

LTSM012583

**POST-REMEDIATION RADIOLOGICAL  
DOSE AND RISK ASSESSMENT  
FOR THE BLISS & LAUGHLIN SITE  
BUFFALO, NEW YORK**

**Prepared for:  
U. S. Army Corps of Engineers, Buffalo District**

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## Acronyms

AEC	Atomic Energy Commission
ALARA	As Low As Reasonably Achievable
DOE	U.S. Department of Energy
MED	Manhattan Engineering District
NRC	U.S. Nuclear Regulatory Commission
RESRAD	Residual Radioactivity
ROD	Record of Decision
TEDE	Total Effective Dose Equivalent
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

## 1 INTRODUCTION

Radiological dose and risk assessments were performed for the Bliss & Laughlin site in order to determine the potential dose and risk due to residual radioactive materials from work conducted under contract to the Manhattan Engineer District (MED). The U.S. Army Corps of Engineers (USACE) determined that Subpart E of 10 CFR 20 is relevant and appropriate in considering the remediation of the Bliss & Laughlin Site. Under these criteria, a site is considered acceptable for unrestricted use if the residual activity that is distinguishable above background radiation results in a total effective dose equivalent (TEDE) to an average member of the critical group that does not exceed 25 mrem/y and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). To assure compliance with the selected ARAR (10 CFR 20 Subpart E), two post-remedial dose assessments were performed for the Bliss & Laughlin Site. The first assessed the dose and radiological cancer risk to a resident (subsistence) farmer located on the site, (assuming the buildings would be removed and the property redeveloped in the future), and the other determined the dose and risk to a worker in the facility. These assessments were developed using the U.S. Department of Energy (DOE) RESRAD computer code version 6.1 and RESRAD-Build version 3.1. The details of the assessments are presented in subsequent text.

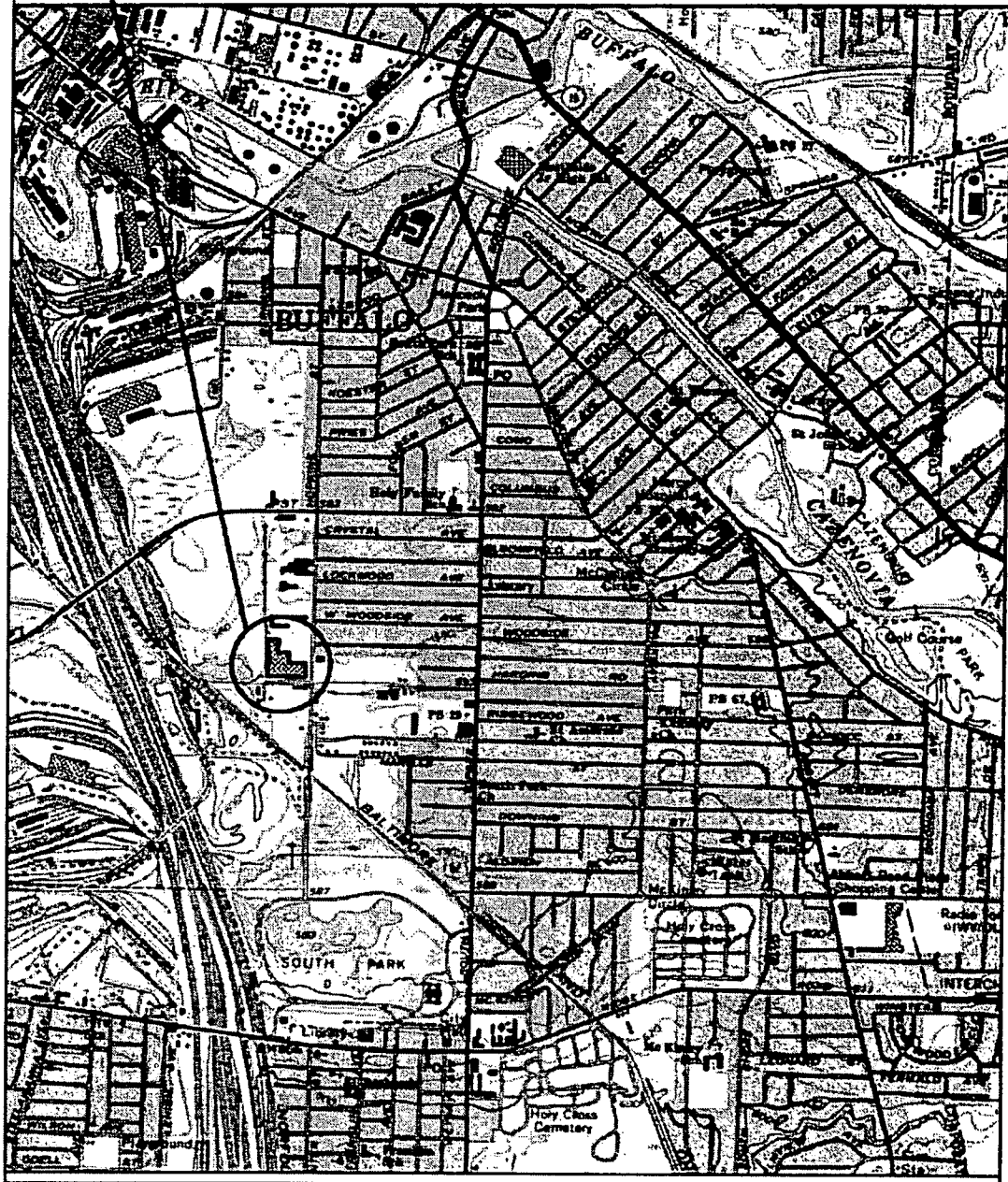
### 1.1 SITE DESCRIPTION AND HISTORY

Bliss & Laughlin is located at 110 Hopkins Street, Buffalo, New York. The location of the site is shown in Figure 1. The site consists of a single building with a floor area of about 12,000 m<sup>2</sup> surrounded by approximately 15,000 m<sup>2</sup> of grounds. The plot plan is shown in Figure 2. In 1952, Bliss & Laughlin Steel Company performed machining and straightening operations on uranium rods for National Lead Company of Ohio, a prime contractor for the Atomic Energy Commission (AEC). The site, now owned by Niagara LaSalle Cold Drawn Corporation, is currently used for the forming of steel products and is an active industrial site with equipment such as rolling mills.

Historical records indicate that machining operations involving uranium rods were performed in a section of the building called the "Special Finishing Area," which

occupies a nominal 300 square meters of floor space. The floor of the special finishing area is concrete and contains shallow utility trenches. There are no floor drains. The floor surfaces are generally rough and pitted and are covered with a thin layer of oil absorbent material and dried oil and grease. Machining and material storage racks are present in various areas of the floor. The ceiling is approximately 12 meters high and is supported by a framework of steel trusses. The machining area of the building does not have any interior walls or partitions.

# Bliss and Laughlin Facility Location



**URS**

JOB No. 1000001

SOURCE:  
USGS  
BUFFALO SE, N.Y.  
7.5 MINUTE SERIES  
APPROX. SCALE 1:24,000

FORMER BLISS AND  
LAUGHLIN STEEL COMPANY  
SITE

BLISS AND LAUGHLIN  
FACILITY LOCATION

Scale: 1:24,000 Date: 02/01/01 **FIGURE 1**



Initial surveys indicated elevated concentrations and activities of uranium within the flooring, trenches and pit. Remediation activities included scabbling of the concrete floors and removal of concrete and contaminated soils in the trenches and pit. Trusses were decontaminated by scraping, wiping with maselin and vacuuming using a high-efficiency particulate air vacuum to remove the dust from the trusses as well as other horizontal surfaces. Radionuclide activities in the surface soils and concrete were monitored during the remediation process to discern when remediation was adequate. The soil clean-up standards developed in the Technical Memorandum, *Cleanup Goals for the Soil at the Finishing Area of the Former Bliss and Laughlin Facility* (USACE 1998), were established for the likely future use considering an industrial worker and a construction worker who have limited occupancy at the site, but are also protective for a residential scenario.

## 1.2 PURPOSE

The post-remedial assessments were performed to confirm that radiological doses from residual radioactivity associated with MED activities will not exceed the criteria established in the Record of Decision (ROD) for unrestricted release of the facility. In addition, the results of the assessments were compared to guidance including the U. S. Environmental Protection Agency (USEPA) guidance for a maximum 15 mrem/y, consistent with the range of allowable risk for CERCLA remedies, and the New York State guidance of 10 mrem/y (TAGM-4003) to the maximally-exposed individual.

The assumptions used to develop the models to assess the dose are described in Section 2. The calculation methods and the results are presented in Sections 3 and 4, respectively. Conclusions are presented in Section 5 and a list of references is included. The selected pathways, survey results, the input parameters and the output of the RESRAD code are included in the appendices.

## 2 ASSUMPTIONS

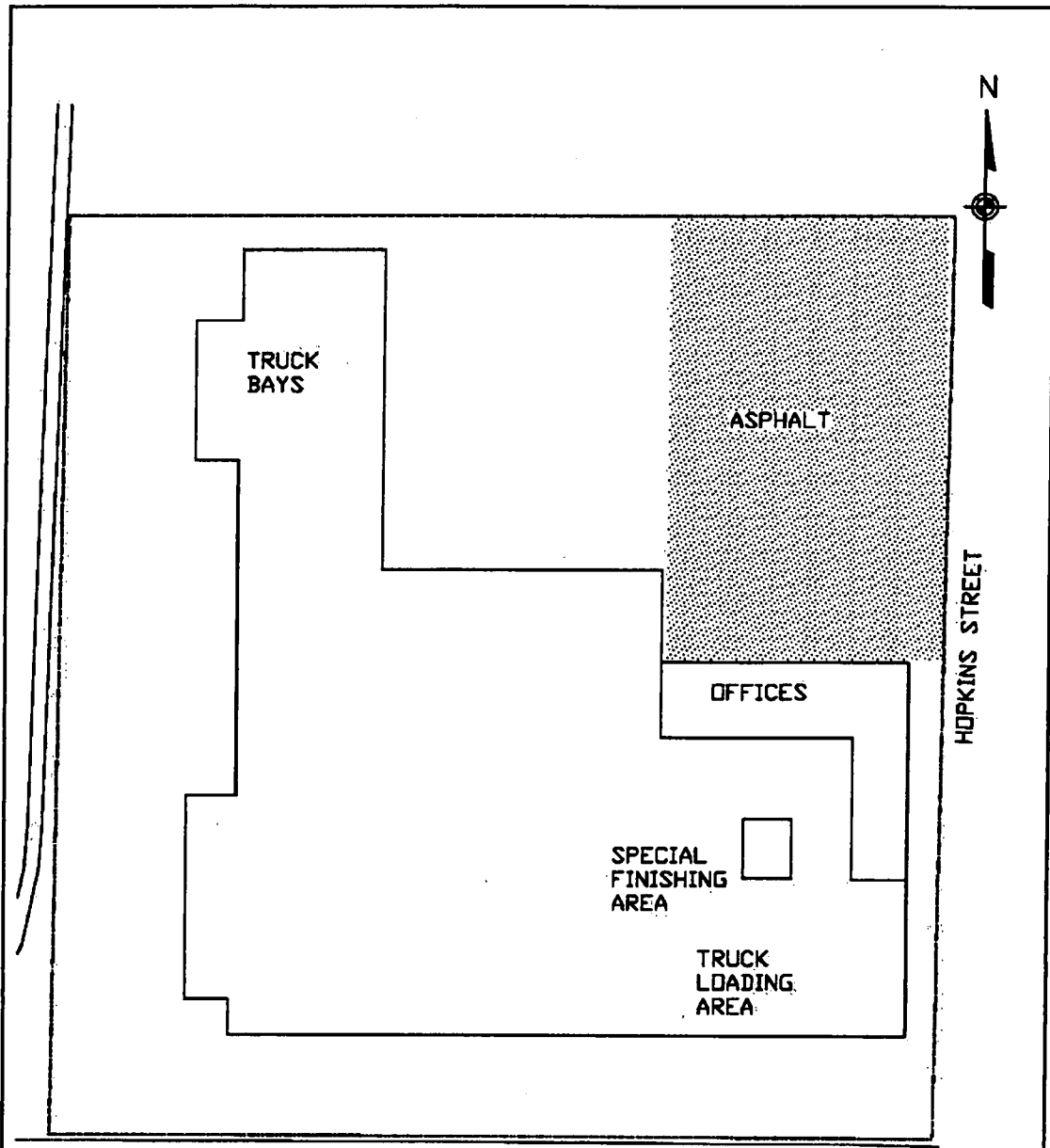
### 2.1 RESIDENT FARMER

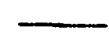
Although the reasonable future land use of the Bliss and Laughlin site would be to remain an industrial facility, the demolition of the buildings and redevelopment of the site as farm land was also considered. In order to determine the radiological dose to the resident farmer, a series of assumptions were made. The scenario that would result in the largest dose to an individual would be when one lives on the site and grows their own food including meat and dairy. This scenario known as the resident (subsistence) farmer scenario, although unlikely, is the most conservative situation to consider. As stated in this scenario, the farmer raises part of their food supply from the site. This includes plant foods, meat, and milk. For this case, the farmer would receive a radiological dose from the crops raised on the property and the animals raised on the site as well as exposure to the ground itself. The crops would be grown in contaminated soil and be irrigated with water from a well located on the site. The livestock would eat the contaminated plants and drink the contaminated water. The farmer would be exposed to direct radiation from the radionuclides in the earth; inhale, as well as ingest, radioactive dust; and be exposed to radon decay products. In the assessment of the Bliss & Laughlin facility, the aquatic pathway was not assessed because there are no fish bearing water bodies within 0.25 miles of the site. Further, the impact of the aquatic foods pathway would be negligible given the size of the zone of contamination. Consistent with the Technical Memorandum, *Cleanup Goals for Soil at the Finishing Area of the Former Bliss & Laughlin Facility, Buffalo, New York* (USACE 1998), the radon pathway was likewise excluded considering that radon standards are based on air concentrations. Also modeling radon migration into structures from soils is highly uncertain. All pathways included in this scenario are listed in Appendix A.


Upon determining the pathways of exposure, the radionuclides and their concentration in the soil were established. From the site history, the only MED material used on the site was natural uranium. Natural uranium consists of 99.3% of U-238 and 0.7% U-235. There are also trace amounts of U-234. The data from the final site survey, shown in Appendix B, was used to develop the concentrations of radionuclides in the soil. The

average concentration in the soil samples was used per the guidance in the RESRAD manual. The concentration in the soil assumed to be homogeneously distributed was modeled as 8.0 pCi/g natural uranium, 3.4, 0.15, and 4.6 pCi/g of U-238, U-235, and U-234, respectively.

The area of the Bliss & Laughlin site is approximately 15,000 m<sup>2</sup>. However the only area to process MED material was the Special Finishing Area. As shown in Figure 2, the Special Finishing Area is a small fraction of the total area of the site. This area is 300 m<sup>2</sup>, and therefore, the area of contamination modeled using the RESRAD computer code is 300 m<sup>2</sup>.



 RAILROAD  
 PROPERTY LINE

100'      0      100'  
  
 APPROXIMATE SCALE

H:\Bliss\LaughlinSteel\LaughlinSteel.dwg, DATE: 02/11/03, 04:18 PM, C

 JOB No. XXXXXX	FORMER BLISS AND LAUGHLIN STEEL COMPANY SITE	FACILITY PLAN VIEW	
		Scale: NTS	Date: 02/02 FIGURE 2

The USACE selection of values for RESRAD input parameters for assessing dose and risk at the Bliss & Laughlin site follows this hierarchy: (1) site-specific values, (2) values recommended by USEPA, (3) RESRAD defaults. Based upon the *Soil Survey of Erie County New York* done by the United States Department of Agriculture, Soil Conservation Service, December 1986, the area surrounding the Bliss & Laughlin site is Urban Land. This classification is a miscellaneous one in which 80 percent or more of the soil surface is covered by asphalt, concrete, buildings, or other impervious structures. However, immediately adjacent the land is classified as Niagara Silt Loam. This classification is most closely related to silty clay loam. Therefore, the RESRAD parameters relating to soil type were changed appropriately or RESRAD default values were used. In addition, climatic data was obtained from the National Weather Service for the Buffalo area and used in the model. These values as well as all other inputs for the computer code are provided in Appendix C.

## 2.2 INDUSTRIAL WORKER

In order to determine the radiological dose to the industrial worker, a series of assumptions were made. The scenario that would result in the largest dose to a worker would be when he works in the facility immediately adjacent to the contamination for nine hours a day. The worker would be exposed to several pathways. These pathways are external radiation, deposition of particles on their skin, immersion in a radioactive cloud, inhalation and ingestion of radionuclides. The radon pathway was not assessed, as previously justified. The pathways are listed in Appendix A.

In reviewing the Final Status Survey Report, two areas of contamination were identified to include in the RESRAD-Build model. The first is the contamination of the Special Finishing Area floor. The second is the trusses above this area. The Special Finishing Area is 300 m<sup>2</sup> and there are 16 linear meters of trusses in this area. The total length of the trusses was converted into a respective circular area directly above the receptor. The trusses were assumed to be 8 cm in width and cross members 5 cm, which gives a combined truss area of 2.08 m<sup>2</sup>.

Surveys of the trusses and concrete floor were taken during the Final Status Survey, and the average results of the survey showed total alpha contamination of 23.5 dpm/100 cm<sup>2</sup> and 123 dpm/100 cm<sup>2</sup> on the floor and trusses, respectively. The levels of alpha contamination were used since uranium and its progeny are primarily alpha emitters and alpha contamination is usually not found in background measurements. Therefore, any alpha contamination is assumed to be from uranium. The survey results are provided in Appendix B. The RESRAD-Build computer code requires concentrations to be entered in units of square meter. Therefore, the two sources modeled in the computation was an area source on a 300 m<sup>2</sup> with levels of contamination of 2350 dpm/m<sup>2</sup> (U-238 1150, U-235 52.8, and U-234 1150 dpm/m<sup>2</sup>). The second source modeled is a contaminated steel plate of 2.08 m<sup>2</sup> having contamination levels of 12,300 dpm/m<sup>2</sup> (U-238 5990, U-235 276, and U-234 6030 dpm/m<sup>2</sup>).

To maximize the dose and therefore the risk to the worker, the sources of contamination were modeled as close to the worker as feasible. The worker was assumed to work in the Special Finishing Area and therefore, the source was at his feet. As described earlier, the trusses are conservatively assumed to be one area of contamination. This source was placed directly above the workers head. An illustration is presented in Figure 3.

Another conservative assumption is that the worker spends the entire time working in the Special Finishing Area. This would result in the worker receiving the maximum dose possible. The worker spends 9 hours a day, 250 days a year directly between the sources.

All input parameters for the computer code are provided in Appendix C.



### 3 METHODS

#### 3.1 RESIDENT FARMER

The computer code RESRAD Version 6.1 was used to model the dose and risk to a future resident farmer exposed to the residual MED materials (natural uranium) in the soils underneath the Special Finishing Area assuming that the site would be redeveloped in the future and the building demolished. The resident farmer is assumed the worst case scenario, if the dose to this hypothetical person meets the dose requirements, then they will be met for all potential uses of the site. In this evaluation, all pathways except for aquatic foods and radon were used in the evaluation. The USACE selection of values for RESRAD input parameters for assessing dose and risk at the Bliss & Laughlin site follows this hierarchy: (1) site-specific values, (2) values recommended by USEPA, (3) RESRAD defaults.

