-07 0.0000  2.641E-09 0.0000  4.923E-04 0.0157
 Pb-210  3.762E-06 0.0001  6.467E-08 0.0000  0.000E+00 0.0000  7.275E-
08 0.0000  2.855E-09 0.0000  4.362E-10 0.0000  3.903E-06 0.0001
 Po-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  2.720E-02 0.8664  4.431E-04 0.0141  0.000E+00 0.0000  5.265E-
04 0.0168  1.981E-05 0.0006  3.481E-06 0.0001  2.819E-02 0.8981
 Th-230  2.434E-03 0.0775  3.917E-05 0.0012  0.000E+00 0.0000  4.713E-
05 0.0015  1.748E-06 0.0001  3.075E-07 0.0000  2.523E-03 0.0804
 U-234   9.733E-05 0.0031  4.966E-07 0.0000  0.000E+00 0.0000  1.907E-
06 0.0001  2.674E-08 0.0000  1.838E-08 0.0000  9.977E-05 0.0032
 U-235   1.927E-05 0.0006  1.425E-08 0.0000  0.000E+00 0.0000  3.794E-
07 0.0000  6.697E-09 0.0000  7.289E-10 0.0000  1.967E-05 0.0006
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 U-238    5.993E-05 0.0019  8.015E-09 0.0000  0.000E+00 0.0000  1.181E-
06 0.0000  4.613E-09 0.0000  1.335E-08 0.0000  6.114E-05 0.0019
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ÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍ
 Total    3.030E-02 0.9651  4.832E-04 0.0154  0.000E+00 0.0000  5.867E-
04 0.0187  2.179E-05 0.0007  3.824E-06 0.0001  3.139E-02 1.0000
*Sum of all water independent and dependent pathways.


RESRAD, Version 6.0       T« Limit = 30 days        03/06/2002  11:20
 Page  19
 Summary : 1 pCi/g U in equilibrium &PG-8-08 Default Parameters
 File    : TESTPI1A.RAD

                        Total Dose Contributions TDOSE(i,p,t) for Indi
vidual Radionuclides (i) and Pathways (p)
                                  As mrem/yr and Fraction of Total
Dose At t = 1.000E+03 years
                                    Water Independent Pathways (Inh
alation excludes radon)
            Ground          Inhalation          Radon            Pl
ant            Meat              Milk              Soil
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
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 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  2.613E-25 0.0000  0.000E+00 0.0000  0.000E+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
 Po-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  4.488E-17 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 Th-230  6.379E-17 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 U-234   9.090E-21 0.0000  0.000E+00 0.0000  0.000E+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   9.025E-29 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
 U-238   4.079E-25 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000
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 Total   1.087E-16 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+
00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000  0.000E+00 0.0000

                         Total Dose Contributions TDOSE(i,p,t) for Indi
vidual Radionuclides (i) and Pathways (p)
                                        As mrem/yr and Fraction of Total
Dose At t = 1.000E+03 years
                                                        Water Dependent
Pathways
              Water              Fish               Radon              Pl
ant              Meat               Milk           All Pathways*
 Radio-  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄ
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 Nuclide  mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/y
r  fract.   mrem/yr  fract.   mrem/yr  fract.   mrem/yr  fract.
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 Ac-227  9.274E-18 0.0000  1.113E-20 0.0000  0.000E+00 0.0000  1.824E-
19 0.0000  4.152E-23 0.0000  6.849E-23 0.0000  9.468E-18 0.0000
 Pa-231  8.888E-04 0.0167  7.539E-07 0.0000  0.000E+00 0.0000  1.749E-
05 0.0003  3.485E-07 0.0000  4.854E-09 0.0000  9.074E-04 0.0171
 Pb-210  1.926E-15 0.0000  3.315E-17 0.0000  0.000E+00 0.0000  3.723E-
17 0.0000  1.463E-18 0.0000  2.232E-19 0.0000  1.998E-15 0.0000
 Po-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  3.629E-02 0.6835  5.922E-04 0.0112  0.000E+00 0.0000  7.023E-
04 0.0132  2.644E-05 0.0005  4.658E-06 0.0001  3.762E-02 0.7085
 Th-230  1.391E-02 0.2621  2.253E-04 0.0042  0.000E+00 0.0000  2.693E-
04 0.0051  1.006E-05 0.0002  1.775E-06 0.0000  1.442E-02 0.2716
 U-234   1.303E-04 0.0025  2.084E-06 0.0000  0.000E+00 0.0000  2.522E-
06 0.0000  9.301E-08 0.0000  1.650E-08 0.0000  1.350E-04 0.0025
 U-235   1.507E-05 0.0003  1.278E-08 0.0000  0.000E+00 0.0000  2.966E-
07 0.0000  5.921E-09 0.0000  8.227E-11 0.0000  1.539E-05 0.0003
 U-238   3.570E-08 0.0000  5.716E-10 0.0000  0.000E+00 0.0000  6.975E-
10 0.0000  2.650E-11 0.0000  4.646E-12 0.0000  3.700E-08 0.0000
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 Total   5.124E-02 0.9650  8.204E-04 0.0155  0.000E+00 0.0000  9.919E-
04 0.0187  3.695E-05 0.0007  6.454E-06 0.0001  5.309E-02 1.0000
*Sum of all water independent and dependent pathways.
```

```
                                   Dose/Source Ratios Summed Over All Pa
thways
                         Parent and Progeny Principal Radionuclide Contri
butions Indicated
Parent  Product  Branch                                  DSR(j,t)  (mrem/
yr)/(pCi/g)
  (i)      (j)   Fraction* 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
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ    ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ
 Ac-227  Ac-227  1.000E+00    1.424E-03 1.446E-03 1.479E-03 1.524E-03
1.306E-03 3.106E-04 1.152E-06 4.208E-16
Pa-231  Pa-231  1.000E+00    6.320E-04 6.622E-04 7.224E-04 9.314E-04 1
.513E-03 3.383E-03 7.523E-03 1.399E-02
 Pa-231  Ac-227  1.000E+00    6.225E-04 6.740E-04 7.806E-04 1.182E-03
2.446E-03 6.502E-03 1.436E-02 2.634E-02
 Pa-231  äDSR(j)              1.255E-03 1.336E-03 1.503E-03 2.114E-03
3.959E-03 9.885E-03 2.188E-02 4.033E-02
Pb-210  Pb-210  1.000E+00    2.198E-03 2.230E-03 2.283E-03 2.355E-03 2
.023E-03 4.872E-04 1.900E-06 9.677E-16
 Pb-210  Po-210  1.000E+00    7.240E-03 7.336E-03 7.493E-03 7.686E-03
6.538E-03 1.560E-03 6.082E-06 3.119E-15
 Pb-210  äDSR(j)              9.438E-03 9.566E-03 9.776E-03 1.004E-02
8.561E-03 2.047E-03 7.982E-06 4.086E-15
Po-210  Po-210  1.000E+00    5.999E-03 1.007E-03 2.819E-05 9.783E-11 1
.110E-26 0.000E+00 0.000E+00 0.000E+00
Ra-226  Ra-226  1.000E+00    2.601E-04 2.724E-04 2.969E-04 3.816E-04 6
.147E-04 1.333E-03 2.722E-03 3.762E-03
 Ra-226  Pb-210  1.000E+00    7.689E-04 8.315E-04 9.605E-04 1.442E-03
2.905E-03 7.084E-03 1.334E-02 1.755E-02
 Ra-226  Po-210  1.000E+00    2.478E-03 2.677E-03 3.089E-03 4.621E-03
9.231E-03 2.223E-02 4.159E-02 5.561E-02
 Ra-226  äDSR(j)              3.507E-03 3.781E-03 4.347E-03 6.445E-03
1.275E-02 3.064E-02 5.765E-02 7.692E-02
Th-230  Th-230  1.000E+00    4.678E-06 4.906E-06 5.360E-06 6.950E-06 1
.147E-05 2.707E-05 6.978E-05 1.995E-04
 Th-230  Ra-226  1.000E+00    1.294E-06 1.422E-06 1.696E-06 2.839E-06
7.642E-06 4.085E-05 2.429E-04 1.439E-03
 Th-230  Pb-210  1.000E+00    2.539E-06 2.892E-06 3.684E-06 7.396E-06
2.671E-05 1.895E-04 1.173E-03 6.706E-03
 Th-230  Po-210  1.000E+00    8.140E-06 9.265E-06 1.179E-05 2.360E-05
8.434E-05 5.880E-04 3.673E-03 2.114E-02
 Th-230  äDSR(j)              1.665E-05 1.849E-05 2.253E-05 4.078E-05
1.302E-04 8.455E-04 5.159E-03 2.949E-02
U-234   U-234   1.000E+00    9.573E-02 9.794E-02 1.020E-01 1.126E-01 1
.264E-01 1.318E-01 1.352E-04 8.489E-24
 U-234   Th-230  1.000E+00    2.297E-07 2.496E-07 2.870E-07 4.275E-07
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8.757E-07 2.563E-06 5.151E-06 5.093E-06
 U-234   Ra-226  1.000E+00    6.272E-09 7.139E-09 9.111E-09 1.818E-08
6.603E-08 5.110E-07 3.712E-06 1.396E-05
 U-234   Pb-210  1.000E+00    4.635E-09 5.458E-09 7.609E-09 1.854E-08
1.013E-07 1.374E-06 1.439E-05 6.162E-05
 U-234   Po-210  1.000E+00    1.366E-08 1.606E-08 2.251E-08 5.563E-08
3.110E-07 4.306E-06 4.553E-05 1.954E-04
 U-234   äDSR(j)              9.573E-02 9.794E-02 1.020E-01 1.126E-01
1.264E-01 1.318E-01 2.040E-04 2.761E-04
U-235   U-235   1.000E+00    9.203E-02 9.415E-02 9.802E-02 1.083E-01 1
.215E-01 1.267E-01 1.301E-04 8.184E-24
 U-235   Pa-231  1.000E+00    1.128E-05 1.221E-05 1.409E-05 2.120E-05
4.398E-05 1.298E-04 2.599E-04 2.376E-04
 U-235   Ac-227  1.000E+00    4.385E-06 4.952E-06 6.199E-06 1.173E-05
3.642E-05 1.756E-04 4.844E-04 4.463E-04
 U-235   äDSR(j)              9.204E-02 9.417E-02 9.804E-02 1.083E-01
1.216E-01 1.270E-01 8.744E-04 6.839E-04
U-238   U-238   1.000E+00    8.833E-02 9.036E-02 9.408E-02 1.039E-01 1
.166E-01 1.216E-01 1.249E-04 7.855E-24
 U-238   U-234   1.000E+00    5.564E-06 5.970E-06 6.793E-06 9.740E-06
1.810E-05 4.502E-05 1.229E-07 2.459E-26
 U-238   Th-230  1.000E+00    3.003E-11 3.484E-11 2.962E-11 4.222E-11
9.329E-11 4.947E-10 1.721E-09 1.661E-09
 U-238   Ra-226  1.000E+00    2.058E-10 2.410E-10 1.998E-10 2.237E-10
2.968E-10 3.329E-10 7.615E-10 3.859E-09
 U-238   Pb-210  1.000E+00    9.385E-10 1.099E-09 9.108E-10 1.019E-09
1.345E-09 1.417E-09 2.704E-09 1.681E-08
 U-238   Po-210  1.000E+00    2.980E-09 3.485E-09 2.891E-09 3.237E-09
4.265E-09 4.495E-09 8.568E-09 5.333E-08
 U-238   äDSR(j)              8.833E-02 9.037E-02 9.408E-02 1.039E-01
1.167E-01 1.216E-01 1.250E-04 7.566E-08
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*Branch Fraction is the cumulative factor for the j't principal radio nuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).

The DSR includes contributions from associated (half-life ó 30 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g

Basic Radiation Dose Limit = 25 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
 ÄÄÄÄÄÄÄ     ÄÄÄÄÄÄÄÄÄÄ   ÄÄÄÄÄÄÄÄÄÄ   ÄÄÄÄÄÄÄÄÄÄ   ÄÄÄÄÄÄÄÄÄÄ   ÄÄÄÄÄÄÄÄÄÄ
   ÄÄÄÄÄÄÄÄÄÄ   ÄÄÄÄÄÄÄÄÄÄ   ÄÄÄÄÄÄÄÄÄÄ
 Ac-227      1.755E+04   1.729E+04   1.690E+04   1.640E+04   1.915E+04
   8.048E+04   2.171E+07  *7.230E+13
 Pa-231      1.993E+04   1.871E+04   1.663E+04   1.183E+04   6.314E+03
   2.529E+03   1.143E+03   6.199E+02
 Pb-210      2.649E+03   2.613E+03   2.557E+03   2.490E+03   2.920E+03
   1.221E+04   3.132E+06  *7.631E+13
 Po-210      4.167E+03   2.483E+04   8.869E+05   2.555E+11  *4.492E+15
  *4.492E+15  *4.492E+15  *4.492E+15
 Ra-226      7.128E+03   6.612E+03   5.751E+03   3.879E+03   1.961E+03
   8.158E+02   4.336E+02   3.250E+02
 Th-230      1.501E+06   1.352E+06   1.109E+06   6.130E+05   1.921E+05
   2.957E+04   4.846E+03   8.478E+02
 U-234       2.611E+02   2.553E+02   2.452E+02   2.219E+02   1.978E+02
   1.897E+02   1.225E+05   9.055E+04
 U-235       2.716E+02   2.655E+02   2.550E+02   2.308E+02   2.056E+02
   1.968E+02   2.859E+04   3.656E+04
 U-238       2.830E+02   2.766E+02   2.657E+02   2.405E+02   2.143E+02
   2.055E+02   2.000E+05  *3.360E+05
 íííííííí    íííííííííí   íííííííííí   íííííííííí   íííííííííí   íííííííííí
   íííííííííí   íííííííííí   íííííííííí
 *At specific activity limit

            Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
            and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
         at tmin = time of minimum single radionuclide soil guideline
     and at tmax = time of maximum total dose =   190.5 ñ 0.4 years

Nuclide  Initial          tmin        DSR(i,tmin) G(i,tmin) DSR(i,tmax)
G(i,tmax)
   (i)     pCi/g         (years)                   (pCi/g)
  (pCi/g)
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄ
 ÄÄÄÄÄÄÄÄÄÄ
 Ac-227  2.250E-02     9.84 ñ 0.02    1.524E-03  1.640E+04  2.768E-05
 9.030E+05
 Pa-231  2.250E-02     1.000E+03      4.033E-02  6.199E+02  1.596E-02
 1.567E+03
 Pb-210  4.890E-01     9.49 ñ 0.02    1.004E-02  2.489E+03  1.860E-04
 1.344E+05
 Po-210  4.890E-01     0.000E+00      5.999E-03  4.167E+03  0.000E+00
*4.492E+15
 Ra-226  4.890E-01      837 ñ 2       7.782E-02  3.212E+02  4.539E-02
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5.507E+02
Th-230  4.890E-01     1.000E+03      2.949E-02  8.478E+02  2.447E-03
1.021E+04
U-234   4.890E-01    190.5 ñ 0.4     1.318E-01  1.896E+02  1.318E-01
1.896E+02
U-235   2.250E-02    190.5 ñ 0.4     1.274E-01  1.962E+02  1.274E-01
1.962E+02
U-238   4.890E-01    190.5 ñ 0.4     1.218E-01  2.053E+02  1.218E-01
2.053E+02
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ííííííííí
*At specific activity limit


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 File    : TESTPI1A.RAD

                                  Individual Nuclide Dose Summed Over All
 Pathways
                                    Parent Nuclide and Branch Fraction In
dicated
Nuclide Parent   BRF(i)                                        DOSE(j,t),
mrem/yr
   (j)     (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
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ    ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ
ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ
 Ac-227  Ac-227  1.000E+00    3.205E-05 3.252E-05 3.328E-05 3.430E-05
2.938E-05 6.990E-06 2.591E-08 9.468E-18
 Ac-227  Pa-231  1.000E+00    1.401E-05 1.517E-05 1.756E-05 2.660E-05
5.503E-05 1.463E-04 3.230E-04 5.927E-04
 Ac-227  U-235   1.000E+00    9.867E-08 1.114E-07 1.395E-07 2.640E-07
8.195E-07 3.950E-06 1.090E-05 1.004E-05
 Ac-227  äDOSE(j):            4.616E-05 4.780E-05 5.098E-05 6.116E-05
8.523E-05 1.572E-04 3.339E-04 6.027E-04
Pa-231  Pa-231  1.000E+00    1.422E-05 1.490E-05 1.625E-05 2.096E-05 3
.405E-05 7.611E-05 1.693E-04 3.147E-04
 Pa-231  U-235   1.000E+00    2.537E-07 2.746E-07 3.171E-07 4.771E-07
9.896E-07 2.920E-06 5.848E-06 5.346E-06
 Pa-231  äDOSE(j):            1.447E-05 1.517E-05 1.657E-05 2.143E-05
3.504E-05 7.903E-05 1.751E-04 3.200E-04
Pb-210  Pb-210  1.000E+00    1.075E-03 1.091E-03 1.116E-03 1.152E-03 9
.893E-04 2.382E-04 9.289E-07 4.732E-16
 Pb-210  Ra-226  1.000E+00    3.760E-04 4.066E-04 4.697E-04 7.050E-04
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1.421E-03 3.464E-03 6.524E-03 8.583E-03
 Pb-210  Th-230  1.000E+00    1.242E-06 1.414E-06 1.801E-06 3.617E-06
1.306E-05 9.268E-05 5.735E-04 3.279E-03
 Pb-210  U-234   1.000E+00    2.267E-09 2.669E-09 3.721E-09 9.065E-09
4.953E-08 6.720E-07 7.039E-06 3.013E-05
 Pb-210  U-238   1.000E+00    4.589E-10 5.375E-10 4.454E-10 4.983E-10
6.575E-10 6.927E-10 1.322E-09 8.221E-09
 Pb-210  äDOSE(j):           1.452E-03 1.499E-03 1.588E-03 1.860E-03
2.423E-03 3.796E-03 7.105E-03 1.189E-02
Po-210  Pb-210  1.000E+00    3.541E-03 3.587E-03 3.664E-03 3.758E-03 3
.197E-03 7.628E-04 2.974E-06 1.525E-15
 Po-210  Po-210  1.000E+00    2.934E-03 4.924E-04 1.378E-05 4.784E-11
5.429E-27 0.000E+00 0.000E+00 0.000E+00
 Po-210  Ra-226  1.000E+00    1.212E-03 1.309E-03 1.511E-03 2.260E-03
4.514E-03 1.087E-02 2.034E-02 2.719E-02
 Po-210  Th-230  1.000E+00    3.981E-06 4.531E-06 5.766E-06 1.154E-05
4.124E-05 2.875E-04 1.796E-03 1.034E-02
 Po-210  U-234   1.000E+00    6.682E-09 7.855E-09 1.101E-08 2.721E-08
1.521E-07 2.106E-06 2.227E-05 9.556E-05
 Po-210  U-238   1.000E+00    1.457E-09 1.704E-09 1.414E-09 1.583E-09
2.085E-09 2.198E-09 4.190E-09 2.608E-08
 Po-210  äDOSE(j):           7.690E-03 5.393E-03 5.194E-03 6.030E-03
7.752E-03 1.192E-02 2.216E-02 3.763E-02
Ra-226  Ra-226  1.000E+00    1.272E-04 1.332E-04 1.452E-04 1.866E-04 3
.006E-04 6.520E-04 1.331E-03 1.840E-03
 Ra-226  Th-230  1.000E+00    6.329E-07 6.955E-07 8.294E-07 1.388E-06
3.737E-06 1.998E-05 1.188E-04 7.038E-04
 Ra-226  U-234   1.000E+00    3.067E-09 3.491E-09 4.455E-09 8.892E-09
3.229E-08 2.499E-07 1.815E-06 6.825E-06
 Ra-226  U-238   1.000E+00    1.006E-10 1.179E-10 9.769E-11 1.094E-10
1.451E-10 1.628E-10 3.724E-10 1.887E-09
 Ra-226  äDOSE(j):           1.278E-04 1.339E-04 1.460E-04 1.880E-04
3.044E-04 6.722E-04 1.452E-03 2.550E-03
Th-230  Th-230  1.000E+00    2.288E-06 2.399E-06 2.621E-06 3.398E-06 5
.609E-06 1.324E-05 3.412E-05 9.758E-05
 Th-230  U-234   1.000E+00    1.123E-07 1.221E-07 1.404E-07 2.091E-07
4.282E-07 1.253E-06 2.519E-06 2.491E-06
 Th-230  U-238   1.000E+00    1.468E-11 1.704E-11 1.448E-11 2.064E-11
4.562E-11 2.419E-10 8.416E-10 8.123E-10
 Th-230  äDOSE(j):           2.400E-06 2.521E-06 2.762E-06 3.607E-06
6.037E-06 1.449E-05 3.664E-05 1.001E-04
U-234   U-234   1.000E+00    4.681E-02 4.789E-02 4.986E-02 5.508E-02 6
.182E-02 6.443E-02 6.614E-05 4.151E-24
 U-234   U-238   1.000E+00    2.721E-06 2.920E-06 3.322E-06 4.763E-06
8.851E-06 2.201E-05 6.011E-08 1.203E-26
 U-234   äDOSE(j):           4.682E-02 4.789E-02 4.986E-02 5.509E-02
6.183E-02 6.445E-02 6.620E-05 4.163E-24
U-235   U-235   1.000E+00    2.071E-03 2.118E-03 2.205E-03 2.437E-03 2
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.735E-03 2.851E-03 2.928E-06 1.841E-25
U-238   U-238   1.000E+00    4.319E-02 4.419E-02 4.600E-02 5.082E-02 5
.704E-02 5.946E-02 6.107E-05 3.841E-24
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 BRF(i) is the branch fraction of the parent nuclide.


