DEPARTMENT OF THE ARMY
US ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND
ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
PICATINNY, NEW JERSEY 07806-5000

MS 16
Q-5

26 September 2007

Docket Nos. 030-05215
040-06377
Control Nos. 138807
138808

License Nos. 29-00047-02
SUB-348

Ms. Betsy Ullrich
Senior Health Physicist
Commercial and R&D Branch
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety
U.S. Nuclear Regulatory Commission – Region 1
475 Allendale Road
King of Prussia, Pa. 19406-1415

RECEIVED
REGION 1
2007 OCT -1 PM 1:50

Dear Ms. Ullrich,

This is a follow-up to your 17 July 2007 e-mail message (encl 1) requesting answers to two questions you received from a reviewer in your Decommissioning Office based on that person's examination of the "New World Technology, Final Report, Picatinny Arsenal Radiological Remediation / Release Surveys and Sampling Project, Revision 4, September 27, 2006.

In order to continue your assessment please find attached a memorandum (encl 2) from our contractor for this decommissioning project, New World Technology, dated 22 August 2007, which summarizes the responses to those questions concurred in by our office, as well as the subsequent modified pages and RESRAD files to the aforementioned report (encl 3) along with a floppy disc containing that updated information. The submitted information should satisfy the NRC criterion for action to amend ARDEC's licenses and lead to the release for unrestricted use Building 167 and its surrounding grounds, Magazine 3018 and Bunker 3030 without radiological restrictions.

Point of contact regarding this correspondence is either Mr. Joseph Fabiano, (973) 724-3742, joseph.a.fabiano@us.army.mil , or the undersigned at (973) 724-3126, richard.w.fliszar@us.army.mil.

Sincerely,

Richard W. Fliszar

Richard W. Fliszar
RDECOM-ARDEC Radiation Protection Officer

Copies Furnished (w/o encl):

138807 / 138808

Printed on Recycled Paper

AMSTA-AR-QES-C (Mr. Sami Hoxha – Chairman IRCC)
AMSTA-AR-QES (Ms. Alison Schwier)
AMSTA-AR-QES-F (Mr. Mike Zecca)
Commander, HQ U.S. Army Field Support Command, ATTN: AMSFS-SF (Mr. Frank Whitaker)
Commander, HQ U.S. Army Materiel Command, ATTN: AMCPE-SG (Major Robert Prins)
Commander, HQ U.S. Army Research, Development and Engineering Command, ATTN: AMSRD-MSF (Ms. Laverne Ogieste)
AMSTA-AAR- AEE-W (Dr. C. Rao Surapaneni)

-----Original Message-----
From: Elizabeth Ullrich [mailto:EXU@nrc.gov]
Sent: Tuesday, July 17, 2007 10:45 AM
To: Rich Fliszar
Cc: Joseph Fabiano
Subject: questions regarding 138807/138808 actions

Rich and Joe,

My apologies, I received these questions last month from the reviewer in our Decommissioning office, and did not do a letter to you. Can you let me know if you think you can get answers to these questions quickly, or not at all?
I know you said you were no longer getting any responses from your contractor.

In the first question, we need to know why the contractor changed the value of the default room from 36 square meters to 100 square meters, in determining the thorium DCGL. the default value is 36 m-sqd, and the DCGL calculated using this value exceeds the 25-mrem in a year limit. If there is a justifiable reason for using 100 m-sqd, we need to know what that reason is and its basis.

Betsy

****
1. In reference to the document "New World Technology, Final Report, Picatinny Arsenal Radiological Remediation/Release Surveys and Sampling Project, Revision 4, September 27, 2006, Table 2 "Resrad-Build Input Parameters" of page 21 lists the room area parameter value as 36 m2. This
value is used for all radionuclides of concern except for thorium-232 (Th-232). The room area parameter value used for Th-232 is 100 m2. Please
justify the room area parameter value used for Th-232.

2. Page 23 of the Final Report, Revision 4, states that the input soil concentration value used for barium-133 (Ba-133) is 48 pCi/g. Table 5 of page 26 also states this input value. However, in Appendix JJ of the Final Report, the input file (RESRAD Version 6.3) on page 562, reports an input soil value of 6 pCi/g for Ba-133. Please clarify this discrepancy.

NOTE:
Table 5 of page 26 of the Final Report, Revision 4, states a resulting dose of 14.7 mrem/year. Using RESRAD Version 6.3, the NRC staff performed an independent dose analysis for Ba-133, using an input soil concentration value of 48 pCi/g for Ba-133 as well as using the other parameter values selected by the licensee as stated on page 23-25 of the Final Report. The dose for Ba-133 resulted in
16.64
mrem/year. NRC staff was not able to verify the 14.7 mrem/year dose result estimated by the licensee. However, it should be noted that the resulting dose of 16.64 mrem/year for Ba-133 meets the 25-mrem/year dose criterion as required under 10 CFR 20.1402.

Fabiano, Joseph A [AMSRD-AAR-QES-F]

From: Radconpro@aol.com
Sent: Tuesday, August 21, 2007 4:24 PM
To: bhaney@earthlink.net; jfabiano@pica.army.mil; rfliszar@pica.army.mil; Frank.C.Whitaker@us.army.mil
Subject: NRC Response to Comments Memo

Attachments: Final Report Revision 4 NRC Comment Memo.doc

Final Report
vision 4 NRC Cc

Hi,

Please review..and if acceptable will send the attachments with corrected pages and RESRAD files.

Daniel M. Spicuzza
NWT Project Manager
Home PA (412) 824-2333
Cellular (412) 848-7022

New World Environmental Inc., d.b.a.
New World Technology Bringing you the Technology of the New World

This Email message is for the sole use of the intended recipient(s) and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited. If you are not the intended recipient, please contact the sender by reply Email and destroy all copies of the original message

---

Get a sneak peek of the all-new AOL.com <http://discover.aol.com/memed/aolcom30tour/?ncid=AOLAOF00020000000982> .

New World Environmental Inc., d.b.a.
New World Technology *Bringing you the Technology of the New World*
Phone: **925-443-7967** Fax: **925-443-0119**

MEMORANDUM

To: Mr. Frank Whitaker, JMC
From: Daniel M. Spicuzza, NWT Project Manager
Date: August 22, 2007

RE: NRC Email Request for Additional Information Concerning Application Amendment to License Control NOS. 138807 and 138808 dated 17 August, 2006

The comments requiring additional information requested in the above referenced email are provided below with a response/resolution to each of the comments:

1) Comment: In reference to the document "New World Technology, Final Report, Picatinny Arsenal Radiological Remediation/Release Surveys and Sampling Project, Revision 4, September 27, 2006, Table 2 "Resrad-Build Input Parameters" of page 21 lists the room area parameter value as 36 m^2. This value is used for all radionuclides of concern except for thorium-232 (Th-232). The room area parameter value used for Th-232 is 100 m^2. Please justify the room area parameter value used for Th-232. The default value is 36 m^2, and the DCGL calculated using this value exceeds the 25-mrem in a year limit. If there is a justifiable reason for using 100 m^2, we need to know what that reason is and its basis.

   Response: The room area parameter was changed for Th-232 to the default value of 36 m^2. A DCGL of 22 dpm/100cm^2 (which results in a calculated total effective dose equivalent (TEDE) of 15 mrem/year) was then calculated using RESRAD-Build Version 3.3. Revised pages 21 through 29 of document "New World Technology, Final Report, Picatinny Arsenal Radiological Remediation/Release Surveys and Sampling Project, Revision 4, September 27, 2006" are attached to this memo along with the RESRAD- Build Version 3.3 input/output reports.

2) Comment: Page 23 of the Final Report, Revision 4, states that the input soil concentration value used for barium-133 (Ba-133) is 48 pCi/g. Table 5 of page 26 also states this input value. However, in Appendix JJ of the Final Report, the input file (RESRAD Version 6.3) on page 562, reports an input soil value of 6 pCi/g for Ba-133. Please clarify this discrepancy.

New World Environmental Inc., d.b.a.
New World Technology *Bringing you the Technology of the New World*
Phone: **925-443-7967** Fax: **925-443-0119**

Response: See response to Comment #3 below.

3) Comment: Table 5 of page 26 of the Final Report, Revision 4, states a resulting dose of 14.7 mrem/year. Using RESRAD Version 6.3, the NRC staff performed an independent dose analysis for Ba-133, using an input soil concentration value of 48 pCi/g for Ba-133 as well as using the other parameter values selected by the licensee as stated on page 23-25 of the Final Report. The dose for Ba-133 resulted in 16.64 mrem/year. NRC staff was not able to verify the 14.7 mrem/year dose result estimated by the licensee. However, it should be noted that the resulting dose of 16.64 mrem/year for Ba-133 meets the 25-mrem/year dose criterion as required under 10 CFR 20.1402.

   Response: A revised input concentration of 43 pCi/g for Ba-133 was used for the RESRAD Version 6.3 calculations which results in a calculated TEDE of 14.8 mrem/year.

   Revised pages 21 through 29 of document "New World Technology, Final Report, Picatinny Arsenal Radiological Remediation/Release Surveys and Sampling Project, Revision 4, September 27, 2006" are attached to this memo along with the RESRAD- Version 6.3 input/output reports.

Please respond to this memorandum as soon as possible indicating if these responses to the comments are acceptable or unacceptable. Electronic copies of the revised documents will then be provided once the responses are deemed to be acceptable.

It you have any questions please do not hesitate to contact me at (412) 824-2333.

Sincerely,

Daniel Spicuzza
Daniel Spicuzza
NWT Project Manager

Cc: Mr. Joseph Fabiano, ARDEC Health Physicist

Mr. Richard Flizsar, ARDEC Radiation Protection Officer

Mr. William Haney, NWT Sr. Vice President Operations

New World Environmental Inc., d.b.a.
New World Technology ***Bringing you the Technology of the New World***
Phone: **925-443-7967** Fax: **925-443-0119**

Ms. Betsy Ullrich, NRC Senior Health Physicist

Mr. Frank Whitaker, JMC Health Physicist

DCGL, Area Factor, and $DCGL_{EMC}$ Calculation Results

The DCGL, Area Factor, and $DCGL_{EMC}$ results are summarized for each radionuclide in Table 3. The modeling results indicate that peak year doses occurred in the first year for all of the radionuclides. The RESRAD-BUILD Version 3.22 and Version 3.3 model inputs and outputs are presented in this report in Volume 3, Appendix JJ.

Table 2 RESRAD-BUILD INPUT PARAMETERS [a]

Parameter	Value
Number of sources	1
Number of receptors	1
Exposure duration (days)	365
Indoor time fraction	0.5[b]
Receptor location on x axis (meters)	6.0[c]
Receptor location on y axis (meters)	6.0[c]
Receptor location on z axis (meters)	1.0[c]
Fraction of time receptor spends at receptor location	1
Receptor inhalation rate (cubic meters / day)	18.0
Receptor ingestion rate of deposited dust (square meters / hour)	1.0E-4
Density of source shielding material (grams / cubic centimeters)	2.4
Thickness of source shielding material (centimeters)	0
Shielding material description	Concrete
Room air exchange rate (1 / hour)	0.8
Room height	2.5
Room area (square meters)	36
Particle deposition velocity (meters / second)	0.01
Particle resuspension rate (1 / seconds)	5.0E-7
Source location on x axis (meters)	6[d]
Source location on y axis (meters)	6[d]
Source location on z axis (meters)	0[d]
Source area (square meters)	36[e]
Source direction	Z[e]
Source direct ingestion rate (1 / hour)	0
Fraction of source released to air	0.1
Removable fraction of source	0.5
Time until source is completely eroded and removed (day)	365
Radon release fraction	0.1

Notes

[a] RESRAD-BUILD general default parameter unless otherwise specified.

[b] Fraction of time inside buildings based on 12 hour workday, 7 days per week, 52 weeks per year.

[c] Receptor located one meter above center of floor based on origin in center of room at floor level

[d] Sources were located on floor, in center of room based on origin in center of floor.

[d] Source areas were assumed equal to entire floor.

