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7 June 2000

Mr. Randy Godfrey, Engineering Manager
U.S. Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

W.O. #10971.219.201.0001

Re: Contract No. DACA31-96-D-0006
Task Order No. 19
Justification for Strontium-90 Soil DCGL
St. Albans Veterans Administration Extended Care Facility, Queens, New York
DCN: VAHOSP-060700-AACK

Dear Mr. Godfrey:

Enclosed please find three (3) copies of the above-referenced addendum. If you have any immediate questions or wish to discuss this, please do not hesitate to contact me at (847) 918-4137 or Mike Madonia at (918) 918-4087.

847

Very truly yours,

ROY F. WESTON, INC.

Michael Van Der Karr
Senior Health Physicist

MVDK/ts

cc: H. Honerlah, CENAB,
J. Rhyner, WESTON
M. Madonia, WESTON
M. Van Der Karr, WESTON



DRAFT VERSION 4
JUSTIFICATION FOR STRONTIUM-90 SOIL DCGL
ST. ALBANS VETERANS ADMINISTRATION EXTENDED CARE CENTER –
QUEENS, NEW YORK

June 2000

This document is submitted to support request for a derived concentration guideline (DCGL) of 11 pCi/g for strontium-90 in soil at the St. Albans Veterans Administration Extended Care Center (VAECC) in Queens, New York. The VAECC maintains a possession-only (intent to decommission) license with the U.S. Nuclear Regulatory Commission (NRC) - License #31-02892-06. Information contained herein supercedes Weston (1999), which was prepared to justify a soil DCGL of 35 pCi/g.

Per 10 CFR 20, Subpart E, a licensee requesting unrestricted license termination is required to determine DCGLs that demonstrate that the maximum total effective dose equivalent (TEDE) to a member of the public does not exceed 25 mrem/year for a 1000 year period. The following analyses were performed using RESRAD Version 5.95. Guidance for application of the RESRAD code for "generic screening" and "limited site-specific analyses" is contained in the NRC (1999). The proposed VAECC DCGL is based on the simplest and most conservative application of RESRAD using the guidance values in NRC (1999) and actual site information.

Site Description

The VAECC setting has been extensively described in S&W (1998) and Weston (1999). Figure 1 illustrates the concrete area (approximately 90 m²) to be removed during decontamination operations. The only area of soil contamination is approximately 1 m² as shown in Figure 1 and will be removed to a depth of 0.15 m during decontamination. This very small volume of soil contamination is the result of surface disturbance and subsequent entry to sample an underlying drain line. Characterization sampling at other locations below the nuclear medicine lab floor indicates that underlying soils have not been contaminated. All concrete removal areas will be restored with a new slab, and the building areas made accessible for unrestricted use. The approximate footprint of the entire nuclear medicine wing is 470 m².

For the purposes of DCGL development and modeling, the entire 90 m² exposed soil area (that will result from concrete removal) is applied to a depth of 0.15 m, yielding a volume of 13.5 m³. These conservative values are used as the bases of calculations for input to the RESRAD model.

Source Activity Analysis

NRC (1999) stipulates that two simulations be performed using RESRAD, the first being the residential garden scenario¹ in which a small volume of waste is brought to the

¹ Given that the site is located in highly urbanized Queens, New York, the agricultural/farming scenario is not considered.

surface and considered for the direct gamma radiation, inhalation, soil ingestion and plant ingestion pathways. The NRC guidelines mention that the simulation should use 600 m³ volume spread out over an area to a depth of 0.9 m (700 m²). Given that the VAECC volume is much smaller, it is assumed to be interspersed in the 600 m³ volume. Using a unit strontium activity of 1 pCi/g, the input activity for this RESRAD simulation is calculated as:

$$\text{Activity (pCi/g)} = \text{Unit Activity (1 pCi/g)} * (13.5 \text{ m}^3 / 600 \text{ m}^3) \quad (1)$$

$$\text{Activity (pCi/g)} = 0.025 \text{ pCi/g}$$

Input to the second RESRAD simulation requires that the groundwater, irrigation and aquatic pathways be considered, and that the development of input radionuclide concentrations should be based on the “true existing waste zone”, as potentially distributed with clean, interspersed soil as part of the uncovering process. Although it is highly unlikely that any major demolition activities will take place at the VAECC in the near term of 30 years, the area of the nuclear medicine wing is conservatively used as the basis of the distribution area. Based on the actual footprint of the VAECC of 470 m² and a unit strontium-90 activity of 1 pCi/g, the input activity for the second RESRAD simulation is calculated from NRC (1999) as:

$$\text{Activity (pCi/g)} = \text{Unit Activity (1 pCi/g)} * (90 \text{ m}^2 / 470 \text{ m}^2) \quad (2)$$

$$\text{Activity (pCi/g)} = 0.19 \text{ pCi/g}$$

Modeling Output

User-defined RESRAD inputs included the aforementioned concentrations as calculated in equations (1) and (2), source areas as defined in NRC (1999), and a strontium distribution coefficient (K_d) of 2.5 cm³/g. The K_d represents a significant departure from default values and adds additional conservatism to the model. Selection of the K_d value is described in Attachment A. Other departures from default parameters have been noted in Weston (1999) and have limited impact in the output doses calculated with the code.

