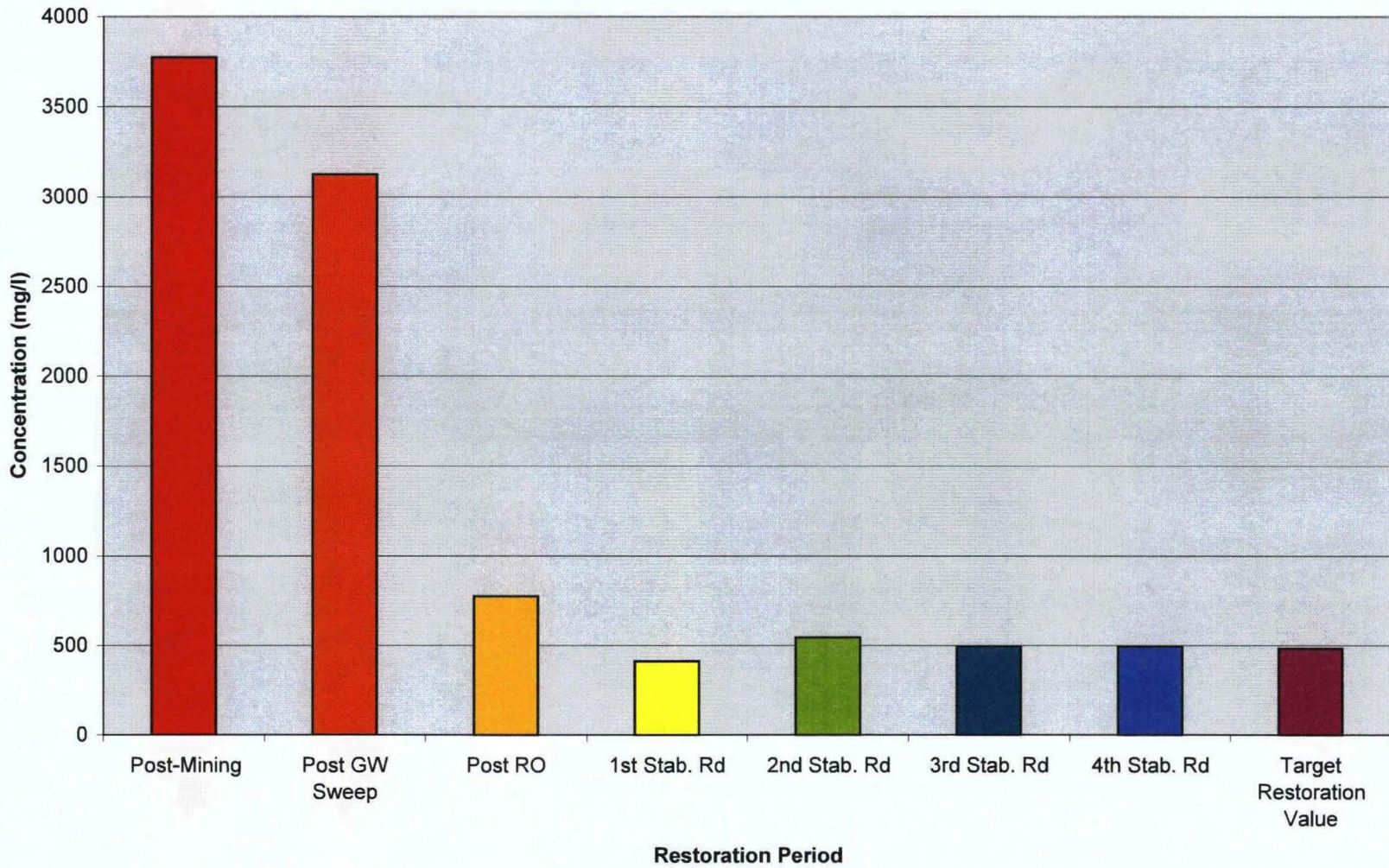


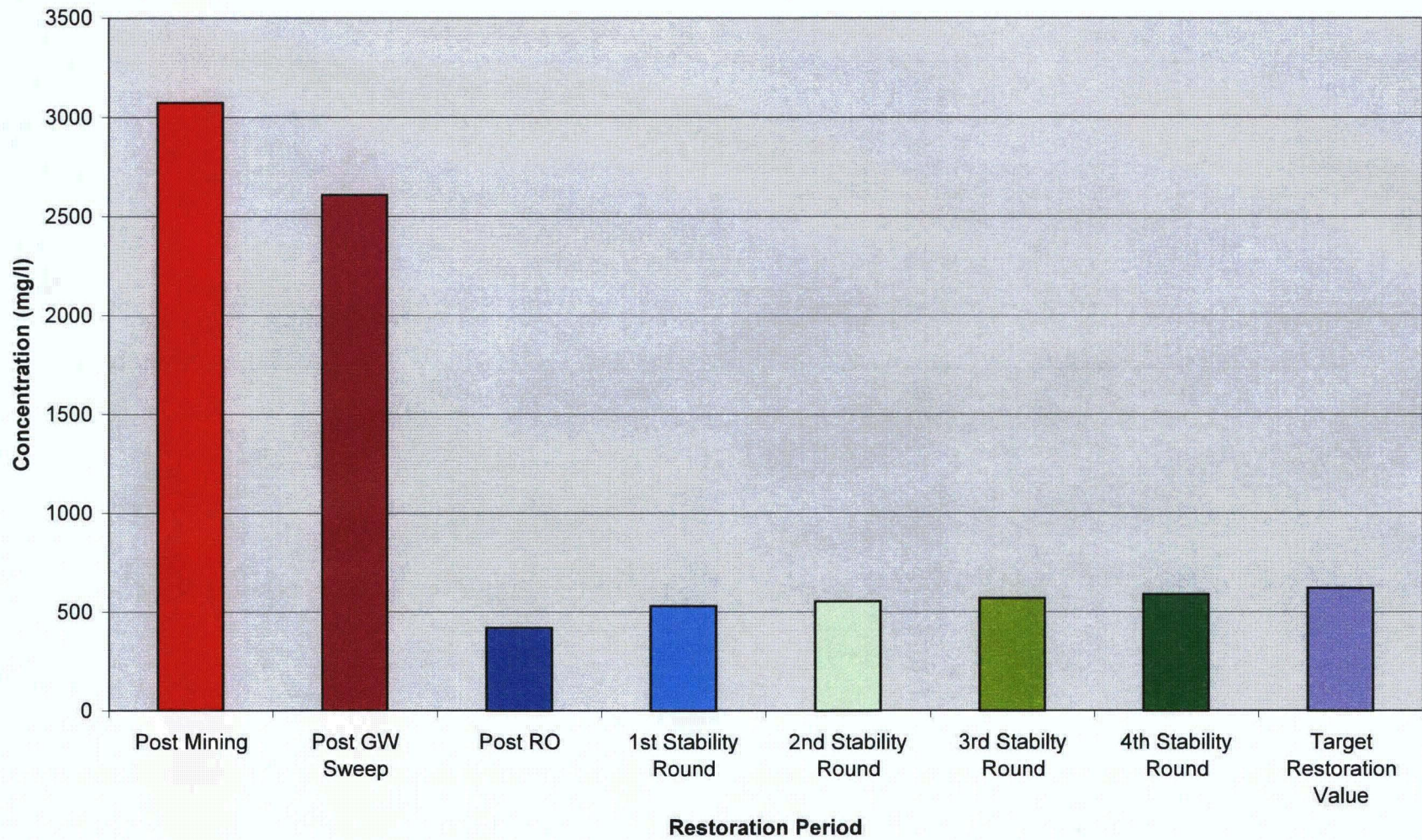
ADDENDUM 6-A
CHRISTENSEN RANCH WELLFIELD RESTORATION REPORT FIGURES

**Figure 6-A-1 Mean TDS Concentration-Post Mining Through 4th Stability Round
Mine Unit 3, Christensen Ranch, Wyoming, Cogema Mining, Inc.**



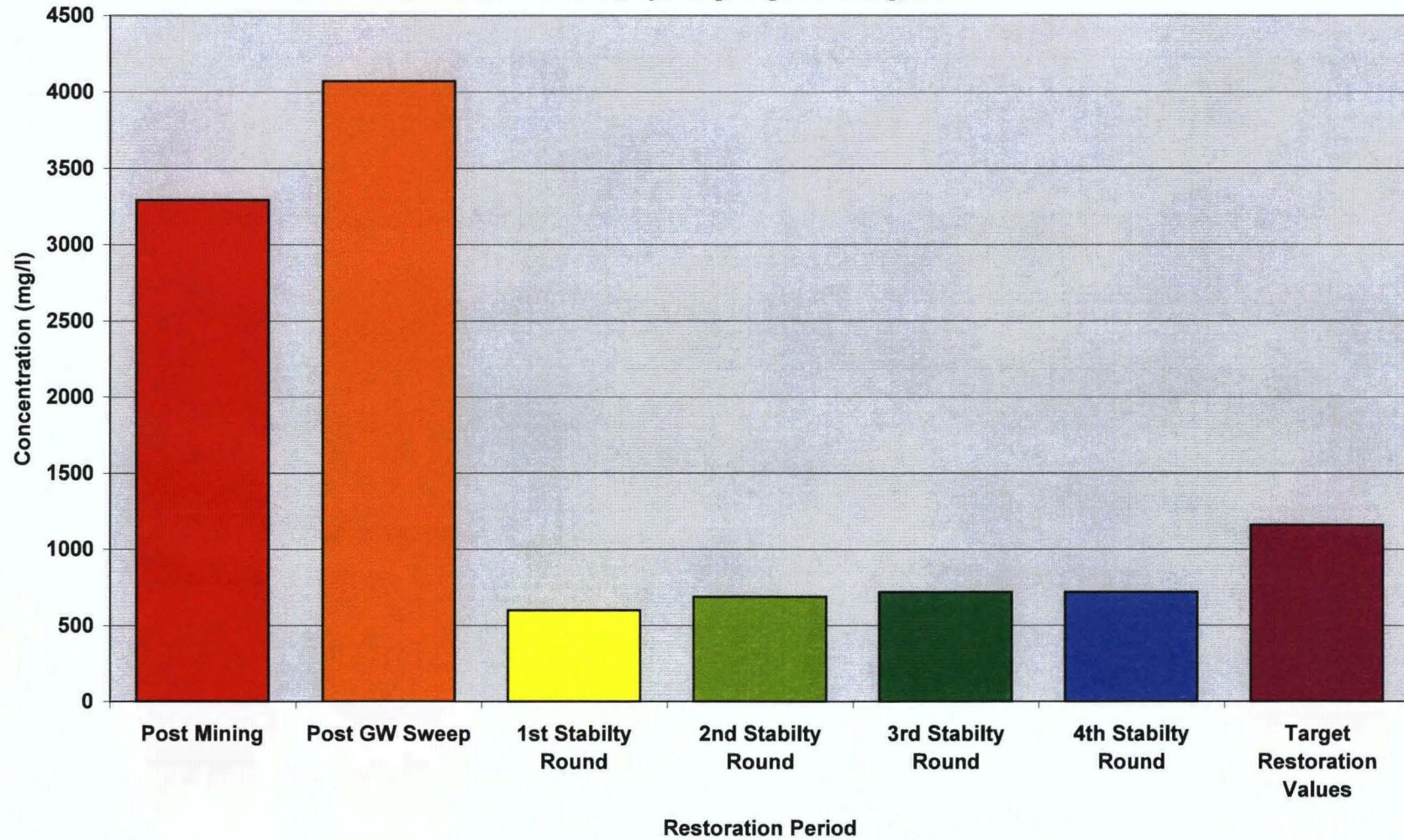
Cogema Mining, Inc., Wellfield Restoration Report Christensen Ranch Project Wyoming, March 2008.

**Figure 6-A-2 Mean TDS Concentration-Post Mining Through 4th Stability Round
Mine Unit 5, Christensen Ranch, Wyoming, Cogema Mining, Inc.**



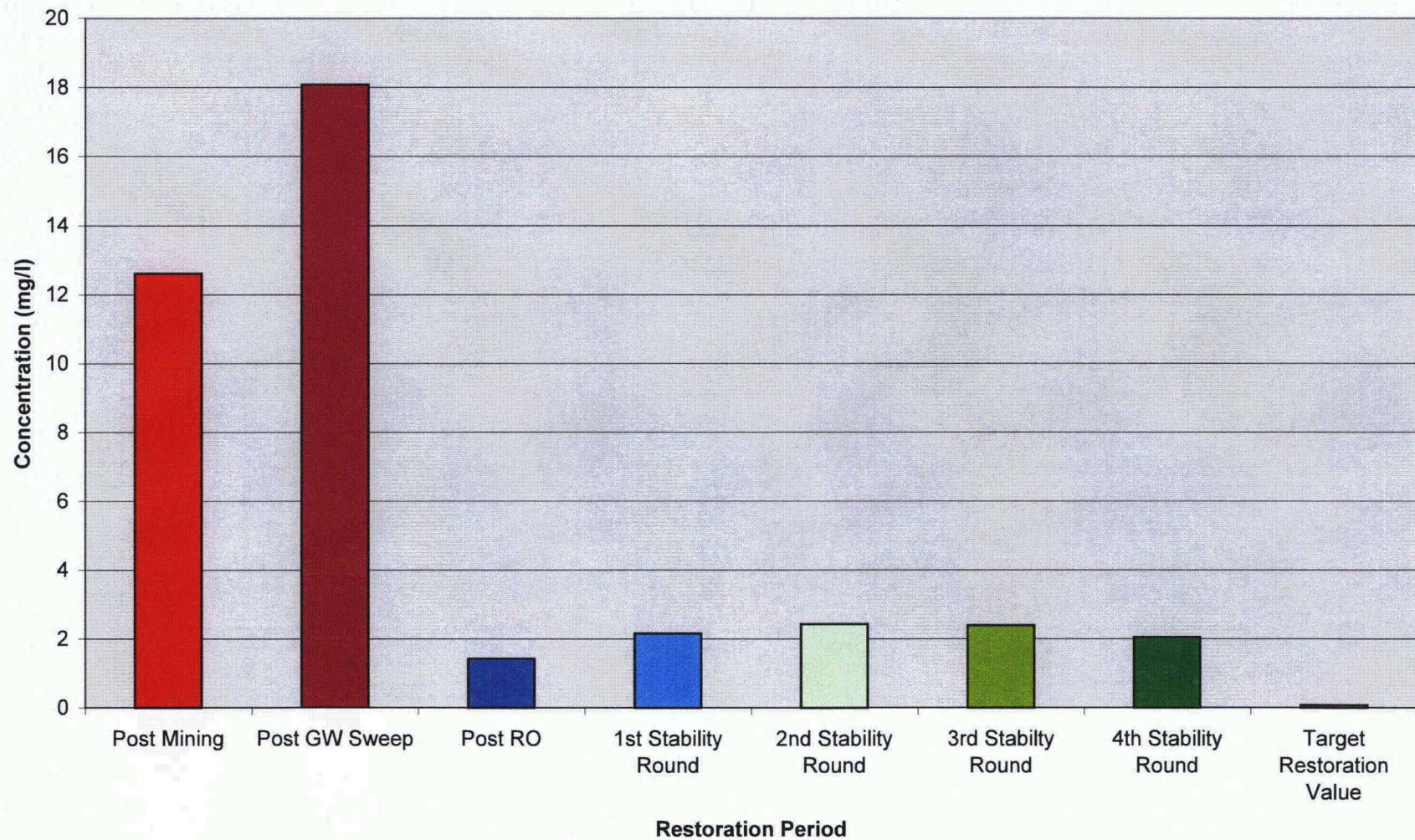
Cogema Mining, Inc., Wellfield Restoration Report Christensen Ranch Project Wyoming, March 2008.