[e] Direction of line perpendicular to the exposed area of the source (straight up in direction of ceiling).

Table 3 RESRAD-BUILD Version 3.22 Calculation Summary Table

Radionuclide	DCGL in dpm/100cm^2	Resulting TEDE in mrem/year	$DCGL_{EMC}$ in dpm/100cm^2	Resulting TEDE in mrem/year	Area Factor
H^3	140,000,000 β	14	1,300,000,000 β	15	9.3
C^{14}	4,700,000 β	15	41,000,000 β	15	8.7
Cs^{137}	40,000 β	14	160,000 β	14	4.0
Np^{237}	64 α	15	580 α	15	9.1
Th^{232}	22 α	15	190 α	14	9.0
Pu^{238}	90 α	15	800 α	15	8.9
Pu^{239}	82 α	15	730 α	15	8.9
Ra^{226}	2,400 α	15	17,000 α	15	7.1
Sr^{90}	20,000 β	14	180,000 β	14	9.0
U^{235}	280 α	15	2600 α	15	9.3
U^{238}	290 α	14	2500 α	14	8.6

Surface contamination DCGLs apply to the total of fixed plus removable surface activity. For cases where the surface contamination is due entirely to one radionuclide, the DCGL for that radionuclide is used for comparison to the measurement data.

For situations where multiple radionuclides with their own DCGLs are present, a gross activity DCGL can be developed. This approach enables field measurement of gross activity, rather than determination of individual radionuclide activity, for comparison to the DCGL. The gross activity DCGL for surfaces with multiple radionuclides is calculated as follows:

1. Determine the relative fraction (f) of the total activity contributed by the radionuclide
2. Obtain the DCGL for each radionuclide present
3. Substitute the values of f and DCGL in the following equation:

$$\text{Gross Activity DCGL} = \frac{1}{\frac{f^1}{DCGL_1} + \frac{f^2}{DCGL_2} + \frac{f^3}{DCGL_3} + \frac{f^4}{DCGL_4} + \frac{f^5}{DCGL_5}}$$

For the purposes of the Final Status Surveys, the above equation was applied to the alpha emitting radionuclides. For the beta-gamma emitting radionuclides the most restrictive DCGL (20,000 dpm/100cm^2 for Sr-90) was employed.

The following equation was used for determining the alpha emitting radionuclides DCGL:

$$\frac{1}{\frac{.14285}{64_{\text{Np-237}}}+\frac{.14285}{22_{Th-232}}+\frac{.14285}{90_{Pu-238}}+\frac{.14285}{82_{Pu-239}}+\frac{.14285}{2400_{Ra-226}}+\frac{.14285}{280_{U-235}}+\frac{.14285}{290_{U-238}}} = 76 \text{ dpm/100cm}^2$$

NOTE: Since no site specific data was available on specific radionuclide concentrations, each of the alpha emitting radionuclides was assumed to be distributed in equal percentages.

DCGL Value Determinations for Ba-133 In Soil

The DCGL values were based on protecting future residents from a radiological target dose of 15 mrem/year Total Effective Dose Equivalent (TEDE). The DCGL calculations were completed using the RESRAD Version 6.3 model developed by Argonne National Laboratory to evaluate doses from exposure to radioactively open land areas. The primary assumptions used in the DCGL calculations were:

- The residual contamination zone covers the entire ground surface (6 m^2) in the area of concern;
- 43 pCi/g of Ba-133 was used as the input soil concentration value;
- The residual contamination is present in the top 15-centimeter of the surface, and is not shielded (thickness of contaminated zone);
- A density of 1.5 g/cm^3 was used as the input value for the density of the contaminated zone;
- The receptor is located in the center of the contaminated zone.

The open exposure pathways available in RESRAD-6.3 were:

- External gamma;

- Inhalation (without radon);
- Soil ingestion;
- Plant ingestion,
- Meat ingestion,
- Milk ingestion;
- Aquatic foods,
- Drinking water;

The suppressed exposure pathways available in RESRAD-6.3 were:

- Radon

The key parameters used in the "Resident Farmer" scenario are provided in Table 4.

Table 4 KEY PARAMETERS USED IN THE RESIDENT FARMER SCENARIO

Parameter	Unit	Resident Farmer
Exposure duration	yr	30
Inhalation rate[a]	m^3/yr	8,400
Fraction of time indoors[b]	-[c]	0.50
Fraction of time outdoors[d]	-	0.25
Contaminated fractions of food	-	
Plant food	-	0.5
Milk	-	1.0
Meat	-	1.0
Aquatic food	-	0.5
Soil Ingestion[e]	g/yr	36.5
Drinking water intake [f]	L/yr	510

[a] RESRAD assumes an average inhalation rate of 8,400 m^3/yr for the suburban resident scenarios.

[b] RESRAD assumes that the suburban resident spend 50% of their time inside on the contaminated site.

[c] A hyphen indicates that the parameter is dimensionless.

[d] RESRAD assumes that the suburban resident spend 25% of their time outside on the contaminated site.

[e] RESRAD uses 36.5 g/yr as the soil ingestion rate. The actual resident soil ingestion rate is corrected by the occupancy factor, which is the sum of the time spent on site (time fraction inside + time fraction outside). The average value suggested in the EPA *Exposure Factor Handbook* (EPA, 1997) is 50 mg/d.

[f] RESRAD considers water ingestion only for the rural resident, and the ingestion rate is 510 L/yr. The EPA also considers water ingestion for the suburban resident and industrial worker; the EPA *Exposure Factor Handbook* (EPA 1997) recommends an average drinking water intake of 1.4 L/d.

DCGL Calculation Results

The DCGL calculation results are summarized for Ba-133 in Table 5. The modeling results indicate that peak year doses occurred in the first year for Ba-133. The RESRAD Version 6.3 model inputs and outputs are presented in this report in Volume 3, Appendix JJ of this report.

Table 5 RESRAD-Version 6.3 Calculation Summary Table

Radionuclide	DCGL in pCi/g	Resulting TEDE in mrem/year
Ba^{133}	43	14.8

The modeling code calculations are presented in Volume 3, Appendix JJ of this report.

Sensitivity Analysis

A sensitivity analysis was run with a multiplier/divisor of 2.0 for the following input parameters which had the largest affect on the calculated dose:

- Area of contaminated zone
- Thickness of contaminated zone
- External gamma shielding factor
- Outdoor time fraction
- Livestock intake of soil

Table 6 below provides a summary of the sensitivity analysis.

Table 6 Sensitivity Analysis Results Summary

Input Parameter	Calculated Dose in mrem/year
Thickness of Contaminated Zone	
0.3 meters	16.7
0.15 meters	14.8
0.075 meters	9.2
Area of Contaminated Zone	
12 meters	21.5
6 meters	14.8
3 meters	9.6
Outdoor Time Fraction	
0.5	21.0
0.25	14.9
0.125	11.8
External Gamma Shielding Factor	
1.0	18.6
0.7	14.9
0.5	12.4
Livestock Intake of Soil	
1.0 kg/day	14.8
0.5 kg/day	14.8
0.25 kg/day	14.8

The graphical results of the sensitivity analyses runs are presented in Volume 3, Appendix JJ of this report.

5.2.3 Building Surfaces and Structures

The DCGL's for building surfaces and structures and the modeling code from which the DCGL's were derived from are presented in Table 7 below.

Table 7 Building Surfaces/Structures DCGLs

Radionuclide	DCGL in DPM/100cm^2 for Building Surfaces	Modeling Code
H^3	140,000,000 β	RESRAD Build 3.22
C^{14}	4,700,000 β	RESRAD Build 3.22
Cs^{137}	40,000 β	RESRAD Build 3.22
Np^{237}	64 α	RESRAD Build 3.22
Th^{232}	22 α	RESRAD Build 3.3
Pu^{238}	90 α	RESRAD Build 3.22
Pu^{239}	82 α	RESRAD Build 3.22
Ra^{226}	2,400 α	RESRAD Build 3.22
Sr^{90}	20,000 β	RESRAD Build 3.22
U^{235}	280 α	RESRAD Build 3.22
U^{238}	290 α	RESRAD Build 3.22

5.2.4 Equipment and Tools

For equipment and tools the limits specified in: "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Materials (NRC 1993), Office of Nuclear Material Safety and Safeguards (NMSS)" were applied.

5.2.5 Soil

The DCGL's for soil concentrations and the modeling code from which the DCGL's were derived from are presented in Table 8 below.

Table 8 Soil Concentration DCGL's

Radionuclide	DCGL in pCi/g for Soil Concentrations	Reference Document
Ba^{133} in Soil	43	RESRAD 6.3
Th^{232} in Soil	1.1	Federal Register, Dated December 7, 1999 (Volume 64, Number 234)
Depleted Uranium in Soil U^{238}	0.5	Federal Register, Dated December 7, 1999 (Volume 64, Number 234)

6.0 RADIOLOGICAL SURVEY METHODS AND INSTRUMENTATION

6.1 RADIOLOGICAL SURVEY METHODS

6.1.1 Scanning Of Land Areas

Land area surfaces were scanned for gamma emitting radionuclides to identify the presence of elevated direct radiation that might indicate residual gross activity or hot spots. 2" by 2" NaI detectors coupled to data loggers were used during this type of survey. The distance between the detector and the surface being measured was less than 4 inches. Scanning rates did not exceed 1 foot per second while moving the detector back and forth in a serpentine pattern. Audible indicators were used to detect changes in instrument count rate. The intensity of the coverage of the scanning survey depended on the classification of the survey unit.

6.1.2 Scanning Of Building Surfaces/Structures

Prior to conducting any fixed measurements, surfaces were scanned for alpha-beta-gamma emitting radionuclides to identify the presence of elevated direct radiation that might indicate residual gross activity or hot spots. Large area gas proportional detectors coupled to rate meters/scalers were used during this type of survey. The distance between the detector and the surface measured was less than 1 cm. Scanning rates did not exceed 1/2 detector width per second and audible indicators were used to detect changes in instrument count rate. The intensity of the coverage of the scanning survey depended on the classification (See Sections 8.2 and 8.3) of the survey unit.

6.1.3 Scanning Minimum Detectable Concentration (MDC)

For scanning the building surfaces for beta and alpha emitters, the scanning minimum detectable concentration (MDC_{scan}) was determined. The MDC_{scan} was determined in the field using site-specific background values. The scanning technique initially considers the sensitivity of the technique and background radiation levels. The initial value is calculated using the following equation:

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld

RESRAD-BUILD Table of Contents

RESRAD-BUILD Input Parameters..... 2
Building Information..... 3
Source Information..... 4
For time = 0.00E+00 yr
Time Specific Parameters..... 5
Receptor-Source Dose Summary..... 6
Dose by Pathway Detail..... 7
Dose by Nuclide Detail..... 8
For time = 1.00E+00 yr
Time Specific Parameters..... 9
Receptor-Source Dose Summary..... 10
Dose by Pathway Detail..... 11
Dose by Nuclide Detail..... 12
For time = 1.00E+01 yr
Time Specific Parameters..... 13
Receptor-Source Dose Summary..... 14
Dose by Pathway Detail..... 15
Dose by Nuclide Detail..... 16
For time = 1.00E+02 yr
Time Specific Parameters..... 17
Receptor-Source Dose Summary..... 18
Dose by Pathway Detail..... 19
Dose by Nuclide Detail..... 20
For time = 1.00E+03 yr
Time Specific Parameters..... 21
Receptor-Source Dose Summary..... 22
Dose by Pathway Detail..... 23
Dose by Nuclide Detail..... 24
Full Summary..... 25

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld

RESRAD-BUILD Input Parameters

Number of Sources : 1
Number of Receptors: 1
Total Time : 3.650000E+02 days
Fraction Inside : 5.000000E-01

Receptor Information

Receptor	Room	x [m]	y [m]	z [m]	FracTime	Inhalation [m3/day]	Ingestion(Dust) [m2/hr]
1	1	6.000	6.000	1.000	1.000	1.80E+01	1.00E-04