Simulation 1 Resident Exposure – Modeling for this exposure scenario yields a maximum dose factor of 0.071 mrem/year per pCi/g at 0 years. Plant ingestion is the predominant pathway.

Simulation 2 Water Pathway Exposure – Modeling for this exposure scenario yields a maximum dose factor of 2.3 mrem/year per pCi/g at 16 years. Drinking water is the predominant pathway.

Table 1 presents the estimated doses for a range of strontium-90 soil concentrations at the VAECC.

Table 1. Estimated Dose Versus Soil Concentration.

Soil Concentration (pCi/g)	Residential Exposure Dose (mrem/year)	Drinking Water Dose (mrem/year)
1	0.071	2.3
5	0.35	11.5
11	0.78	25
20	1.4	46

Summary

The proposed strontium-90 soil DCGL of 11 pCi/g is derived under extremely conservative modeling conditions and is protective of public health. These reasons include:

1. The value of K_d is significantly lower than published defaults for RESRAD and DandD.
2. Source activity will likely decay significantly prior to any disturbance of the VAECC buildings.
3. Based on the NRC (1999), the most conservative modeling situation has been applied, in which the "mass balance" groundwater transfer model has been applied.

In all instances, remediation of the site will be performed to the specifications of a site As Low As Reasonably Achievable (ALARA) program. This program will address reduction of contaminated material volumes and exposure potential.

References

CDM 1995. Final Feasibility Study Report – Operable Unit IV, for Brookhaven National Laboratory by CDM Federal Programs Corporation, November, 1995.

EQM 1999. Sampling and Analysis Program for the Cleanup Verification of Soil and Disposal of Debris from the Removal of the Pile Fan Sump, Piping, and Aboveground Ducts (Working Draft), for Brookhaven Science Associates by Environmental Quality Management, September, 1999.

Boring Logs, Certified As-Built Drawing for St. Albans VA ECC New Booster Pump Station, H2M Group.

IT 1991. Draft Final Remedial Investigation/Feasibility Study Work Plan – Operable Unit IV, for Brookhaven National Laboratory by International Technology Corporation, September, 1991.

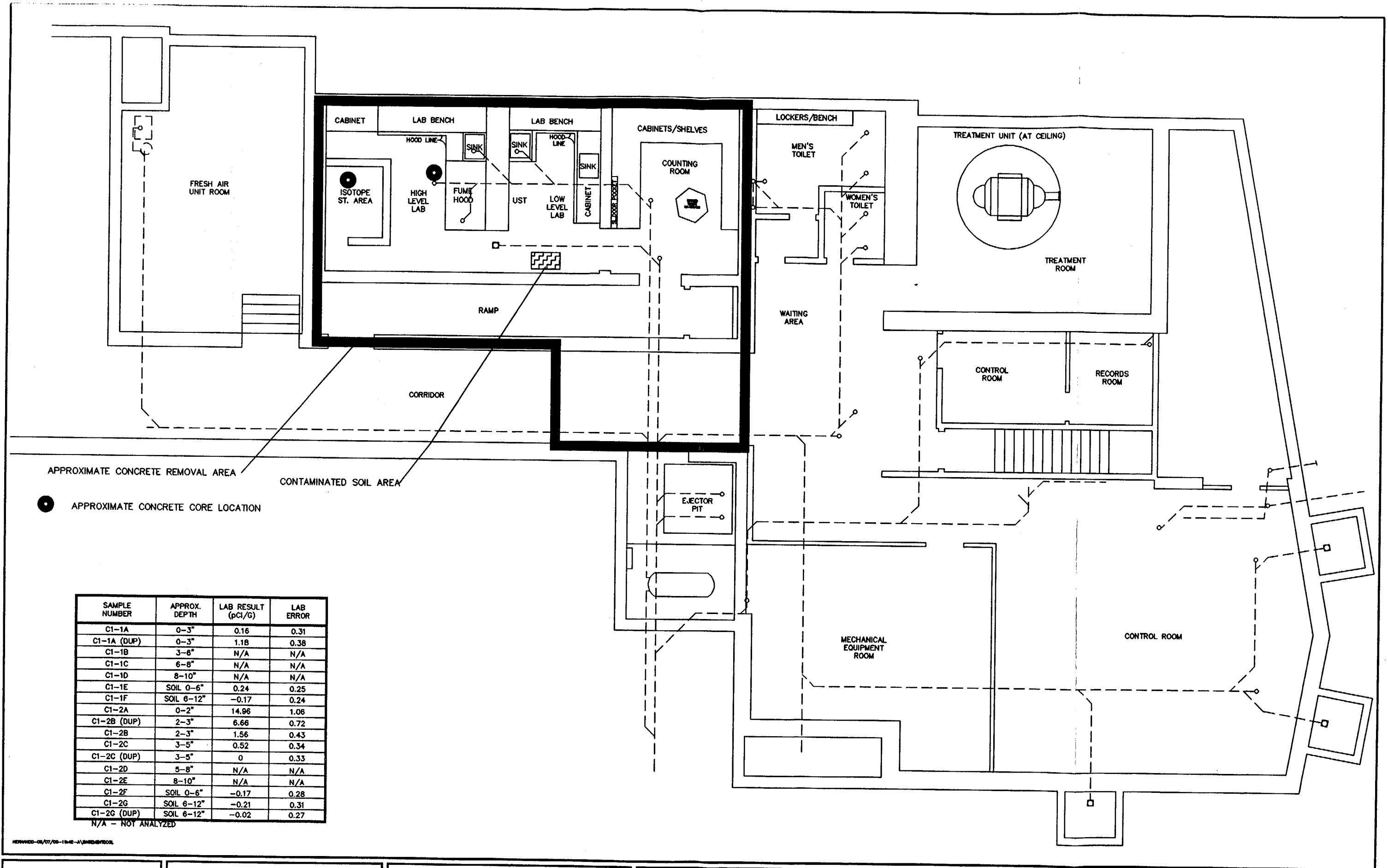
NRC 1999. Preliminary Guidelines for Evaluating Dose Assessments in Support of Decommissioning. U.S. Nuclear Regulatory Commission, Low-Level Waste and Decommissioning Programs Branch. March 1999.