#### 3.2 INDUSTRIAL WORKER

The computer code RESRAD-Build Version 3.1 was used to model the dose to a potential industrial worker exposed to the residual MED materials (natural uranium) in the Special Finishing Area. ICRP-60, *Recommendations of the International Commission on Radiological Protections*, dose to latent cancer risk coefficient was used to calculate the risk to a potential industrial worker. The USACE selection of values for RESRAD input parameters for assessing dose and risk at the Bliss & Laughlin site follows this hierarchy: (1) site-specific values, (2) RESRAD-Build defaults.

### 4 RESULTS

#### 4.1 RESIDENT FARMER

Results of the RESRAD model predict that the residential farmer would receive a maximum radiological dose of 1.7 mrem/y 989 years from site release. The model assumes the farm is established on a 300 m<sup>2</sup> site uniformly contaminated with 8.0 pCi/g natural uranium, (3.4, 0.15, and 4.6 pCi/g of U-238, U-235, and U-234 respectively). The resulting total excess cancer risk from this dose is 1.3E-05. The total annual doses and



risks for all years evaluated are shown in Table-1. The results for the dose and risk assessment are provided in Appendix D and E, respectively.

Year	Dose (mrem/y)	Total Excess Cancer Risk
0	0.40	6.0E-06
1	0.40	6.0E-06
3	0.40	6.0E-06
10	0.39	5.8E-06
30	0.36	5.4E-06
100	0.28	4.2E-06
300	0.26	3.8E-06
989	1.7	1.3E-05
1000	1.7	1.3E-05
3000	0.04	3.8E-07
10000	0.05	4.9E-07

#### 4.2 INDUSTRIAL WORKER

Results of the RESRAD-Build Version 3.1 model predict that the industrial worker receives a maximum radiological dose of 0.14 mrem/y in the first year when they work in the Special Finishing Area 9 hours a day for 250 days a year. The dose is from 2 sources, 300 m<sup>2</sup> concrete contaminated with 23.5 dpm/100 cm<sup>2</sup> of natural uranium (U-238 11.5, U-235 0.528, and U-234 11.5 dpm/cm<sup>2</sup>) and 2.08 m<sup>2</sup> steel contaminated with 123 dpm/100 cm<sup>2</sup> (U-238 59.9, U-235 2.76, and U-234 60.3 dpm/m<sup>2</sup>) of uranium. The worker is assumed to work in the center of both sources. The concrete is at his feet, 1 meter away and the steel is 11 meters from the floor. The resulting risk from this dose is 7E-08 latent cancer fatalities. The radiological doses and resulting risks from both sources and the totals are shown in Table-2. The output from the RESRAD-Build run is given in Appendix D.

Table 2 Radiological Dose and Latent Cancer Risks to an Industrial Worker				
Source	Year 0		Year 1	
	Dose (mrem/y)	Latent Cancer Fatality Risk	Dose (mrem/y)	Latent Cancer Fatality Risk
Concrete	1.4E-01	7E-08	1.4E-04	7E-11
Trusses	4.9E-03	2E-09	9.9E-07	5E-13
Total	1.4E-01	7E-08	1.4E-04	7E-11

\*Latent Cancer Risk Factor 5E-07/mrem per ICRP-60

## 5 CONCLUSIONS

Based on the results of the modeling, the Bliss & Laughlin site remediation meets the criteria specified in the Record of Decision, including the ARAR of 10 CFR 20 Subpart E which specifies an unrestricted release dose limit of 25 mrem/y. In addition, the site has been remediated to a level which meets the USEPA guidance of 15 mrem/y and the New York State TAGM 4003 guidance of 10 mrem/y. These dose limits/guidance are met for both the residential farmer and industrial worker scenarios.

## 6 REFERENCES

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

*Closure Report, Decontamination of the Former Bliss & Laughlin Facility, Niagara Cold Steel, Buffalo, New York*. Prepared by Radian International (a Dames & Moore Group Company) for the USACE, September, 1999.

EPA/600/P-95/002Fa, b, and c, *Exposure Factors Handbook*, United States Environmental Protection Agency, 1997.

*Final Status Survey Report for The Bliss & Laughlin Site Buffalo, New York*. Prepared by Dames & Moore for the USACE, June, 1999.

ICRP-60, *ICRP-90 Recommendations of the International Commission on Radiological Protections*, 1991.

Linsley, Jr., R. K., et al., *Hydrology for Engineers*, 3<sup>rd</sup> edition, McGraw-Hill, Inc. New York, NY, 1982.

OSWER No. 9200.4-18, Memorandum from S. D. Luftig to Addressees, *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination*, United States Environmental Protection Agency, August 22, 1997.

*Record of Decision for the Bliss & Laughlin Site, Buffalo, New York, United States Army Corps of Engineers, Buffalo District, December 1998.*

*Remedial Investigation, Feasibility Study, & Proposed Plan for the Bliss & Laughlin Site, Buffalo, New York, United States Army Corps of Engineers, Buffalo District, September 1998.*

*Soil Survey of Erie County New York done by the United States Department of Agriculture, Soil Conservation Service, December 1986*

*TAGM-4003, Cleanup Guideline for Soils Contaminated with Radioactive Materials, New York State Department of Environmental Conservation Division of Hazardous Substances Regulation, September 1993.*

*Technical Memorandum Cleanup Goals for the Soil at the Finishing Area of the Former Bliss and Laughlin Facility, Buffalo, New York. United States Army Corps of Engineers, Buffalo District, December 1998.*

## **7 APPENDIXES**

Appendix A Pathways Evaluated

Appendix B Survey Data

Appendix C Parameter Values Used

Appendix D Dose Assessment

APPENDIX A PATHWAYS EVALUATED

A-1 PATHWAYS EVALUATED WITH RESRAD FOR RESIDENT FARMER

External gamma	Assessed
Inhalation (w/o radon)	Assessed
Plant ingestion	Assessed
Meat ingestion	Assessed
Milk ingestion	Assessed
Drinking water	Assessed
Aquatic foods	The aquatic pathway has been turned off because there are no fish bearing water bodies within 0.25 miles of the site. Further, the impact of the aquatic foods pathway would be negligible given the size of the zone of contamination. The closest potentially fish bearing bodies are the Buffalo River, Cazenovia Creek, and South Park Lake.
Soil ingestion	Assessed
Radon	Not included following guidance of the Technical Memorandum, <i>Cleanup Goals for Soil at the Finishing Area of the Former Bliss and Laughlin Facility, Buffalo, New York</i> , USACE, December, 1998, it is stated, "The radon pathway was likewise excluded considering that radon standards are based on air concentrations.

A-2 PATHWAYS EVALUATED WITH RESRAD-BUILD FOR INDUSTRIAL WORKER

external radiation	Assessed
deposition of particles on their skin	Assessed
immersion in a radioactive cloud	Assessed
inhalation of radionuclides	Assessed
ingestion of radionuclides	Assessed
exposure to decay of radon progeny	Not Assessed

## APPENDIX B

## SURVEY DATA

## B-1 SOIL SAMPLES FOR SPECIAL FINISHING AREA

Sample ID	U-238		U-235		U-234	
	Concentration (pCi/g)	2 $\sigma$	Concentration (pCi/g)	2 $\sigma$	Concentration (pCi/g)	2 $\sigma$
B&L-SO-001	10	1	0.2	0.3	13	1
B&L-SO-002	1.3	0.3	0	0.2	1.1	0.4
B&L-SO-003	1.2	0.4	0	0.2	1.2	0.5
B&L-SO-004	2.5	0.6	0.1	0.3	4.9	0.9
B&L-SO-005	1.2	0.7	0	0.4	2.6	0.9
B&L-SO-006	4.4	0.6	0	0.2	4.9	0.7
Average	3.4	1.6	0.05	0.7	4.6	1.9

## B-2 SWIPE DATA FOR FLOORS AND TRUSSES

## B-2.1 FINISHING AREA FLOOR

Sample Number	Total		Removable	
	cpm/100 cm <sup>2</sup>	dpm/100 cm <sup>2</sup>	cpm/100 cm <sup>2</sup>	dpm/100 cm <sup>2</sup>
1	3	14.0	0	-0.4
2	2	0.0	0	-0.4
3	5	42.0	0	-0.4
4	9	97.9	2	5.6
5	5	42.0	2	5.6
6	10	111.9	0	-0.4
7	7	69.9	1	2.6
8	4	28.0	1	2.6
9	10	111.9	0	-0.4
10	2	0.0	0	-0.4
11	3	14.0	0	-0.4
12	0	-28.0	0	-0.4
13	1	-14.0	0	-0.4
14	1	-14.0	2	5.6
15	3	14.0	0	-0.4
16	3	14.0	0	-0.4
17	2	0.0	1	2.6
18	6	55.9	0	-0.4
19	5	42.0	0	-0.4
20	0	-28.0	0	-0.4
21	4	28.0	1	2.6
22	6	55.9	0	-0.4

Sample Number	Total		Removable	
	cpm/100 cm <sup>2</sup>	dpm/100 cm <sup>2</sup>	cpm/100 cm <sup>2</sup>	dpm/100 cm <sup>2</sup>
23	1	-14.0	0	-0.4
24	3	14.0	0	-0.4
25	4	28.0	0	-0.4
26	9	97.9	0	-0.4
27	5	42.0	0	-0.4
28	5	42.0	0	-0.4
29	3	14.0	0	-0.4
30	4	28.0	0	-0.4
31	4	28.0	0	-0.4
32	3	14.0	1	2.6
33	4	28.0	0	-0.4
34	7	69.9	0	-0.4
35	4	28.0	0	-0.4
36	4	28.0	0	-0.4
37	6	55.9	0	-0.4
38	5	42.0	0	-0.4
39	1	-14.0	0	-0.4
40	1	-14.0	0	-0.4
41	2	0.0	2	5.6
42	2	0.0	0	-0.4
43	6	55.9	0	-0.4
44	3	14.0	0	-0.4
45	4	28.0	0	-0.4
46	3	14.0	0	-0.4
47	3	14.0	1	2.6
48	2	0.0	0	-0.4
49	3	14.0	0	-0.4
50	3	14.0	0	-0.4
51	1	-14.0	0	-0.4
52	7	69.9	0	-0.4
53	3	14.0	0	-0.4
54	2	0.0	0	-0.4
55	2	0.0	1	2.6
56	4	28.0	0	-0.4
57	6	55.9	1	2.6
58	3	14.0	0	-0.4
59	3	14.0	0	-0.4
60	2	0.0	0	-0.4
61	2	0.0	0	-0.4
62	2	0.0	0	-0.4
63	2	0.0	0	-0.4
64	2	0.0	0	-0.4
65	2	0.0	0	-0.4

Sample Number	Total		Removable	
	cpm/100 cm <sup>2</sup>	dpm/100 cm <sup>2</sup>	cpm/100 cm <sup>2</sup>	dpm/100 cm <sup>2</sup>
66	4	28.0	0	-0.4
67	8	83.9	0	-0.4
68	2	0.0	0	-0.4
69	2	0.0	0	-0.4
70	4	28.0	0	-0.4
71	3	14.0	0	-0.4
72	2	0.0	0	-0.4
73	1	-14.0	0	-0.4
74	7	69.9	0	-0.4
75	3	14.0	0	-0.4
76	5	42.0	0	-0.4
77	3	14.0	0	-0.4
78	7	69.9	0	-0.4
79	2	0.0	0	-0.4
80	2	0.0	1	2.6
81	6	55.9	0	-0.4
82	3	14.0	0	-0.4
Average alpha	3.7	23.5	0.2	0.2

### B-2.2 TRUSSES

Sample Number	Total		Removable	
	cpm/100 cm <sup>2</sup>	dpm/100 cm <sup>2</sup>	cpm/100 cm <sup>2</sup>	dpm/100 cm <sup>2</sup>
Finishing Area Trusses 1	0	0.0	1	2.6
Finishing Area Trusses 2	0	0.0	2	5.6
Finishing Area Trusses 3	0	0.0	3	8.6
Finishing Area Trusses 4	1	14.0	2	5.6
Finishing Area Trusses 5	7	97.9	2	5.6
Finishing Area Trusses 6	7	97.9	0	-0.4
Finishing Area Trusses 7	0	0.0	0	-0.4
Finishing Area Trusses 8	0	0.0	1	2.6
Finishing Area Trusses 9	0	0.0	1	2.6
Finishing Area Trusses 10	0	0.0	3	8.6
Finishing Area Trusses 11	0	0.0	1	2.6
Finishing Area Trusses 12	0	0.0	1	2.6
Finishing Area Trusses 13	0	0.0	2	5.6
Finishing Area Trusses 14	7	97.9	0	-0.4
Finishing Area Trusses 15	7	97.9	1	2.6
Finishing Area Trusses 16	1	14.0	1	2.6
Truss #19 1	19	265.7	0	-0.4
Truss #19 2	8	111.9	2	5.7
Truss #19 3	21	293.7	2	5.7

Sample Number	Total		Removable	
	cpm/100 cm <sup>2</sup>	dpm/100 cm <sup>2</sup>	cpm/100 cm <sup>2</sup>	dpm/100 cm <sup>2</sup>
Truss #19 4	13	181.8	1	2.7
Truss #19 5	22	307.7	6	17.7
Truss #19 6	12	167.8	3	8.7
Truss #19 7	5	69.9	6	17.7
Truss #19 8	12	167.8	3	8.7
Truss #19 9	9	125.9	2	5.7
Truss #19 10	6	83.9	2	5.7
Truss #19 11	8	111.9	4	11.7
Truss #18 1	11	153.8	6	17.7
Truss #18 2	8	111.9	2	5.7
Truss #18 3	9	125.9	0	-0.4
Truss #18 4	11	153.8	0	-0.4
Truss #18 5	8	111.9	2	5.7
Truss #18 6	17	237.8	1	2.7
Truss #18 7	10	139.9	3	8.7
Truss #18 8	15	209.8	1	2.7
Truss #18 9	13	181.8	2	5.7
Truss #18 10	8	111.9	3	8.7
Truss #18 11	15	209.8	1	2.7
Truss #18 12	14	195.8	4	11.7
Truss #18 13	15	209.8	1	2.7
Truss #18 14	21	293.7	1	2.7
Truss #18 15	6	83.9	0	-0.4
Truss #18 16	17	237.8	1	2.7
Truss #18 17	1	14.0	0	-0.4
Truss #18 18	5	69.9	2	5.7
Truss #18 19	14	195.8	5	14.7
Truss #18 20	9	125.9	1	2.7
Truss #18 21	10	139.9	2	5.7
Truss #18 22	12	167.8	3	8.7
Truss #18 23	13	181.8	1	2.7
Truss #18 24	17	237.8	7	20.7
Truss #18 25	17	237.8	3	8.7
Truss #18 26	11	153.8	3	8.7
Truss #18 27	8	111.9	5	14.7
Truss #18 28	12	167.8	0	-0.4
Truss #18 29	12	167.8	3	8.7
Truss #18 30	7	97.9	3	8.7
Truss #18 31	1	14.0	3	8.7
Truss #18 32	7	97.9	2	5.7
Average alpha	8.8	123.0	2.1	5.9



## C-1 VALUES USED IN THE RESRAD MODEL

Parameter	Value Modeled	Default Value	Rationale
<b>Dose conversion factors for inhalation, mrem/pCi:</b>			
Ac-227+D	6.72E+00	6.72E+00	Default Value
Pa-231	1.28E+00	1.28E+00	Default Value
Pb-210+D	2.32E-02	2.32E-02	Default Value
Ra-226+D	8.60E-03	8.60E-03	Default Value
Th-230	3.26E-01	3.26E-01	Default Value
U-234	1.32E-01	1.32E-01	Default Value
U-235+D	1.23E-01	1.23E-01	Default Value
U-238+D	1.18E-01	1.18E-01	Default Value
<b>Dose conversion factors for ingestion, mrem/pCi:</b>			
Ac-227+D	1.48E-02	1.48E-02	Default Value
Pa-231	1.06E-02	1.06E-02	Default Value
Pb-210+D	7.27E-03	7.27E-03	Default Value
Ra-226+D	1.33E-03	1.33E-03	Default Value
Th-230	5.48E-04	5.48E-04	Default Value
U-234	2.83E-04	2.83E-04	Default Value
U-235+D	2.67E-04	2.67E-04	Default Value
U-238+D	2.69E-04	2.69E-04	Default Value
<b>Food transfer factors:</b>			
Ac-227+D , plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	Default Value
Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.00E-05	2.00E-05	Default Value
Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.00E-05	2.00E-05	Default Value
Pa-231 , plant/soil concentration ratio, dimensionless	1.00E-02	1.00E-02	Default Value
Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.00E-03	5.00E-03	Default Value
Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	Default Value
Pb-210+D , plant/soil concentration ratio, dimensionless	1.00E-02	1.00E-02	Default Value
Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.00E-04	8.00E-04	Default Value
Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.00E-04	3.00E-04	Default Value
Ra-226+D , plant/soil concentration ratio, dimensionless	4.00E-02	4.00E-02	Default Value
Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-03	1.00E-03	Default Value
Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.00E-03	1.00E-03	Default Value
Th-230 , plant/soil concentration ratio, dimensionless	1.00E-03	1.00E-03	Default Value
Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.00E-04	1.00E-04	Default Value
Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.00E-06	5.00E-06	Default Value

Parameter	Value Modeled	Default Value	Rationale
U-234, plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	Default Value
U-234, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	Default Value
U-234, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	Default Value
U-235+D, plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	Default Value
U-235+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	Default Value
U-235+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	Default Value
U-238+D, plant/soil concentration ratio, dimensionless	2.50E-03	2.50E-03	Default Value
U-238+D, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.40E-04	3.40E-04	Default Value
U-238+D, milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.00E-04	6.00E-04	Default Value
<b>Bioaccumulation factors, fresh water, L/kg:</b>			
Ac-227+D, fish	1.50E+01	1.50E+01	Default Value
Ac-227+D, crustacea and mollusks	1.00E+03	1.00E+03	Default Value
Pa-231, fish	1.00E+01	1.00E+01	Default Value
Pa-231, crustacea and mollusks	1.10E+02	1.10E+02	Default Value
Pb-210+D, fish	3.00E+02	3.00E+02	Default Value
Pb-210+D, crustacea and mollusks	1.00E+02	1.00E+02	Default Value
Ra-226+D, fish	5.00E+01	5.00E+01	Default Value
Ra-226+D, crustacea and mollusks	2.50E+02	2.50E+02	Default Value
Th-230, fish	1.00E+02	1.00E+02	Default Value
Th-230, crustacea and mollusks	5.00E+02	5.00E+02	Default Value
U-234, fish	1.00E+01	1.00E+01	Default Value
U-234, crustacea and mollusks	6.00E+01	6.00E+01	Default Value
U-235+D, fish	1.00E+01	1.00E+01	Default Value
U-235+D, crustacea and mollusks	6.00E+01	6.00E+01	Default Value
U-238+D, fish	1.00E+01	1.00E+01	Default Value
U-238+D, crustacea and mollusks	6.00E+01	6.00E+01	Default Value

Parameter	Modeled Parameter	RESRAD Default	Rationale
Area of contaminated zone (m**2)	3.00E+02	1.00E+04	Area of Special Finishing Area
Thickness of contaminated zone (m)	2.00E+00	2.00E+00	Default
Length parallel to aquifer flow (m)	1.00E+02	1.00E+02	Default
Basic radiation dose limit (mrem/yr)	2.50E+01	2.50E+01	Default
Time since placement of material (yr)	0.00E+00	0.00E+00	Default
Times for calculations (yr)	1.00E+00	1.00E+00	Default
Times for calculations (yr)	3.00E+00	3.00E+00	Default
Times for calculations (yr)	1.00E+01	1.00E+01	Default
Times for calculations (yr)	3.00E+01	3.00E+01	Default

