CINTICHEM, INC.
P.O. BOX 816
TUXEDO, NEW YORK 10987 [914] 351-2131

February 1, 1994

Mr. Dominick Orlando
U. S. Nuclear Regulatory Commission
Mail Stop 5-E4
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Dear Mr. Orlando:

Reference: Cintichem Decommissioning Project, Soil Criteria (Docket 50-54, 70-687)

Cintichem has identified five additional radionuclides for which USNRC approved soil release criteria is needed. These radionuclides are: Manganese-54, Zinc-65, Cadmium-109, Europium-154 and Europium-155. To date these radionuclides have been found in a small volume of soil (less than 2000 cf) with individual concentrations generally less than 0.5 pCi/gram.

Cintichem has developed proposed surface soil release criteria for these radionuclides. They are:

Radionuclide	Surface Criteria, pCi/gram
Mn-54	3.3
Zn-65	3.7
Cd-109	63.1
Eu-154	1.8
Eu-155	99.5

The proposed additional release criteria were calculated using a dose limit of 10 mRem per year from all pathways and a limit of 4 mRem per year for drinking water pathways. The calculations were performed using the RESRAD computer code. All exposure scenario assumptions, site specific input parameters and methodologies used in the calculations are the same as those used for the surface soil criteria that was previously approved by the NRC.

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As the RESRAD code radionuclide library did not list Zn-65 and Cd-109, analogs of Co-57 and Fe-55 were used respectively, along the appropriate physical and biological conversion factors. This is the same methodology as was previously used for Ag110m, Zr-95 and Nb-95.

As used to determine the previously approved criteria, Kd values for sandy soil were calculated using the methodology of Sheppand and Thibault. The Kd values used are as follows:

Radionuclide	Sandy Soil Kd (cm^3/gm)
Mn-54	24
Zn-65	7
Cd-109	8
Eu-154	82
Eu-155	82

To aid in the NRC's review of this proposed additional criteria, copies of the RESRAD input parameter summary sheets for the five radionuclides are attached. If you have any questions, please call me at 914-351-2136.

Very truly yours,

J. Adler
Manager, Health, Safety and
Environmental Affairs

JA/bjc

Attachment

Distribution Coefficients (Kd) and Soil Guidelines for the Cintichem Site Based Upon the Limiting Criteria of 10 mRem/yr All Pathways and EPA Drinking Water Standards

Reference: Sheppard, M.I., and Thibault, D.H., 1990, "Default Soil Solid/Liquid Partition Coefficients, Kd's, Four Major Soil Types: a Compendium," Health Physics, 59:471-482.

$\ln Kd = a + c + b (\ln 4(Biv))$ where: a = 4.62
b = -0.5
c = -2.51 for sandy soil

	Biv	*Sandy Soil Kd (cm^3/gm)*	*Base Case Dose Rate (mRem/yr) per (pCi/gm)*	*Base Case Soil Guideline (pCi/gm)*
H-3	0.0E+00	0	1.273E-03	815.4
Mn-54	3.0E-02	24	3.004E+00	3.3
Fe-55	4.0E-04	206	1.916E-05	521920.7
Co-60	9.4E-04	135	1.136E+01	0.9
Ni-63	1.9E-02	30	1.725E-04	57971.0
Zn-65	4.0E-01	7	2.688E+00	3.7
Sr-90	2.0E-01	9.2	4.205E-01	17.4
Zr-95	1.7E-04	316	3.848E+00	2.6
Nb-95	9.4E-03	43	3.964E+00	2.5
Tc-99	2.5E-01	8.2	5.592E-03	1788.3
Ru-106	1.0E-02	41	7.412E-01	13.5
Ag-108m	1.5E-01	11	8.803E+00	1.1
Ag-110m	1.5E-01	11	1.352E+01	0.7
Cd-109	3.0E-01	8	1.585E-01	63.1
Sb-125	1.1E-02	39	1.536E+00	6.5
Cs-134	2.0E-03	92	5.711E+00	1.8
Cs-137	2.0E-03	92	2.666E+00	3.8
Ce-144	5.0E-04	184	1.577E-01	63.4
Eu-152	2.5E-03	82	4.920E+00	2.0
Eu-154	2.5E-03	82	5.521E+00	1.8
Eu-155	2.5E-03	82	1.005E-01	99.5
U-234	2.5E-03	82	1.098E-01	19.6
U-235	2.5E-03	82	6.301E-01	15.9
U-238	2.5E-03	82	1.677E-01	21.9
Pu-238	2.5E-04	261	4.149E-01	24.1
Pu-239	2.5E-04	261	4.614E-01	4.3
Pu-241	2.5E-04	261	2.050E-02	26.4
Cm-244	2.5E-03	82	3.253E-01	17.1

Notes

1. Data for Vegetable/Soil Transfer Factors (Biv) for Root Uptake from the RESRAD Manual.

Calculation of ^{65}Zn, ^{110m}Ag, ^{108m}Ag, ^{95}Zr, ^{95}Nb and ^{109}Cd Soil Guidelines

The radionuclides ^{95}Zn, ^{110m}Ag, ^{108m}Ag, ^{95}Zr, ^{95}Nb and ^{109}Cd are not currently in the RESRAD databases. Therefore, RESRAD cannot directly calculate soil guidelines for these radionuclides. However, Cintichem has determined that RESRAD can be used indirectly to establish soil guidelines for these radionuclides, and proposes the following methodology.