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                                        Individual Nuclide Soil Concentrat
ion
                                     Parent Nuclide and Branch Fraction In
dicated
Nuclide Parent   BRF(i)                                          S(j,t), p
Ci/g
   (j)     (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
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ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄ
 Ac-227  Ac-227  1.000E+00    2.250E-02 2.175E-02 2.031E-02 1.600E-02
8.086E-03 7.425E-04 8.084E-07 3.444E-17
 Ac-227  Pa-231  1.000E+00    0.000E+00 7.035E-04 2.037E-03 6.009E-03
1.301E-02 1.766E-02 1.258E-02 3.335E-03
 Ac-227  U-235   1.000E+00    0.000E+00 7.332E-09 6.180E-08 5.488E-07
2.714E-06 5.833E-06 4.346E-06 1.152E-06
 Ac-227  äS(j):               2.250E-02 2.245E-02 2.235E-02 2.201E-02
2.110E-02 1.841E-02 1.259E-02 3.336E-03
Pa-231  Pa-231  1.000E+00    2.250E-02 2.246E-02 2.237E-02 2.208E-02 2
.126E-02 1.861E-02 1.274E-02 3.375E-03
 Pa-231  U-235   1.000E+00    0.000E+00 4.609E-07 1.297E-06 3.493E-06
6.172E-06 6.414E-06 4.398E-06 1.166E-06
 Pa-231  äS(j):               2.250E-02 2.246E-02 2.237E-02 2.208E-02
2.126E-02 1.862E-02 1.274E-02 3.376E-03
Pb-210  Pb-210  1.000E+00    4.890E-01 4.724E-01 4.408E-01 3.459E-01 1
.731E-01 1.533E-02 1.507E-05 4.484E-16
 Pb-210  Ra-226  1.000E+00    0.000E+00 1.492E-02 4.316E-02 1.269E-01
2.722E-01 3.576E-01 2.329E-01 4.505E-02
 Pb-210  Th-230  1.000E+00    0.000E+00 3.252E-06 2.855E-05 2.916E-04
2.096E-03 1.232E-02 3.632E-02 5.959E-02
 Pb-210  U-234   1.000E+00    0.000E+00 9.635E-12 2.475E-10 7.736E-09
1.330E-07 1.415E-06 4.964E-06 8.488E-06
 Pb-210  U-238   1.000E+00    0.000E+00 6.777E-18 5.144E-16 5.080E-14
2.251E-12 4.889E-11 2.128E-10 3.807E-10
```