**Figure 6-A-3 Mean Total Dissolved Solids Concentration-Post Mining Through 4th Stability Round
Mine Unit 6, Christensen Ranch, Wyoming, Cogema Mining, Inc.**



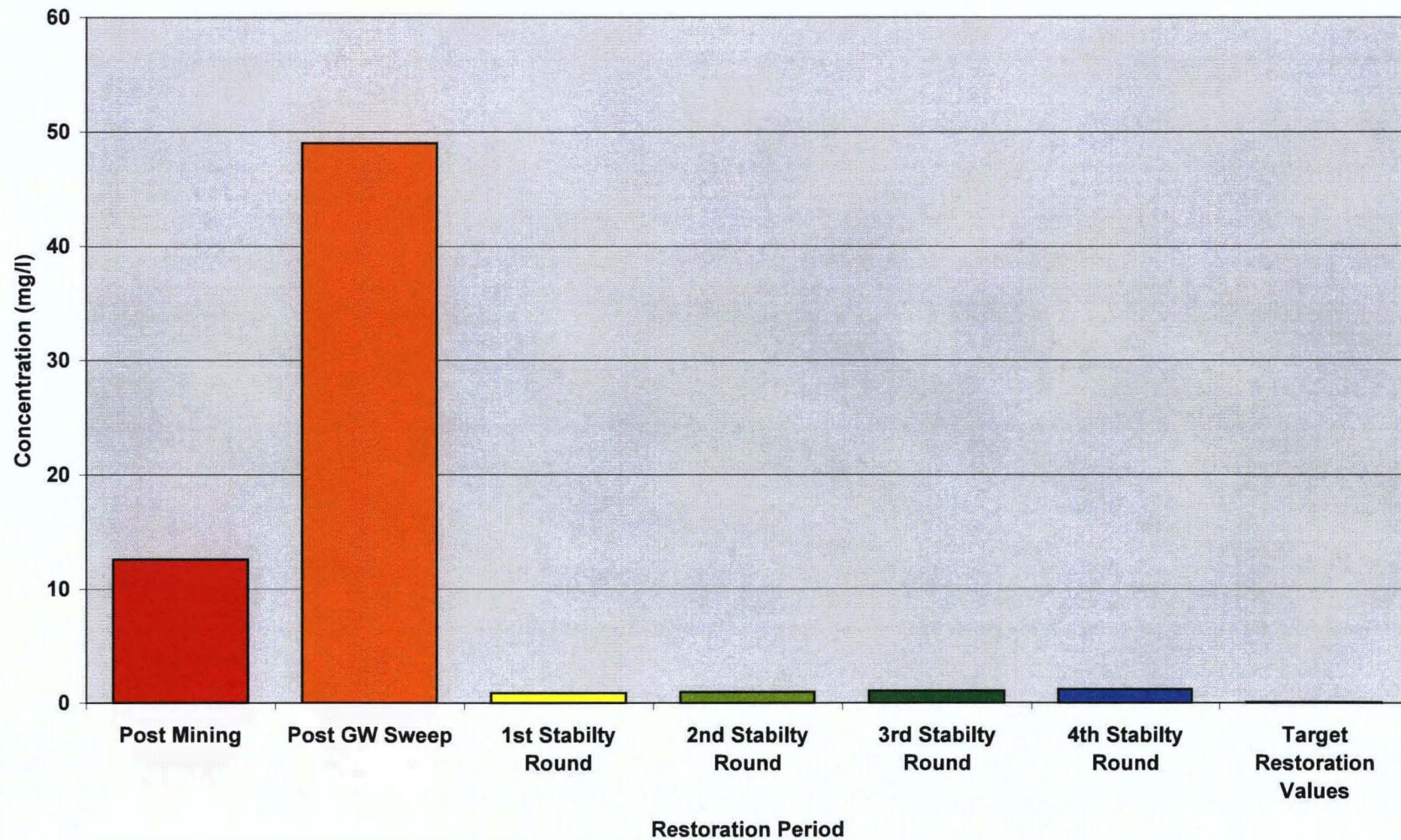
Cogema Mining, Inc., Wellfield Restoration Report Christensen Ranch Project Wyoming, March 2008.

**Figure 6-A-4 Mean Uranium Concentration-Post Mining Through 4th Stability Round
Mine Unit 5, Christensen Ranch, Wyoming, Cogema Mining, Inc..**



Cogema Mining, Inc., Wellfield Restoration Report Christensen Ranch Project Wyoming, March 2008.

**Figure 6-A-5 Mean Uranium Concentration-Post Mining Through 4th Stability Round
Mine Unit 6, Christensen Ranch, Wyoming, Cogema Mining, Inc.**



Cogema Mining, Inc., Wellfield Restoration Report Christensen Ranch Project Wyoming, March 2008.

ADDENDUM 6-B
RESRAD REPORT

Appendix D-1
RESRAD Data Input Basis Parameters

RESRAD Data Input Basis Parameters

This document summarizes the data input and modeling scenario that was used to determine the radium benchmark dose for the LISR Project. The modeling was performed using RESRAD for Windows Version 6.4 developed by the Environmental Assessment Division at Argonne National Laboratory.

The resident farmer scenario was used since this is the most likely land use near the site. The following sections describe the data parameters that were used to model site-specific conditions.

The data input was based upon five principal sources:

1. The Data Collection Handbook to Support Modeling Impacts of Radioactive Material in Soil (Data Collection Handbook) (ANL, 1993)
2. The NUREG-1569 (NRC, 2003)
3. Site specific information to be included in the LISR license application
4. The Natural Resources Conservation Service (NRCS) 2003 Annual Natural Resources Inventory, State Report (NRCS, 2007)
5. The US Geological Survey (USGS) Circular 1268 (USGS, 2004)

Soil Concentration

1. Lead-210: Used 5.0 pCi/g per the NUREG-1569 (NRC, 2003).

No sensitivity analysis on this parameter was performed based on the guidance.

2. Radium-226: Used 5.0 pCi/g regulatory limit as basis for determining benchmark.

No sensitivity analysis on this parameter was performed based on the regulatory limit.

Distribution Coefficient (K_d)

The soil in the contaminated, unsaturated, and saturated zones are described as clay loam to loamy sand. All values found in the Data Collection Handbook (ANL, 1993).

1. Lead-210: Used the value for loam, 16,000 cm³/g, for the contaminated, unsaturated, and saturated zones. The Data Collection Handbook specifies the following values (ANL, 1993):

- Sand = 270 cm³/g
- Loam = 16,000 cm³/g
- Clay = 550 cm³/g

Sensitivity analyses were performed on the external and plant (water independent) pathways with a multiple of 100 on the value for the contaminated zone (i.e. 160, 16,000, 1,600,000). No appreciable impacts on maximum dose were found when using the higher or lower K_d . The range of values covers the range of potential values at the site based upon sandy loam and loamy sand soil types. Graphs attached.

2. Radium 226: Used the value for loam, 36,000 cm³/g, for the contaminated, unsaturated, and saturated zones. The Data Collection Handbook specifies the following values (ANL, 1993):

- Sand = 500 cm³/g
- Loam = 36,000 cm³/g
- Clay = 9,100 cm³/g

Sensitivity analyses were performed on the external and plant (water independent) pathways with a multiple of 100 on the value for the contaminated zone (i.e. 360, 36,000, 3,600,000). No appreciable impacts on maximum dose were found when using the higher or lower K_d . The range of values covers the range of potential values at the site based upon sandy loam and loamy sand soil types. Graphs attached.

Contaminated Zone

1. Area: Used the default value of 10,000 square meters.

Sensitivity analysis was performed on the external pathway with a multiple of 2 (i.e. 5,000, 10,000, and 20,000). There was no impact on maximum dose rate for the external dose pathway when using the larger value. There was a small decrease in maximum dose rate for the external dose pathway when using the smaller value. Therefore the use of the mid-range value for the area is conservative. Graph attached.

2. Thickness: Used 0.15 m (6 inches) based on regulatory requirement.

No sensitivity analysis on this parameter was performed based on the guidance.

3. Length parallel to aquifer flow: Used the default value of 100 meters, based on the square root of a 10,000 square meter contaminated zone.

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

Cover and Contaminated Zone

The topsoil of the area (the contaminated zone) is described as clay loam to loamy sand.

1. Cover depth: Used 0 meters in accordance with NUREG-1569 (NRC, 2003).

No sensitivity analysis on this parameter was performed based on the guidance.

2. Density of contaminated zone: Used the average density of the contaminated zone, 1.50 g/cm³, based on site specific data.

No sensitivity analysis was performed because the value is site specific.

3. Contaminated zone erosion rate: Used the erosion rates for Wyoming listed in the NRCS 2003 National Resources Inventory, State Report (NCRS, 2007) to calculate the erosion rate. The erosion rates listed for Wyoming are 0.5 tons/acre-year from water erosion and 3.2 tons/acre-year from wind erosion (3.7 tons/acre-year total). Using the contaminated zone soil density (1.50 g/cm³), the total erosion rate was calculated as shown below and used in RESRAD.

$$\text{Erosion Rate (m/yr)} = \frac{3.7 \text{ ton}}{\text{acre - yr}} \times \frac{9.07 \times 10^5 \text{ g}}{\text{ton}} \times \frac{\text{acre}}{4.047 \times 10^7 \text{ cm}^2} \times \frac{\text{cm}^3}{1.50 \text{ g}} \times \frac{\text{m}}{100 \text{ cm}} = 0.0006$$

Sensitivity analyses of the external and plant (water independent) pathways were performed with a multiple of 2 (i.e. 0.0012, 0.0006, and 0.0003). The maximum dose rate from the external pathway did not change when the value was changed. The maximum dose rate from the plant (water independent) pathway decreased slightly when using the smaller value. Also, the mid-range value is based on information specific to Wyoming. Therefore the mid-range value is both adequate for the model and conservative. Graph attached.

4. Contaminated zone total porosity: Used the average total porosity of the contaminated zone, 0.25, based on site specific data.

No sensitivity analysis was performed because the value is site specific.

5. Contaminated zone field capacity: Used the value obtained from subtracting the effective porosity of the contaminated zone from the total porosity of the contaminated zone, 0.06. The value used for the effective porosity of the contaminated zone was the average of the mean effective porosities for clay and sand (medium) listed in the Data Collection Handbook, 0.19 (ANL, 1993).

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

6. Contaminated zone hydraulic conductivity: Used the average of the representative hydraulic conductivity values for clay loam and loamy sand listed in the Data Collection Handbook, 2.47×10^4 m/yr (ANL, 1993).

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

7. Contaminated zone b parameter: Used the average of the b parameters for clay loam and loamy sand listed in the Data Collection Handbook, 6.45 (ANL, 1993).

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

8. Evapotranspiration Coefficient: Used the maximum evapotranspiration coefficient, 0.999, based on site specific data.

No sensitivity analysis was performed because the value is site specific.

9. Wind Speed: Used the average wind speed, 5.77 m/s, based on site specific data.

No sensitivity analysis was performed because the value is site specific.

10. Precipitation: Used the precipitation rate, 0.29 m/yr, based on site specific data.

No sensitivity analysis was performed because the value is site specific.

11. Irrigation Rate: Used the average irrigation rate for Wyoming listed in the USGS Circular 1268, 1.33 m/yr (4.36 ft/yr) (USGS, 2004).

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

12. Runoff Coefficient: From the Data Collection Handbook, the equation for runoff coefficient for an agricultural environment is shown below (ANL, 1993).

$$\text{Runoff Coefficient} = 1 - c_1 - c_2 - c_3$$

The values of c_1 , c_2 , and c_3 used were 0.2 (rolling land), 0.2 (intermediate combinations of clay and loam), and 0.1 (cultivated lands), respectively. The resulting runoff coefficient used is 0.5.

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

13. Watershed Area for Nearby Stream or Pond: Used the default value of 1,000,000 m².

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

14. Accuracy: Used the default value of 0.001.

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

Saturated Zone

1. Density of saturated zone: Used the average density of the saturated zone, 1.50 g/cm³, based on site specific data.

No sensitivity analysis was performed because the value is site specific.

2. Saturated zone total porosity: Used the average total porosity of the contaminated zone, 0.25, based on site specific data.

No sensitivity analysis was performed because the value is site specific.

3. Saturated zone effective porosity: Used the value of 0.19 obtained from the average of the mean effective porosities for clay and sand (medium) listed in the Data Collection Handbook, 0.19 (ANL, 1993).

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

4. Saturated zone field capacity: Used the value obtained from subtracting the effective porosity of the saturated zone from the total porosity of the saturated zone, 0.06.

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

5. Saturated zone hydraulic conductivity: Used the average of the representative hydraulic conductivity values for clay loam and loamy sand listed in the Data Collection Handbook, 2.47 x 10⁴ m/yr (ANL, 1993).

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

6. Saturated zone hydraulic gradient: Used the default value of 0.02.

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

6. Saturated zone b parameter: Used the average of the b parameters for clay loam and loamy sand listed in the Data Collection Handbook, 6.45 (ANL, 1993).

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

7. Water Table Drop Rate: Used the default value of 0.001 m/yr.

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

8. Well Pump Intake Depth: Used the site specific value of 54.9 m.

No sensitivity analysis was performed because the site specific value is used.

10. Model for Water Transport Parameters: Used non-dispersion per NUREG-1569 (NRC, 2003).

No sensitivity analysis on this parameter was performed based on the guidance.

11. Well Pumping Rate: Used the default value of 250 m³/yr.

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

Unsaturated Zone

1. Unsaturated zone thickness: Used the site specific value of 53.3 m.

No sensitivity analysis was performed because the value is site specific.

2. Density of unsaturated zone: Used the average density of the saturated zone, 1.50 g/cm³, based on site specific data.

No sensitivity analysis was performed because the value is site specific.

3. Unsaturated zone total porosity: Used the average total porosity of the contaminated zone, 0.25, based on site specific data.

No sensitivity analysis was performed because the value is site specific.

4. Unsaturated zone effective porosity: Used the value of 0.19 obtained from the average of the mean effective porosities for clay and sand (medium) listed in the Data Collection Handbook, 0.19 (ANL, 1993).

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

5. Unsaturated zone field capacity: Used the value obtained from subtracting the effective porosity of the unsaturated zone from the total porosity of the unsaturated zone, 0.06.

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

6. Unsaturated zone hydraulic conductivity: Used the average of the representative hydraulic conductivity values for clay loam and loamy sand listed in the Data Collection Handbook, 2.47×10^4 m/yr (ANL, 1993).

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

7. Unsaturated zone b parameter: Used the average of the b parameters for clay loam and loamy sand listed in the Data Collection Handbook, 6.45 (ANL, 1993).

No sensitivity analysis was performed since water dependent pathways were not significant contributors to dose.

Occupancy

1. Inhalation Rate: Used the default value of 8,400 m³/yr.

No sensitivity analysis was performed since inhalation pathways were not significant contributors to dose.

2. Mass Loading for Inhalation: Used the default value of 0.0001 g/m³.

No sensitivity analysis was performed since inhalation pathways were not significant contributors to dose.

3. Exposure Duration: Used the default value of 30 years.

4. Indoor dust filtration factor: Used the default value of 0.4.

No sensitivity analysis was performed since inhalation pathways were not significant contributors to dose.

5. External gamma shielding factor: Used the value of 0.55. The NUREG-1569 requires that a value between 0.33 and 0.55 be used.

Sensitivity analysis of the external pathway was performed using a multiple of 1.5 (i.e., 0.367, 0.55 and 0.825). Using the lower value resulted in a decrease in the maximum dose rate for the external exposure pathway. Using the higher value resulted in an increase in the maximum dose rate for the external exposure pathway. The value 0.55 is the most conservative value in the range specified by the NUREG-1569. Graph attached.

6. Indoor/Outdoor Fractions: Used the defaults of 0.5 indoors and 0.25 outdoors for farmer scenario in the NUREG-1569 (NRC, 2003).

No sensitivity analyses on these parameters were performed based on the guidance.

7. Shape of contaminated zone: A circular shape was used.

Ingestion: Dietary

1. Consumption Rates:

- A. Fruit, vegetable and grain: Used the default value of 160 kg/yr. This value was used based upon EPA estimated consumption. NRC Reg. Guide 1.109 has an estimated consumption for an adult of 190 kg/yr. RESRAD adjusts for contaminated and uncontaminated fractions based upon the size of the contaminated area (ANL, 1993).
- B. Leafy vegetable: Used the default value of 14 kg/yr. NRC Reg. Guide 1.109 has an estimated consumption for an adult of 64 kg/yr, while NRC estimates for dose from nuclear power plants uses a consumption rate of 30 kg/yr. RESRAD adjusts

for contaminated and uncontaminated fractions based upon the size of the contaminated area (ANL, 1993).