RESRAD calculates exposures through numerous pathways based upon concentrations of a given radionuclide in soil (water-independent) and water (water-dependent). The concentrations, as a function of time, are dependent solely upon the radionuclide's radioactive half life and it's soil/water distribution coefficient, K_d. If radionuclides with half lives similar to the missing isotopes can be found in RESRAD, and the K_d values for these radionuclides are set equal to those of the missing isotopes, the concentrations in soil and water for the missing isotopes may be determined as a function of time. Once soil and water concentrations have been determined, appropriate modifications to dose conversion, depth, food transfer and bioaccumulation factors must be made in order to properly calculate the resultant doses from these radionuclides.

As an example, ^{110m}Ag is considered. Silver-110m has a half life of roughly 252 days. The isotope chosen as nearest to ^{110m}Ag, ^{57}Co, has a half life of approximately 271 days. Using the ^{57}Co half life will produce slightly conservative results for a RESRAD calculation of ^{110m}Ag. The following radionuclide-specific parameters have been identified or calculated for ^{110m}Ag:

<u>Silver-110m Dose Conversion Factors</u>

1.1 External Radiation Dose Conversion Factors [Ref. 1 and 2]

Surface:	2.68 (mrem/yr per pCi/cm^2)
Volume (ρ=1.0 gm/cm^3):	22.5 (mrem/yr per pCi/cm^3)
Volume (ρ=1.8 gm/cm^3):	15.4 (mrem/yr per pCi/cm^3)

1.2 Depth Factors [Ref. 2]

T=0.15m (ρ=1.0 gm/cm^3): 0.71
T=0.50m (ρ=1.0 gm/cm^3): 0.97
T=1.00m (ρ=1.0 gm/cm^3): 1.00
T=0.15m (ρ=1.8 gm/cm^3): 0.87
T=0.50m (ρ=1.8 gm/cm^3): 1.00
T=1.00m (ρ=1.8 gm/cm^3): 1.00

1.3 Dose Conversion Factor For Inhalation [Ref. 1]

5.3E-5 (mrem/pCi)

1.4 Dose Conversion Factor For Ingestion [Ref. 1]

1.1E-5 (mrem/pCi)

1.5 Food Transfer Factors [Ref. 3]

Plant:	1.5E-1
Beef:	9.9E-4 (d/kg)
Milk:	2.5E-2 (d/L)

1.6 Bioaccumulation [Ref. 3]

Fish	2.3 (L/kg)
Mollusks	7.7E+2 (L/kg)

RESRAD dose conversion and other radionuclide-specific factors for ^{65}Zn, ^{108m}Ag, ^{95}Zr, ^{95}Nb and ^{109}Cd are determined in a similar fashion. However, there is no radionuclide in the RESRAD data base with a half life less than ^{57}Co. Therefore, the dose conversion and other radionuclide-specific factors for ^{65}Zn, ^{95}Zr and ^{95}Nb are input into a RESRAD ^{57}Co calculation. The results will be conservative because these three isotopes have half lives significantly less than that of ^{57}Co. The half-life of ^{108m}Ag is relatively long, at 130 years. The isotope in the RESRAD database with a similar half-life is ^{63}Ni (100 years). The half-life of ^{109}Cd is 453 days. The isotope in the RESRAD database with a similar half-life is ^{55}Fe (2.7 years). The following radionuclide-specific parameters have been identified or calculated for ^{65}Zn, ^{108m}Ag, ^{95}Zr, ^{95}Nb and ^{109}Cd:

Silver 108m Dose Conversion Factors

2.1 External Radiation Dose Conversion Factors [Ref. 1 and 2]

Surface:	1.66 (mrem/yr per pCi/cm^2)
Volume (ρ=1.0 gm/cm^3):	14.29 (mrem/yr per pCi/cm^3)
Volume (ρ=1.8 gm/cm^3):	9.60 (mrem/yr per pCi/cm^3)

