

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Dose Conversion Factor (and Related) Parameter Summary ... 2
 Site-Specific Parameter Summary 3
 Summary of Pathway Selections 7
 Contaminated Zone and Total Dose Summary 8
 Total Dose Components
 Time = 0.000E+00 9
 Time = 1.000E+03 10
 Time = 8.980E+03 11
 Time = 1.000E+04 12
 Dose/Source Ratios Summed Over All Pathways 13
 Single Radionuclide Soil Guidelines 13
 Dose Per Nuclide Summed Over All Pathways 14
 Soil Concentration Per Nuclide 14
 1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 2
 Summary : RESRAD Default Parameters
 File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

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

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2 (1)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2 (2)
B-1	Th-230	3.260E-01	3.260E-01	DCF2 (3)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3 (1)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3 (2)
D-1	Th-230	5.480E-04	5.480E-04	DCF3 (3)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(3,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(3,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(3,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)

Silo3_radon_highKd_LIR_LC_0.sum

D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(3,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(3,2)

1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 3
 Summary : RESRAD Default Parameters
 File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

Site-Specific Parameter Summary

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	3.240E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.200E+01	2.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	1.800E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+03	1.000E+00	---	T(2)
R011	Times for calculations (yr)	8.980E+03	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+04	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Pb-210	2.620E+03	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Ra-226	2.970E+03	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Th-230	5.120E+04	0.000E+00	---	S1(3)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	3.200E+00	0.000E+00	---	COVERO
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	5.500E-04	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.800E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	5.500E-04	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	2.000E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	9.740E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS

Silo3_radon_highKd_LIR_LC_0.sum

R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.900E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	2.390E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.000E-03	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)	1.000E+01	1.000E+01	---	DWIBWT

1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 4
 Summary : RESRAD Default Parameters
 File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	not used	1	---	NS
R015	Unsat. zone 1, thickness (m)	6.000E-01	4.000E+00	---	H (1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.800E+00	1.500E+00	---	DENSUZ (1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ (1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ (1)
R015	Unsat. zone 1, field capacity	2.000E-01	2.000E-01	---	FCUZ (1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ (1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	3.000E-01	1.000E+01	---	HCUZ (1)
R015	Unsat. zone 2, thickness (m)	4.430E+00	0.000E+00	---	H (2)
R015	Unsat. zone 2, soil density (g/cm**3)	1.570E+00	1.500E+00	---	DENSUZ (2)
R015	Unsat. zone 2, total porosity	4.000E-01	4.000E-01	---	TPUZ (2)
R015	Unsat. zone 2, effective porosity	2.000E-01	2.000E-01	---	EPUZ (2)
R015	Unsat. zone 2, field capacity	2.000E-01	2.000E-01	---	FCUZ (2)
R015	Unsat. zone 2, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ (2)
R015	Unsat. zone 2, hydraulic conductivity (m/yr)	1.890E+02	1.000E+01	---	HCUZ (2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC (1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU (1,1)
R016	Unsaturated zone 2 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU (1,2)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS (1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.202E-06	ALEACH (1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (1)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC (2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU (2,1)
R016	Unsaturated zone 2 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU (2,2)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS (2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.717E-06	ALEACH (2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (2)
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC (3)

Silo3 radon_highKd_LIR_LC_0.sum

R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU (3,1)
R016	Unsaturated zone 2 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU (3,2)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS (3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.006E-09	ALEACH (3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (3)
R017	Inhalation rate (m**3/yr)	not used	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	not used	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	not used	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	not used	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	0.000E+00	5.000E-01	---	FIND