OBG 1987. Brooklyn/Queens Aquifer Study, for NYCDEP by O'Brien and Gere, June 1987.

USGS 1998. Ground-Water Quality in Kings, Queens, and Western Nassau Counties, Long Island, New York, 1992-96, with Geophysical Logs from Selected Wells, U.S. Geological Survey, Open File Report 98-298, 1998.

USGS 1986. Hydrogeologic Data from the Northern Part of the Town of Brookhaven,, Suffolk County, new York, U.S. Geological Survey, Long Island Water Resources Bulletin 15, 1986.

Weston 1999. Addendum to Justification for Derived Concentration Guidelines. Roy F. Weston, Inc. Report submitted to U.S. Army Corps of Engineers. October 1999.



ATTACHMENT A

K_d Analysis

Previous comments from the NRC have highlighted the need to justify a reasonable, site-specific strontium K_d (distribution coefficient) to replace the default value of 30 cm³/g specified in the RESRAD code. An extensive data search yielded no actual strontium K_d values that had been measured and/or calculated in the vicinity of the VAECC. The closest published values were noted for Brookhaven National Laboratory (BNL), and a comparison of VAECC and BNL soil types was performed to determine if the BNL K_d values were appropriate for use in the RESRAD model.

A comparison of shallow surface materials beneath the VAECC and the Brookhaven National Laboratory (BNL), located approximately 47 miles east in Suffolk County, Long Island indicates that soil types (and subsequent K_d values) at Brookhaven National Laboratory (BNL) are similar to those at the VAECC. It should be noted that the VAECC is located on a 10-acre site at 179th Street and Linden Boulevard in Queens, New York at the western end of Long Island.

Both sites overlie the Magothy aquifer which is characterized by a layer of coarse sand and gravel ranging from 25 to 50' thick in the vicinity of the VAECC and sand with some silt, clay and/or pebbles under the BNL site (USGS 1998, 1986). Specific soil surveys are not available for either facility because Long Island is classified as urban based upon the extent of development.

During the recent installation of a New Booster Pump Station and New Ground Storage Tank at the VAECC site, four shallow soil borings were taken. The boring logs, summarized below in Table 1 demonstrate that just below the topsoil layer, the shallow subsurface stratigraphy of the site consists of brown, brown white and red brown sands and sands and gravels with little to no fines (silts and clays). This condition is consistent to the groundwater elevation of approximately 18' below grade. Only three out of 19 samples were described as having "some" (>35%) fines, only one of which was above the water table.

Table 1 – St Albans VAECC Soil Borings Summary

Boring B-1	Boring B-2	Boring B-3	Boring B-4
Topsoil (0-2')	Topsoil (0-2')	Topsoil (0-2')	Topsoil (0-2')
Brown Sand Sand (little or no fines) (2-10')	Brown Sand (little or no fines) (2-15')	Brown Sand (little or no fines) (2-10')	Brown Sand (little or no fines) (2-15')
Brown Sand and Gravel (10-15') (little or no fines)		Brown/White (little or no fines) Sand (10-15')	
Brown Sand (15-20') (little or no fines)	Brown Sand and Gravel (little or no fines) (15-30')	Red-Brown Silty Sand (some fines) (15-20')	Dark Brown Sand and Gravel (little or no fines) (15-25')
Dark Brown Sand and Gravel (20-55') (little or no fines)	Yellow/Brown Sand (30-32')	Dark Brown Sand and Gravel (little or no fines) (20-32')	Orange/Brown Sand (little or no fines) (25-32')
Grey/Brown Sand and Gravel (little or no fines) (55-65')	End of Boring	End of Boring	End of Boring
Grey Sand (little or no fines) (65-75')			
Grey Sand and Gravel Sand (little or no fines) (75-90')			
Grey Silty Clay and Fine Sand (some fines) (90-95')			
Grey/Red Silty Clay (some fines) (95-102')			
End of Boring			

Numerous wells and borings have been drilled at BNL. Several of these wells were used to prepare remedial investigation/feasibility study documents IT(1991) and CDM(1995). Only boring logs identified as native material were compared to the VAECC soils, while those identifying subsurface fill material were discarded. Table 2 presents boring data from native soils at BNL.