2.2 Depth Factors [Ref. 2]

T=0.15m (ρ=1.0 gm/cm^3):	0.75
T=0.50m (ρ=1.0 gm/cm^3):	0.98
T=1.00m (ρ=1.0 gm/cm^3):	1.00
T=0.15m (ρ=1.8 gm/cm^3):	0.90
T=0.50m (ρ=1.8 gm/cm^3):	1.00
T=1.00m (ρ=1.8 gm/cm^3):	1.00

2.3 Dose Conversion Factor For Inhalation [Ref. 1]

2.0E-4 (mrem/pCi)

2.4 Dose Conversion Factor For Ingestion [Ref. 1]

7.5E-6 (mrem/pCi)

2.5 Food Transfer Factors [Ref. 3]

Plant:	1.5E-1
Beef:	9.9E-4 (d/kg)
Milk:	2.5E-2 (d/L)

2.6 Bioaccumulation [Ref. 3]

Fish	2.3 (L/kg)
Mollusks	7.7E+2 (L/kg)

Zirconium-95 Dose Conversion Factors

3.1 External Radiation Dose Conversion Factors [Ref. 1 and 2]

Surface:	0.747 (mrem/yr per pCi/cm^2)
Volume (ρ=1.0 gm/cm^3):	6.31 (mrem/yr per pCi/cm^3)
Volume (ρ=1.8 gm/cm^3):	4.28 (mrem/yr per pCi/cm^3)

3.2 Depth Factors [Ref. 2]

T=0.15m (ρ=1.0 gm/cm^3): 0.73
T=0.50m (ρ=1.0 gm/cm^3): 0.98
T=1.00m (ρ=1.0 gm/cm^3): 1.00
T=0.15m (ρ=1.8 gm/cm^3): 0.89
T=0.50m (ρ=1.8 gm/cm^3): 1.00
T=1.00m (ρ=1.8 gm/cm^3): 1.00

3.3 Dose Conversion Factor For Inhalation [Ref. 1]

1.9E-5 (mrem/pCi)

3.4 Dose Conversion Factor For Ingestion [Ref. 1]

3.4E-6 (mrem/pCi)

3.5 Food Transfer Factors [Ref. 3]

Plant:	1.7E-4
Beef:	5.0E-4 (d/kg)
Milk:	2.5E-6 (d/L)

3.6 Bioaccumulation [Ref. 3]

Fish	3.3 (L/kg)
Mollusks	6.7 (L/kg)

Niobium-95 Dose Conversion Factors

4.1 External Radiation Dose Conversion Factors [Ref. 1 and 2]

Surface:	0.776 (mrem/yr per pCi/cm^2)
Volume (ρ=1.0 gm/cm^3):	6.49 (mrem/yr per pCi/cm^3)
Volume (ρ=1.8 gm/cm^3):	4.41 (mrem/yr per pCi/cm^3)

4.2 Depth Factors [Ref. 2]

T=0.15m (ρ=1.0 gm/cm^3): 0.73
T=0.50m (ρ=1.0 gm/cm^3): 0.98
T=1.00m (ρ=1.0 gm/cm^3): 1.00
T=0.15m (ρ=1.8 gm/cm^3): 0.89
T=0.50m (ρ=1.8 gm/cm^3): 1.00
T=1.00m (ρ=1.8 gm/cm^3): 1.00

4.3 Dose Conversion Factor For Inhalation [Ref. 1]

4.5E-6 (mrem/pCi)

4.4 Dose Conversion Factor For Ingestion [Ref. 1]

2.2E-6 (mrem/pCi)

4.5 Food Transfer Factors [Ref. 3]

Plant:	9.4E-3
Beef:	5.0E-4 (d/kg)
Milk:	1.2E-3 (d/L)

4.6 Bioaccumulation [Ref. 3]

Fish	3.0E+4 (L/kg)
Mollusks	1.0E+2 (L/kg)

Cadmium-109 Dose Conversion Factors

5.1 External Radiation Dose Conversion Factors [Ref. 1 and 2]

Surface:	2.21E-4 (mrem/yr per pCi/cm^2)
Volume (ρ=1.0 gm/cm^3):	4.44E-6 (mrem/yr per pCi/cm^3)
Volume (ρ=1.8 gm/cm^3):	2.47E-6 (mrem/yr per pCi/cm^3)

5.2 Depth Factors [Ref. 2]

T=0.15m (ρ=1.0 gm/cm^3): 1.00
T=0.50m (ρ=1.0 gm/cm^3): 1.00
T=1.00m (ρ=1.0 gm/cm^3): 1.00
T=0.15m (ρ=1.8 gm/cm^3): 1.00
T=0.50m (ρ=1.8 gm/cm^3): 1.00
T=1.00m (ρ=1.8 gm/cm^3): 1.00

5.3 Dose Conversion Factor For Inhalation [Ref. 1]

4.2E-5 (mrem/pCi)