Parameter	Modeled Parameter	RESRAD Default	Rationale
Times for calculations (yr)	1.00E+02	1.00E+02	Default
Times for calculations (yr)	3.00E+02	3.00E+02	Default
Times for calculations (yr)	1.00E+03	1.00E+03	Default
Times for calculations (yr)	3.00E+03	0.00E+00	Included to determine maximum dose
Times for calculations (yr)	1.00E+04	0.00E+00	Included to determine maximum dose
Initial principal radionuclide (pCi/g):U-234	4.60E+00	0.00E+00	Average soil concentration from soil samples
Initial principal radionuclide (pCi/g):U-235	1.52E-01	0.00E+00	Average soil concentration from soil samples
Initial principal radionuclide (pCi/g):U-238	3.40E+00	0.00E+00	Average soil concentration from soil samples
Concentration in groundwater (pCi/L):U-234	not used	0.00E+00	Pathway not modeled
Concentration in groundwater (pCi/L):U-235	not used	0.00E+00	Pathway not modeled
Concentration in groundwater (pCi/L):U-238	not used	0.00E+00	Pathway not modeled
Cover depth (m)	0.00E+00	0.00E+00	Default
Density of cover material (g/cm**3)	not used	1.50E+00	No cover material assumed
Cover depth erosion rate (m/yr)	not used	1.00E-03	No cover material assumed
Density of contaminated zone (g/cm**3)	1.28E+00	1.50E+00	Density of silty clay loam (Linsley 1982)
Contaminated zone erosion rate (m/yr)	1.00E-03	1.00E-03	Default
Contaminated zone total porosity	4.00E-01	4.00E-01	Default
Contaminated zone field capacity	2.00E-01	2.00E-01	Default
Contaminated zone hydraulic conductivity (m/yr)	4.05E+01	1.00E+01	From RESRAD manual for silty clay loam
Contaminated zone b parameter	1.14E+01	5.30E+00	From RESRAD manual for silty clay loam
Average annual wind speed (m/sec)	5.28E+00	2.00E+00	From RESRAD manual for silty clay loam
Humidity in air (g/m**3)	not used	8.00E+00	Pathway not modeled
Evapotranspiration coefficient	5.00E-01	5.00E-01	Default
Precipitation (m/yr)	9.53E-01	1.00E+00	Annual average precipitation for Buffalo
Irrigation (m/yr)	2.10E-01	2.00E-01	Ratioed to default value based upon annual average precipitation (i.e., (1/0.953)*0.2)
Irrigation mode	overhead	overhead	Default
Runoff coefficient	2.00E-01	2.00E-01	Default
Watershed area for nearby stream or pond (m**2)	1.00E+06	1.00E+06	Default
Accuracy for water/soil computations	1.00E-03	1.00E-03	Default
Density of saturated zone (g/cm**3)	1.28E+00	1.50E+00	Density of silty clay loam (Linsley 1982)
Saturated zone total porosity	4.00E-01	4.00E-01	Default

Parameter	Modeled Parameter	RESRAD Default	Rationale
Saturated zone effective porosity	2.00E-01	2.00E-01	Default
Saturated zone field capacity	2.30E-01	2.00E-01	From RESRAD manual for silty clay loam
Saturated zone hydraulic conductivity (m/yr)	5.36E+01	1.00E+02	From RESRAD manual for silty clay loam
Saturated zone hydraulic gradient	2.00E-02	2.00E-02	Default
Saturated zone b parameter	7.75E+00	5.30E+00	From RESRAD manual for silty clay loam
Water table drop rate (m/yr)	1.00E-03	1.00E-03	Default
Well pump intake depth (m below water table)	1.00E+01	1.00E+01	Default
Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	Default
Well pumping rate (m <sup>3</sup> /yr)	2.50E+02	2.50E+02	Default
Number of unsaturated zone strata	1	1	Default
Unsat. zone 1, thickness (m)	4.00E+00	4.00E+00	Default
Unsat. zone 1, soil density (g/cm <sup>3</sup> )	1.28E+00	1.50E+00	Density of silty clay loam (Linsley 1982)
Unsat. zone 1, total porosity	4.00E-01	4.00E-01	Default
Unsat. zone 1, effective porosity	2.00E-01	2.00E-01	Default
Unsat. zone 1, field capacity	2.30E-01	2.00E-01	From RESRAD manual for silty clay loam
Unsat. zone 1, soil-specific b parameter	7.75E+00	5.30E+00	From RESRAD manual for silty clay loam
Unsat. zone 1, hydraulic conductivity (m/yr)	5.36E+01	1.00E+01	From RESRAD manual for silty clay loam
<b>Distribution coefficients for U-234</b>			
Contaminated zone (cm <sup>3</sup> /g)	5.00E+01	5.00E+01	Default
Unsaturated zone 1 (cm <sup>3</sup> /g)	5.00E+01	5.00E+01	Default
Saturated zone (cm <sup>3</sup> /g)	5.00E+01	5.00E+01	Default
Leach rate (/yr)	3.78E-03	3.78E-03	Determined by RESRAD
Solubility constant	not used	not used	Default
<b>Distribution coefficients for U-235</b>			
Contaminated zone (cm <sup>3</sup> /g)	5.00E+01	5.00E+01	Default
Unsaturated zone 1 (cm <sup>3</sup> /g)	5.00E+01	5.00E+01	Default
Saturated zone (cm <sup>3</sup> /g)	5.00E+01	5.00E+01	Default
Leach rate (/yr)	3.78E-03	3.78E-03	Determined by RESRAD
Solubility constant	not used	not used	Default
<b>Distribution coefficients for U-238</b>			
Contaminated zone (cm <sup>3</sup> /g)	5.00E+01	5.00E+01	Default
Unsaturated zone 1 (cm <sup>3</sup> /g)	5.00E+01	5.00E+01	Default
Saturated zone (cm <sup>3</sup> /g)	5.00E+01	5.00E+01	Default
Leach rate (/yr)	3.78E-03	3.78E-03	Determined by RESRAD
Solubility constant	not used	not used	Default
<b>Distribution coefficients for daughter Ac-227</b>			
Contaminated zone (cm <sup>3</sup> /g)	2.00E+01	2.00E+01	Default

Parameter	Modeled Parameter	RESRAD Default	Rationale
Unsaturated zone 1 (cm**3/g)	2.00E+01	2.00E+01	Default
Saturated zone (cm**3/g)	2.00E+01	2.00E+01	Default
Leach rate (/yr)	9.37E-03	9.37E-03	Determined by RESRAD
Solubility constant	not used	not used	Default
<b>Distribution coefficients for daughter Pa-231</b>			
Contaminated zone (cm**3/g)	5.00E+01	5.00E+01	Default
Unsaturated zone 1 (cm**3/g)	5.00E+01	5.00E+01	Default
Saturated zone (cm**3/g)	5.00E+01	5.00E+01	Default
Leach rate (/yr)	3.78E-03	3.78E-03	Determined by RESRAD
Solubility constant	not used	not used	Default
<b>Distribution coefficients for daughter Pb-210</b>			
Contaminated zone (cm**3/g)	1.00E+02	1.00E+02	Default
Unsaturated zone 1 (cm**3/g)	1.00E+02	1.00E+02	Default
Saturated zone (cm**3/g)	1.00E+02	1.00E+02	Default
Leach rate (/yr)	1.89E-03	1.89E-03	Determined by RESRAD
Solubility constant	not used	not used	Default
<b>Distribution coefficients for daughter Ra-226</b>			
Contaminated zone (cm**3/g)	7.00E+01	7.00E+01	Default
Unsaturated zone 1 (cm**3/g)	7.00E+01	7.00E+01	Default
Saturated zone (cm**3/g)	7.00E+01	7.00E+01	Default
Leach rate (/yr)	2.70E-03	2.70E-03	Determined by RESRAD
Solubility constant	not used	not used	Default
<b>Distribution coefficients for daughter Th-230</b>			
Contaminated zone (cm**3/g)	6.00E+04	6.00E+04	Default
Unsaturated zone 1 (cm**3/g)	6.00E+04	6.00E+04	Default
Saturated zone (cm**3/g)	6.00E+04	6.00E+04	Default
Leach rate (/yr)	3.17E-06	3.17E-06	Determined by RESRAD
Solubility constant	not used	not used	Default
Inhalation rate (m**3/yr)	4.75E+03	8.40E+03	Per USEPA Exposure Factors Handbook
Mass loading for inhalation (g/m**3)	1.00E-04	1.00E-04	Default
Exposure duration	3.00E+01	3.00E+01	Default
Shielding factor, inhalation	4.00E-01	4.00E-01	Default
Shielding factor, external gamma	4.00E-01	7.00E-01	Per OSWER Directive 9355.4-16
Fraction of time spent indoors	5.00E-01	5.00E-01	Default
Fraction of time spent outdoors (on site)	2.50E-01	2.50E-01	Default
Shape factor flag, external gamma	1.00E+00	1.00E+00	Default
Outer annular radius (m), ring1:	not used	5.00E+01	Not used
Outer annular radius (m), ring2:	not used	7.07E+01	Not used
Outer annular radius (m), ring3:	not used	0.00E+00	Not used
Outer annular radius (m), ring4:	not used	0.00E+00	Not used
Outer annular radius (m), ring5:	not used	0.00E+00	Not used

Parameter	Modeled Parameter	RESRAD Default	Rationale
Outer annular radius (m), ring6:	not used	0.00E+00	Not used
Outer annular radius (m), ring7:	not used	0.00E+00	Not used
Outer annular radius (m), ring8:	not used	0.00E+00	Not used
Outer annular radius (m), ring9:	not used	0.00E+00	Not used
Outer annular radius (m), ring 10:	not used	0.00E+00	Not used
Outer annular radius (m), ring 11:	not used	0.00E+00	Not used
Outer annular radius (m), ring 12:	not used	0.00E+00	Not used
Ring1	not used	1.00E+00	Not used
Ring2	not used	2.73E-01	Not used
Ring3	not used	0.00E+00	Not used
Ring4	not used	0.00E+00	Not used
Ring5	not used	0.00E+00	Not used
Ring6	not used	0.00E+00	Not used
Ring7	not used	0.00E+00	Not used
Ring8	not used	0.00E+00	Not used
Ring9	not used	0.00E+00	Not used
Ring 10	not used	0.00E+00	Not used
Ring 11	not used	0.00E+00	Not used
Ring 12	not used	0.00E+00	Not used
Fruits, vegetables and grain consumption (kg/yr)	1.60E+02	1.60E+02	Default
Leafy vegetable consumption (kg/yr)	1.40E+01	1.40E+01	Default
Milk consumption (L/yr)	9.20E+01	9.20E+01	Default
Meat and poultry consumption (kg/yr)	6.30E+01	6.30E+01	Default
Fish consumption (kg/yr)	not used	5.40E+00	Pathway not modeled
Other seafood consumption (kg/yr)	not used	9.00E-01	Pathway not modeled
Soil ingestion rate (g/yr)	3.65E+01	3.65E+01	Default
Drinking water intake (L/yr)	8.40E+02	5.10E+02	Per USEPA Exposure Factors Handbook
Contamination fraction of drinking water	1.00E+00	1.00E+00	Default
Contamination fraction of household water	not used	1.00E+00	Pathway not modeled
Contamination fraction of livestock water	1.00E+00	1.00E+00	Default
Contamination fraction of irrigation water	1.00E+00	1.00E+00	Default
Contamination fraction of aquatic food	not used	5.00E-01	Pathway not modeled
Contamination fraction of plant food	1.90E-01	1.90E-01	Determined by RESRAD
Contamination fraction of meat	1.90E-02	1.90E-02	Determined by RESRAD

Parameter	Modeled Parameter	RESRAD Default	Rationale
Contamination fraction of milk	1.90E-02	1.90E-02	Determined by RESRAD
Livestock fodder intake for meat (kg/day)	6.80E+01	6.80E+01	Default
Livestock fodder intake for milk (kg/day)	5.50E+01	5.50E+01	Default
Livestock water intake for meat (L/day)	5.00E+01	5.00E+01	Default
Livestock water intake for milk (L/day)	1.60E+02	1.60E+02	Default
Livestock soil intake (kg/day)	5.00E-01	5.00E-01	Default
Mass loading for foliar deposition (g/m**3)	1.00E-04	1.00E-04	Default
Depth of soil mixing layer (m)	1.50E-01	1.50E-01	Default
Depth of roots (m)	9.00E-01	9.00E-01	Default
Drinking water fraction from ground water	1.00E+00	1.00E+00	Default
Household water fraction from ground water	not used	1.00E+00	Pathway not modeled
Livestock water fraction from ground water	1.00E+00	1.00E+00	Default
Contamination fraction from ground water	1.00E+00	1.00E+00	Default
Wet weight crop yield for Non-Leafy (kg/m**2)	7.00E-01	7.00E-01	Default
Wet weight crop yield for Leafy (kg/m**2)	1.50E+00	1.50E+00	Default
Wet weight crop yield for Fodder(kg/m**2)	1.10E+00	1.10E+00	Default
Growing Season for Non-Leafy (years)	1.70E-01	1.70E-01	Default
Growing Season for Leafy (years)	2.50E-01	2.50E-01	Default
Growing Season for Fodder(years)	8.00E-02	8.00E-02	Default
Translocation Factor for Non-Leafy	1.00E-01	1.00E-01	Default
Translocation Factor for Leafy	1.00E+00	1.00E+00	Default
Translocation Factor for Fodder	1.00E+00	1.00E+00	Default
Dry Foliar Interception Fraction for Non-Leafy	2.50E-01	2.50E-01	Default
Dry Foliar Interception Fraction for Leafy	2.50E-01	2.50E-01	Default
Dry Foliar Interception Fraction for Fodder	2.50E-01	2.50E-01	Default
Wet Foliar Interception Fraction for Leafy	2.50E-01	2.50E-01	Default

Parameter	Modeled Parameter	RESRAD Default	Rationale
Wet Foliar Interception Fraction for Leafy	2.50E-01	2.50E-01	Default
Wet Foliar Interception Fraction for Fodder	2.50E-01	2.50E-01	Default
Weathering Removal Constant for Vegetation	2.00E+01	2.00E+01	Default
C-12 concentration in water (g/cm**3)	not used	2.00E-05	Pathway not modeled
C-12 concentration in contaminated soil (g/g)	not used	3.00E-02	Pathway not modeled
Fraction of vegetation carbon from soil	not used	2.00E-02	Pathway not modeled
Fraction of vegetation carbon from air	not used	9.80E-01	Pathway not modeled
C-14 evasion layer thickness in soil (m)	not used	3.00E-01	Pathway not modeled
C-14 evasion flux rate from soil (1/sec)	not used	7.00E-07	Pathway not modeled
C-12 evasion flux rate from soil (1/sec)	not used	1.00E-10	Pathway not modeled
Fraction of grain in beef cattle feed	not used	8.00E-01	Pathway not modeled
Fraction of grain in milk cow feed	not used	2.00E-01	Pathway not modeled
DCF correction factor for gaseous forms of C14	not used	8.89E+01	Pathway not modeled
<b>Storage times of contaminated foodstuffs (days):</b>			
Fruits, non-leafy vegetables, and grain	1.40E+01	1.40E+01	Default
Leafy vegetables	1.00E+00	1.00E+00	Default
Milk	1.00E+00	1.00E+00	Default
Meat and poultry	2.00E+01	2.00E+01	Default
Fish	7.00E+00	7.00E+00	Default
Crustacea and mollusks	7.00E+00	7.00E+00	Default
Well water	1.00E+00	1.00E+00	Default
Surface water	1.00E+00	1.00E+00	Default
Livestock fodder	4.50E+01	4.50E+01	Default
Thickness of building foundation (m)	not used	1.50E-01	Pathway not modeled
Bulk density of building foundation (g/cm**3)	not used	2.40E+00	Pathway not modeled
Total porosity of the cover material	not used	4.00E-01	Pathway not modeled
Total porosity of the building foundation	not used	1.00E-01	Pathway not modeled
Volumetric water content of the	not used	5.00E-02	Pathway not modeled



Parameter	Modeled Parameter	RESRAD Default	Rationale
cover material			
Volumetric water content of the foundation	not used	3.00E-02	Pathway not modeled
Diffusion coefficient for radon gas (m/sec):			
in cover material	not used	2.00E-06	Pathway not modeled
in foundation material	not used	3.00E-07	Pathway not modeled
in contaminated zone soil	not used	2.00E-06	Pathway not modeled
Radon vertical dimension of mixing (m)	not used	2.00E+00	Pathway not modeled
Average building air exchange rate (1/hr)	not used	5.00E-01	Pathway not modeled
Height of the building (room) (m)	not used	2.50E+00	Pathway not modeled
Building interior area factor	not used	0.00E+00	Pathway not modeled
Building depth below ground surface (m)	not used	1.00E+00	Pathway not modeled
Emanating power of Rn-222 gas	not used	2.50E-01	Pathway not modeled
Emanating power of Rn-220 gas	not used	1.50E-01	Pathway not modeled
Number of graphical time points	32	32	Default
Maximum number of integration points for dose	17	17	Default
Maximum number of integration points for risk	257	257	Default

C-2 VALUES USED IN THE RESRAD-BUILD MODEL

Parameter	Value	Units	Assumption
Number of Sources	2	unitless	Source from trusses and floors
Number of Receptors	1	unitless	1 person
Total Time	365	days	Default
Fraction Inside	0.26		9 hours /day, 250 days/year
Building Air Exchange Rate	0.8	h <sup>-1</sup>	Default
Height	12	m	Building description
Area	1000	m <sup>2</sup>	Building description
Deposition velocity	.01	m/s	Default
Resuspension Rate	5.0E-07	s <sup>-1</sup>	Default
Fraction of time in room	1	unitless	Default
Inhalation	18	m <sup>3</sup> /day	Default
Ingestion (Dust)	1.0E-4	m <sup>2</sup> /hr	Default

Location of Receptors and Sources

Identifier	Room	x (m)	y (m)	Z (m)	Assumptions	Area (m <sup>2</sup> )	Assumption
Receptor	1	0	0	1	Distance from floor to center of worker	Not applicable	Not applicable
Source 1	1	0	0	0	Floor	300	The area of the Special Finishing Area
Source 2	1	0	0	11	Ceiling height is 12 m assumed trusses were at 11 m.	2.08	Truss length with cross members (16 m * (0.05 m + 0.08 m))

Source Data

Parameter	Source 1	Source 2	Assumption
Direct Ingestion Rate (hr <sup>-1</sup> )	0	0	Default
Fraction released to air	0.1	0.1	Default
Removable fraction	50 %	50 %	Default
Time to Remove(days)	365	365	Default
Radon Release Fraction	0	0	Radon pathway not assessed
Nuclide	Concentration (dpm/m <sup>2</sup> )	Concentration (dpm/m <sup>2</sup> )	Data obtained from averaging release survey of floor/trusses. Contamination assumed evenly distributed/ floors/trusses.
U-238	1150	5990	
U-235	52.8	276	
U-234	1150	6030	

**APPENDIX D RESRAD MODEL OUTPUTS**

**D-1 DOSE ASSESSMENT FOR RESIDENTIAL FARMER**

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Time = 3.000E+01 .....	15
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Dose Conversion Factor (and Related) Parameter Summary  
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Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2 ( 1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2 ( 2)