Table 2 – BNL Soil Borings/Well Log Summary

Boring B-5 11/4/87	Well IT-1 11/3/87	Well 76-17 6/30/89	Well 76-21 12/12/89
Topsoil (0-2')	Topsoil (0-2')	Topsoil (0-2')	Topsoil (0-2')
Tan Sand, little Gravel (2-7')	Brown Sand, some Gravel (2-7')	Sand and coarse gravel (2-7')	Orange Brown Sand and gravel (2-7')
Brown Silty Sand, tan sand, little Gravel (7-12')	Brown Sand, little gravel (2-7')	Light brown sand and gravel (7-12')	Brown sand, some gravel (7-12')
Tan Sand, Little Gravel (12-17')	Brown Sand, little Gravel (7-12')	Tan to light Tan Sand, trace gravel (12-17')	White sand, trace gravel (12-27')
Tan Sand, Some Gravel (17-22')	Tan Sand, Little Gravel (12-17')	Tan to light brown sand, trace gravel (17-22')	White sand (27-32')
Tan Sand, Little Gravel (22-27')	Tan Sand, Little Gravel, Little Silt (17-22')	Light tan sand and gravel (22-27')	White sand, with gravel (32-42')
Tan Sand, some gravel (27-32')	Tan Sand, Little Gravel (22-32')	Tan sand and gravel (27-32)	White sand (42-52')
Tan Sand, Little Gravel (32-35')	Tan/Brown Sand (32-37')	Sand and Gravel (32-37')	End of Boring
Tan Sand, Little Silt, Little Gravel (35-37')	Tan Sand (37-42')	Tan Sand and Fine Gravel (37-42')	
End of Boring	Tan Sand and Gravel (42-50')	No recovery (42-47')	
	End of Boring	Gravel and sand (47-52')	
		End of Boring	

As can be observed from these two tables, the materials underlying the two sites are similar in terms of grain-size distribution and consistency, being mainly composed of sands and sands and gravel. Silt is indicated as being present in "little" amounts in only 2 of the 32 samples reported. No clay is reported.

The value of K_d input to RESRAD is taken as the most conservative value from research performed at Brookhaven National Laboratory (CDM 1995, EQM 1999). Values calculated or measured for strontium include 2.5, 3 and 7. The most conservative value of 2.5 is chosen.

ATTACHMENT B

Dose Conversion Factor (and Related) Parameter Summary

File: Default.LIB

Menu	Parameter	Current Value	Default	Pa
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF
D-34	Food transfer factors:			
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIO
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIO

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used b (If different)
R011	Area of contaminated zone (m**2)	7.000E+02	1.000E+04	-
R011	Thickness of contaminated zone (m)	9.000E-01	2.000E+00	-
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	-
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	-
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	-
R011	Times for calculations (yr)	1.000E-01	1.000E+00	-
R011	Times for calculations (yr)	5.000E-01	3.000E+00	-
R011	Times for calculations (yr)	1.000E+00	1.000E+01	-
R011	Times for calculations (yr)	3.000E+00	3.000E+01	-
R011	Times for calculations (yr)	1.000E+01	1.000E+02	-
R011	Times for calculations (yr)	3.000E+01	3.000E+02	-
R011	Times for calculations (yr)	5.000E+01	1.000E+03	-
R011	Times for calculations (yr)	1.000E+02	0.000E+00	-
R011	Times for calculations (yr)	3.000E+02	0.000E+00	-
R012	Initial principal radionuclide (pCi/g): Sr-90	2.500E-02	0.000E+00	-
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	-
R013	Cover depth (m)	0.000E+00	0.000E+00	-
R013	Density of cover material (g/cm**3)	not used	1.500E+00	-
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	-
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	-
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	-
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	-
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	-
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	-
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	-
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	-
R013	Humidity in air (g/m**3)	not used	8.000E+00	-
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	-
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	-
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	-
R013	Irrigation mode	overhead	overhead	-
R013	Runoff coefficient	2.000E-01	2.000E-01	-
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	-
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	-
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	-
R014	Saturated zone total porosity	4.000E-01	4.000E-01	-
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	-
R014	Saturated zone field capacity	2.000E-01	2.000E-01	-
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	-
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	-
R014	Saturated zone b parameter	5.300E+00	5.300E+00	-
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	-
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	-
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	-
R014	Well pumping rate (m**3/yr)	1.180E+02	2.500E+02	-
R015	Number of unsaturated zone strata	1	1	-

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used b (If different)
R015	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	-
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	-
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	-
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	-
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	-
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	-
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	-
R016	Distribution coefficients for Sr-90			
R016	Contaminated zone (cm**3/g)	2.500E+00	3.000E+01	-
R016	Unsaturated zone 1 (cm**3/g)	2.500E+00	3.000E+01	-
R016	Saturated zone (cm**3/g)	2.500E+00	3.000E+01	-
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.36
R016	Solubility constant	3.000E+00	0.000E+00	-
R017	Inhalation rate (m**3/yr)	1.169E+04	8.400E+03	-
R017	Mass loading for inhalation (g/m**3)	3.140E-06	1.000E-04	-
R017	Exposure duration	3.000E+01	3.000E+01	-
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	-
R017	Shielding factor, external gamma	5.512E-01	7.000E-01	-
R017	Fraction of time spent indoors	6.571E-01	5.000E-01	-
R017	Fraction of time spent outdoors (on site)	1.101E-01	2.500E-01	-
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows ci
R017	Radii of shape factor array (used if FS = -1):			
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	-
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	-
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	-
R017	Fractions of annular areas within AREA:			
R017	Ring 1	not used	1.000E+00	-
R017	Ring 2	not used	2.732E-01	-
R017	Ring 3	not used	0.000E+00	-
R017	Ring 4	not used	0.000E+00	-
R017	Ring 5	not used	0.000E+00	-
R017	Ring 6	not used	0.000E+00	-
R017	Ring 7	not used	0.000E+00	-
R017	Ring 8	not used	0.000E+00	-
R017	Ring 9	not used	0.000E+00	-
R017	Ring 10	not used	0.000E+00	-
R017	Ring 11	not used	0.000E+00	-
R017	Ring 12	not used	0.000E+00	-

