

Summary : Hematite - Excavation Scenario Ra-226+C

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## Dose Conversion Factor (and Related) Parameter Summary

Dose Library: Hematite Plus FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1( 1)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1( 2)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1( 3)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1( 4)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1( 5)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1( 6)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1( 7)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1( 8)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1( 9)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1( 10)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1( 11)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2( 1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2( 2)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3( 1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3( 2)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	7.400E-03	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)	5.570E-04	3.000E-04	RTF( 1,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	7.400E-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-04	1.000E-03	RTF( 2,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Pb-210+D , fish	2.930E+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	4.930E+01	5.000E+01	BIOFAC( 2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC( 2,2)

#For DCF1(xxx) only, factors are for infinite depth &amp; area. See ETFG table in Ground Pathway of Detailed Report.

\*Base Case means Default.Lib w/o Associate Nuclide contributions.

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## 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)	7.000E+02	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	9.000E-01	2.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	4.100E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	2.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T( 2)
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)	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	1.000E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Ra-226	1.000E+00	0.000E+00	---	S1(2)
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)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVERO
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.690E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	6.000E-04	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.500E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.700E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.456E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	9.900E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	4.300E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	8.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.010E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	1.400E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	4.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	9.989E+05	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)	1.510E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.300E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.800E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	1.500E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	2.520E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.100E-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)	2.500E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	3.338E+03	2.500E+02	---	UW

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	8.200E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.690E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.500E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.900E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	1.700E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	9.900E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.456E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCC( 1)
R016	Unsaturated zone 1 (cm**3/g)	5.500E+02	1.000E+02	---	DCNUCU( 1,1)
R016	Saturated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCS( 1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.783E-04	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)	9.100E+03	7.000E+01	---	DCNUCC( 2)
R016	Unsaturated zone 1 (cm**3/g)	9.100E+03	7.000E+01	---	DCNUCU( 2,1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS( 2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.078E-05	ALEACH( 2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK( 2)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.300E-05	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	5.500E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	2.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.600E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.200E-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)

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## 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)	1.120E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.100E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	2.330E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.500E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	2.100E+01	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)	1.820E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	4.600E+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	1.000E+00	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.350E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.350E-01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.350E-01	FMILK
R019	Livestock fodder intake for meat (kg/day)	1.200E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	9.000E+00	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	3.700E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.050E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	4.500E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	2.300E-05	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	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	1.750E+00	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)	2.600E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	1.700E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	2.100E-01	8.000E-02	---	TE(3)

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## Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
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	6.000E-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	3.300E+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
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	128	---	---	NPTS

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Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
TITL	Maximum number of integration points for dose	5	---	---	LYMAX
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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Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	700.00 square meters	Pb-210	1.000E+00
Thickness:	0.90 meters	Ra-226	1.000E+00
Cover Depth:	0.00 meters		

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+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	9.690E+00	9.684E+00	9.667E+00	9.608E+00	9.437E+00	8.838E+00	7.259E+00	3.198E+00
M(t):	3.876E-01	3.874E-01	3.867E-01	3.843E-01	3.775E-01	3.535E-01	2.903E-01	1.279E-01

Maximum TDOSE(t): 9.690E+00 mrem/yr at t = 0.000E+00 years

Summary : Hematite - Excavation Scenario Ra-226+C

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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 = 0.000E+00 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	1.368E-03	0.0001	1.275E-04	0.0000	0.000E+00	0.0000	2.467E+00	0.2546	7.025E-03	0.0007	1.681E-02	0.0017	7.119E-02	0.0073
Ra-226	2.500E+00	0.2579	4.995E-05	0.0000	0.000E+00	0.0000	4.607E+00	0.4754	4.189E-03	0.0004	1.533E-03	0.0002	1.424E-02	0.0015
Total	2.501E+00	0.2581	1.774E-04	0.0000	0.000E+00	0.0000	7.074E+00	0.7300	1.121E-02	0.0012	1.834E-02	0.0019	8.542E-02	0.0088

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

## Water Dependent Pathways

Radio- 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	2.564E+00	0.2645
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	7.127E+00	0.7355
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	9.690E+00	1.0000

\*Sum of all water independent and dependent pathways.

Summary : Hematite - Excavation Scenario Ra-226+C

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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 = 1.000E+00 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	1.326E-03	0.0001	1.235E-04	0.0000	0.000E+00	0.0000	2.389E+00	0.2467	6.808E-03	0.0007	1.629E-02	0.0017	6.900E-02	0.0071
Ra-226	2.498E+00	0.2580	5.383E-05	0.0000	0.000E+00	0.0000	4.679E+00	0.4832	4.406E-03	0.0005	2.052E-03	0.0002	1.641E-02	0.0017
Total	2.500E+00	0.2581	1.774E-04	0.0000	0.000E+00	0.0000	7.069E+00	0.7300	1.121E-02	0.0012	1.834E-02	0.0019	8.540E-02	0.0088

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

## Water Dependent Pathways

Radio- 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	2.483E+00	0.2564
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	7.201E+00	0.7436
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	9.684E+00	1.0000

\*Sum of all water independent and dependent pathways.