- C. Milk: Used the default value of 92 L/yr.
- D. Meat and poultry: Used the default value of 63 kg/yr.
- E. Fish/Seafood: Used the default values of 5.4 kg/yr for fish and 0.9 kg/yr for other seafood.
- F. Soil ingestion: Used the default value of 36.5 g/yr.
- G. Drinking water intake: Used the default value of 510 L/yr (1.4 L/d).

2. Contaminated Fractions:

NUREG-1569 states that for sites with over 25 acres (approximately 10,000 square meters) of contamination, the fraction of diet from contaminated area should be assumed to be 25% (0.25) (NRC, 2003).

No sensitivity analyses on these parameters were performed.

- A. Water: Used the value of 0 due to the aquifer being exempt from being used for drinking water.
- B. Livestock Water: Used default value of 1 (i.e., 100% is from contaminated water). All current water use for livestock around the site is from private wells and will likely continue to be in the foreseeable future.

- C. Irrigation Water: Used the default value of 1 (i.e., 100% is from contaminated water). All current water use for irrigation around the site is from private wells and will likely continue to be in the foreseeable future.
- D. Plant food: Used 0.25 as percentage of plant food that is contaminated.
- E. Meat: Used 0.25 as percentage of meat that is contaminated.
- F. Aquatic food: Used the value of 0 due to the semiarid environment of the site.
- G. Milk: Used the value of 0 due to no consumption of locally produced and consumed milk per NUREG-1569 (NRC, 2003).

Ingestion: Nondietary

1. Consumption Rates:

- A. Livestock fodder intake for meat: Used the default value of 68 kg/day.
- B. Livestock water intake for meat: Used the default value of 50 L/day. According to NRC Regulatory Guide 1.109 (NRC, 1977), the water ingestion rate for beef cattle is 50 L/d.
- C. Livestock intake of soil for meat: Used the default value of 0.5 g/day.
- D. Mass loading for foliar deposition: Used the default value of 0.0001 g/m³.

Sensitivity analysis on the plant (water independent) pathway was run with a multiple of 100 (i.e., 0.000001, 0.0001, and 0.01 g/m³). Using the higher value resulted in a small increase in the maximum dose rate. Using the lower value did not result in a change in the maximum dose rate. According to the Data Collection Handbook, the mid-range

value has been used by the EPA for screening calculations. Therefore the mid-range value is justified for use in the model. Graph attached.

E. Depth of soil mixing layer: Used the default value of 0.15 meters.

F. Depth of roots: Used 0.3 meters as a screening level based upon NUREG-1569. The root depth varies for different plants. For some plants, such as beets, carrots, lettuce, and so forth, it does not extend below about 0.3 m, which is the basis of the NRC guidance. For others, such as fruit trees, the roots may extend 2 or 3 m below the surface. Tap roots for some crops (e.g., alfalfa) can extend to 5 m. Most of the plant roots from which nutrients are obtained, however, usually extend to less than 1 m below the surface.

Sensitivity analysis on the plant (water independent) pathway was run with a multiple of 2 (i.e. 0.15, 0.3, and 0.6). There was a significant impact on the maximum dose. Assumption of a shallow root system increased the dose significantly. The NRC guidance is based on the shallow-rooted plants used for consumption. Therefore, the use of the root depth recommended in the NUREG-1569 in the model is conservative. Graph attached.

G. Groundwater fractional usage:

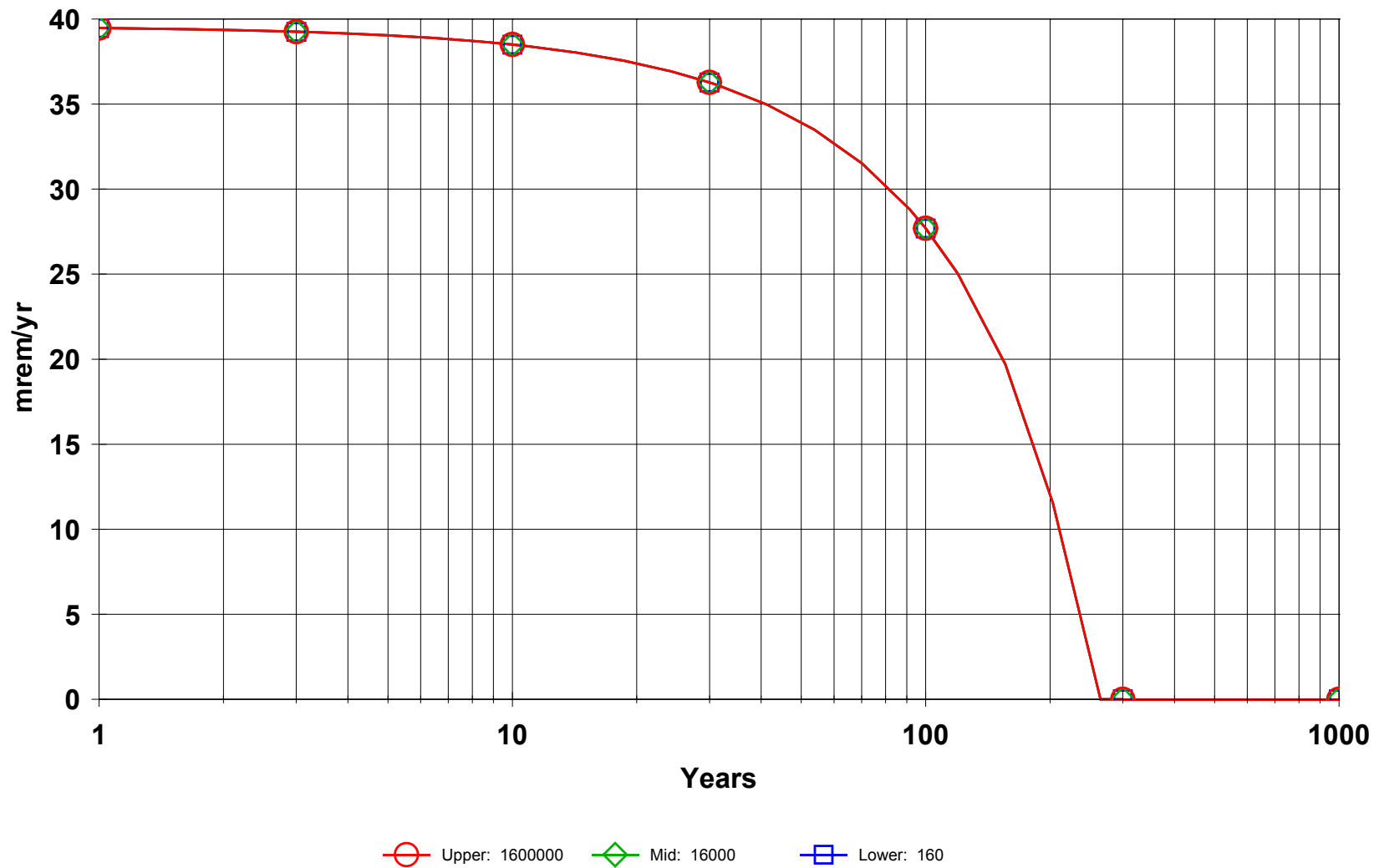
- Drinking water: Used the value of 0 due to the aquifer being exempt from being used for drinking water.
- Livestock water: Used the default value of 1.
- Irrigation water: Used the default value of 1.

Storage Times

Used the default values for all storage times (vegetables, meats, fodder, etc.).

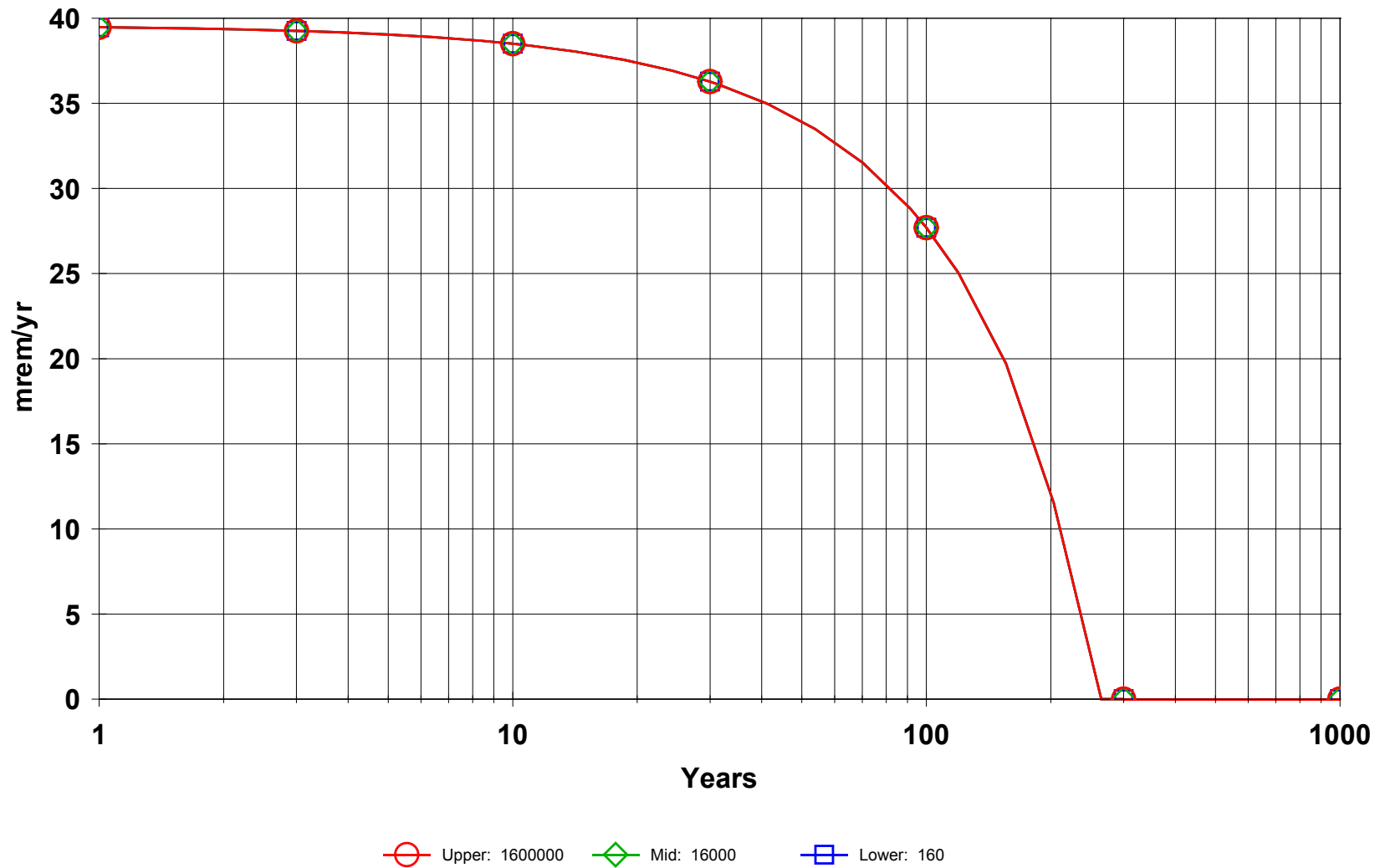
Appendix D-2
RESRAD Input Parameter Sensitivity Analysis

**DOSE: All Nuclides Summed, All Pathways Summed With SA on Pb-210 Contaminated Zone
Distribution Coefficient**



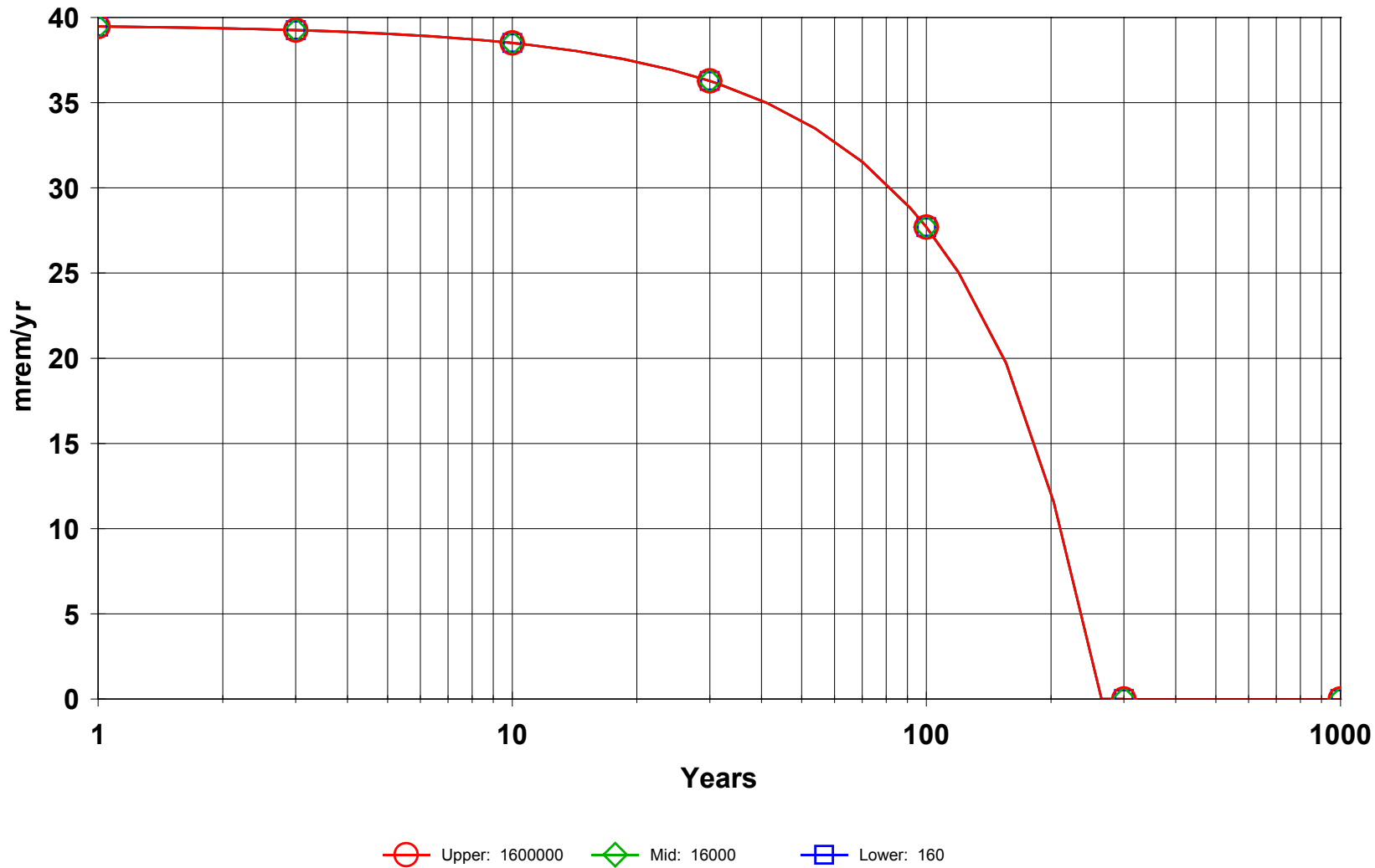
C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 13:36 GRAPHICS.ASC Includes All Pathways

DOSE: All Nuclides Summed, All Pathways Summed With SA on Pb-210 Saturated Zone Distribution Coefficient