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used b (If different)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.120E+02	1.600E+02	-
R018	Leafy vegetable consumption (kg/yr)	2.140E+01	1.400E+01	-
R018	Milk consumption (L/yr)	not used	9.200E+01	-
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	-
R018	Fish consumption (kg/yr)	not used	5.400E+00	-
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	-
R018	Soil ingestion rate (g/yr)	1.826E+01	3.650E+01	-
R018	Drinking water intake (L/yr)	not used	5.100E+02	-
R018	Contamination fraction of drinking water	not used	1.000E+00	-
R018	Contamination fraction of household water	not used	1.000E+00	-
R018	Contamination fraction of livestock water	not used	1.000E+00	-
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	-
R018	Contamination fraction of aquatic food	not used	5.000E-01	-
R018	Contamination fraction of plant food	5.000E-01	-1	-
R018	Contamination fraction of meat	not used	-1	-
R018	Contamination fraction of milk	not used	-1	-
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	-
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	-
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	-
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	-
R019	Livestock soil intake (kg/day)	not used	5.000E-01	-
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	-
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	-
R019	Depth of roots (m)	9.000E-01	9.000E-01	-
R019	Drinking water fraction from ground water	not used	1.000E+00	-
R019	Household water fraction from ground water	not used	1.000E+00	-
R019	Livestock water fraction from ground water	not used	1.000E+00	-
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	-
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	-
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	-
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	-
R19B	Growing Season for Non-Leafy (years)	2.500E-01	1.700E-01	-
R19B	Growing Season for Leafy (years)	1.230E-01	2.500E-01	-
R19B	Growing Season for Fodder (years)	not used	8.000E-02	-
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	-
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	-
R19B	Translocation Factor for Fodder	not used	1.000E+00	-
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	-
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	-
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	-
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	-
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	-
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	-
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	-
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	-
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	-
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	-
C14	Fraction of vegetation carbon from air	not used	9.800E-01	-

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used b (If different
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	-
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	-
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	-
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	-
C14	Fraction of grain in milk cow feed	not used	2.000E-01	-
STOR	Storage times of contaminated foodstuffs (days):			
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	-
STOR	Leafy vegetables	1.000E+00	1.000E+00	-
STOR	Milk	1.000E+00	1.000E+00	-
STOR	Meat and poultry	2.000E+01	2.000E+01	-
STOR	Fish	7.000E+00	7.000E+00	-
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	-
STOR	Well water	1.000E+00	1.000E+00	-
STOR	Surface water	1.000E+00	1.000E+00	-
STOR	Livestock fodder	0.000E+00	4.500E+01	-
R021	Thickness of building foundation (m)	not used	1.500E-01	-
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	-
R021	Total porosity of the cover material	not used	4.000E-01	-
R021	Total porosity of the building foundation	not used	1.000E-01	-
R021	Volumetric water content of the cover material	not used	5.000E-02	-
R021	Volumetric water content of the foundation	not used	3.000E-02	-
R021	Diffusion coefficient for radon gas (m/sec):			
R021	in cover material	not used	2.000E-06	-
R021	in foundation material	not used	3.000E-07	-
R021	in contaminated zone soil	not used	2.000E-06	-
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	-
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	-
R021	Height of the building (room) (m)	not used	2.500E+00	-
R021	Building interior area factor	not used	0.000E+00	-
R021	Building depth below ground surface (m)	not used	-1.000E+00	-
R021	Emanating power of Rn-222 gas	not used	2.500E-01	-
R021	Emanating power of Rn-220 gas	not used	1.500E-01	-
FITL	Number of graphical time points	32	---	-
TITL	Maximum number of integration points for dose	17	---	-
FITL	Maximum number of integration points for risk	513	---	-

Summary of Pathway Selections

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

Contaminated Zone Dimensions

Area: 700.00 square meters
Thickness: 0.90 meters
Cover Depth: 0.00 meters

Initial Soil Concentrations, pCi/g

Sr-90 2.500E-02

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

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

t (years):	0.000E+00	1.000E-01	5.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.00
TDOSE(t):	7.127E-02	7.016E-02	6.577E-02	6.068E-02	4.394E-02	1.420E-02	4.451E-03	1.78
M(t):	2.851E-03	2.806E-03	2.631E-03	2.427E-03	1.758E-03	5.679E-04	1.780E-04	7.12