```
 Pb-210  äS(j):                4.890E-01 4.873E-01 4.839E-01 4.731E-01
4.474E-01 3.853E-01 2.692E-01 1.047E-01
Po-210  Pb-210  1.000E+00    0.000E+00 4.006E-01 4.457E-01 3.513E-01 1
.758E-01 1.557E-02 1.530E-05 4.554E-16
 Po-210  Po-210  1.000E+00    4.890E-01 7.798E-02 1.983E-03 5.199E-09
5.878E-25 0.000E+00 0.000E+00 0.000E+00
 Po-210  Ra-226  1.000E+00    0.000E+00 8.099E-03 3.551E-02 1.207E-01
2.687E-01 3.566E-01 2.324E-01 4.496E-02
 Po-210  Th-230  1.000E+00    0.000E+00 1.330E-06 2.008E-05 2.622E-04
2.026E-03 1.219E-02 3.614E-02 5.938E-02
 Po-210  U-234   1.000E+00    0.000E+00 3.191E-12 1.535E-10 6.653E-09
1.270E-07 1.399E-06 4.939E-06 8.459E-06
 Po-210  U-238   1.000E+00    0.000E+00 1.890E-18 2.854E-16 4.179E-14
2.120E-12 4.822E-11 2.117E-10 3.794E-10
 Po-210  äS(j):                4.890E-01 4.866E-01 4.832E-01 4.722E-01
4.464E-01 3.843E-01 2.685E-01 1.043E-01
Ra-226  Ra-226  1.000E+00    4.890E-01 4.879E-01 4.856E-01 4.777E-01 4
.558E-01 3.867E-01 2.419E-01 4.679E-02
 Ra-226  Th-230  1.000E+00    0.000E+00 2.116E-04 6.330E-04 2.091E-03
6.108E-03 1.858E-02 4.334E-02 6.642E-02
 Ra-226  U-234   1.000E+00    0.000E+00 9.329E-10 8.042E-09 7.736E-08
4.848E-07 2.268E-06 5.961E-06 9.464E-06
 Ra-226  U-238   1.000E+00    0.000E+00 8.725E-16 2.210E-14 6.590E-13
1.007E-11 8.419E-11 2.574E-10 4.247E-10
 Ra-226  äS(j):                4.890E-01 4.881E-01 4.862E-01 4.797E-01
4.619E-01 4.053E-01 2.852E-01 1.132E-01
Th-230  Th-230  1.000E+00    4.890E-01 4.888E-01 4.885E-01 4.875E-01 4
.845E-01 4.742E-01 4.458E-01 3.593E-01
 Th-230  U-234   1.000E+00    0.000E+00 4.265E-06 1.202E-05 3.258E-05
5.886E-05 6.778E-05 6.385E-05 5.146E-05
 Th-230  U-238   1.000E+00    0.000E+00 5.982E-12 4.953E-11 4.137E-10
1.759E-09 3.021E-09 2.880E-09 2.321E-09
 Th-230  äS(j):                4.890E-01 4.889E-01 4.886E-01 4.875E-01
4.846E-01 4.742E-01 4.459E-01 3.594E-01
U-234   U-234   1.000E+00    4.890E-01 4.591E-01 4.046E-01 2.600E-01 7
.351E-02 8.833E-04 2.882E-09 1.809E-28
 U-234   U-238   1.000E+00    0.000E+00 1.301E-06 3.441E-06 7.371E-06
6.252E-06 2.505E-07 2.453E-12 5.136E-31
 U-234   äS(j):                4.890E-01 4.591E-01 4.046E-01 2.600E-01
7.352E-02 8.836E-04 2.885E-09 1.814E-28
U-235   U-235   1.000E+00    2.250E-02 2.112E-02 1.862E-02 1.196E-02 3
.383E-03 4.066E-05 1.327E-10 8.348E-30
U-238   U-238   1.000E+00    4.890E-01 4.591E-01 4.046E-01 2.600E-01 7
.352E-02 8.836E-04 2.885E-09 1.814E-28
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ    ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ
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 BRF(i) is the branch fraction of the parent nuclide.
RESMAIN5.EXE execution time =  137.80 seconds
```

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TECHNICAL MEMORANDUM

March 6, 2002

Originator: A.H. Thatcher, CHP, Senior HP Scientist

Subject: ***Derivation of Surface Soil DCGLs for KMTC***

Revision: 2

ENDORSEMENT: This document contains the results of research and technical analysis which have been reviewed and approved for publication by the Technical Director, NEXTEP Environmental, Inc.

H. Newman by Jo Johnson 3-6-02

Harry J. Newman, CHP, Technical Director — Date

Introduction:

This document provides information regarding the modeling and parameters used in release limits for outdoor areas where the soil survey unit lies on the surface of the ground. As this modeling supports MARSSIM activities, the release limits will be referred to as Derived Concentration Guideline Levels (DCGL). The characterization data for the outdoor areas of the Technical Center indicates that elevated quantities of uranium and thorium contamination exist at several locations. The data also reveals that radium 226 may not be in equilibrium with uranium 238. DCGLs are therefore derived for:

- Thorium-232 and progeny
- The uranium series to uranium 234
- Ra-226 and progeny (includes dose contribution from Th-230)

The use of three DCGLs allows flexibility whereby higher or lower than expected concentrations of radium 226 (in comparison to uranium 238) can be accommodated.

The remaining section of this document provides the area factors for the three DCGLs.

General Method for Calculating DCGLs:

The software code RESRAD[1] was used to provide pathway modeling, incorporating guidance on parameter values contained in NRC Policy and Guidance Directive PG-8-08[2] and the "Method for Surveying and Averaging Concentrations of Thorium in Contaminated Subsurface Soil"[3]. Where specific guidance is not provided, and sufficient justification for appropriate alternate parameter values are presented and justified, conservative modeling parameters are selected such as the default values from RESRAD.

The computer code DandD[4] is acknowledged as the default code for performing calculations to support release criteria for decommissioning activities by the USNRC. However, the DandD code lacks the ability to model complex soil columns for contaminant transport considerations, thus making the RESRAD code the preferred code for the Technical Center analysis.

The following bullets describe key parameters and criteria used for this modeling.

- **ICRP 72[5] Ingestion Dose Coefficients**– The ingestion and inhalation dose conversion factors (DCFs) from ICRP 56+ documents are summarized in ICRP 72 and applied in this analysis. The ICRP 72 DCFs were developed specifically for calculation of dose to members of the public. ICRP 72 retains the gastrointestinal tract model used in ICRP 30, but also utilizes the updated tissue weighting factors presented in ICRP 60, and revised biokinetic information to reflect increased knowledge in the uptake and retention of various elements in the body. ICRP 72 inhalation factors represent the application of an updated lung uptake and retention model.
- **Surface modeling** – Uniform contamination is assumed to exist to a depth of 30 cm (1 foot) over an area of 10,000 m^2. A 10,000 m^2 area is used as this effectively represents an infinite slab for external exposures. The exposure characteristics for the modeling are for a residential scenario.
- **Saturated hydraulic conductivity** – The upper saturated soil column is located within the Garber-Wellington aquifer. This layer is described as orange-brown to red-brown fine-grained sandstone, irregularly bedded with red-brown shale and some chert and mudstone conglomerate[6]. This highly compacted layer is characterized as a sandy clay with a hydraulic conductivity of less than 100 ft/year[7]. In this analysis, a conservative saturated hydraulic conductivity value of 70 m/y[8] is used to account for potentially greater velocities due to fractured flow.

---

[1] Yu, C., A.J. Zielen, J.J. Cheng, Y.C. Yuan, L.G. Jones, D.J. LePoire, Y.Y. Wang, C.O. Loureiro, E. Gnanapragasam, E. Faillace, A. Wallo III, W.A. Williams, and H. Peterson, *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.61*, ANL/EAD/LD-2, Argonne National laboratory, Argonne, Illinois, 1993.

[2] USNRC. Scenarios for Assessing Potential Doses Associated with Residual Radioactivity. Policy and Guidance Directive PG-8-08.

[3] USNRC. Method for Surveying and Averaging Concentrations of Thorium in contaminated Subsurface Soil. Prepared by NRC staff in connection with the review of the AAR "Site Remediation Plan for the former Brooks and Perkins, Inc. Site". 1997.

[4] USNRC. DandD computer code to support license termination, version 1.0. Sandia National Laboratory.

[5] ICRP, Age-Dependent Doses to Members of the Public From Intake of Radionuclides: Part 5 Compilation of Ingestion and Inhalation Dose Coefficients, ICRP Publication 72, Oxford, Pergamon Press, 1995.

[6] Decommissioning Plan for Kerr-McGee Technical Center, March 2001.

[7] Personal communication with Roy Widman and Jim Crawford, Kerr-McGee, 12/6/00.

[8] Table E.2, RESRAD manual.

- **Distribution coefficient (Kd)** – A total of four soil layers are included in the analysis. Those layers are the contaminated layer, the upper unsaturated soil layer, the lower unsaturated soil layer, and the saturated soil column. For all layers except the lower unsaturated soil layer, NUREG 5512 default Kd values are used. For the lower unsaturated soil layer, the recommended Kd value for clay from Sheppard and Thibault[9] is used.

  In order to more accurately classify the unsaturated soil layers, a grain size and hydrometer analysis was performed on an upper soil sample representing the top meter of soil and a lower soil sample above the saturated soil column. The results of this analysis are included as Attachment 1. Classifying the soils in a manner similar to Sheppard and Thibault, the upper soil is classified as a clay loam with similar sized fractions of sand, clay and silt. The lower soil of the unsaturated soil column is similarly classified as a silty clay with a silt sized fraction of 58% and a clay sized fraction of 40%. The limited permeability and significant fraction of silt and clay sized particles in the unsaturated soil column provide an indication of the conservative nature of the use of the default Kds for the upper soil column.

DCGLw for Thorium-232 and progeny

Attachment 2 provides the RESRAD output for the modeling results and the specific parameters used. Figure 1 displays the contribution to dose over time as well. The major pathways are external exposure and ingestion of plants. The analysis predicted a peak dose of 4.682 mrem/y/pCi/g, or a 5.3 pCi/g limit to meet a 25 mrem/y standard.

DCGLw for Total Uranium (to Uranium 234)

Attachment 3 provides the RESRAD output for the modeling results and the specific parameters used. The graph below displays the contribution to dose over time as well. Over 50% of the dose is initially delivered via plant ingestion. The analysis predicted a peak dose of 0.1093 mrem/y/pCi/g, or a 228 pCi/g limit to meet a 25 mrem/y standard. The significantly lower contribution from the uranium series to uranium 234 (as compared to natural thorium) is due to the lack of any significant gamma sources for external exposure from these radionuclides.

DCGLw for Ra-226 and Progeny (including Th-230)

Attachment 4 provides the RESRAD output for the modeling results and the specific parameters used. The graph below displays the contribution to dose over time as well. The overwhelming contribution to dose is from radium 226 via external exposure and plant ingestion. Lead 210 is also predicted to contribute to exposure through the plant pathway. The analysis predicted a peak dose of 7.064 mrem/y/pCi/g, or a 3.5 pCi/g limit to meet a 25 mrem/y standard.

[9] Sheppard, M.I. and Thibault, D.H. Default soil solid/liquid partition coefficients, Kds, for four major soil types: a compendium. Health Physics. Vol. 59 (4), pp. 471-482. 1990. This reference is predominately used as the reference for the Kd recommendations from RESRAD.

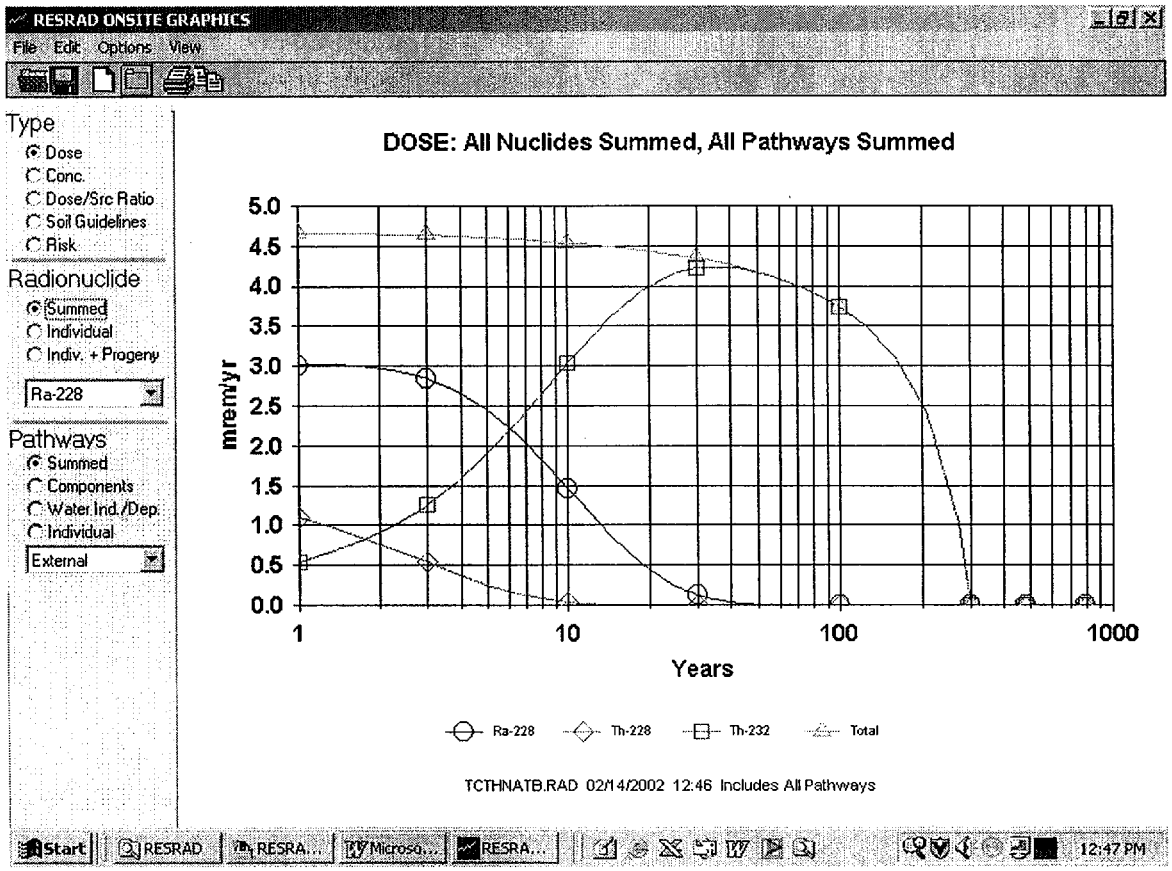


Figure 1
Dose Due to Thorium –232 and Progeny

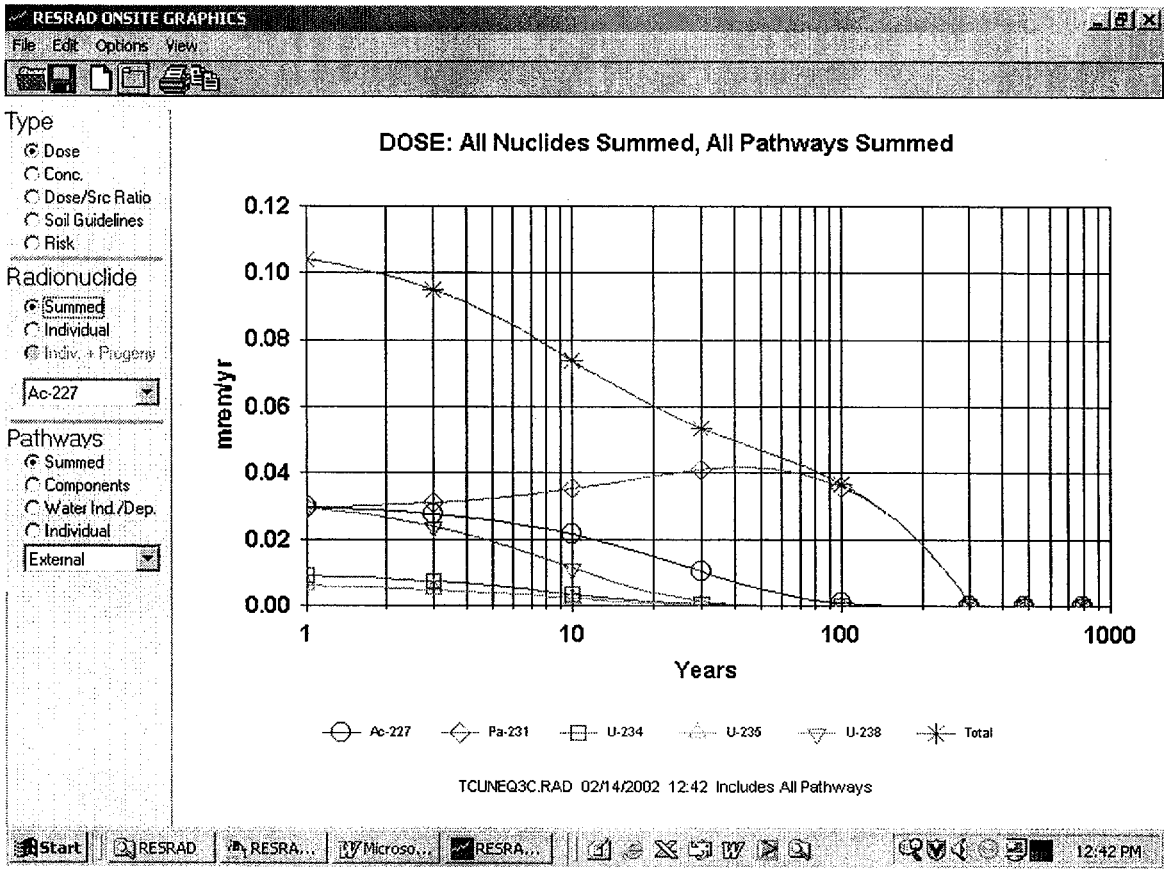


Figure 2
Dose Due to Total Uranium (to U-234)

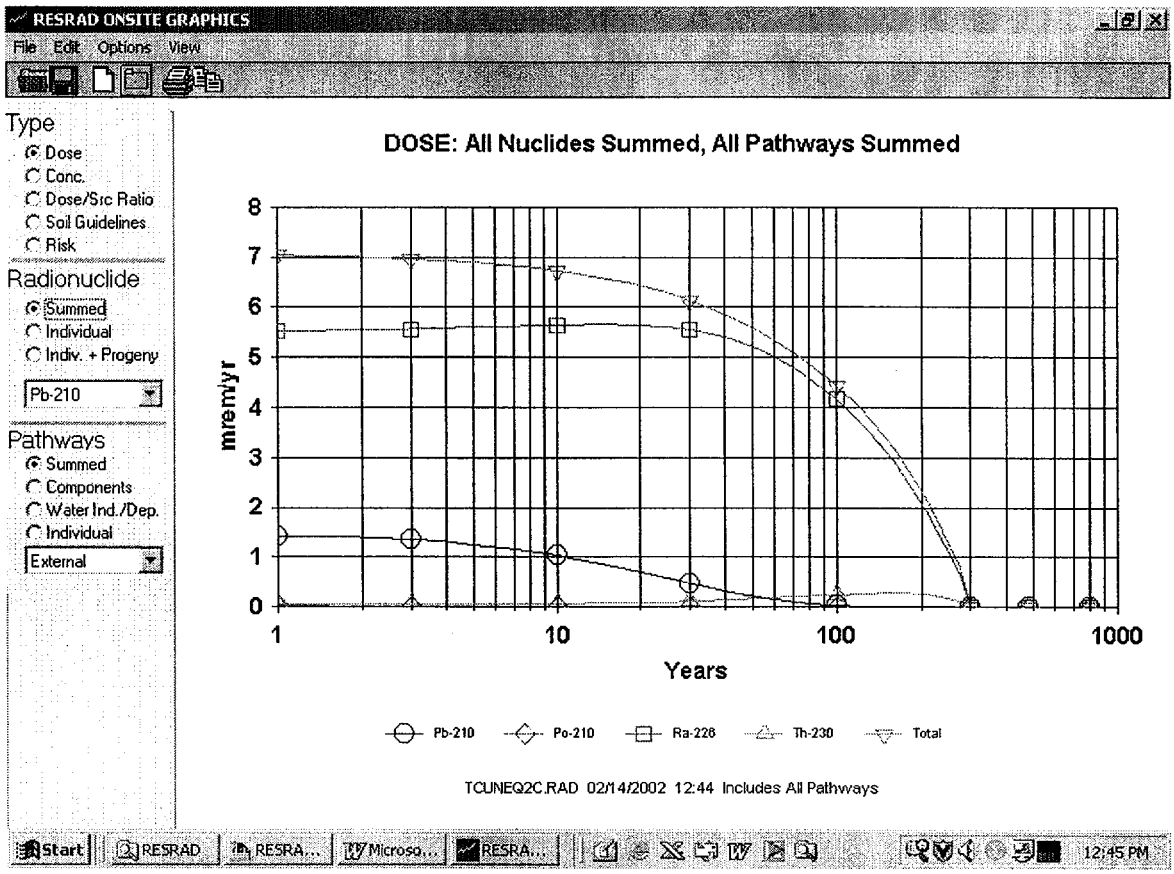


Figure 3
Dose Due to Th-230 and Progeny

Area Factor Results

Successive RESRAD computations were run for each of the three nuclide series described above while varying the contaminated area from 10,000 m^2 down to 1 m^2 to determine the area factors for each nuclide. Figure 4 provides the individual curves for each of the DCGLs detailed in this document. These area factor curves will be used to evaluate elevated measurements significantly greater than the DCGL. In practice, the area factor for an individual release limit may be determined by interpolation from the graph, by developing an equation of the line for each area factor curve, or by performing actual RESRAD computations for the specific surface area.

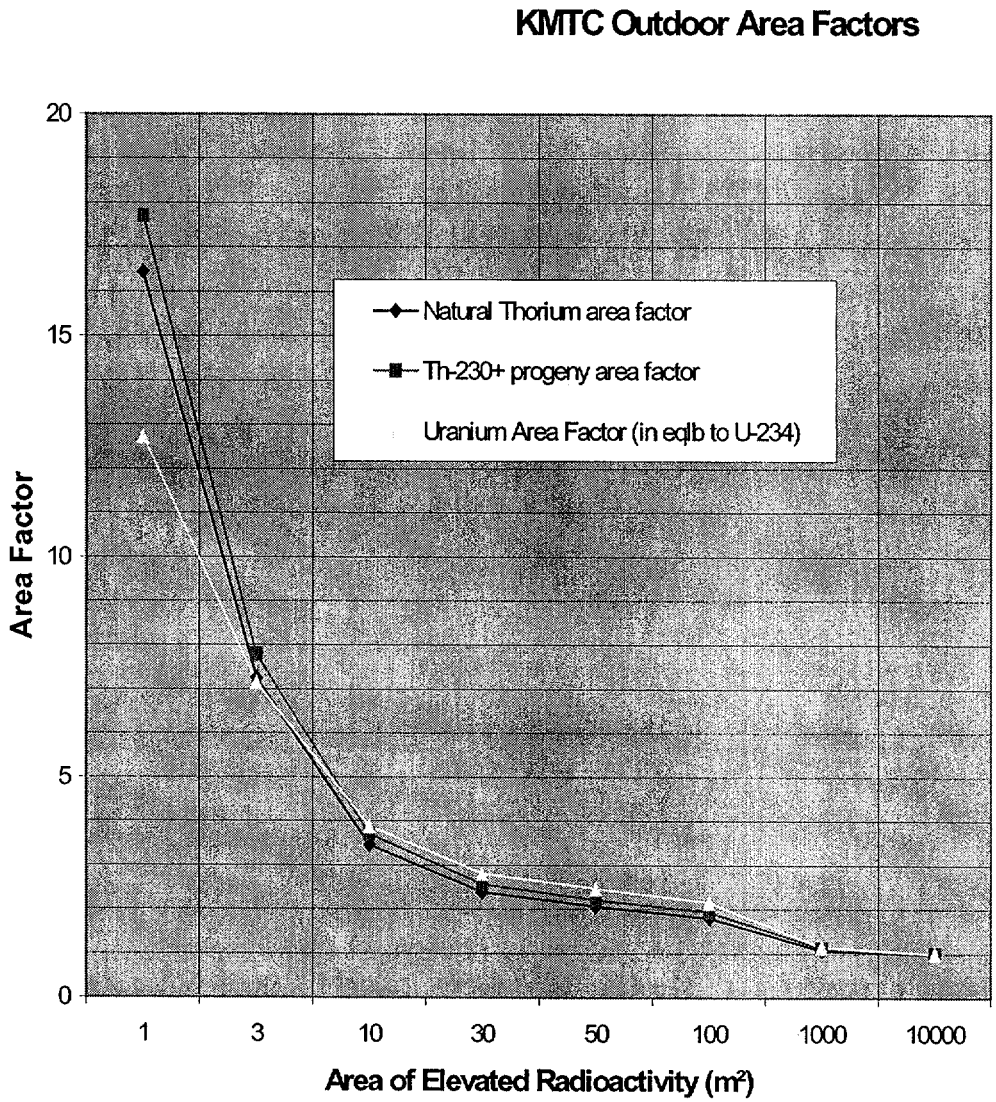
The computed equations for the three curves in Figure 4 are as follows:

Natural Thorium Area Factor = $14.22*(\text{area of elevated activity})^{-0.5287}$

Uranium Series through U-234 Area Factor = $11.76*(\text{area of elevated activity})^{-0.4223}$

Th-230 and progeny Area Factor = $15.27*(\text{area of elevated activity})^{-0.5286}$

Figure 4
Area Factor Calculations



Conclusions/Recommendations

Guidance on application and use of the unity rule for three separate DCGLs is outlined in MARSSIM, appendix I.11. The individual surface DCGLs are summarized in Table 1.

Table 1
Calculated Surface Soil DCGLs for KMTC

Nuclide Series	Dose Conversion Factor (mrem/y/pCi/g)	DCGLw (pCi/g)
Thorium-232 and progeny	4.682	5.3
Total Uranium (to Uranium 234)	0.1093	228
Ra-226 and progeny	7.064	3.5

The assumptions used in calculating the dose are intended to apply to the average member of a critical group or to the maximally exposed member of the general population. The primary pathway for exposure is generally the external pathway and to a lesser extent the ingestion of contaminated foodstuffs.

The use of area factors allows for the evaluation of higher than expected contaminant concentrations in areas significantly smaller than the modeled 10,000 m^2. In practice, the area factor for a specific area may be determined by interpolation from the graph, by using the given equations for the curves, or by performing RESRAD computations.

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5358 S. 125TH EAST AVE., STE B, TULSA, OK 74146 (918) 459-2700

Acct. No:	0220CIM11 File No: CIM11		
Report Date:	12/19/00	Date Sampled:	11/20/00
Project:	Client Information	Sampled By:	Mike G.
Location:	Tech Center 778.1-110.2	By Order Of:	Karen Morgan
Arch./Engr:		Order No:	
Client:	Cimarron Corp.	Quantity Represented:	Red Sandy Clayey Silt
REPORT:	GRAIN SIZE ANALYSIS OF SOILS	LAB NO:	E-2487
Specification:		Test Method:	ASTM D422

TEST RESULTS

SIEVE ANALYSIS	
SIEVE SIZE	PERCENT PASSING
No. 4	100.0
No. 10	100.0
No. 40	99.5
No. 200	97.9
HYDROMETER ANALYSIS	
SMALLER THAN	PERCENT
0.074 mm	97.4
0.005 mm	39.9
0.001 mm	21.9

Charge: Cimarron Corp. Attn: Karen Morgan
Orig. Same
1-cc Laboratory

Unit Rates for this Report		
Units	@	Amount
S506 @ 100.00		
S504 @ 45.00		

RECEIVED
JAN 22 2001

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5358 S. 125TH EAST AVE., STE B — TULSA, OK 74146 — (918) 459-2700

Acct. No:	0220CIM11 File No: CIM11		
Report Date:	12/19/00	Date Sampled:	11/20/00
Project:	Client Information	Sampled By:	Mike G.
Location:	Tech Center 777-112.5	By Order Of:	Karen Morgan
Arch./Engr:		Order No:	
Client:	Cimarron Corp.	Quantity Represented:	Red Clayey Sandy Silt
REPORT:	GRAIN SIZE ANALYSIS OF SOILS	LAB NO:	E-2488
Specification:		Test Method:	ASTM D422

TEST RESULTS

SIEVE ANALYSIS	
SIEVE SIZE	PERCENT PASSING
No. 4	100.0
No. 10	100.0
No. 40	97.7
No. 200	63.9
HYDROMETER ANALYSIS	
SMALLER THAN	PERCENT
0.074 mm	63.3
0.005 mm	21.2
0.001 mm	15.4

Charge: Cimarron Corp. Attn: Karen Morgan
Orig. Same
1-cc Laboratory

Unit Rates for this Report		
Units	@	Amount
S506 @ 100.00		
S504 @ 45.00		

THIS REPORT APPLIES ONLY TO THE STANDARDS OR PROCEDURES INDICATED AND TO THE SAMPLE(S) TESTED AND/OR OBSERVED AND ARE NOT NECESSARILY INDICATIVE OF THE QUALITIES OF APPARENTLY IDENTICAL OR SIMILAR PRODUCTS OR PROCEDURES. NOR DO THEY REPRESENT AN ONGOING QUALITY ASSURANCE PROGRAM UNLESS SO NOTED. THESE REPORTS ARE FOR THE EXCLUSIVE USE OF THE ADDRESSED CLIENT AND ARE NOT TO BE REPRODUCED WITHOUT SPECIFIC WRITTEN PERMISSION.

Attachment 2

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:15 Page 1
Summary : KMTC 1 pCi/g natural Th in eqlb, 5512 default Kd parameters, Kd for clay layer
File : TCTHNATB.RAD

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Total Dose Components
Time = 0.000E+00 9
Time = 1.000E+00 10
Time = 3.000E+00 11
Time = 1.000E+01 12
Time = 3.000E+01 13
Time = 1.000E+02 14
Time = 3.000E+02 15
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RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:15 Page 2
Summary : KMTC 1 pCi/g natural Th in eqlb, 5512 default Kd parameters, Kd for clay layer
File : TCTHNATB.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: 92890566.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ra-228+D	9.630E-03	5.080E-03	DCF2(1)
B-1	Th-228+D	1.480E-01	3.450E-01	DCF2(2)
B-1	Th-232	9.260E-02	1.640E+00	DCF2(3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ra-228+D	2.560E-03	1.440E-03	DCF3(1)
D-1	Th-228+D	2.670E-04	8.080E-04	DCF3(2)
D-1	Th-232	8.520E-04	2.730E-03	DCF3(3)
D-34	Food transfer factors:			
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(1,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(1,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(2,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				

D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(3,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(3,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(1,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(1,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(2,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(2,2)
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(3,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.000E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	2.000E+01	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)	4.810E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	7.940E+02	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ra-228	5.000E-01	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Th-228	5.000E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Th-232	5.000E-01	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Ra-228	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Th-228	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(3)
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)	1.630E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-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)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI

R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.630E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	7.000E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	2	1	---	NS
R015	Unsat. zone 1, thickness (m)	1.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.630E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	3.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	2.660E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.630E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	3.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	2.000E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.189E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Th-228				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.984E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)

R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.984E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	5.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	5.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	3.300E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.500E-01	5.000E-01	---	FIND

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fraction of time spent outdoors (on site)	2.100E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.660E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.100E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)

R018	Soil ingestion rate (g/yr)	1.825E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.500E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.500E+00	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5

			tcappc2		
C14	DCF correction factor for gaseous forms of C14	not used	1.234E+02	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1

Site-Specific Parameter Summary (continued)

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

Summary of Pathway Selections

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

9 -- radon ³ suppressed
Find peak pathway doses ³ active

Contaminated Zone Dimensions

Area: 10000.00 square meters
Thickness: 0.30 meters
Cover Depth: 0.00 meters

Initial Soil Concentrations, pCi/g

Ra-228	5.000E-01
Th-228	5.000E-01
Th-232	5.000E-01

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 25 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	4.810E+02	7.940E+02
TDOSE(t):	4.682E+00	4.665E+00	4.633E+00	4.536E+00	4.345E+00	3.745E+00	9.988E-06	0.000E+00	0.000E+00
M(t):	1.873E-01	1.866E-01	1.853E-01	1.814E-01	1.738E-01	1.498E-01	3.995E-07	0.000E+00	0.000E+00

0Maximum TDOSE(t): 4.682E+00 mrem/yr at t = 0.000E+00 years

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

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	1.335E+00	0.2852	2.202E-03	0.0005	0.000E+00	0.0000	1.421E+00	0.3035	5.347E-02	0.0114	7.423E-02	0.0159	1.699E-02	0.0036
Th-228	1.573E+00	0.3360	8.561E-03	0.0018	0.000E+00	0.0000	3.309E-03	0.0007	1.844E-04	0.0000	1.452E-05	0.0000	1.553E-03	0.0003
Th-232	7.653E-02	0.0163	6.490E-03	0.0014	0.000E+00	0.0000	9.488E-02	0.0203	3.291E-03	0.0007	4.066E-03	0.0009	6.946E-03	0.0015
Total	2.985E+00	0.6376	1.725E-02	0.0037	0.000E+00	0.0000	1.519E+00	0.3244	5.694E-02	0.0122	7.831E-02	0.0167	2.548E-02	0.0054

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.
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	2.903E+00	0.6200
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	1.587E+00	0.3389
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	1.922E-01	0.0410
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	4.682E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : KMTC 1 pCi/g natural Th in eqlb, 5512 default Kd parameters, Kd for clay layer
File : TCTHNATB.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.
Ra-228	1.628E+00	0.3489	4.383E-03	0.0009	0.000E+00	0.0000	1.253E+00	0.2685	4.723E-02	0.0101	6.547E-02	0.0140	1.545E-02	0.0033
Th-228	1.094E+00	0.2346	5.956E-03	0.0013	0.000E+00	0.0000	2.295E-03	0.0005	1.283E-04	0.0000	1.010E-05	0.0000	1.080E-03	0.0002
Th-232	2.571E-01	0.0551	6.895E-03	0.0015	0.000E+00	0.0000	2.538E-01	0.0544	9.157E-03	0.0020	1.231E-02	0.0026	8.897E-03	0.0019
Total	2.979E+00	0.6386	1.723E-02	0.0037	0.000E+00	0.0000	1.509E+00	0.3234	5.651E-02	0.0121	7.779E-02	0.0167	2.543E-02	0.0055

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.
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	3.013E+00	0.6459
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	1.104E+00	0.2366
Th-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.482E-01	0.1175
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	4.665E+00	1.0000

*Sum of all water independent and dependent pathways.

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Summary : KMTC 1 pCi/g natural Th in eqlb, 5512 default Kd parameters, Kd for clay layer
File : TCTHNATB.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+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.
Ra-228	1.763E+00	0.3804	6.101E-03	0.0013	0.000E+00	0.0000	9.725E-01	0.2099	3.677E-02	0.0079	5.092E-02	0.0110	1.255E-02	0.0027
Th-228	5.295E-01	0.1143	2.883E-03	0.0006	0.000E+00	0.0000	1.103E-03	0.0002	6.209E-05	0.0000	4.886E-06	0.0000	5.229E-04	0.0001
Th-232	6.740E-01	0.1455	8.204E-03	0.0018	0.000E+00	0.0000	5.176E-01	0.1117	1.916E-02	0.0041	2.617E-02	0.0056	1.226E-02	0.0026
Total	2.966E+00	0.6402	1.719E-02	0.0037	0.000E+00	0.0000	1.491E+00	0.3219	5.599E-02	0.0121	7.710E-02	0.0166	2.533E-02	0.0055

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.
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	2.841E+00	0.6133
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.340E-01	0.1153
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	1.257E+00	0.2714
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	4.633E+00	1.0000

*Sum of all water independent and dependent pathways.

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Summary : KMTC 1 pCi/g natural Th in eqlb, 5512 default Kd parameters, Kd for clay layer
File : TCTHNATB.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
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.
Ra-228	1.014E+00	0.2236	4.059E-03	0.0009	0.000E+00	0.0000	3.999E-01	0.0882	1.526E-02	0.0034	2.112E-02	0.0047	5.549E-03	0.0012
Th-228	4.170E-02	0.0092	2.274E-04	0.0001	0.000E+00	0.0000	8.500E-05	0.0000	4.893E-06	0.0000	3.852E-07	0.0000	4.125E-05	0.0000
Th-232	1.870E+00	0.4121	1.274E-02	0.0028	0.000E+00	0.0000	1.039E+00	0.2291	3.925E-02	0.0087	5.401E-02	0.0119	1.949E-02	0.0043
Total	2.925E+00	0.6449	1.703E-02	0.0038	0.000E+00	0.0000	1.439E+00	0.3172	5.451E-02	0.0120	7.513E-02	0.0166	2.508E-02	0.0055

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.
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	1.460E+00	0.3219
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	4.206E-02	0.0093
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	3.034E+00	0.6689
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	4.536E+00	1.0000

*Sum of all water independent and dependent pathways.

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Summary : KMTC 1 pCi/g natural Th in eqlb, 5512 default Kd parameters, Kd for clay layer
File : TCTHNATB.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.
Ra-228	9.021E-02	0.0208	3.704E-04	0.0001	0.000E+00	0.0000	3.135E-02	0.0072	1.229E-03	0.0003	1.706E-03	0.0004	4.723E-04	0.0001
Th-228	2.927E-05	0.0000	1.605E-07	0.0000	0.000E+00	0.0000	5.585E-08	0.0000	3.443E-09	0.0000	2.712E-10	0.0000	2.911E-08	0.0000
Th-232	2.772E+00	0.6380	1.640E-02	0.0038	0.000E+00	0.0000	1.288E+00	0.2963	5.013E-02	0.0115	6.929E-02	0.0159	2.425E-02	0.0056
Total	2.862E+00	0.6587	1.677E-02	0.0039	0.000E+00	0.0000	1.319E+00	0.3036	5.136E-02	0.0118	7.100E-02	0.0163	2.472E-02	0.0057

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.

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	1.253E-01	0.0288
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	2.951E-05	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	4.220E+00	0.9711
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	4.345E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Ra-228	1.504E-05	0.0000	6.417E-08	0.0000	0.000E+00	0.0000	4.018E-06	0.0000	1.788E-07	0.0000	2.517E-07	0.0000	8.177E-08	0.0000
Th-228	2.619E-16	0.0000	1.499E-18	0.0000	0.000E+00	0.0000	3.866E-19	0.0000	3.182E-20	0.0000	2.511E-21	0.0000	2.718E-19	0.0000
Th-232	2.662E+00	0.7109	1.619E-02	0.0043	0.000E+00	0.0000	9.425E-01	0.2516	4.178E-02	0.0112	5.848E-02	0.0156	2.386E-02	0.0064
Total	2.663E+00	0.7109	1.619E-02	0.0043	0.000E+00	0.0000	9.425E-01	0.2516	4.178E-02	0.0112	5.848E-02	0.0156	2.386E-02	0.0064

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.
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	1.963E-05	0.0000
Th-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.641E-16	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	3.745E+00	1.0000
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	3.745E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ra-228	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.593E-22	0.0000	1.722E-22	0.0000	6.632E-23	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-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.357E-06	0.7365	1.904E-06	0.1906	7.283E-07	0.0729	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.357E-06	0.7365	1.904E-06	0.1906	7.283E-07	0.0729	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

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Water Dependent Pathways

Radio- Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
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	8.978E-22	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-232	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.988E-06	1.0000
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	9.988E-06	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 4.810E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
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-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
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 = 4.810E+02 years
Water Dependent Pathways

Radio- Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
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-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
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 7.940E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
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-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

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Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 7.940E+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.
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-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
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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.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	4.810E+02	7.940E+02
Ra-228	Ra-228	1.000E+00	5.219E+00	4.602E+00	3.579E+00	1.485E+00	1.200E-01	1.757E-21	0.000E+00	0.000E+00	0.000E+00
Ra-228	Th-228	1.000E+00	5.877E-01	1.423E+00	2.103E+00	1.435E+00	1.307E-01	2.170E-05	8.762E-24	0.000E+00	0.000E+00
Ra-228	äDSR(j)		5.806E+00	6.026E+00	5.683E+00	2.920E+00	2.507E-01	3.927E-05	1.796E-21	0.000E+00	0.000E+00
Th-228	Th-228	1.000E+00	3.174E+00	2.208E+00	1.068E+00	8.413E-02	5.903E-05	5.283E-16	0.000E+00	0.000E+00	0.000E+00
Th-232	Th-232	1.000E+00	5.147E-02	5.136E-02	5.114E-02	5.038E-02	4.823E-02	4.098E-02	1.459E-07	0.000E+00	0.000E+00
Th-232	Ra-228	1.000E+00	3.083E-01	8.947E-01	1.869E+00	3.826E+00	4.899E+00	4.099E+00	1.976E-05	0.000E+00	0.000E+00
Th-232	Th-228	1.000E+00	2.466E-02	1.504E-01	5.948E-01	2.192E+00	3.493E+00	3.350E+00	7.427E-08	0.000E+00	0.000E+00
Th-232	äDSR(j)		3.844E-01	1.096E+00	2.515E+00	6.068E+00	8.439E+00	7.491E+00	1.998E-05	0.000E+00	0.000E+00
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*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ó 30 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 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	4.810E+02	7.940E+02
Ra-228	4.306E+00	4.149E+00	4.399E+00	8.562E+00	9.973E+01	6.366E+05	*2.726E+14	*2.726E+14	*2.726E+14
Th-228	7.877E+00	1.132E+01	2.341E+01	2.972E+02	4.235E+05	*8.192E+14	*8.192E+14	*8.192E+14	*8.192E+14
Th-232	6.504E+01	2.280E+01	9.941E+00	4.120E+00	2.962E+00	3.338E+00	*1.096E+05	*1.096E+05	*1.096E+05
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*At specific activity limit

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

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-228	5.000E-01	1.157 ñ 0.002	6.029E+00	4.146E+00	5.806E+00	4.306E+00
Th-228	5.000E-01	0.000E+00	3.174E+00	7.877E+00	3.174E+00	7.877E+00
Th-232	5.000E-01	35.06 ñ 0.07	8.472E+00	2.951E+00	3.844E-01	6.504E+01

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RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:15 Page 19
Summary : KMTC 1 pCi/g natural Th in eqlb, 5512 default Kd parameters, Kd for clay layer
File : TCTHNATB.RAD

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	4.810E+02	7.940E+02
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Ra-228	Ra-228	1.000E+00	2.609E+00	2.301E+00	1.790E+00	7.423E-01	5.998E-02	8.784E-06	8.935E-22	0.000E+00	0.000E+00
Ra-228	Th-232	1.000E+00	1.541E-01	4.473E-01	9.345E-01	1.913E+00	2.449E+00	2.050E+00	9.878E-06	0.000E+00	0.000E+00
Ra-228	äDOSE(j):		2.763E+00	2.749E+00	2.724E+00	2.655E+00	2.509E+00	2.050E+00	9.878E-06	0.000E+00	0.000E+00
