Input Data and Output Results of the Computer Models Employed for Human Health Impact Analyses in the Uranium Leasing Program PEIS

Environmental Science Division

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prepared by
Environmental Science Division, Argonne National Laboratory
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INPUT DATA AND OUTPUT RESULTS OF THE COMPUTER MODELS EMPLOYED FOR HUMAN HEALTH IMPACT ANALYSES IN THE URARNIUM LEASING PROGRAM PEIS

This report contains the input data and output results of RESRAD (Yu et al. 2001), CAP88-PC (Trinity Engineering Associates, Inc. 2007), and COMPLY-R (EPA 1989), which were employed for human health impact analyses in the Draft Uranium Leasing Program Programmatic Environmental Impact Statement (Draft ULP PEIS; DOE 2013). The input data and output results were saved as pdf files and appear in this report as attachements. There are a total of 23 attachments. The text that follows describes the information contained in each attachment.

Attachment 1 contains the RESRAD summary report for the calculation of the dose associated with the potential exposure of a reclamation worker who would work on a very large waste-rock pile during the reclamation phase. The summary report contains a table listing all the input parameters used for the dose calculation. The same RESRAD input file was modified for the dimensions of the radiation source and then used for dose calculations for the same worker working on a small, a medium, or a large waste-rock pile. Information on the dimensions of waste-rock piles are listed in Table 4.1-3 of the Draft ULP PEIS.

Attachment 2 contains the joint frequency data needed for all CAP88-PC (Trinity Engineering Associates, Inc. 2007) calculations.

Attachment 3 contains the radon working levels (WLs) at different downwind locations calculated by CAP88-PC associated with the emission of radon from a very large waste-rock pile. These WLs were used to calculate radon doses that would be incurred by residents living near a uranium lease tract during or after the reclamation phase. The emission rate of radon from a very large waste-rock pile is listed in Table 4.1-4 of the Draft ULP PEIS; it was obtained by using the outdoor radon flux from the RESRAD run detailed in Attachment 1. Aside from the radon emission rate and meteorological data, the other input data needed for CAP88-PC calculations include the annual precipitation rate (32 cm/yr), annual ambient temperature (10°C), height of the lid (1,500 m), absolute humidity (8 g/m^3), and source height and area (listed in Table 4.1-3 of the Draft ULP PEIS). No plume rise was assumed for this calculation, and all other input parameters were assigned the CAP88-PC default values.

Attachment 4 contains the Chi/Q values at different downwind locations calculated by CAP88-PC associated with the emission of dust particles containing uranium isotopes and their decay products from a very large waste-rock pile. These Chi/Q values are ratios of air concentrations at downwind locations to the emission rate of individual radionuclides from the waste-rock pile. The Chi/Q values would be the same for different radionuclides, because their radiological half-lives are all much greater than the transit time in the atmosphere and they were assumed to have the same deposition velocity. These Chi/Q values were used to calculate radiation exposures that would be incurred by a resident living close to the uranium lease tract area. The CAP88-PC input data are the same as those mentioned in Attachment 3, except for the release rates of radionuclides, which are listed in Table 4.1-4 of the Draft ULP PEIS.

Attachment 5 contains the radon WLs calculated by CAP88-PC associated with the emission of radon from a large waste-rock pile.

Attachment 6 contains the Chi/Q values calculated by CAP88-PC associated with the emission of dust particles from a large-waste rock pile.

Attachment 7 contains the radon WLs calculated by CAP88-PC associated with the emission of radon from a medium waste-rock pile.

Attachment 8 contains the Chi/Q values calculated by CAP88-PC associated with the emission of dust particles from a medium-waste rock pile.

Attachment 9 contains the radon WLs calculated by CAP88-PC associated with the emission of radon from a small waste-rock pile.

Attachment 10 contains the Chi/Q values calculated by CAP88-PC associated with the emission of dust particles from a small-waste rock pile.

Attachment 11 contains the RESRAD summary report for the dose calculation associated with the potential exposure of a resident who would consume the meat and milk produced by livestock that grazed in the uranium lease tract area after the reclamation phase.

Attachment 12 contains the RESRAD summary report for the dose calculation associated with the potential exposure of a recreationist who would camp on a very large waste-rock pile after the reclamation phase. The same RESRAD input file was modified for the dimensions of radiation source and then used for dose calculations concerning the same recreationist camping on a small, a medium, or a large waste-rock pile. Information on the dimensions of waste-rock piles are listed in Table 4.1-3 of the Draft ULP PEIS.