5.4. Dose Conversion Factor For Ingestion [Ref. 1]

1.2E-5 (mrem/pCi)

5.5 Food Transfer Factors [Ref. 3]

Plant:	3.0E-1
Beef:	1.6E-2 (d/kg)
Milk:	6.2E-5 (d/L)

5.6 Bioaccumulation [Ref. 3]

Fish	2.0E+4 (L/kg)
Mollusks	2.0E+3 (L/kg)

Zinc-65 Dose Conversion Factors

6.1 External Radiation Dose Conversion Factors [Ref. 1 and 2]

Surface:	0.548 (mrem/yr per pCi/cm^2)
Volume (ρ=1.0 gm/cm^3):	4.23 (mrem/yr per pCi/cm^3)
Volume (ρ=1.8 gm/cm^3):	2.92 (mrem/yr per pCi/cm^3)

6.2 Depth Factors [Ref. 2]

T=0.15m (ρ=1.0 gm/cm^3): 0.70
T=0.50m (ρ=1.0 gm/cm^3): 0.97
T=1.00m (ρ=1.0 gm/cm^3): 1.00
T=0.15m (ρ=1.8 gm/cm^3): 0.87
T=0.50m (ρ=1.8 gm/cm^3): 1.00
T=1.00m (ρ=1.8 gm/cm^3): 1.00

6.3 Dose Conversion Factor For Inhalation [Ref. 1]

2.0E-5 (mrem/pCi)

6.4 Dose Conversion Factor For Ingestion [Ref. 1]

1.4E-5 (mrem/pCi)

6.5 Food Transfer Factors [Ref. 3]

Plant:	4.0E-1
Beef:	5.0E-2 (d/kg)
Milk:	6.0E-3 (d/L)

6.6 Bioaccumulation [Ref. 3]

Fish	2.0E+3 (L/kg)
Mollusks	1.0E+4 (L/kg)

Summary : CINTICHEM Problem #54 (Eu-154) - Zones #1, #3 and #4.
File : CINTI54.DAT

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Summary : CINTICHEM Problem #54 (Eu-154) - Zones #1, #3 and #4.
File : CINTI54.DAT

Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Eu-154 , soil density = 1.0 g/cm**3	1.100E+01	1.100E+01	DCF1(1,1)
A-1	Eu-154 , soil density = 1.8 g/cm**3	6.060E+00	6.060E+00	DCF1(1,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Eu-154 , soil density = 1.0 g/cm**3, thickness = .15 m	6.900E-01	6.900E-01	FD(1,1,1)
A-3	Eu-154 , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.800E-01	9.800E-01	FD(1,2,1)
A-3	Eu-154 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Eu-154 , soil density = 1.8 g/cm**3, thickness = .15 m	8.600E-01	8.600E-01	FD(1,1,2)
A-3	Eu-154 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Eu-154 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
B-1	Dose conversion factors for dust inhalation, mrem/pCi:			
B-1	Eu-154	2.600E-04	2.600E-04	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Eu-154	9.100E-06	9.100E-06	DCF3(1)
D-34	Food transfer factors:			
D-34	Eu-154 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Eu-154 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(1,2)
D-34	Eu-154 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Eu-154 , fish	2.500E+01	2.500E+01	BIOFAC(1,1)
D-5	Eu-154 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)

Summary : CINTICHEM Problem #54 (Eu-154) - Zones #1, #3 and #4.
File : CINTI54.DAT

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	1.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	7.500E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+01	1.000E+02	---	BRLD
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+03	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+04	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Eu-154	1.000E+00	0.000E+00	---	S(1)
R012	Concentration in groundwater (pCi/L): Eu-154	not used	0.000E+00	---	W(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.600E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.600E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.000E+01	5.300E+00	---	BCZ
R013	Evapotranspiration coefficient	6.600E-01	6.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.200E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	3.880E+05	1.000E+06	---	WAREA
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.600E+00	---	DENSAQ
R014	Saturated zone total porosity	3.800E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.600E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	8.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Individual's use of groundwater (m**3/yr)	not used	1.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for Eu-154				
R016	Contaminated zone (cm**3/g)	8.200E+01	0.000E+00	---	DCACTC(1)
R016	Saturated zone (cm**3/g)	8.200E+01	0.000E+00	---	DCACTS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.999E-02	RLEACH(1)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	1.000E+00	1.000E+00	---	FS1
R017	Fractions of annular areas within AREA:				
R017	Outer annular radius (m) = √(1/π)	not used	2.500E-01	---	FRACA(1)
R017	Outer annular radius (m) = √(10/π)	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = √(20/π)	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = √(50/π)	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = √(100/π)	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = √(200/π)	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = √(500/π)	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = √(1000/π)	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = √(5000/π)	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = √(1.E+04/π)	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = √(1.E+05/π)	not used	1.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = √(1.E+06/π)	not used	1.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Fraction of drinking water from site	1.000E+00	1.000E+00	---	FDW
R018	Fraction of aquatic food from site	5.000E-01	5.000E-01	---	FR9
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	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
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	1.000E-01	---	PH2OCV
R021	Volumetric water content of the foundation	not used	5.000E-02	---	PH2OFL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	2.000E-08	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	not used	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	not used	1.000E+00	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.000E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.000E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- radon	suppressed
9 -- soil ingestion	active

