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 Summary : Fernald dose calculation File: Fernald_WCS_Farmer_0_001.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/nCi:			
B-1	Pb-210+D	2.320E+01	2.320E+01	DCF2 (1)
B-1	Ra-226+D	8.600E+00	8.600E+00	DCF2 (2)
B-1	Th-230	3.260E+02	3.260E+02	DCF2 (3)
D-1	Dose conversion factors for ingestion, mrem/nCi:			
D-1	Pb-210+D	7.270E+00	7.270E+00	DCF3 (1)
D-1	Ra-226+D	1.330E+00	1.330E+00	DCF3 (2)
D-1	Th-230	5.480E-01	5.480E-01	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, (nCi/kg)/(nCi/d)	8.000E-04	8.000E-04	RTF (1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (nCi/L)/(nCi/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, (nCi/kg)/(nCi/d)	1.000E-03	1.000E-03	RTF (2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (nCi/L)/(nCi/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, (nCi/kg)/(nCi/d)	1.000E-04	1.000E-04	RTF (3,2)
D-34	Th-230 , milk/livestock-intake ratio, (nCi/L)/(nCi/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)
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	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)

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 Summary : Fernald dose calculation File: Fernald_WCS_Farmer_0_001.rad

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)	1.957E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	8.230E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.400E+02	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+02	1.000E+00	---	T(2)
R011	Times for calculations (yr)	9.150E+03	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+05	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 (nCi/g): Pb-210	5.480E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (nCi/g): Ra-226	1.126E+01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (nCi/g): Th-230	1.830E+00	0.000E+00	---	S1(3)
R012	Concentration in groundwater (nCi/L): Pb-210	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (nCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (nCi/L): Th-230	not used	0.000E+00	---	W1(3)
R013	Cover depth (m)	9.140E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	2.135E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	2.041E+00	1.500E+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 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)	3.100E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.100E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	3.600E-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	9.100E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	2.040E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	1.400E-01	4.000E-01	---	TPSZ

R014	Saturated zone effective porosity	1.400E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.100E-02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.600E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	not used	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	0.000E+00	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	8.530E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL

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 Summary : Fernald dose calculation File: Fernald_WCS_Farmer_0_001.rad

Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	4	1	---	NS
R015	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	---	H (1)
R015	Unsat. zone 1, soil density (g/cm**3)	2.140E+00	1.500E+00	---	DENSUZ (1)
R015	Unsat. zone 1, total porosity	3.010E-01	4.000E-01	---	TPUZ (1)
R015	Unsat. zone 1, effective porosity	3.010E-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)	1.400E-03	1.000E+01	---	HCUZ (1)
R015	Unsat. zone 2, thickness (m)	4.000E+00	0.000E+00	---	H (2)
R015	Unsat. zone 2, soil density (g/cm**3)	2.140E+00	1.500E+00	---	DENSUZ (2)
R015	Unsat. zone 2, total porosity	3.010E-01	4.000E-01	---	TPUZ (2)
R015	Unsat. zone 2, effective porosity	3.010E-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)	1.400E-03	1.000E+01	---	HCUZ (2)
R015	Unsat. zone 3, thickness (m)	8.500E+00	0.000E+00	---	H (3)
R015	Unsat. zone 3, soil density (g/cm**3)	2.040E+00	1.500E+00	---	DENSUZ (3)
R015	Unsat. zone 3, total porosity	1.040E-01	4.000E-01	---	TPUZ (3)
R015	Unsat. zone 3, effective porosity	1.040E-01	2.000E-01	---	EPUZ (3)
R015	Unsat. zone 3, field capacity	2.000E-01	2.000E-01	---	FCUZ (3)
R015	Unsat. zone 3, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ (3)
R015	Unsat. zone 3, hydraulic conductivity (m/yr)	1.100E-01	1.000E+01	---	HCUZ (3)
R015	Unsat. zone 4, thickness (m)	3.200E+01	0.000E+00	---	H (4)
R015	Unsat. zone 4, soil density (g/cm**3)	2.140E+00	1.500E+00	---	DENSUZ (4)
R015	Unsat. zone 4, total porosity	3.010E-01	4.000E-01	---	TPUZ (4)
R015	Unsat. zone 4, effective porosity	3.010E-01	2.000E-01	---	EPUZ (4)
R015	Unsat. zone 4, field capacity	2.000E-01	2.000E-01	---	FCUZ (4)
R015	Unsat. zone 4, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ (4)
R015	Unsat. zone 4, hydraulic conductivity (m/yr)	1.400E-03	1.000E+01	---	HCUZ (4)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	5.970E+02	1.000E+02	---	DCNUCC (1)
R016	Unsat. zone 1 (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCU (1,1)
R016	Unsat. zone 2 (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCU (1,2)
R016	Unsat. zone 3 (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCU (1,3)
R016	Unsat. zone 4 (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCU (1,4)

R016	Saturated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCS (1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.907E-07	ALEACH (1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (1)