Receptor-Source Shielding Relationship

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

═══ Building Information ═══

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

```
 Height[m]          Air Exchanges [m3/hr]
 Area [m2]
                   ******************************
                   *                            *
                   *                            *
                   *                           <=Q01: 7.20E+01
 H1:   2.500       *           Room  1          *      Q10 :  7.20E+01
                   *   LAMBDA: 8.00E-01         *
Area  36.000       *                            *
                   *                            •
                   ******************************
```

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

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld

Source Information

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00[m]
Geometry:: Type: Area Area:3.60E+01 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 5.000E-01
Time to Remove: 3.650E+02 [day]

Radon Release Fraction: 1.000E-01

Contamination::

Nuclide	Concentration [dpm/m2]	Dose Conversion Factor (Library: FGR 13 Morbidity Ingestion [mrem/dpm]	Inhalation [mrem/dpm]	Submersion [mrem/yr/(dpm/m3)]
TH-232	2.200E+03	1.230E-03	7.387E-01	4.588E-07
TH-228	0.000E+00	3.642E-04	1.556E-01	4.224E-03
RA-228	0.000E+00	6.496E-04	2.287E-03	2.515E-03

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 0.00000000E+00 years

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

```
========  Source Information  ========
```

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:3.60E+01 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 5.000E-01
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [dpm/m2]
TH-232	2.200E+03
TH-228	0.000E+00
RA-228	0.000E+00

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 0.00000000E+00 years

RESRAD-BUILDDose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	1.50E+01	1.50E+01
Total	1.50E+01	1.50E+01

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 0.00000000E+00 years

Pathway Detail of Doses

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	5.93E-04	4.15E-05	4.45E-07	1.49E+01	1.84E-04	6.80E-02
Total	5.93E-04	4.15E-05	4.45E-07	1.49E+01	1.84E-04	6.80E-02

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 0.00000000E+00 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-232		
TH-232	1.50E+01	1.50E+01
TH-228	1.42E-02	1.42E-02
RA-228	4.58E-03	4.58E-03

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 1.00000000 years

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

```
========  Source Information  ========
```

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:3.60E+01 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [dpm/m2]
TH-232	1.100E+03
TH-228	2.054E+01
RA-228	1.249E+02

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 1.00000000 years

RESRAD-BUILDDose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	2.35E-03	2.35E-03
Total	2.35E-03	2.35E-03

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 1.00000000 years

Pathway Detail of Doses

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	1.46E-03	0.00E+00	0.00E+00	0.00E+00	8.97E-04	0.00E+00
Total	1.46E-03	0.00E+00	0.00E+00	0.00E+00	8.97E-04	0.00E+00

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 1.00000000 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-232		
TH-232	8.99E-06	8.99E-06
TH-228	1.28E-03	1.28E-03
RA-228	1.07E-03	1.07E-03

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 10.0000000 years

```
==========================================================
==========================================================
===        Assessment for Time:  3                     ===
===              Time =1.00E+01 yr                     ===
==========================================================
==========================================================
```

```
========  Source Information  ========
```

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:3.60E+01 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [dpm/m2]
TH-232	1.100E+03
TH-228	6.211E+02
RA-228	7.705E+02

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 10.0000000 years

RESRAD-BUILDDose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	2.36E-02	2.36E-02
Total	2.36E-02	2.36E-02

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 10.0000000 years

Pathway Detail of Doses

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	1.03E-02	0.00E+00	0.00E+00	0.00E+00	1.33E-02	0.00E+00
Total	1.03E-02	0.00E+00	0.00E+00	0.00E+00	1.33E-02	0.00E+00

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 10.0000000 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-232		
TH-232	8.99E-06	8.99E-06
TH-228	1.89E-02	1.89E-02
RA-228	4.66E-03	4.66E-03

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 100.000008 years

```
==========================================
==========================================
===       Assessment for Time:  4      ===
===             Time =1.00E+02 yr      ===
==========================================
==========================================
```

```
========  Source Information  ========
```

```
Source:  1
       Location::  Room :  1  x:   6.00 y:   6.00  z:   0.00 [m]
       Geometry::  Type: Area        Area:3.60E+01 [m2]  Direction: z
       Pathway ::
            Direct Ingestion Rate:    0.000E+00 [1/hr]
            Fraction released to air: 1.000E-01
            Removable fraction:       0.000E+00
            Time to Remove:           3.650E+02 [day]
```

Contamination::	Nuclide	Concentration [dpm/m2]
	TH-232	1.100E+03
	TH-228	1.100E+03
	RA-228	1.100E+03

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 100.000008 years

RESRAD-BUILDDose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	3.86E-02	3.86E-02
Total	3.86E-02	3.86E-02

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 100.000008 years

Pathway Detail of Doses

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	1.60E-02	0.00E+00	0.00E+00	0.00E+00	2.26E-02	0.00E+00
Total	1.60E-02	0.00E+00	0.00E+00	0.00E+00	2.26E-02	0.00E+00

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 100.000008 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-232		
TH-232	8.99E-06	8.99E-06
TH-228	3.21E-02	3.21E-02
RA-228	6.49E-03	6.49E-03

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 1000.00000 years

Assessment for Time: 5
Time =1.00E+03 yr

Source Information

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:3.60E+01 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [dpm/m2]
TH-232	1.100E+03
TH-228	1.100E+03
RA-228	1.100E+03

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 1000.00000 years

RESRAD-BUILDDose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	3.86E-02	3.86E-02
Total	3.86E-02	3.86E-02

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 1000.00000 years

Pathway Detail of Doses

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	1.60E-02	0.00E+00	0.00E+00	0.00E+00	2.26E-02	0.00E+00
Total	1.60E-02	0.00E+00	0.00E+00	0.00E+00	2.26E-02	0.00E+00

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Evaluation Time: 1000.00000 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-232		
TH-232	8.99E-06	8.99E-06
TH-228	3.21E-02	3.21E-02
RA-228	6.49E-03	6.49E-03

Title : Th-232
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232.bld
Full Summary

RESRAD-BUILD Dose (Time) Tables

Receptor Dose Received for the Exposure Duration

(mrem)

	Evaluation Time [yr]				
	0.00E+00	1.00E+00	1.00E+01	1.00E+02	1.00E+03
1	1.50E+01	2.35E-03	2.36E-02	3.86E-02	3.86E-02

Receptor Dose/Yr Averaged Over Exposure Duration

(mrem/yr)

	Evaluation Time [yr]				
	0.00E+00	1.00E+00	1.00E+01	1.00E+02	1.00E+03
1	1.50E+01	2.36E-03	2.36E-02	3.87E-02	3.87E-02

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld

RESRAD-BUILD Table of Contents

RESRAD-BUILD Input Parameters..... 2
Building Information..... 3
Source Information..... 4
For time = 0.00E+00 yr
Time Specific Parameters..... 5
Receptor-Source Dose Summary..... 6
Dose by Pathway Detail..... 7
Dose by Nuclide Detail..... 8
For time = 1.00E+00 yr
Time Specific Parameters..... 9
Receptor-Source Dose Summary..... 10
Dose by Pathway Detail..... 11
Dose by Nuclide Detail..... 12
For time = 1.00E+01 yr
Time Specific Parameters..... 13
Receptor-Source Dose Summary..... 14
Dose by Pathway Detail..... 15
Dose by Nuclide Detail..... 16
For time = 1.00E+02 yr
Time Specific Parameters..... 17
Receptor-Source Dose Summary..... 18
Dose by Pathway Detail..... 19
Dose by Nuclide Detail..... 20
For time = 1.00E+03 yr
Time Specific Parameters..... 21
Receptor-Source Dose Summary..... 22
Dose by Pathway Detail..... 23
Dose by Nuclide Detail..... 24
Full Summary..... 25

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld

RESRAD-BUILD Input Parameters

Number of Sources : 1
Number of Receptors: 1
Total Time : 3.650000E+02 days
Fraction Inside : 5.000000E-01

Receptor Information

Receptor	Room	x [m]	y [m]	z [m]	FracTime	Inhalation [m3/day]	Ingestion(Dust) [m2/hr]
1	1	6.000	6.000	1.000	1.000	1.80E+01	1.00E-04

Receptor-Source Shielding Relationship

Receptor	Source	Density [g/cm3]	Thickness [cm]	Material
1	1	2.40E+00	0.00E+0C	Concrete

Building Information

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

```
 Height[m]          Air Exchanges [m3/hr]
 Area [m2]
                   ******************************
                   *                            *
                   *                            *
                   *                            <=Q01: 7.20E+01
 H1:    2.500      *           Room  1          *      Q10 :  7.20E+01
                   *   LAMBDA: 8.00E-01         *
Area  36.000       *                            *
                   *                            *
                   ******************************
```

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

Source Information

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00[m]
Geometry:: Type: Area Area:4.00E+00 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 5.000E-01
Time to Remove: 3.650E+02 [day]

Radon Release Fraction: 1.000E-01

Contamination::

Nuclide	Concentration [dpm/m2]	Dose Conversion Factor (Library: FGR 13 Morbidity Ingestion [mrem/dpm]	Inhalation [mrem/dpm]	Submersion [mrem/yr/(dpm/m3)]
TH-232	1.900E+04	1.230E-03	7.387E-01	4.588E-07
TH-228	0.000E+00	3.642E-04	1.556E-01	4.224E-03
RA-228	0.000E+00	6.496E-04	2.287E-03	2.515E-03

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 0.00000000E+00 years

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

Source Information

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:4.00E+00 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 5.000E-01
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [dpm/m2]
TH-232	1.900E+04
TH-228	0.000E+00
RA-228	0.000E+00

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 0.00000000E+00 years

RESRAD-BUILDDose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	1.44E+01	1.44E+01
Total	1.44E+01	1.44E+01

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 0.00000000E+00 years

Pathway Detail of Doses

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	1.68E-03	3.98E-05	4.27E-07	1.43E+01	1.76E-04	6.53E-02
Total	1.68E-03	3.98E-05	4.27E-07	1.43E+01	1.76E-04	6.53E-02

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 0.00000000E+00 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-232		
TH-232	1.44E+01	1.44E+01
TH-228	1.38E-02	1.38E-02
RA-228	5.32E-03	5.32E-03

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 1.00000000 years

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

Source Information

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:4.00E+00 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [dpm/m2]
TH-232	9.500E+03
TH-228	1.774E+02
RA-228	1.079E+03

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 1.00000000 years

RESRAD-BUILDDose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	4.97E-03	4.97E-03
Total	4.97E-03	4.97E-03

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 1.00000000 years

Pathway Detail of Doses

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	4.11E-03	0.00E+00	0.00E+00	0.00E+00	8.61E-04	0.00E+00
Total	4.11E-03	0.00E+00	0.00E+00	0.00E+00	8.61E-04	0.00E+00

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 1.00000000 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-232		
TH-232	2.93E-05	2.93E-05
TH-228	1.93E-03	1.93E-03
RA-228	3.01E-03	3.01E-03

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 10.0000000 years

Assessment for Time: 3
Time =1.00E+01 yr

Source Information

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:4.00E+00 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [dpm/m2]
TH-232	9.500E+03
TH-228	5.364E+03
RA-228	6.654E+03

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 10.0000000 years

RESRAD-BUILDDose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	4.17E-02	4.17E-02
Total	4.17E-02	4.17E-02

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 10.0000000 years

Pathway Detail of Doses

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	2.89E-02	0.00E+00	0.00E+00	0.00E-00	1.28E-02	0.00E+00
Total	2.89E-02	0.00E+00	0.00E+00	0.00E+00	1.28E-02	0.00E+00

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 10.0000000 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-232		
TH-232	2.93E-05	2.93E-05
TH-228	2.86E-02	2.86E-02
RA-228	1.31E-02	1.31E-02

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 100.000008 years

Assessment for Time: 4
Time =1.00E+02 yr

Source Information

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:4.00E+00 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [dpm/m2]
TH-232	9.500E+03
TH-228	9.500E+03
RA-228	9.500E+03

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 100.000008 years

RESRAD-BUILDDose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	6.68E-02	6.68E-02
Total	6.68E-02	6.68E-02