Th-228	Ra-228	1.000E+00	2.938E-01	7.117E-01	1.052E+00	7.177E-01	6.536E-02	1.085E-05	4.381E-24	0.000E+00	0.000E+00
Th-228	Th-228	1.000E+00	1.587E+00	1.104E+00	5.340E-01	4.206E-02	2.951E-05	2.641E-16	0.000E+00	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	1.233E-02	7.521E-02	2.974E-01	1.096E+00	1.746E+00	1.675E+00	3.714E-08	0.000E+00	0.000E+00
Th-228	äDOSE(j):		1.893E+00	1.891E+00	1.883E+00	1.856E+00	1.812E+00	1.675E+00	3.714E-08	0.000E+00	0.000E+00
Th-232	Th-232	1.000E+00	2.574E-02	2.568E-02	2.557E-02	2.519E-02	2.411E-02	2.049E-02	7.294E-08	0.000E+00	0.000E+00
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BRF(i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	BRF(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	4.810E+02	7.940E+02
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Ra-228	Ra-228	1.000E+00	5.000E-01	4.418E-01	3.449E-01	1.451E-01	1.221E-02	2.114E-06	3.780E-17	7.095E-27	1.065E-43
Ra-228	Th-232	1.000E+00	0.000E+00	5.668E-02	1.509E-01	3.447E-01	4.699E-01	4.653E-01	4.212E-01	3.848E-01	3.292E-01
Ra-228	äS(j):		5.000E-01	4.985E-01	4.959E-01	4.898E-01	4.821E-01	4.653E-01	4.212E-01	3.848E-01	3.292E-01
Th-228	Ra-228	1.000E+00	0.000E+00	1.424E-01	2.676E-01	1.997E-01	1.849E-02	3.204E-06	5.729E-17	1.075E-26	1.626E-43
Th-228	Th-228	1.000E+00	5.000E-01	3.479E-01	1.684E-01	1.328E-02	9.374E-06	8.752E-17	0.000E+00	0.000E+00	0.000E+00
Th-228	Th-232	1.000E+00	0.000E+00	9.309E-03	6.190E-02	2.783E-01	4.637E-01	4.653E-01	4.212E-01	3.848E-01	3.292E-01
Th-228	äS(j):		5.000E-01	4.995E-01	4.979E-01	4.913E-01	4.822E-01	4.653E-01	4.212E-01	3.848E-01	3.292E-01
Th-232	Th-232	1.000E+00	5.000E-01	4.998E-01	4.993E-01	4.975E-01	4.926E-01	4.757E-01	4.306E-01	3.934E-01	3.366E-01
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BRF(i) is the branch fraction of the parent nuclide.
0RESMAIN5.EXE execution time = 3.33 seconds

Attachment 3

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:16 Page 1
Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.RAD

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RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:16 Page 2
Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: 92890566.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	2.040E+00	6.720E+00	DCF2(1)
B-1	Pa-231	5.180E-01	1.280E+00	DCF2(2)
B-1	Pb-210+D	4.070E-03	1.380E-02	DCF2(3)
B-1	Po-210	1.220E-02	9.400E-03	DCF2(4)
B-1	Ra-226+D	1.300E-02	8.600E-03	DCF2(5)
B-1	Th-230	5.180E-02	3.260E-01	DCF2(6)
B-1	U-234	1.300E-02	1.320E-01	DCF2(7)
B-1	U-235+D	1.150E-02	1.230E-01	DCF2(8)
B-1	U-238+D	1.070E-02	1.180E-01	DCF2(9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	4.070E-03	1.480E-02	DCF3(1)
D-1	Pa-231	2.630E-03	1.060E-02	DCF3(2)
D-1	Pb-210+D	2.560E-03	5.370E-03	DCF3(3)
D-1	Po-210	4.440E-03	1.900E-03	DCF3(4)
D-1	Ra-226+D	1.040E-03	1.330E-03	DCF3(5)
D-1	Th-230	7.780E-04	5.480E-04	DCF3(6)
D-1	U-234	1.810E-04	2.830E-04	DCF3(7)

Menu	Parameter	Current Value	Default	Parameter Name
D-1	U-235+D	1.740E-04	2.670E-04	DCF3(8)
D-1	U-238+D	1.670E-04	2.690E-04	DCF3(9)
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	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:16 Page 3
Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.RAD

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: 92890566.LIB

Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(8,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	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				

			tcappc3		
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	Th-230	, fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Th-230	, crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)
D-5					
D-5	U-234	, fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-234	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5					
D-5	U-235+D	, fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-235+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)
D-5					
D-5	U-238+D	, fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-238+D	, crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.000E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	2.000E+01	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)	4.810E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	7.940E+02	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	2.250E-02	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	2.250E-02	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): U-234	4.890E-01	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-235	2.250E-02	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): U-238	4.890E-01	0.000E+00	---	S1(9)
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): U-234	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(9)
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)	1.630E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-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)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.630E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	7.000E+01	1.000E+02	---	HCSZ

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	2	1	---	NS
R015	Unsat. zone 1, thickness (m)	1.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.630E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	3.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	2.660E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.630E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	3.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	2.000E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	2.400E+03	2.000E+01	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.796E-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)	5.100E+02	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	2.700E+03	5.000E+01	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.127E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(7,1)
R016	Unsaturated zone 2 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(7,2)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.053E-01	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)

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Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.RAD

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-235				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(8,1)
R016	Unsaturated zone 2 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(8,2)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.053E-01	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(9,1)
R016	Unsaturated zone 2 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(9,2)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.053E-01	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.904E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Po-210				
R016	Contaminated zone (cm**3/g)	1.500E+02	1.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+02	1.000E+01	---	DCNUCU(4,1)
R016	Unsaturated zone 2 (cm**3/g)	3.000E+03	1.000E+01	---	DCNUCU(4,2)
R016	Saturated zone (cm**3/g)	1.500E+02	1.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.062E-02	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCU(5,1)

R016	Unsaturated zone 2 (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCU(5,2)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.189E-03	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(6,1)
R016	Unsaturated zone 2 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU(6,2)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.984E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	1.000E-04	---	MLINH

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Exposure duration	5.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	5.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	3.300E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.500E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.100E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.660E+02	1.600E+02	---	DIET(1)

R018	Leafy vegetable consumption (kg/yr)	1.100E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.825E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.500E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.500E+00	FMILK

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC

			tcappc3		
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	1.234E+02	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)

Site-Specific Parameter Summary (continued)

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

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active

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   5 -- milk ingestion        ³      active
   6 -- aquatic foods         ³      active
   7 -- drinking water        ³      active
   8 -- soil ingestion        ³      active
   9 -- radon                 ³    suppressed
   Find peak pathway doses    ³      active
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RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:16 Page 10
Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	10000.00 square meters	Ac-227	2.250E-02
Thickness:	0.30 meters	Pa-231	2.250E-02
Cover Depth:	0.00 meters	U-234	4.890E-01
		U-235	2.250E-02
		U-238	4.890E-01

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 25 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	4.810E+02	7.940E+02
TDOSE(t):	1.093E-01	1.040E-01	9.491E-02	7.399E-02	5.361E-02	3.664E-02	1.270E-07	0.000E+00	0.000E+00
M(t):	4.372E-03	4.161E-03	3.796E-03	2.959E-03	2.145E-03	1.465E-03	5.079E-09	0.000E+00	0.000E+00

Maximum TDOSE(t): 1.093E-01 mrem/yr at t = 0.000E+00 years

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:16 Page 11
Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.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 = 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	1.671E-02	0.1529	6.220E-03	0.0569	0.000E+00	0.0000	6.634E-03	0.0607	3.157E-05	0.0003	4.913E-05	0.0004	1.248E-03	0.0114
Pa-231	1.883E-03	0.0172	1.705E-03	0.0156	0.000E+00	0.0000	1.753E-02	0.1604	6.779E-03	0.0620	1.092E-05	0.0001	8.394E-04	0.0077
U-234	7.084E-05	0.0006	8.324E-04	0.0076	0.000E+00	0.0000	6.213E-03	0.0568	5.039E-04	0.0046	1.378E-03	0.0126	1.165E-03	0.0107
U-235	6.102E-03	0.0558	3.390E-05	0.0003	0.000E+00	0.0000	2.750E-04	0.0025	2.235E-05	0.0002	6.094E-05	0.0006	5.155E-05	0.0005
U-238	2.372E-02	0.2170	6.851E-04	0.0063	0.000E+00	0.0000	5.733E-03	0.0524	4.649E-04	0.0043	1.271E-03	0.0116	1.075E-03	0.0098
Total	4.849E-02	0.4436	9.476E-03	0.0867	0.000E+00	0.0000	3.639E-02	0.3329	7.802E-03	0.0714	2.770E-03	0.0253	4.379E-03	0.0401

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	3.090E-02	0.2827
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	2.875E-02	0.2630

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	1.016E-02	0.0930
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	6.546E-03	0.0599
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	3.295E-02	0.3014
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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	1.093E-01	1.0000

*Sum of all water independent and dependent pathways.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:16 Page 12
Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.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	1.613E-02	0.1550	6.002E-03	0.0577	0.000E+00	0.0000	6.381E-03	0.0613	3.046E-05	0.0003	4.739E-05	0.0005	1.204E-03	0.0116
Pa-231	2.399E-03	0.0231	1.894E-03	0.0182	0.000E+00	0.0000	1.763E-02	0.1695	6.756E-03	0.0649	1.242E-05	0.0001	8.757E-04	0.0084
U-234	6.377E-05	0.0006	7.492E-04	0.0072	0.000E+00	0.0000	5.579E-03	0.0536	4.541E-04	0.0044	1.240E-03	0.0119	1.049E-03	0.0101
U-235	5.493E-03	0.0528	3.055E-05	0.0003	0.000E+00	0.0000	2.473E-04	0.0024	2.027E-05	0.0002	5.485E-05	0.0005	4.642E-05	0.0004
U-238	2.135E-02	0.2052	6.166E-04	0.0059	0.000E+00	0.0000	5.147E-03	0.0495	4.190E-04	0.0040	1.144E-03	0.0110	9.677E-04	0.0093
Total	4.543E-02	0.4367	9.292E-03	0.0893	0.000E+00	0.0000	3.499E-02	0.3363	7.680E-03	0.0738	2.499E-03	0.0240	4.143E-03	0.0398

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	2.979E-02	0.2864
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	2.957E-02	0.2842
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	9.135E-03	0.0878
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	5.892E-03	0.0566
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	2.964E-02	0.2849
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	1.040E-01	1.0000

*Sum of all water independent and dependent pathways.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:16 Page 13
Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.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+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	1.502E-02	0.1583	5.590E-03	0.0589	0.000E+00	0.0000	5.902E-03	0.0622	2.834E-05	0.0003	4.411E-05	0.0005	1.121E-03	0.0118
Pa-231	3.372E-03	0.0355	2.249E-03	0.0237	0.000E+00	0.0000	1.779E-02	0.1875	6.702E-03	0.0706	1.522E-05	0.0002	9.440E-04	0.0099
U-234	5.170E-05	0.0005	6.070E-04	0.0064	0.000E+00	0.0000	4.489E-03	0.0473	3.676E-04	0.0039	1.004E-03	0.0106	8.498E-04	0.0090
U-235	4.451E-03	0.0469	2.483E-05	0.0003	0.000E+00	0.0000	1.996E-04	0.0021	1.667E-05	0.0002	4.441E-05	0.0005	3.764E-05	0.0004

U-238	1.729E-02	0.1822	4.996E-04	0.0053	0.000E+00	0.0000	4.142E-03	0.0436	3.392E-04	0.0036	9.264E-04	0.0098	7.840E-04	0.0083
Total	4.019E-02	0.4234	8.970E-03	0.0945	0.000E+00	0.0000	3.253E-02	0.3427	7.453E-03	0.0785	2.034E-03	0.0214	3.737E-03	0.0394

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	2.771E-02	0.2919
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	3.108E-02	0.3274
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	7.370E-03	0.0777
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	4.774E-03	0.0503
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	2.398E-02	0.2527
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	9.491E-02	1.0000

*Sum of all water independent and dependent pathways.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:16 Page 14
Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
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	1.171E-02	0.1582	4.356E-03	0.0589	0.000E+00	0.0000	4.491E-03	0.0607	2.203E-05	0.0003	3.430E-05	0.0005	8.738E-04	0.0118
Pa-231	6.228E-03	0.0842	3.290E-03	0.0445	0.000E+00	0.0000	1.812E-02	0.2449	6.513E-03	0.0880	2.340E-05	0.0003	1.142E-03	0.0154
U-234	2.504E-05	0.0003	2.907E-04	0.0039	0.000E+00	0.0000	2.099E-03	0.0284	1.756E-04	0.0024	4.796E-04	0.0065	4.069E-04	0.0055
U-235	2.131E-03	0.0288	1.218E-05	0.0002	0.000E+00	0.0000	9.517E-05	0.0013	8.647E-06	0.0001	2.122E-05	0.0003	1.813E-05	0.0002
U-238	8.272E-03	0.1118	2.391E-04	0.0032	0.000E+00	0.0000	1.936E-03	0.0262	1.620E-04	0.0022	4.425E-04	0.0060	3.752E-04	0.0051
Total	2.836E-02	0.3833	8.188E-03	0.1107	0.000E+00	0.0000	2.674E-02	0.3614	6.881E-03	0.0930	1.001E-03	0.0135	2.816E-03	0.0381

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	2.148E-02	0.2904
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	3.531E-02	0.4773
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	3.476E-03	0.0470
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	2.286E-03	0.0309
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	1.143E-02	0.1544
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.399E-02	1.0000

*Sum of all water independent and dependent pathways.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:16 Page 15
Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay

File : TCUNEQ3C.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	5.740E-03	0.1071	2.136E-03	0.0398	0.000E+00	0.0000	2.050E-03	0.0382	1.073E-05	0.0002	1.673E-05	0.0003	4.285E-04	0.0080
Pa-231	1.099E-02	0.2051	5.005E-03	0.0933	0.000E+00	0.0000	1.768E-02	0.3297	5.997E-03	0.1119	3.673E-05	0.0007	1.457E-03	0.0272
U-234	4.550E-06	0.0001	3.566E-05	0.0007	0.000E+00	0.0000	2.392E-04	0.0045	2.134E-05	0.0004	5.811E-05	0.0011	4.997E-05	0.0009
U-235	2.614E-04	0.0049	2.285E-06	0.0000	0.000E+00	0.0000	1.388E-05	0.0003	2.125E-06	0.0000	2.575E-06	0.0000	2.450E-06	0.0000
U-238	1.005E-03	0.0188	2.912E-05	0.0005	0.000E+00	0.0000	2.195E-04	0.0041	1.959E-05	0.0004	5.360E-05	0.0010	4.570E-05	0.0009
Total	1.801E-02	0.3358	7.207E-03	0.1344	0.000E+00	0.0000	2.020E-02	0.3767	6.051E-03	0.1129	1.677E-04	0.0031	1.983E-03	0.0370

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	1.038E-02	0.1936
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	4.117E-02	0.7678
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	4.088E-04	0.0076
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	2.848E-04	0.0053
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	1.373E-03	0.0256
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.361E-02	1.0000

*Sum of all water independent and dependent pathways.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:16 Page 16
Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.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	4.695E-04	0.0128	1.763E-04	0.0048	0.000E+00	0.0000	1.254E-04	0.0034	8.647E-07	0.0000	1.354E-06	0.0000	3.537E-05	0.0010
Pa-231	1.275E-02	0.3480	5.521E-03	0.1507	0.000E+00	0.0000	1.157E-02	0.3158	4.458E-03	0.1217	4.012E-05	0.0011	1.471E-03	0.0401
U-234	5.490E-06	0.0001	3.120E-07	0.0000	0.000E+00	0.0000	2.386E-06	0.0001	4.432E-07	0.0000	1.644E-07	0.0000	5.637E-07	0.0000
U-235	2.760E-06	0.0001	1.128E-06	0.0000	0.000E+00	0.0000	2.390E-06	0.0001	9.240E-07	0.0000	9.772E-09	0.0000	3.027E-07	0.0000
U-238	6.203E-07	0.0000	1.838E-08	0.0000	0.000E+00	0.0000	1.026E-07	0.0000	1.207E-08	0.0000	3.313E-08	0.0000	2.884E-08	0.0000
Total	1.323E-02	0.3610	5.699E-03	0.1556	0.000E+00	0.0000	1.170E-02	0.3194	4.460E-03	0.1217	4.168E-05	0.0011	1.507E-03	0.0411

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	8.088E-04	0.0221
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	3.581E-02	0.9774
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	9.359E-06	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	7.515E-06	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	8.154E-07	0.0000
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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	3.664E-02	1.0000

*Sum of all water independent and dependent pathways.

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Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.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+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	8.848E-13	0.0000	1.428E-14	0.0000	2.745E-15	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.382E-08	0.4239	7.299E-08	0.5748	6.807E-11	0.0005	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.905E-11	0.0003	2.688E-11	0.0002	2.742E-12	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.115E-11	0.0001	1.512E-11	0.0001	1.410E-14	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.036E-15	0.0000	7.106E-16	0.0000	7.261E-17	0.0000	0.000E+00	0.0000
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Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.387E-08	0.4243	7.303E-08	0.5752	7.083E-11	0.0006	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	9.019E-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	1.269E-07	0.9992
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	6.867E-11	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.629E-11	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	1.819E-15	0.0000
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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	1.270E-07	1.0000

*Sum of all water independent and dependent pathways.

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Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.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 = 4.810E+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

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 = 4.810E+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
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.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 10:16 Page 19
Summary : KMTC 1 pCi/g total U in eqlb to U-234, 5512 default Kd parameters, Kd for clay
File : TCUNEQ3C.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 = 7.940E+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
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 7.940E+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
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.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	4.810E+02	7.940E+02
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ
Ac-227	Ac-227	1.000E+00	1.373E+00	1.324E+00	1.231E+00	9.548E-01	4.614E-01	3.595E-02	4.008E-11	0.000E+00	0.000E+00
Pa-231	Pa-231	1.000E+00	1.254E+00	1.248E+00	1.234E+00	1.188E+00	1.062E+00	7.038E-01	4.957E-06	0.000E+00	0.000E+00
Pa-231	Ac-227	1.000E+00	2.342E-02	6.656E-02	1.470E-01	3.820E-01	7.672E-01	8.877E-01	6.815E-07	0.000E+00	0.000E+00
Pa-231	äDSR(j)		1.278E+00	1.314E+00	1.381E+00	1.570E+00	1.830E+00	1.592E+00	5.639E-06	0.000E+00	0.000E+00
U-234	U-234	1.000E+00	2.078E-02	1.868E-02	1.507E-02	7.106E-03	8.284E-04	4.406E-07	2.031E-21	0.000E+00	0.000E+00
U-234	Th-230	1.000E+00	1.957E-07	5.429E-07	1.128E-06	2.399E-06	3.284E-06	2.866E-06	1.141E-11	0.000E+00	0.000E+00
U-234	Ra-226	1.000E+00	3.388E-09	2.332E-08	1.158E-07	8.235E-07	4.029E-06	1.375E-05	5.866E-11	0.000E+00	0.000E+00
U-234	Pb-210	1.000E+00	5.775E-12	7.311E-11	7.262E-10	1.407E-08	1.733E-07	1.061E-06	2.833E-11	0.000E+00	0.000E+00
U-234	Po-210	1.000E+00	1.292E-12	2.587E-11	3.727E-10	9.622E-09	1.362E-07	1.017E-06	4.203E-11	0.000E+00	0.000E+00
U-234	äDSR(j)		2.078E-02	1.868E-02	1.507E-02	7.109E-03	8.360E-04	1.914E-05	1.404E-10	0.000E+00	0.000E+00
U-235	U-235	1.000E+00	2.909E-01	2.618E-01	2.121E-01	1.014E-01	1.232E-02	7.668E-06	1.954E-21	0.000E+00	0.000E+00
U-235	Pa-231	1.000E+00	1.211E-05	3.579E-05	7.609E-05	1.615E-04	2.103E-04	1.458E-04	1.027E-09	0.000E+00	0.000E+00
U-235	Ac-227	1.000E+00	1.677E-07	1.069E-06	5.012E-06	3.214E-05	1.205E-04	1.805E-04	1.412E-10	0.000E+00	0.000E+00
U-235	äDSR(j)		2.909E-01	2.619E-01	2.122E-01	1.016E-01	1.266E-02	3.340E-04	1.168E-09	0.000E+00	0.000E+00
U-238	U-238	1.000E+00	6.737E-02	6.061E-02	4.904E-02	2.337E-02	2.808E-03	1.667E-06	1.876E-21	0.000E+00	0.000E+00
U-238	U-234	1.000E+00	2.895E-08	7.896E-08	1.491E-07	2.113E-07	7.161E-08	1.255E-10	1.728E-24	0.000E+00	0.000E+00
U-238	Th-230	1.000E+00	1.888E-13	1.184E-12	5.327E-12	2.937E-11	7.678E-11	7.754E-11	3.089E-16	0.000E+00	0.000E+00
U-238	Ra-226	1.000E+00	2.343E-15	3.419E-14	3.637E-13	6.810E-12	6.915E-11	3.373E-10	1.554E-15	0.000E+00	0.000E+00
U-238	Pb-210	1.000E+00	3.391E-18	8.682E-17	1.789E-15	9.165E-14	2.507E-12	2.499E-11	7.479E-16	0.000E+00	0.000E+00
U-238	Po-210	1.000E+00	6.652E-19	2.704E-17	8.320E-16	6.010E-14	1.947E-12	2.394E-11	1.110E-15	0.000E+00	0.000E+00
U-238	äDSR(j)		6.737E-02	6.061E-02	4.904E-02	2.337E-02	2.808E-03	1.667E-06	3.721E-15	0.000E+00	0.000E+00
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ó 30 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 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	4.810E+02	7.940E+02
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ
Ac-227	1.821E+01	1.888E+01	2.030E+01	2.618E+01	5.418E+01	6.954E+02	6.237E+11	*7.230E+13	*7.230E+13
Pa-231	1.956E+01	1.902E+01	1.810E+01	1.593E+01	1.366E+01	1.571E+01	4.434E+06	*4.722E+10	*4.722E+10
U-234	1.203E+03	1.338E+03	1.659E+03	3.517E+03	2.990E+04	1.306E+06	*6.245E+09	*6.245E+09	*6.245E+09
U-235	8.593E+01	9.547E+01	1.178E+02	2.460E+02	1.975E+03	7.485E+04	*2.160E+06	*2.160E+06	*2.160E+06
U-238	3.711E+02	4.124E+02	5.098E+02	1.070E+03	8.904E+03	*3.360E+05	*3.360E+05	*3.360E+05	*3.360E+05
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

*At specific activity limit

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

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Ac-227	2.250E-02	0.000E+00	1.373E+00	1.821E+01	1.373E+00	1.821E+01

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                                                                  tcappc3
 Pa-231  2.250E-02    43.27 ñ 0.09    1.864E+00  1.341E+01  1.278E+00  1.956E+01
 U-234   4.890E-01     0.000E+00      2.078E-02  1.203E+03  2.078E-02  1.203E+03
 U-235   2.250E-02     0.000E+00      2.909E-01  8.593E+01  2.909E-01  8.593E+01
 U-238   4.890E-01     0.000E+00      6.737E-02  3.711E+02  6.737E-02  3.711E+02
 ÍÍÍÍÍÍÍ ÍÍÍÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ  ÍÍÍÍÍÍÍÍÍ
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                                   Individual Nuclide Dose Summed Over All Pathways
                                     Parent Nuclide and Branch Fraction Indicated
Nuclide Parent   BRF(i)                                   DOSE(j,t), mrem/yr
   (j)     (i)              t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 4.810E+02 7.940E+02
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ    ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ
 Ac-227  Ac-227  1.000E+00    3.090E-02 2.979E-02 2.771E-02 2.148E-02 1.038E-02 8.088E-04 9.019E-13 0.000E+00 0.000E+00
 Ac-227  Pa-231  1.000E+00    5.269E-04 1.498E-03 3.309E-03 8.595E-03 1.726E-02 1.997E-02 1.533E-08 0.000E+00 0.000E+00
 Ac-227  U-235   1.000E+00    3.774E-09 2.404E-08 1.128E-07 7.231E-07 2.710E-06 4.062E-06 3.177E-12 0.000E+00 0.000E+00
 Ac-227  äDOSE(j):            3.142E-02 3.129E-02 3.101E-02 3.008E-02 2.765E-02 2.079E-02 1.534E-08 0.000E+00 0.000E+00
Pa-231  Pa-231  1.000E+00    2.822E-02 2.807E-02 2.777E-02 2.672E-02 2.390E-02 1.583E-02 1.115E-07 0.000E+00 0.000E+00
 Pa-231  U-235   1.000E+00    2.724E-07 8.053E-07 1.712E-06 3.634E-06 4.732E-06 3.281E-06 2.311E-11 0.000E+00 0.000E+00
 Pa-231  äDOSE(j):            2.822E-02 2.807E-02 2.777E-02 2.672E-02 2.391E-02 1.584E-02 1.116E-07 0.000E+00 0.000E+00
U-234   U-234   1.000E+00    1.016E-02 9.134E-03 7.369E-03 3.475E-03 4.051E-04 2.155E-07 9.933E-22 0.000E+00 0.000E+00
 U-234   U-238   1.000E+00    1.416E-08 3.861E-08 7.293E-08 1.033E-07 3.502E-08 6.139E-11 8.451E-25 0.000E+00 0.000E+00
 U-234   äDOSE(j):            1.016E-02 9.134E-03 7.369E-03 3.475E-03 4.051E-04 2.155E-07 9.942E-22 0.000E+00 0.000E+00
Th-230  U-234   1.000E+00    9.572E-08 2.655E-07 5.516E-07 1.173E-06 1.606E-06 1.402E-06 5.582E-12 0.000E+00 0.000E+00
 Th-230  U-238   1.000E+00    9.234E-14 5.788E-13 2.605E-12 1.436E-11 3.754E-11 3.792E-11 1.510E-16 0.000E+00 0.000E+00
 Th-230  äDOSE(j):            9.572E-08 2.655E-07 5.516E-07 1.173E-06 1.606E-06 1.402E-06 5.582E-12 0.000E+00 0.000E+00
Ra-226  U-234   1.000E+00    1.657E-09 1.140E-08 5.661E-08 4.027E-07 1.970E-06 6.726E-06 2.868E-11 0.000E+00 0.000E+00
 Ra-226  U-238   1.000E+00    1.146E-15 1.672E-14 1.778E-13 3.330E-12 3.381E-11 1.650E-10 7.601E-16 0.000E+00 0.000E+00
 Ra-226  äDOSE(j):            1.657E-09 1.140E-08 5.661E-08 4.027E-07 1.970E-06 6.726E-06 2.869E-11 0.000E+00 0.000E+00
Pb-210  U-234   1.000E+00    2.824E-12 3.575E-11 3.551E-10 6.882E-09 8.474E-08 5.187E-07 1.385E-11 0.000E+00 0.000E+00
 Pb-210  U-238   1.000E+00    1.658E-18 4.246E-17 8.747E-16 4.482E-14 1.226E-12 1.222E-11 3.657E-16 0.000E+00 0.000E+00
 Pb-210  äDOSE(j):            2.824E-12 3.575E-11 3.551E-10 6.882E-09 8.474E-08 5.187E-07 1.385E-11 0.000E+00 0.000E+00
Po-210  U-234   1.000E+00    6.318E-13 1.265E-11 1.822E-10 4.705E-09 6.658E-08 4.975E-07 2.055E-11 0.000E+00 0.000E+00
 Po-210  U-238   1.000E+00    3.253E-19 1.322E-17 4.068E-16 2.939E-14 9.522E-13 1.171E-11 5.427E-16 0.000E+00 0.000E+00
 Po-210  äDOSE(j):            6.318E-13 1.265E-11 1.822E-10 4.705E-09 6.658E-08 4.975E-07 2.056E-11 0.000E+00 0.000E+00
U-235   U-235   1.000E+00    6.546E-03 5.891E-03 4.772E-03 2.282E-03 2.773E-04 1.725E-07 4.397E-23 0.000E+00 0.000E+00
U-238   U-238   1.000E+00    3.295E-02 2.964E-02 2.398E-02 1.143E-02 1.373E-03 8.151E-07 9.173E-22 0.000E+00 0.000E+00
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 BRF(i) is the branch fraction of the parent nuclide.
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                                   Individual Nuclide Soil Concentration
                                     Parent Nuclide and Branch Fraction Indicated
Nuclide Parent   BRF(i)                                   S(j,t), pCi/g
   (j)     (i)              t= 0.000E+00 1.000E+00 3.000E+00 1.000E+01 3.000E+01 1.000E+02 3.000E+02 4.810E+02 7.940E+02
 ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ    ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄ
 Ac-227  Ac-227  1.000E+00    2.250E-02 2.171E-02 2.022E-02 1.576E-02 7.726E-03 6.379E-04 5.126E-07 8.108E-10 1.162E-14
 Ac-227  Pa-231  1.000E+00    0.000E+00 7.026E-04 2.028E-03 5.926E-03 1.249E-02 1.547E-02 8.576E-03 4.851E-03 1.811E-03
 Ac-227  U-235   1.000E+00    0.000E+00 7.224E-09 5.917E-08 4.793E-07 1.947E-06 3.145E-06 1.777E-06 1.005E-06 3.752E-07
 Ac-227  äS(j):               2.250E-02 2.241E-02 2.225E-02 2.168E-02 2.022E-02 1.611E-02 8.578E-03 4.852E-03 1.812E-03
Pa-231  Pa-231  1.000E+00    2.250E-02 2.243E-02 2.229E-02 2.180E-02 2.047E-02 1.642E-02 8.751E-03 4.950E-03 1.848E-03
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 Pa-231  U-235   1.000E+00    0.000E+00 4.511E-07 1.219E-06 2.890E-06 4.044E-06 3.403E-06 1.813E-06 1.026E-06 3.829E-07
 Pa-231  äS(j):              2.250E-02 2.243E-02 2.229E-02 2.181E-02 2.048E-02 1.643E-02 8.753E-03 4.951E-03 1.848E-03
U-234   U-234   1.000E+00    4.890E-01 4.401E-01 3.566E-01 1.707E-01 2.078E-02 1.310E-05 9.411E-15 4.995E-23 2.446E-37
 U-234   U-238   1.000E+00    0.000E+00 1.248E-06 3.033E-06 4.838E-06 1.768E-06 3.716E-09 8.008E-18 6.816E-26 5.513E-40
 U-234   äS(j):              4.890E-01 4.401E-01 3.566E-01 1.707E-01 2.079E-02 1.311E-05 9.419E-15 5.002E-23 2.452E-37
Th-230  U-234   1.000E+00    0.000E+00 4.177E-06 1.131E-05 2.714E-05 3.960E-05 3.994E-05 3.608E-05 3.292E-05 2.808E-05
 Th-230  U-238   1.000E+00    0.000E+00 5.818E-12 4.560E-11 3.187E-10 9.196E-10 1.080E-09 9.765E-10 8.908E-10 7.600E-10
 Th-230  äS(j):              0.000E+00 4.177E-06 1.131E-05 2.714E-05 3.960E-05 3.994E-05 3.609E-05 3.292E-05 2.808E-05
Ra-226  U-234   1.000E+00    0.000E+00 9.196E-10 7.712E-09 6.811E-08 3.604E-07 1.362E-06 2.987E-06 3.523E-06 3.566E-06
 Ra-226  U-238   1.000E+00    0.000E+00 8.542E-16 2.076E-14 5.410E-13 6.133E-12 3.338E-11 7.914E-11 9.447E-11 9.623E-11
 Ra-226  äS(j):              0.000E+00 9.196E-10 7.712E-09 6.811E-08 3.605E-07 1.362E-06 2.987E-06 3.524E-06 3.566E-06
Pb-210  U-234   1.000E+00    0.000E+00 9.526E-12 2.394E-10 6.969E-09 1.025E-07 8.447E-07 2.383E-06 2.918E-06 3.012E-06
 Pb-210  U-238   1.000E+00    0.000E+00 6.659E-18 4.885E-16 4.309E-14 1.465E-12 1.987E-11 6.293E-11 7.816E-11 8.124E-11
 Pb-210  äS(j):              0.000E+00 9.526E-12 2.394E-10 6.970E-09 1.025E-07 8.447E-07 2.383E-06 2.918E-06 3.012E-06
Po-210  U-234   1.000E+00    0.000E+00 3.159E-12 1.488E-10 6.008E-09 9.800E-08 8.338E-07 2.367E-06 2.901E-06 2.995E-06
 Po-210  U-238   1.000E+00    0.000E+00 1.861E-18 2.720E-16 3.563E-14 1.385E-12 1.959E-11 6.249E-11 7.768E-11 8.078E-11
 Po-210  äS(j):              0.000E+00 3.159E-12 1.488E-10 6.008E-09 9.801E-08 8.338E-07 2.367E-06 2.901E-06 2.995E-06
U-235   U-235   1.000E+00    2.250E-02 2.025E-02 1.641E-02 7.852E-03 9.564E-04 6.031E-07 4.334E-16 2.301E-24 1.128E-38
U-238   U-238   1.000E+00    4.890E-01 4.401E-01 3.566E-01 1.707E-01 2.079E-02 1.311E-05 9.419E-15 5.002E-23 2.452E-37
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 BRF(i) is the branch fraction of the parent nuclide.