Summary : CINTICHEM Problem #54 (Eu-154) - Zones #1, #3 and #4.
File : CINTI54.DAT

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	5400.00 square meters	Eu-154	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 10 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
TDOSE(t):	5.521E+00	4.975E+00	4.040E+00	1.947E+00	2.388E-01	1.140E-04	1.137E-15	0.000E+00	0.000E+00	0.000E+00
M(t):	5.521E-01	4.975E-01	4.040E-01	1.947E-01	2.388E-02	1.140E-05	1.137E-16	0.000E+00	0.000E+00	0.000E+00

Maximum TDOSE(t): 5.521E+00 mrem/yr at t = 0.000E+00 years

Summary : CINTICHEM Problem #56 (Eu-155) - Zones #1, #3 and #4.
File : CINTI56.DAT

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Summary : CINTICHEM Problem #56 (Eu-155) - Zones #1, #3 and #4.
File : CINTI56.DAT

Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Eu-155 , soil density = 1.0 g/cm**3	1.650E-01	1.650E-01	DCF1(1,1)
A-1	Eu-155 , soil density = 1.8 g/cm**3	9.190E-02	9.190E-02	DCF1(1,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Eu-155 , soil density = 1.0 g/cm**3, thickness = .15 m	9.420E-01	9.420E-01	FD(1,1,1)
A-3	Eu-155 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,1)
A-3	Eu-155 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Eu-155 , soil density = 1.8 g/cm**3, thickness = .15 m	9.970E-01	9.970E-01	FD(1,1,2)
A-3	Eu-155 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Eu-155 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
B-1	Dose conversion factors for dust inhalation, mrem/pCi:			
B-1	Eu-155	3.900E-05	3.900E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Eu-155	1.300E-06	1.300E-06	DCF3(1)
D-34	Food transfer factors:			
D-34	Eu-155 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Eu-155 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(1,2)
D-34	Eu-155 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.500E-06	2.500E-06	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Eu-155 , fish	2.500E+01	2.500E+01	BIOFAC(1,1)
D-5	Eu-155 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)

Summary : CINTICHEM Problem #56 (Eu-155) - Zones #1, #3 and #4.
File : CINTI56.DAT

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	1.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	7.500E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+01	1.000E+02	---	BRLD
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+03	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+04	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Eu-155	1.000E+00	0.000E+00	---	S(1)
R012	Concentration in groundwater (pCi/L): Eu-155	not used	0.000E+00	---	W(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.600E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.600E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.000E+01	5.300E+00	---	BCZ
R013	Evapotranspiration coefficient	6.600E-01	6.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.200E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	3.880E+05	1.000E+06	---	WAREA
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.600E+00	---	DENSAQ
R014	Saturated zone total porosity	3.800E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.600E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	8.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Individual's use of groundwater (m**3/yr)	not used	1.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for Eu-155				
R016	Contaminated zone (cm**3/g)	8.200E+01	0.000E+00	---	DCACTC(1)
R016	Saturated zone (cm**3/g)	8.200E+01	0.000E+00	---	DCACTS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.999E-02	RLEACH(1)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	1.000E+00	1.000E+00	---	FS1
R017	Fractions of annular areas within AREA:				
R017	Outer annular radius (m) = √(1/π)	not used	2.500E-01	---	FRACA(1)
R017	Outer annular radius (m) = √(10/π)	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = √(20/π)	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = √(50/π)	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = √(100/π)	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = √(200/π)	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = √(500/π)	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = √(1000/π)	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = √(5000/π)	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = √(1.E+04/π)	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = √(1.E+05/π)	not used	1.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = √(1.E+06/π)	not used	1.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Fraction of drinking water from site	1.000E+00	1.000E+00	---	FDW
R018	Fraction of aquatic food from site	5.000E-01	5.000E-01	---	FR9
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	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
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	1.000E-01	---	PH2OCV
R021	Volumetric water content of the foundation	not used	5.000E-02	---	PH2OFL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	2.000E-08	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	not used	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	not used	1.000E+00	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.000E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.000E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- radon	suppressed
9 -- soil ingestion	active

Summary : CINTICHEM Problem #56 (Eu-155) - Zones #1, #3 and #4.
File : CINTI56.DAT