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 100.000008 years

Pathway Detail of Doses

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	4.52E-02	0.00E+00	0.00E+00	0.00E+00	2.17E-02	0.00E+00
Total	4.52E-02	0.00E+00	0.00E+00	0.00E+00	2.17E-02	0.00E+00

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 100.000008 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-232		
TH-232	2.93E-05	2.93E-05
TH-228	4.85E-02	4.85E-02
RA-228	1.83E-02	1.83E-02

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 1000.00000 years

Assessment for Time: 5
Time =1.00E+03 yr

Source Information

Source: 1
Location:: Room : 1 x: 6.00 y: 6.00 z: 0.00 [m]
Geometry:: Type: Area Area:4.00E+00 [m2] Direction: z
Pathway ::
Direct Ingestion Rate: 0.000E+00 [1/hr]
Fraction released to air: 1.000E-01
Removable fraction: 0.000E+00
Time to Remove: 3.650E+02 [day]

Contamination::

Nuclide	Concentration [dpm/m2]
TH-232	9.500E+03
TH-228	9.500E+03
RA-228	9.500E+03

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 1000.00000 years

RESRAD-BUILDDose Tables

Source Contributions to Receptor Doses

[mrem]

	Source 1	Total
Receptor 1	6.68E-02	6.68E-02
Total	6.68E-02	6.68E-02

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 1000.00000 years

Pathway Detail of Doses

[mrem]

Source: 1

Receptor	External	Deposition	Immersion	Inhalation	Radon	Ingestion
1	4.52E-02	0.00E+00	0.00E+00	0.00E+00	2.17E-02	0.00E+00
Total	4.52E-02	0.00E+00	0.00E+00	0.00E+00	2.17E-02	0.00E+00

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Evaluation Time: 1000.00000 years

Nuclide Detail of Doses

[mrem]

Source: 1

Nuclide	Receptor 1	Total
TH-232		
TH-232	2.93E-05	2.93E-05
TH-228	4.85E-02	4.85E-02
RA-228	1.83E-02	1.83E-02

Title : Th-232 EMC
Input File : C:\Program Files\RESRAD_Family\BUILD\Th-232 EMC.bld
Full Summary

RESRAD-BUILD Dose (Time) Tables

Receptor Dose Received for the Exposure Duration

(mrem)

	Evaluation Time [yr]				
	0.00E+00	1.00E+00	1.00E+01	1.00E+02	1.00E+03
1	1.44E+01	4.97E-03	4.17E-02	6.68E-02	6.68E-02

Receptor Dose/Yr Averaged Over Exposure Duration

(mrem/yr)

	Evaluation Time [yr]				
	0.00E+00	1.00E+00	1.00E+01	1.00E+02	1.00E+03
1	1.44E+01	4.97E-03	4.17E-02	6.69E-02	6.69E-02

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

se Conversion Factor (and Related) Parameter Summary ... 2
Site-Specific Parameter Summary 3
Summary of Pathway Selections 7
ntaminated Zone and Total Dose Summary 8
Total Dose Components
Time = 0.000E+00 9
Time = 1.000E+00 10
Time = 3.000E+00 11
Time = 1.000E+01 12
Time = 3.000E+01 13
Time = 1.000E+02 14
Time = 3.000E+02 15
Time = 1.000E+03 16
se/Source Ratios Summed Over All Pathways 17
ngle Radionuclide Soil Guidelines 17
Dose Per Nuclide Summed Over All Pathways 18
il Concentration Per Nuclide 18

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

nu	Parameter	Current Value	Base Case*	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
1	Ba-133	7.810E-06	7.810E-06	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ba-133	3.400E-06	3.400E-06	DCF3(1)
34	Food transfer factors:			
D-34	Ba-133 , plant/soil concentration ratio, dimensionless	5.000E-03	5.000E-03	RTF(1,1)
34	Ba-133 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-04	2.000E-04	RTF(1,2)
34	Ba-133 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-04	5.000E-04	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
5	Ba-133 , fish	4.000E+00	4.000E+00	BIOFAC(1,1)
5	Ba-133 , crustacea and mollusks	2.000E+02	2.000E+02	BIOFAC(1,2)

ase Case means Default.Lib w/o Associate Nuclide contributions.

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
11	Area of contaminated zone (m**2)	6.000E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	---	THICK0
11	Length parallel to aquifer flow (m)	3.000E+00	1.000E+02	---	LCZPAQ
11	Basic radiation dose limit (mrem/yr)	1.500E+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)
11	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
11	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)
11	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
11	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)
11	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Ba-133	4.300E+01	0.000E+00	---	S1(1)
12	Concentration in groundwater (pCi/L): Ba-133	not used	0.000E+00	---	W1(1)
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
13	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
13	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
13	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
13	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
13	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
13	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
13	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
13	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
13	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
14	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
14	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
14	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
14	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
14	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
14	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
15	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
15	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
15	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
15	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ba-133				
16	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(1)
16	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.426E-02	ALEACH(1)
16	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
17	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
17	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
17	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
17	Radii of shape factor array (used if FS = -1):				
17	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)
17	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)
17	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
17	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)
17	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
17	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)
17	Fractions of annular areas within AREA:				
17	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
17	Ring 3	not used	0.000E+00	---	FRACA(3)
17	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)
17	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)
17	Ring 10	not used	0.000E+00	---	FRACA(10)
17	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
18	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)
18	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
18	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)
18	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
18	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
18	Contamination fraction of household water	not used	1.000E+00	---	FHHW
18	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
18	Contamination fraction of plant food	-1	-1	0.300E-02	FPLANT
18	Contamination fraction of meat	-1	-1	0.300E-03	FMEAT
R018	Contamination fraction of milk	-1	-1	0.300E-03	FMILK
19	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
19	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
19	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
19	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
19	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
19	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
9B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
9B	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)
9B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
9B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
9B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
9B	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)
9B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
9B	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)
9B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
9B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
4	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
4	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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
4	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
4	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	0.000E+00	---	CO2F
OR	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)
OR	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)
OR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
OR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
OR	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
21	Total porosity of the cover material	not used	4.000E-01	---	TPCV
21	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
21	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
21	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
21	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
21	Height of the building (room) (m)	not used	2.500E+00	---	HRM
21	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)
21	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TL	Maximum number of integration points for dose	17	---	---	LYMAX
TL	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	suppressed

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	6.00 square meters	Ba-133	4.300E+01
Thickness:	0.15 meters		
ver Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 1.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	1.489E+01	1.330E+01	1.061E+01	4.802E+00	4.931E-01	1.300E-04	0.000E+00	0.000E+00
M(t):	9.930E-01	8.868E-01	7.073E-01	3.201E-01	3.287E-02	8.665E-06	0.000E+00	0.000E+00

ximum TDOSE(t): 1.489E+01 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
clide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	1.489E+01	1.0000	9.250E-06	0.0000	0.000E+00	0.0000	6.020E-05	0.0000	2.915E-07	0.0000	1.041E-06	0.0000	2.268E-05	0.0000
tal	1.489E+01	1.0000	9.250E-06	0.0000	0.000E+00	0.0000	6.020E-05	0.0000	2.915E-07	0.0000	1.041E-06	0.0000	2.268E-05	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
clide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.489E+01	1.0000
tal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.489E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
clide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	1.330E+01	1.0000	8.241E-06	0.0000	0.000E+00	0.0000	5.364E-05	0.0000	2.598E-07	0.0000	9.274E-07	0.0000	2.020E-05	0.0000
tal	1.330E+01	1.0000	8.241E-06	0.0000	0.000E+00	0.0000	5.364E-05	0.0000	2.598E-07	0.0000	9.274E-07	0.0000	2.020E-05	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
clide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.330E+01	1.0000
tal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.330E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	1.061E+01	1.0000	6.540E-06	0.0000	0.000E+00	0.0000	4.257E-05	0.0000	2.062E-07	0.0000	7.360E-07	0.0000	1.604E-05	0.0000
Total	1.061E+01	1.0000	6.540E-06	0.0000	0.000E+00	0.0000	4.257E-05	0.0000	2.062E-07	0.0000	7.360E-07	0.0000	1.604E-05	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.061E+01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.061E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
·tclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	4.802E+00	1.0000	2.908E-06	0.0000	0.000E+00	0.0000	1.893E-05	0.0000	9.168E-08	0.0000	3.273E-07	0.0000	7.130E-06	0.0000
›tal	4.802E+00	1.0000	2.908E-06	0.0000	0.000E+00	0.0000	1.893E-05	0.0000	9.168E-08	0.0000	3.273E-07	0.0000	7.130E-06	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
·clide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.802E+00	1.0000
·tal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.802E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	4.931E-01	1.0000	2.828E-07	0.0000	0.000E+00	0.0000	1.841E-06	0.0000	8.915E-09	0.0000	3.182E-08	0.0000	6.933E-07	0.0000
Total	4.931E-01	1.0000	2.828E-07	0.0000	0.000E+00	0.0000	1.841E-06	0.0000	8.915E-09	0.0000	3.182E-08	0.0000	6.933E-07	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.931E-01	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.931E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
clide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	1.300E-04	1.0000	5.772E-11	0.0000	0.000E+00	0.0000	3.759E-10	0.0000	1.821E-12	0.0000	6.496E-12	0.0000	1.415E-10	0.0000
tal	1.300E-04	1.0000	5.772E-11	0.0000	0.000E+00	0.0000	3.759E-10	0.0000	1.821E-12	0.0000	6.496E-12	0.0000	1.415E-10	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
clide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.300E-04	1.0000
tal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.300E-04	1.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
clide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
tal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
clide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ba-133	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
tal	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	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
Ba-133	Ba-133	1.000E+00	3.464E-01	3.094E-01	2.467E-01	1.117E-01	1.147E-02	3.023E-06	0.000E+00	0.000E+00

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

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 1.500E-01 mrem/yr

clide (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
Ba-133	4.330E+01	4.849E+01	6.079E+01	1.343E+02	1.308E+03	4.962E+06	*2.504E+14	*2.504E+14

* at specific activity limit

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

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ba-133	4.300E+01	0.000E+00	3.464E-01	4.330E+01	3.464E-01	4.330E+01

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

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	1.000E+00	1.489E+01	1.330E+01	1.061E+01	4.802E+00	4.931E-01	1.300E-04	0.000E+00	0.000E+00

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

clide (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
-133	Ba-133	1.000E+00	4.300E+01	3.857E+01	3.103E+01	1.449E+01	1.644E+00	8.102E-04	2.877E-13	0.000E+00

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

SCALC.EXE execution time = 0.83 seconds

Table of Contents

Part II: Source Terms, Factors, and Parameters for Individual Pathways

Source Factors for Ingrowth and Decay
Radioactivity Only 3
Combined Radioactivity and Leaching 3

ound Pathway
Source Term Parameters 4
Time Dependence of Source Geometry 4
Occupancy, Cover/Depth, and Area Factors 5
Dose Conversion and Environmental Transport Factors . 5
Dose/Source Ratios 5

halation Pathway (radon excluded)
Dose/Source Ratios 6
Pathway Factors 6
Dose Conversion and Environmental Transport Factors . 6

Groundwater and Surface Water Pathway Segments
Transport Time Parameters for Unsaturated Zone Strata 7
Dilution Factor and Rise Time Parameters for
Nondispersion (ND) Model 8
Primary Parameters Used to Calculate Ratios 8
Water/Soil Concentration Ratios 9

Table of Contents (cont.)