Maximum TDOSE(t): 7.127E-02 mrem/yr at t = 0.000E+00 years

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	2.672E-04	0.0037	5.320E-08	0.0000	0.000E+00	0.0000	7.097E-02	0.9958	0.000E+00	0.0000
Total	2.672E-04	0.0037	5.320E-08	0.0000	0.000E+00	0.0000	7.097E-02	0.9958	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	2.630E-04	0.0037	5.236E-08	0.0000	0.000E+00	0.0000	6.986E-02	0.9958	0.000E+00	0.0000
Total	2.630E-04	0.0037	5.236E-08	0.0000	0.000E+00	0.0000	6.986E-02	0.9958	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) an
 As mrem/yr and Fraction of Total Dose At t = 5.000E-01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	2.467E-04	0.0038	4.911E-08	0.0000	0.000E+00	0.0000	6.550E-02	0.9958	0.000E+00	0.0000
Total	2.467E-04	0.0038	4.911E-08	0.0000	0.000E+00	0.0000	6.550E-02	0.9958	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) an
 As mrem/yr and Fraction of Total Dose At t = 5.000E-01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	2.277E-04	0.0038	4.533E-08	0.0000	0.000E+00	0.0000	6.042E-02	0.9958	0.000E+00	0.0000
Total	2.277E-04	0.0038	4.533E-08	0.0000	0.000E+00	0.0000	6.042E-02	0.9958	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	1.652E-04	0.0038	3.289E-08	0.0000	0.000E+00	0.0000	4.375E-02	0.9958	0.000E+00	0.0000
Total	1.652E-04	0.0038	3.289E-08	0.0000	0.000E+00	0.0000	4.375E-02	0.9958	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	5.381E-05	0.0038	1.071E-08	0.0000	0.000E+00	0.0000	1.414E-02	0.9957	0.000E+00	0.0000
Total	5.381E-05	0.0038	1.071E-08	0.0000	0.000E+00	0.0000	1.414E-02	0.9957	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Br-90	2.181E-06	0.0005	4.343E-10	0.0000	0.000E+00	0.0000	5.602E-04	0.1259	0.000E+00	0.0000
Total	2.181E-06	0.0005	4.343E-10	0.0000	0.000E+00	0.0000	5.602E-04	0.1259	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Br-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.888E-03	0.8736	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.888E-03	0.8736	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) an
As mrem/yr and Fraction of Total Dose At t = 5.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Br-90	8.844E-08	0.0005	1.761E-11	0.0000	0.000E+00	0.0000	2.219E-05	0.1246	0.000E+00	0.0000
Total	8.844E-08	0.0005	1.761E-11	0.0000	0.000E+00	0.0000	2.219E-05	0.1246	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) an
As mrem/yr and Fraction of Total Dose At t = 5.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Br-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.558E-04	0.8748	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.558E-04	0.8748	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	2.927E-11	0.0005	5.826E-15	0.0000	0.000E+00	0.0000	6.911E-09	0.1215	0.000E+00	0.0000
Total	2.927E-11	0.0005	5.826E-15	0.0000	0.000E+00	0.0000	6.911E-09	0.1215	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.994E-08	0.8779	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.994E-08	0.8779	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	3.510E-25	0.0006	6.987E-29	0.0000	0.000E+00	0.0000	6.215E-23	0.1094	0.000E+00	0.0000
Total	3.510E-25	0.0006	6.987E-29	0.0000	0.000E+00	0.0000	6.215E-23	0.1094	0.000E+00	0.0000

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.053E-22	0.8899	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.053E-22	0.8899	0.000E+00	0.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(pCi/g)						
			t= 0.000E+00	1.000E-01	5.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01
Sr-90	Sr-90	1.000E+00	2.851E+00	2.806E+00	2.631E+00	2.427E+00	1.758E+00	5.679E-01	1.780E-01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j)
The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E-01	5.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01
Sr-90	8.769E+00	8.908E+00	9.502E+00	1.030E+01	1.422E+01	4.402E+01	1.404E+02

*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)
Sr-90	2.500E-02	0.000E+00	2.851E+00	8.769E+00	2.851E+00	8.769E+00

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

Nuclide Parent (j) (i)	BRF(i)	DOSE(j,t), mrem/yr							
		t=	0.000E+00	1.000E-01	5.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+02
Sr-90	Sr-90	1.000E+00	7.127E-02	7.016E-02	6.577E-02	6.068E-02	4.394E-02	1.420E-02	4.451E-03

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide Parent (j) (i)	BRF(i)	S(j,t), pCi/g							
		t=	0.000E+00	1.000E-01	5.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+02
Sr-90	Sr-90	1.000E+00	2.500E-02	2.460E-02	2.307E-02	2.130E-02	1.546E-02	5.034E-03	2.041E-03

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

RESMAIN5.EXE execution time = 214.16 seconds

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Time = 5.000E-01	11
Time = 1.000E+00	12
Time = 3.000E+00	13
Time = 1.000E+01	14
Time = 3.000E+01	15
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Dose Conversion Factor (and Related) Parameter Summary
 File: Default.LIB

Menu	Parameter	Current Value	Default	Pa
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Sr-90+D	1.310E-03	1.310E-03	DCF
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Sr-90+D	1.530E-04	1.530E-04	DCF
D-34	Food transfer factors:			
D-34	Sr-90+D , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF
D-34	Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-03	8.000E-03	RTF
D-34	Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-03	2.000E-03	RTF
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Sr-90+D , fish	6.000E+01	6.000E+01	BIO
D-5	Sr-90+D , crustacea and mollusks	1.000E+02	1.000E+02	BIO