Summary : Hematite - Excavation Scenario Ra-226+C

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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 = 3.000E+00 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	1.245E-03	0.0001	1.161E-04	0.0000	0.000E+00	0.0000	2.242E+00	0.2319	6.394E-03	0.0007	1.530E-02	0.0016	6.482E-02	0.0067
Ra-226	2.496E+00	0.2582	6.122E-05	0.0000	0.000E+00	0.0000	4.813E+00	0.4979	4.809E-03	0.0005	3.030E-03	0.0003	2.055E-02	0.0021
Total	2.498E+00	0.2584	1.773E-04	0.0000	0.000E+00	0.0000	7.054E+00	0.7297	1.120E-02	0.0012	1.833E-02	0.0019	8.536E-02	0.0088

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

## Water Dependent Pathways

Radio- 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	2.330E+00	0.2410
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	7.338E+00	0.7590
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	9.667E+00	1.0000

\*Sum of all water independent and dependent pathways.

Summary : Hematite - Excavation Scenario Ra-226+C

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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 = 1.000E+01 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	1.001E-03	0.0001	9.324E-05	0.0000	0.000E+00	0.0000	1.793E+00	0.1866	5.133E-03	0.0005	1.229E-02	0.0013	5.208E-02	0.0054
Ra-226	2.489E+00	0.2590	8.367E-05	0.0000	0.000E+00	0.0000	5.211E+00	0.5423	6.027E-03	0.0006	6.000E-03	0.0006	3.313E-02	0.0034
Total	2.490E+00	0.2591	1.769E-04	0.0000	0.000E+00	0.0000	7.003E+00	0.7289	1.116E-02	0.0012	1.829E-02	0.0019	8.521E-02	0.0089

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

## Water Dependent Pathways

Radio- 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	1.863E+00	0.1939
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	7.745E+00	0.8061
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	9.608E+00	1.0000

\*Sum of all water independent and dependent pathways.

Summary : Hematite - Excavation Scenario Ra-226+C

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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 = 3.000E+01 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	5.355E-04	0.0001	4.990E-05	0.0000	0.000E+00	0.0000	9.464E-01	0.1003	2.741E-03	0.0003	6.564E-03	0.0007	2.787E-02	0.0030
Ra-226	2.467E+00	0.2614	1.258E-04	0.0000	0.000E+00	0.0000	5.909E+00	0.6261	8.289E-03	0.0009	1.157E-02	0.0012	5.679E-02	0.0060
Total	2.468E+00	0.2615	1.757E-04	0.0000	0.000E+00	0.0000	6.855E+00	0.7264	1.103E-02	0.0012	1.813E-02	0.0019	8.466E-02	0.0090

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

## Water Dependent Pathways

Radio- 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	9.842E-01	0.1043
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	8.453E+00	0.8957
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	9.437E+00	1.0000

\*Sum of all water independent and dependent pathways.

Summary : Hematite - Excavation Scenario Ra-226+C

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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 = 1.000E+02 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	6.004E-05	0.0000	5.594E-06	0.0000	0.000E+00	0.0000	1.011E-01	0.0114	3.049E-04	0.0000	7.314E-04	0.0001	3.124E-03	0.0004
Ra-226	2.392E+00	0.2707	1.651E-04	0.0000	0.000E+00	0.0000	6.235E+00	0.7054	1.023E-02	0.0012	1.676E-02	0.0019	7.915E-02	0.0090
Total	2.392E+00	0.2707	1.707E-04	0.0000	0.000E+00	0.0000	6.336E+00	0.7168	1.054E-02	0.0012	1.749E-02	0.0020	8.227E-02	0.0093

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

## Water Dependent Pathways

Radio- 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	1.053E-01	0.0119
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	8.733E+00	0.9881
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	8.838E+00	1.0000

\*Sum of all water independent and dependent pathways.

Summary : Hematite - Excavation Scenario Ra-226+C

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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 = 3.000E+02 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	1.156E-07	0.0000	1.078E-08	0.0000	0.000E+00	0.0000	1.668E-04	0.0000	5.743E-07	0.0000	1.384E-06	0.0000	6.018E-06	0.0000
Ra-226	2.189E+00	0.3016	1.562E-04	0.0000	0.000E+00	0.0000	4.969E+00	0.6846	9.187E-03	0.0013	1.566E-02	0.0022	7.530E-02	0.0104
Total	2.189E+00	0.3016	1.562E-04	0.0000	0.000E+00	0.0000	4.969E+00	0.6846	9.188E-03	0.0013	1.566E-02	0.0022	7.531E-02	0.0104

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

## Water Dependent Pathways

Radio- 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	1.749E-04	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	7.258E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.259E+00	1.0000

\*Sum of all water independent and dependent pathways.