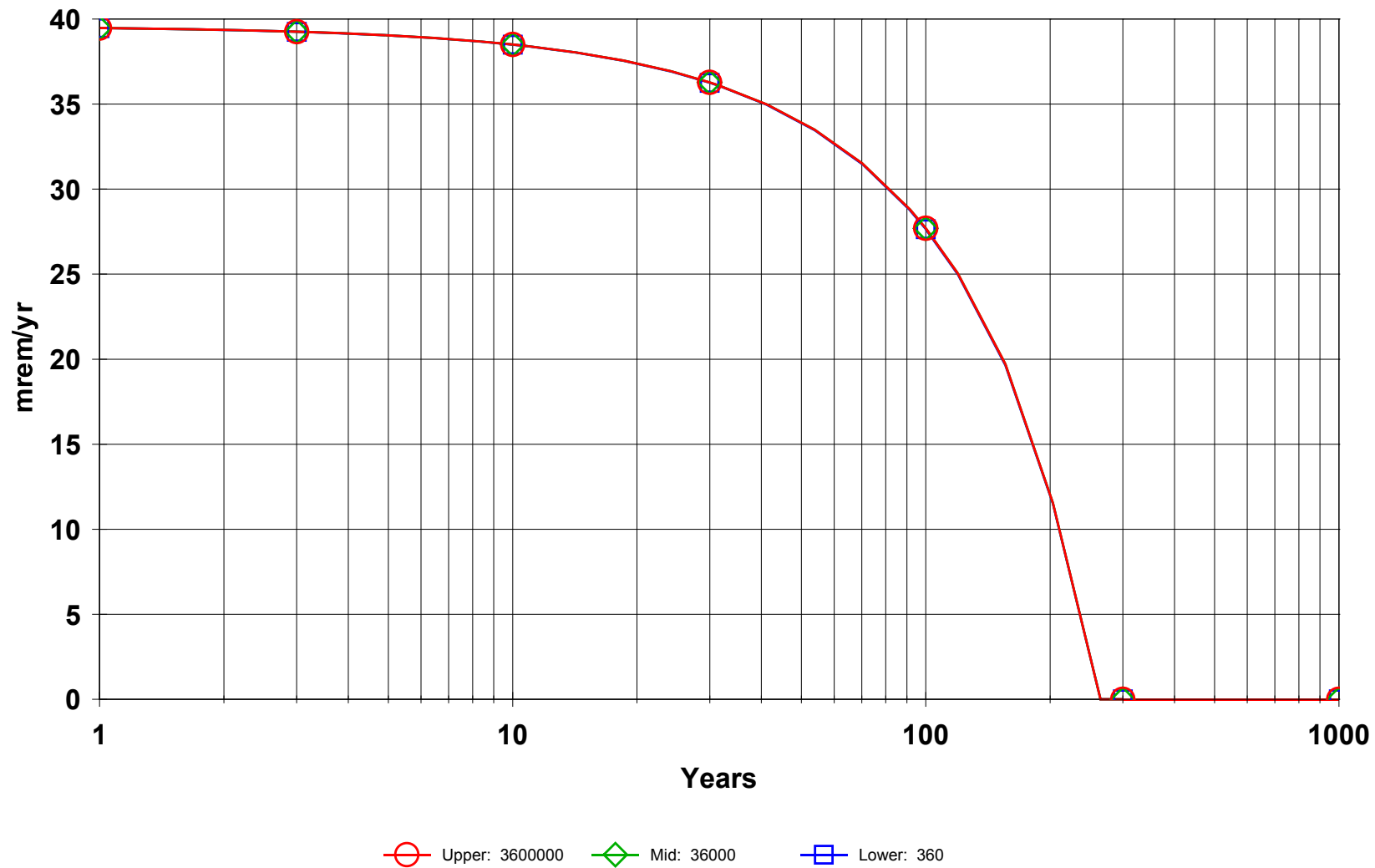
C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 13:36 GRAPHICS.ASC Includes All Pathways

DOSE: All Nuclides Summed, All Pathways Summed With SA on Pb-210 Unsaturated Zone Distribution Coefficient



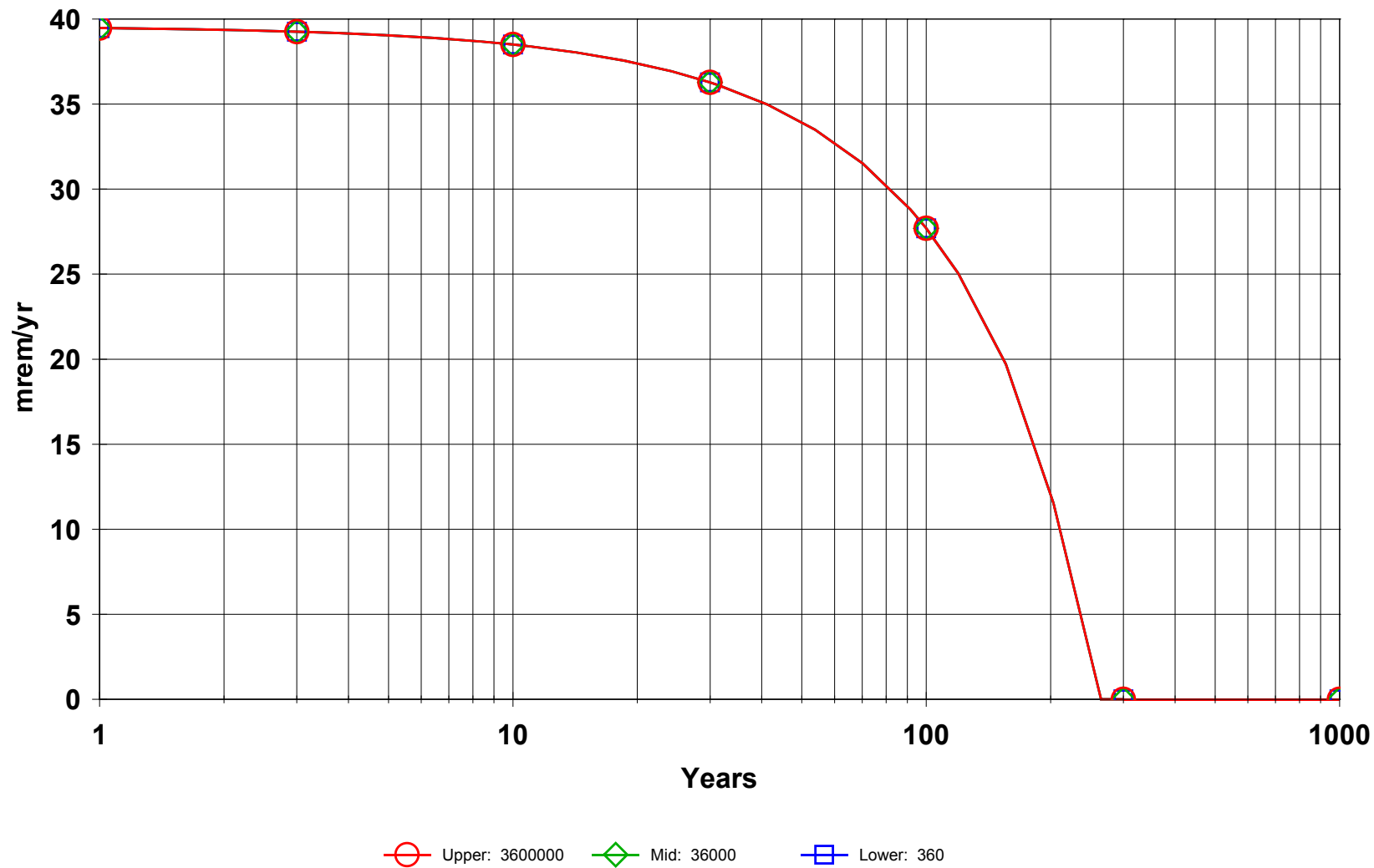
C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 13:36 GRAPHICS.ASC Includes All Pathways

DOSE: All Nuclides Summed, All Pathways Summed With SA on Ra-226 Contaminated Zone Distribution Coefficient



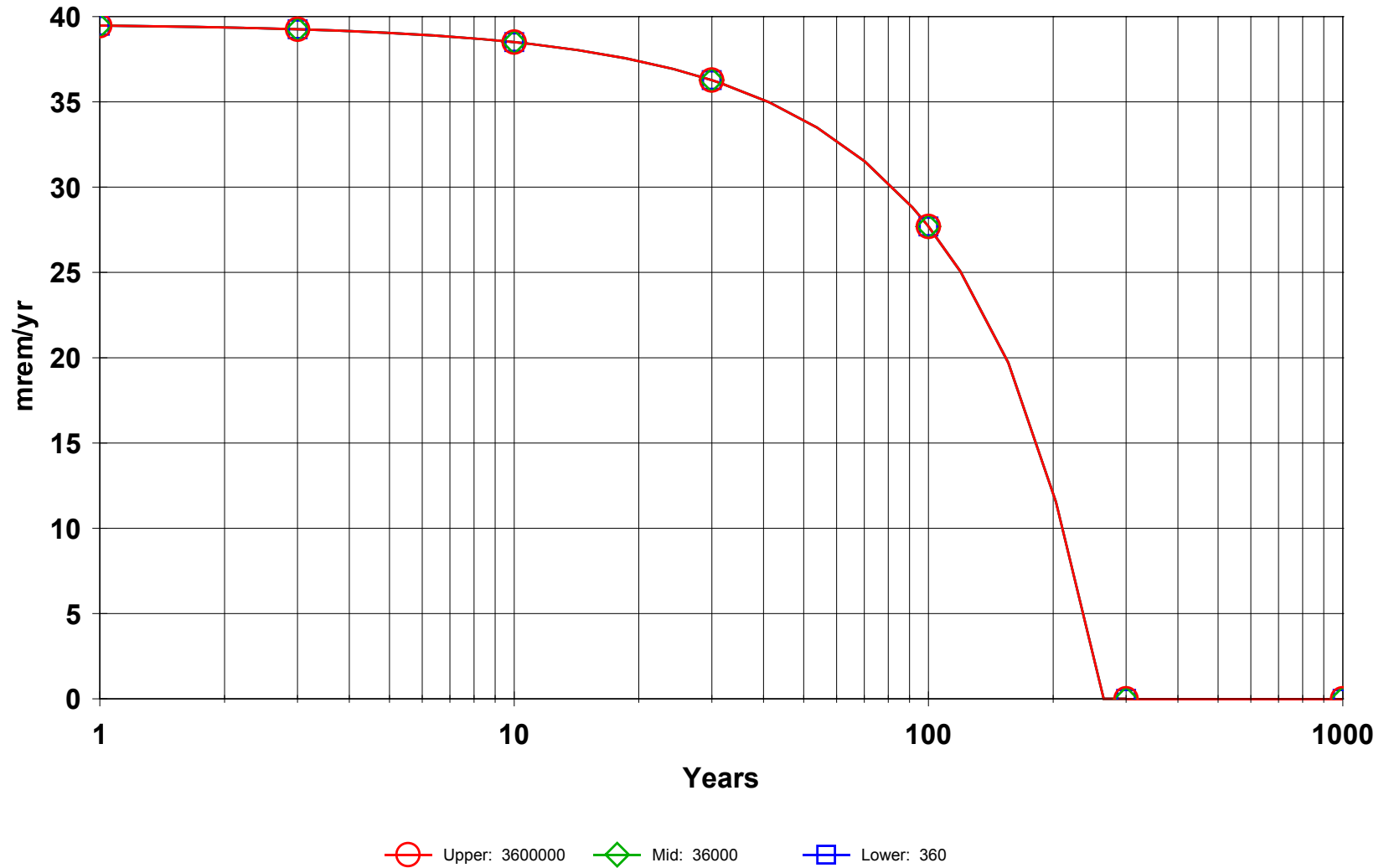
C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 13:36 GRAPHICS.ASC Includes All Pathways

**DOSE: All Nuclides Summed, All Pathways Summed With SA on Ra-226 Unsaturated Zone
Distribution Coefficient**



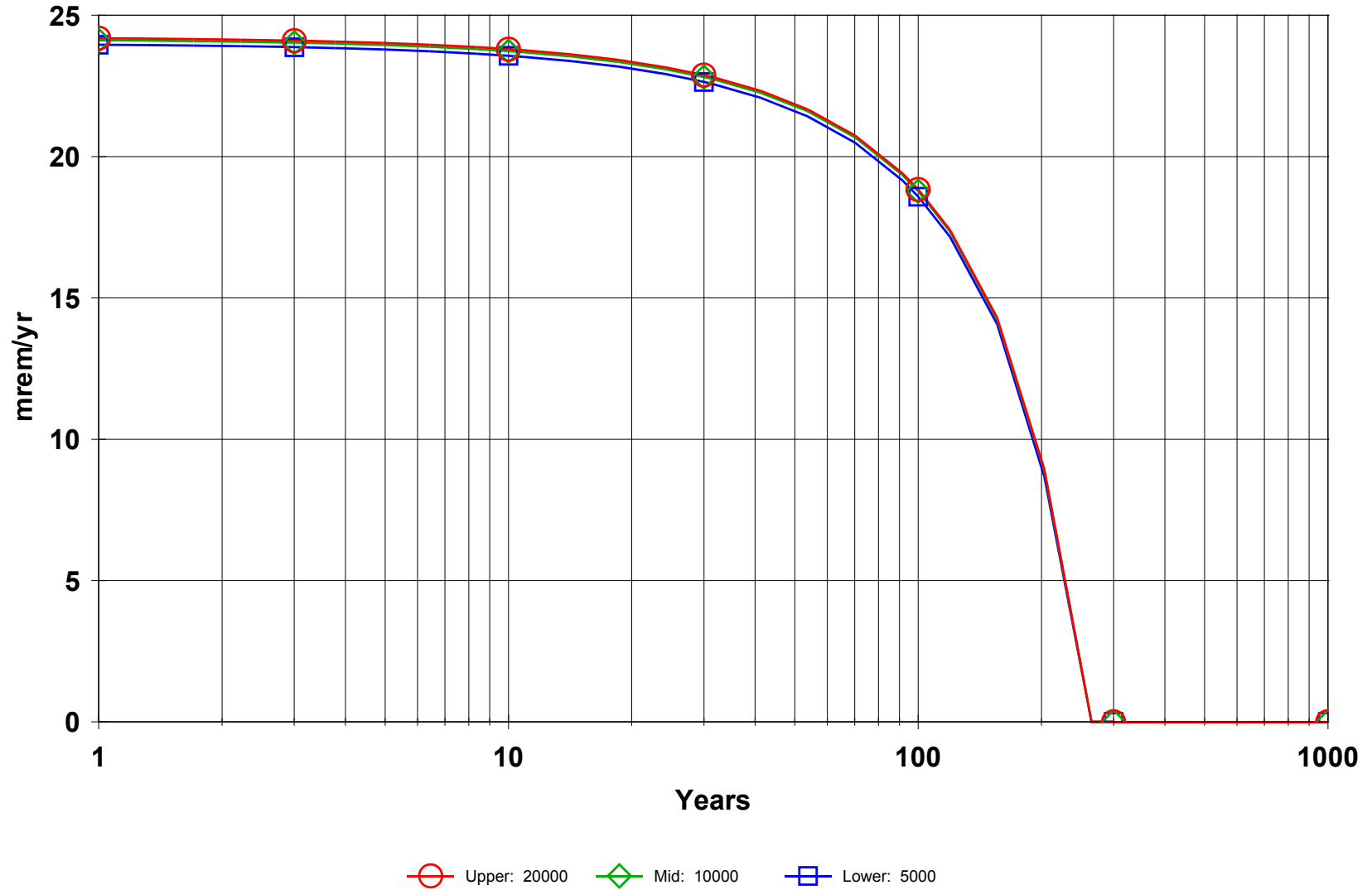
C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 13:36 GRAPHICS.ASC Includes All Pathways

DOSE: All Nuclides Summed, All Pathways Summed With SA on Ra-226 Saturated Zone Distribution Coefficient