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used b (If different
R011	Area of contaminated zone (m**2)	4.700E+02	1.000E+04	-
R011	Thickness of contaminated zone (m)	1.500E-01	2.000E+00	-
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	-
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	-
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	-
R011	Times for calculations (yr)	1.000E-01	1.000E+00	-
R011	Times for calculations (yr)	5.000E-01	3.000E+00	-
R011	Times for calculations (yr)	1.000E+00	1.000E+01	-
R011	Times for calculations (yr)	3.000E+00	3.000E+01	-
R011	Times for calculations (yr)	1.000E+01	1.000E+02	-
R011	Times for calculations (yr)	3.000E+01	3.000E+02	-
R011	Times for calculations (yr)	5.000E+01	1.000E+03	-
R011	Times for calculations (yr)	1.000E+02	0.000E+00	-
R011	Times for calculations (yr)	3.000E+02	0.000E+00	-
R012	Initial principal radionuclide (pCi/g): Sr-90	2.000E-01	0.000E+00	-
R012	Concentration in groundwater (pCi/L): Sr-90	not used	0.000E+00	-
R013	Cover depth (m)	0.000E+00	0.000E+00	-
R013	Density of cover material (g/cm**3)	not used	1.500E+00	-
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	-
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	-
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	-
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	-
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	-
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	-
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	-
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	-
R013	Humidity in air (g/m**3)	not used	8.000E+00	-
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	-
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	-
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	-
R013	Irrigation mode	overhead	overhead	-
R013	Runoff coefficient	2.000E-01	2.000E-01	-
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	-
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	-
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	-
R014	Saturated zone total porosity	4.000E-01	4.000E-01	-
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	-
R014	Saturated zone field capacity	2.000E-01	2.000E-01	-
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	-
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	-
R014	Saturated zone b parameter	5.300E+00	5.300E+00	-
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	-
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	-
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	MB	ND	-
R014	Well pumping rate (m**3/yr)	not used	2.500E+02	-
R015	Number of unsaturated zone strata	1	1	-

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used b (If different
R015	Unsat. zone 1, thickness (m)			-
R015	Unsat. zone 1, soil density (g/cm**3)	4.000E+00	4.000E+00	-
R015	Unsat. zone 1, total porosity	1.500E+00	1.500E+00	-
R015	Unsat. zone 1, effective porosity	4.000E-01	4.000E-01	-
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	-
R015	Unsat. zone 1, soil-specific b parameter	2.000E-01	2.000E-01	-
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	5.300E+00	5.300E+00	-
		1.000E+01	1.000E+01	-
R016	Distribution coefficients for Sr-90			-
R016	Contaminated zone (cm**3/g)			-
R016	Unsaturated zone 1 (cm**3/g)	2.500E+00	3.000E+01	-
R016	Saturated zone (cm**3/g)	2.500E+00	3.000E+01	-
R016	Leach rate (/yr)	2.500E+00	3.000E+01	-
R016	Solubility constant	0.000E+00	0.000E+00	8.18
		3.000E+00	0.000E+00	-
R017	Inhalation rate (m**3/yr)			-
R017	Mass loading for inhalation (g/m**3)	not used	8.400E+03	-
R017	Exposure duration	not used	1.000E-04	-
R017	Shielding factor, inhalation	3.000E+01	3.000E+01	-
R017	Shielding factor, external gamma	not used	4.000E-01	-
R017	Fraction of time spent indoors	not used	7.000E-01	-
R017	Fraction of time spent outdoors (on site)	not used	5.000E-01	-
R017	Shape factor flag, external gamma	not used	2.500E-01	-
R017	Radii of shape factor array (used if FS = -1):	not used	1.000E+00	>0 shows ci
R017	Outer annular radius (m), ring 1:			-
R017	Outer annular radius (m), ring 2:	not used	5.000E+01	-
R017	Outer annular radius (m), ring 3:	not used	7.071E+01	-
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	-
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	-
		not used	0.000E+00	-
R017	Fractions of annular areas within AREA:			-
R017	Ring 1			-
R017	Ring 2			-
R017	Ring 3	not used	1.000E+00	-
R017	Ring 4	not used	2.732E-01	-
R017	Ring 5	not used	0.000E+00	-
R017	Ring 6	not used	0.000E+00	-
R017	Ring 7	not used	0.000E+00	-
R017	Ring 8	not used	0.000E+00	-
R017	Ring 9	not used	0.000E+00	-
R017	Ring 10	not used	0.000E+00	-
R017	Ring 11	not used	0.000E+00	-
R017	Ring 12	not used	0.000E+00	-
		not used	0.000E+00	-
		not used	0.000E+00	-