B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2 ( 3)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2 ( 4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2 ( 5)
B-1	U-234	1.320E-01	1.320E-01	DCF2 ( 6)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2 ( 7)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2 ( 8)
D-1   Dose conversion factors for ingestion, mrem/pCi:				
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3 ( 1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3 ( 2)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3 ( 3)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3 ( 4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3 ( 5)
D-1	U-234	2.830E-04	2.830E-04	DCF3 ( 6)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3 ( 7)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3 ( 8)
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	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	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	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF ( 4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF ( 4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF ( 4,3)
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF ( 5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF ( 5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF ( 5,3)
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF ( 6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF ( 6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF ( 6,3)
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF ( 7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF ( 7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF ( 7,3)

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Dose Conversion Factor (and Related) Parameter Summary (continued)  
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0 Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF( 8,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF( 8,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF( 8,3)
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	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	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	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC( 4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC( 4,2)
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC( 5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC( 5,2)
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC( 6,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC( 6,2)
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC( 7,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC( 7,2)
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC( 8,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC( 8,2)

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Site-Specific Parameter Summary

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	3.000E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+00	2.000E+00	---	THICK0

R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T( 2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T( 3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T( 4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T( 5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T( 6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T( 7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T( 8)
R011	Times for calculations (yr)	3.000E+03	0.000E+00	---	T( 9)
R011	Times for calculations (yr)	1.000E+04	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-234	4.600E+00	0.000E+00	---	S1( 6)
R012	Initial principal radionuclide (pCi/g): U-235	1.520E-01	0.000E+00	---	S1( 7)
R012	Initial principal radionuclide (pCi/g): U-238	3.400E+00	0.000E+00	---	S1( 8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1( 6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1( 7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1( 8)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.280E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	V CZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.050E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.140E+01	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	5.275E+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)	9.530E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.100E-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)	1.280E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.300E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.360E+01	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	7.750E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT

R014 | Well pump intake depth (m below water table) | 1.000E+01 | 1.000E+01 |  
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0	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	1	1	---	NS
	R015	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	---	H(1)
	R015	Unsat. zone 1, soil density (g/cm**3)	1.280E+00	1.500E+00	---	DENSUZ(1)
	R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
	R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
	R015	Unsat. zone 1, field capacity	2.300E-01	2.000E-01	---	FCUZ(1)
	R015	Unsat. zone 1, soil-specific b parameter	7.750E+00	5.300E+00	---	BUZ(1)
	R015	Unsat. zone 1, hydraulic conductivity (m/yr)	5.360E+01	1.000E+01	---	HCUZ(1)
	R016	Distribution coefficients for U-234				
	R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC( 6)
	R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU( 6,1)
	R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS( 6)
	R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.779E-03	ALEACH( 6)
	R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 6)
	R016	Distribution coefficients for U-235				
	R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC( 7)
	R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU( 7,1)
	R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS( 7)
	R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.779E-03	ALEACH( 7)
	R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 7)
	R016	Distribution coefficients for U-238				
	R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC( 8)
	R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU( 8,1)
	R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS( 8)
	R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.779E-03	ALEACH( 8)
	R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 8)
	R016	Distribution coefficients for daughter Ac-227				
	R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC( 1)
	R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU( 1,1)
	R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS( 1)
	R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.373E-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)	5.000E+01	5.000E+01	---	DCNUCC( 2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU( 2,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS( 2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.779E-03	ALEACH( 2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 2)

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Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC( 3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU( 3,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS( 3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.894E-03	ALEACH( 3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 3)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC( 4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU( 4,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS( 4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.703E-03	ALEACH( 4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 4)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC( 5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU( 5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS( 5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.165E-06	ALEACH( 5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 5)
R017	Inhalation rate (m**3/yr)	4.745E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	4.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-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)

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0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
-----					
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA( 1)
R017	Ring 2	not used	2.732E-01	---	FRACA( 2)
R017	Ring 3	not used	0.000E+00	---	FRACA( 3)
R017	Ring 4	not used	0.000E+00	---	FRACA( 4)
R017	Ring 5	not used	0.000E+00	---	FRACA( 5)
R017	Ring 6	not used	0.000E+00	---	FRACA( 6)
R017	Ring 7	not used	0.000E+00	---	FRACA( 7)
R017	Ring 8	not used	0.000E+00	---	FRACA( 8)
R017	Ring 9	not used	0.000E+00	---	FRACA( 9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
-----					
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	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)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	8.395E+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	not used	5.000E-01	---	FR9

R018	Contamination fraction of plant food	-1	-1	0.150E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.150E-01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.150E-01	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LF15
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LF16
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)

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Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)

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Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

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

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Contaminated Zone Dimensions

Area: 300.00 square meters  
 Thickness: 2.00 meters  
 Cover Depth: 0.00 meters

Initial Soil Concentrations, pCi/g

U-234 4.600E+00  
 U-235 1.520E-01  
 U-238 3.400E+00

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 2.500E+01 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
TDOSE(t):	4.034E-01	4.019E-01	3.989E-01	3.885E-01	3.605E-01	2.779E-01	2.555E-01	1.691E+00	3.571E-02	4.642E-02
M(t):	1.614E-02	1.607E-02	1.595E-02	1.554E-02	1.442E-02	1.112E-02	1.022E-02	6.762E-02	1.428E-03	1.857E-03
Maximum TDOSE(t):	1.744E+00 mrem/yr		at t = 989 $\bar{n}$ 2 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 = 9.890E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	5.555E-03	0.0032	1.750E-04	0.0001	0.000E+00	0.0000	6.209E-03	0.0036	1.995E-05	0.0000	2.645E-05	0.0000	3.862E-04	0.0002
U-235	1.143E-03	0.0007	9.361E-06	0.0000	0.000E+00	0.0000	3.303E-04	0.0002	4.658E-06	0.0000	5.314E-07	0.0000	2.198E-05	0.0000

U-238	4.283E-03	0.0025	9.363E-05	0.0001	0.000E+00	0.0000	1.425E-03	0.0008	4.703E-06	0.0000	1.152E-05	0.0000	1.792E-04	0.0001
Total	1.098E-02	0.0063	2.780E-04	0.0002	0.000E+00	0.0000	7.965E-03	0.0046	2.931E-05	0.0000	3.850E-05	0.0000	5.873E-04	0.0003

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
As mrem/yr and Fraction of Total Dose At t = 9.890E+02 years

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	9.311E-01	0.5339	0.000E+00	0.0000	0.000E+00	0.0000	1.371E-02	0.0079	6.536E-05	0.0000	2.423E-04	0.0001	9.575E-01	0.5491
U-235	1.189E-01	0.0682	0.000E+00	0.0000	0.000E+00	0.0000	1.751E-03	0.0010	2.614E-05	0.0000	8.121E-06	0.0000	1.222E-01	0.0701
U-238	6.483E-01	0.3718	0.000E+00	0.0000	0.000E+00	0.0000	9.544E-03	0.0055	4.454E-05	0.0000	1.693E-04	0.0001	6.641E-01	0.3808
Total	1.698E+00	0.9739	0.000E+00	0.0000	0.000E+00	0.0000	2.500E-02	0.0143	1.360E-04	0.0001	4.197E-04	0.0002	1.744E+00	1.0000

0\*Sum of all water independent and dependent pathways.

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	7.474E-04	0.0019	5.929E-03	0.0147	0.000E+00	0.0000	8.480E-02	0.2102	2.798E-04	0.0007	6.860E-04	0.0017	1.067E-02	0.0265
U-235	4.570E-02	0.1133	1.826E-04	0.0005	0.000E+00	0.0000	2.648E-03	0.0066	8.802E-06	0.0000	2.139E-05	0.0001	3.328E-04	0.0008
U-238	1.797E-01	0.4455	3.917E-03	0.0097	0.000E+00	0.0000	5.958E-02	0.1477	1.966E-04	0.0005	4.820E-04	0.0012	7.497E-03	0.0186
Total	2.261E-01	0.5606	1.003E-02	0.0249	0.000E+00	0.0000	1.470E-01	0.3645	4.852E-04	0.0012	1.189E-03	0.0029	1.850E-02	0.0459

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

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.031E-01	0.2556
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	4.889E-02	0.1212
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	2.514E-01	0.6232
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	4.034E-01	1.0000

0\*Sum of all water independent and dependent pathways.  
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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years  
 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	7.446E-04	0.0019	5.906E-03	0.0147	0.000E+00	0.0000	8.449E-02	0.2102	2.788E-04	0.0007	6.834E-04	0.0017	1.063E-02	0.0265
U-235	4.553E-02	0.1133	1.819E-04	0.0005	0.000E+00	0.0000	2.647E-03	0.0066	8.955E-06	0.0000	2.131E-05	0.0001	3.318E-04	0.0008
U-238	1.790E-01	0.4455	3.903E-03	0.0097	0.000E+00	0.0000	5.936E-02	0.1477	1.959E-04	0.0005	4.802E-04	0.0012	7.469E-03	0.0186
Total	2.253E-01	0.5606	9.991E-03	0.0249	0.000E+00	0.0000	1.465E-01	0.3645	4.836E-04	0.0012	1.185E-03	0.0029	1.843E-02	0.0459

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.027E-01	0.2556
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	4.872E-02	0.1212
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	2.504E-01	0.6231
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.019E-01	1.0000

0\*Sum of all water independent and dependent pathways.  
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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years  
 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	7.394E-04	0.0019	5.862E-03	0.0147	0.000E+00	0.0000	8.385E-02	0.2102	2.767E-04	0.0007	6.783E-04	0.0017	1.055E-02	0.0265
U-235	4.518E-02	0.1133	1.807E-04	0.0005	0.000E+00	0.0000	2.645E-03	0.0066	9.264E-06	0.0000	2.115E-05	0.0001	3.300E-04	0.0008
U-238	1.777E-01	0.4454	3.873E-03	0.0097	0.000E+00	0.0000	5.891E-02	0.1477	1.944E-04	0.0005	4.765E-04	0.0012	7.413E-03	0.0186
Total	2.236E-01	0.5606	9.916E-03	0.0249	0.000E+00	0.0000	1.454E-01	0.3645	4.803E-04	0.0012	1.176E-03	0.0029	1.829E-02	0.0459

0

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

0

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	1.020E-01	0.2556
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	4.837E-02	0.1213
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	2.485E-01	0.6231
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	3.989E-01	1.0000

0\*Sum of all water independent and dependent pathways.

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Summary : Bliss & Laughlin Radiological Assessment for Residential Farmer

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

0

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	7.240E-04	0.0019	5.710E-03	0.0147	0.000E+00	0.0000	8.167E-02	0.2102	2.695E-04	0.0007	6.606E-04	0.0017	1.028E-02	0.0264
U-235	4.401E-02	0.1133	1.765E-04	0.0005	0.000E+00	0.0000	2.640E-03	0.0068	1.031E-05	0.0000	2.060E-05	0.0001	3.237E-04	0.0008
U-238	1.730E-01	0.4453	3.772E-03	0.0097	0.000E+00	0.0000	5.737E-02	0.1477	1.893E-04	0.0005	4.641E-04	0.0012	7.219E-03	0.0186
Total	2.178E-01	0.5605	9.659E-03	0.0249	0.000E+00	0.0000	1.417E-01	0.3646	4.691E-04	0.0012	1.145E-03	0.0029	1.782E-02	0.0459

0

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

0

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	9.931E-02	0.2556
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	4.718E-02	0.1214
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	2.421E-01	0.6230
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	3.885E-01	1.0000

0\*Sum of all water independent and dependent pathways.

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	7.014E-04	0.0019	5.297E-03	0.0147	0.000E+00	0.0000	7.574E-02	0.2101	2.499E-04	0.0007	6.125E-04	0.0017	9.532E-03	0.0264
U-235	4.083E-02	0.1132	1.661E-04	0.0005	0.000E+00	0.0000	2.631E-03	0.0073	1.296E-05	0.0000	1.911E-05	0.0001	3.083E-04	0.0009
U-238	1.604E-01	0.4450	3.498E-03	0.0097	0.000E+00	0.0000	5.320E-02	0.1476	1.756E-04	0.0005	4.304E-04	0.0012	6.694E-03	0.0186
Total	2.020E-01	0.5602	8.961E-03	0.0249	0.000E+00	0.0000	1.316E-01	0.3649	4.384E-04	0.0012	1.062E-03	0.0029	1.653E-02	0.0459

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- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	9.213E-02	0.2555
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	4.397E-02	0.1220
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	2.244E-01	0.6225
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	3.605E-01	1.0000

\*Sum of all water independent and dependent pathways.

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Summary : Bliss & Laughlin Radiological Assessment for Residential Farmer

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	8.250E-04	0.0030	4.073E-03	0.0147	0.000E+00	0.0000	5.833E-02	0.2099	1.924E-04	0.0007	4.705E-04	0.0017	7.330E-03	0.0264
U-235	3.144E-02	0.1131	1.370E-04	0.0005	0.000E+00	0.0000	2.558E-03	0.0092	1.908E-05	0.0001	1.471E-05	0.0001	2.641E-04	0.0010
U-238	1.232E-01	0.4431	2.685E-03	0.0097	0.000E+00	0.0000	4.084E-02	0.1470	1.348E-04	0.0005	3.304E-04	0.0012	5.139E-03	0.0185
Total	1.554E-01	0.5592	6.895E-03	0.0248	0.000E+00	0.0000	1.017E-01	0.3660	3.462E-04	0.0012	8.156E-04	0.0029	1.273E-02	0.0458

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-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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	7.122E-02	0.2562
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.444E-02	0.1239
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	1.723E-01	0.6199
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.779E-01	1.0000

0\*Sum of all water independent and dependent pathways.

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

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	2.048E-03	0.0080	1.930E-03	0.0076	0.000E+00	0.0000	2.861E-02	0.1120	9.414E-05	0.0004	2.238E-04	0.0009	3.490E-03	0.0137
U-235	1.492E-02	0.0584	7.841E-05	0.0003	0.000E+00	0.0000	1.940E-03	0.0076	2.119E-05	0.0001	6.971E-06	0.0000	1.632E-04	0.0006
U-238	5.784E-02	0.2264	1.262E-03	0.0049	0.000E+00	0.0000	1.920E-02	0.0751	6.334E-05	0.0002	1.553E-04	0.0006	2.415E-03	0.0095
Total	7.481E-02	0.2928	3.271E-03	0.0128	0.000E+00	0.0000	4.974E-02	0.1947	1.787E-04	0.0007	3.860E-04	0.0015	6.069E-03	0.0238

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-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	6.558E-02	0.2566	0.000E+00	0.0000	0.000E+00	0.0000	9.637E-04	0.0038	4.467E-06	0.0000	1.707E-05	0.0001	1.030E-01	0.4029
U-235	7.533E-03	0.0295	0.000E+00	0.0000	0.000E+00	0.0000	1.108E-04	0.0004	6.763E-07	0.0000	5.769E-07	0.0000	2.478E-02	0.0970
U-238	4.615E-02	0.1806	0.000E+00	0.0000	0.000E+00	0.0000	6.782E-04	0.0027	3.144E-06	0.0000	1.201E-05	0.0000	1.278E-01	0.5001
Total	1.193E-01	0.4668	0.000E+00	0.0000	0.000E+00	0.0000	1.753E-03	0.0069	8.286E-06	0.0000	2.966E-05	0.0001	2.555E-01	1.0000

0\*Sum of all water independent and dependent pathways.

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

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	5.581E-03	0.0033	1.693E-04	0.0001	0.000E+00	0.0000	6.148E-03	0.0036	1.974E-05	0.0000	2.584E-05	0.0000	3.764E-04	0.0002
U-235	1.097E-03	0.0006	9.035E-06	0.0000	0.000E+00	0.0000	3.197E-04	0.0002	4.516E-06	0.0000	5.101E-07	0.0000	2.124E-05	0.0000
U-238	4.110E-03	0.0024	8.983E-05	0.0001	0.000E+00	0.0000	1.368E-03	0.0008	4.513E-06	0.0000	1.105E-05	0.0000	1.719E-04	0.0001
Total	1.079E-02	0.0064	2.682E-04	0.0002	0.000E+00	0.0000	7.836E-03	0.0046	2.877E-05	0.0000	3.740E-05	0.0000	5.695E-04	0.0003

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

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	9.027E-01	0.5340	0.000E+00	0.0000	0.000E+00	0.0000	1.329E-02	0.0079	6.349E-05	0.0000	2.349E-04	0.0001	9.286E-01	0.5493
U-235	1.155E-01	0.0683	0.000E+00	0.0000	0.000E+00	0.0000	1.701E-03	0.0010	2.559E-05	0.0000	7.869E-06	0.0000	1.187E-01	0.0702
U-238	6.280E-01	0.3715	0.000E+00	0.0000	0.000E+00	0.0000	9.246E-03	0.0055	4.318E-05	0.0000	1.640E-04	0.0001	6.432E-01	0.3805
Total	1.646E+00	0.9738	0.000E+00	0.0000	0.000E+00	0.0000	2.424E-02	0.0143	1.323E-04	0.0001	4.068E-04	0.0002	1.691E+00	1.0000

\*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
As mrem/yr and Fraction of Total Dose At t = 3.000E+03 years  
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
As mrem/yr and Fraction of Total Dose At t = 3.000E+03 years

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
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

U-234 3.512E-02 0.9834 0.000E+00 0.0000 0.000E+00 0.0000 5.190E-04 0.0145 5.986E-06 0.0002 6.832E-06 0.0002 3.565E-02 0.9983  
 U-235 2.778E-06 0.0001 0.000E+00 0.0000 0.000E+00 0.0000 4.094E-08 0.0000 9.461E-10 0.0000 1.115E-10 0.0000 2.820E-06 0.0001  
 U-238 5.662E-05 0.0016 0.000E+00 0.0000 0.000E+00 0.0000 8.364E-07 0.0000 8.805E-09 0.0000 1.161E-08 0.0000 5.748E-05 0.0016  
 =====  
 Total 3.518E-02 0.9851 0.000E+00 0.0000 0.000E+00 0.0000 5.199E-04 0.0146 5.996E-06 0.0002 6.844E-06 0.0002 3.571E-02 1.0000  
 0\*Sum of all water independent and dependent pathways.  
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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 As mrem/yr and Fraction of Total Dose At t = 1.000E+04 years  
 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 As mrem/yr and Fraction of Total Dose At t = 1.000E+04 years  
 Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	4.564E-02	0.9832	0.000E+00	0.0000	0.000E+00	0.0000	6.744E-04	0.0145	7.778E-06	0.0002	8.862E-06	0.0002	4.633E-02	0.9981
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	8.907E-05	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	1.316E-06	0.0000	1.519E-08	0.0000	1.734E-08	0.0000	9.042E-05	0.0019
Total	4.573E-02	0.9851	0.000E+00	0.0000	0.000E+00	0.0000	6.757E-04	0.0146	7.794E-06	0.0002	8.879E-06	0.0002	4.642E-02	1.0000

0\*Sum of all water independent and dependent pathways.  
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Dose/Source Ratios Summed Over All Pathways  
 Parent and Progeny Principal Radionuclide Contributions Indicated

OParent (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	1.000E+03	3.000E+03	1.000E+04			
U-234	U-234	1.000E+00	2.242E-02	2.233E-02	2.216E-02	2.158E-02	2.001E-02	1.536E-02	2.168E-02	1.966E-01	2.588E-06	0.000E+00			
U-234	Th-230	1.000E+00	1.071E-07	3.100E-07	7.115E-07	2.093E-06	5.844E-06	1.694E-05	3.632E-05	5.333E-05	2.029E-06	1.910E-06			

U-234	Ra-226	1.000E+00	3.626E-09	2.568E-08	1.359E-07	1.200E-06	9.679E-06	8.971E-05	5.199E-04	2.275E-03	1.624E-03	2.100E-03
U-234	Pb-210	1.000E+00	1.347E-11	1.740E-10	1.828E-09	4.297E-08	8.570E-07	1.735E-05	1.460E-04	2.936E-03	6.122E-03	7.970E-03
U-234	-DSR(j)		2.242E-02	2.233E-02	2.216E-02	2.159E-02	2.003E-02	1.548E-02	2.238E-02	2.019E-01	7.750E-03	1.007E-02
OU-235	U-235	1.000E+00	3.216E-01	3.204E-01	3.180E-01	3.097E-01	2.872E-01	2.204E-01	1.172E-01	1.929E-01	2.462E-06	0.000E+00
U-235	Pa-231	1.000E+00	3.023E-05	9.302E-05	2.176E-04	6.391E-04	1.724E-03	4.360E-03	9.551E-03	1.558E-01	6.017E-06	0.000E+00
U-235	Ac-227	1.000E+00	2.481E-07	1.591E-06	7.861E-06	6.177E-05	3.852E-04	1.781E-03	3.627E-02	4.321E-01	1.007E-05	0.000E+00
U-235	-DSR(j)		3.217E-01	3.205E-01	3.182E-01	3.104E-01	2.893E-01	2.266E-01	1.630E-01	7.808E-01	1.855E-05	0.000E+00
OU-238	U-238	1.000E+00	7.393E-02	7.365E-02	7.310E-02	7.119E-02	6.601E-02	5.067E-02	3.756E-02	1.886E-01	2.481E-06	0.000E+00
U-238	U-234	1.000E+00	3.176E-08	9.495E-08	2.199E-07	6.425E-07	1.730E-06	4.376E-06	1.848E-05	5.585E-04	2.211E-08	0.000E+00
U-238	Th-230	1.000E+00	1.049E-13	6.965E-13	3.579E-12	3.107E-11	2.481E-10	2.262E-09	1.262E-08	3.857E-08	5.851E-09	7.994E-09
U-238	Ra-226	1.000E+00	2.548E-15	3.878E-14	4.540E-13	1.187E-11	2.758E-10	8.203E-09	1.317E-07	1.810E-06	3.050E-06	5.589E-06
U-238	Pb-210	1.000E+00	8.043E-18	2.126E-16	4.759E-15	3.276E-13	1.922E-11	1.339E-09	3.628E-08	3.245E-06	1.135E-05	2.100E-05
U-238	-DSR(j)		7.393E-02	7.365E-02	7.310E-02	7.119E-02	6.601E-02	5.067E-02	3.758E-02	1.892E-01	1.691E-05	2.659E-05

\*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  $\delta$  0.5 yr) daughters.