Attachment 13 contains the RESRAD summary report for the dose calculation associated with the potential exposure of a recreationist who would ingest wild berries and the meat of wildlife animals killed during hunting activities.

Attachment 14 contains the RESRAD summary report for the dose calculation associated with the potential exposure of a worker conducting mine exploration activities.

Attachment 15 contains the radon working levels (WLs) at different downwind locations calculated by CAP88-PC associated with the emission of radon from a small underground uranium mine during mine development and operations. The WLs were used to calculate radon doses that would be incurred by residents living near a uranium lease tract. The emission rate of radon from a small underground mine is listed in Table 4.3-3 of the Draft ULP PEIS; it was obtained by assuming the small mine had been developed and operated for 10 years. Aside from the radon emission rate and meteorological data, the other input data used for CAP88-PC calculations are the same as those described above for Attachment 3, except for the following parameters: The emission is from a stack, the height of the source is 2 m; the diameter of the source is 1.8 m; and the exit velocity of the radon plume is 5 m/s. The radon WLs associated

with emissions from a medium or a large underground uranium mine would be twice or four times, respectively, the WLs calculated for radon emissions from a small mine.

Attachment 16 contains the radon WLs at different downwind locations calculated by CAP88-PC associated with the emission of radon from a very large open-pit mine during mine development and operations. The WLs were used to calculate radon doses that would be incurred by residents living near a uranium lease tract. The emission rate of radon from a very large open-pit mine is listed in Table 4.3-3 of the Draft ULP PEIS. Aside from the radon emission rate and meteorological data, the other input data used for CAP88-PC calculations are the same as those described above for Attachment 3, except for the following parameters: The emission height is 0 m and emission area is 404,600 m^2 (100 acres).

Attachment 17 contains the population distribution data needed by CAP88-PC for the calculations of collective exposures. The data describe the population distributions surrounding the center point of each of the four uranium lease tract groups and were developed by using 2010 Census data.

Attachment 18 contains the collective WL result (3.2 person-WL) calculated by CAP88-PC for the population surrounding the group 1 uranium lease tracts during the year of peak operations under Alternative 3. This collective WL was used to calculate the collective dose associated with the operation of seven underground uranium mines with a total radon emission of 7,390 Ci/yr (see Table 4.3-3 of the Draft ULP PEIS). Except for the radon emission rate and the specification of population dose calculation, the other CAP88-PC input data used for obtaining the collective WL result were the same as those described previously for Attachment 15. Under Alternatives 4 and 5, the total radon emission rate from underground uranium mines is increased to 18,000 Ci/yr (see Table 4.4-2 of the Draft ULP PEIS) and 21,100 Ci/yr (see Table 4.5-2 of the Draft ULP PEIS), respectively; therefore, the collective WL would be increased proportionally under these two alternatives.

Attachment 19 contains the collective WL result (1.71 person-WL) calculated by CAP88-PC for the population surrounding the group 2 uranium lease tracts during the year of peak operations under Alternative 3. As being pointed out in the discussion for Attachment 18, under Alternatives 4 and 5, the collective WL would be increased proportionally because of the higher total radon emissions.

Attachment 20 contains the collective WL result (0.868 person-WL) calculated by CAP88-PC for the population surrounding the group 3 uranium lease tracts during the year of peak operations under Alternative 3. Under Alternatives 4 and 5, the collective WL would be increased proportionally because of the higher total radon emissions.

Attachment 21 contains the collective WL result (0.549 person-WL) calculated by CAP88-PC for the population surrounding the group 4 uranium lease tracts during the year of peak operations under Alternative 3. Under Alternatives 4 and 5, the collective WL would be increased proportionally because of the higher total radon emissions.

Attachment 22 contains the collective WL result (0.0734 person-WL) calculated by CAP88-PC for the population surrounding the group 3 uranium lease tracts during the year of peak operations under Alternative 3. This collective WL was used to calculate the collective dose associated with the operation of the very large open-pit mine with a radon emission of 600 Ci/yr (see Table 4.3-3 of the Draft ULP PEIS). Except for the radon emission rate and the specification of population dose calculation, the other CAP88-PC input data used for obtaining the collective WL result were the same as those described previously for Attachment 16. Under Alternatives 4 and 5, the collective WL would be the same because the same emission rate was assumed for the very large open pit mine under these two alternatives.

Attachment 23 contains the report generated by COMPLY-R for the dose calculation associated with the potential exposure of nearby residents resulting from radon emissions from a small underground uranium mine.