Part II: Source Terms, Factors, and Parameters for Individual Pathways

Food Pathways
Storage Times for Contaminated Foodstuffs 10
Storage Time Ingrowth and Decay Factors 10
Storage Correction Factors
Drinking Water 11
Irrigation Water 11
Livestock Water 12
Plants 12
Livestock Fodder 13
Meat and Milk 13
Fish and Crustacea 14
Area and Depth Factors 15
Dose Conversion and Environmental Transport Factors
Plant 17
Meat 18
Milk 19
Fish 20
Drinking Water 20
Dose/Source Ratios
Plant 21
Plant Total 22
Meat 23
Meat Total 24
Milk 25
Milk Total 26
Fish 27
Drinking Water 28
Concentration Ratios
Plant/Air and Plant/Water 29
Plant/Soil 29
Meat/Fodder, Fodder/Air, Fodder/Water 31
Fodder/Soil 32
Meat/Soil 33
Milk/Soil 34

Soil Ingestion Pathway
Dose/Source Ratios..... 35
Dose Conversion and Environmental Transport Factors . 35

Source Factors for Ingrowth and Decay
Radioactivity Factors Only
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	ID(j,t) = THF(j)*S1(j,t)/S1(i,0) At Time in 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
-133	Ba-133	1.000E+00	1.000E+00	9.375E-01	8.240E-01	5.245E-01	1.443E-01	1.574E-03	3.902E-09	9.357E-29

Source Factors for Ingrowth and Decay
Combined Radioactivity and Leaching Factors
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	SF(j,t) = THF(j)*S1(j,t)/S1(i,0) At Time in 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
-133	Ba-133	1.000E+00	1.000E+00	8.969E-01	7.215E-01	3.369E-01	3.824E-02	1.884E-05	6.690E-15	0.000E+00

The effect of volatilization was also considered when computing the source factors for H-3 and C-14.

Parameters Used for Calculating Cover Depth and Contaminated Zone Thicknesses

Cover Erosion rate (vcv): 0.001000 m/yr
Contaminated Zone Erosion rate (vcz): 0.001000 m/yr
Water Table Drop rate (vwt): 0.001000 m/yr
Precipitation rate (Pr): 1.000000 m/yr
Cover Removal Time (Tc): 0.000E+00 yr
Overhead irrigation rate (Irr): 0.200 m/yr Runoff coefficient (Cr): 0.200
Evapotranspiration coeff. (Ce): 0.500 Infiltration rate (In): 0.500 m/yr
Bulk soil density (rhob): 1.500 g/cm**3 Effective porosity (pe): 0.000

Radio-nuclide (i)	Distribution Coefficient Kd(i),cm**3/g	Leaching Ratio q(i)
Ba-133	5.000000E+01	4.261E-03

Time Dependence of Source Geometry

Time Dependence of Cover Depth [Cd(i,t)]

Nuclide (i)	Cd(i,t) (meters) 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
Ba-133	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

Time Dependence of Contaminated Zone Thicknesses [T(i,t)]

Nuclide (i)	T(i,t) (meters) 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
Ba-133	1.5000E-01	1.4900E-01	1.4700E-01	1.4000E-01	1.2000E-01	5.0000E-02	0.0000E+00	0.0000E+00

Occupancy, Cover/Depth, and Area Factors for Ground Pathway

Occupancy Factor (FO1):	0.600
Area (A):	6. sq. meters
Initial cover depth (Cd):	0.000 meters
Initial contaminated zone thickness (T):	0.150 meters

Time Dependence of Cover/Depth Factor [FCTR_COV_DEPTH(i,t)]

Nuclide	FCTR_COV_DEPTH(i,t) (dimensionless)							
(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
-133	9.276E-01	9.263E-01	9.238E-01	9.142E-01	8.796E-01	6.056E-01	0.000E+00	0.000E+00

Time Dependence of Area Factor [FCTR_AREA(i,t)]

clide	FCTR_AREA(i,t) (dimensionless)							
(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
-133	3.324E-01	3.314E-01	3.295E-01	3.228E-01	3.036E-01	2.377E-01	1.000E+00	1.000E+00

Dose Conversion and Environmental Transport Factors for the Ground Pathway (p=1)

Nuclide	DCF(i,1)*	ETFG(i,t) At Time in Years (dimensionless)							
(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
Ba-133	1.980E+00	1.850E-01	1.842E-01	1.827E-01	1.771E-01	1.602E-01	8.636E-02	0.000E+00	0.000E+00

- Units are (mrem/yr)/(pCi/g) at infinite depth and area. Multiplication by ETFG(i,t) converts to site conditions.

Dose/Source Ratios for External Radiation from the Ground (p=1)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent	Product	Thread	DSR(j,1,t) At Time in Years (mrem/yr)/(pCi/g)							
(i)	(j)	Fraction	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	1.000E+00	3.464E-01	3.094E-01	2.467E-01	1.117E-01	1.147E-02	3.023E-06	0.000E+00	0.000E+00

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

Dose/Source Ratios for Inhalation Pathway, Excluding Radon (p=2)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,2,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
Ba-133	Ba-133	1.000E+00	2.151E-07	1.917E-07	1.521E-07	6.763E-08	6.576E-09	1.342E-12	0.000E+00	0.000E+00

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

Pathway Factors for the Inhalation Pathway (radon excluded)

Area (A):	6.0000E+00 m**2	Occupancy Factor (FO2):	4.5000E-01
Area Factor (FA2):	7.7156E-02	Annual Air Intake (F12):	8.4000E+03 m**3/yr
Cover Depth [Cd(0)]:	0.0000E+00 m	Mass Loading (ASR2):	1.0000E-04 g/m**3
Contaminated Zone Thickness [T(0)]:	1.5000E-01 m	FA2 * FO2 * F12 * ASR2:	2.9165E-02 g/yr

clide (i)	t= 0.000E+00	1.000E+00	Depth Factor [FD(i,2,t)] (dimensionless) 3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
-133	1.0000E+00	9.9333E-01	9.8000E-01	9.3333E-01	8.0000E-01	3.3333E-01	0.0000E+00	0.0000E+00

Dose Conversion and Environmental Transport Factors for the Inhalation Pathway, Excluding Radon (p=2)

Parent (i)	Product (j)	DCF(j,2)*	ETF(j,2,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	7.810E-06	2.916E-02	2.897E-02	2.858E-02	2.722E-02	2.333E-02	9.722E-03	0.000E+00	0.000E+00

* The dose conversion factor units are mrem/pCi.

ransport Time Parameters for Unsaturated Zone Stratum No. 1

Stratum thickness [h(1)]:	4.000000 m
Bulk soil material density [rhob(1)]:	1.500000 g/cm**3
Effective porosity [peuz(1)]:	0.200000
Hydraulic conductivity [Khuz(1)]:	10.000000 m/yr
Total porosity [ptuz(1)]:	0.400000
Soil specific b parameter [buz(1)]:	5.300000
Saturation ratio [sruz(1)]:	0.802299

Radio-clide (i)	Distribution Coefficient Kduz(i,1), cm**3/g	Retardation Factor Rduz(i,1)	Transport Time Dtuz(i,1), yr
-133	5.0000E+01	2.3470E+02	3.0128E+02

ansport Time Parameters for Unsaturated Zone created by the Falling Water Table

Water table drop rate [vwt]:	0.001000 m/yr
lk soil material density [rhobaq]:	1.500000 g/cm**3
Effective porosity [peaq]:	0.200000
Hydraulic conductivity [Khaq]:	100.000000 m/yr
Total porosity [ptaq]:	0.400000
Soil specific b parameter [baq]:	5.300000
Saturation ratio [sruaq]:	0.677340

adio-clide (i)	Distribution Coefficient Kdaq(i), cm**3/g	Retardation Factor Rduaq(i)	Minimum Transport Time Dtuaq(i), yr
Ba-133	5.0000E+01	2.7782E+02	2.4524E+01

Dilution Factor and Rise Time Parameters for Nondispersion (ND) Model

Aquifer contamination depth at well (z):	7.50000E-01	m
Depth of water intake below water table (dw):	1.00000E+01	m
Infiltration rate (In):	5.00000E-01	m/yr
Aquifer water flow rate (Vwfr):	2.00000E+00	m/yr
Hydraulic gradient (J):	2.00000E-02	
Hydraulic conductivity of aquifer (Kszh):	1.00000E+02	m/yr
Contaminated zone extent parallel to gradient (l):	3.00000E+00	m
Distance below contaminated zone to water table (h):	0.40000E+01	m
Initial thickness of uncontaminated cover (Cd):	0.00000E+00	m
Initial thickness of contaminated zone (T):	0.15000E+00	m
Effective porosity of saturated zone (pesz):	0.20000E+00	

Radio-nuclide (i)	Dilution Factor f(i)	Retardation Factor Rdsz(i)	Horizontal Transport Time Onsite Tauh(i), yr	Rise Time dt(i), yr	Decay Time Parameter 1/lamda(i),yr
-133	1.200E-02	1.885E+02	5.655E-01	5.655E+01	1.549E+01

Primary Parameters Used for Calculating Water/Soil
Concentration Ratios for Groundwater Pathway Segment

Model used: Nondispersion (ND)
Bulk soil density in contaminated zone (rhob): 1.500 g/cm**3

Radio-nuclide (i)	Dilution Factor f(i)	Retardation Factor Rdcz(i)	Breakthrough Time Chain year	Breakthrough Time Single Nuclide Dt(i), yr	Rise Time dt(i), yr
-133	1.200E-02	2.347E+02	3.258E+02	3.258E+02	5.655E+01

Water/Soil Concentration Ratios [WSR(j,1,t)] for Groundwater Pathway Segment

Parent (i)	Product (j)	Thread Fraction	WSR(j,1,t) At Time in Years (pCi/L)/(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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Water/Soil Concentration Ratios [WSR(j,2,t)] for Surface Water Pathway Segment

Watershed Area (Aw) = 1.0000E+06 m**2
Contaminated Zone Area (A) = 6.0000E+00 m**2
Dilution Factor (f') = 6.0000E-06
Soil Density (rhob) = 1.5000E+00 kg/m**3

Parent (i)	Product (j)	Thread Fraction	WSR(j,2,t) At Time in Years (pCi/L)/(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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Storage Times For Contaminated Foodstuffs

k	Food Item	STOR_T(k), days
1	non-leafy plants	14.
2	leafy plants	1.
3	milk	1.
4	meat	20.
5	fish	7.
6	crustacea	7.
7	well water	1.
8	surface water	1.
9	livestock fodder	45.

Storage Time Ingrowth and Decay Factors
Storage Time for k'th Foodstuff: t = STOR_T(k), days

Parent (i)	Product (j)	Thread Fraction	STOR_ID(i,j,t) = CONCE(i,j,t)/CONCE(i,i,0) t= 1.400E+01	1.000E+00	1.000E+00	2.000E+01	7.000E+00	7.000E+00	1.000E+00	1.000E+00	4.500E+01
I -133	Ba-133	1.000E+00	9.975E-01	9.998E-01	9.998E-01	9.965E-01	9.988E-01	9.988E-01	9.998E-01	9.998E-01	9.921E-01

CONCE(i,j,t)/CONCE(i,i,0) is the concentration ratio of Product(j) at time t to Parent(i) at start of storage time.