0

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

ONuclide (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	3.000E+03	1.000E+04
U-234	1.115E+03	1.119E+03	1.128E+03	1.158E+03	1.248E+03	1.615E+03	1.117E+03	1.238E+02	3.226E+03	2.482E+03
U-235	7.772E+01	7.800E+01	7.856E+01	8.054E+01	8.643E+01	1.103E+02	1.534E+02	3.202E+01	1.348E+06	*2.160E+06
U-238	3.381E+02	3.394E+02	3.420E+02	3.512E+02	3.787E+02	4.934E+02	6.652E+02	1.321E+02	*3.360E+05	*3.360E+05

\*At specific activity limit

0

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 = 989  $\bar{n}$  2 years

ONuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
U-234	4.600E+00	991 $\bar{n}$ 2	2.083E-01	1.200E+02	2.081E-01	1.201E+02
U-235	1.520E-01	958 $\bar{n}$ 2	8.208E-01	3.046E+01	8.041E-01	3.109E+01
U-238	3.400E+00	991 $\bar{n}$ 2	1.954E-01	1.279E+02	1.953E-01	1.280E+02

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

ONuclide Parent BRF(i)

(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	3.000E+03	1.000E+04
U-234	U-234	1.000E+00	1.031E-01	1.027E-01	1.020E-01	9.929E-02	9.206E-02	7.065E-02	9.972E-02	9.044E-01	1.190E-05	0.000E+00
U-234	U-238	1.000E+00	1.080E-07	3.228E-07	7.477E-07	2.185E-06	5.884E-06	1.488E-05	6.282E-05	1.899E-03	7.516E-08	0.000E+00
U-234	-DOSE(j)		1.031E-01	1.027E-01	1.020E-01	9.929E-02	9.206E-02	7.066E-02	9.979E-02	9.063E-01	1.198E-05	0.000E+00
0Th-230	U-234	1.000E+00	4.927E-07	1.426E-06	3.273E-06	9.627E-06	2.688E-05	7.792E-05	1.671E-04	2.453E-04	9.334E-06	8.787E-06
Th-230	U-238	1.000E+00	3.565E-13	2.368E-12	1.217E-11	1.056E-10	8.435E-10	7.691E-09	4.289E-08	1.311E-07	1.990E-08	2.718E-08
Th-230	-DOSE(j)		4.927E-07	1.426E-06	3.273E-06	9.627E-06	2.688E-05	7.793E-05	1.671E-04	2.454E-04	9.354E-06	8.814E-06
ORa-226	U-234	1.000E+00	1.668E-08	1.181E-07	6.253E-07	5.522E-06	4.452E-05	4.127E-04	2.391E-03	1.047E-02	7.469E-03	9.658E-03
Ra-226	U-238	1.000E+00	8.665E-15	1.319E-13	1.544E-12	4.037E-11	9.377E-10	2.789E-08	4.477E-07	6.155E-06	1.037E-05	1.900E-05
Ra-226	-DOSE(j)		1.668E-08	1.181E-07	6.253E-07	5.522E-06	4.452E-05	4.127E-04	2.392E-03	1.047E-02	7.479E-03	9.677E-03
OPb-210	U-234	1.000E+00	6.196E-11	8.004E-10	8.410E-09	1.977E-07	3.942E-06	7.981E-05	6.718E-04	1.351E-02	2.816E-02	3.666E-02
Pb-210	U-238	1.000E+00	2.734E-17	7.227E-16	1.618E-14	1.114E-12	6.534E-11	4.551E-09	1.234E-07	1.103E-05	3.858E-05	7.139E-05
Pb-210	-DOSE(j)		6.196E-11	8.004E-10	8.410E-09	1.977E-07	3.942E-06	7.981E-05	6.719E-04	1.352E-02	2.820E-02	3.673E-02
OU-235	U-235	1.000E+00	4.889E-02	4.870E-02	4.834E-02	4.707E-02	4.365E-02	3.350E-02	1.781E-02	2.932E-02	3.743E-07	0.000E+00
OPa-231	U-235	1.000E+00	4.595E-06	1.414E-05	3.308E-05	9.715E-05	2.620E-04	6.627E-04	1.452E-03	2.369E-02	9.146E-07	0.000E+00
OAc-227	U-235	1.000E+00	3.771E-08	2.418E-07	1.195E-06	9.389E-06	5.855E-05	2.707E-04	5.512E-03	6.568E-02	1.531E-06	0.000E+00
OU-238	U-238	1.000E+00	2.514E-01	2.504E-01	2.485E-01	2.420E-01	2.244E-01	1.723E-01	1.277E-01	6.413E-01	8.435E-06	0.000E+00

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

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Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

ONuclide	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	1.000E+03	3.000E+03	1.000E+04
U-234	U-234	1.000E+00	4.600E+00	4.583E+00	4.548E+00	4.429E+00	4.107E+00	3.152E+00	1.479E+00	1.048E-01	5.446E-05	1.740E-16
U-234	U-238	1.000E+00	0.000E+00	9.602E-06	2.859E-05	9.281E-05	2.582E-04	6.605E-04	9.304E-04	2.200E-04	3.438E-07	3.697E-18
U-234	-S(j):		4.600E+00	4.583E+00	4.548E+00	4.429E+00	4.107E+00	3.152E+00	1.480E+00	1.051E-01	5.480E-05	1.777E-16
0Th-230	U-234	1.000E+00	0.000E+00	4.133E-05	1.235E-04	4.063E-04	1.174E-03	3.446E-03	7.413E-03	1.060E-02	1.059E-02	9.727E-03
Th-230	U-238	1.000E+00	0.000E+00	4.327E-11	3.875E-10	4.230E-09	3.621E-08	3.384E-07	1.900E-06	5.373E-06	5.892E-06	5.412E-06
Th-230	-S(j):		0.000E+00	4.133E-05	1.235E-04	4.063E-04	1.174E-03	3.446E-03	7.415E-03	1.061E-02	1.060E-02	9.733E-03
ORa-226	U-234	1.000E+00	0.000E+00	8.949E-09	8.017E-08	8.765E-07	7.534E-06	7.144E-05	4.167E-04	1.286E-03	1.468E-03	1.349E-03
Ra-226	U-238	1.000E+00	0.000E+00	6.248E-15	1.678E-13	6.100E-12	1.561E-10	4.805E-09	7.754E-08	5.729E-07	8.157E-07	7.505E-07
Ra-226	-S(j):		0.000E+00	8.949E-09	8.017E-08	8.765E-07	7.535E-06	7.144E-05	4.167E-04	1.287E-03	1.469E-03	1.350E-03
OPb-210	U-234	1.000E+00	0.000E+00	9.201E-11	2.436E-09	8.426E-08	1.889E-06	3.983E-05	3.388E-04	1.195E-03	1.384E-03	1.272E-03
Pb-210	U-238	1.000E+00	0.000E+00	4.826E-17	3.842E-15	4.466E-13	3.066E-11	2.257E-09	5.823E-08	5.241E-07	7.690E-07	7.076E-07
Pb-210	-S(j):		0.000E+00	9.201E-11	2.436E-09	8.426E-08	1.889E-06	3.983E-05	3.388E-04	1.196E-03	1.385E-03	1.273E-03
OU-235	U-235	1.000E+00	1.520E-01	1.514E-01	1.503E-01	1.464E-01	1.357E-01	1.042E-01	4.893E-02	3.474E-03	1.815E-06	5.913E-18
OPa-231	U-235	1.000E+00	0.000E+00	3.204E-06	9.539E-06	3.096E-05	8.611E-05	2.202E-04	3.096E-04	7.273E-05	1.116E-07	1.128E-18
OAc-227	U-235	1.000E+00	0.000E+00	5.037E-08	4.389E-07	4.368E-06	2.924E-05	1.384E-04	2.399E-04	6.023E-05	9.412E-08	9.568E-19
OU-238	U-238	1.000E+00	3.400E+00	3.387E+00	3.362E+00	3.274E+00	3.036E+00	2.330E+00	1.094E+00	7.771E-02	4.060E-05	1.323E-16

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

0RESALC.EXE execution time = 15.38 seconds

## D-2 RISK ASSESSMENT OUTPUT FROM RESRAD

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Cancer Risk Slope Factors Summary Table  
 Risk Library: FGR 13 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
Sf-1	Ground external radiation slope factors, 1/yr per (pCi/g):			
Sf-1	Ac-227+D	1.47E-06	1.47E-06	SLPF( 1,1)
Sf-1	Pa-231	1.39E-07	1.39E-07	SLPF( 2,1)
Sf-1	Pb-210+D	4.21E-09	4.21E-09	SLPF( 3,1)
Sf-1	Ra-226+D	8.49E-06	8.49E-06	SLPF( 4,1)
Sf-1	Th-230	8.18E-10	8.18E-10	SLPF( 5,1)
Sf-1	U-234	2.52E-10	2.52E-10	SLPF( 6,1)
Sf-1	U-235+D	5.43E-07	5.43E-07	SLPF( 7,1)
Sf-1	U-238+D	8.66E-08	8.66E-08	SLPF( 8,1)
Sf-2	Inhalation, slope factors, 1/(pCi):			

Sf-2	Ac-227+D	2.13E-07	2.13E-07	SLPF( 1,2)
Sf-2	Pa-231	7.62E-08	7.62E-08	SLPF( 2,2)
Sf-2	Pb-210+D	3.08E-08	3.08E-08	SLPF( 3,2)
Sf-2	Ra-226+D	2.82E-08	2.82E-08	SLPF( 4,2)
Sf-2	Th-230	3.40E-08	3.40E-08	SLPF( 5,2)
Sf-2	U-234	2.78E-08	2.78E-08	SLPF( 6,2)
Sf-2	U-235+D	2.50E-08	2.50E-08	SLPF( 7,2)
Sf-2	U-238+D	2.36E-08	2.36E-08	SLPF( 8,2)
Sf-3	Food ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.51E-10	6.51E-10	SLPF( 1,3)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF( 2,3)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF( 3,3)
Sf-3	Ra-226+D	5.14E-10	5.14E-10	SLPF( 4,3)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF( 5,3)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF( 6,3)
Sf-3	U-235+D	9.73E-11	9.73E-11	SLPF( 7,3)
Sf-3	U-238+D	1.20E-10	1.20E-10	SLPF( 8,3)
Sf-3	Water ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	4.85E-10	4.85E-10	SLPF( 1,4)
Sf-3	Pa-231	1.73E-10	1.73E-10	SLPF( 2,4)
Sf-3	Pb-210+D	2.66E-09	2.66E-09	SLPF( 3,4)
Sf-3	Ra-226+D	3.85E-10	3.85E-10	SLPF( 4,4)
Sf-3	Th-230	9.10E-11	9.10E-11	SLPF( 5,4)
Sf-3	U-234	7.07E-11	7.07E-11	SLPF( 6,4)
Sf-3	U-235+D	7.18E-11	7.18E-11	SLPF( 7,4)
Sf-3	U-238+D	8.73E-11	8.73E-11	SLPF( 8,4)
Sf-3	Soil ingestion, slope factors, 1/(pCi):			
Sf-3	Ac-227+D	6.51E-10	6.51E-10	SLPF( 1,5)
Sf-3	Pa-231	2.26E-10	2.26E-10	SLPF( 2,5)
Sf-3	Pb-210+D	3.44E-09	3.44E-09	SLPF( 3,5)
Sf-3	Ra-226+D	5.14E-10	5.14E-10	SLPF( 4,5)
Sf-3	Th-230	1.19E-10	1.19E-10	SLPF( 5,5)
Sf-3	U-234	9.55E-11	9.55E-11	SLPF( 6,5)
Sf-3	U-235+D	9.73E-11	9.73E-11	SLPF( 7,5)
Sf-3	U-238+D	1.20E-10	1.20E-10	SLPF( 8,5)

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Cancer Risk Slope Factors Summary Table (continued)  
 Risk Library: FGR 13 Morbidity

0	Menu	Parameter	Current Value	Default	Parameter Name
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Sf-Rn   Radon Inhalation slope factors, 1/(pCi):			
Sf-Rn   Rn-222	1.80E-12	1.80E-12	SLPFRN (1,1)
Sf-Rn   Po-218	3.70E-12	3.70E-12	SLPFRN (1,2)
Sf-Rn   Pb-214	6.20E-12	6.20E-12	SLPFRN (1,3)
Sf-Rn   Bi-214	1.50E-11	1.50E-11	SLPFRN (1,4)
Sf-Rn   Radon K factors, (mrem/WLM):			
Sf-Rn   Rn-222 Indoor	7.60E+02	7.60E+02	KFACTR (1,1)
Sf-Rn   Rn-222 Outdoor	5.70E+02	5.70E+02	KFACTR (1,2)

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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 As pCi/yr at t= 0.000E+00 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-226	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-234	4.500E-02	3.002E+02	9.904E-01	2.428E+00	3.778E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	1.487E-03	9.919E+00	3.273E-02	8.024E-02	1.248E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.414E+02
U-238	3.326E-02	2.219E+02	7.320E-01	1.795E+00	2.792E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.128E+01
											2.523E+02

\* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil  
 and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of  
 Radon and its Decay Products as pCi/yr at t= 0.000E+00 years

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent      Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)



and Fraction of Total Risk at t= 0.000E+00 years  
 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.884E-10	0.0000	6.821E-13	0.0000	1.410E-11	0.0000	1.115E-14	0.0000	3.789E-15	0.0000	1.750E-12	0.0000
Pa-231	7.377E-11	0.0000	1.000E-12	0.0000	7.905E-11	0.0000	1.681E-12	0.0000	2.218E-15	0.0000	2.491E-12	0.0000
Pb-210	2.513E-14	0.0000	4.511E-15	0.0000	1.367E-11	0.0000	4.843E-14	0.0000	2.315E-14	0.0000	4.230E-13	0.0000
Ra-226	2.509E-10	0.0000	2.115E-14	0.0000	4.100E-11	0.0000	1.181E-13	0.0000	1.454E-13	0.0000	3.236E-13	0.0000
Th-230	5.902E-12	0.0000	5.969E-12	0.0000	5.594E-11	0.0000	1.159E-13	0.0000	8.372E-15	0.0000	1.754E-11	0.0000
U-234	1.331E-08	0.0022	3.548E-08	0.0059	8.132E-07	0.1345	2.683E-09	0.0004	6.578E-09	0.0011	1.023E-07	0.0169
U-235	9.315E-07	0.1540	1.054E-09	0.0002	2.738E-08	0.0045	9.034E-11	0.0000	2.215E-10	0.0000	3.445E-09	0.0006
U-238	3.228E-06	0.5338	2.226E-08	0.0037	7.552E-07	0.1249	2.492E-09	0.0004	6.109E-09	0.0010	9.503E-08	0.0157
Total	4.173E-06	0.6901	5.880E-08	0.0097	1.596E-06	0.2639	5.268E-09	0.0009	1.291E-08	0.0021	2.008E-07	0.0332

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	2.050E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.580E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.420E-11	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.925E-10	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	8.547E-11	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	9.736E-07	0.1610
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	9.636E-07	0.1594
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	4.109E-06	0.6795
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	6.047E-06	1.0000

\*\* Sum of water independent ground, inhalation, plant, meat, milk, soil  
 and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of  
 Radon and its Decay Products at t= 0.000E+00 years  
 Radionuclides

Radon

Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent      Water-dep. == Water-dependent  
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Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 0.000E+00 years  
 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
U-234	1.357E-08	0.0022	3.548E-08	0.0059	0.000E+00	0.0000	8.133E-07	0.1345	2.683E-09	0.0004	6.578E-09	0.0011	1.023E-07	0.0169
U-235	9.317E-07	0.1541	1.056E-09	0.0002	0.000E+00	0.0000	2.747E-08	0.0045	9.203E-11	0.0000	2.215E-10	0.0000	3.449E-09	0.0006
U-238	3.228E-06	0.5338	2.226E-08	0.0037	0.000E+00	0.0000	7.553E-07	0.1249	2.492E-09	0.0004	6.110E-09	0.0010	9.504E-08	0.0157
Total	4.173E-06	0.6901	5.880E-08	0.0097	0.000E+00	0.0000	1.596E-06	0.2639	5.268E-09	0.0009	1.291E-08	0.0021	2.008E-07	0.0332

Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
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	9.739E-07	0.1611
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.640E-07	0.1594
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.109E-06	0.6795
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	6.047E-06	1.0000

\*\*\*CNRSI(i,p,t) includes contribution from decay daughter radionuclides  
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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 As pCi/yr at t= 1.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	4.927E-10	3.970E-06	2.847E-08	1.009E-09	4.136E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.413E-06
Pa-231	3.134E-08	8.141E-04	1.598E-05	2.666E-08	2.631E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.564E-04
Pb-210	9.001E-13	3.109E-08	1.364E-10	5.905E-11	7.556E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.205E-08
Ra-226	8.754E-11	8.712E-06	1.952E-08	2.708E-08	7.349E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.832E-06
Th-230	4.043E-07	1.136E-03	2.633E-06	2.204E-07	3.394E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.479E-03
U-234	4.483E-02	2.991E+02	9.870E-01	2.419E+00	3.763E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.401E+02
U-235	1.481E-03	9.883E+00	3.261E-02	7.995E-02	1.244E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.124E+01
U-238	3.313E-02	2.211E+02	7.295E-01	1.788E+00	2.782E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.514E+02

\* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of Radon and its Decay Products as pCi/yr at t= 1.000E+00 years  
Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent      Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.057E-10	0.0000	7.445E-13	0.0000	1.539E-11	0.0000	1.193E-14	0.0000	4.135E-15	0.0000	1.910E-12	0.0000
Pa-231	7.849E-11	0.0000	1.064E-12	0.0000	8.410E-11	0.0000	1.788E-12	0.0000	2.361E-15	0.0000	2.650E-12	0.0000
Pb-210	2.845E-14	0.0000	5.107E-15	0.0000	1.547E-11	0.0000	5.475E-14	0.0000	2.618E-14	0.0000	4.788E-13	0.0000
Ra-226	2.764E-10	0.0000	2.329E-14	0.0000	4.516E-11	0.0000	1.301E-13	0.0000	1.602E-13	0.0000	3.564E-13	0.0000
Th-230	6.287E-12	0.0000	6.359E-12	0.0000	5.959E-11	0.0000	1.235E-13	0.0000	8.923E-15	0.0000	1.868E-11	0.0000
U-234	1.326E-08	0.0022	3.535E-08	0.0059	8.101E-07	0.1345	2.673E-09	0.0004	6.553E-09	0.0011	1.019E-07	0.0169
U-235	9.279E-07	0.1540	1.050E-09	0.0002	2.727E-08	0.0045	9.000E-11	0.0000	2.206E-10	0.0000	3.432E-09	0.0006
U-238	3.216E-06	0.5338	2.218E-08	0.0037	7.524E-07	0.1249	2.483E-09	0.0004	6.086E-09	0.0010	9.467E-08	0.0157
Total	4.157E-06	0.6901	5.858E-08	0.0097	1.590E-06	0.2639	5.248E-09	0.0009	1.286E-08	0.0021	2.001E-07	0.0332

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	2.237E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.681E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.606E-11	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.222E-10	0.0001
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	9.106E-11	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	9.699E-07	0.1610
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	9.600E-07	0.1594
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	4.093E-06	0.6795
===== 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	6.024E-06	1.0000

\*\* Sum of water independent ground, inhalation, plant, meat, milk, soil  
 and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of  
 Radon and its Decay Products at t= 1.000E+00 years  
 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
===== Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 1.000E+00 years  
 Water Independent Pathways (Inhalation excludes radon)

Ground	Inhalation	Radon	Plant	Meat	Milk	Soil
--------	------------	-------	-------	------	------	------

Radio-Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
U-234	1.354E-08	0.0022	3.535E-08	0.0059	0.000E+00	0.0000	8.102E-07	0.1345	2.673E-09	0.0004	6.553E-09	0.0011	1.020E-07	0.0169
U-235	9.282E-07	0.1541	1.052E-09	0.0002	0.000E+00	0.0000	2.737E-08	0.0045	9.180E-11	0.0000	2.206E-10	0.0000	3.436E-09	0.0006
U-238	3.216E-06	0.5338	2.218E-08	0.0037	0.000E+00	0.0000	7.524E-07	0.1249	2.483E-09	0.0004	6.087E-09	0.0010	9.468E-08	0.0157
Total	4.157E-06	0.6901	5.858E-08	0.0097	0.000E+00	0.0000	1.590E-06	0.2639	5.248E-09	0.0009	1.286E-08	0.0021	2.001E-07	0.0332

Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 1.000E+00 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
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	9.703E-07	0.1611
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.604E-07	0.1594
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.093E-06	0.6795
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	6.024E-06	1.0000

\*\*\*CNRSI(i,p,t) includes contribution from decay daughter radionuclides  
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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p) As pCi/yr at t= 3.000E+00 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*	
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk		
Ac-227	4.294E-09	3.074E-05	9.507E-08	8.125E-09	3.605E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.444E-05
Pa-231	9.332E-08	2.468E-03	5.134E-05	7.255E-08	7.834E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.598E-03
Pb-210	2.383E-11	7.030E-07	2.839E-09	1.269E-09	2.000E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.271E-07
Ra-226	7.842E-10	8.179E-05	2.195E-07	2.792E-07	6.584E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.294E-05
Th-230	1.208E-06	3.282E-03	7.042E-06	5.347E-07	1.014E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.304E-03
U-234	4.449E-02	2.968E+02	9.795E-01	2.401E+00	3.735E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.376E+02
U-235	1.470E-03	9.809E+00	3.237E-02	7.935E-02	1.234E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.115E+01
U-238	3.289E-02	2.194E+02	7.240E-01	1.775E+00	2.761E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.495E+02

\* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of Radon and its Decay Products as pCi/yr at t= 3.000E+00 years

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent      Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 3.000E+00 years

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.427E-10	0.0000	8.784E-13	0.0000	1.815E-11	0.0000	1.354E-14	0.0000	4.876E-15	0.0000	2.254E-12	0.0000
Pa-231	8.781E-11	0.0000	1.191E-12	0.0000	9.410E-11	0.0000	2.002E-12	0.0000	2.638E-15	0.0000	2.965E-12	0.0000
Pb-210	3.601E-14	0.0000	6.464E-15	0.0000	1.956E-11	0.0000	6.913E-14	0.0000	3.308E-14	0.0000	6.061E-13	0.0000
Ra-226	3.320E-10	0.0001	2.798E-14	0.0000	5.426E-11	0.0000	1.565E-13	0.0000	1.925E-13	0.0000	4.282E-13	0.0000
Th-230	7.054E-12	0.0000	7.134E-12	0.0000	6.683E-11	0.0000	1.384E-13	0.0000	9.984E-15	0.0000	2.096E-11	0.0000
U-234	1.316E-08	0.0022	3.508E-08	0.0059	8.040E-07	0.1345	2.653E-09	0.0004	6.504E-09	0.0011	1.012E-07	0.0169
U-235	9.210E-07	0.1540	1.042E-09	0.0002	2.707E-08	0.0045	8.932E-11	0.0000	2.190E-10	0.0000	3.406E-09	0.0006
U-238	3.191E-06	0.5338	2.201E-08	0.0037	7.467E-07	0.1249	2.464E-09	0.0004	6.041E-09	0.0010	9.396E-08	0.0157
Total	4.126E-06	0.6901	5.814E-08	0.0097	1.578E-06	0.2639	5.209E-09	0.0009	1.276E-08	0.0021	1.986E-07	0.0332

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 3.000E+00 years

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	2.640E-10	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.881E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.032E-11	0.0000

Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.871E-10	0.0001
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	1.021E-10	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	9.626E-07	0.1610
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	9.528E-07	0.1594
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	4.063E-06	0.6795
===== 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	5.979E-06	1.0000

\*\* Sum of water independent ground, inhalation, plant, meat, milk, soil  
and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of  
Radon and its Decay Products at t= 3.000E+00 years  
Radionuclides

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
===== Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent      Water-dep. == Water-dependent

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Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p)  
and Fraction of Total Risk at t= 3.000E+00 years

0

Water Independent Pathways (Inhalation excludes radon)

0

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
U-234	1.350E-08	0.0023	3.509E-08	0.0059	0.000E+00	0.0000	8.041E-07	0.1345	2.653E-09	0.0004	6.504E-09	0.0011	1.012E-07	0.0169
U-235	9.213E-07	0.1541	1.044E-09	0.0002	0.000E+00	0.0000	2.718E-08	0.0045	9.134E-11	0.0000	2.190E-10	0.0000	3.411E-09	0.0006
U-238	3.191E-06	0.5338	2.201E-08	0.0037	0.000E+00	0.0000	7.468E-07	0.1249	2.464E-09	0.0004	6.041E-09	0.0010	9.397E-08	0.0157
===== Total	4.126E-06	0.6901	5.814E-08	0.0097	0.000E+00	0.0000	1.578E-06	0.2639	5.209E-09	0.0009	1.276E-08	0.0021	1.986E-07	0.0332

0

Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p)  
and Fraction of Total Risk at t= 3.000E+00 years

Water Dependent Pathways

Radio-	Water	Fish	Radon	Plant	Meat	Milk	All pathways
--------	-------	------	-------	-------	------	------	--------------

Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
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	9.631E-07	0.1611
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.532E-07	0.1594
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.063E-06	0.6795
===== 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	5.979E-06	1.0000

\*\*\*CNRSI(i,p,t) includes contribution from decay daughter radionuclides  
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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 As pCi/yr at t= 1.000E+01 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	4.273E-08	2.919E-04	3.535E-07	7.821E-08	3.587E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.282E-04
Pa-231	3.029E-07	8.062E-03	1.709E-04	2.277E-07	2.543E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.487E-03
Pb-210	8.242E-10	2.274E-05	8.322E-08	3.910E-08	6.920E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.356E-05
Ra-226	8.574E-09	9.088E-04	2.586E-06	3.201E-06	7.198E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.218E-04
Th-230	3.975E-06	1.066E-02	2.221E-05	1.616E-06	3.337E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.403E-02
U-234	4.333E-02	2.891E+02	9.540E-01	2.339E+00	3.638E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.288E+02
U-235	1.432E-03	9.553E+00	3.152E-02	7.728E-02	1.202E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.086E+01
U-238	3.203E-02	2.137E+02	7.051E-01	1.729E+00	2.689E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.430E+02
===== Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.430E+02

\* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil  
 and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of  
 Radon and its Decay Products as pCi/yr at t= 1.000E+01 years  
 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
===== Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 1.000E+01 years



0  
0

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	3.936E-10	0.0001	1.425E-12	0.0000	2.937E-11	0.0000	1.933E-14	0.0000	7.897E-15	0.0000	3.656E-12	0.0000
Pa-231	1.193E-10	0.0000	1.618E-12	0.0000	1.279E-10	0.0000	2.724E-12	0.0000	3.576E-15	0.0000	4.028E-12	0.0000
Pb-210	7.363E-14	0.0000	1.322E-14	0.0000	3.991E-11	0.0000	1.403E-13	0.0000	6.733E-14	0.0000	1.239E-12	0.0000
Ra-226	5.750E-10	0.0001	4.847E-14	0.0000	9.405E-11	0.0000	2.718E-13	0.0000	3.341E-13	0.0000	7.416E-13	0.0000
Th-230	9.691E-12	0.0000	9.802E-12	0.0000	9.175E-11	0.0000	1.896E-13	0.0000	1.363E-14	0.0000	2.880E-11	0.0000
U-234	1.282E-08	0.0022	3.416E-08	0.0059	7.830E-07	0.1345	2.584E-09	0.0004	6.334E-09	0.0011	9.853E-08	0.0169
U-235	8.969E-07	0.1540	1.015E-09	0.0002	2.636E-08	0.0045	8.699E-11	0.0000	2.133E-10	0.0000	3.317E-09	0.0006
U-238	3.108E-06	0.5337	2.144E-08	0.0037	7.273E-07	0.1249	2.400E-09	0.0004	5.883E-09	0.0010	9.151E-08	0.0157
Total	4.019E-06	0.6901	5.663E-08	0.0097	1.537E-06	0.2639	5.074E-09	0.0009	1.243E-08	0.0021	1.934E-07	0.0332

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	4.281E-10	0.0001
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.556E-10	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.144E-11	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.705E-10	0.0001
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	1.402E-10	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	9.375E-07	0.1610
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	9.279E-07	0.1593
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	3.956E-06	0.6794
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	5.823E-06	1.0000

\*\* Sum of water independent ground, inhalation, plant, meat, milk, soil  
 and water dependent water, fish, plant, meat, milk pathways

0  
0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of  
 Radon and its Decay Products at t= 1.000E+01 years  
 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
------------------	--------	--------	--------	--------	--------	--------	--------	--------

Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent    Water-dep. == Water-dependent  
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Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 1.000E+01 years

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
U-234	1.340E-08	0.0023	3.417E-08	0.0059	0.000E+00	0.0000	7.832E-07	0.1345	2.584E-09	0.0004	6.334E-09	0.0011	9.855E-08	0.0169
U-235	8.974E-07	0.1541	1.018E-09	0.0002	0.000E+00	0.0000	2.652E-08	0.0046	8.973E-11	0.0000	2.133E-10	0.0000	3.325E-09	0.0006
U-238	3.108E-06	0.5337	2.144E-08	0.0037	0.000E+00	0.0000	7.273E-07	0.1249	2.400E-09	0.0004	5.883E-09	0.0010	9.151E-08	0.0157
Total	4.019E-06	0.6901	5.663E-08	0.0097	0.000E+00	0.0000	1.537E-06	0.2639	5.074E-09	0.0009	1.243E-08	0.0021	1.934E-07	0.0332

Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 1.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
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	9.383E-07	0.1611
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.286E-07	0.1595
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	3.957E-06	0.6794
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	5.823E-06	1.0000

\*\*\*CNRSI(i,p,t) includes contribution from decay daughter radionuclides  
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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p) As pCi/yr at t= 3.000E+01 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	2.860E-07	1.928E-03	1.206E-06	5.184E-07	2.401E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.170E-03
Pa-231	8.424E-07	2.246E-02	4.787E-04	6.272E-07	7.072E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.365E-02
Pb-210	1.848E-08	4.995E-04	1.756E-06	8.428E-07	1.551E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.176E-04
Ra-226	7.371E-08	7.849E-03	2.270E-05	2.789E-05	6.188E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.961E-03
Th-230	1.149E-05	3.071E-02	6.341E-05	4.553E-06	9.643E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.042E-02
U-234	4.018E-02	2.680E+02	8.845E-01	2.168E+00	3.373E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.048E+02
U-235	1.328E-03	8.857E+00	2.923E-02	7.165E-02	1.115E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.007E+01
U-238	2.970E-02	1.981E+02	6.538E-01	1.603E+00	2.493E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.253E+02

\* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of Radon and its Decay Products as pCi/yr at t= 3.000E+01 years

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent      Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 3.000E+01 years

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	9.277E-10	0.0002	3.358E-12	0.0000	6.902E-11	0.0000	3.630E-14	0.0000	1.857E-14	0.0000	8.617E-12	0.0000
Pa-231	2.001E-10	0.0000	2.713E-12	0.0000	2.146E-10	0.0000	4.578E-12	0.0000	5.982E-15	0.0000	6.756E-12	0.0000
Pb-210	3.017E-13	0.0000	5.415E-14	0.0000	1.629E-10	0.0000	5.682E-13	0.0000	2.738E-13	0.0000	5.077E-12	0.0000
Ra-226	1.656E-09	0.0003	1.396E-13	0.0000	2.712E-10	0.0001	7.865E-13	0.0000	9.652E-13	0.0000	2.136E-12	0.0000
Th-230	1.685E-11	0.0000	1.704E-11	0.0000	1.594E-10	0.0000	3.286E-13	0.0000	2.354E-14	0.0000	5.008E-11	0.0000
U-234	1.189E-08	0.0022	3.168E-08	0.0059	7.260E-07	0.1344	2.396E-09	0.0004	5.873E-09	0.0011	9.135E-08	0.0169
U-235	8.316E-07	0.1540	9.413E-10	0.0002	2.444E-08	0.0045	8.066E-11	0.0000	1.977E-10	0.0000	3.076E-09	0.0006
U-238	2.882E-06	0.5335	1.988E-08	0.0037	6.743E-07	0.1248	2.225E-09	0.0004	5.455E-09	0.0010	8.485E-08	0.0157
Total	3.728E-06	0.6902	5.252E-08	0.0097	1.426E-06	0.2639	4.708E-09	0.0009	1.153E-08	0.0021	1.794E-07	0.0332

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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	1.009E-09	0.0002
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.288E-10	0.0001
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.692E-10	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.931E-09	0.0004
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	2.437E-10	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	8.692E-07	0.1609
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	8.604E-07	0.1593
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	3.669E-06	0.6791
===== 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	5.402E-06	1.0000

\*\* Sum of water independent ground, inhalation, plant, meat, milk, soil  
 and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of  
 Radon and its Decay Products at t= 3.000E+01 years  
 Radionuclides

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
===== Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent      Water-dep. == Water-dependent

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Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 3.000E+01 years

0

Radio-	Water Independent Pathways (Inhalation excludes radon)						
	Ground	Inhalation	Radon	Plant	Meat	Milk	Soil

Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
U-234	1.356E-08	0.0025	3.169E-08	0.0059	0.000E+00	0.0000	7.265E-07	0.1345	2.397E-09	0.0004	5.874E-09	0.0011	9.140E-08	0.0169
U-235	8.328E-07	0.1542	9.474E-10	0.0002	0.000E+00	0.0000	2.473E-08	0.0046	8.527E-11	0.0000	1.978E-10	0.0000	3.091E-09	0.0006
U-238	2.882E-06	0.5335	1.988E-08	0.0037	0.000E+00	0.0000	6.744E-07	0.1248	2.225E-09	0.0004	5.455E-09	0.0010	8.486E-08	0.0157
===== Total	3.728E-06	0.6902	5.252E-08	0.0097	0.000E+00	0.0000	1.426E-06	0.2639	4.708E-09	0.0009	1.153E-08	0.0021	1.794E-07	0.0332

Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 3.000E+01 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.715E-07	0.1613
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.618E-07	0.1595
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	3.669E-06	0.6791
===== 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	5.402E-06	1.0000

\*\*\*CNRSI(i,p,t) includes contribution from decay daughter radionuclides  
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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p) As pCi/yr at t= 1.000E+02 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	1.354E-06	9.086E-03	3.895E-06	2.447E-06	1.137E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.023E-02
Pa-231	2.154E-06	5.746E-02	1.227E-03	1.598E-06	1.808E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.050E-02
Pb-210	3.896E-07	1.046E-02	3.622E-05	1.752E-05	3.271E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.084E-02
Ra-226	6.989E-07	7.454E-02	2.168E-04	2.657E-04	5.867E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.561E-02
Th-230	3.371E-05	9.001E-02	1.853E-04	1.324E-05	2.830E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.185E-01
U-234	3.084E-02	2.057E+02	6.789E-01	1.664E+00	2.589E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.340E+02
U-235	1.019E-03	6.799E+00	2.244E-02	5.500E-02	8.555E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.732E+00
U-238	2.279E-02	1.521E+02	5.018E-01	1.230E+00	1.914E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.729E+02
===== Total											

\* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of  
 Radon and its Decay Products as pCi/yr at t= 1.000E+02 years  
 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent      Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	2.702E-09	0.0006	9.782E-12	0.0000	2.005E-10	0.0000	8.407E-14	0.0000	5.400E-14	0.0000	2.510E-11	0.0000
Pa-231	3.937E-10	0.0001	5.339E-12	0.0000	4.225E-10	0.0001	9.022E-12	0.0000	1.175E-14	0.0000	1.329E-11	0.0000
Pb-210	2.760E-12	0.0000	4.954E-13	0.0000	1.484E-09	0.0004	5.137E-12	0.0000	2.486E-12	0.0000	4.645E-11	0.0000
Ra-226	8.999E-09	0.0022	7.584E-13	0.0000	1.475E-09	0.0004	4.290E-12	0.0000	5.257E-12	0.0000	1.161E-11	0.0000
Th-230	3.804E-11	0.0000	3.847E-11	0.0000	3.595E-10	0.0001	7.399E-13	0.0000	5.286E-14	0.0000	1.130E-10	0.0000
U-234	9.122E-09	0.0022	2.431E-08	0.0058	5.573E-07	0.1340	1.839E-09	0.0004	4.508E-09	0.0011	7.012E-08	0.0169
U-235	6.384E-07	0.1535	7.225E-10	0.0002	1.876E-08	0.0045	6.191E-11	0.0000	1.518E-10	0.0000	2.361E-09	0.0006
U-238	2.212E-06	0.5318	1.526E-08	0.0037	5.176E-07	0.1244	1.708E-09	0.0004	4.187E-09	0.0010	6.513E-08	0.0157
Total	2.872E-06	0.6903	4.035E-08	0.0097	1.098E-06	0.2638	3.628E-09	0.0009	8.855E-09	0.0021	1.378E-07	0.0331

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.148E-13	0.0000	0.000E+00	0.0000	1.011E-14	0.0000	2.703E-18	0.0000	5.946E-18	0.0000	2.938E-09	0.0007
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	8.438E-10	0.0002
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.542E-09	0.0004
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	1.049E-08	0.0025

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	5.498E-10	0.0001
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	6.672E-07	0.1604
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	6.604E-07	0.1588
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	2.816E-06	0.6769
===== Total	5.148E-13	0.0000	0.000E+00	0.0000	1.011E-14	0.0000	2.703E-18	0.0000	5.946E-18	0.0000	4.160E-06	1.0000

\*\* Sum of water independent ground, inhalation, plant, meat, milk, soil and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of Radon and its Decay Products at t= 1.000E+02 years  
Radionuclides

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
===== Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent      Water-dep. == Water-dependent  
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Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 1.000E+02 years

0

0

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
U-234	1.816E-08	0.0044	2.435E-08	0.0059	0.000E+00	0.0000	5.604E-07	0.1347	1.849E-09	0.0004	4.515E-09	0.0011	7.027E-08	0.0169
U-235	6.414E-07	0.1542	7.377E-10	0.0002	0.000E+00	0.0000	1.939E-08	0.0047	7.102E-11	0.0000	1.518E-10	0.0000	2.399E-09	0.0006
U-238	2.212E-06	0.5318	1.526E-08	0.0037	0.000E+00	0.0000	5.177E-07	0.1245	1.708E-09	0.0004	4.188E-09	0.0010	6.515E-08	0.0157
===== Total	2.872E-06	0.6903	4.035E-08	0.0097	0.000E+00	0.0000	1.098E-06	0.2638	3.628E-09	0.0009	8.855E-09	0.0021	1.378E-07	0.0331

0

Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 1.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.