1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 5
 Summary : RESRAD Default Parameters
 File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fraction of time spent outdoors (on site)	1.000E+00	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	not used	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE (1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE (2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE (3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE (4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE (5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE (6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE (7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE (8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE (9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE (10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE (11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE (12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA (1)
R017	Ring 2	not used	2.732E-01	---	FRACA (2)
R017	Ring 3	not used	0.000E+00	---	FRACA (3)
R017	Ring 4	not used	0.000E+00	---	FRACA (4)
R017	Ring 5	not used	0.000E+00	---	FRACA (5)
R017	Ring 6	not used	0.000E+00	---	FRACA (6)
R017	Ring 7	not used	0.000E+00	---	FRACA (7)
R017	Ring 8	not used	0.000E+00	---	FRACA (8)
R017	Ring 9	not used	0.000E+00	---	FRACA (9)
R017	Ring 10	not used	0.000E+00	---	FRACA (10)
R017	Ring 11	not used	0.000E+00	---	FRACA (11)
R017	Ring 12	not used	0.000E+00	---	FRACA (12)
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET (1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET (2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET (3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET (4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET (5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET (6)

Silo3 radon_highKd_LIR_LC_0.sum

R018	Soil ingestion rate (g/yr)	not used	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LF15
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LF16
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5

1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 6
 Summary : RESRAD Default Parameters
 File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	not used	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	1.000E+00	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN

Silo3 radon_highKd_LIR_LC_0.sum

C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1

1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 7
 Summary : RESRAD Default Parameters
 File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	4.000E-01	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	5.000E-02	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	2.000E-06	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	code computed (time dependent)	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA (1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA (2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	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	suppressed
8 -- soil ingestion	suppressed
9 -- radon	active
Find peak pathway doses	active

1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 8
 Summary : RESRAD Default Parameters
 File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

Contaminated Zone Dimensions Initial Soil Concentrations, pCi/g

Area:	324.00 square meters	Pb-210	2.620E+03
Thickness:	12.00 meters	Ra-226	2.970E+03
Cover Depth:	3.20 meters	Th-230	5.120E+04

0
 Total Dose TDOSE(t), mrem/yr
 Basic Radiation Dose Limit = 2.500E+01 mrem/yr
 Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+03	8.980E+03	1.000E+04
TDOSE(t):	5.917E-02	6.916E-01	2.475E+01	2.471E+01
M(t):	2.367E-03	2.766E-02	9.901E-01	9.882E-01

0 Maximum TDOSE(t): 2.475E+01 mrem/yr at t = 8980 ± * 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 = 8.980E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	3.145E-02	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	2.472E+01	0.9987	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	2.475E+01	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

As mrem/yr and Fraction of Total Dose At t = 8.980E+03 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.145E-02	0.0013
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.472E+01	0.9987
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.475E+01	1.0000

0*Sum of all water independent and dependent pathways.

1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 9
 Summary : RESRAD Default Parameters

File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	5.895E-02	0.9963	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	2.202E-04	0.0037	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	5.917E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.895E-02	0.9963
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.202E-04	0.0037
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.917E-02	1.0000

0*Sum of all water independent and dependent pathways.

1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 10
Summary : RESRAD Default Parameters
File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

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

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	6.704E-02	0.0969	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	6.246E-01	0.9031	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	6.916E-01	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.704E-02	0.0969
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.246E-01	0.9031

Silo3_radon_highKd_LIR_LC_0.sum

Total 0.000E+00 0.0000 0.000E+00 0.0000 0.000E+00 0.0000 0.000E+00 0.0000 0.000E+00 0.0000 0.000E+00 0.0000 6.916E-01 1.0000
 0*Sum of all water independent and dependent pathways.
 1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 11
 Summary : RESRAD Default Parameters
 File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 8.980E+03 years

0
0
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	3.145E-02	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	2.472E+01	0.9987	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	2.475E+01	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 8.980E+03 years

0
0
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.145E-02	0.0013
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.472E+01	0.9987
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.475E+01	1.0000

0*Sum of all water independent and dependent pathways.
 1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 12
 Summary : RESRAD Default Parameters
 File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

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

0
0
Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	2.018E-02	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	2.469E+01	0.9992	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	2.471E+01	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

0
0
Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Silo3_radon_highKd_LIR_LC_0.sum

Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.018E-02	0.0008
Th-230	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.469E+01	0.9992

Total 0.000E+00 0.0000 0.000E+00 0.0000 0.000E+00 0.0000 0.000E+00 0.0000 0.000E+00 0.0000 0.000E+00 0.0000 0.000E+00 0.0000 2.471E+01 1.0000

0*Sum of all water independent and dependent pathways.