RESMAIN5.EXE execution time =    3.13 seconds
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Attachment 4

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 13:12 Page 1
Summary : Tc 1 pCi/g Th-230 and progeny, 5512 default Kd parameters, Kd for clay layer
File : TCUNEQ2C.RAD

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Time = 0.000E+00 11
Time = 1.000E+00 12
Time = 3.000E+00 13
Time = 1.000E+01 14
Time = 3.000E+01 15
Time = 1.000E+02 16
Time = 3.000E+02 17
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RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 13:12 Page 2
Summary : Tc 1 pCi/g Th-230 and progeny, 5512 default Kd parameters, Kd for clay layer
File : TCUNEQ2C.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: 92890566.LIB

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	2.040E+00	6.720E+00	DCF2(1)
B-1	Pa-231	5.180E-01	1.280E+00	DCF2(2)
B-1	Pb-210+D	4.070E-03	1.380E-02	DCF2(3)
B-1	Po-210	1.220E-02	9.400E-03	DCF2(4)
B-1	Ra-226+D	1.300E-02	8.600E-03	DCF2(5)
B-1	Th-230	5.180E-02	3.260E-01	DCF2(6)
B-1	U-234	1.300E-02	1.320E-01	DCF2(7)
B-1	U-235+D	1.150E-02	1.230E-01	DCF2(8)
B-1	U-238+D	1.070E-02	1.180E-01	DCF2(9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	4.070E-03	1.480E-02	DCF3(1)
D-1	Pa-231	2.630E-03	1.060E-02	DCF3(2)
D-1	Pb-210+D	2.560E-03	5.370E-03	DCF3(3)
D-1	Po-210	4.440E-03	1.900E-03	DCF3(4)
D-1	Ra-226+D	1.040E-03	1.330E-03	DCF3(5)
D-1	Th-230	7.780E-04	5.480E-04	DCF3(6)
D-1	U-234	1.810E-04	2.830E-04	DCF3(7)
D-1	U-235+D	1.740E-04	2.670E-04	DCF3(8)

D-1	U-238+D	1.670E-04	2.690E-04	DCF3(9)
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	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: 92890566.LIB

Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(8,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	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	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.000E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	2.000E+01	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)	4.810E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	7.940E+02	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Pb-210	1.000E+00	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Po-210	1.000E+00	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.000E+00	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): Th-230	1.000E+00	0.000E+00	---	S1(6)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Po-210	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(6)
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)	1.630E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-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)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.630E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	7.000E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	2	1	---	NS
R015	Unsat. zone 1, thickness (m)	1.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.630E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	3.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R015	Unsat. zone 2, thickness (m)	2.660E+00	0.000E+00	---	H(2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.630E+00	1.500E+00	---	DENSUZ(2)
R015	Unsat. zone 2, total porosity	3.000E-01	4.000E-01	---	TPUZ(2)
R015	Unsat. zone 2, effective porosity	2.000E-01	2.000E-01	---	EPUZ(2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ(2)
R015	Unsat. zone 2, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCU(3,1)
R016	Unsaturated zone 2 (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCU(3,2)
R016	Saturated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.904E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Po-210				
R016	Contaminated zone (cm**3/g)	1.500E+02	1.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+02	1.000E+01	---	DCNUCU(4,1)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Unsaturated zone 2 (cm**3/g)	3.000E+03	1.000E+01	---	DCNUCU(4,2)
R016	Saturated zone (cm**3/g)	1.500E+02	1.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.062E-02	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCU(5,1)
R016	Unsaturated zone 2 (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCU(5,2)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.189E-03	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(6,1)
R016	Unsaturated zone 2 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU(6,2)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.984E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCU(1,1)
R016	Unsaturated zone 2 (cm**3/g)	2.400E+03	2.000E+01	---	DCNUCU(1,2)
R016	Saturated zone (cm**3/g)	4.200E+02	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.796E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCU(2,1)
R016	Unsaturated zone 2 (cm**3/g)	2.700E+03	5.000E+01	---	DCNUCU(2,2)
R016	Saturated zone (cm**3/g)	5.100E+02	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.127E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter U-234				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(7,1)
R016	Unsaturated zone 2 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(7,2)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.053E-01	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for daughter U-235				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(8,1)
R016	Unsaturated zone 2 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(8,2)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.053E-01	ALEACH(8)

R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter U-238				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(9,1)
R016	Unsaturated zone 2 (cm**3/g)	1.600E+03	5.000E+01	---	DCNUCU(9,2)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.053E-01	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	1.000E-04	---	MLINH

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Exposure duration	5.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	5.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	3.300E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.500E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.100E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.660E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.100E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)

R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	1.825E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.500E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.500E+00	FMILK

Site-Specific Parameter Summary (continued)

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

C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	1.234E+02	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)

Site-Specific Parameter Summary (continued)

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

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active

8 -- soil ingestion ³ active
9 -- radon ³ suppressed
Find peak pathway doses ³ active

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 13:12 Page 10
Summary : Tc 1 pCi/g Th-230 and progeny, 5512 default Kd parameters, Kd for clay layer
File : TCUNEQ2C.RAD

Contaminated Zone Dimensions	
Area:	10000.00 square meters
Thickness:	0.30 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Pb-210	1.000E+00
Po-210	1.000E+00
Ra-226	1.000E+00
Th-230	1.000E+00

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 25 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	4.810E+02	7.940E+02
TDOSE(t):	7.064E+00	7.041E+00	6.972E+00	6.740E+00	6.137E+00	4.430E+00	4.536E-06	0.000E+00	0.000E+00
M(t):	2.826E-01	2.816E-01	2.789E-01	2.696E-01	2.455E-01	1.772E-01	1.814E-07	0.000E+00	0.000E+00

Maximum TDOSE(t): 7.064E+00 mrem/yr at t = 0.000E+00 years

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 13:12 Page 11
Summary : Tc 1 pCi/g Th-230 and progeny, 5512 default Kd parameters, Kd for clay layer
File : TCUNEQ2C.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 = 0.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	2.292E-03	0.0003	1.447E-03	0.0002	0.000E+00	0.0000	8.733E-01	0.1236	2.400E-01	0.0340	4.872E-02	0.0069	6.764E-02	0.0096
Po-210	8.890E-06	0.0000	7.693E-04	0.0001	0.000E+00	0.0000	6.005E-02	0.0085	1.673E-01	0.0237	1.790E-02	0.0025	2.815E-02	0.0040
Ra-226	4.142E+00	0.5864	1.809E-03	0.0003	0.000E+00	0.0000	1.239E+00	0.1754	4.935E-02	0.0070	6.477E-02	0.0092	1.533E-02	0.0022
Th-230	1.356E-03	0.0002	7.144E-03	0.0010	0.000E+00	0.0000	2.324E-02	0.0033	1.290E-03	0.0002	1.131E-04	0.0000	1.079E-02	0.0015
Total	4.146E+00	0.5869	1.117E-02	0.0016	0.000E+00	0.0000	2.196E+00	0.3108	4.579E-01	0.0648	1.315E-01	0.0186	1.219E-01	0.0173

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

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.233E+00	0.1746
Po-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.741E-01	0.0388
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.513E+00	0.7804
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	4.393E-02	0.0062
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.064E+00	1.0000

*Sum of all water independent and dependent pathways.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 13:12 Page 12
Summary : Tc 1 pCi/g Th-230 and progeny, 5512 default Kd parameters, Kd for clay layer
File : TCUNEQ2C.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.
Pb-210	2.216E-03	0.0003	2.023E-03	0.0003	0.000E+00	0.0000	8.982E-01	0.1276	3.676E-01	0.0522	6.189E-02	0.0088	8.817E-02	0.0125
Po-210	1.412E-06	0.0000	1.222E-04	0.0000	0.000E+00	0.0000	9.508E-03	0.0014	2.657E-02	0.0038	2.842E-03	0.0004	4.471E-03	0.0006
Ra-226	4.127E+00	0.5862	1.859E-03	0.0003	0.000E+00	0.0000	1.259E+00	0.1788	5.920E-02	0.0084	6.622E-02	0.0094	1.780E-02	0.0025
Th-230	3.146E-03	0.0004	7.141E-03	0.0010	0.000E+00	0.0000	2.369E-02	0.0034	1.312E-03	0.0002	1.410E-04	0.0000	1.079E-02	0.0015
Total	4.132E+00	0.5869	1.115E-02	0.0016	0.000E+00	0.0000	2.190E+00	0.3111	4.546E-01	0.0646	1.311E-01	0.0186	1.212E-01	0.0172

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

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.420E+00	0.2017
Po-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	4.351E-02	0.0062
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.531E+00	0.7856
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	4.622E-02	0.0066
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.041E+00	1.0000

*Sum of all water independent and dependent pathways.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 13:12 Page 13
Summary : Tc 1 pCi/g Th-230 and progeny, 5512 default Kd parameters, Kd for clay layer
File : TCUNEQ2C.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+00 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	2.059E-03	0.0003	1.990E-03	0.0003	0.000E+00	0.0000	8.373E-01	0.1201	3.654E-01	0.0524	6.002E-02	0.0086	8.598E-02	0.0123
Po-210	3.559E-08	0.0000	3.081E-06	0.0000	0.000E+00	0.0000	2.381E-04	0.0000	6.697E-04	0.0001	7.165E-05	0.0000	1.127E-04	0.0000
Ra-226	4.096E+00	0.5875	1.972E-03	0.0003	0.000E+00	0.0000	1.295E+00	0.1857	8.165E-02	0.0117	6.930E-02	0.0099	2.313E-02	0.0033
Th-230	6.702E-03	0.0010	7.136E-03	0.0010	0.000E+00	0.0000	2.461E-02	0.0035	1.371E-03	0.0002	1.993E-04	0.0000	1.080E-02	0.0015
Total	4.105E+00	0.5888	1.110E-02	0.0016	0.000E+00	0.0000	2.157E+00	0.3094	4.491E-01	0.0644	1.296E-01	0.0186	1.200E-01	0.0172

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

Radio-	Water	Fish	Radon	Plant	Meat	Milk	All Pathways*

Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.353E+00	0.1940
Po-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	1.095E-03	0.0002
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.567E+00	0.7985
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	5.082E-02	0.0073
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.972E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	1.589E-03	0.0002	1.539E-03	0.0002	0.000E+00	0.0000	6.312E-01	0.0936	2.816E-01	0.0418	4.621E-02	0.0069	6.646E-02	0.0099
Po-210	9.055E-14	0.0000	7.842E-12	0.0000	0.000E+00	0.0000	5.919E-10	0.0000	1.703E-09	0.0000	1.822E-10	0.0000	2.869E-10	0.0000
Ra-226	3.990E+00	0.5920	2.300E-03	0.0003	0.000E+00	0.0000	1.387E+00	0.2058	1.478E-01	0.0219	7.801E-02	0.0116	3.884E-02	0.0058
Th-230	1.890E-02	0.0028	7.117E-03	0.0011	0.000E+00	0.0000	2.797E-02	0.0041	1.715E-03	0.0003	4.196E-04	0.0001	1.086E-02	0.0016
Total	4.011E+00	0.5950	1.096E-02	0.0016	0.000E+00	0.0000	2.047E+00	0.3036	4.312E-01	0.0640	1.246E-01	0.0185	1.162E-01	0.0172

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

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.029E+00	0.1526
Po-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.772E-09	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.645E+00	0.8374
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	6.698E-02	0.0099
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.740E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	7.583E-04	0.0001	7.344E-04	0.0001	0.000E+00	0.0000	2.804E-01	0.0457	1.332E-01	0.0217	2.181E-02	0.0036	3.172E-02	0.0052
Po-210	9.381E-30	0.0000	8.143E-28	0.0000	0.000E+00	0.0000	5.723E-26	0.0000	1.763E-25	0.0000	1.888E-26	0.0000	2.980E-26	0.0000
Ra-226	3.698E+00	0.6026	2.788E-03	0.0005	0.000E+00	0.0000	1.449E+00	0.2362	2.525E-01	0.0411	8.938E-02	0.0146	6.416E-02	0.0105

Th-230	5.170E-02	0.0084	7.067E-03	0.0012	0.000E+00	0.0000	3.774E-02	0.0061	3.466E-03	0.0006	1.125E-03	0.0002	1.121E-02	0.0018
Total	3.751E+00	0.6111	1.059E-02	0.0017	0.000E+00	0.0000	1.767E+00	0.2880	3.891E-01	0.0634	1.123E-01	0.0183	1.071E-01	0.0174

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

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.686E-01	0.0764
Po-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.830E-25	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.556E+00	0.9053
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	1.123E-01	0.0183
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.137E+00	1.0000

*Sum of all water independent and dependent pathways.

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Summary : Tc 1 pCi/g Th-230 and progeny, 5512 default Kd parameters, Kd for clay layer
File : TCUNEQ2C.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.
Pb-210	5.681E-05	0.0000	5.514E-05	0.0000	0.000E+00	0.0000	1.559E-02	0.0035	9.671E-03	0.0022	1.576E-03	0.0004	2.381E-03	0.0005
Po-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	2.778E+00	0.6272	2.643E-03	0.0006	0.000E+00	0.0000	9.683E-01	0.2186	2.696E-01	0.0609	7.580E-02	0.0171	7.050E-02	0.0159
Th-230	1.424E-01	0.0322	6.905E-03	0.0016	0.000E+00	0.0000	5.824E-02	0.0131	1.137E-02	0.0026	3.380E-03	0.0008	1.297E-02	0.0029
Total	2.921E+00	0.6593	9.603E-03	0.0022	0.000E+00	0.0000	1.042E+00	0.2353	2.907E-01	0.0656	8.076E-02	0.0182	8.585E-02	0.0194

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

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.933E-02	0.0066
Po-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	4.165E+00	0.9403
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	2.353E-01	0.0531
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	4.430E+00	1.0000

*Sum of all water independent and dependent pathways.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 13:12 Page 17
Summary : Tc 1 pCi/g Th-230 and progeny, 5512 default Kd parameters, Kd for clay layer
File : TCUNEQ2C.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

TCAPPC4

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.113E-11	0.0000	8.412E-11	0.0000	4.523E-12	0.0000	0.000E+00	0.0000
Po-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	1.032E-06	0.2275	2.290E-06	0.5048	4.365E-07	0.0962	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.371E-07	0.0523	4.495E-07	0.0991	9.107E-08	0.0201	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.269E-06	0.2798	2.739E-06	0.6039	5.276E-07	0.1163	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.098E-10	0.0000
Po-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	3.758E-06	0.8285
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	7.776E-07	0.1714
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	4.536E-06	1.0000

*Sum of all water independent and dependent pathways.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 13:12 Page 18
Summary : Tc 1 pCi/g Th-230 and progeny, 5512 default Kd parameters, Kd for clay layer
File : TCUNEQ2C.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 = 4.810E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Po-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
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
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 = 4.810E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Po-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
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
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.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 13:12 Page 19
Summary : Tc 1 pCi/g Th-230 and progeny, 5512 default Kd parameters, Kd for clay layer
File : TCUNEQ2C.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 = 7.940E+02 years
Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Po-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
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
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 7.940E+02 years
Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Po-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
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
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.

RESRAD, Version 6.0 T« Limit = 30 days 03/06/2002 13:12 Page 20
Summary : Tc 1 pCi/g Th-230 and progeny, 5512 default Kd parameters, Kd for clay layer
File : TCUNEQ2C.RAD

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	4.810E+02	7.940E+02
Pb-210	Pb-210	1.000E+00	8.501E-01	8.169E-01	7.541E-01	5.698E-01	2.551E-01	1.475E-02	3.429E-11	0.000E+00	0.000E+00
Pb-210	Po-210	1.000E+00	3.832E-01	6.032E-01	5.986E-01	4.589E-01	2.135E-01	1.458E-02	7.549E-11	0.000E+00	0.000E+00
Pb-210	äDSR(j)		1.233E+00	1.420E+00	1.353E+00	1.029E+00	4.686E-01	2.933E-02	1.098E-10	0.000E+00	0.000E+00
Po-210	Po-210	1.000E+00	2.741E-01	4.351E-02	1.095E-03	2.772E-09	2.830E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-226	Ra-226	1.000E+00	5.492E+00	5.467E+00	5.418E+00	5.250E+00	4.791E+00	3.416E+00	1.494E-06	0.000E+00	0.000E+00
Ra-226	Pb-210	1.000E+00	1.575E-02	4.189E-02	8.981E-02	2.253E-01	4.222E-01	3.805E-01	7.173E-07	0.000E+00	0.000E+00
Ra-226	Po-210	1.000E+00	5.128E-03	2.168E-02	5.930E-02	1.697E-01	3.425E-01	3.684E-01	1.546E-06	0.000E+00	0.000E+00
Ra-226	äDSR(j)		5.513E+00	5.531E+00	5.567E+00	5.645E+00	5.556E+00	4.165E+00	3.758E-06	0.000E+00	0.000E+00
Th-230	Th-230	1.000E+00	4.276E-02	4.266E-02	4.247E-02	4.178E-02	3.985E-02	3.336E-02	3.851E-08	0.000E+00	0.000E+00
Th-230	Ra-226	1.000E+00	1.170E-03	3.537E-03	8.237E-03	2.425E-02	6.639E-02	1.746E-01	3.211E-07	0.000E+00	0.000E+00
Th-230	Pb-210	1.000E+00	2.473E-06	1.507E-05	7.217E-05	5.547E-04	3.382E-03	1.394E-02	1.327E-07	0.000E+00	0.000E+00
Th-230	Po-210	1.000E+00	6.486E-07	6.245E-06	4.133E-05	3.948E-04	2.684E-03	1.338E-02	2.852E-07	0.000E+00	0.000E+00
Th-230	äDSR(j)		4.393E-02	4.622E-02	5.082E-02	6.698E-02	1.123E-01	2.353E-01	7.776E-07	0.000E+00	0.000E+00

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*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ó 30 days) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 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	4.810E+02	7.940E+02
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Pb-210	2.027E+01	1.760E+01	1.848E+01	2.430E+01	5.335E+01	8.523E+02	2.277E+11	*7.631E+13	*7.631E+13
Po-210	9.119E+01	5.745E+02	2.282E+04	9.020E+09	*4.492E+15	*4.492E+15	*4.492E+15	*4.492E+15	*4.492E+15
Ra-226	4.535E+00	4.520E+00	4.491E+00	4.429E+00	4.500E+00	6.002E+00	6.652E+06	*9.882E+11	*9.882E+11
Th-230	5.690E+02	5.409E+02	4.920E+02	3.732E+02	2.226E+02	1.062E+02	3.215E+07	*2.018E+10	*2.018E+10
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*At specific activity limit

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

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
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Pb-210	1.000E+00	1.193 ñ 0.002	1.422E+00	1.758E+01	1.233E+00	2.027E+01
Po-210	1.000E+00	0.000E+00	2.741E-01	9.119E+01	2.741E-01	9.119E+01
Ra-226	1.000E+00	14.80 ñ 0.03	5.658E+00	4.418E+00	5.513E+00	4.535E+00
Th-230	1.000E+00	161.9 ñ 0.3	2.810E-01	8.898E+01	4.393E-02	5.690E+02
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Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	4.810E+02	7.940E+02
			DOSE(j,t), mrem/yr								
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Pb-210	Pb-210	1.000E+00	8.501E-01	8.169E-01	7.541E-01	5.698E-01	2.551E-01	1.475E-02	3.429E-11	0.000E+00	0.000E+00
Pb-210	Ra-226	1.000E+00	1.575E-02	4.189E-02	8.981E-02	2.253E-01	4.222E-01	3.805E-01	7.173E-07	0.000E+00	0.000E+00
Pb-210	Th-230	1.000E+00	2.473E-06	1.507E-05	7.217E-05	5.547E-04	3.382E-03	1.394E-02	1.327E-07	0.000E+00	0.000E+00
Pb-210	äDOSE(j):		8.659E-01	8.588E-01	8.440E-01	7.957E-01	6.807E-01	4.092E-01	8.501E-07	0.000E+00	0.000E+00
Po-210	Pb-210	1.000E+00	3.832E-01	6.032E-01	5.986E-01	4.589E-01	2.135E-01	1.458E-02	7.549E-11	0.000E+00	0.000E+00
Po-210	Po-210	1.000E+00	2.741E-01	4.351E-02	1.095E-03	2.772E-09	2.830E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Po-210	Ra-226	1.000E+00	5.128E-03	2.168E-02	5.930E-02	1.697E-01	3.425E-01	3.684E-01	1.546E-06	0.000E+00	0.000E+00
Po-210	Th-230	1.000E+00	6.486E-07	6.245E-06	4.133E-05	3.948E-04	2.684E-03	1.338E-02	2.852E-07	0.000E+00	0.000E+00
Po-210	äDOSE(j):		6.625E-01	6.684E-01	6.591E-01	6.290E-01	5.587E-01	3.963E-01	1.832E-06	0.000E+00	0.000E+00
Ra-226	Ra-226	1.000E+00	5.492E+00	5.467E+00	5.418E+00	5.250E+00	4.791E+00	3.416E+00	1.494E-06	0.000E+00	0.000E+00
Ra-226	Th-230	1.000E+00	1.170E-03	3.537E-03	8.237E-03	2.425E-02	6.639E-02	1.746E-01	3.211E-07	0.000E+00	0.000E+00
Ra-226	äDOSE(j):		5.493E+00	5.471E+00	5.426E+00	5.274E+00	4.858E+00	3.591E+00	1.815E-06	0.000E+00	0.000E+00
Th-230	Th-230	1.000E+00	4.276E-02	4.266E-02	4.247E-02	4.178E-02	3.985E-02	3.336E-02	3.851E-08	0.000E+00	0.000E+00
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BRF(i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	4.810E+02	7.940E+02
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Pb-210	Pb-210	1.000E+00	1.000E+00	9.637E-01	8.950E-01	6.908E-01	3.297E-01	2.476E-02	1.517E-05	1.877E-08	1.761E-13
Pb-210	Ra-226	1.000E+00	0.000E+00	3.046E-02	8.777E-02	2.549E-01	5.285E-01	6.254E-01	3.142E-01	1.631E-01	5.249E-02
Pb-210	Th-230	1.000E+00	0.000E+00	6.641E-06	5.817E-05	5.890E-04	4.136E-03	2.272E-02	5.806E-02	7.015E-02	7.190E-02
Pb-210	äS(j):		1.000E+00	9.942E-01	9.828E-01	9.463E-01	8.624E-01	6.729E-01	3.723E-01	2.333E-01	1.244E-01
Po-210	Pb-210	1.000E+00	0.000E+00	8.167E-01	9.040E-01	7.009E-01	3.345E-01	2.512E-02	1.539E-05	1.905E-08	1.786E-13
Po-210	Po-210	1.000E+00	1.000E+00	1.588E-01	4.004E-03	1.019E-08	1.058E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Po-210	Ra-226	1.000E+00	0.000E+00	1.652E-02	7.214E-02	2.421E-01	5.209E-01	6.226E-01	3.130E-01	1.625E-01	5.229E-02
Po-210	Th-230	1.000E+00	0.000E+00	2.714E-06	4.086E-05	5.288E-04	3.990E-03	2.245E-02	5.767E-02	6.972E-02	7.149E-02
Po-210	äS(j):		1.000E+00	9.920E-01	9.802E-01	9.435E-01	8.594E-01	6.702E-01	3.707E-01	2.322E-01	1.238E-01
Ra-226	Ra-226	1.000E+00	1.000E+00	9.964E-01	9.892E-01	9.644E-01	8.970E-01	6.961E-01	3.373E-01	1.751E-01	5.635E-02
Ra-226	Th-230	1.000E+00	0.000E+00	4.323E-04	1.292E-03	4.244E-03	1.222E-02	3.538E-02	7.252E-02	8.460E-02	8.512E-02
Ra-226	äS(j):		1.000E+00	9.968E-01	9.905E-01	9.687E-01	9.092E-01	7.315E-01	4.098E-01	2.597E-01	1.415E-01
Th-230	Th-230	1.000E+00	1.000E+00	9.995E-01	9.985E-01	9.949E-01	9.849E-01	9.505E-01	8.588E-01	7.834E-01	6.684E-01
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BRF(i) is the branch fraction of the parent nuclide.

RESMAIN5.EXE execution time = 1.18 seconds

NEXTEP Environmental

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TECHNICAL MEMORANDUM

March 6, 2002

Originator: Harry J. Newman, CHP, Technical Director

Subject: ***Derivation of Indoor Surface DCGLs for KMTC***

Revision: 2

Endorsement: This document contains the results of research and technical analysis which have been reviewed and approved for publication by the Technical Director, NEXTEP Environmental, Inc.

H Newman by W. A. Rogers 3-6-02
Harry J. Newman, CHP, Technical Director Date

Introduction

This Technical Memo provides information regarding the modeling and parameters used in deriving a 25 mrem/y, industrial use, release limit for indoor surfaces and structures. As this modeling supports MARSSIM activities, the release limits will be referred to as Derived Concentration Guideline Levels (DCGL). The characterization data for the Kerr-McGee Technical Center (KMTC) indicates that elevated quantities of uranium and thorium contamination exist at several locations, and that equilibrium with progeny may not exist. DCGLs are therefore derived for:

- Thorium – 232 and progeny
- The uranium series through uranium 234
- Ra-226 and progeny (includes dose contribution from Th-230)

This approach allows flexibility whereby higher or lower than expected concentrations of radium 226 (in comparison to uranium 238) can be accommodated, and allows for comparison of measured values with the calculated DCGLs.

$DCGL_{EMC}$ calculations for these scenarios are shown to be impractical due to the high residual contamination levels that would be allowable. KMTC has chosen to utilize a more conservative ALARA based approach as described herein.

General Method for Calculating DCGL

The software code RESRAD-BUILD[1] is used to provide pathway modeling and contains default values for model parameters. The following bullets describe key parameters and criteria that differ from the default parameters used in RESRAD-BUILD.

- **Building Air Exchange Rate** – An air turnover rate of 1.52 exchanges per hour is used based on mean air exchange rates for commercial buildings as presented in Appendix C to NUREG-6697. This turnover rate conservatively under-represents the actual design ventilation air turnover rate of 10 per hour found in laboratories at KMTC.

- **Room Height** – The height of the false ceiling for most rooms at KMTC is 10.8 feet[3]. A ceiling height of 3 m, or 9.8 feet is conservatively applied in the modeling.

- **Removable Fraction** – 0.7 percent removable fraction is used. This value is based upon comparisons of smear measurements and fixed plus removable measurements for beta radioactivity in affected labs.

- **Dose Conversion Factors** – ICRP 72 dose conversion factors for the radionuclides (and progeny) of interest were substituted for the default ICRP 30 parameter for consistency with the other pathway analyses and DCGLs derived sitewide.

Derived DCGLs

The RESRAD-BUILD default room area of 6m x 6m was used, with a height of 3m. The individual is assumed to be located in the center of the room for the exposure duration with exposure from all 6 surfaces of the room. The input concentration for the RESRAD-BUILD code is in pCi/m² while the output is provided in mrem/y. The input values represent a contamination level of 1dpm/100cm² for the initial parent nuclide, with appropriate entries for daughter products. In order to convert the results from RESRAD-BUILD to the $DCGL_w$, the following step is necessary.

$$DCGL_w = \frac{25mrem\,\text{limit}}{RESRADoutput\{mrem/y(dpm/100cm^2)\}} * (beta + ice)/dpm$$

Where the betas plus internal conversion electron (i.c.e.) per /dpm is radionuclide series specific[4]. The individual DCGLw are provided in Table 1. The units for the calculated $DCGL_w$ are Beta + i.c.e./100cm². Attachments 1-3 provide the results of the RESRAD-BUILD computer calculations for each radionuclide series.

[1] RESRAD-BUILD for Windows, Version 3.0. Argonne National Laboratory for USNRC and USDOE, August 25, 2000.

[3] In other locations such as the Pilot Plant, storage building, and TSSL building, the ceiling height is in excess of 14 feet.

[4] For the natural thorium series 3.61 betas + ice/dpm, for uranium 238 to uranium 234, 2.03 betas + ice/dpm, and 3.31 betas + ice/dpm is used for Ra-226 and progeny (including Th-230).

Table 1
Derived DCGLs

Radionuclide	mrem/y per dpm/100cm^2	DCGLw (dpm/100 cm^2)*
Thorium 232 and progeny	7.13E-03	12,675
Uranium Series through U-234	2.50E-04	203,000
Ra-226 and progeny	1.92E-03	43,000

**The release limit in dpm/100 cm² is based upon the total beta (plus i.c.e.) emissions.*

$DCGL_{EMC}$ and ALARA Considerations

The $DCGL_w$ for the 3 contaminant types is presented in Table 2. The $DCGL_w$ is the residual concentration level at which a dose of 25 mrem/y will be received under the modeled scenario, if all surfaces are uniformly contaminated at that level. Higher levels of residual contamination are allowable when the area of the contamination is less than 144m^2. For example, if only the floor area of 36m^2 was contaminated at the $DCGL_w$, the dose to the hypothetical modeled individual would be reduced by the contributions from the walls and ceiling. Table 2 presents the dose associated with this scenario for the three contaminant types at KMTC.

Table 2
Dose to Individual for Two Scenarios

	Entire Room Contaminated at $DCGL_w$	Floor only Contaminated at $DCGL_w$
Thorium 232 and progeny	25 mrem/y	7.3 mrem/y
Uranium Series through U-234	25 mrem/y	6.8 mrem/y
Ra-226 and progeny	25 mrem/y	8.9 mrem/y

Table 2 shows that if the floor area only was contaminated at a level between 2.8 and 3.7 times the DCGLw, the dose to the modeled individual would still be less than 25 mrem/y. Smaller areas of residual contamination would allow even higher levels to remain. However, in consideration of ALARA principles, KMTC will ensure that all residual indoor contamination exceeding the $DCGL_w$ will be limited to a value which is less than or equal to 2.8 x $DCGL_w$ for all radionuclides. Therefore, the $DCGL_{EMC}$ values to be used at KMTC are as follows:

- Thorium – 232 and progeny : 35,000 dpm/100cm^2
- U-238 through U-234: 568,000 dpm/100cm^2
- Ra-226 and progeny: 120,000 dpm/100cm^2

where the units represent total beta plus i.c.e emissions per 100cm^2

Conclusions/Recommendations

The individual surface $DCGL_w$ for building surfaces are provided in Table 1. It will be possible in numerous locations to perform final status surveys assuming the contaminant is natural thorium only and apply this $DCGL_w$, which is lower than the $DCGL_w$ for the other two series. In instances where contamination greater than the natural thorium $DCGL_w$ is identified, it will be necessary to determine the relative contaminant contributions if the residual contamination will be left in place. Guidance on application and use of the unity rule for three separate DCGLs in this instance is outlined in MARSSIM, appendix I.11.

The use of area factors allows for the evaluation of higher than expected contaminant concentrations in areas significantly smaller than the modeled 6m x 6m x 3m area ($144m^2$). KMTC has established the $DCGL_{EMC}$ at an upper threshold of 2.8 times the $DCGL_w$ for all radionuclides, in consideration of ALARA.

Attachment 1

□

** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19 Page: 1
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld