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	6.796E-07	0.1634
U-235	5.148E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.011E-14	0.0000	2.703E-18	0.0000	5.946E-18	0.0000	6.642E-07	0.1597
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	2.816E-06	0.6770
Total	5.148E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.011E-14	0.0000	2.703E-18	0.0000	5.946E-18	0.0000	4.160E-06	1.0000

\*\*\*CNRSI(i,p,t) includes contribution from decay daughter radionuclides  
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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 As pCi/yr at t= 3.000E+02 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	2.347E-06	1.573E-02	6.053E-06	4.237E-06	1.970E-03	3.330E-01	0.000E+00	4.896E-03	1.419E-06	2.892E-06	3.556E-01
Pa-231	3.028E-06	8.081E-02	1.726E-03	2.245E-06	2.542E-03	4.713E-02	0.000E+00	6.939E-04	4.719E-05	1.023E-07	1.329E-01
Pb-210	3.315E-06	8.881E-02	3.063E-04	1.485E-04	2.783E-03	1.424E-05	0.000E+00	2.108E-07	2.300E-09	1.877E-09	9.206E-02
Ra-226	4.077E-06	4.350E-01	1.267E-03	1.552E-03	3.423E-03	9.186E-05	0.000E+00	1.362E-06	1.821E-08	3.962E-08	4.413E-01
Th-230	7.253E-05	1.936E-01	3.982E-04	2.842E-05	6.089E-02	1.899E-05	0.000E+00	1.107E-06	1.155E-08	1.700E-09	2.549E-01
U-234	1.448E-02	9.662E+01	3.188E-01	7.816E-01	1.216E+01	2.254E+02	0.000E+00	3.312E+00	1.535E-02	5.866E-02	3.386E+02
U-235	4.786E-04	3.193E+00	1.054E-02	2.583E-02	4.018E-01	7.448E+00	0.000E+00	1.095E-01	5.072E-04	1.939E-03	1.119E+01
U-238	1.071E-02	7.143E+01	2.357E-01	5.778E-01	8.988E+00	1.666E+02	0.000E+00	2.448E+00	1.134E-02	4.337E-02	2.503E+02

\* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil  
 and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of  
 Radon and its Decay Products as pCi/yr at t= 3.000E+02 years

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 3.000E+02 years  
 Water Independent Pathways (Inhalation excludes radon)



Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	4.127E-09	0.0011	1.494E-11	0.0000	3.060E-10	0.0001	1.175E-13	0.0000	8.242E-14	0.0000	3.833E-11	0.0000
Pa-231	5.062E-10	0.0001	6.865E-12	0.0000	5.433E-10	0.0001	1.161E-11	0.0000	1.509E-14	0.0000	1.709E-11	0.0000
Pb-210	1.841E-11	0.0000	3.305E-12	0.0000	9.888E-09	0.0026	3.411E-11	0.0000	1.654E-11	0.0000	3.098E-10	0.0001
Ra-226	4.372E-08	0.0116	3.685E-12	0.0000	7.167E-09	0.0019	2.088E-11	0.0000	2.557E-11	0.0000	5.639E-11	0.0000
Th-230	7.504E-11	0.0000	7.589E-11	0.0000	7.090E-10	0.0002	1.458E-12	0.0000	1.041E-13	0.0000	2.230E-10	0.0001
U-234	4.284E-09	0.0011	1.142E-08	0.0030	2.617E-07	0.0696	8.635E-10	0.0002	2.117E-09	0.0006	3.293E-08	0.0088
U-235	2.998E-07	0.0797	3.394E-10	0.0001	8.812E-09	0.0023	2.908E-11	0.0000	7.129E-11	0.0000	1.109E-09	0.0003
U-238	1.039E-06	0.2762	7.166E-09	0.0019	2.431E-07	0.0646	8.022E-10	0.0002	1.967E-09	0.0005	3.059E-08	0.0081
Total	1.391E-06	0.3699	1.903E-08	0.0051	5.322E-07	0.1415	1.763E-09	0.0005	4.197E-09	0.0011	6.527E-08	0.0174

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	6.271E-09	0.0017	0.000E+00	0.0000	1.239E-10	0.0000	3.695E-14	0.0000	7.319E-14	0.0000	1.088E-08	0.0029
Pa-231	4.742E-10	0.0001	0.000E+00	0.0000	9.129E-12	0.0000	6.231E-13	0.0000	1.347E-15	0.0000	1.569E-09	0.0004
Pb-210	1.555E-11	0.0000	0.000E+00	0.0000	2.964E-13	0.0000	3.257E-15	0.0000	2.633E-15	0.0000	1.029E-08	0.0027
Ra-226	8.547E-12	0.0000	0.000E+00	0.0000	1.691E-13	0.0000	2.279E-15	0.0000	4.950E-15	0.0000	5.100E-08	0.0136
Th-230	1.661E-13	0.0000	0.000E+00	0.0000	8.622E-15	0.0000	7.781E-17	0.0000	1.135E-17	0.0000	1.085E-09	0.0003
U-234	8.765E-07	0.2330	0.000E+00	0.0000	1.741E-08	0.0046	8.097E-11	0.0000	3.087E-10	0.0001	1.208E-06	0.3210
U-235	2.942E-08	0.0078	0.000E+00	0.0000	5.864E-10	0.0002	2.727E-12	0.0000	1.039E-11	0.0000	3.402E-07	0.0904
U-238	8.001E-07	0.2127	0.000E+00	0.0000	1.618E-08	0.0043	7.522E-11	0.0000	2.867E-10	0.0001	2.139E-06	0.5687
Total	1.713E-06	0.4553	0.000E+00	0.0000	3.431E-08	0.0091	1.596E-10	0.0000	6.059E-10	0.0002	3.762E-06	1.0000

\*\* Sum of water independent ground, inhalation, plant, meat, milk, soil  
 and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of  
 Radon and its Decay Products at t= 3.000E+02 years  
 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
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Water-ind. 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00  
 Water-dep. 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00  
 =====  
 Total 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent  
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Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 3.000E+02 years

0  
 0 Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
U-234	4.809E-08	0.0128	1.149E-08	0.0031	0.000E+00	0.0000	2.793E-07	0.0742	9.194E-10	0.0002	2.158E-09	0.0006	3.350E-08	0.0089
U-235	3.045E-07	0.0809	3.612E-10	0.0001	0.000E+00	0.0000	9.662E-09	0.0026	4.080E-11	0.0000	7.138E-11	0.0000	1.164E-09	0.0003
U-238	1.039E-06	0.2762	7.174E-09	0.0019	0.000E+00	0.0000	2.433E-07	0.0647	8.028E-10	0.0002	1.968E-09	0.0005	3.061E-08	0.0081
Total	1.391E-06	0.3699	1.903E-08	0.0051	0.000E+00	0.0000	5.322E-07	0.1415	1.763E-09	0.0005	4.197E-09	0.0011	6.527E-08	0.0174

0

Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
U-234	8.759E-07	0.2328	0.000E+00	0.0000	0.000E+00	0.0000	1.740E-08	0.0046	8.092E-11	0.0000	3.085E-10	0.0001	1.269E-06	0.3374
U-235	3.616E-08	0.0096	0.000E+00	0.0000	0.000E+00	0.0000	7.194E-10	0.0002	3.387E-12	0.0000	1.047E-11	0.0000	3.526E-07	0.0937
U-238	8.007E-07	0.2129	0.000E+00	0.0000	0.000E+00	0.0000	1.619E-08	0.0043	7.528E-11	0.0000	2.869E-10	0.0001	2.140E-06	0.5689
Total	1.713E-06	0.4553	0.000E+00	0.0000	0.000E+00	0.0000	3.431E-08	0.0091	1.596E-10	0.0000	6.059E-10	0.0002	3.762E-06	1.0000

\*\*\*CNRSI(i,p,t) includes contribution from decay daughter radionuclides  
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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 As pCi/yr at t= 1.000E+03 years

Water Independent Pathways (Inhalation w/o radon)

Water Dependent Pathways

Radio-Nuclide	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	Total Ingestion*
Ac-227	5.892E-07	3.948E-03	1.471E-06	1.063E-06	4.946E-04	4.372E+00	0.000E+00	6.434E-02	2.147E-05	3.803E-05	4.441E+00
Pa-231	7.115E-07	1.899E-02	4.057E-04	5.272E-07	5.973E-04	2.183E+00	0.000E+00	3.220E-02	2.207E-03	4.753E-06	2.237E+00
Pb-210	1.170E-05	3.133E-01	1.079E-03	5.237E-04	9.821E-03	1.509E+00	0.000E+00	2.227E-02	2.446E-04	1.972E-04	1.856E+00
Ra-226	1.259E-05	1.344E+00	3.916E-03	4.795E-03	1.057E-02	2.292E+00	0.000E+00	3.407E-02	4.633E-04	9.978E-04	3.691E+00
Th-230	1.038E-04	2.770E-01	5.695E-04	4.063E-05	8.712E-02	1.180E-02	0.000E+00	1.853E-04	3.963E-07	4.899E-08	3.767E-01
U-234	1.028E-03	6.857E+00	2.263E-02	5.547E-02	8.628E-01	3.153E+03	0.000E+00	4.642E+01	2.168E-01	8.236E-01	3.208E+03
U-235	3.399E-05	2.267E-01	7.482E-04	1.834E-03	2.853E-02	1.043E+02	0.000E+00	1.535E+00	7.168E-03	2.723E-02	1.061E+02
U-238	7.602E-04	5.072E+00	1.674E-02	4.103E-02	6.382E-01	2.332E+03	0.000E+00	3.434E+01	1.603E-01	6.092E-01	2.373E+03

\* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of Radon and its Decay Products as pCi/yr at t= 1.000E+03 years

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	9.979E-10	0.0001	3.612E-12	0.0000	7.398E-11	0.0000	2.756E-14	0.0000	1.993E-14	0.0000	9.269E-12	0.0000
Pa-231	1.150E-10	0.0000	1.560E-12	0.0000	1.235E-10	0.0000	2.638E-12	0.0000	3.429E-15	0.0000	3.885E-12	0.0000
Pb-210	6.064E-11	0.0000	1.088E-11	0.0000	3.255E-08	0.0025	1.122E-10	0.0000	5.442E-11	0.0000	1.021E-09	0.0001
Ra-226	1.272E-07	0.0097	1.072E-11	0.0000	2.085E-08	0.0016	6.077E-11	0.0000	7.441E-11	0.0000	1.640E-10	0.0000
Th-230	1.048E-10	0.0000	1.060E-10	0.0000	9.899E-10	0.0001	2.035E-12	0.0000	1.452E-13	0.0000	3.114E-10	0.0000
U-234	3.040E-10	0.0000	8.103E-10	0.0001	1.857E-08	0.0014	6.129E-11	0.0000	1.502E-10	0.0000	2.337E-09	0.0002
U-235	2.129E-08	0.0016	2.410E-11	0.0000	6.257E-10	0.0000	2.065E-12	0.0000	5.062E-12	0.0000	7.874E-11	0.0000
U-238	7.377E-08	0.0056	5.088E-10	0.0000	1.726E-08	0.0013	5.696E-11	0.0000	1.396E-10	0.0000	2.172E-09	0.0002
Total	2.238E-07	0.0171	1.476E-09	0.0001	9.105E-08	0.0070	2.980E-10	0.0000	4.239E-10	0.0000	6.097E-09	0.0005

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	5.991E-08	0.0046	0.000E+00	0.0000	1.183E-09	0.0001	3.959E-13	0.0000	6.995E-13	0.0000	6.218E-08	0.0048
Pa-231	1.082E-08	0.0008	0.000E+00	0.0000	2.086E-10	0.0000	1.430E-11	0.0000	3.079E-14	0.0000	1.129E-08	0.0009
Pb-210	1.257E-07	0.0096	0.000E+00	0.0000	2.400E-09	0.0002	2.636E-11	0.0000	2.126E-11	0.0000	1.619E-07	0.0124
Ra-226	2.761E-08	0.0021	0.000E+00	0.0000	5.479E-10	0.0000	7.451E-12	0.0000	1.605E-11	0.0000	1.765E-07	0.0135
Th-230	3.307E-11	0.0000	0.000E+00	0.0000	6.754E-13	0.0000	1.404E-15	0.0000	1.725E-16	0.0000	1.548E-09	0.0001
U-234	6.297E-06	0.4821	0.000E+00	0.0000	1.252E-07	0.0096	5.848E-10	0.0000	2.222E-09	0.0002	6.447E-06	0.4936
U-235	2.115E-07	0.0162	0.000E+00	0.0000	4.219E-09	0.0003	1.970E-11	0.0000	7.485E-11	0.0000	2.378E-07	0.0182
U-238	5.752E-06	0.4403	0.000E+00	0.0000	1.164E-07	0.0089	5.435E-10	0.0000	2.065E-09	0.0002	5.964E-06	0.4566
===== Total	1.248E-05	0.9557	0.000E+00	0.0000	2.502E-07	0.0192	1.197E-09	0.0001	4.400E-09	0.0003	1.306E-05	1.0000

\*\* Sum of water independent ground, inhalation, plant, meat, milk, soil  
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of  
Radon and its Decay Products at t= 1.000E+03 years

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
===== Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent      Water-dep. == Water-dependent

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Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p)  
and Fraction of Total Risk at t= 1.000E+03 years

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
===== Total														

U-234	1.276E-07	0.0098	9.361E-10	0.0001	0.000E+00	0.0000	7.290E-08	0.0056	2.361E-10	0.0000	2.788E-10	0.0000	3.827E-09	0.0003
U-235	2.240E-08	0.0017	2.927E-11	0.0000	0.000E+00	0.0000	8.232E-10	0.0001	4.731E-12	0.0000	5.085E-12	0.0000	9.189E-11	0.0000
U-238	7.383E-08	0.0057	5.106E-10	0.0000	0.000E+00	0.0000	1.733E-08	0.0013	5.717E-11	0.0000	1.400E-10	0.0000	2.178E-09	0.0002
Total	2.238E-07	0.0171	1.476E-09	0.0001	0.000E+00	0.0000	9.105E-08	0.0070	2.980E-10	0.0000	4.239E-10	0.0000	6.097E-09	0.0005

0

Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 1.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
U-234	6.437E-06	0.4928	0.000E+00	0.0000	0.000E+00	0.0000	1.279E-07	0.0098	6.173E-10	0.0000	2.254E-09	0.0002	6.773E-06	0.5185
U-235	2.822E-07	0.0216	0.000E+00	0.0000	0.000E+00	0.0000	5.611E-09	0.0004	3.439E-11	0.0000	7.558E-11	0.0000	3.113E-07	0.0238
U-238	5.765E-06	0.4413	0.000E+00	0.0000	0.000E+00	0.0000	1.167E-07	0.0089	5.448E-10	0.0000	2.070E-09	0.0002	5.978E-06	0.4577
Total	1.248E-05	0.9557	0.000E+00	0.0000	0.000E+00	0.0000	2.502E-07	0.0192	1.197E-09	0.0001	4.400E-09	0.0003	1.306E-05	1.0000

\*\*\*CNRSI(i,p,t) includes contribution from decay daughter radionuclides  
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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p) As pCi/yr at t= 3.000E+03 years

Radio-Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk	
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.030E-04	0.000E+00	1.517E-06	5.679E-10	8.972E-10	1.045E-04
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	8.567E-05	0.000E+00	1.264E-06	8.681E-08	1.867E-10	8.703E-05
Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.821E+00	0.000E+00	5.639E-02	6.195E-04	4.995E-04	3.879E+00
Ra-226	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.538E+00	0.000E+00	8.232E-02	1.120E-03	2.411E-03	5.624E+00
Th-230	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.682E-02	0.000E+00	2.475E-04	3.399E-07	3.661E-08	1.707E-02
U-234	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.206E-02	0.000E+00	6.195E-04	2.898E-06	1.099E-05	4.270E-02
U-235	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.393E-03	0.000E+00	2.052E-05	9.597E-08	3.641E-07	1.414E-03
U-238	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.116E-02	0.000E+00	4.589E-04	2.147E-06	8.145E-06	3.163E-02

\* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil and water-dependent water, fish, plant, meat, milk pathways

0

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of

Radon and its Decay Products as pCi/yr at t= 3.000E+03 years

Radon Pathway	Radionuclides							
	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent      Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
and Fraction of Total Risk at t= 3.000E+03 years

Radio-Nuclide	Water Independent Pathways (Inhalation excludes radon)											
	Ground		Inhalation		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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
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
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
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
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
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
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
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
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

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
and Fraction of Total Risk at t= 3.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
Ac-227	1.091E-12	0.0000	0.000E+00	0.0000	2.156E-14	0.0000	8.201E-18	0.0000	1.276E-17	0.0000	1.112E-12	0.0000
Pa-231	3.425E-13	0.0000	0.000E+00	0.0000	6.604E-15	0.0000	4.535E-16	0.0000	9.750E-19	0.0000	3.496E-13	0.0000
Pb-210	3.048E-07	0.8102	0.000E+00	0.0000	5.821E-09	0.0155	6.395E-11	0.0002	5.156E-11	0.0001	3.107E-07	0.8260
Ra-226	6.395E-08	0.1700	0.000E+00	0.0000	1.269E-09	0.0034	1.727E-11	0.0000	3.718E-11	0.0001	6.528E-08	0.1735
Th-230	4.592E-11	0.0001	0.000E+00	0.0000	8.836E-13	0.0000	1.213E-15	0.0000	1.307E-16	0.0000	4.680E-11	0.0001