REFERENCES

DOE (U.S. Department of Energy), 2013, *Draft Uranium Leasing Program Programmatic Environmental Impact Statement*, DOE/EIS 0472-D, Office of Legacy Management, Washington, D.C., Jan.

EPA (U.S. Environmental Protection Agency), 1989, *User's Guide for the COMPLY-R Code (Revision 1)*, EPA 520/1-89-029, Office of Radiation Programs, Washington, D.C., Oct.

Trinity Engineering Associates, Inc., 2007, *CAP88-PC Version 3.0 User Guide*, Cincinnati, Ohio, Dec. 9.

Yu, C., et al., 2001, *User's Manual for RESRAD Version 6*, ANL/EAD-4, Argonne National Laboratory, Argonne, Ill., July.

ATTACHMENT 1:

RECLAMATION WORKER, VERY LARGE WASTE-ROCK PILE

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: ICRP 60)	4.485E-04	4.485E-04	DCF1(1)
A-1	At-218 (Source: ICRP 60)	4.878E-03	4.878E-03	DCF1(2)
A-1	Bi-210 (Source: ICRP 60)	5.476E-03	5.476E-03	DCF1(3)
A-1	Bi-211 (Source: ICRP 60)	2.373E-01	2.373E-01	DCF1(4)
A-1	Bi-214 (Source: ICRP 60)	9.325E+00	9.325E+00	DCF1(5)
A-1	Fr-223 (Source: ICRP 60)	1.813E-01	1.813E-01	DCF1(6)
A-1	Pa-231 (Source: ICRP 60)	1.762E-01	1.762E-01	DCF1(7)
A-1	Pa-234 (Source: ICRP 60)	1.088E+01	1.088E+01	DCF1(8)
A-1	Pa-234m (Source: ICRP 60)	9.867E-02	9.867E-02	DCF1(9)
A-1	Pb-210 (Source: ICRP 60)	1.981E-03	1.981E-03	DCF1(10)
A-1	Pb-211 (Source: ICRP 60)	2.915E-01	2.915E-01	DCF1(11)
A-1	Pb-214 (Source: ICRP 60)	1.243E+00	1.243E+00	DCF1(12)
A-1	Po-210 (Source: ICRP 60)	4.934E-05	4.934E-05	DCF1(13)
A-1	Po-211 (Source: ICRP 60)	4.485E-02	4.485E-02	DCF1(14)
A-1	Po-214 (Source: ICRP 60)	4.840E-04	4.840E-04	DCF1(15)
A-1	Po-215 (Source: ICRP 60)	9.456E-04	9.456E-04	DCF1(16)
A-1	Po-218 (Source: ICRP 60)	5.326E-05	5.326E-05	DCF1(17)
A-1	Ra-223 (Source: ICRP 60)	5.532E-01	5.532E-01	DCF1(18)
A-1	Ra-226 (Source: ICRP 60)	2.915E-02	2.915E-02	DCF1(19)
A-1	Rn-219 (Source: ICRP 60)	2.859E-01	2.859E-01	DCF1(20)
A-1	Rn-222 (Source: ICRP 60)	2.186E-03	2.186E-03	DCF1(21)
A-1	Th-227 (Source: ICRP 60)	4.803E-01	4.803E-01	DCF1(22)
A-1	Th-230 (Source: ICRP 60)	1.071E-03	1.071E-03	DCF1(23)
A-1	Th-231 (Source: ICRP 60)	3.214E-02	3.214E-02	DCF1(24)
A-1	Th-234 (Source: ICRP 60)	2.130E-02	2.130E-02	DCF1(25)
A-1	Tl-207 (Source: ICRP 60)	2.299E-02	2.299E-02	DCF1(26)
A-1	Tl-210 (Source: ICRP 60)	1.661E+01	1.661E+01	DCF1(27)
A-1	U-234 (Source: ICRP 60)	3.439E-04	3.439E-04	DCF1(28)
A-1	U-235 (Source: ICRP 60)	6.597E-01	6.597E-01	DCF1(29)
A-1	U-238 (Source: ICRP 60)	7.961E-05	7.961E-05	DCF1(30)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	2.109E+00	2.035E+00	DCF2(1)
B-1	Pa-231	5.180E-01	5.180E-01	DCF2(2)
B-1	Pb-210+D	3.694E-02	2.072E-02	DCF2(3)
B-1	Ra-226+D	3.531E-02	3.515E-02	DCF2(4)
B-1	Th-230	3.700E-01	3.700E-01	DCF2(5)
B-1	U-234	3.480E-02	3.478E-02	DCF2(6)
B-1	U-235+D	3.150E-02	3.145E-02	DCF2(7)
B-1	U-238	2.960E-02	2.960E-02	DCF2(8)
B-1	U-238+D	2.963E-02	2.960E-02	DCF2(9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	4.473E-03	4.070E-03	DCF3(1)
D-1	Pa-231	2.630E-03	2.627E-03	DCF3(2)
D-1	Pb-210+D	6.995E-03	2.553E-03	DCF3(3)
D-1	Ra-226+D	1.041E-03	1.036E-03	DCF3(4)
D-1	Th-230	7.770E-04	7.770E-04	DCF3(5)
D-1	U-234	1.810E-04	1.813E-04	DCF3(6)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-235+D	1.753E-04	1.739E-04	DCF3(7)
D-1	U-238	1.670E-04	1.665E-04	DCF3(8)
D-1	U-238+D	1.796E-04	1.665E-04	DCF3(9)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(8,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(6,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	8.092E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.010E+00	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	1.000E+02	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+02	1.000E+00	---	T(2)
R011	Times for calculations (yr)	not used	3.000E+00	---	T(3)
R011	Times for calculations (yr)	not used	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): Ac-227	1.090E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	1.090E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	2.370E+01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	2.370E+01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Th-230	2.370E+01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): U-234	2.370E+01	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.090E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	2.370E+01	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
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)	2.800E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	3.000E-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)	2.722E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E-03	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	9.990E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
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	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
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	1	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)	1.500E+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)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.961E-12	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.187E-12	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.938E-13	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.480E-13	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.904E-16	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.187E-12	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.187E-12	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.187E-12	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R017	Inhalation rate (m**3/yr)	8.000E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	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	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.830E-02	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)	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)
R018	Soil ingestion rate (g/yr)	3.650E+01	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	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
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)	1.500E-01	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)