```
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íííí      RESRAD-BUILD Table of Contents        íííí
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For time = 0.00E+00 yr
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For time = 1.00E+00 yr
Time Specific Parameters..... 14
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□

** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19 Page: 2
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld

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```

Number of Sources : 6
Number of Receptors: 1
Total Time : 3.650000E+02 days
Fraction Inside : 7.000000E-01

ÍÍÍÍÍÍÍÍÍÍ Receptor Information ÍÍÍÍÍÍÍÍÍÍ

Receptor	Room	x	y	z	FracTime	Inhalation	Ingestion (Dust)
		[m]	[m]	[m]		[m3/day]	[m2/hr]
1	1	3.000	3.000	1.000	0.330	3.36E+01	1.00E-04

ÍÍÍ Receptor-Source Shielding Relationship ÍÍÍ

Receptor	Source	Density [g/cm3]	Thickness [cm]	Material
1	1	2.40E+00	0.00E+00	Concrete
1	2	2.40E+00	0.00E+00	Concrete
1	3	2.40E+00	0.00E+00	Concrete
1	4	2.40E+00	0.00E+00	Concrete
1	5	2.40E+00	0.00E+00	Concrete
1	6	2.40E+00	0.00E+00	Concrete

□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19 Page: 3
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld

ÍÍÍÍÍÍÍÍ Building Information ÍÍÍÍÍÍÍÍ

Building Air Exchange Rate: 1.52E+00 1/hr

```
    Height[m]          Air Exchanges [m3/hr]
    Area [m2]
                      ******************************
                      *                            *
                      *                            *
                      *                           <=Q01: 1.64E+02
    H1:    3.000      *           Room  1          *      Q10 :  1.64E
+02
                      *   LAMBDA: 1.52E+00         *
   Area  36.000       *                            *
                      *                            *
                      ******************************


      Deposition velocity: 1.00E-02 [m/s]   Resuspension Rate: 5.00E-0
7 [1/s]
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:   4
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld


              ÍÍÍÍÍÍÍÍ  Source Information  ÍÍÍÍÍÍÍÍ


 Source:  1
        Location::  Room :  1  x:   3.00 y:   3.00  z:   0.00[m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]

             Radon Release Fraction:   1.000E-01


   Contamination::
    Nuclide Concentration       Dose Conversion Factors
    ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
                          Ingestion   Inhalation  Submersion
                [pCi/m2]  [mrem/pCi]  [mrem/pCi]  [mrem/yr/
```

```
                                                    (pCi/m3)]
     TH-232     4.550E+01   1.000E-03   9.260E-02   1.020E-06
     TH-228     4.550E+01   2.670E-04   1.480E-01   9.410E-03
     RA-228     4.550E+01   2.560E-03   9.630E-03   5.590E-03

 Source:  2
         Location::  Room :  1  x:   3.00 y:   3.00  z:   3.00[m]
         Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
         Pathway ::
              Direct Ingestion Rate:    0.000E+00 [1/hr]
              Fraction released to air: 1.000E-01
              Removable fraction:       7.000E-03
              Time to Remove:           3.650E+02 [day]

              Radon Release Fraction:   1.000E-01


   Contamination::
    Nuclide Concentration       Dose Conversion Factors
    ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
                            Ingestion   Inhalation  Submersion
                [pCi/m2]    [mrem/pCi]  [mrem/pCi]  [mrem/yr/
                                                    (pCi/m3)]
     TH-232     4.550E+01   1.000E-03   9.260E-02   1.020E-06
     TH-228     4.550E+01   2.670E-04   1.480E-01   9.410E-03
     RA-228     4.550E+01   2.560E-03   9.630E-03   5.590E-03
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:   5
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld


 Source:  3
         Location::  Room :  1  x:   0.00 y:   3.00  z:   1.50[m]
         Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
         Pathway ::
              Direct Ingestion Rate:    0.000E+00 [1/hr]
              Fraction released to air: 1.000E-01
              Removable fraction:       7.000E-03
              Time to Remove:           3.650E+02 [day]

              Radon Release Fraction:   1.000E-01
```

```
   Contamination::
    Nuclide Concentration        Dose Conversion Factors
    ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
                                Ingestion   Inhalation  Submersion
                [pCi/m2]        [mrem/pCi]  [mrem/pCi]  [mrem/yr/
                                                        (pCi/m3)]
     TH-232     4.550E+01       1.000E-03   9.260E-02   1.020E-06
     TH-228     4.550E+01       2.670E-04   1.480E-01   9.410E-03
     RA-228     4.550E+01       2.560E-03   9.630E-03   5.590E-03

 Source:  4
        Location::  Room :  1  x:   3.00 y:   0.00  z:   1.50[m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]

             Radon Release Fraction:   1.000E-01


   Contamination::
    Nuclide Concentration        Dose Conversion Factors
    ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
                                Ingestion   Inhalation  Submersion
                [pCi/m2]        [mrem/pCi]  [mrem/pCi]  [mrem/yr/
                                                        (pCi/m3)]
     TH-232     4.550E+01       1.000E-03   9.260E-02   1.020E-06
     TH-228     4.550E+01       2.670E-04   1.480E-01   9.410E-03
     RA-228     4.550E+01       2.560E-03   9.630E-03   5.590E-03
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:   6
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld


 Source:  5
        Location::  Room :  1  x:   6.00 y:   3.00  z:   1.50[m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
```

Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 7.000E-03
Time to Remove: 3.650E+02 [day]

Radon Release Fraction: 1.000E-01

Contamination::

Nuclide	Concentration [pCi/m2]	Dose Conversion Factors Ingestion [mrem/pCi]	Inhalation [mrem/pCi]	Submersion [mrem/yr/ (pCi/m3)]
TH-232	4.550E+01	1.000E-03	9.260E-02	1.020E-06
TH-228	4.550E+01	2.670E-04	1.480E-01	9.410E-03
RA-228	4.550E+01	2.560E-03	9.630E-03	5.590E-03

Source: 6
Location:: Room : 1 x: 3.00 y: 6.00 z: 1.50[m]
Geometry:: Type: Area Area:1.80E+01 [m2] Direction:
y

Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 7.000E-03
Time to Remove: 3.650E+02 [day]

Radon Release Fraction: 1.000E-01

Contamination::

Nuclide	Concentration [pCi/m2]	Dose Conversion Factors Ingestion [mrem/pCi]	Inhalation [mrem/pCi]	Submersion [mrem/yr/ (pCi/m3)]
TH-232	4.550E+01	1.000E-03	9.260E-02	1.020E-06
TH-228	4.550E+01	2.670E-04	1.480E-01	9.410E-03
RA-228	4.550E+01	2.560E-03	9.630E-03	5.590E-03

□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19 Page: 7
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time: 0.000000 years

```
ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
ÍÍÍ       Assessment for Time:  1            ÍÍÍ
ÍÍÍ             Time =0.00E+00 yr            ÍÍÍ
ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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ÍÍÍÍÍÍÍÍ  Source Information  ÍÍÍÍÍÍÍÍ


 Source:  1
        Location::  Room :  1  x:   3.00 y:   3.00  z:   0.00 [m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.550E+01
                             TH-228      4.550E+01
                             RA-228      4.550E+01

 Source:  2
        Location::  Room :  1  x:   3.00 y:   3.00  z:   3.00 [m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.550E+01
```

```
TH-228        4.550E+01
RA-228        4.550E+01
```

□

```
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:   8
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time:    0.000000     years


 Source:  3
        Location::  Room :  1  x:   0.00 y:   3.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.550E+01
                             TH-228      4.550E+01
                             RA-228      4.550E+01

 Source:  4
        Location::  Room :  1  x:   3.00 y:   0.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.550E+01
                             TH-228      4.550E+01
                             RA-228      4.550E+01
```

```
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:   9
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time:    0.000000     years


 Source:  5
        Location::  Room :  1  x:   6.00 y:   3.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.550E+01
                             TH-228      4.550E+01
                             RA-228      4.550E+01

 Source:  6
        Location::  Room :  1  x:   3.00 y:   6.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.550E+01
                             TH-228      4.550E+01
                             RA-228      4.550E+01
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:  10
```

**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time: 0.000000 years

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ííí RESRAD-BUILD Dose Tables ííí
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Source Contributions to Receptor Doses
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[mrem]

	Source 1	Source 2	Source 3	Source 4	Source 5	Source 6	Total
Receptor 1	2.07E-03	1.75E-03	8.25E-04	8.25E-04	8.25E-04	8.25E-04	7.12E-03
Total	2.07E-03	1.75E-03	8.25E-04	8.25E-04	8.25E-04	8.25E-04	7.12E-03

□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19 Page: 11
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time: 0.000000 years

Pathway Detail of Doses
íííííííííííííííííííííííí
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	6.78E-04	2.07E-07	2.43E-09	5.11E-04	8.65E-04	1.16E-05
Total	6.78E-04	2.07E-07	2.43E-09	5.11E-04	8.65E-04	1.16E-05

Source: 2

Receptor	External	Deposition	Immersion	Inhalation	Radon	I ngestion
1	3.63E-04	2.07E-07	2.43E-09	5.11E-04	8.65E-04	1.16E-05
Total	3.63E-04	2.07E-07	2.43E-09	5.11E-04	8.65E-04	1.16E-05

Source: 3

Receptor	External	Deposition	Immersion	Inhalation	Radon	I ngestion
1	1.30E-04	1.04E-07	1.22E-09	2.56E-04	4.33E-04	5.81E-06
Total	1.30E-04	1.04E-07	1.22E-09	2.56E-04	4.33E-04	5.81E-06

Source: 4

Receptor	External	Deposition	Immersion	Inhalation	Radon	I ngestion
1	1.30E-04	1.04E-07	1.22E-09	2.56E-04	4.33E-04	5.81E-06
Total	1.30E-04	1.04E-07	1.22E-09	2.56E-04	4.33E-04	5.81E-06

Source: 5

Receptor	External	Deposition	Immersion	Inhalation	Radon	I ngestion
1	1.30E-04	1.04E-07	1.22E-09	2.56E-04	4.33E-04	5.81E-06
Total	1.30E-04	1.04E-07	1.22E-09	2.56E-04	4.33E-04	5.81E-06

Source: 6

Receptor	External	Deposition	Immersion	Inhalation	Radon	I ngestion
1	1.30E-04	1.04E-07	1.22E-09	2.56E-04	4.33E-04	5.81E-06
Total	1.30E-04	1.04E-07	1.22E-09	2.56E-04	4.33E-04	

5.81E-06
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19 Page: 12
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time: 0.000000 years

Nuclide Detail of Doses
íííííííííííííííííííííí
[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-232		
TH-232	2.12E-04	2.12E-04
TH-228	1.00E-05	1.00E-05
RA-228	1.75E-05	1.75E-05
TH-228		
TH-228	1.30E-03	1.30E-03
RA-228		
TH-228	2.40E-04	2.40E-04
RA-228	2.85E-04	2.85E-04

Source: 2

Nuclide	Receptor 1	Total
TH-232		
TH-232	2.11E-04	2.11E-04
TH-228	8.80E-06	8.80E-06
RA-228	1.01E-05	1.01E-05
TH-228		
TH-228	1.15E-03	1.15E-03
RA-228		
TH-228	2.11E-04	2.11E-04
RA-228	1.65E-04	1.65E-04

Source: 3

Nuclide	Receptor 1	Total
TH-232		
TH-232	1.06E-04	1.06E-04
TH-228	4.20E-06	4.20E-06
RA-228	3.87E-06	3.87E-06
TH-228		
TH-228	5.47E-04	5.47E-04
RA-228		
TH-228	1.01E-04	1.01E-04
RA-228	6.30E-05	6.30E-05

□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19 Page: 13
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time: 0.000000 years

Source: 4

Nuclide	Receptor 1	Total
TH-232		
TH-232	1.06E-04	1.06E-04
TH-228	4.20E-06	4.20E-06
RA-228	3.87E-06	3.87E-06
TH-228		
TH-228	5.47E-04	5.47E-04
RA-228		
TH-228	1.01E-04	1.01E-04
RA-228	6.30E-05	6.30E-05

Source: 5

Nuclide	Receptor 1	Total
TH-232		
TH-232	1.06E-04	1.06E-04
TH-228	4.20E-06	4.20E-06
RA-228	3.87E-06	3.87E-06
TH-228		
TH-228	5.47E-04	5.47E-04

```
 RA-228
  TH-228    1.01E-04  1.01E-04
  RA-228    6.30E-05  6.30E-05


Source:  6

   Nuclide Receptor   Total
                 1
 TH-232
  TH-232    1.06E-04  1.06E-04
  TH-228    4.20E-06  4.20E-06
  RA-228    3.87E-06  3.87E-06
 TH-228
  TH-228    5.47E-04  5.47E-04
 RA-228
  TH-228    1.01E-04  1.01E-04
  RA-228    6.30E-05  6.30E-05


□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:  14
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time:     1.00000     years


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              ÍÍÍ       Assessment for Time:  2            ÍÍÍ
              ÍÍÍ             Time =1.00E+00 yr            ÍÍÍ
              ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
              ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ


              ÍÍÍÍÍÍÍÍ  Source Information  ÍÍÍÍÍÍÍÍ


 Source:  1
        Location::  Room :  1  x:   3.00 y:   3.00  z:   0.00 [m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
```

```
                Removable fraction:        0.000E+00
                Time to Remove:            3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.518E+01
                             TH-228      4.518E+01
                             RA-228      4.518E+01

 Source:  2
        Location::  Room :  1  x:   3.00 y:   3.00  z:   3.00 [m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
                Direct Ingestion Rate:     0.000E+00 [1/hr]
                Fraction released to air: 1.000E-01
                Removable fraction:        0.000E+00
                Time to Remove:            3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.518E+01
                             TH-228      4.518E+01
                             RA-228      4.518E+01
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:  15
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time:     1.00000     years


 Source:  3
        Location::  Room :  1  x:   0.00 y:   3.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
                Direct Ingestion Rate:     0.000E+00 [1/hr]
                Fraction released to air: 1.000E-01
                Removable fraction:        0.000E+00
                Time to Remove:            3.650E+02 [day]
```

```
        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.518E+01
                             TH-228      4.518E+01
                             RA-228      4.518E+01

 Source:  4
        Location::  Room :  1  x:   3.00 y:   0.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       0.000E+00
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.518E+01
                             TH-228      4.518E+01
                             RA-228      4.518E+01
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:  16
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time:     1.00000     years


 Source:  5
        Location::  Room :  1  x:   6.00 y:   3.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       0.000E+00
             Time to Remove:           3.650E+02 [day]
```

```
        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.518E+01
                             TH-228      4.518E+01
                             RA-228      4.518E+01

 Source:  6
        Location::  Room :  1  x:   3.00 y:   6.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       0.000E+00
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-232      4.518E+01
                             TH-228      4.518E+01
                             RA-228      4.518E+01
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:  17
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time:     1.00000     years


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             ÍÍÍ                                                ÍÍÍ
             ÍÍÍ        RESRAD-BUILD Dose Tables                ÍÍÍ
             ÍÍÍ                                                ÍÍÍ
             ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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                   Source Contributions to Receptor Doses
                   ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
                                 [mrem]
```

	Source 1	Source 2	Source 3	Source 4	Source 5	Source 6	Total
Receptor 1	1.54E-03	1.22E-03	5.61E-04	5.61E-04	5.61E-04	5.61E-04	5.01E-03
Total	1.54E-03	1.22E-03	5.61E-04	5.61E-04	5.61E-04	5.61E-04	5.01E-03

□

** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19 Page: 18 **

Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time: 1.00000 years

Pathway Detail of Doses
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	6.76E-04	0.00E+00	0.00E+00	0.00E+00	8.62E-04	0.00E+00
Total	6.76E-04	0.00E+00	0.00E+00	0.00E+00	8.62E-04	0.00E+00

Source: 2

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	3.62E-04	0.00E+00	0.00E+00	0.00E+00	8.62E-04	0.00E+00
Total	3.62E-04	0.00E+00	0.00E+00	0.00E+00	8.62E-04	0.00E+00

Source: 3

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	1.30E-04	0.00E+00	0.00E+00	0.00E+00	4.31E-04	0.00E+00
Total	1.30E-04	0.00E+00	0.00E+00	0.00E+00	4.31E-04	0.00E+00

```
Source:  4
   Receptor     External  Deposition Immersion  Inhalation   Radon    I
ngestion
       1        1.30E-04   0.00E+00   0.00E+00   0.00E+00   4.31E-04
0.00E+00
   Total        1.30E-04   0.00E+00   0.00E+00   0.00E+00   4.31E-04
0.00E+00


Source:  5
   Receptor     External  Deposition Immersion  Inhalation   Radon    I
ngestion
       1        1.30E-04   0.00E+00   0.00E+00   0.00E+00   4.31E-04
0.00E+00
   Total        1.30E-04   0.00E+00   0.00E+00   0.00E+00   4.31E-04
0.00E+00


Source:  6
   Receptor     External  Deposition Immersion  Inhalation   Radon    I
ngestion
       1        1.30E-04   0.00E+00   0.00E+00   0.00E+00   4.31E-04
0.00E+00
   Total        1.30E-04   0.00E+00   0.00E+00   0.00E+00   4.31E-04
0.00E+00
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:  19
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time:     1.00000     years


                    Nuclide Detail of Doses
                    ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
                            [mrem]

Source:  1

   Nuclide Receptor   Total
                 1
 TH-232
  TH-232   3.79E-07  3.79E-07
```

```
  TH-228    5.22E-05  5.22E-05
  RA-228    4.48E-05  4.48E-05
 TH-228
  TH-228    7.46E-04  7.46E-04
 RA-228
  TH-228    4.66E-04  4.66E-04
  RA-228    2.28E-04  2.28E-04


Source:  2

   Nuclide Receptor   Total
                1
 TH-232
  TH-232    1.80E-07  1.80E-07
  TH-228    4.45E-05  4.45E-05
  RA-228    2.40E-05  2.40E-05
 TH-228
  TH-228    6.36E-04  6.36E-04
 RA-228
  TH-228    3.97E-04  3.97E-04
  RA-228    1.22E-04  1.22E-04


Source:  3

   Nuclide Receptor   Total
                1
 TH-232
  TH-232    5.95E-08  5.95E-08
  TH-228    2.10E-05  2.10E-05
  RA-228    8.61E-06  8.61E-06
 TH-228
  TH-228    3.00E-04  3.00E-04
 RA-228
  TH-228    1.87E-04  1.87E-04
  RA-228    4.39E-05  4.39E-05


□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:  20
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Evaluation Time:     1.00000     years
```

Source: 4

Nuclide	Receptor 1	Total
TH-232		
TH-232	5.95E-08	5.95E-08
TH-228	2.10E-05	2.10E-05
RA-228	8.61E-06	8.61E-06
TH-228		
TH-228	3.00E-04	3.00E-04
RA-228		
TH-228	1.87E-04	1.87E-04
RA-228	4.39E-05	4.39E-05

Source: 5

Nuclide	Receptor 1	Total
TH-232		
TH-232	5.95E-08	5.95E-08
TH-228	2.10E-05	2.10E-05
RA-228	8.61E-06	8.61E-06
TH-228		
TH-228	3.00E-04	3.00E-04
RA-228		
TH-228	1.87E-04	1.87E-04
RA-228	4.39E-05	4.39E-05

Source: 6

Nuclide	Receptor 1	Total
TH-232		
TH-232	5.95E-08	5.95E-08
TH-228	2.10E-05	2.10E-05
RA-228	8.61E-06	8.61E-06
TH-228		
TH-228	3.00E-04	3.00E-04
RA-228		
TH-228	1.87E-04	1.87E-04
RA-228	4.39E-05	4.39E-05

```
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:19  Page:  21
**
Title : Natural Th with ICRP72 DCFs Eval Rev. 1
Input File : C:\Winbld\Tc232b.bld
Full Summary


              ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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              ÍÍÍ                                                ÍÍÍ
              ÍÍÍ     RESRAD-BUILD Dose (Time) Tables            ÍÍÍ
              ÍÍÍ                                                ÍÍÍ
              ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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              Receptor Doses Received for the Exposure Duration
              ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
                                   (mrem)

                            Evaluation Time [yr]
      0.00E+00  1.00E+00
      ÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄ
  1   7.12E-03  5.01E-03


              Receptor Dose/Yr Averaged Over Exposure Duration
              ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
                                  (mrem/yr)

                            Evaluation Time [yr]
      0.00E+00  1.00E+00
      ÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄ
  1   7.12E-03  5.01E-03
```