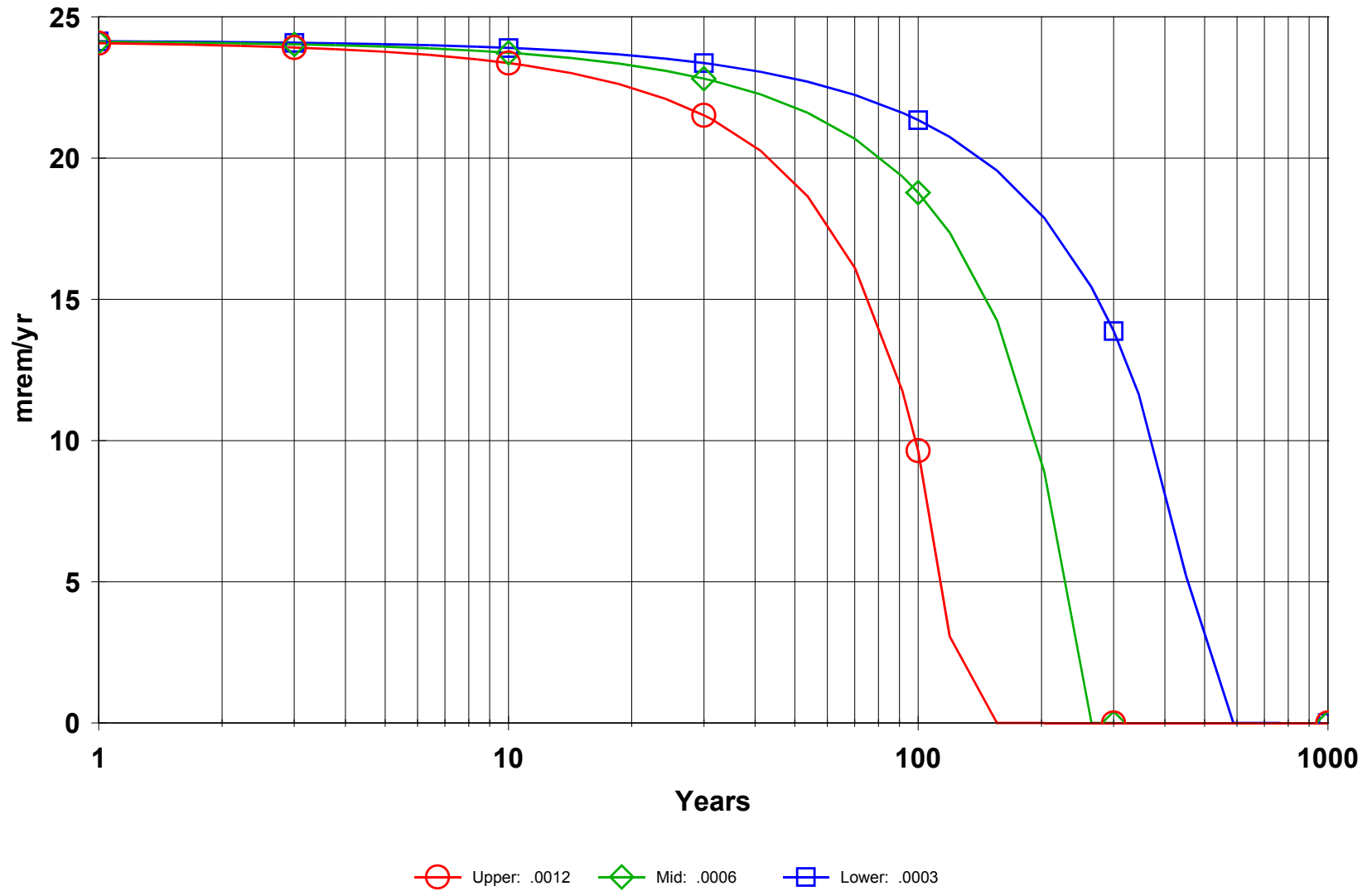
C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 15:09 GRAPHICS.ASC Includes All Pathways

DOSE: All Nuclides Summed, External With SA on Area of contaminated zone



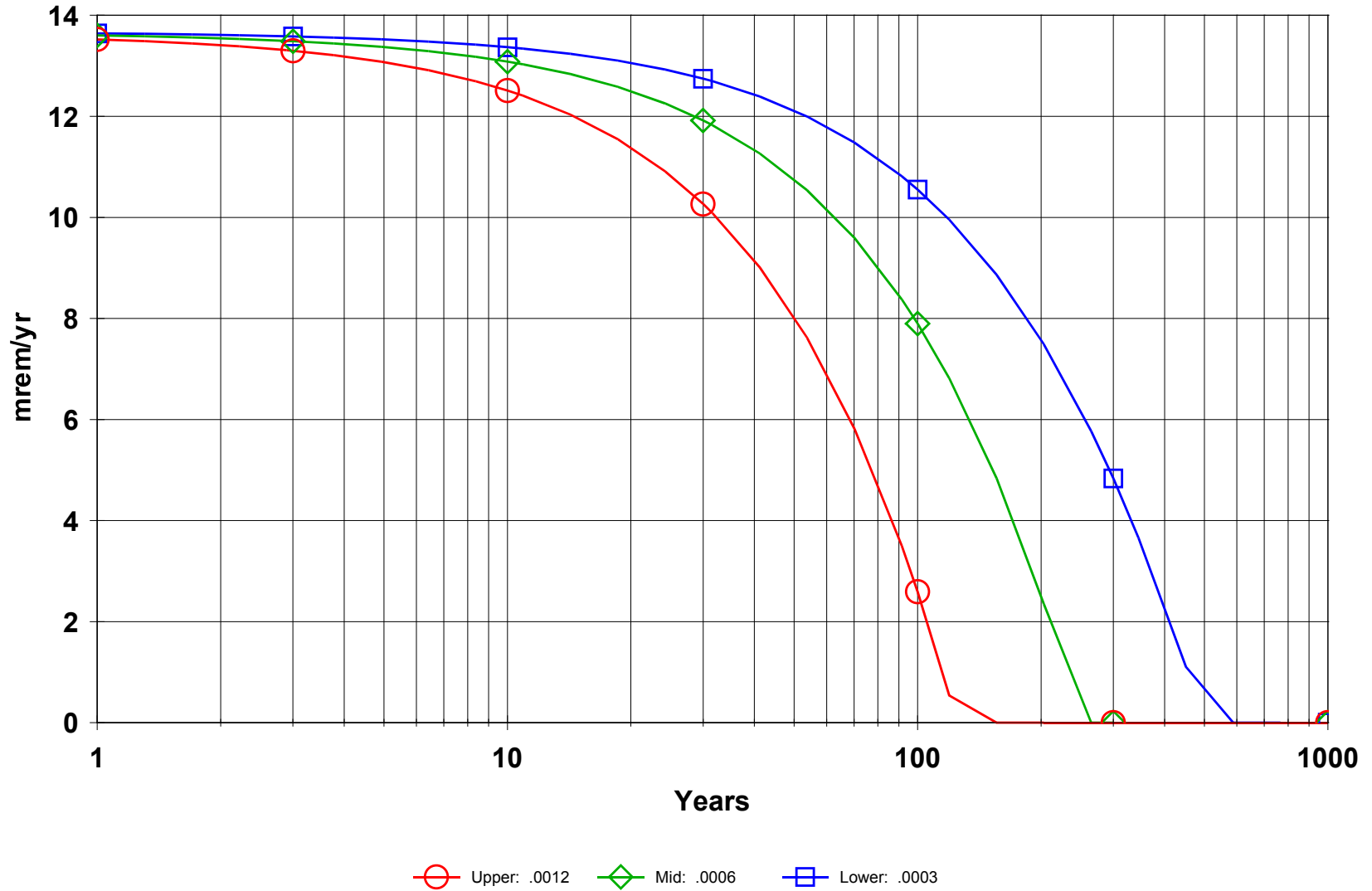
C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 15:09 GRAPHICS.ASC Pathways: External

DOSE: All Nuclides Summed, External With SA on Contaminated zone erosion rate



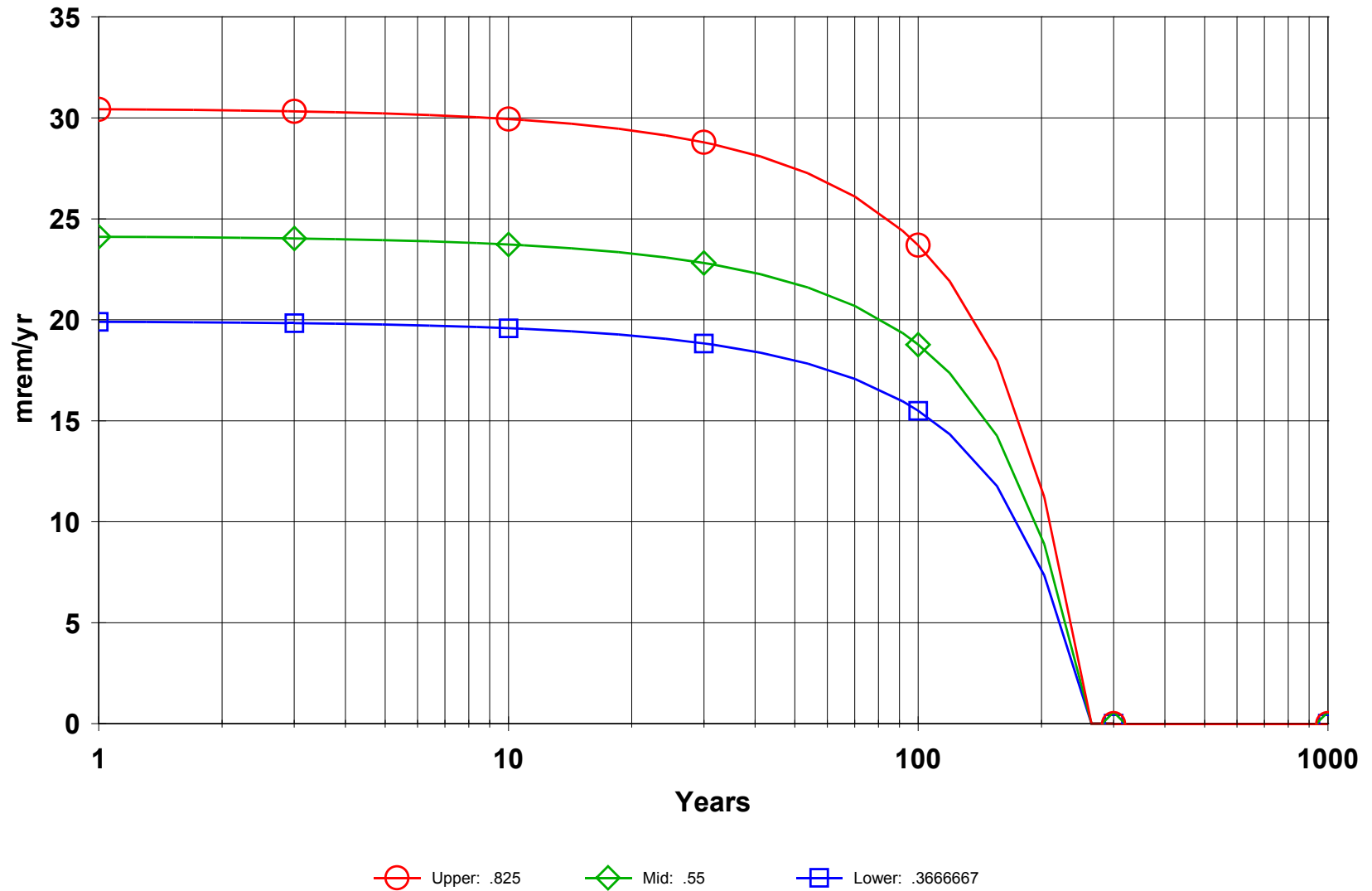
C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 15:09 GRAPHICS.ASC Pathways: External

DOSE: All Nuclides Summed, Plant (Water Independent) With SA on Contaminated zone erosion rate



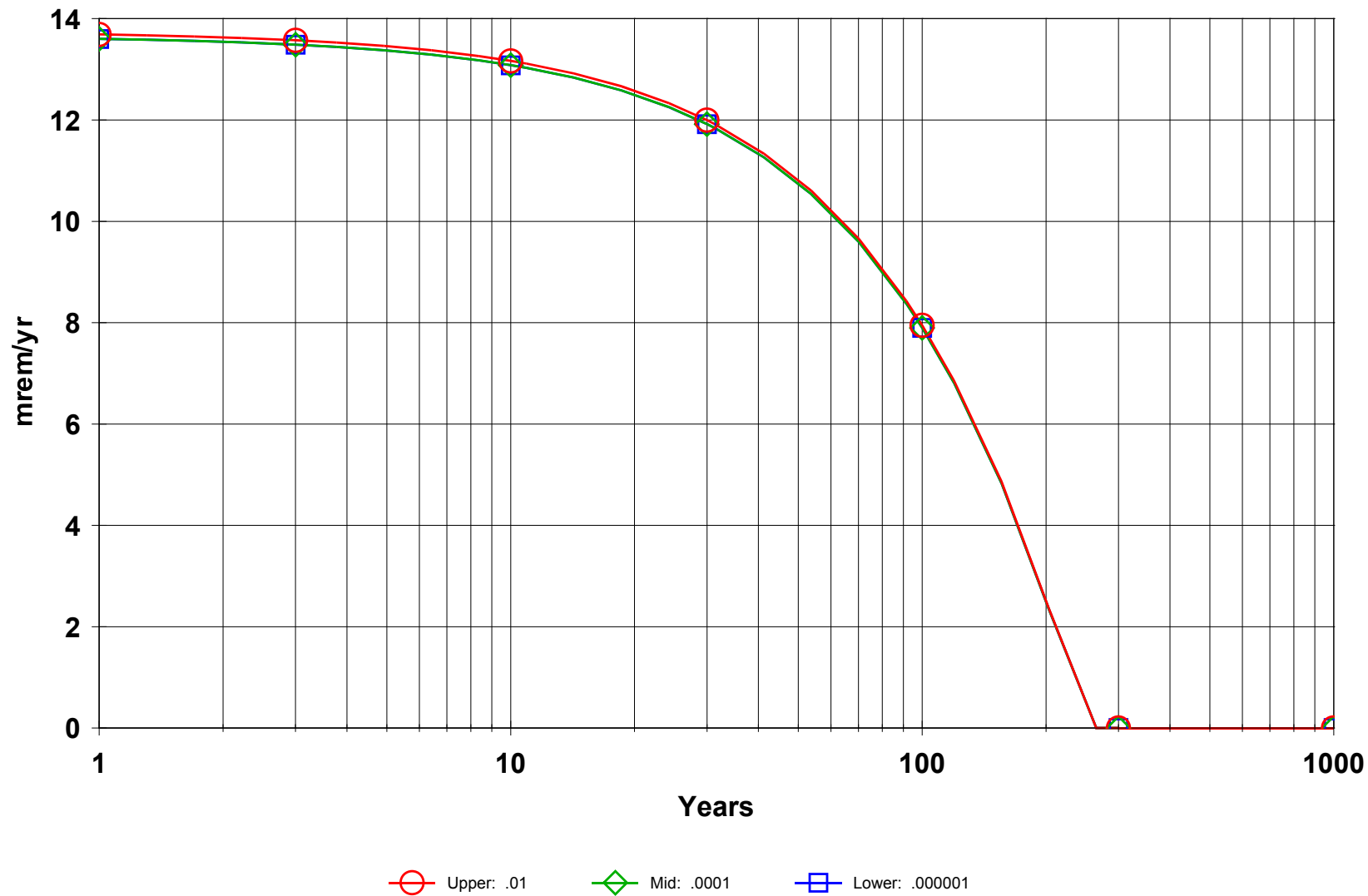
C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 15:09 GRAPHICS.ASC Pathways: Plant (Water Independent)