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	5400.00 square meters	Eu-155	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 10 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
TDOSE(t):	1.005E-01	8.564E-02	6.216E-02	2.024E-02	8.165E-04	8.889E-09	4.244E-24	0.000E+00	0.000E+00	0.000E+00
M(t):	1.005E-02	8.564E-03	6.216E-03	2.024E-03	8.165E-05	8.889E-10	4.244E-25	0.000E+00	0.000E+00	0.000E+00

Maximum TDOSE(t): 1.005E-01 mrem/yr at t = 0.000E+00 years

Summary : CINTICHEM Problem #50 (Mn-54) - Zones #1, #3 and #4.
File : CINTI50.DAT

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Summary : CINTICHEM Problem #50 (Mn-54) - Zones #1, #3 and #4.
File : CINTI50.DAT

Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Mn-54 , soil density = 1.0 g/cm**3	5.880E+00	5.880E+00	DCF1(1,1)
A-1	Mn-54 , soil density = 1.8 g/cm**3	3.270E+00	3.270E+00	DCF1(1,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Mn-54 , soil density = 1.0 g/cm**3, thickness = .15 m	7.030E-01	7.030E-01	FD(1,1,1)
A-3	Mn-54 , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.720E-01	9.720E-01	FD(1,2,1)
A-3	Mn-54 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Mn-54 , soil density = 1.8 g/cm**3, thickness = .15 m	8.670E-01	8.670E-01	FD(1,1,2)
A-3	Mn-54 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Mn-54 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
B-1	Dose conversion factors for dust inhalation, mrem/pCi:			
B-1	Mn-54	6.400E-06	6.400E-06	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Mn-54	2.700E-06	2.700E-06	DCF3(1)
D-34	Food transfer factors:			
D-34	Mn-54 , plant/soil concentration ratio, dimensionless	3.000E-02	3.000E-02	RTF(1,1)
D-34	Mn-54 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(1,2)
D-34	Mn-54 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-04	1.000E-04	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Mn-54 , fish	4.000E+02	4.000E+02	BIOFAC(1,1)
D-5	Mn-54 , crustacea and mollusks	9.000E+04	9.000E+04	BIOFAC(1,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	1.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	7.500E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+01	1.000E+02	---	BRLD
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+03	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+04	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Mn-54	1.000E+00	0.000E+00	---	S(1)
R012	Concentration in groundwater (pCi/L): Mn-54	not used	0.000E+00	---	W(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.600E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.600E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.000E+01	5.300E+00	---	BCZ
R013	Evapotranspiration coefficient	6.600E-01	6.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.200E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	3.880E+05	1.000E+06	---	WAREA
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.600E+00	---	DENSAQ
R014	Saturated zone total porosity	3.800E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.600E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	8.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Individual's use of groundwater (m**3/yr)	not used	1.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for Mn-54				
R016	Contaminated zone (cm**3/g)	2.400E+01	2.000E+02	---	DCACTC(1)
R016	Saturated zone (cm**3/g)	2.400E+01	2.000E+02	---	DCACTS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.790E-02	RLEACH(1)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	1.000E+00	1.000E+00	---	FS1
R017	Fractions of annular areas within AREA:				
R017	Outer annular radius (m) = √(1/π)	not used	2.500E-01	---	FRACA(1)
R017	Outer annular radius (m) = √(10/π)	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = √(20/π)	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = √(50/π)	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = √(100/π)	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = √(200/π)	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = √(500/π)	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = √(1000/π)	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = √(5000/π)	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = √(1.E+04/π)	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = √(1.E+05/π)	not used	1.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = √(1.E+06/π)	not used	1.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Fraction of drinking water from site	1.000E+00	1.000E+00	---	FDW
R018	Fraction of aquatic food from site	5.000E-01	5.000E-01	---	FR9
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	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
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	1.000E-01	---	PH2OCV
R021	Volumetric water content of the foundation	not used	5.000E-02	---	PH2OFL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	2.000E-08	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	not used	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	not used	1.000E+00	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.000E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.000E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- radon	suppressed
9 -- soil ingestion	active

Summary : CINTICHEM Problem #50 (Mn-54) - Zones #1, #3 and #4.
File : CINTI50.DAT

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	5400.00 square meters	Mn-54	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 10 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
TDOSE(t):	3.004E+00	1.247E+00	2.149E-01	4.575E-04	1.082E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
M(t):	3.004E-01	1.247E-01	2.149E-02	4.575E-05	1.082E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Maximum TDOSE(t): 3.004E+00 mrem/yr at t = 0.000E+00 years

Summary : CINTICHEM Problem #58 (Zn-65) For Zones #1, 3 and 4 (Using Co-57).
File : CINTI58.DAT