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 Summary : Fernald dose calculation File: Fernald_WCS_Farmer_0_001.rad

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
0					
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)	9.100E+03	7.000E+01	---	DCNUCU (2,1)
R016	Unsaturated zone 2 (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCU (2,2)
R016	Unsaturated zone 3 (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCU (2,3)
R016	Unsaturated zone 4 (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCU (2,4)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS (2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.476E-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)
R016	Unsaturated zone 1 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU (3,1)
R016	Unsaturated zone 2 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU (3,2)
R016	Unsaturated zone 3 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU (3,3)
R016	Unsaturated zone 4 (cm**3/g)	5.800E+03	6.000E+04	---	DCNUCU (3,4)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS (3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.893E-09	ALEACH (3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK (3)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	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 flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE (1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE (2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE (3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE (4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE (5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE (6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE (7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE (8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE (9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE (10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE (11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE (12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA (1)
R017	Ring 2	not used	2.732E-01	---	FRACA (2)
R017	Ring 3	not used	0.000E+00	---	FRACA (3)
R017	Ring 4	not used	0.000E+00	---	FRACA (4)
R017	Ring 5	not used	0.000E+00	---	FRACA (5)
R017	Ring 6	not used	0.000E+00	---	FRACA (6)
R017	Ring 7	not used	0.000E+00	---	FRACA (7)
R017	Ring 8	not used	0.000E+00	---	FRACA (8)
R017	Ring 9	not used	0.000E+00	---	FRACA (9)
R017	Ring 10	not used	0.000E+00	---	FRACA (10)
R017	Ring 11	not used	0.000E+00	---	FRACA (11)
R017	Ring 12	not used	0.000E+00	---	FRACA (12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET (1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET (2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET (3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET (4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET (5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET (6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.978E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.978E+00	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	EGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV (1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV (2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV (3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE (1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE (2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE (3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV (1)

Site-Specific Parameter Summary (continued)					
Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
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
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	1024	---	---	NPTS

TITL | Maximum number of integration points for dose | 17 | --- | LYMAX
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 Summary : Fernald dose calculation File: Fernald_WCS_Farmer_0_001.rad

Site-Specific Parameter Summary (continued)

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

Summary of Pathway Selections

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

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 Summary : Fernald dose calculation File: Fernald_WCS_Farmer_0_001.rad

Contaminated Zone Dimensions

Initial Soil Concentrations, nCi/g

Area:	19570.00 square meters	Pb-210	5.480E+00
Thickness:	8.23 meters	Ra-226	1.126E+01
Cover Depth:	9.14 meters	Th-230	1.830E+00

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+02	9.150E+03	1.000E+05
TDOSE(t):	0.000E+00	0.000E+00	3.564E+04	0.000E+00
M(t):	0.000E+00	0.000E+00	1.426E+03	0.000E+00

0Maximum TDOSE(t): 3.563E+04 mrem/yr at t = 9153 ± * 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 = 9.153E+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	1.332E+03	0.0374	3.867E-01	0.0000	0.000E+00	0.0000	2.310E+03	0.0648	1.456E+02	0.0041	1.114E+02	0.0031	4.973E+01	0.0014

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Th-230	1.070E+04	0.3002	3.475E+01	0.0010	0.000E+00	0.0000	1.848E+04	0.5186	1.163E+03	0.0326	8.902E+02	0.0250	4.200E+02	0.0118
Total	1.203E+04	0.3376	3.514E+01	0.0010	0.000E+00	0.0000	2.079E+04	0.5834	1.309E+03	0.0367	1.002E+03	0.0281	4.697E+02	0.0132

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 9.153E+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	0.000E+03	0.1108
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	3.169E+04	0.8892
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.563E+04	1.0000

0*Sum of all water independent and dependent pathways.
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Summary : Fernald dose calculation File: Fernald_WCS_Farmer_0_001.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	0.000E+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

0
0
Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
Water Independent Pathways (Inhalation excludes radon)
0
0
Radio-Nuclide
mrem/yr fract. mrem/yr fract. mrem/yr fract. mrem/yr fract. mrem/yr fract. mrem/yr fract. mrem/yr fract. 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
0*Sum of all water independent and dependent pathways.
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Summary : Fernald dose calculation File: Fernald_WCS_Farmer_0_001.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+02 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.

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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

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

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

0*Sum of all water independent and dependent pathways.

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 9.150E+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	1.333E+03	0.0374	3.872E-01	0.0000	0.000E+00	0.0000	2.312E+03	0.0649	1.458E+02	0.0041	1.115E+02	0.0031	4.979E+01	0.0014
Th-230	1.070E+04	0.3002	3.475E+01	0.0010	0.000E+00	0.0000	1.848E+04	0.5186	1.163E+03	0.0326	8.902E+02	0.0250	4.200E+02	0.0118
Total	1.203E+04	0.3376	3.514E+01	0.0010	0.000E+00	0.0000	2.079E+04	0.5834	1.309E+03	0.0367	1.002E+03	0.0281	4.698E+02	0.0132

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 9.150E+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	3.953E+03	0.1109
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	3.169E+04	0.8891
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.564E+04	1.0000

0*Sum of all water independent and dependent pathways.