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used b (If different
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	-
-R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	-
R018	Milk consumption (L/yr)	not used	9.200E+01	-
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	-
-R018	Fish consumption (kg/yr)	not used	5.400E+00	-
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	-
R018	Soil ingestion rate (g/yr)	not used	3.650E+01	-
R018	Drinking water intake (L/yr)	4.785E+02	5.100E+02	-
-R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	-
R018	Contamination fraction of household water	not used	1.000E+00	-
R018	Contamination fraction of livestock water	not used	1.000E+00	-
-R018	Contamination fraction of irrigation water	not used	1.000E+00	-
R018	Contamination fraction of aquatic food	not used	5.000E-01	-
R018	Contamination fraction of plant food	not used	-1	-
-R018	Contamination fraction of meat	not used	-1	-
-R018	Contamination fraction of milk	not used	-1	-
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	-
-R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	-
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	-
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	-
-R019	Livestock soil intake (kg/day)	not used	5.000E-01	-
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	-
R019	Depth of soil mixing layer (m)	not used	1.500E-01	-
R019	Depth of roots (m)	not used	9.000E-01	-
-R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	-
R019	Household water fraction from ground water	not used	1.000E+00	-
R019	Livestock water fraction from ground water	not used	1.000E+00	-
-R019	Irrigation fraction from ground water	not used	1.000E+00	-
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	-
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	-
-R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	-
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	-
R19B	Growing Season for Leafy (years)	not used	2.500E-01	-
-R19B	Growing Season for Fodder (years)	not used	8.000E-02	-
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	-
R19B	Translocation Factor for Leafy	not used	1.000E+00	-
-R19B	Translocation Factor for Fodder	not used	1.000E+00	-
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	-
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	-
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	-
-R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	-
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	-
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	-
-R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	-
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	-
-C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	-
-C14	Fraction of vegetation carbon from soil	not used	2.000E-02	-
C14	Fraction of vegetation carbon from air	not used	9.800E-01	-

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used b (If different)
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	-
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	-
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	-
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	-
C14	Fraction of grain in milk cow feed	not used	2.000E-01	-
STOR	Storage times of contaminated foodstuffs (days):			
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	-
STOR	Leafy vegetables	1.000E+00	1.000E+00	-
STOR	Milk	1.000E+00	1.000E+00	-
STOR	Meat and poultry	2.000E+01	2.000E+01	-
STOR	Fish	7.000E+00	7.000E+00	-
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	-
STOR	Well water	1.000E+00	1.000E+00	-
STOR	Surface water	1.000E+00	1.000E+00	-
STOR	Livestock fodder	0.000E+00	4.500E+01	-
R021	Thickness of building foundation (m)	not used	1.500E-01	-
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	-
R021	Total porosity of the cover material	not used	4.000E-01	-
R021	Total porosity of the building foundation	not used	1.000E-01	-
R021	Volumetric water content of the cover material	not used	5.000E-02	-
R021	Volumetric water content of the foundation	not used	3.000E-02	-
R021	Diffusion coefficient for radon gas (m/sec):			
R021	in cover material	not used	2.000E-06	-
R021	in foundation material	not used	3.000E-07	-
R021	in contaminated zone soil	not used	2.000E-06	-
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	-
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	-
R021	Height of the building (room) (m)	not used	2.500E+00	-
R021	Building interior area factor	not used	0.000E+00	-
R021	Building depth below ground surface (m)	not used	-1.000E+00	-
R021	Emanating power of Rn-222 gas	not used	2.500E-01	-
R021	Emanating power of Rn-220 gas	not used	1.500E-01	-
TITL	Number of graphical time points	32	---	-
TITL	Maximum number of integration points for dose	17	---	-
TITL	Maximum number of integration points for risk	513	---	-

Summary of Pathway Selections

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

Contaminated Zone Dimensions

Initial Soil Concentrations, pCi/g

Area: 470.00 square meters
Thickness: 0.15 meters
Cover Depth: 0.00 meters

Sr-90 2.000E-01

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 25 mrem/yr

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

t (years):	0.000E+00	1.000E-01	5.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01	5.00
TDOSE(t):	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.477E-05	1.08
M(t):	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.909E-07	4.33

Maximum TDOSE(t): 2.432E+00 mrem/yr at t = 16.38 ± 0.03 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) an
As mrem/yr and Fraction of Total Dose At t = 1.638E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) an
As mrem/yr and Fraction of Total Dose At t = 1.638E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	2.432E+00	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.432E+00	1.0000	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) as
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and
 As mrem/yr and Fraction of Total Dose At t = 5.000E-01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and
 As mrem/yr and Fraction of Total Dose At t = 5.000E-01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

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

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	2.477E-05	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.477E-05	1.0000	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) an
As mrem/yr and Fraction of Total Dose At t = 5.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) an
As mrem/yr and Fraction of Total Dose At t = 5.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	1.084E-12	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.084E-12	1.0000	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
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	3.680E-31	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.680E-31	1.0000	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) an
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

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

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Sr-90	0.000E+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

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Branch Fraction*	t= 0.000E+00	1.000E-01	5.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01
Sr-90	Sr-90	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.239E-01

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j)
The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 25 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E-01	5.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01
Sr-90	*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+14	*1.365E+14	2.018E+05

*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 = 16.38 ± 0.03 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Sr-90	2.000E-01	16.38 ± 0.03	1.216E+01	2.056E+00	1.216E+01	2.056E+00

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

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr						
			t= 0.000E+00	1.000E-01	5.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01
Sr-90	Sr-90	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.477E-01

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g						
			t= 0.000E+00	1.000E-01	5.000E-01	1.000E+00	3.000E+00	1.000E+01	3.000E+01
Sr-90	Sr-90	1.000E+00	2.000E-01	1.838E-01	1.312E-01	8.612E-02	1.597E-02	4.381E-05	2.102E-05

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

RESMAIN5.EXE execution time = 523.06 seconds