Summary : Hematite - Excavation Scenario Ra-226+C

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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 = 1.000E+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	3.676E-17	0.0000	3.380E-18	0.0000	0.000E+00	0.0000	2.179E-14	0.0000	1.658E-16	0.0000	4.074E-16	0.0000	1.887E-15	0.0000
Ra-226	1.610E+00	0.5034	1.145E-04	0.0000	0.000E+00	0.0000	1.517E+00	0.4743	5.561E-03	0.0017	1.057E-02	0.0033	5.519E-02	0.0173
Total	1.610E+00	0.5034	1.145E-04	0.0000	0.000E+00	0.0000	1.517E+00	0.4743	5.561E-03	0.0017	1.057E-02	0.0033	5.519E-02	0.0173

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

## Water Dependent Pathways

Radio- 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	2.429E-14	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	3.198E+00	1.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.198E+00	1.0000

\*Sum of all water independent and dependent pathways.

Summary : Hematite - Excavation Scenario Ra-226+C

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g)							
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210+D	Pb-210+D	1.000E+00	2.564E+00	2.483E+00	2.330E+00	1.863E+00	9.842E-01	1.053E-01	1.749E-04	2.429E-14
Ra-226+D	Ra-226+D	1.000E+00	7.066E+00	7.059E+00	7.047E+00	7.004E+00	6.882E+00	6.468E+00	5.387E+00	2.591E+00
Ra-226+D	Pb-210+D	1.000E+00	6.117E-02	1.414E-01	2.905E-01	7.407E-01	1.571E+00	2.265E+00	1.871E+00	6.069E-01
Ra-226+D	∑DSR(j)		7.127E+00	7.201E+00	7.338E+00	7.745E+00	8.453E+00	8.733E+00	7.258E+00	3.198E+00

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

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

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

Nuclide (i)	t=								
	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	
Pb-210	9.752E+00	1.007E+01	1.073E+01	1.342E+01	2.540E+01	2.375E+02	1.429E+05	*7.634E+13	
Ra-226	3.508E+00	3.472E+00	3.407E+00	3.228E+00	2.958E+00	2.863E+00	3.444E+00	7.818E+00	

\*At specific activity limit

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

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

at tmin = time of minimum single radionuclide soil guideline

and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Pb-210	1.000E+00	0.000E+00	2.564E+00	9.752E+00	2.564E+00	9.752E+00
Ra-226	1.000E+00	70.8 ± 0.1	8.819E+00	2.835E+00	7.127E+00	3.508E+00

Summary : Hematite - Excavation Scenario Ra-226+C

File : C:\RESRAD\_FAMILY\RESRAD\USERFILES\HEMATITE - EXCAVATION SCENARIO RA-226+C.RAD

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

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr							
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	1.000E+00	2.564E+00	2.483E+00	2.330E+00	1.863E+00	9.842E-01	1.053E-01	1.749E-04	2.429E-14
Pb-210	Ra-226	1.000E+00	6.117E-02	1.414E-01	2.905E-01	7.407E-01	1.571E+00	2.265E+00	1.871E+00	6.069E-01
Pb-210	ΣDOSE(j)		2.625E+00	2.624E+00	2.620E+00	2.604E+00	2.555E+00	2.370E+00	1.871E+00	6.069E-01
Ra-226	Ra-226	1.000E+00	7.066E+00	7.059E+00	7.047E+00	7.004E+00	6.882E+00	6.468E+00	5.387E+00	2.591E+00

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

Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g							
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Pb-210	Pb-210	1.000E+00	1.000E+00	9.692E-01	9.105E-01	7.315E-01	3.915E-01	4.389E-02	8.454E-05	2.651E-14
Pb-210	Ra-226	1.000E+00	0.000E+00	3.060E-02	8.895E-02	2.663E-01	6.004E-01	9.206E-01	8.828E-01	6.470E-01
Pb-210	ΣS(j):		1.000E+00	9.998E-01	9.994E-01	9.978E-01	9.919E-01	9.644E-01	8.828E-01	6.470E-01
Ra-226	Ra-226	1.000E+00	1.000E+00	9.996E-01	9.987E-01	9.956E-01	9.868E-01	9.566E-01	8.753E-01	6.415E-01

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

RESRAD.EXE execution time = 1.30 seconds