Storage Time Correction Factors
Drinking Water from Well and/or Surface
Harvest Time = t - 2.74E-03 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,1)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors
Irrigation Water for Nonleafy Plants from Well and/or Surface
Harvest Time = t - 4.11E-02 yr; Consumption Time = t - 3.83E-02 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,2)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors
Irrigation Water for Leafy Plants from Well and/or Surface
Harvest Time = t - 5.48E-03 yr; Consumption Time = t - 2.74E-03 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,3)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors
Irrigation Water for Livestock (Milk) Fodder from Well and/or Surface
Harvest Time = t - 1.29E-01 yr; Consumption Time = t - 1.26E-01 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,5)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors
Irrigation Water for Livestock (Meat) Fodder from Well and/or Surface
Harvest Time = t - 1.81E-01 yr; Consumption Time = t - 1.78E-01 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,7)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors
Livestock (Milk) Water from Well and/or Surface
Harvest Time = t - 5.48E-03 yr; Consumption Time = t - 2.74E-03 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,4)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors
Livestock (Meat) Water from Well and/or Surface
Harvest Time = t - 5.75E-02 yr; Consumption Time = t - 5.48E-02 yr

Parent (i)	Product (j)	Thread Fraction	CFWW(j,t,6)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Nonleafy Plants
Harvest Time = t - 3.83E-02 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CF3(j,1,t)# At Time in 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
-133	Ba-133	1.000E+00	1.000E+00	9.975E-01	9.975E-01	9.975E-01	9.975E-01	9.975E-01	9.975E-01	9.975E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Leafy Plants
Harvest Time = t - 2.74E-03 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CF3(j,2,t)# At Time in 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

Storage Time Correction Factors for Leafy Plants
Harvest Time = t - 2.74E-03 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CF3(j,2,t)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Livestock (Meat) Fodder
Harvest Time = t - 1.78E-01 yr; Consumption Time = t - 5.48E-02 yr

Parent (i)	Product (j)	Thread Fraction	CFLF(j,1,t)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.921E-01	9.921E-01	9.921E-01	9.921E-01	9.921E-01	9.921E-01	9.921E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Livestock (Milk) Fodder
Harvest Time = t - 1.26E-01 yr; Consumption Time = t - 2.74E-03 yr

Parent (i)	Product (j)	Thread Fraction	CFLF(j,2,t)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.921E-01	9.921E-01	9.921E-01	9.921E-01	9.921E-01	9.921E-01	9.921E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Meat
Harvest Time = t - 5.48E-02 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CF45(j,1,t)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.965E-01	9.965E-01	9.965E-01	9.965E-01	9.965E-01	9.965E-01	9.965E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Milk
Harvest Time = t - 2.74E-03 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CF45(j,2,t)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01	9.998E-01

#Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Storage Time Correction Factors for Fish & Crustacea
Harvest Time = t - 1.92E-02 yr; Consumption Time = t yr

Parent (i)	Product (j)	Thread Fraction	CFF(j,1,t)# At Time in 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
Ba-133	Ba-133	1.000E+00	1.000E+00	9.988E-01	9.988E-01	9.988E-01	9.988E-01	9.988E-01	9.988E-01	9.988E-01

Correction factor = (concentration in media at consumption time)/(concentration at harvest time).

Area and Depth Factors for Plant (p=3), Meat (p=4), and Milk (p=5) Pathways
Root Uptake from Contaminated Soil (q=1)

Area Factor for Plant Foods [FA(3)] = 0.00

Nuclide (i)	Depth Factor FD(i,1,t) (dimensionless) 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
Ba-133	1.6667E-01	1.6556E-01	1.6333E-01	1.5556E-01	1.3333E-01	5.5556E-02	0.0000E+00	0.0000E+00

Area and Depth Factors for Plant (p=3), Meat (p=4), and Milk (p=5) Pathways
Foliar Uptake from Contaminated Dust (q=2)

Area Factor for Plant Foods [FA(3)] = 0.00

Nuclide (i)	Depth Factor FD(i,2,t) (dimensionless) 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
Ba-133	1.0000E+00	9.9333E-01	9.8000E-01	9.3333E-01	8.0000E-01	3.3333E-01	0.0000E+00	0.0000E+00

Area and Depth Factors for Plant (p=3), Meat (p=4), and Milk (p=5) Pathways
Ditch Irrigation (q=3)

Area Factor for Plant Foods [FA(3)] = 0.00

Nuclide (i)	Depth Factor FD(i,3,t) (dimensionless) 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
Ba-133	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00	1.0000E+00

Area and Depth Factors for Plant (p=3), Meat (p=4), and Milk (p=5) Pathways
Overhead Irrigation (q=4)

Area Factor for Plant Foods [FA(3)] = 0.00

The Depth Factor Value
FD(i,p,q,t) = 1.0000E+00
is applicable for all radionuclides(i) and times(t).

Area and Depth Factors for Meat (p=4) and Milk (p=5) Pathways
Transfer from Livestock Water (q=5) and Soil (q=6) Intake

Area Factor for Meat and Milk [FA(p),p=4,5] = 0.00

The livestock water subpathway (q=5) and livestock soil intake subpathway (q=6)
occur only for the meat (p=4) and milk (p=5) pathways.

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)
Subpathway: Root Uptake from Contaminated Soil (q=1)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,1,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	3.400E-06	4.350E-01	3.883E-01	3.081E-01	1.370E-01	1.333E-02	2.738E-06	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)
Subpathway: Foliar Uptake from Contaminated Dust (q=2)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,2,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	3.400E-06	2.868E-04	2.559E-04	2.031E-04	9.030E-05	8.786E-06	1.804E-09	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)
Subpathway: Ditch Irrigation (q=3)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,3,t) * SF(j,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
-133	Ba-133	3.400E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Plant Food Pathway (p=3)
Subpathway: Overhead Irrigation (q=4)

Parent (i)	Product (j)	DCF(j,3)*	ETF(j,3,4,t) * SF(j,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
-133	Ba-133	3.400E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)
Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,1,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	3.400E-06	2.142E-04	1.926E-04	1.528E-04	6.797E-05	6.615E-06	1.361E-09	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)
Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,2,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	3.400E-06	5.684E-07	5.110E-07	4.056E-07	1.804E-07	1.755E-08	3.611E-12	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)
Subpathway: Ditch Irrigation (q=3)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,3,t) * SF(j,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
-133	Ba-133	3.400E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)
Subpathway: Overhead Irrigation (q=4)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,4,t) * SF(j,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
-133	Ba-133	3.400E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Meat Pathway (p=4)
Subpathway: Livestock Water (q=5)

Parent (i)	Product (j)	DCF(j,4)*	ETF(j,4,5,t) * SF(j,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
-133	Ba-133	3.400E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)
Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,1,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	3.400E-06	6.325E-04	5.671E-04	4.501E-04	2.002E-04	1.948E-05	4.005E-09	0.000E+00	0.000E+00

- The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)
Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,2,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	3.400E-06	1.678E-06	1.505E-06	1.194E-06	5.312E-07	5.169E-08	1.063E-11	0.000E+00	0.000E+00

- The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)
Subpathway: Ditch Irrigation (q=3)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,3,t) * SF(j,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
-133	Ba-133	3.400E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)
Subpathway: Overhead Irrigation (q=4)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,4,t) * SF(j,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
-133	Ba-133	3.400E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Milk Pathway (p=5)
Subpathway: Livestock Water (q=5)

Parent (i)	Product (j)	DCF(j,5)*	ETF(j,5,5,t) * SF(j,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	3.400E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

- The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Fish Pathway (p=6)

Parent (i)	Product (j)	DCF(j,6)*	ETF(j,6,t) * SF(j,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	3.400E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose Conversion and Environmental Transport Factors for the Drinking Water Pathway (p=7)

Parent (i)	Product (j)	DCF(j,7)*	ETF(j,7,t) * SF(j,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	3.400E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

* - The dose conversion factor units are mrem/pCi.

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)
Subpathway: Root Uptake from Contaminated Soil (q=1)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,3,1t) 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
Ba-133	Ba-133	1.000E+00	1.399E-06	1.247E-06	9.894E-07	4.399E-07	4.278E-08	8.735E-12	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)
Subpathway: Foliar Uptake from Contaminated Dust (q=2)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,3,2t) 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
Ba-133	Ba-133	1.000E+00	9.220E-10	8.215E-10	6.520E-10	2.899E-10	2.819E-11	5.756E-15	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)
Subpathway: Ditch Irrigation (q=3)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,3,3t) 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)
Subpathway: Overhead Irrigation (q=4)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,3,4t) 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Plant Foods (p=3)
Total for All Subpathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,3,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
F -133	Ba-133	1.000E+00	1.400E-06	1.248E-06	9.901E-07	4.402E-07	4.281E-08	8.741E-12	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,1t) 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
Ba-133	Ba-133	1.000E+00	6.935E-10	6.184E-10	4.908E-10	2.182E-10	2.122E-11	4.341E-15	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,2t) 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
Ba-133	Ba-133	1.000E+00	1.840E-12	1.641E-12	1.302E-12	5.790E-13	5.631E-14	1.152E-17	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Subpathway: Ditch Irrigation (q=3)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,3t) 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Subpathway: Overhead Irrigation (q=4)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,4t) 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Subpathway: Livestock Water (q=5)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,5t) 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Meat (p=4)
Total for All Subpathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,4,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
Ba-133	Ba-133	1.000E+00	6.780E-09	6.042E-09	4.795E-09	2.132E-09	2.073E-10	4.235E-14	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)
Subpathway: Fodder Root Uptake from Contaminated Soil (q=1)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,1t) 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
Ba-133	Ba-133	1.000E+00	2.043E-09	1.821E-09	1.445E-09	6.426E-10	6.250E-11	1.278E-14	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)
Subpathway: Fodder Foliar Uptake from Contaminated Dust (q=2)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,2t) 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
Ba-133	Ba-133	1.000E+00	5.421E-12	4.832E-12	3.835E-12	1.705E-12	1.658E-13	3.390E-17	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)
Subpathway: Ditch Irrigation (q=3)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,3t) 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)
Subpathway: Overhead Irrigation (q=4)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,4t) 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)
Subpathway: Livestock Water (q=5)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,5t) 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from Ingestion of Milk (p=5)
Total for All Subpathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,5,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
Ba-133	Ba-133	1.000E+00	2.421E-08	2.157E-08	1.712E-08	7.611E-09	7.400E-10	1.511E-13	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from the Ingestion of Fish (p=6)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,6,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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Dose/Source Ratios for Internal Radiation from the Ingestion of Drinking Water (p=7)
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Thread Fraction	DSR(j,7,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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Plant/Air and Plant/Water Concentration Ratios

Mass loading [ASR(3)]: 1.000E-04 g/m**3
Area Factor for Mass Loading [FA(2)]: 7.716E-02

Nuclide (i)	FAR(i,3,2,1) m**3/g	FAR(i,3,2,2) m**3/g	FWR(i,3,3,1) L/g	FWR(i,3,3,2) L/g	FWR(i,3,4,1) L/g	FWR(i,3,4,2) L/g
Ba-133	5.4545E-02	2.6156E-01	5.6454E-07	8.2874E-07	3.4522E-04	1.6554E-03

FAR(i,p,q,k) is the plant/air concentration ratio for airborne contaminated dust,
and FWR(i,p,q,k) is the plant/water concentration ratio. See groundwater displays
for water/soil concentration ratios.

Plant/Soil Concentration Ratios, FSR(i,3,q,k,t)

Root Uptake (q=1) and Foliar Dust Deposition (q=2)
Nonleafy (k=1) and/or Leafy (k=2) Vegetables

Nuclide(i) Parent	Product	FSR(i,3,1,k)	FSR(i,3,2,1)	FSR(i,3,2,2)
Ba-133	Ba-133	5.0000E-03	4.2085E-07	2.0181E-06

Plant/Soil Concentration Ratio, FSR(j,3,q,k,t)
Ditch Irrigation (q=3)

Parent (i)	Product (j)	Thread Fraction	FSR(j,3,3,k,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Plant/Soil Concentration Ratio, FSR(j,3,q,k,t)
Overhead Irrigation (q=4) and Nonleafy Vegetables (k=1)

Parent (i)	Product (j)	Thread Fraction	FSR(j,3,4,1,t) * SF(j,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Plant/Soil Concentration Ratio, FSR(j,3,q,k,t)
Overhead Irrigation (q=4) and Leafy Vegetables (k=2)

Parent (i)	Product (j)	Thread Fraction	FSR(j,3,4,2,t) * SF(j,t) At Time in 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

Plant/Soil Concentration Ratio, FSR(j,3,q,k,t)
Overhead Irrigation (q=4) and Leafy Vegetables (k=2)

Parent (i)	Product (j)	Thread Fraction	FSR(j,3,4,2,t) * SF(j,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Meat/Fodder, Milk/Fodder, Fodder/Air and Fodder/Water Concentration Ratios

FI(4,q): 68.0 kg/day FI(5,q): 55.0 kg/day q=1,2,3,4
FI(4,q): 50.0 L/day FI(5,q): 160.0 L/day q=5
FI(4,q): 0.5 kg/day FI(5,q):

Nuclide (i)	FQR(i,4) d/kg	FQR(i,5) d/kg	FAR(i,3,2,3) m**3/g	FWR(i,3,3,3) L/g	FWR(i,3,4,3) L/g
Ba-133	2.0000E-04	5.0000E-04	2.8659E-01	2.6619E-07	1.8139E-03

FI(p,q) are the fodder (q=1,2,3,4), livestock water (q=5) and soil (q=6) intake rates; FQR(i,p) are the transfer coefficients from contaminated fodder of livestock water to meat (p=4) or milk (p=5). FAR(i,3,2,3) are the fodder/air concentration ratios, and FWR(i,3,3,3) and FWR(i,3,4,3) are the fodder/water concentration ratios for ditch and overhead irrigation, respectively.