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Summary : CINTICHEM Problem #58 (Zn-65) For Zones #1, 3 and 4 (Using Co-57).
File : CINTI58.DAT

Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Co-57 , soil density = 1.0 g/cm**3	4.230E+00	5.030E-01	DCF1(1,1)
A-1	Co-57 , soil density = 1.8 g/cm**3	2.920E+00	2.800E-01	DCF1(1,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Co-57 , soil density = 1.0 g/cm**3, thickness = .15 m	7.000E-01	9.070E-01	FD(1,1,1)
A-3	Co-57 , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	1.000E+00	FD(1,2,1)
A-3	Co-57 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Co-57 , soil density = 1.8 g/cm**3, thickness = .15 m	8.700E-01	9.850E-01	FD(1,1,2)
A-3	Co-57 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Co-57 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
B-1	Dose conversion factors for dust inhalation, mrem/pCi:			
B-1	Co-57	2.000E-05	7.500E-06	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Co-57	1.400E-05	1.100E-06	DCF3(1)
D-34	Food transfer factors:			
D-34	Co-57 , plant/soil concentration ratio, dimensionless	4.000E-01	9.400E-03	RTF(1,1)
D-34	Co-57 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-02	1.000E-03	RTF(1,2)
D-34	Co-57 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-03	5.000E-04	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Co-57 , fish	2.000E+03	5.000E+01	BIOFAC(1,1)
D-5	Co-57 , crustacea and mollusks	1.000E+04	2.000E+02	BIOFAC(1,2)

Summary : CINTICHEM Problem #58 (Zn-65) For Zones #1, 3 and 4 (Using Co-57).
File : CINTI58.DAT

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	1.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	7.500E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+01	1.000E+02	---	BRLD
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+03	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+04	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Co-57	1.000E+00	0.000E+00	---	S(1)
R012	Concentration in groundwater (pCi/L): Co-57	not used	0.000E+00	---	W(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVERO
R013	Density of cover material (g/cm**3)	not used	1.600E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.600E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.000E+01	5.300E+00	---	BCZ
R013	Evapotranspiration coefficient	6.600E-01	6.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.200E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	3.880E+05	1.000E+06	---	WAREA
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.600E+00	---	DENSAQ
R014	Saturated zone total porosity	3.800E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.600E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	8.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Individual's use of groundwater (m**3/yr)	not used	1.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for Co-57				
R016	Contaminated zone (cm**3/g)	7.000E+00	1.000E+03	---	DCACTC(1)
R016	Saturated zone (cm**3/g)	7.000E+00	1.000E+03	---	DCACTS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.282E-01	RLEACH(1)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	1.000E+00	1.000E+00	---	FS1
R017	Fractions of annular areas within AREA:				
R017	Outer annular radius (m) = √(1/π)	not used	2.500E-01	---	FRACA(1)
R017	Outer annular radius (m) = √(10/π)	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = √(20/π)	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = √(50/π)	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = √(100/π)	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = √(200/π)	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = √(500/π)	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = √(1000/π)	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = √(5000/π)	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = √(1.E+04/π)	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = √(1.E+05/π)	not used	1.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = √(1.E+06/π)	not used	1.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Fraction of drinking water from site	1.000E+00	1.000E+00	---	FDW
R018	Fraction of aquatic food from site	5.000E-01	5.000E-01	---	FR9
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	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
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	1.000E-01	---	PH2OCV
R021	Volumetric water content of the foundation	not used	5.000E-02	---	PH2OFL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	2.000E-08	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	not used	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	not used	1.000E+00	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.000E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.000E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- radon	suppressed
9 -- soil ingestion	active

Summary : CINTICHEM Problem #58 (Zn-65) For Zones #1, 3 and 4 (Using Co-57).
File : CINTI58.DAT

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	5400.00 square meters	Co-57	1.000E+00
Thickness:	0.15 meters		
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 10 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
TDOSE(t):	2.688E+00	8.538E-01	8.739E-02	3.160E-05	2.452E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
M(t):	2.688E-01	8.538E-02	8.739E-03	3.160E-06	2.452E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Maximum TDOSE(t): 2.688E+00 mrem/yr at t = 0.000E+00 years

Summary : CINTICHEM Problem #52 (Cd-109) For Zones #1, 3 and 4 (Using Fe-55).
File : CINTI52.DAT

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Summary : CINTICHEM Problem #52 (Cd-109) For Zones #1, 3 and 4 (Using Fe-55).
File : CINTI52.DAT

Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Fe-55 , soil density = 1.0 g/cm**3	4.440E-06	4.440E-06	DCF1(1,1)
A-1	Fe-55 , soil density = 1.8 g/cm**3	2.470E-06	2.470E-06	DCF1(1,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Fe-55 , soil density = 1.0 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(1,1,1)
A-3	Fe-55 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,1)
A-3	Fe-55 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Fe-55 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(1,1,2)
A-3	Fe-55 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Fe-55 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
B-1	Dose conversion factors for dust inhalation, mrem/pCi:			
B-1	Fe-55	4.200E-05	4.200E-05	DCF2(1)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Fe-55	1.200E-05	1.200E-05	DCF3(1)
D-34	Food transfer factors:			
D-34	Fe-55 , plant/soil concentration ratio, dimensionless	3.000E-01	3.000E-01	RTF(1,1)
D-34	Fe-55 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.600E-02	1.600E-02	RTF(1,2)
D-34	Fe-55 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.200E-05	6.200E-05	RTF(1,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Fe-55 , fish	2.000E+04	2.000E+04	BIOFAC(1,1)
D-5	Fe-55 , crustacea and mollusks	2.000E+03	2.000E+03	BIOFAC(1,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	5.400E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.500E-01	1.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	7.500E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.000E+01	1.000E+02	---	BRLD
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+03	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+04	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Fe-55	1.000E+00	0.000E+00	---	S(1)
R012	Concentration in groundwater (pCi/L): Fe-55	not used	0.000E+00	---	W(1)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.600E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.600E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	5.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	1.000E+01	5.300E+00	---	BCZ
R013	Evapotranspiration coefficient	6.600E-01	6.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.200E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	3.880E+05	1.000E+06	---	WAREA
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.600E+00	---	DENSAQ
R014	Saturated zone total porosity	3.800E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.600E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	8.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	3.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Individual's use of groundwater (m**3/yr)	not used	1.500E+02	---	UW
R015	Number of unsaturated zone strata	0	1	---	NS
R016	Distribution coefficients for Fe-55				
R016	Contaminated zone (cm**3/g)	8.000E+00	1.000E+03	---	DCACTC(1)
R016	Saturated zone (cm**3/g)	8.000E+00	1.000E+03	---	DCACTS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.003E-01	RLEACH(1)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	1.000E+00	1.000E+00	---	FS1
R017	Fractions of annular areas within AREA:				
R017	Outer annular radius (m) = √(1/π)	not used	2.500E-01	---	FRACA(1)
R017	Outer annular radius (m) = √(10/π)	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = √(20/π)	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = √(50/π)	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = √(100/π)	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = √(200/π)	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = √(500/π)	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = √(1000/π)	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = √(5000/π)	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = √(1.E+04/π)	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = √(1.E+05/π)	not used	1.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = √(1.E+06/π)	not used	1.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Fraction of drinking water from site	1.000E+00	1.000E+00	---	FDW
R018	Fraction of aquatic food from site	5.000E-01	5.000E-01	---	FR9
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	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
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	1.000E-01	---	PH2OCV
R021	Volumetric water content of the foundation	not used	5.000E-02	---	PH2OFL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	2.000E-08	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	not used	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	not used	1.000E+00	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.000E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.000E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- radon	suppressed
9 -- soil ingestion	active

Summary : CINTICHEM Problem #52 (Cd-109) For Zones #1, 3 and 4 (Using Fe-55).
File : CINTI52.DAT

Contaminated Zone Dimensions	
Area:	5400.00 square meters
Thickness:	0.15 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Fe-55	1.000E+00

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 10 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
TDOSE(t):	6.360E-02	1.337E-01	1.555E-01	3.295E-02	3.741E-06	5.853E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00
M(t):	6.360E-03	1.337E-02	1.555E-02	3.295E-03	3.741E-07	5.853E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Maximum TDOSE(t): 1.585E-01 mrem/yr at t = 2.3844 ± 0.0007 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 = 2.3844 years

Water Independent Pathways

Radio-	Ground		Dust		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.
Fe-55	9.151E-07	0.0000	1.006E-05	0.0001	0.000E+00	0.0000	1.722E-02	0.1086	3.664E-03	0.0231	1.677E-05	0.0001	6.500E-05	0.0004
Total	9.151E-07	0.0000	1.006E-05	0.0001	0.000E+00	0.0000	1.722E-02	0.1086	3.664E-03	0.0231	1.677E-05	0.0001	6.500E-05	0.0004

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 2.3844 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.
Fe-55	1.567E-03	0.0099	1.330E-01	0.8391	0.000E+00	0.0000	2.690E-03	0.0170	2.732E-04	0.0017	1.645E-06	0.0000	1.585E-01	1.0000
Total	1.567E-03	0.0099	1.330E-01	0.8391	0.000E+00	0.0000	2.690E-03	0.0170	2.732E-04	0.0017	1.645E-06	0.0000	1.585E-01	1.0000

*Sum of all water independent and dependent pathways.