Attachment 2

□

** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 1
**

Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld

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ííí RESRAD-BUILD Table of Contents ííí
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For time = 1.00E+00 yr
Time Specific Parameters..... 19
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Dose by Nuclide Detail..... 25
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□

** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 2
**

Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld

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ííí RESRAD-BUILD Input Parameters ííí
ííí ííí
íí
íí

Number of Sources : 6
Number of Receptors: 1
Total Time : 3.650000E+02 days
Fraction Inside : 7.000000E-01

ÍÍÍÍÍÍÍÍÍÍ Receptor Information ÍÍÍÍÍÍÍÍÍÍ

Receptor	Room	x	y	z	FracTime	Inhalation	Ingestion(Dust)
		[m]	[m]	[m]		[m3/day]	[m2/hr]
1	1	3.000	3.000	1.000	0.330	3.36E+01	1.00E-04

ÍÍÍ Receptor-Source Shielding Relationship ÍÍÍ

Receptor	Source	Density [g/cm3]	Thickness [cm]	Material
1	1	2.40E+00	0.00E+00	Concrete
1	2	2.40E+00	0.00E+00	Concrete
1	3	2.40E+00	0.00E+00	Concrete
1	4	2.40E+00	0.00E+00	Concrete
1	5	2.40E+00	0.00E+00	Concrete
1	6	2.40E+00	0.00E+00	Concrete

ÍÍÍÍÍÍÍÍ Building Information ÍÍÍÍÍÍÍÍ

Building Air Exchange Rate: 1.52E+00 1/hr

```
    Height[m]          Air Exchanges [m3/hr]
    Area [m2]
                      ******************************
                      *                            *
                      *                            *
                      *                           <=Q01: 1.64E+02
    H1:   3.000       *           Room  1          *      Q10 :  1.64E
+02
                      *   LAMBDA: 1.52E+00         *
   Area  36.000       *                            *
                      *                            *
                      ******************************


      Deposition velocity: 1.00E-02 [m/s]   Resuspension Rate: 5.00E-0
7 [1/s]
□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08  Page:   4
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld


              ÍÍÍÍÍÍÍÍ  Source Information  ÍÍÍÍÍÍÍÍ


 Source:  1
        Location::  Room :  1  x:   3.00 y:   3.00  z:   0.00[m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]

             Radon Release Fraction:   1.000E-01


   Contamination::
    Nuclide Concentration        Dose Conversion Factors
    ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
                         Ingestion   Inhalation  Submersion
                [pCi/m2]  [mrem/pCi]  [mrem/pCi]  [mrem/yr/
```

				(pCi/m3)]
U-238	4.550E+01	1.670E-04	1.070E-02	1.600E-04
U-235	2.100E+00	1.740E-04	1.150E-02	9.030E-04
U-234	4.550E+01	1.810E-04	1.300E-02	8.930E-07
PA-231	0.000E+00	2.630E-03	5.180E-01	2.010E-04
TH-230	0.000E+00	7.780E-04	5.180E-02	2.040E-06
AC-227	0.000E+00	4.070E-03	2.040E+00	2.160E-03
RA-226	0.000E+00	1.040E-03	1.300E-02	1.040E-02
PB-210	0.000E+00	2.560E-03	4.070E-03	1.430E-05

□

** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 5
**

Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld

Source: 2
Location:: Room : 1 x: 3.00 y: 3.00 z: 3.00[m]
Geometry:: Type: Area Area:3.60E+01 [m2] Direction:
z

Pathway ::

Direct Ingestion Rate:	0.000E+00	[1/hr]
Fraction released to air:	1.000E-01	
Removable fraction:	7.000E-03	
Time to Remove:	3.650E+02	[day]
Radon Release Fraction:	1.000E-01	

Contamination::

Nuclide	Concentration [pCi/m2]	Dose Conversion Factors Ingestion [mrem/pCi]	Inhalation [mrem/pCi]	Submersion [mrem/yr/ (pCi/m3)]
U-238	4.550E+01	1.670E-04	1.070E-02	1.600E-04
U-235	2.100E+00	1.740E-04	1.150E-02	9.030E-04
U-234	4.550E+01	1.810E-04	1.300E-02	8.930E-07
PA-231	0.000E+00	2.630E-03	5.180E-01	2.010E-04
TH-230	0.000E+00	7.780E-04	5.180E-02	2.040E-06
AC-227	0.000E+00	4.070E-03	2.040E+00	2.160E-03
RA-226	0.000E+00	1.040E-03	1.300E-02	1.040E-02
PB-210	0.000E+00	2.560E-03	4.070E-03	1.430E-05

□

** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 6
**

Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld

Source: 3
Location:: Room : 1 x: 0.00 y: 3.00 z: 1.50[m]
Geometry:: Type: Area Area:1.80E+01 [m2] Direction:
x
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 7.000E-03
Time to Remove: 3.650E+02 [day]

Radon Release Fraction: 1.000E-01

Contamination::

Nuclide	Concentration [pCi/m2]	Dose Conversion Factors Ingestion [mrem/pCi]	Inhalation [mrem/pCi]	Submersion [mrem/yr/ (pCi/m3)]
U-238	4.550E+01	1.670E-04	1.070E-02	1.600E-04
U-235	2.100E+00	1.740E-04	1.150E-02	9.030E-04
U-234	4.550E+01	1.810E-04	1.300E-02	8.930E-07
PA-231	0.000E+00	2.630E-03	5.180E-01	2.010E-04
TH-230	0.000E+00	7.780E-04	5.180E-02	2.040E-06
AC-227	0.000E+00	4.070E-03	2.040E+00	2.160E-03
RA-226	0.000E+00	1.040E-03	1.300E-02	1.040E-02
PB-210	0.000E+00	2.560E-03	4.070E-03	1.430E-05

□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 7
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld

Source: 4
Location:: Room : 1 x: 3.00 y: 0.00 z: 1.50[m]
Geometry:: Type: Area Area:1.80E+01 [m2] Direction:
y
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01

Removable fraction: 7.000E-03
Time to Remove: 3.650E+02 [day]

Radon Release Fraction: 1.000E-01

Contamination::

Nuclide	Concentration [pCi/m2]	Dose Conversion Factors Ingestion [mrem/pCi]	Inhalation [mrem/pCi]	Submersion [mrem/yr/ (pCi/m3)]
U-238	4.550E+01	1.670E-04	1.070E-02	1.600E-04
U-235	2.100E+00	1.740E-04	1.150E-02	9.030E-04
U-234	4.550E+01	1.810E-04	1.300E-02	8.930E-07
PA-231	0.000E+00	2.630E-03	5.180E-01	2.010E-04
TH-230	0.000E+00	7.780E-04	5.180E-02	2.040E-06
AC-227	0.000E+00	4.070E-03	2.040E+00	2.160E-03
RA-226	0.000E+00	1.040E-03	1.300E-02	1.040E-02
PB-210	0.000E+00	2.560E-03	4.070E-03	1.430E-05

□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 8
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld

Source: 5
Location:: Room : 1 x: 6.00 y: 3.00 z: 1.50[m]
Geometry:: Type: Area Area:1.80E+01 [m2] Direction: x
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 7.000E-03
Time to Remove: 3.650E+02 [day]

Radon Release Fraction: 1.000E-01

Contamination::

Nuclide	Concentration [pCi/m2]	Dose Conversion Factors Ingestion [mrem/pCi]	Inhalation [mrem/pCi]	Submersion [mrem/yr/

				(pCi/m3)]
U-238	4.550E+01	1.670E-04	1.070E-02	1.600E-04
U-235	2.100E+00	1.740E-04	1.150E-02	9.030E-04
U-234	4.550E+01	1.810E-04	1.300E-02	8.930E-07
PA-231	0.000E+00	2.630E-03	5.180E-01	2.010E-04
TH-230	0.000E+00	7.780E-04	5.180E-02	2.040E-06
AC-227	0.000E+00	4.070E-03	2.040E+00	2.160E-03
RA-226	0.000E+00	1.040E-03	1.300E-02	1.040E-02
PB-210	0.000E+00	2.560E-03	4.070E-03	1.430E-05

□

** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 9
**

Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld

Source: 6
Location:: Room : 1 x: 3.00 y: 6.00 z: 1.50[m]
Geometry:: Type: Area Area:1.80E+01 [m2] Direction:
y
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 7.000E-03
Time to Remove: 3.650E+02 [day]

Radon Release Fraction: 1.000E-01

Contamination::

Nuclide	Concentration	Dose Conversion Factors		
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		
		Ingestion	Inhalation	Submersion
	[pCi/m2]	[mrem/pCi]	[mrem/pCi]	[mrem/yr/ (pCi/m3)]
U-238	4.550E+01	1.670E-04	1.070E-02	1.600E-04
U-235	2.100E+00	1.740E-04	1.150E-02	9.030E-04
U-234	4.550E+01	1.810E-04	1.300E-02	8.930E-07
PA-231	0.000E+00	2.630E-03	5.180E-01	2.010E-04
TH-230	0.000E+00	7.780E-04	5.180E-02	2.040E-06
AC-227	0.000E+00	4.070E-03	2.040E+00	2.160E-03
RA-226	0.000E+00	1.040E-03	1.300E-02	1.040E-02
PB-210	0.000E+00	2.560E-03	4.070E-03	1.430E-05

□

** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 10
**

Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time: 0.000000 years

```
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íííííííííííííííííííííííííííííííííííííííííííííííí
ííí       Assessment for Time:  1           ííí
ííí             Time =0.00E+00 yr           ííí
íííííííííííííííííííííííííííííííííííííííííííííííí
íííííííííííííííííííííííííííííííííííííííííííííííí
```

íííííííí Source Information íííííííí

```
 Source:  1
        Location::  Room :  1  x:   3.00 y:   3.00  z:   0.00 [m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]
```

Contamination::

Nuclide	Concentration [pCi/m2]
U-238	4.550E+01
U-235	2.100E+00
U-234	4.550E+01
PA-231	0.000E+00
TH-230	0.000E+00
AC-227	0.000E+00
RA-226	0.000E+00
PB-210	0.000E+00

□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 11
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time: 0.000000 years

```
Source:  2
        Location::  Room :  1  x:   3.00 y:   3.00  z:   3.00 [m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]


        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             U-238       4.550E+01
                             U-235       2.100E+00
                             U-234       4.550E+01
                             PA-231      0.000E+00
                             TH-230      0.000E+00
                             AC-227      0.000E+00
                             RA-226      0.000E+00
                             PB-210      0.000E+00

Source:  3
        Location::  Room :  1  x:   0.00 y:   3.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]


        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             U-238       4.550E+01
                             U-235       2.100E+00
                             U-234       4.550E+01
                             PA-231      0.000E+00
                             TH-230      0.000E+00
                             AC-227      0.000E+00
                             RA-226      0.000E+00
                             PB-210      0.000E+00
```

** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 12
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time: 0.000000 years

Source: 4
Location:: Room : 1 x: 3.00 y: 0.00 z: 1.50 [m]
Geometry:: Type: Area Area:1.80E+01 [m2] Direction:
y
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 7.000E-03
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [pCi/m2]
U-238	4.550E+01
U-235	2.100E+00
U-234	4.550E+01
PA-231	0.000E+00
TH-230	0.000E+00
AC-227	0.000E+00
RA-226	0.000E+00
PB-210	0.000E+00

Source: 5
Location:: Room : 1 x: 6.00 y: 3.00 z: 1.50 [m]
Geometry:: Type: Area Area:1.80E+01 [m2] Direction:
x
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 7.000E-03
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [pCi/m2]
U-238	4.550E+01

```
U-235        2.100E+00
U-234        4.550E+01
PA-231       0.000E+00
TH-230       0.000E+00
AC-227       0.000E+00
RA-226       0.000E+00
PB-210       0.000E+00
```

□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08   Page: 13
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time: 0.000000   years

```
 Source:  6
        Location::  Room :  1  x:   3.00 y:   6.00  z:   1.50 [m]
        Geometry::  Type: Area       Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:     0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:        7.000E-03
             Time to Remove:            3.650E+02 [day]
```

Contamination::

Nuclide	Concentration [pCi/m2]
U-238	4.550E+01
U-235	2.100E+00
U-234	4.550E+01
PA-231	0.000E+00
TH-230	0.000E+00
AC-227	0.000E+00
RA-226	0.000E+00
PB-210	0.000E+00

□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08   Page: 14
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time: 0.000000   years

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ííí RESRAD-BUILD Dose Tables ííí
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Source Contributions to Receptor Doses
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[mrem]

	Source 1	Source 2	Source 3	Source 4	Source 5	Source 6	Total
Receptor 1	6.75E-05	6.19E-05	3.00E-05	3.00E-05	3.00E-05	3.00E-05	2.50E-04
Total	6.75E-05	6.19E-05	3.00E-05	3.00E-05	3.00E-05	3.00E-05	2.50E-04

□

** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 15 **

Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time: 0.000000 years

Pathway Detail of Doses
ííííííííííííííííííííííí
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	1.19E-05	4.16E-09	3.72E-11	5.44E-05	2.03E-14	1.14E-06
Total	1.19E-05	4.16E-09	3.72E-11	5.44E-05	2.03E-14	1.14E-06

Source: 2

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	6.30E-06	4.16E-09	3.72E-11	5.44E-05	2.03E-14	1.14E-06

```
   Total        6.30E-06   4.16E-09   3.72E-11   5.44E-05   2.03E-14
1.14E-06


Source:  3
   Receptor     External  Deposition Immersion  Inhalation   Radon    I
ngestion
       1        2.25E-06   2.08E-09   1.86E-11   2.72E-05   1.02E-14
5.71E-07
   Total        2.25E-06   2.08E-09   1.86E-11   2.72E-05   1.02E-14
5.71E-07


Source:  4
   Receptor     External  Deposition Immersion  Inhalation   Radon    I
ngestion
       1        2.25E-06   2.08E-09   1.86E-11   2.72E-05   1.02E-14
5.71E-07
   Total        2.25E-06   2.08E-09   1.86E-11   2.72E-05   1.02E-14
5.71E-07


Source:  5
   Receptor     External  Deposition Immersion  Inhalation   Radon    I
ngestion
       1        2.25E-06   2.08E-09   1.86E-11   2.72E-05   1.02E-14
5.71E-07
   Total        2.25E-06   2.08E-09   1.86E-11   2.72E-05   1.02E-14
5.71E-07


Source:  6
   Receptor     External  Deposition Immersion  Inhalation   Radon    I
ngestion
       1        2.25E-06   2.08E-09   1.86E-11   2.72E-05   1.02E-14
5.71E-07
   Total        2.25E-06   2.08E-09   1.86E-11   2.72E-05   1.02E-14
5.71E-07
□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08  Page:  16
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time:    0.000000     years
```

Nuclide Detail of Doses
íííííííííííííííííííííí
[mrem]

Source: 1

Nuclide	Receptor 1	Total
U-238		
U-238	3.35E-05	3.35E-05
U-234	4.30E-11	4.30E-11
TH-230	5.04E-16	5.04E-16
RA-226	2.19E-19	2.19E-19
PB-210	0.00E+00	0.00E+00
U-235		
U-235	3.59E-06	3.59E-06
PA¬231	5.76E-10	5.76E-10
AC-227	2.36E-11	2.36E-11
U-234		
U-234	3.04E-05	3.04E-05
TH-230	5.34E-10	5.34E-10
RA-226	3.55E-13	3.55E-13
PB-210	9.36E-17	9.36E-17

Source: 2

Nuclide	Receptor 1	Total
U-238		
U-238	2.93E-05	2.93E-05
U-234	4.25E-11	4.25E-11
TH-230	5.03E-16	5.03E-16
RA-226	1.29E-19	1.29E-19
PB-210	0.00E+00	0.00E+00
U-235		
U-235	2.48E-06	2.48E-06
PA-231	5.73E-10	5.73E-10
AC-227	2.33E-11	2.33E-11
U-234		
U-234	3.01E-05	3.01E-05
TH-230	5.33E-10	5.33E-10
RA-226	2.09E-13	2.09E-13
PB-210	8.89E-17	8.89E-17

□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 17
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time: 0.000000 years

Source: 3

Nuclide	Receptor 1	Total
U-238		
U-238	1.40E-05	1.40E-05
U-234	2.12E-11	2.12E-11
TH-230	2.51E-16	2.51E-16
RA-226	4.99E-20	4.99E-20
PB-210	0.00E+00	0.00E+00
U-235		
U-235	1.06E-06	1.06E-06
PA-231	2.86E-10	2.86E-10
AC-227	1.16E-11	1.16E-11
U-234		
U-234	1.50E-05	1.50E-05
TH-230	2.66E-10	2.66E-10
RA-226	8.11E-14	8.11E-14
PB-210	4.37E-17	4.37E-17

Source: 4

Nuclide	Receptor 1	Total
U-238		
U-238	1.40E-05	1.40E-05
U-234	2.12E-11	2.12E-11
TH-230	2.51E-16	2.51E-16
RA-226	4.99E-20	4.99E-20
PB-210	0.00E+00	0.00E+00
U-235		
U-235	1.06E-06	1.06E-06
PA-231	2.86E-10	2.86E-10
AC-227	1.16E-11	1.16E-11
U-234		

U-234	1.50E-05	1.50E-05
TH-230	2.66E-10	2.66E-10
RA-226	8.11E-14	8.11E-14
PB-210	4.37E-17	4.37E-17

□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 18
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time: 0.000000 years

Source: 5

Nuclide	Receptor 1	Total
U-238		
U-238	1.40E-05	1.40E-05
U-234	2.12E-11	2.12E-11
TH-230	2.51E-16	2.51E-16
RA-226	4.99E-20	4.99E-20
PB-210	0.00E+00	0.00E+00
U-235		
U-235	1.06E-06	1.06E-06
PA-231	2.86E-10	2.86E-10
AC-227	1.16E-11	1.16E-11
U-234		
U-234	1.50E-05	1.50E-05
TH-230	2.66E-10	2.66E-10
RA-226	8.11E-14	8.11E-14
PB-210	4.37E-17	4.37E-17

Source: 6

Nuclide	Receptor 1	Total
U-238		
U-238	1.40E-05	1.40E-05
U-234	2.12E-11	2.12E-11
TH-230	2.51E-16	2.51E-16
RA-226	4.99E-20	4.99E-20
PB-210	0.00E+00	0.00E+00
U-235		

```
  U-235     1.06E-06  1.06E-06
  PA-231    2.86E-10  2.86E-10
  AC-227    1.16E-11  1.16E-11
 U-234
  U-234     1.50E-05  1.50E-05
  TH-230    2.66E-10  2.66E-10
  RA-226    8.11E-14  8.11E-14
  PB-210    4.37E-17  4.37E-17
```

□

```
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08  Page:  19
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time:     1.00000     years


              ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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              ÍÍÍ       Assessment for Time:  2            ÍÍÍ
              ÍÍÍ             Time =1.00E+00 yr            ÍÍÍ
              ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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              ÍÍÍÍÍÍÍÍ  Source Information  ÍÍÍÍÍÍÍÍ


 Source:  1
         Location::  Room :  1  x:   3.00 y:   3.00  z:   0.00 [m]
         Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
         Pathway ::
              Direct Ingestion Rate:    0.000E+00 [1/hr]
              Fraction released to air: 1.000E-01
              Removable fraction:       0.000E+00
              Time to Remove:           3.650E+02 [day]



         Contamination::     Nuclide    Concentration
                                          [pCi/m2]
                              U-238       4.518E+01
                              U-235       2.085E+00
                              U-234       4.518E+01
```

PA-231	4.412E-05
TH-230	4.067E-04
AC-227	6.962E-07
RA-226	8.809E-08
PB-210	9.056E-10

□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 20
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time: 1.00000 years

Source: 2
Location:: Room : 1 x: 3.00 y: 3.00 z: 3.00 [m]
Geometry:: Type: Area Area:3.60E+01 [m2] Direction:
z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [pCi/m2]
U-238	4.518E+01
U-235	2.085E+00
U-234	4.518E+01
PA-231	4.412E-05
TH-230	4.067E-04
AC-227	6.962E-07
RA-226	8.809E-08
PB-210	9.056E-10

Source: 3
Location:: Room : 1 x: 0.00 y: 3.00 z: 1.50 [m]
Geometry:: Type: Area Area:1.80E+01 [m2] Direction:
x
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

```
        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             U-238       4.518E+01
                             U-235       2.085E+00
                             U-234       4.518E+01
                             PA-231      4.412E-05
                             TH-230      4.067E-04
                             AC-227      6.962E-07
                             RA-226      8.809E-08
                             PB-210      9.056E-10
□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08  Page:  21
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time:     1.00000     years


 Source:  4
        Location::  Room :  1  x:   3.00 y:   0.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       0.000E+00
             Time to Remove:           3.650E+02 [day]


        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             U-238       4.518E+01
                             U-235       2.085E+00
                             U-234       4.518E+01
                             PA-231      4.412E-05
                             TH-230      4.067E-04
                             AC-227      6.962E-07
                             RA-226      8.809E-08
                             PB-210      9.056E-10

 Source:  5
        Location::  Room :  1  x:   6.00 y:   3.00  z:   1.50 [m]
```

```
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       0.000E+00
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             U-238       4.518E+01
                             U-235       2.085E+00
                             U-234       4.518E+01
                             PA-231      4.412E-05
                             TH-230      4.067E-04
                             AC-227      6.962E-07
                             RA-226      8.809E-08
                             PB-210      9.056E-10
□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08  Page:  22
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time:     1.00000     years


 Source:  6
        Location::  Room :  1  x:   3.00 y:   6.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       0.000E+00
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             U-238       4.518E+01
                             U-235       2.085E+00
                             U-234       4.518E+01
```

PA-231	4.412E-05
TH-230	4.067E-04
AC-227	6.962E-07
RA-226	8.809E-08
PB-210	9.056E-10

□

** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 23
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time: 1.00000 years

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Source Contributions to Receptor Doses
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[mrem]

	Source 1	Source 2	Source 3	Source 4	Source 5	Source 6	Total
Receptor 1	1.18E-05	6.27E-06	2.24E-06	2.24E-06	2.24E-06	2.24E-06	2.71E-05
Total	1.18E-05	6.27E-06	2.24E-06	2.24E-06	2.24E-06	2.24E-06	2.71E-05

□

** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 24
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time: 1.00000 years

Pathway Detail of Doses
íííííííííííííííííííííííí
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	I
ngestion						
1	1.18E-05	0.00E+00	0.00E+00	0.00E+00	1.52E-13	
0.00E+00						
Total	1.18E-05	0.00E+00	0.00E+00	0.00E+00	1.52E-13	
0.00E+00						

Source: 2

Receptor	External	Deposition	Immersion	Inhalation	Radon	I
ngestion						
1	6.27E-06	0.00E+00	0.00E+00	0.00E+00	1.52E-13	
0.00E+00						
Total	6.27E-06	0.00E+00	0.00E+00	0.00E+00	1.52E-13	
0.00E+00						

Source: 3

Receptor	External	Deposition	Immersion	Inhalation	Radon	I
ngestion						
1	2.24E-06	0.00E+00	0.00E+00	0.00E+00	7.62E-14	
0.00E+00						
Total	2.24E-06	0.00E+00	0.00E+00	0.00E+00	7.62E-14	
0.00E+00						

Source: 4

Receptor	External	Deposition	Immersion	Inhalation	Radon	I
ngestion						
1	2.24E-06	0.00E+00	0.00E+00	0.00E+00	7.62E-14	
0.00E+00						
Total	2.24E-06	0.00E+00	0.00E+00	0.00E+00	7.62E-14	
0.00E+00						

Source: 5

Receptor	External	Deposition	Immersion	Inhalation	Radon	I
ngestion						
1	2.24E-06	0.00E+00	0.00E+00	0.00E+00	7.62E-14	
0.00E+00						
Total	2.24E-06	0.00E+00	0.00E+00	0.00E+00	7.62E-14	
0.00E+00						

```
Source:  6
   Receptor     External  Deposition Immersion  Inhalation   Radon    I
ngestion
       1        2.24E-06   0.00E+00   0.00E+00   0.00E+00   7.62E-14
0.00E+00
   Total        2.24E-06   0.00E+00   0.00E+00   0.00E+00   7.62E-14
0.00E+00
□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08  Page:  25
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time:     1.00000     years


                         Nuclide Detail of Doses
                         íííííííííííííííííííííí
                                [mrem]

Source:  1

   Nuclide Receptor   Total
                 1
 U-238
  U-238    8.90E-06  8.90E-06
  U-234    2.43E-12  2.43E-12
  TH-230   1.37E-17  1.37E-17
  RA-226   4.28E-18  4.28E-18
  PB-210   1.06E-22  1.06E-22
 U-235
  U-235    2.36E-06  2.36E-06
  PA-231   2.08E-11  2.08E-11
  AC-227   4.36E-12  4.36E-12
 U-234
  U-234    5.72E-07  5.72E-07
  TH-230   5.81E-12  5.81E-12
  RA-226   2.50E-12  2.50E-12
  PB-210   1.68E-16  1.68E-16


Source:  2

   Nuclide Receptor   Total
                 1
 U-238
```

```
  U-238     4.74E-06  4.74E-06
  U-234     1.17E-12  1.17E-12
  TH-230    6.66E-18  6.66E-18
  RA-226    2.41E-18  2.41E-18
  PB-210    5.31E-23  5.31E-23
 U-235
  U-235     1.26E-06  1.26E-06
  PA-231    1.09E-11  1.09E-11
  AC-227    2.34E-12  2.34E-12
 U-234
  U-234     2.75E-07  2.75E-07
  TH-230    2.82E-12  2.82E-12
  RA-226    1.41E-12  1.41E-12
  PB-210    8.39E-17  8.39E-17
```