Fodder/Soil Concentration Ratios, QSR(i,p,q,t), for Meat and Milk Pathways
Root Uptake (q=1) and Foliar Dust Deposition (q=2)

Nuclide(i) Parent	Product	QSR(i,p,1)	QSR(i,p,2)
Ba-133	Ba-133	5.0000E-03	2.2112E-06

Fodder/Soil Concentration Ratio, QSR(j,p,q,t),for Meat and Milk Pathways
Ditch Irrigation (q=3)

Parent (i)	Product (j)	Thread Fraction	QSR(j,p,3,t) * SF(j,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Fodder/Soil Concentration Ratio, QSR(j,p,q,t),for Meat and Milk Pathways
Overhead Irrigation (q=4)

Parent (i)	Product (j)	Thread Fraction	QSR(j,p,4,t) * SF(j,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Fodder/Soil Concentration Ratio, QSR(j,p,q,t),for Meat and Milk Pathways
Livestock Water (q=5)

Parent (i)	Product (j)	Thread Fraction	QSR(j,p,5,t) * SF(j,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Meat/Soil Concentration Ratios, FSR(i,4,q,t)
Root Uptake (q=1) and Foliar Dust Deposition (q=2)

Nuclide(i) Parent	Product	FSR(i,4,1)	FSR(i,4,2)
Ba-133	Ba-133	1.1333E-05	3.0073E-08

Meat/Soil Concentration Ratio, FSR(j,4,q,t)
Ditch Irrigation (q=3)

Parent (i)	Product (j)	Thread Fraction	FSR(j,4,3,t) * SF(j,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Meat/Soil Concentration Ratio, FSR(j,4,q,t)
Overhead Irrigation (q=4)

Parent (i)	Product (j)	Thread Fraction	FSR(j,4,4,t) * SF(j,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Meat/Soil Concentration Ratio, FSR(j,4,q,t)
Livestock Water (q=5)

Parent (i)	Product (j)	Thread Fraction	FSR(j,4,5,t) * SF(j,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Milk/Soil Concentration Ratios, FSR(i,5,q,t)
Root Uptake (q=1) and Foliar Dust Deposition (q=2)

Nuclide(i) Parent	Product	FSR(i,5,1)	FSR(i,5,2)
Ba-133	Ba-133	2.2917E-05	6.0808E-08

Milk/Soil Concentration Ratio, FSR(j,5,q,t)
Ditch Irrigation (q=3)

Parent (i)	Product (j)	Thread Fraction	FSR(j,5,3,t) * SF(j,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Milk/Soil Concentration Ratio, FSR(j,5,q,t)
Overhead Irrigation (q=4)

Parent (i)	Product (j)	Thread Fraction	FSR(j,5,4,t) * SF(j,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Milk/Soil Concentration Ratio, FSR(j,5,q,t)
Livestock Water (q=5)

Parent (i)	Product (j)	Thread Fraction	FSR(j,5,5,t) * SF(j,t) At Time in 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
Ba-133	Ba-133	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Dose/Source Ratios for Soil Ingestion Pathway (p=8)
Parent and Progeny Principal Radionuclide Contributions Indicated

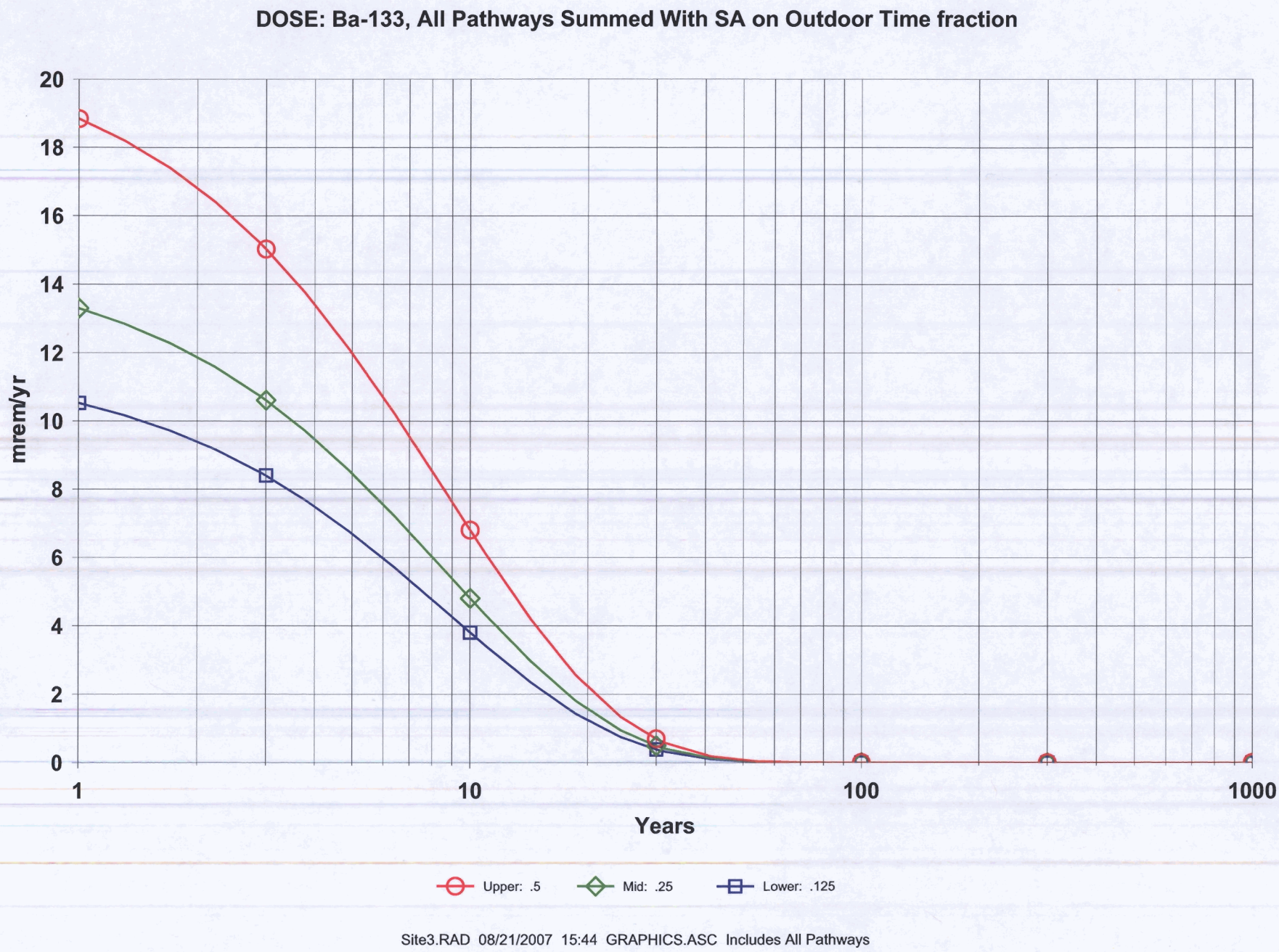
Parent (i)	Product (j)	Thread Fraction	DSR(j,8,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	1.000E+00	5.274E-07	4.699E-07	3.729E-07	1.658E-07	1.612E-08	3.291E-12	0.000E+00	0.000E+00

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

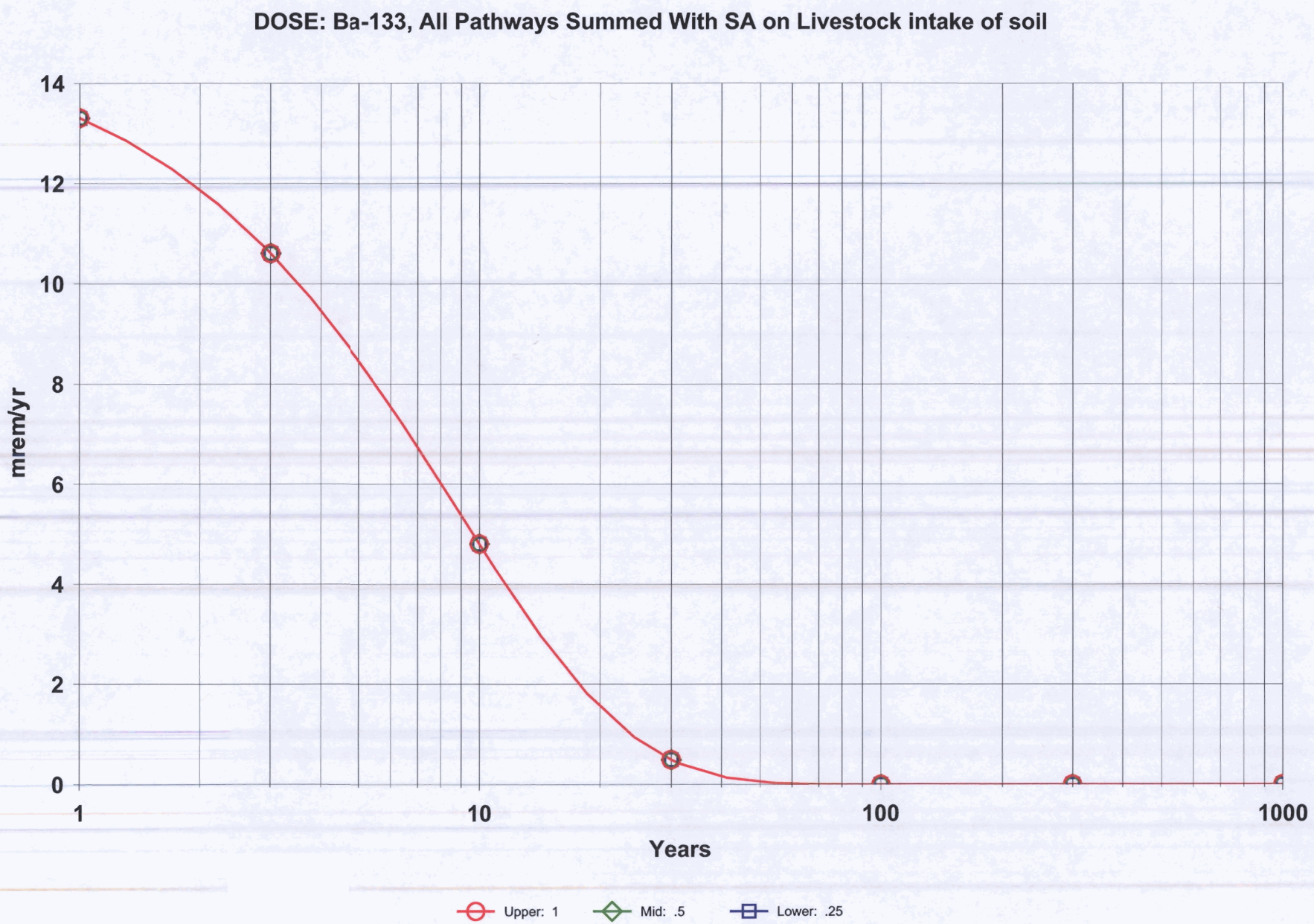
Dose Conversion and Environmental Transport Factors for the Soil Ingestion Pathway (p=8)

Parent (i)	Product (j)	DCF(j,8)*	ETF(j,8,t) At Time in Years (g/yr) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Ba-133	Ba-133	3.400E-06	1.643E-01	1.632E-01	1.610E-01	1.533E-01	1.314E-01	5.475E-02	0.000E+00	0.000E+00