DOSE: All Nuclides Summed, External With SA on External Gamma Shielding factor



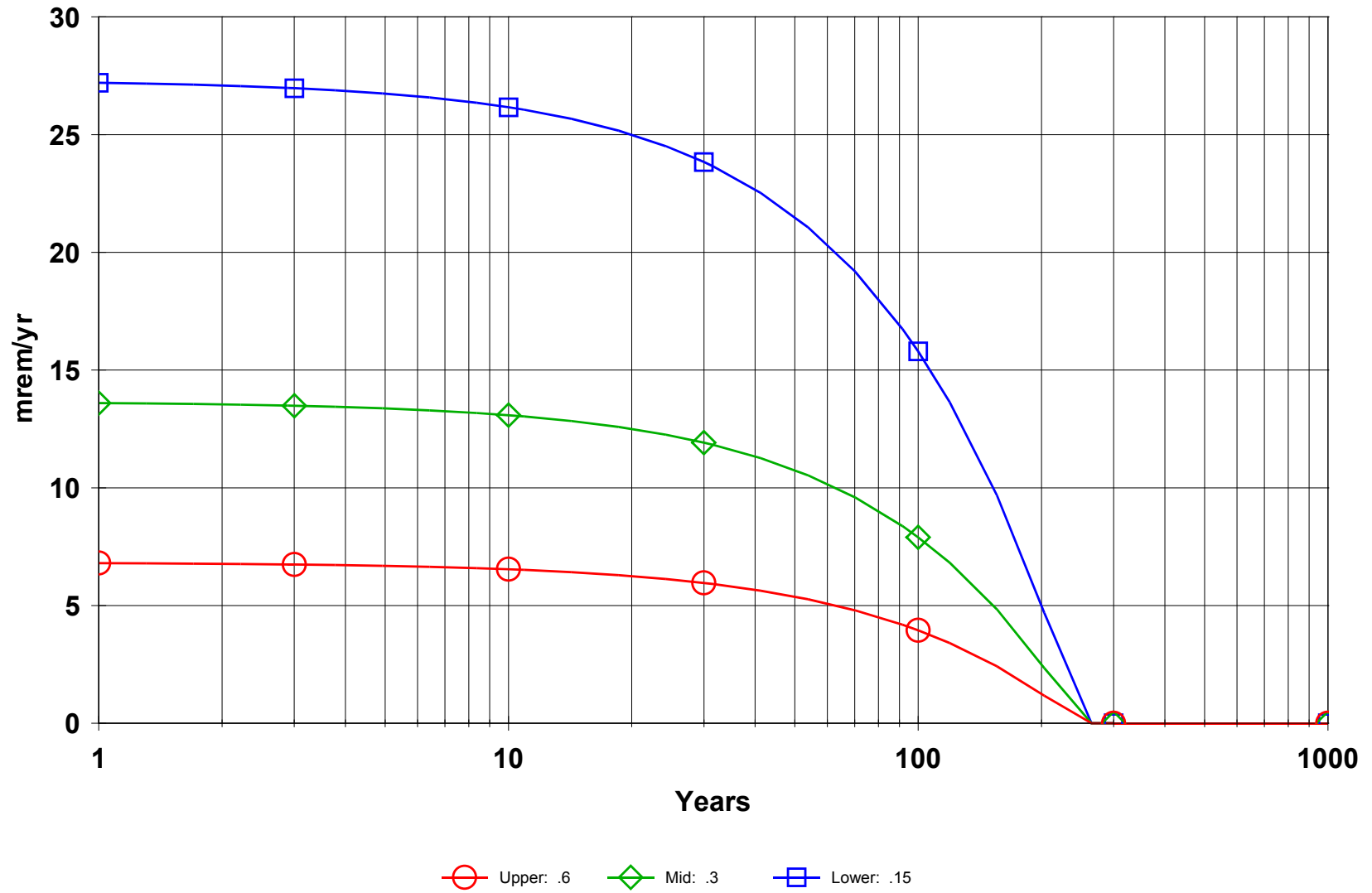
C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 15:09 GRAPHICS.ASC Pathways: External

DOSE: All Nuclides Summed, Plant (Water Independent) With SA on Mass loading for foliar deposition



C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 15:09 GRAPHICS.ASC Pathways: Plant (Water Independent)

DOSE: All Nuclides Summed, Plant (Water Independent) With SA on Depth of roots



C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD 12/10/2008 15:40 GRAPHICS.ASC Pathways: Plant (Water Independent)

Appendix D-3
RESRAD Model Output - Radium

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Time = 0.000E+00	9
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Time = 3.000E+00	11
Time = 1.000E+01	12
Time = 3.000E+01	13
Time = 1.000E+02	14
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Dose Conversion Factor (and Related) Parameter Summary
 Dose Library: FGR 11

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(1)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(2)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(3)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(4)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(5)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(6)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(7)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(8)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(9)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(10)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(11)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See EFTG table in Ground Pathway of Detailed Report.

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

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)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T (2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T (3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T (4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T (5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T (8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T (9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Pb-210	5.000E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Ra-226	5.000E+00	0.000E+00	---	S1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1 (1)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1 (2)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	6.000E-04	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	2.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	6.000E-02	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.470E+04	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	6.450E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	5.770E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	2.900E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.330E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	5.000E-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)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	2.500E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	1.900E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	6.000E-02	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	2.470E+04	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	6.450E+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)	5.490E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	5.330E+01	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	2.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	1.900E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	6.000E-02	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	6.450E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	2.470E+04	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.600E+04	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.600E+04	1.000E+02	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	1.600E+04	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.097E-07	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	3.600E+04	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	3.600E+04	7.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	3.600E+04	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.821E-07	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.500E-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)

Site-Specific Parameter Summary (continued)

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)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	0.000E+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	0.000E+00	5.000E-01	---	FR9
R018	Contamination fraction of plant food	2.500E-01	-1	---	FPLANT
R018	Contamination fraction of meat	2.500E-01	-1	---	FMEAT
R018	Contamination fraction of milk	0.000E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
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)	3.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	0.000E+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)

Site-Specific Parameter Summary (continued)

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
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	1	---	---	KYMAX

Summary of Pathway Selections

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

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANRADIUMBENCHMARK.RAD

Contaminated Zone Dimensions

Initial Soil Concentrations, pCi/g

Area: 10000.00 square meters
 Thickness: 0.15 meters
 Cover Depth: 0.00 meters

Pb-210 5.000E+00
 Ra-226 5.000E+00

0

Total Dose TDOSE(t), mrem/yr

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

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

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	3.957E+01	3.947E+01	3.926E+01	3.850E+01	3.627E+01	2.770E+01	0.000E+00	0.000E+00
M(t):	1.583E+00	1.579E+00	1.570E+00	1.540E+00	1.451E+00	1.108E+00	0.000E+00	0.000E+00

0Maximum TDOSE(t): 3.957E+01 mrem/yr at t = 0.000E+00 years

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- 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.
Pb-210	1.503E-02	0.0004	2.861E-03	0.0001	0.000E+00	0.0000	7.778E+00	0.1965	3.786E-01	0.0096	0.000E+00	0.0000	9.787E-01	0.0247
Ra-226	2.414E+01	0.6101	1.121E-03	0.0000	0.000E+00	0.0000	5.878E+00	0.1485	2.016E-01	0.0051	0.000E+00	0.0000	1.957E-01	0.0049
Total	2.416E+01	0.6105	3.982E-03	0.0001	0.000E+00	0.0000	1.366E+01	0.3451	5.802E-01	0.0147	0.000E+00	0.0000	1.174E+00	0.0297

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio- 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.
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	9.153E+00	0.2313
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.042E+01	0.7687
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	3.957E+01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- 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.
Pb-210	1.457E-02	0.0004	2.762E-03	0.0001	0.000E+00	0.0000	7.509E+00	0.1903	3.655E-01	0.0093	0.000E+00	0.0000	9.449E-01	0.0239
Ra-226	2.410E+01	0.6106	1.203E-03	0.0000	0.000E+00	0.0000	6.093E+00	0.1544	2.127E-01	0.0054	0.000E+00	0.0000	2.246E-01	0.0057
Total	2.411E+01	0.6110	3.965E-03	0.0001	0.000E+00	0.0000	1.360E+01	0.3446	5.782E-01	0.0146	0.000E+00	0.0000	1.170E+00	0.0296

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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.837E+00	0.2239
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.063E+01	0.7761
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	3.947E+01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- 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.
Pb-210	1.368E-02	0.0003	2.575E-03	0.0001	0.000E+00	0.0000	7.000E+00	0.1783	3.408E-01	0.0087	0.000E+00	0.0000	8.808E-01	0.0224
Ra-226	2.402E+01	0.6118	1.357E-03	0.0000	0.000E+00	0.0000	6.487E+00	0.1653	2.326E-01	0.0059	0.000E+00	0.0000	2.791E-01	0.0071
Total	2.403E+01	0.6122	3.932E-03	0.0001	0.000E+00	0.0000	1.349E+01	0.3436	5.734E-01	0.0146	0.000E+00	0.0000	1.160E+00	0.0295

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio- 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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.238E+00	0.2099
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.102E+01	0.7901
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	3.926E+01	1.0000

*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- 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.
Pb-210	1.098E-02	0.0003	2.012E-03	0.0001	0.000E+00	0.0000	5.471E+00	0.1421	2.663E-01	0.0069	0.000E+00	0.0000	6.885E-01	0.0179
Ra-226	2.372E+01	0.6161	1.803E-03	0.0000	0.000E+00	0.0000	7.612E+00	0.1977	2.900E-01	0.0075	0.000E+00	0.0000	4.374E-01	0.0114
Total	2.373E+01	0.6164	3.816E-03	0.0001	0.000E+00	0.0000	1.308E+01	0.3398	5.563E-01	0.0144	0.000E+00	0.0000	1.126E+00	0.0292

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio- 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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.439E+00	0.1673
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.206E+01	0.8327
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	3.850E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

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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.
Pb-210	5.852E-03	0.0002	9.905E-04	0.0000	0.000E+00	0.0000	2.693E+00	0.0742	1.311E-01	0.0036	0.000E+00	0.0000	3.389E-01	0.0093
Ra-226	2.281E+01	0.6288	2.488E-03	0.0001	0.000E+00	0.0000	9.226E+00	0.2544	3.759E-01	0.0104	0.000E+00	0.0000	6.882E-01	0.0190
Total	2.281E+01	0.6290	3.479E-03	0.0001	0.000E+00	0.0000	1.192E+01	0.3286	5.070E-01	0.0140	0.000E+00	0.0000	1.027E+00	0.0283

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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.170E+00	0.0874
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.310E+01	0.9126
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	3.627E+01	1.0000

0*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- 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.
Pb-210	6.314E-04	0.0000	7.658E-05	0.0000	0.000E+00	0.0000	2.082E-01	0.0075	1.014E-02	0.0004	0.000E+00	0.0000	2.620E-02	0.0009
Ra-226	1.878E+01	0.6780	2.230E-03	0.0001	0.000E+00	0.0000	7.690E+00	0.2777	3.261E-01	0.0118	0.000E+00	0.0000	6.552E-01	0.0237
Total	1.878E+01	0.6780	2.307E-03	0.0001	0.000E+00	0.0000	7.898E+00	0.2852	3.362E-01	0.0121	0.000E+00	0.0000	6.814E-01	0.0246

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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.453E-01	0.0089
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.745E+01	0.9911
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	2.770E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

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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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

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

Water Dependent Pathways

Radio- 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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
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*Sum of all water independent and dependent pathways.

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio- 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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio- 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.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
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*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

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Dose/Source Ratios Summed Over All Pathways

0 Parent (i)	Product (j)	Parent and Progeny Principal Radionuclide Contributions Indicated Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g)								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
Pb-210+D	Pb-210+D	1.000E+00	1.831E+00	1.767E+00	1.648E+00	1.288E+00	6.340E-01	4.905E-02	0.000E+00	0.000E+00	
0Ra-226+D	Ra-226+D	1.000E+00	6.050E+00	6.036E+00	6.009E+00	5.911E+00	5.621E+00	4.454E+00	0.000E+00	0.000E+00	
Ra-226+D	Pb-210+D	1.000E+00	3.353E-02	9.002E-02	1.948E-01	5.013E-01	9.994E-01	1.036E+00	0.000E+00	0.000E+00	
Ra-226+D	ΣDSR(j)		6.084E+00	6.126E+00	6.203E+00	6.412E+00	6.620E+00	5.490E+00	0.000E+00	0.000E+00	

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

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

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

0Nuclide (i)	t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210		1.366E+01	1.414E+01	1.517E+01	1.941E+01	3.943E+01	5.096E+02	*7.634E+13	*7.634E+13
Ra-226		4.109E+00	4.081E+00	4.030E+00	3.899E+00	3.776E+00	4.554E+00	*9.885E+11	*9.885E+11

*At specific activity limit

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

0Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Pb-210	5.000E+00	0.000E+00	1.831E+00	1.366E+01	1.831E+00	1.366E+01
Ra-226	5.000E+00	29.80 ± 0.06	6.620E+00	3.776E+00	6.084E+00	4.109E+00

Summary : RESRAD Default Parameters

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

ONuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr							
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	1.000E+00	9.153E+00	8.837E+00	8.238E+00	6.439E+00	3.170E+00	2.453E-01	0.000E+00	0.000E+00
Pb-210	Ra-226	1.000E+00	1.677E-01	4.501E-01	9.742E-01	2.506E+00	4.997E+00	5.181E+00	0.000E+00	0.000E+00
Pb-210	ΣDOSE(j)		9.320E+00	9.287E+00	9.212E+00	8.946E+00	8.167E+00	5.427E+00	0.000E+00	0.000E+00
ORa-226	Ra-226	1.000E+00	3.025E+01	3.018E+01	3.004E+01	2.955E+01	2.810E+01	2.227E+01	0.000E+00	0.000E+00

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

ONuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g							
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	1.000E+00	5.000E+00	4.847E+00	4.555E+00	3.664E+00	1.968E+00	2.234E-01	4.458E-04	1.584E-13
Pb-210	Ra-226	1.000E+00	0.000E+00	1.530E-01	4.449E-01	1.333E+00	3.009E+00	4.629E+00	4.452E+00	3.287E+00
Pb-210	ΣS(j):		5.000E+00	5.000E+00	5.000E+00	4.997E+00	4.977E+00	4.852E+00	4.452E+00	3.287E+00
ORa-226	Ra-226	1.000E+00	5.000E+00	4.998E+00	4.994E+00	4.978E+00	4.935E+00	4.788E+00	4.390E+00	3.242E+00

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

ORESCALC.EXE execution time = 18.66 seconds

Appendix D-4
RESRAD Model Output - Uranium

Summary : RESRAD Default Parameters

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Time = 3.000E+00	14
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Dose Conversion Factor (and Related) Parameter Summary
 Dose Library: FGR 11

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: FGR 12)	4.951E-04	4.951E-04	DCF1 (1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1 (2)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1 (3)
A-1	Bi-211 (Source: FGR 12)	2.559E-01	2.559E-01	DCF1 (4)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1 (5)
A-1	Fr-223 (Source: FGR 12)	1.980E-01	1.980E-01	DCF1 (6)
A-1	Pa-231 (Source: FGR 12)	1.906E-01	1.906E-01	DCF1 (7)
A-1	Pa-234 (Source: FGR 12)	1.155E+01	1.155E+01	DCF1 (8)
A-1	Pa-234m (Source: FGR 12)	8.967E-02	8.967E-02	DCF1 (9)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1 (10)
A-1	Pb-211 (Source: FGR 12)	3.064E-01	3.064E-01	DCF1 (11)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1 (12)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1 (13)
A-1	Po-211 (Source: FGR 12)	4.764E-02	4.764E-02	DCF1 (14)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1 (15)
A-1	Po-215 (Source: FGR 12)	1.016E-03	1.016E-03	DCF1 (16)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1 (17)
A-1	Ra-223 (Source: FGR 12)	6.034E-01	6.034E-01	DCF1 (18)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1 (19)
A-1	Rn-219 (Source: FGR 12)	3.083E-01	3.083E-01	DCF1 (20)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1 (21)
A-1	Th-227 (Source: FGR 12)	5.212E-01	5.212E-01	DCF1 (22)
A-1	Th-230 (Source: FGR 12)	1.209E-03	1.209E-03	DCF1 (23)
A-1	Th-231 (Source: FGR 12)	3.643E-02	3.643E-02	DCF1 (24)
A-1	Th-234 (Source: FGR 12)	2.410E-02	2.410E-02	DCF1 (25)
A-1	Tl-207 (Source: FGR 12)	1.980E-02	1.980E-02	DCF1 (26)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1 (27)
A-1	U-234 (Source: FGR 12)	4.017E-04	4.017E-04	DCF1 (28)
A-1	U-235 (Source: FGR 12)	7.211E-01	7.211E-01	DCF1 (29)
A-1	U-238 (Source: FGR 12)	1.031E-04	1.031E-04	DCF1 (30)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.724E+00	6.700E+00	DCF2 (1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2 (2)
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2 (3)
B-1	Ra-226+D	8.594E-03	8.580E-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	1.180E-01	1.180E-01	DCF2 (8)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2 (9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.410E-02	DCF3 (1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3 (2)
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3 (3)
D-1	Ra-226+D	1.321E-03	1.320E-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)

Dose Conversion Factor (and Related) Parameter Summary (continued)

Dose Library: FGR 11

0 Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-235+D	2.673E-04	2.660E-04	DCF3 (7)
D-1	U-238	2.550E-04	2.550E-04	DCF3 (8)
D-1	U-238+D	2.687E-04	2.550E-04	DCF3 (9)
D-34	Food transfer factors:			
D-34	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)
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF (8,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF (8,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF (8,3)
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF (9,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF (9,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF (9,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC (1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC (1,2)
D-5	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)

Dose Conversion Factor (and Related) Parameter Summary (continued)

Dose Library: FGR 11

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

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.