□

```
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08  Page:  26
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time:     1.00000     years


Source:  3

   Nuclide Receptor   Total
               1
 U-238
  U-238     1.70E-06  1.70E-06
  U-234     3.90E-13  3.90E-13
  TH-230    2.24E-18  2.24E-18
  RA-226    9.04E-19  9.04E-19
  PB-210    1.84E-23  1.84E-23
 U-235
  U-235     4.52E-07  4.52E-07
  PA-231    3.86E-12  3.86E-12
  AC-227    8.43E-13  8.43E-13
 U-234
  U-234     9.17E-08  9.17E-08
  TH-230    9.48E-13  9.48E-13
  RA-226    5.29E-13  5.29E-13
  PB-210    2.90E-17  2.90E-17


Source:  4
```

```
   Nuclide Receptor   Total
                 1
 U-238
  U-238     1.70E-06  1.70E-06
  U-234     3.90E-13  3.90E-13
  TH-230    2.24E-18  2.24E-18
  RA-226    9.04E-19  9.04E-19
  PB-210    1.84E-23  1.84E-23
 U-235
  U-235     4.52E-07  4.52E-07
  PA-231    3.86E-12  3.86E-12
  AC-227    8.43E-13  8.43E-13
 U-234
  U-234     9.17E-08  9.17E-08
  TH-230    9.48E-13  9.48E-13
  RA-226    5.29E-13  5.29E-13
  PB-210    2.90E-17  2.90E-17
```

□

```
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08  Page:  27
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Evaluation Time:     1.00000     years


Source:  5

   Nuclide Receptor   Total
                 1
 U-238
  U-238     1.70E-06  1.70E-06
  U-234     3.90E-13  3.90E-13
  TH-230    2.24E-18  2.24E-18
  RA-226    9.04E-19  9.04E-19
  PB-210    1.84E-23  1.84E-23
 U-235
  U-235     4.52E-07  4.52E-07
  PA-231    3.86E-12  3.86E-12
  AC-227    8.43E-13  8.43E-13
 U-234
  U-234     9.17E-08  9.17E-08
  TH-230    9.48E-13  9.48E-13
  RA-226    5.29E-13  5.29E-13
  PB-210    2.90E-17  2.90E-17
```

Source: 6

Nuclide	Receptor 1	Total
U-238		
U-238	1.70E-06	1.70E-06
U-234	3.90E-13	3.90E-13
TH-230	2.24E-18	2.24E-18
RA-226	9.04E-19	9.04E-19
PB-210	1.84E-23	1.84E-23
U-235		
U-235	4.52E-07	4.52E-07
PA-231	3.86E-12	3.86E-12
AC-227	8.43E-13	8.43E-13
U-234		
U-234	9.17E-08	9.17E-08
TH-230	9.48E-13	9.48E-13
RA-226	5.29E-13	5.29E-13
PB-210	2.90E-17	2.90E-17

□
** RESRAD-BUILD Program Output, Version 3.1 03/04/02 18:08 Page: 28
**
Title : KMTC U-238 thru U-234 w/ ICRP72 DCFs Eva
Input File : C:\Winbld\Tc238b.bld
Full Summary

```
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ííí                                              ííí
ííí     RESRAD-BUILD Dose (Time) Tables          ííí
ííí                                              ííí
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```

Receptor Doses Received for the Exposure Duration
íí
(mrem)

Evaluation Time [yr]

	0.00E+00	1.00E+00
	ÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄ
1	2.50E-04	2.71E-05

Receptor Dose/Yr Averaged Over Exposure Duration
ÍÍ
(mrem/yr)

Evaluation Time [yr]

	0.00E+00	1.00E+00
	ÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄ
1	2.50E-04	2.71E-05

Attachment 3

□

** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02 Page: 1
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld

```
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ííí                                             ííí
ííí      RESRAD-BUILD Table of Contents         ííí
ííí                                             ííí
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```


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□

** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02 Page: 2
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld

```
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ííí      RESRAD-BUILD Input Parameters          ííí
ííí                                             ííí
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íííííííííííííííííííííííííííííííííííííííííííííííííí
```

Number of Sources : 6
Number of Receptors: 1
Total Time : 3.650000E+02 days
Fraction Inside : 7.000000E-01

ÍÍÍÍÍÍÍÍÍÍ Receptor Information ÍÍÍÍÍÍÍÍÍÍ

Receptor	Room	x	y	z	FracTime	Inhalation	Ingestion(Dust)
		[m]	[m]	[m]		[m3/day]	[m2/hr]
1	1	3.000	3.000	1.000	0.330	3.36E+01	1.00E-04

ÍÍÍ Receptor-Source Shielding Relationship ÍÍÍ

Receptor	Source	Density [g/cm3]	Thickness [cm]	Material
1	1	2.40E+00	0.00E+00	Concrete
1	2	2.40E+00	0.00E+00	Concrete
1	3	2.40E+00	0.00E+00	Concrete
1	4	2.40E+00	0.00E+00	Concrete
1	5	2.40E+00	0.00E+00	Concrete
1	6	2.40E+00	0.00E+00	Concrete

□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02 Page: 3
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld

ÍÍÍÍÍÍÍÍ Building Information ÍÍÍÍÍÍÍÍ

Building Air Exchange Rate: 1.52E+00 1/hr

```
    Height[m]          Air Exchanges [m3/hr]
    Area [m2]
                      ******************************
                      *                            *
                      *                            *
                      *                           <=Q01: 1.64E+02
    H1:   3.000       *           Room  1          *      Q10 :  1.64E
+02
                      *   LAMBDA: 1.52E+00         *
   Area  36.000       *                            *
                      *                            *
                      ******************************


      Deposition velocity: 1.00E-02 [m/s]   Resuspension Rate: 5.00E-0
7 [1/s]
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:   4
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld


              ÍÍÍÍÍÍÍÍ  Source Information  ÍÍÍÍÍÍÍÍ


 Source:  1
        Location::  Room :  1  x:   3.00 y:   3.00  z:   0.00[m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]

             Radon Release Fraction:   1.000E-01


   Contamination::
    Nuclide Concentration       Dose Conversion Factors
    ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
                          Ingestion   Inhalation  Submersion
                [pCi/m2]  [mrem/pCi]  [mrem/pCi]  [mrem/yr/
```

```
                                                        (pCi/m3)]
     TH-230     4.550E+01   7.780E-04   5.180E-02   2.040E-06
     RA-226     4.550E+01   1.040E-03   1.300E-02   1.040E-02
     PB-210     4.550E+01   2.560E-03   4.070E-03   1.430E-05

 Source:  2
        Location::  Room :  1  x:   3.00 y:   3.00  z:   3.00[m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]

             Radon Release Fraction:   1.000E-01


   Contamination::
    Nuclide Concentration       Dose Conversion Factors
    ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
                            Ingestion   Inhalation  Submersion
                [pCi/m2]    [mrem/pCi]  [mrem/pCi]  [mrem/yr/
                                                    (pCi/m3)]
     TH-230     4.550E+01   7.780E-04   5.180E-02   2.040E-06
     RA-226     4.550E+01   1.040E-03   1.300E-02   1.040E-02
     PB-210     4.550E+01   2.560E-03   4.070E-03   1.430E-05
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:   5
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld


 Source:  3
        Location::  Room :  1  x:   0.00 y:   3.00  z:   1.50[m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]

             Radon Release Fraction:   1.000E-01
```

```
   Contamination::
    Nuclide Concentration        Dose Conversion Factors
    ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
                                Ingestion   Inhalation  Submersion
                [pCi/m2]        [mrem/pCi]  [mrem/pCi]  [mrem/yr/
                                                        (pCi/m3)]
     TH-230     4.550E+01   7.780E-04   5.180E-02   2.040E-06
     RA-226     4.550E+01   1.040E-03   1.300E-02   1.040E-02
     PB-210     4.550E+01   2.560E-03   4.070E-03   1.430E-05

 Source:  4
        Location::  Room :  1  x:   3.00 y:   0.00  z:   1.50[m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]

             Radon Release Fraction:   1.000E-01


   Contamination::
    Nuclide Concentration        Dose Conversion Factors
    ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
                                Ingestion   Inhalation  Submersion
                [pCi/m2]        [mrem/pCi]  [mrem/pCi]  [mrem/yr/
                                                        (pCi/m3)]
     TH-230     4.550E+01   7.780E-04   5.180E-02   2.040E-06
     RA-226     4.550E+01   1.040E-03   1.300E-02   1.040E-02
     PB-210     4.550E+01   2.560E-03   4.070E-03   1.430E-05
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:   6
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld


 Source:  5
        Location::  Room :  1  x:   6.00 y:   3.00  z:   1.50[m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
```

```
                Direct Ingestion Rate:     0.000E+00 [1/hr]
                Fraction released to air: 1.000E-01
                Removable fraction:        7.000E-03
                Time to Remove:            3.650E+02 [day]

                Radon Release Fraction:    1.000E-01


   Contamination::
    Nuclide Concentration        Dose Conversion Factors
    ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
                             Ingestion   Inhalation  Submersion
                [pCi/m2]     [mrem/pCi]  [mrem/pCi]  [mrem/yr/
                                                     (pCi/m3)]
     TH-230     4.550E+01   7.780E-04   5.180E-02   2.040E-06
     RA-226     4.550E+01   1.040E-03   1.300E-02   1.040E-02
     PB-210     4.550E+01   2.560E-03   4.070E-03   1.430E-05

 Source:  6
        Location::  Room :  1  x:   3.00 y:   6.00  z:   1.50[m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
                Direct Ingestion Rate:     0.000E+00 [1/hr]
                Fraction released to air: 1.000E-01
                Removable fraction:        7.000E-03
                Time to Remove:            3.650E+02 [day]

                Radon Release Fraction:    1.000E-01


   Contamination::
    Nuclide Concentration        Dose Conversion Factors
    ÄÄÄÄÄÄÄ ÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
                             Ingestion   Inhalation  Submersion
                [pCi/m2]     [mrem/pCi]  [mrem/pCi]  [mrem/yr/
                                                     (pCi/m3)]
     TH-230     4.550E+01   7.780E-04   5.180E-02   2.040E-06
     RA-226     4.550E+01   1.040E-03   1.300E-02   1.040E-02
     PB-210     4.550E+01   2.560E-03   4.070E-03   1.430E-05
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:   7
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time:    0.000000     years
```

```
íííííííííííííííííííííííííííííííííííííííííííííííí
íííííííííííííííííííííííííííííííííííííííííííííííí
íííí       Assessment for Time:  1            íííí
íííí             Time =0.00E+00 yr            íííí
íííííííííííííííííííííííííííííííííííííííííííííííí
íííííííííííííííííííííííííííííííííííííííííííííííí


íííííííí  Source Information  íííííííí


Source:  1
        Location::  Room :  1  x:   3.00 y:   3.00  z:   0.00 [m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-230      4.550E+01
                             RA-226      4.550E+01
                             PB-210      4.550E+01

Source:  2
        Location::  Room :  1  x:   3.00 y:   3.00  z:   3.00 [m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-230      4.550E+01
```

RA-226	4.550E+01
PB-210	4.550E+01

□

Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time: 0.000000 years

Source: 3
Location:: Room : 1 x: 0.00 y: 3.00 z: 1.50 [m]
Geometry:: Type: Area Area:1.80E+01 [m2] Direction: x
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 7.000E-03
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [pCi/m2]
TH-230	4.550E+01
RA-226	4.550E+01
PB-210	4.550E+01

Source: 4
Location:: Room : 1 x: 3.00 y: 0.00 z: 1.50 [m]
Geometry:: Type: Area Area:1.80E+01 [m2] Direction: y
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 7.000E-03
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [pCi/m2]
TH-230	4.550E+01
RA-226	4.550E+01
PB-210	4.550E+01

```
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:   9
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time:    0.000000     years


 Source:  5
        Location::  Room :  1  x:   6.00 y:   3.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-230      4.550E+01
                             RA-226      4.550E+01
                             PB-210      4.550E+01

 Source:  6
        Location::  Room :  1  x:   3.00 y:   6.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       7.000E-03
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-230      4.550E+01
                             RA-226      4.550E+01
                             PB-210      4.550E+01
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:  10
```

**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time: 0.000000 years

RESRAD-BUILD Dose Tables

Source Contributions to Receptor Doses
[mrem]

	Source 1	Source 2	Source 3	Source 4	Source 5	Source 6	Total
Receptor 1	6.87E-04	4.61E-04	1.94E-04	1.94E-04	1.94E-04	1.94E-04	1.92E-03
Total	6.87E-04	4.61E-04	1.94E-04	1.94E-04	1.94E-04	1.94E-04	1.92E-03

**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time: 0.000000 years

Pathway Detail of Doses
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	4.87E-04	1.70E-07	1.91E-09	1.55E-04	3.14E-05	1.39E-05
Total	4.87E-04	1.70E-07	1.91E-09	1.55E-04	3.14E-05	1.39E-05

Source: 2

Receptor	External	Deposition	Immersion	Inhalation	Radon	I ngestion
1	2.61E-04	1.70E-07	1.91E-09	1.55E-04	3.14E-05	1.39E-05
Total	2.61E-04	1.70E-07	1.91E-09	1.55E-04	3.14E-05	1.39E-05

Source: 3

Receptor	External	Deposition	Immersion	Inhalation	Radon	I ngestion
1	9.37E-05	8.52E-08	9.55E-10	7.73E-05	1.57E-05	6.96E-06
Total	9.37E-05	8.52E-08	9.55E-10	7.73E-05	1.57E-05	6.96E-06

Source: 4

Receptor	External	Deposition	Immersion	Inhalation	Radon	I ngestion
1	9.37E-05	8.52E-08	9.55E-10	7.73E-05	1.57E-05	6.96E-06
Total	9.37E-05	8.52E-08	9.55E-10	7.73E-05	1.57E-05	6.96E-06

Source: 5

Receptor	External	Deposition	Immersion	Inhalation	Radon	I ngestion
1	9.37E-05	8.52E-08	9.55E-10	7.73E-05	1.57E-05	6.96E-06
Total	9.37E-05	8.52E-08	9.55E-10	7.73E-05	1.57E-05	6.96E-06

Source: 6

Receptor	External	Deposition	Immersion	Inhalation	Radon	I ngestion
1	9.37E-05	8.52E-08	9.55E-10	7.73E-05	1.57E-05	6.96E-06
Total	9.37E-05	8.52E-08	9.55E-10	7.73E-05	1.57E-05	

6.96E-06
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02 Page: 12
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time: 0.000000 years

Nuclide Detail of Doses
ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-230		
TH-230	1.19E-04	1.19E-04
RA-226	1.19E-07	1.19E-07
PB-210	4.21E-11	4.21E-11
RA-226		
RA-226	5.49E-04	5.49E-04
PB-210	2.91E-07	2.91E-07
PB-210		
PB-210	1.87E-05	1.87E-05

Source: 2

Nuclide	Receptor 1	Total
TH-230		
TH-230	1.19E-04	1.19E-04
RA-226	7.00E-08	7.00E-08
PB-210	4.00E-11	4.00E-11
RA-226		
RA-226	3.24E-04	3.24E-04
PB-210	2.77E-07	2.77E-07
PB-210		
PB-210	1.77E-05	1.77E-05

Source: 3

Nuclide	Receptor 1	Total
TH-230		
TH-230	5.95E-05	5.95E-05
RA-226	2.71E-08	2.71E-08
PB-210	1.97E-11	1.97E-11
RA-226		
RA-226	1.25E-04	1.25E-04
PB-210	1.36E-07	1.36E-07
PB-210		
PB-210	8.73E-06	8.73E-06

□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02 Page: 13
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time: 0.000000 years

Source: 4

Nuclide	Receptor 1	Total
TH-230		
TH-230	5.95E-05	5.95E-05
RA-226	2.71E-08	2.71E-08
PB-210	1.97E-11	1.97E-11
RA-226		
RA-226	1.25E-04	1.25E-04
PB-210	1.36E-07	1.36E-07
PB-210		
PB-210	8.73E-06	8.73E-06

Source: 5

Nuclide	Receptor 1	Total
TH-230		
TH-230	5.95E-05	5.95E-05
RA-226	2.71E-08	2.71E-08
PB-210	1.97E-11	1.97E-11
RA-226		
RA-226	1.25E-04	1.25E-04

```
  PB-210    1.36E-07  1.36E-07
 PB-210
  PB-210    8.73E-06  8.73E-06


Source:  6

   Nuclide Receptor   Total
               1
 TH-230
  TH-230    5.95E-05  5.95E-05
  RA-226    2.71E-08  2.71E-08
  PB-210    1.97E-11  1.97E-11
 RA-226
  RA-226    1.25E-04  1.25E-04
  PB-210    1.36E-07  1.36E-07
 PB-210
  PB-210    8.73E-06  8.73E-06


□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:  14
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time:     1.00000     years


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              ÍÍÍ       Assessment for Time:  2            ÍÍÍ
              ÍÍÍ             Time =1.00E+00 yr            ÍÍÍ
              ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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              ÍÍÍÍÍÍÍÍ  Source Information  ÍÍÍÍÍÍÍÍ


 Source:  1
        Location::  Room :  1  x:   3.00 y:   3.00  z:   0.00 [m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
```

```
            Removable fraction:        0.000E+00
            Time to Remove:            3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-230      4.518E+01
                             RA-226      4.518E+01
                             PB-210      4.518E+01

 Source:  2
        Location::  Room :  1  x:   3.00 y:   3.00  z:   3.00 [m]
        Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction:
z
        Pathway ::
            Direct Ingestion Rate:     0.000E+00 [1/hr]
            Fraction released to air: 1.000E-01
            Removable fraction:        0.000E+00
            Time to Remove:            3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-230      4.518E+01
                             RA-226      4.518E+01
                             PB-210      4.518E+01
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:  15
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time:     1.00000     years


 Source:  3
        Location::  Room :  1  x:   0.00 y:   3.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
            Direct Ingestion Rate:     0.000E+00 [1/hr]
            Fraction released to air: 1.000E-01
            Removable fraction:        0.000E+00
            Time to Remove:            3.650E+02 [day]
```

```
        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-230      4.518E+01
                             RA-226      4.518E+01
                             PB-210      4.518E+01

 Source:  4
        Location::  Room :  1  x:   3.00 y:   0.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       0.000E+00
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-230      4.518E+01
                             RA-226      4.518E+01
                             PB-210      4.518E+01
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:  16
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time:     1.00000     years


 Source:  5
        Location::  Room :  1  x:   6.00 y:   3.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
x
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       0.000E+00
             Time to Remove:           3.650E+02 [day]
```

```
        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-230      4.518E+01
                             RA-226      4.518E+01
                             PB-210      4.518E+01

 Source:  6
        Location::  Room :  1  x:   3.00 y:   6.00  z:   1.50 [m]
        Geometry::  Type: Area        Area:1.80E+01 [m2]  Direction:
y
        Pathway ::
             Direct Ingestion Rate:    0.000E+00 [1/hr]
             Fraction released to air: 1.000E-01
             Removable fraction:       0.000E+00
             Time to Remove:           3.650E+02 [day]



        Contamination::     Nuclide    Concentration
                                         [pCi/m2]
                             TH-230      4.518E+01
                             RA-226      4.518E+01
                             PB-210      4.518E+01
```

□

** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02 Page: 17
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time: 1.00000 years

```
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ííí        RESRAD-BUILD Dose Tables             ííí
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```

Source Contributions to Receptor Doses
íííííííííííííííííííííííííííííííííííííí
[mrem]

	Source 1	Source 2	Source 3	Source 4	Source 5	Source 6	Total
Receptor 1	5.17E-04	2.91E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.24E-03
Total	5.17E-04	2.91E-04	1.09E-04	1.09E-04	1.09E-04	1.09E-04	1.24E-03

□

** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02 Page: 18 **

Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time: 1.00000 years

Pathway Detail of Doses
[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	4.85E-04	0.00E+00	0.00E+00	0.00E+00	3.13E-05	0.00E+00
Total	4.85E-04	0.00E+00	0.00E+00	0.00E+00	3.13E-05	0.00E+00

Source: 2

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	2.60E-04	0.00E+00	0.00E+00	0.00E+00	3.13E-05	0.00E+00
Total	2.60E-04	0.00E+00	0.00E+00	0.00E+00	3.13E-05	0.00E+00

Source: 3

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	9.34E-05	0.00E+00	0.00E+00	0.00E+00	1.56E-05	0.00E+00
Total	9.34E-05	0.00E+00	0.00E+00	0.00E+00	1.56E-05	0.00E+00

```
Source:  4
   Receptor     External  Deposition Immersion  Inhalation   Radon    I
ngestion
       1        9.34E-05   0.00E+00   0.00E+00   0.00E+00   1.56E-05
0.00E+00
   Total        9.34E-05   0.00E+00   0.00E+00   0.00E+00   1.56E-05
0.00E+00


Source:  5
   Receptor     External  Deposition Immersion  Inhalation   Radon    I
ngestion
       1        9.34E-05   0.00E+00   0.00E+00   0.00E+00   1.56E-05
0.00E+00
   Total        9.34E-05   0.00E+00   0.00E+00   0.00E+00   1.56E-05
0.00E+00


Source:  6
   Receptor     External  Deposition Immersion  Inhalation   Radon    I
ngestion
       1        9.34E-05   0.00E+00   0.00E+00   0.00E+00   1.56E-05
0.00E+00
   Total        9.34E-05   0.00E+00   0.00E+00   0.00E+00   1.56E-05
0.00E+00
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:  19
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time:     1.00000     years


                    Nuclide Detail of Doses
                    ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
                            [mrem]

Source:  1

   Nuclide Receptor    Total
                 1
 TH-230
  TH-230    4.31E-07  4.31E-07
```

```
  RA-226    3.34E-07  3.34E-07
  PB-210    3.09E-11  3.09E-11
 RA-226
  RA-226    5.14E-04  5.14E-04
  PB-210    8.50E-08  8.50E-08
 PB-210
  PB-210    1.79E-06  1.79E-06


Source:  2

   Nuclide Receptor   Total
                1
 TH-230
  TH-230    2.09E-07  2.09E-07
  RA-226    1.88E-07  1.88E-07
  PB-210    1.55E-11  1.55E-11
 RA-226
  RA-226    2.90E-04  2.90E-04
  PB-210    4.25E-08  4.25E-08
 PB-210
  PB-210    8.94E-07  8.94E-07


Source:  3

   Nuclide Receptor   Total
                1
 TH-230
  TH-230    7.02E-08  7.02E-08
  RA-226    7.06E-08  7.06E-08
  PB-210    5.35E-12  5.35E-12
 RA-226
  RA-226    1.09E-04  1.09E-04
  PB-210    1.47E-08  1.47E-08
 PB-210
  PB-210    3.10E-07  3.10E-07


□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:  20
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Evaluation Time:     1.00000     years
```

Source: 4

Nuclide	Receptor 1	Total
TH-230		
TH-230	7.02E-08	7.02E-08
RA-226	7.06E-08	7.06E-08
PB-210	5.35E-12	5.35E-12
RA-226		
RA-226	1.09E-04	1.09E-04
PB-210	1.47E-08	1.47E-08
PB-210		
PB-210	3.10E-07	3.10E-07

Source: 5

Nuclide	Receptor 1	Total
TH-230		
TH-230	7.02E-08	7.02E-08
RA-226	7.06E-08	7.06E-08
PB-210	5.35E-12	5.35E-12
RA-226		
RA-226	1.09E-04	1.09E-04
PB-210	1.47E-08	1.47E-08
PB-210		
PB-210	3.10E-07	3.10E-07

Source: 6

Nuclide	Receptor 1	Total
TH-230		
TH-230	7.02E-08	7.02E-08
RA-226	7.06E-08	7.06E-08
PB-210	5.35E-12	5.35E-12
RA-226		
RA-226	1.09E-04	1.09E-04
PB-210	1.47E-08	1.47E-08
PB-210		
PB-210	3.10E-07	3.10E-07

```
□
** RESRAD-BUILD Program Output, Version 3.1 03/06/02 10:02  Page:  21
**
Title : Th-230 through end of chain with ICRP72
Input File : C:\Winbld\Tc230b.bld
Full Summary


            ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
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            ÍÍÍ                                                   ÍÍÍ
            ÍÍÍ     RESRAD-BUILD Dose (Time) Tables               ÍÍÍ
            ÍÍÍ                                                   ÍÍÍ
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            Receptor Doses Received for the Exposure Duration
            ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
                                   (mrem)

                              Evaluation Time [yr]
      0.00E+00  1.00E+00
      ÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄ
 1    1.92E-03  1.24E-03


            Receptor Dose/Yr Averaged Over Exposure Duration
            ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ
                                   (mrem/yr)

                              Evaluation Time [yr]
      0.00E+00  1.00E+00
      ÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄ
 1    1.92E-03  1.24E-03
```