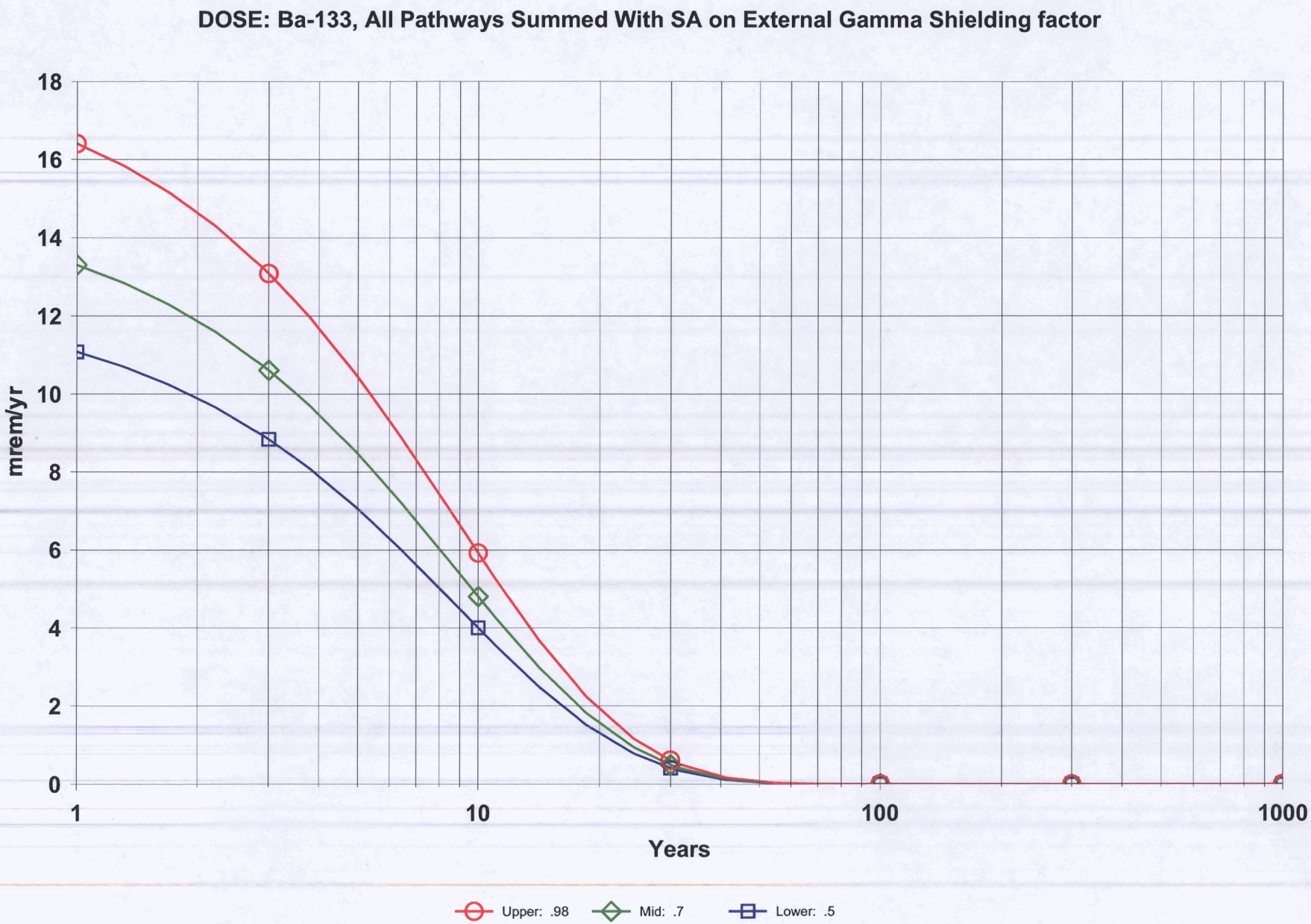
* - The dose conversion factor units are mrem/pCi.



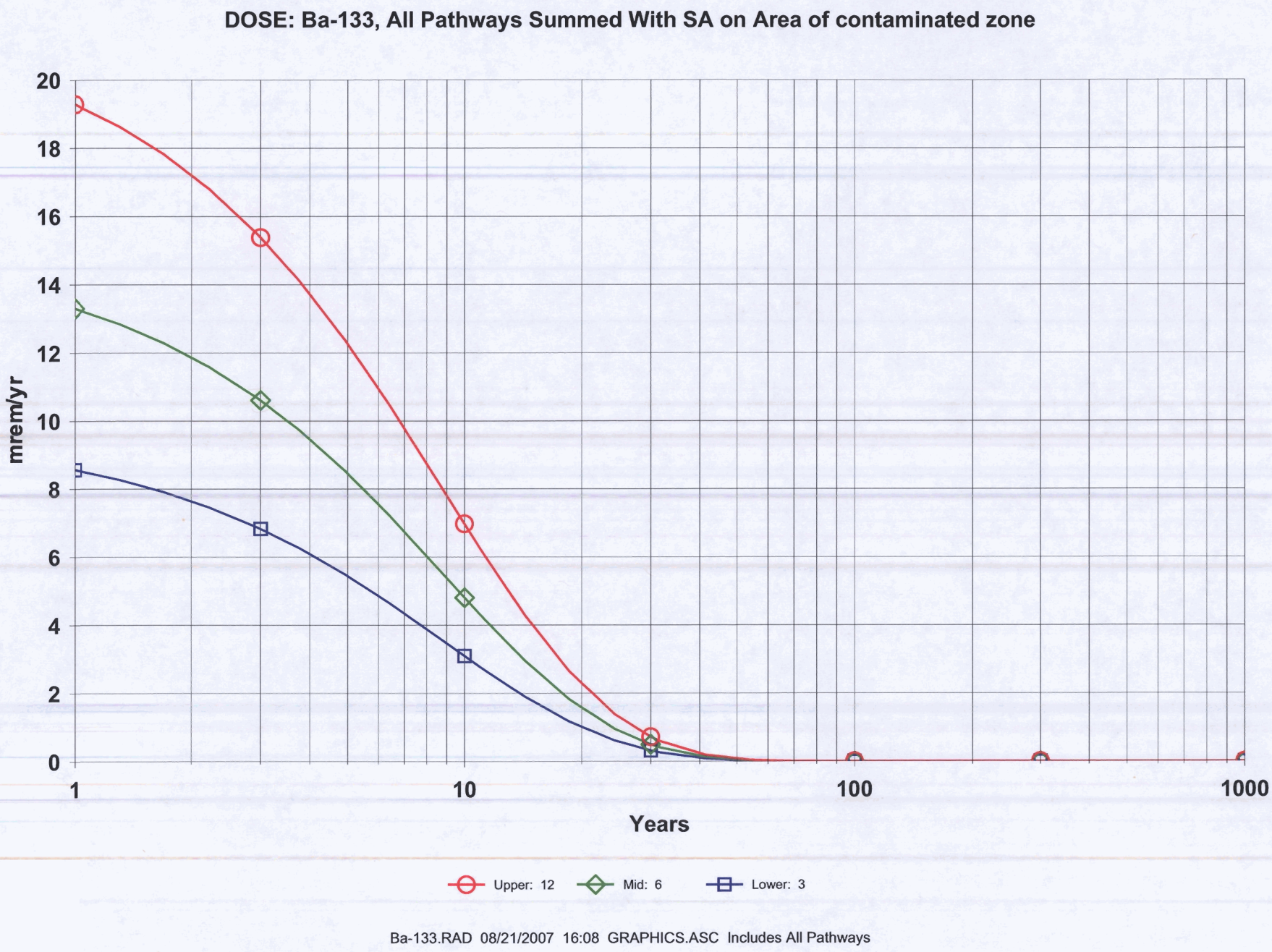
Site3.RAD 08/21/2007 15:44 GRAPHICS.ASC Includes All Pathways



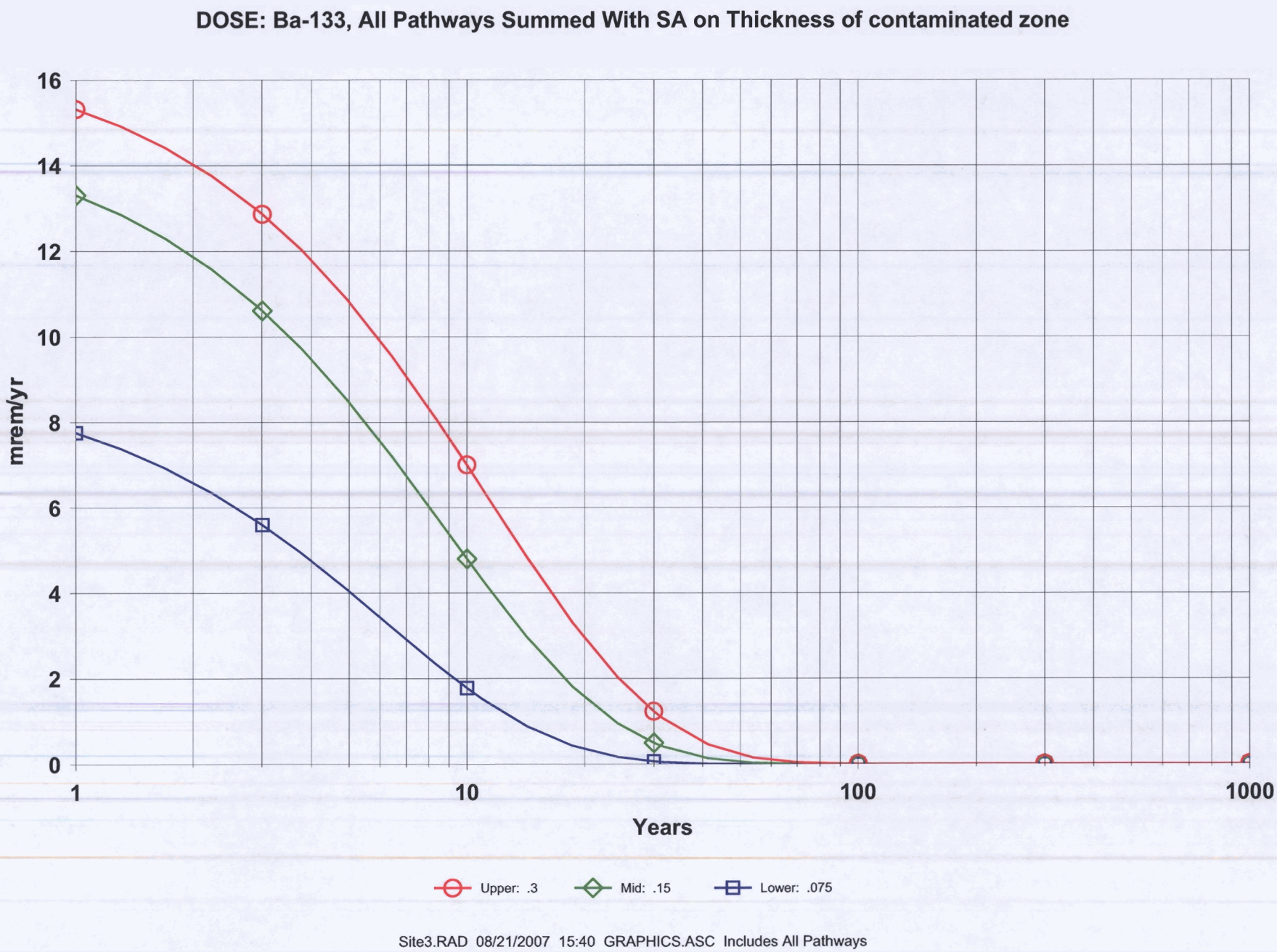
Ba-133.RAD 08/21/2007 16:11 GRAPHICS.ASC Includes All Pathways



Ba-133.RAD 08/21/2007 16:03 GRAPHICS.ASC Includes All Pathways



Ba-133.RAD 08/21/2007 16:08 GRAPHICS.ASC Includes All Pathways


DOSE: Ba-133, All Pathways Summed With SA on Thickness of contaminated zone
mrem/yr
16
14
12
10
8
6
4
2
0
1
10
100
1000
Years
Upper: .3
Mid: .15
Lower: .075
Site3.RAD 08/21/2007 15:40 GRAPHICS.ASC Includes All Pathways