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

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)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T (2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T (3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T (4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T (5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T (6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T (7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T (8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T (9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-234	4.920E+01	0.000E+00	---	S1 (6)
R012	Initial principal radionuclide (pCi/g): U-235	2.200E+00	0.000E+00	---	S1 (7)
R012	Initial principal radionuclide (pCi/g): U-238	4.860E+01	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)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	6.000E-04	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	2.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	6.000E-02	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.470E+04	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	6.450E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	5.770E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	2.900E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.330E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	5.000E-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)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	2.500E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	1.900E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	6.000E-02	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	2.470E+04	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	6.450E+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)	5.490E+01	1.000E+01	---	DWIBWT

Site-Specific Parameter Summary (continued)

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)	5.330E+01	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	2.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	1.900E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	6.000E-02	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	6.450E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	2.470E+04	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	Unsat. 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	1.310E-04	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	Unsat. 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	1.310E-04	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	Unsat. 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	1.310E-04	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	Unsat. 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	3.268E-04	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	Unsat. 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	1.310E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)

Site-Specific Parameter Summary (continued)

0 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	6.552E-05	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	9.357E-05	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	1.093E-07	ALEACH (5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (5)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	5.500E-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)

Site-Specific Parameter Summary (continued)

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)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	0.000E+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	0.000E+00	5.000E-01	---	FR9
R018	Contamination fraction of plant food	2.500E-01	-1	---	FPLANT
R018	Contamination fraction of meat	2.500E-01	-1	---	FMEAT
R018	Contamination fraction of milk	0.000E+00	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
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)	3.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	0.000E+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)

Site-Specific Parameter Summary (continued)

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
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for 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	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	active

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANURANIUMBENCHMARK.RAD

Contaminated Zone Dimensions

Initial Soil Concentrations, pCi/g

Area: 10000.00 square meters
 Thickness: 0.15 meters
 Cover Depth: 0.00 meters

U-234 4.920E+01
 U-235 2.200E+00
 U-238 4.860E+01

0

Total Dose TDOSE(t), mrem/yr

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

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

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	6.867E+00	6.852E+00	6.823E+00	6.718E+00	6.409E+00	5.178E+00	0.000E+00	0.000E+00
M(t):	2.747E-01	2.741E-01	2.729E-01	2.687E-01	2.564E-01	2.071E-01	0.000E+00	0.000E+00

0Maximum TDOSE(t): 6.867E+00 mrem/yr at t = 0.000E+00 years

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANURANIUMBENCHMARK.RAD

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-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	1.003E-02	0.0015	1.627E-01	0.0237	0.000E+00	0.0000	7.559E-01	0.1101	4.355E-02	0.0063	0.000E+00	0.0000	3.804E-01	0.0554
U-235	8.183E-01	0.1192	6.779E-03	0.0010	0.000E+00	0.0000	3.198E-02	0.0047	1.853E-03	0.0003	0.000E+00	0.0000	1.607E-02	0.0023
U-238	3.389E+00	0.4935	1.437E-01	0.0209	0.000E+00	0.0000	7.090E-01	0.1032	4.085E-02	0.0059	0.000E+00	0.0000	3.568E-01	0.0520
Total	4.218E+00	0.6142	3.132E-01	0.0456	0.000E+00	0.0000	1.497E+00	0.2180	8.625E-02	0.0126	0.000E+00	0.0000	7.532E-01	0.1097

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

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-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	1.353E+00	0.1970
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	8.750E-01	0.1274
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	4.639E+00	0.6756
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	6.867E+00	1.0000

0*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANURANIUMBENCHMARK.RAD

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- 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	1.003E-02	0.0015	1.620E-01	0.0236	0.000E+00	0.0000	7.528E-01	0.1099	4.337E-02	0.0063	0.000E+00	0.0000	3.788E-01	0.0553
U-235	8.179E-01	0.1194	6.753E-03	0.0010	0.000E+00	0.0000	3.196E-02	0.0047	1.878E-03	0.0003	0.000E+00	0.0000	1.602E-02	0.0023
U-238	3.386E+00	0.4941	1.431E-01	0.0209	0.000E+00	0.0000	7.061E-01	0.1030	4.068E-02	0.0059	0.000E+00	0.0000	3.553E-01	0.0518
Total	4.214E+00	0.6149	3.119E-01	0.0455	0.000E+00	0.0000	1.491E+00	0.2176	8.593E-02	0.0125	0.000E+00	0.0000	7.501E-01	0.1095

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	1.347E+00	0.1966
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	8.745E-01	0.1276
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	4.631E+00	0.6758
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	6.852E+00	1.0000

0*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANURANIUMBENCHMARK.RAD

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- 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	1.003E-02	0.0015	1.607E-01	0.0235	0.000E+00	0.0000	7.466E-01	0.1094	4.301E-02	0.0063	0.000E+00	0.0000	3.757E-01	0.0551
U-235	8.169E-01	0.1197	6.701E-03	0.0010	0.000E+00	0.0000	3.191E-02	0.0047	1.927E-03	0.0003	0.000E+00	0.0000	1.592E-02	0.0023
U-238	3.378E+00	0.4952	1.419E-01	0.0208	0.000E+00	0.0000	7.002E-01	0.1026	4.034E-02	0.0059	0.000E+00	0.0000	3.523E-01	0.0516
Total	4.205E+00	0.6164	3.093E-01	0.0453	0.000E+00	0.0000	1.479E+00	0.2167	8.528E-02	0.0125	0.000E+00	0.0000	7.439E-01	0.1090

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio- 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	1.336E+00	0.1958
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	8.734E-01	0.1280
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	4.613E+00	0.6762
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	6.823E+00	1.0000

0*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANURANIUMBENCHMARK.RAD

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- 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	1.006E-02	0.0015	1.560E-01	0.0232	0.000E+00	0.0000	7.247E-01	0.1079	4.175E-02	0.0062	0.000E+00	0.0000	3.647E-01	0.0543
U-235	8.133E-01	0.1211	6.525E-03	0.0010	0.000E+00	0.0000	3.175E-02	0.0047	2.090E-03	0.0003	0.000E+00	0.0000	1.557E-02	0.0023
U-238	3.352E+00	0.4991	1.378E-01	0.0205	0.000E+00	0.0000	6.797E-01	0.1012	3.916E-02	0.0058	0.000E+00	0.0000	3.420E-01	0.0509
Total	4.176E+00	0.6216	3.003E-01	0.0447	0.000E+00	0.0000	1.436E+00	0.2138	8.300E-02	0.0124	0.000E+00	0.0000	7.223E-01	0.1075

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio- 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	1.297E+00	0.1931
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	8.693E-01	0.1294
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	4.551E+00	0.6775
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	6.718E+00	1.0000

0*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

File : C:\RESRAD_FAMILY\RESRAD\USERFILES\LUDEMANURANIUMBENCHMARK.RAD

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

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- 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	1.037E-02	0.0016	1.426E-01	0.0223	0.000E+00	0.0000	6.626E-01	0.1034	3.817E-02	0.0060	0.000E+00	0.0000	3.335E-01	0.0520
U-235	8.017E-01	0.1251	6.055E-03	0.0009	0.000E+00	0.0000	3.121E-02	0.0049	2.484E-03	0.0004	0.000E+00	0.0000	1.462E-02	0.0023
U-238	3.270E+00	0.5102	1.259E-01	0.0196	0.000E+00	0.0000	6.214E-01	0.0970	3.580E-02	0.0056	0.000E+00	0.0000	3.127E-01	0.0488
Total	4.082E+00	0.6369	2.746E-01	0.0428	0.000E+00	0.0000	1.315E+00	0.2052	7.646E-02	0.0119	0.000E+00	0.0000	6.608E-01	0.1031

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	1.187E+00	0.1853
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	8.561E-01	0.1336
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	4.366E+00	0.6812
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	6.409E+00	1.0000

0*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

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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	1.327E-02	0.0026	9.640E-02	0.0186	0.000E+00	0.0000	4.484E-01	0.0866	2.581E-02	0.0050	0.000E+00	0.0000	2.254E-01	0.0435
U-235	7.306E-01	0.1411	4.422E-03	0.0009	0.000E+00	0.0000	2.680E-02	0.0052	3.032E-03	0.0006	0.000E+00	0.0000	1.108E-02	0.0021
U-238	2.853E+00	0.5510	8.501E-02	0.0164	0.000E+00	0.0000	4.195E-01	0.0810	2.417E-02	0.0047	0.000E+00	0.0000	2.110E-01	0.0408
Total	3.597E+00	0.6947	1.858E-01	0.0359	0.000E+00	0.0000	8.947E-01	0.1728	5.301E-02	0.0102	0.000E+00	0.0000	4.475E-01	0.0864

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	8.093E-01	0.1563
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.759E-01	0.1498
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	3.593E+00	0.6939
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	5.178E+00	1.0000

0*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

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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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

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

Water Dependent Pathways

Radio- 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

0*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

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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	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio- 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

0*Sum of all water independent and dependent pathways.

Summary : RESRAD Default Parameters

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Dose/Source Ratios Summed Over All Pathways

0 Parent (i)	Product (j)	Parent and Progeny Principal Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g)								
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
U-234	U-234	1.000E+00	2.749E-02	2.738E-02	2.715E-02	2.636E-02	2.411E-02	1.633E-02	0.000E+00	0.000E+00	
U-234	Th-230	1.000E+00	1.679E-07	4.919E-07	1.130E-06	3.283E-06	8.729E-06	1.963E-05	0.000E+00	0.000E+00	
U-234	Ra-226+D	1.000E+00	3.849E-09	2.721E-08	1.440E-07	1.273E-06	1.026E-05	8.958E-05	0.000E+00	0.000E+00	
U-234	Pb-210+D	1.000E+00	1.248E-11	1.628E-10	1.711E-09	3.973E-08	7.568E-07	1.203E-05	0.000E+00	0.000E+00	
U-234	ΣDSR(j)		2.749E-02	2.738E-02	2.715E-02	2.637E-02	2.413E-02	1.645E-02	0.000E+00	0.000E+00	
0U-235+D	U-235+D	1.000E+00	3.977E-01	3.974E-01	3.967E-01	3.943E-01	3.867E-01	3.459E-01	0.000E+00	0.000E+00	
U-235+D	Pa-231	1.000E+00	3.385E-05	1.053E-04	2.471E-04	7.252E-04	1.933E-03	4.339E-03	0.000E+00	0.000E+00	
U-235+D	Ac-227+D	1.000E+00	3.015E-07	1.936E-06	9.597E-06	7.668E-05	4.991E-04	2.438E-03	0.000E+00	0.000E+00	
U-235+D	ΣDSR(j)		3.977E-01	3.975E-01	3.970E-01	3.951E-01	3.891E-01	3.527E-01	0.000E+00	0.000E+00	
0U-238	U-238	5.400E-05	1.329E-06	1.324E-06	1.313E-06	1.275E-06	1.165E-06	7.874E-07	0.000E+00	0.000E+00	
0U-238+D	U-238+D	9.999E-01	9.546E-02	9.528E-02	9.492E-02	9.364E-02	8.983E-02	7.393E-02	0.000E+00	0.000E+00	
U-238+D	U-234	9.999E-01	3.894E-08	1.164E-07	2.694E-07	7.847E-07	2.085E-06	4.652E-06	0.000E+00	0.000E+00	
U-238+D	Th-230	9.999E-01	1.620E-13	1.097E-12	5.675E-12	4.897E-11	3.774E-10	2.792E-09	0.000E+00	0.000E+00	
U-238+D	Ra-226+D	9.999E-01	2.710E-15	4.115E-14	4.817E-13	1.264E-11	2.958E-10	8.526E-09	0.000E+00	0.000E+00	
U-238+D	Pb-210+D	9.999E-01	7.415E-18	1.983E-16	4.454E-15	3.038E-13	1.714E-11	9.614E-10	0.000E+00	0.000E+00	
U-238+D	ΣDSR(j)		9.546E-02	9.528E-02	9.492E-02	9.364E-02	8.983E-02	7.393E-02	0.000E+00	0.000E+00	

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

0

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

0Nuclide (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
U-234	9.094E+02	9.131E+02	9.207E+02	9.482E+02	1.036E+03	1.520E+03	*6.247E+09	*6.247E+09
U-235	6.285E+01	6.289E+01	6.298E+01	6.327E+01	6.425E+01	7.089E+01	*2.161E+06	*2.161E+06
U-238	2.619E+02	2.624E+02	2.634E+02	2.670E+02	2.783E+02	3.381E+02	*3.361E+05	*3.361E+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 = 0.000E+00 years

0Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
U-234	4.920E+01	0.000E+00	2.749E-02	9.094E+02	2.749E-02	9.094E+02
U-235	2.200E+00	0.000E+00	3.977E-01	6.285E+01	3.977E-01	6.285E+01
U-238	4.860E+01	0.000E+00	9.546E-02	2.619E+02	9.546E-02	2.619E+02

Summary : RESRAD Default Parameters

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Individual Nuclide Dose Summed Over All Pathways										
Parent Nuclide and Branch Fraction Indicated										
ONuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr							
			t=	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
U-234	U-234	1.000E+00	1.353E+00	1.347E+00	1.336E+00	1.297E+00	1.186E+00	8.033E-01	0.000E+00	0.000E+00
U-234	U-238	9.999E-01	1.892E-06	5.657E-06	1.309E-05	3.813E-05	1.013E-04	2.261E-04	0.000E+00	0.000E+00
U-234	ΣDOSE(j)		1.353E+00	1.347E+00	1.336E+00	1.297E+00	1.186E+00	8.033E-01	0.000E+00	0.000E+00
0Th-230	U-234	1.000E+00	8.259E-06	2.420E-05	5.561E-05	1.615E-04	4.295E-04	9.660E-04	0.000E+00	0.000E+00
Th-230	U-238	9.999E-01	7.872E-12	5.331E-11	2.758E-10	2.380E-09	1.834E-08	1.357E-07	0.000E+00	0.000E+00
Th-230	ΣDOSE(j)		8.259E-06	2.420E-05	5.561E-05	1.615E-04	4.295E-04	9.661E-04	0.000E+00	0.000E+00
0Ra-226	U-234	1.000E+00	1.894E-07	1.339E-06	7.084E-06	6.261E-05	5.047E-04	4.407E-03	0.000E+00	0.000E+00
Ra-226	U-238	9.999E-01	1.317E-13	2.000E-12	2.341E-11	6.143E-10	1.438E-08	4.144E-07	0.000E+00	0.000E+00
Ra-226	ΣDOSE(j)		1.894E-07	1.339E-06	7.084E-06	6.261E-05	5.047E-04	4.408E-03	0.000E+00	0.000E+00
0Pb-210	U-234	1.000E+00	6.142E-10	8.008E-09	8.420E-08	1.955E-06	3.723E-05	5.920E-04	0.000E+00	0.000E+00
Pb-210	U-238	9.999E-01	3.604E-16	9.639E-15	2.165E-13	1.476E-11	8.330E-10	4.672E-08	0.000E+00	0.000E+00
Pb-210	ΣDOSE(j)		6.142E-10	8.008E-09	8.420E-08	1.955E-06	3.723E-05	5.920E-04	0.000E+00	0.000E+00
0U-235	U-235	1.000E+00	8.750E-01	8.742E-01	8.728E-01	8.675E-01	8.507E-01	7.610E-01	0.000E+00	0.000E+00
0Pa-231	U-235	1.000E+00	7.448E-05	2.316E-04	5.437E-04	1.595E-03	4.253E-03	9.546E-03	0.000E+00	0.000E+00
0Ac-227	U-235	1.000E+00	6.632E-07	4.259E-06	2.111E-05	1.687E-04	1.098E-03	5.364E-03	0.000E+00	0.000E+00
0U-238	U-238	5.400E-05	6.461E-05	6.434E-05	6.381E-05	6.194E-05	5.663E-05	3.827E-05	0.000E+00	0.000E+00
U-238	U-238	9.999E-01	4.639E+00	4.631E+00	4.613E+00	4.551E+00	4.366E+00	3.593E+00	0.000E+00	0.000E+00
U-238	ΣDOSE(j)		4.639E+00	4.631E+00	4.613E+00	4.551E+00	4.366E+00	3.593E+00	0.000E+00	0.000E+00