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Summary : Fernald dose calculation File: Fernald_WCS_Farmer_0_001.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+05 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.

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Radio-Nuclide	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

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+05 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	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

0*Sum of all water independent and dependent pathways.

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Summary : Fernald dose calculation File: Fernald_WCS_Farmer_0_001.rad

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) (mrem/yr)/(nCi/g)
		t= 0.000E+00	1.000E+02 9.150E+03 1.000E+05
Pb-210	Pb-210	1.000E+00	0.000E+00 0.000E+00 0.000E+00 0.000E+00
Ra-226	Ra-226	1.000E+00	0.000E+00 0.000E+00 2.158E+02 0.000E+00
Ra-226	Pb-210	1.000E+00	0.000E+00 0.000E+00 1.352E+02 0.000E+00
Ra-226	ΣDSR(j)		0.000E+00 0.000E+00 3.511E+02 0.000E+00
Th-230	Th-230	1.000E+00	0.000E+00 0.000E+00 7.762E+01 0.000E+00
Th-230	Ra-226	1.000E+00	0.000E+00 0.000E+00 1.065E+04 0.000E+00
Th-230	Pb-210	1.000E+00	0.000E+00 0.000E+00 6.583E+03 0.000E+00
Th-230	ΣDSR(j)		0.000E+00 0.000E+00 1.731E+04 0.000E+00

*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.

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

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

Nuclide (i)	t= 0.000E+00	1.000E+02	9.150E+03	1.000E+05
Pb-210	*7.631E+10	*7.631E+10	*7.631E+10	*7.631E+10
Ra-226	*9.882E+08	*9.882E+08	7.121E-02	*9.882E+08
Th-230	*2.018E+07	*2.018E+07	1.444E-03	*2.018E+07

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(nCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in nCi/g
at tmin = time of minimum single radionuclide soil guideline

and at tmax = time of maximum total dose = 9153 ± * years

0Nuclide (i)	Initial (nCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (nCi/g)	DSR(i,tmax)	G(i,tmax) (nCi/g)
Pb-210	5.480E+00	0.000E+00	0.000E+00	*7.631E+10	0.000E+00	*7.631E+10
Ra-226	1.126E+01	9147 ± *	3.515E+02	7.113E-02	3.506E+02	7.130E-02
Th-230	1.830E+00	9153 ± *	1.731E+04	1.444E-03	1.731E+04	1.444E-03

*At specific activity limit

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

0Nuclide (j)	Parent (i)	BRF(i)	t= 0.000E+00	DOSE(j,t), mrem/yr	1.000E+02	9.150E+03	1.000E+05
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	1.523E+03	0.000E+00	0.000E+00
Pb-210	Th-230	1.000E+00	0.000E+00	0.000E+00	1.205E+04	0.000E+00	0.000E+00
Pb-210	∑DOSE(j)		0.000E+00	0.000E+00	1.357E+04	0.000E+00	0.000E+00
0Ra-226	Ra-226	1.000E+00	0.000E+00	0.000E+00	2.430E+03	0.000E+00	0.000E+00
Ra-226	Th-230	1.000E+00	0.000E+00	0.000E+00	1.950E+04	0.000E+00	0.000E+00
Ra-226	∑DOSE(j)		0.000E+00	0.000E+00	2.193E+04	0.000E+00	0.000E+00
0Th-230	Th-230	1.000E+00	0.000E+00	0.000E+00	1.420E+02	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= 0.000E+00	S(j,t), nCi/g	1.000E+02	9.150E+03	1.000E+05
Pb-210	Pb-210	1.000E+00	5.480E+00	2.448E-01	0.000E+00	0.000E+00	0.000E+00
Pb-210	Ra-226	1.000E+00	0.000E+00	1.042E+01	2.120E-01	1.367E-18	1.367E-18
Pb-210	Th-230	1.000E+00	0.000E+00	5.395E-02	1.677E+00	7.553E-01	7.553E-01
Pb-210	∑S(j):		5.480E+00	1.072E+01	1.889E+00	7.553E-01	7.553E-01
0Ra-226	Ra-226	1.000E+00	1.126E+01	1.078E+01	2.090E-01	1.348E-18	1.348E-18
Ra-226	Th-230	1.000E+00	0.000E+00	7.754E-02	1.677E+00	7.550E-01	7.550E-01
Ra-226	∑S(j):		1.126E+01	1.086E+01	1.886E+00	7.550E-01	7.550E-01
0Th-230	Th-230	1.000E+00	1.830E+00	1.828E+00	1.685E+00	7.437E-01	7.437E-01

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

0RESALC.EXE execution time = 3.79 seconds