1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 13

Summary : RESRAD Default Parameters
File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

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+03	8.980E+03	1.000E+04
Pb-210	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Ra-226	Ra-226	1.000E+00	1.985E-05	2.257E-05	1.059E-05	6.794E-06
Ra-226	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-226	∑DSR(j)		1.985E-05	2.257E-05	1.059E-05	6.794E-06
0Th-230	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	Ra-226	1.000E+00	4.300E-09	1.220E-05	4.828E-04	4.821E-04
Th-230	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-230	∑DSR(j)		4.300E-09	1.220E-05	4.828E-04	4.821E-04

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

0

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

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

0Nuclide (i)	t = 0.000E+00	1.000E+03	8.980E+03	1.000E+04
Pb-210	*7.631E+13	*7.631E+13	*7.631E+13	*7.631E+13
Ra-226	1.260E+06	1.108E+06	2.361E+06	3.680E+06
Th-230	5.814E+09	2.049E+06	5.178E+04	5.185E+04

*At specific activity limit

0

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)

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

at tmin = time of minimum single radionuclide soil guideline

and at tmax = time of maximum total dose = 8980 ± * years

0Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Pb-210	2.620E+03	0.000E+00	0.000E+00	*7.631E+13	0.000E+00	*7.631E+13
Ra-226	2.970E+03	5818 ± *	4.189E-05	5.968E+05	1.059E-05	2.361E+06
Th-230	5.120E+04	9118 ± *	4.828E-04	5.178E+04	4.828E-04	5.178E+04

*At specific activity limit

1RESRAD, Version 6.22 T½ Limit = 0.5 year 06/23/2006 14:25 Page 14

Summary : RESRAD Default Parameters
File : Silo3_radon_highKd_LIR_LC_0.00055.RAD

Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	BRF(i)	t=	DOSE(j,t), mrem/yr			
			0.000E+00	1.000E+03	8.980E+03	1.000E+04	
Pb-210	Pb-210	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Ra-226	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pb-210	ΣDOSE(j)		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0Ra-226	Ra-226	1.000E+00	5.895E-02	6.704E-02	3.145E-02	2.018E-02	
Ra-226	Th-230	1.000E+00	2.202E-04	6.246E-01	2.472E+01	2.469E+01	
Ra-226	ΣDOSE(j)		5.917E-02	6.916E-01	2.475E+01	2.471E+01	
0Th-230	Th-230	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

0Nuclide (j)	Parent (i)	BRF(i)	t=	S(j,t), pCi/g			
			0.000E+00	1.000E+03	8.980E+03	1.000E+04	
Pb-210	Pb-210	1.000E+00	2.620E+03	8.292E-11	0.000E+00	0.000E+00	
Pb-210	Ra-226	1.000E+00	0.000E+00	1.950E+03	6.062E+01	3.890E+01	
Pb-210	Th-230	1.000E+00	0.000E+00	1.744E+04	4.698E+04	4.692E+04	
Pb-210	ΣS(j):		2.620E+03	1.939E+04	4.704E+04	4.696E+04	
0Ra-226	Ra-226	1.000E+00	2.970E+03	1.923E+03	5.978E+01	3.836E+01	
Ra-226	Th-230	1.000E+00	0.000E+00	1.790E+04	4.698E+04	4.692E+04	
Ra-226	ΣS(j):		2.970E+03	1.982E+04	4.704E+04	4.696E+04	
0Th-230	Th-230	1.000E+00	5.120E+04	5.074E+04	4.722E+04	4.679E+04	

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

ORESCALC.EXE execution time = 1.10 seconds