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

Summary : RESRAD Default Parameters

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Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

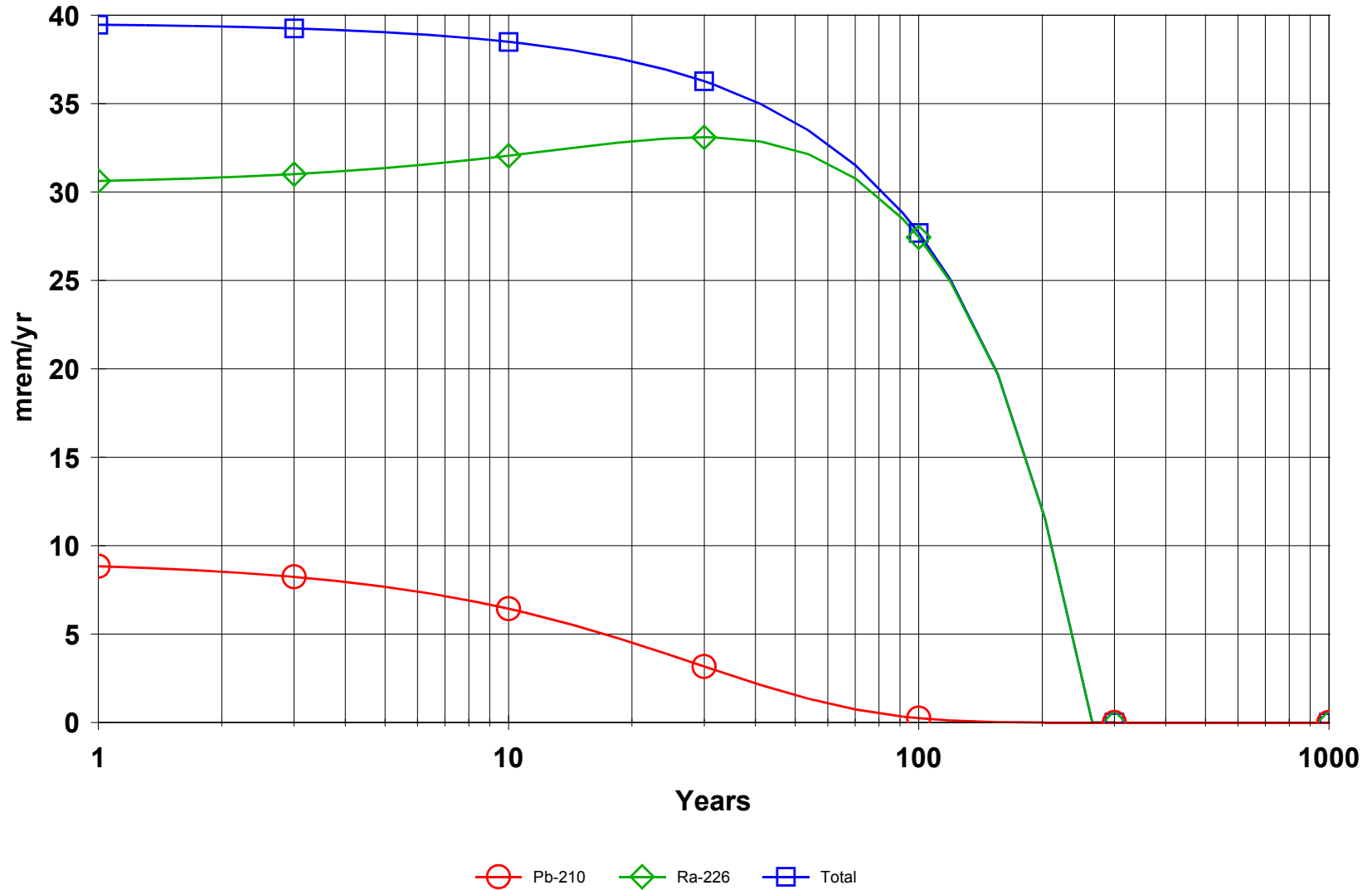
ONuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g							
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	4.920E+01	4.919E+01	4.918E+01	4.913E+01	4.900E+01	4.855E+01	4.726E+01	4.304E+01
U-234	U-238	9.999E-01	0.000E+00	1.378E-04	4.132E-04	1.376E-03	4.117E-03	1.360E-02	3.972E-02	1.207E-01
U-234	ΣS(j):		4.920E+01	4.919E+01	4.918E+01	4.914E+01	4.901E+01	4.856E+01	4.730E+01	4.316E+01
0Th-230	U-234	1.000E+00	0.000E+00	4.429E-04	1.328E-03	4.426E-03	1.326E-02	4.397E-02	1.301E-01	4.126E-01
Th-230	U-238	9.999E-01	0.000E+00	6.200E-10	5.579E-09	6.195E-08	5.566E-07	6.145E-06	5.430E-05	5.662E-04
Th-230	ΣS(j):		0.000E+00	4.429E-04	1.328E-03	4.426E-03	1.326E-02	4.398E-02	1.301E-01	4.132E-01
0Ra-226	U-234	1.000E+00	0.000E+00	9.591E-08	8.628E-07	9.572E-06	8.577E-05	9.382E-04	8.079E-03	7.720E-02
Ra-226	U-238	9.999E-01	0.000E+00	8.953E-14	2.416E-12	8.937E-11	2.403E-09	8.778E-08	2.278E-06	7.358E-05
Ra-226	ΣS(j):		0.000E+00	9.591E-08	8.628E-07	9.572E-06	8.577E-05	9.383E-04	8.082E-03	7.728E-02
0Pb-210	U-234	1.000E+00	0.000E+00	9.861E-10	2.621E-08	9.196E-07	2.147E-05	5.214E-04	6.558E-03	7.271E-02
Pb-210	U-238	9.999E-01	0.000E+00	6.914E-16	5.530E-14	6.536E-12	4.704E-10	4.089E-08	1.690E-06	6.717E-05
Pb-210	ΣS(j):		0.000E+00	9.861E-10	2.621E-08	9.196E-07	2.147E-05	5.214E-04	6.560E-03	7.278E-02
0U-235	U-235	1.000E+00	2.200E+00	2.200E+00	2.199E+00	2.197E+00	2.191E+00	2.171E+00	2.115E+00	1.930E+00
0Pa-231	U-235	1.000E+00	0.000E+00	4.654E-05	1.396E-04	4.648E-04	1.391E-03	4.589E-03	1.338E-02	4.041E-02
0Ac-227	U-235	1.000E+00	0.000E+00	7.330E-07	6.457E-06	6.669E-05	4.940E-04	3.196E-03	1.192E-02	3.892E-02
0U-238	U-238	5.400E-05	2.624E-03	2.624E-03	2.623E-03	2.621E-03	2.614E-03	2.590E-03	2.523E-03	2.302E-03
U-238	U-238	9.999E-01	4.860E+01	4.859E+01	4.858E+01	4.853E+01	4.841E+01	4.797E+01	4.673E+01	4.263E+01
U-238	ΣS(j):		4.860E+01	4.859E+01	4.858E+01	4.854E+01	4.841E+01	4.797E+01	4.673E+01	4.263E+01

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

ORESCALC.EXE execution time = 1.28 seconds

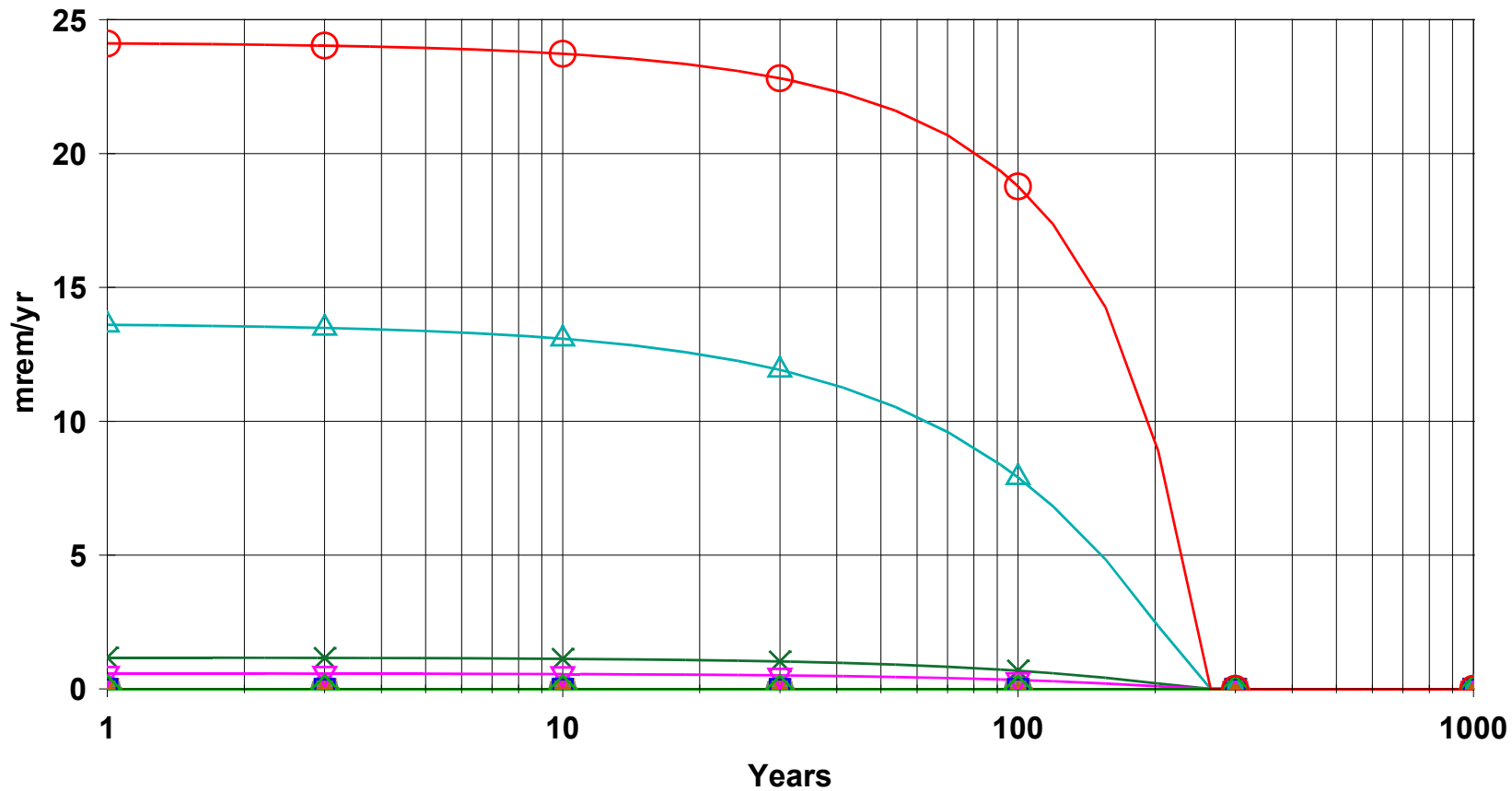
Appendix D-5
Standard Graphics for Radium and
Natural Uranium Dose Modeling

Radium Dose Graphics: DOSE: All Nuclides Summed, All Pathways Summed



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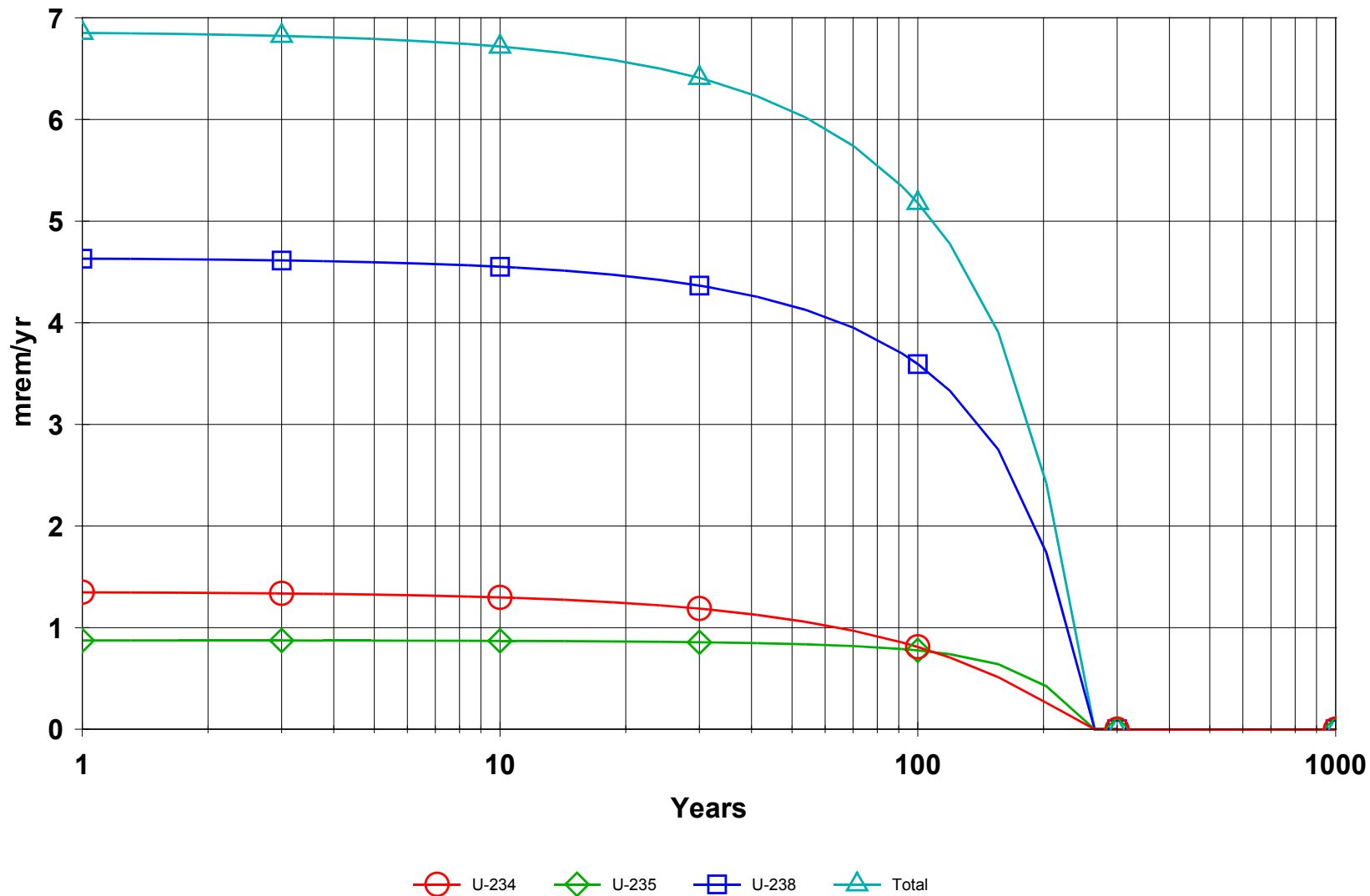
Radium Dose Graphics: DOSE: All Nuclides Summed, Component Pathways



- | | | | |
|---------------------------|--------------------------|-------------------------|------------------------|
| External | Meat (Water Independent) | Fish | Milk (Water Dependent) |
| Inhalation | Milk (Water Independent) | Radon (Water Dependent) | |
| Radon (Water Independent) | Soil Ingest | Plant (Water Dependent) | |
| Plant (Water Independent) | Drinking Water | Meat (Water Dependent) | |

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Natural Uranium Dose Graphics: DOSE: All Nuclides Summed, All Pathways Summed



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ADDENDUM 6-C
SURETY COST ESTIMATES