U-234	6.843E-11	0.0002	0.000E+00	0.0000	1.361E-12	0.0000	6.370E-15	0.0000	2.416E-14	0.0000	6.982E-11	0.0002
U-235	2.301E-12	0.0000	0.000E+00	0.0000	4.594E-14	0.0000	2.149E-16	0.0000	8.153E-16	0.0000	2.348E-12	0.0000
U-238	6.259E-11	0.0002	0.000E+00	0.0000	1.267E-12	0.0000	5.929E-15	0.0000	2.249E-14	0.0000	6.389E-11	0.0002
===== Total	3.689E-07	0.9807	0.000E+00	0.0000	7.093E-09	0.0189	8.123E-11	0.0002	8.879E-11	0.0002	3.762E-07	1.0000

\*\* Sum of water independent ground, inhalation, plant, meat, milk, soil and water dependent water, fish, plant, meat, milk pathways

0

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of Radon and its Decay Products at t= 3.000E+03 years  
Radionuclides

0

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
===== Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent    Water-dep. == Water-dependent  
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Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 3.000E+03 years  
Water Independent Pathways (Inhalation excludes radon)

0

Radio-Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
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

0

Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p) and Fraction of Total Risk at t= 3.000E+03 years

Water Dependent Pathways

Radio-Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
===== Total														

U-234	3.684E-07	0.9792	0.000E+00	0.0000	0.000E+00	0.0000	7.082E-09	0.0188	8.111E-11	0.0002	8.864E-11	0.0002	3.756E-07	0.9984
U-235	3.735E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.410E-14	0.0000	6.767E-16	0.0000	8.290E-16	0.0000	3.810E-12	0.0000
U-238	5.694E-10	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	1.101E-11	0.0000	1.175E-13	0.0000	1.449E-13	0.0000	5.807E-10	0.0015
===== Total	3.689E-07	0.9807	0.000E+00	0.0000	0.000E+00	0.0000	7.093E-09	0.0189	8.123E-11	0.0002	8.879E-11	0.0002	3.762E-07	1.0000

\*\*\*CNRSI(i,p,t) includes contribution from decay daughter radionuclides  
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Amount of Intake Quantities QINT(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 As pCi/yr at t= 1.000E+04 years

Radio- Nuclide	Water Independent Pathways (Inhalation w/o radon)					Water Dependent Pathways					Total Ingestion*	
	Inhalation	Plant	Meat	Milk	Soil	Water	Fish	Plant	Meat	Milk		
Ac-227	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pa-231	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	4.978E+00	0.000E+00	7.345E-02	8.069E-04	6.506E-04	5.053E+00	7.276E+00
Ra-226	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	7.165E+00	0.000E+00	1.065E-01	1.449E-03	3.120E-03	1.608E-02	1.608E-02
Th-230	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.585E-02	0.000E+00	2.332E-04	3.203E-07	3.449E-08	0.000E+00	0.000E+00
U-234	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-235	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-238	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

\* Sum of all ingestion pathways, i.e. water independent plant, meat, milk, soil  
 and water-dependent water, fish, plant, meat, milk pathways

Amount of Intake Quantities QINT9(irn,i,t) and QINT9W(irn,i,t) for Inhalation of  
 Radon and its Decay Products as pCi/yr at t= 1.000E+04 years  
 Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Water-dep.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
===== Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water-ind. == Water-independent Water-dep. == Water-dependent

Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 1.000E+04 years

	Ground	Inhalation	Plant	Meat	Milk	Soil
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Radio- Nuclide	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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
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
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
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
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
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
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
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
===== 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

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Excess Cancer Risks CNRS(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
and Fraction of Total Risk at t= 1.000E+04 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Plant		Meat		Milk		All Pathways**	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	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
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
Pb-210	3.971E-07	0.8114	0.000E+00	0.0000	7.583E-09	0.0155	8.331E-11	0.0002	6.717E-11	0.0001	4.048E-07	0.8272
Ra-226	8.279E-08	0.1692	0.000E+00	0.0000	1.643E-09	0.0034	2.235E-11	0.0000	4.812E-11	0.0001	8.450E-08	0.1727
Th-230	4.327E-11	0.0001	0.000E+00	0.0000	8.325E-13	0.0000	1.143E-15	0.0000	1.231E-16	0.0000	4.410E-11	0.0001
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
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
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
===== Total	4.799E-07	0.9807	0.000E+00	0.0000	9.227E-09	0.0189	1.057E-10	0.0002	1.153E-10	0.0002	4.894E-07	1.0000

\*\* Sum of water independent ground, inhalation, plant, meat, milk, soil  
and water dependent water, fish, plant, meat, milk pathways

Excess Cancer Risks CNRS9(irn,i,t) and CNRS9W(irn,i,t) for Inhalation of  
Radon and its Decay Products at t= 1.000E+04 years  
Radionuclides

Radon Pathway	Rn-222	Po-218	Pb-214	Bi-214	Rn-220	Po-216	Pb-212	Bi-212
Water-ind.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

```

Water-dep. 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
=====
Total      0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

```

Water-ind. == Water-independent    Water-dep. == Water-dependent  
 IRESRAD, Version 6.1    T<sub>0</sub> Limit = 0.5 year    03/01/2002 08:47 Page 33  
 Intrisk : Bliss & Laughlin Radiological Assessment for Residential Farmer  
 File : Bal\_d.rad

Total Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 1.000E+04 years

0  
0

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
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 Excess Cancer Risk CNRSI(i,p,t)\*\*\* for Initially Existent Radionuclides (i) and Pathways (p)  
 and Fraction of Total Risk at t= 1.000E+04 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All pathways	
	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.	risk	fract.
U-234	4.790E-07	0.9788	0.000E+00	0.0000	0.000E+00	0.0000	9.209E-09	0.0188	1.055E-10	0.0002	1.151E-10	0.0002	4.884E-07	0.9981
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	9.350E-10	0.0019	0.000E+00	0.0000	0.000E+00	0.0000	1.798E-11	0.0000	2.059E-13	0.0000	2.252E-13	0.0000	9.534E-10	0.0019
Total	4.799E-07	0.9807	0.000E+00	0.0000	0.000E+00	0.0000	9.227E-09	0.0189	1.057E-10	0.0002	1.153E-10	0.0002	4.894E-07	1.0000

\*\*\*CNRSI(i,p,t) includes contribution from decay daughter radionuclides

D-3 DOSE ASSESSMENT OUTPUT FROM RESRAD-BUILD

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 1 \*\*  
Title : Bliss & Laughlin Industrial Worker Dose  
Input File : sitel.bld

```
=====
=====
===
===      RESRAD-BUILD Table of Contents      ===
===
=====
=====
```

Table of Contents.....	1
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\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 2 \*\*  
 Title : Bliss & Laughlin Industrial Worker Dose  
 Input File : sitel.bld

```

=====
=====
===
===      RESRAD-BUILD Input Parameters      ===
===
=====
=====
  
```

```

Number of Sources : 2
Number of Receptors: 1
Total Time : 3.650000E+02 days
Fraction Inside : 2.600000E-01
  
```

```

===== Receptor Information =====
  
```

Receptor	Room	x [m]	y [m]	z [m]	FracTime	Inhalation [m3/day]	Ingestion (Dust) [m2/hr]
1	1	0.000	0.000	1.000	1.000	1.80E+01	1.00E-04

```

=== Receptor-Source Shielding Relationship ===
  
```

Receptor	Source	Density [g/cm3]	Thickness [cm]	Material
1	1	2.40E+00	0.00E+00	Concrete
1	2	7.60E+00	0.00E+00	Fe

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 3 \*\*  
Title : Bliss & Laughlin Industrial Worker Dose  
Input File : sitel.bld

=====  
Building Information  
=====

Building Air Exchange Rate: 8.00E-01 1/hr

Height[m]	Air Exchanges [m3/hr]	
Area [m2]		
		*****
		*
		*
		*
H1: 12.000	Room 1	<=Q01: 2.88E+03
		* Q10 : 2.88E+03
	LAMBDA: 8.00E-01	*
Area 300.000		*
		*
		*****

Deposition velocity: 1.00E-02 [m/s]    Resuspension Rate: 5.00E-07 [1/s]

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 4 \*\*  
 Title : Bliss & Laughlin Industrial Worker Dose  
 Input File : sitel.bld

=====  
 Source Information  
 =====

Source: 1  
 Location:: Room : 1 x: 0.00 y: 0.00 z: 0.00[m]  
 Geometry:: Type: Area Area:3.00E+02 [m2] Direction: z  
 Pathway ::  
 Direct Ingestion Rate: 0.000E+00 [1/hr]  
 Fraction released to air: 1.000E-01  
 Removable fraction: 5.000E-01  
 Time to Remove: 3.650E+02 [day]  
 Radon Release Fraction: 0.000E+00

Contamination::

Nuclide	Concentration [dpm/m2]	Dose Conversion Factors		
		Ingestion [mrem/dpm]	Inhalation [mrem/dpm]	Submersion [mrem/yr/ (dpm/m3)]
U-238	1.150E+03	1.212E-04	5.315E-02	7.207E-05
U-235	5.280E+01	1.203E-04	5.541E-02	4.068E-04
U-234	1.150E+03	1.275E-04	5.946E-02	4.023E-07
PA-231	0.000E+00	4.775E-03	5.766E-01	9.054E-05
TH-230	0.000E+00	2.468E-04	1.468E-01	9.189E-07
AC-227	0.000E+00	6.667E-03	3.027E+00	9.730E-04
RA-226	0.000E+00	5.991E-04	3.874E-03	4.685E-03
PB-210	0.000E+00	3.275E-03	1.045E-02	4.730E-06

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 5 \*\*  
 Title : Bliss & Laughlin Industrial Worker Dose  
 Input File : sitel.bld

Source: 2

Location:: Room : 1 x: 0.00 y: 0.00 z: 11.00[m]  
 Geometry:: Type: Area Area:2.08E+00 [m2] Direction: z  
 Pathway ::  
 Direct Ingestion Rate: 0.000E+00 [1/hr]  
 Fraction released to air: 1.000E-01  
 Removable fraction: 5.000E-01  
 Time to Remove: 3.650E+02 [day]  
 Radon Release Fraction: 0.000E+00

Contamination::

Nuclide	Concentration [dpm/m2]	Dose Conversion Factors		
		Ingestion [mrem/dpm]	Inhalation [mrem/dpm]	Submersion [mrem/yr/ (dpm/m3)]
U-238	5.990E+03	1.212E-04	5.315E-02	7.207E-05
U-235	2.760E+02	1.203E-04	5.541E-02	4.068E-04
U-234	6.030E+03	1.275E-04	5.946E-02	4.023E-07
PA-231	0.000E+00	4.775E-03	5.766E-01	9.054E-05
TH-230	0.000E+00	2.468E-04	1.468E-01	9.189E-07
AC-227	0.000E+00	6.667E-03	3.027E+00	9.730E-04
RA-226	0.000E+00	5.991E-04	3.874E-03	4.685E-03
PB-210	0.000E+00	3.275E-03	1.045E-02	4.730E-06

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 6 \*\*  
Title : Bliss & Laughlin Industrial Worker Dose  
Input File : sitel.bld  
Evaluation Time: 0.000000 years

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

===== Source Information =====

Source: 1  
Location:: Room : 1 x: 0.00 y: 0.00 z: 0.00 [m]  
Geometry:: Type: Area Area:3.00E+02 [m2] Direction: z  
Pathway ::  
Direct Ingestion Rate: 0.000E+00 [1/hr]  
Fraction released to air: 1.000E-01  
Removable fraction: 5.000E-01  
Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [dpm/m2]
	U-238	1.150E+03
	U-235	5.280E+01
	U-234	1.150E+03
	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 15:14 Page: 7 \*\*  
Title : Bliss & Laughlin Industrial Worker Dose  
Input File : sitel.bld  
Evaluation Time: 0.000000 years

Source: 2

Location:: Room : 1 x: 0.00 y: 0.00 z: 11.00 [m]  
Geometry:: Type: Area Area:2.08E+00 [m2] Direction: z  
Pathway ::  
Direct Ingestion Rate: 0.000E+00 [1/hr]  
Fraction released to air: 1.000E-01  
Removable fraction: 5.000E-01  
Time to Remove: 3.650E+02 [day]

Contamination::	Nuclide	Concentration [dpm/m2]
	U-238	5.990E+03
	U-235	2.760E+02
	U-234	6.030E+03
	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 15:14 Page: 8 \*\*  
 Title : Bliss & Laughlin Industrial Worker Dose  
 Input File : sitel.bld  
 Evaluation Time: 0.000000 years

```

=====
=====
===
===          RESRAD-BUILD Dose Tables          ===
===
=====
=====
  
```

Source Contributions to Receptor Doses

[mrem]

	Source 1	Source 2	Total
Receptor 1	1.35E-01	4.88E-03	1.40E-01
Total	1.35E-01	4.88E-03	1.40E-01

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 9 \*\*  
 Title : Bliss & Laughlin Industrial Worker Dose  
 Input File : sitel.bld  
 Evaluation Time: 0.000000 years

Pathway Detail of Doses

=====

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	2.03E-04	3.20E-06	1.61E-08	1.34E-01	2.11E-17	7.88E-04
Total	2.03E-04	3.20E-06	1.61E-08	1.34E-01	2.11E-17	7.88E-04

Source: 2

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	1.48E-06	1.16E-07	5.83E-10	4.85E-03	7.66E-19	2.85E-05
Total	1.48E-06	1.16E-07	5.83E-10	4.85E-03	7.66E-19	2.85E-05

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 10 \*\*  
 Title : Bliss & Laughlin Industrial Worker Dose  
 Input File : sitel.bld  
 Evaluation Time: 0.000000 years

Nuclide Detail of Doses

=====

[mrem]

Source: 1

Nuclide	Receptor	Total
	1	
U-238		
U-238	6.23E-02	6.23E-02
U-234	8.75E-08	8.75E-08
TH-230	6.79E-13	6.79E-13
RA-226	4.98E-18	4.98E-18
PB-210	0.00E+00	0.00E+00
U-235		
U-235	3.01E-03	3.01E-03
PA-231	3.31E-07	3.31E-07
AC-227	1.78E-08	1.78E-08
U-234		
U-234	6.95E-02	6.95E-02
TH-230	7.67E-07	7.67E-07
RA-226	8.74E-12	8.74E-12
PB-210	1.09E-13	1.09E-13

Source: 2

Nuclide	Receptor	Total
	1	
U-238		
U-238	2.25E-03	2.25E-03
U-234	3.16E-09	3.16E-09
TH-230	2.45E-14	2.45E-14
RA-226	1.05E-19	1.05E-19
PB-210	0.00E+00	0.00E+00
U-235		
U-235	1.08E-04	1.08E-04
PA-231	1.20E-08	1.20E-08
AC-227	6.43E-10	6.43E-10
U-234		
U-234	2.53E-03	2.53E-03
TH-230	2.79E-08	2.79E-08
RA-226	1.86E-13	1.86E-13
PB-210	3.97E-15	3.97E-15

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 11 \*\*  
 Title : Bliss & Laughlin Industrial Worker Dose  
 Input File : sitel.bld  
 Evaluation Time: 1.00000 years

```

=====
=====
===      Assessment for Time: 2      ===
===      Time =1.00E+00 yr          ===
=====
=====
  
```

===== Source Information =====

Source: 1  
 Location:: Room : 1 x: 0.00 y: 0.00 z: 0.00 [m]  
 Geometry:: Type: Area Area:3.00E+02 [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 [dpm/m2]
	U-238	5.750E+02
	U-235	2.640E+01
	U-234	5.750E+02
	PA-231	5.586E-04
	TH-230	5.176E-03
	AC-227	8.798E-06
	RA-226	1.121E-06
	PB-210	1.153E-08

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 12 \*\*  
Title : Bliss & Laughlin Industrial Worker Dose  
Input File : sitel.bld  
Evaluation Time: 1.00000 years

Source: 2

Location:: Room : 1 x: 0.00 y: 0.00 z: 11.00 [m]  
Geometry:: Type: Area Area:2.08E+00 [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 [dpm/m2]
	U-238	2.995E+03
	U-235	1.380E+02
	U-234	3.015E+03
	PA-231	2.920E-03
	TH-230	2.714E-02
	AC-227	4.599E-05
	RA-226	5.878E-06
	PB-210	6.043E-08

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 13 \*\*  
Title : Bliss & Laughlin Industrial Worker Dose  
Input File : site1.bld  
Evaluation Time: 1.00000 years

```
=====
=====
===
===          RESRAD-BUILD Dose Tables          ===
===
=====
=====
```

Source Contributions to Receptor Doses

=====

[mrem]

	Source	Source	Total
	1	2	
Receptor 1	1.35E-04	9.89E-07	1.36E-04
Total	1.35E-04	9.89E-07	1.36E-04

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 14 \*\*  
 Title : Bliss & Laughlin Industrial Worker Dose  
 Input File : sitel.bld  
 Evaluation Time: 1.00000 years

Pathway Detail of Doses  
 =====  
 [mrem]

Source: 1		External	Deposition	Immersion	Inhalation	Radon	Ingestion
Receptor							
1		1.35E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total		1.35E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Source: 2		External	Deposition	Immersion	Inhalation	Radon	Ingestion
Receptor							
1		9.89E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total		9.89E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00



\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 15 \*\*  
 Title : Bliss & Laughlin Industrial Worker Dose  
 Input File : sitel.bld  
 Evaluation Time: 1.00000 years

Nuclide Detail of Doses

=====

[mrem]

Source: 1

Nuclide	Receptor	Total
	1	
U-238		
U-238	1.03E-04	1.03E-04
U-234	2.22E-11	2.22E-11
TH-230	1.30E-16	1.30E-16
RA-226	4.69E-17	4.69E-17
PB-210	1.13E-21	1.13E-21
U-235		
U-235	2.72E-05	2.72E-05
PA-231	2.30E-10	2.30E-10
AC-227	5.09E-11	5.09E-11
U-234		
U-234	5.23E-06	5.23E-06
TH-230	5.53E-11	5.53E-11
RA-226	2.75E-11	2.75E-11
PB-210	1.79E-15	1.79E-15

Source: 2

Nuclide	Receptor	Total
	1	
U-238		
U-238	7.67E-07	7.67E-07
U-234	7.24E-14	7.24E-14
TH-230	5.76E-19	5.76E-19
RA-226	3.51E-19	3.51E-19
PB-210	7.62E-24	7.62E-24
U-235		
U-235	2.05E-07	2.05E-07
PA-231	1.54E-12	1.54E-12
AC-227	3.93E-13	3.93E-13
U-234		
U-234	1.71E-08	1.71E-08
TH-230	2.46E-13	2.46E-13
RA-226	2.07E-13	2.07E-13
PB-210	1.21E-17	1.21E-17

\*\* RESRAD-BUILD Program Output, Version 3.1 03/04/02 15:14 Page: 16 \*\*  
 Title : Bliss & Laughlin Industrial Worker Dose  
 Input File : sitel.bld  
 Full Summary

```

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

Receptor Doses Received for the Exposure Duration

=====

(mrem)

	Evaluation Time [yr]	
	0.00E+00	1.00E+00
1	1.40E-01	1.36E-04

Receptor Dose/Yr Averaged Over Exposure Duration

=====

(mrem/yr)

	Evaluation Time [yr]	
	0.00E+00	1.00E+00
1	1.40E-01	1.36E-04