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	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
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	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	1.500E-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

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 dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions

Area:	80920.00 square meters
Thickness:	6.01 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g

Ac-227	1.090E+00
Pa-231	1.090E+00
Pb-210	2.370E+01
Ra-226	2.370E+01
Th-230	2.370E+01
U-234	2.370E+01
U-235	1.090E+00
U-238	2.370E+01

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
TDOSE(t):	4.822E+00	4.822E+00
M(t):	1.929E-01	1.929E-01

Maximum TDOSE(t): 4.822E+00 mrem/yr at t = 16.06 ± 0.03 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 = 1.606E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	2.158E-02	0.0045	3.883E-03	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.922E-03	0.0004
Pa-231	1.843E-02	0.0038	4.311E-03	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.248E-03	0.0007
Pb-210	1.915E-03	0.0004	1.498E-03	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.617E-02	0.0137
Ra-226	4.446E+00	0.9222	3.382E-03	0.0007	2.779E-02	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.074E-02	0.0126
Th-230	3.247E-02	0.0067	2.511E-02	0.0052	2.001E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.259E-02	0.0026
U-234	1.503E-04	0.0000	2.364E-03	0.0005	1.494E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.867E-03	0.0006
U-235	1.359E-02	0.0028	9.935E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.285E-04	0.0000
U-238	6.596E-02	0.0137	2.010E-03	0.0004	2.342E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.843E-03	0.0006
Total	4.600E+00	0.9541	4.266E-02	0.0088	2.799E-02	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.505E-01	0.0312

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.606E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ac-227	0.000E+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	2.739E-02	0.0057
Pa-231	0.000E+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	2.599E-02	0.0054
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	6.959E-02	0.0144
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	4.538E+00	0.9412
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	7.038E-02	0.0146
U-234	0.000E+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	5.381E-03	0.0011
U-235	0.000E+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	1.382E-02	0.0029
U-238	0.000E+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	7.082E-02	0.0147
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	4.822E+00	1.0000

*Sum of all water independent and dependent pathways.

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-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.599E-02	0.0075	6.475E-03	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.205E-03	0.0007
Pa-231	4.021E-03	0.0008	1.719E-03	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.966E-03	0.0004
Pb-210	3.156E-03	0.0007	2.467E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.090E-01	0.0226
Ra-226	4.476E+00	0.9284	2.433E-03	0.0005	2.798E-02	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.818E-02	0.0038
Th-230	1.429E-03	0.0003	2.510E-02	0.0052	6.062E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.230E-02	0.0026
U-234	1.478E-04	0.0000	2.361E-03	0.0005	1.819E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.865E-03	0.0006
U-235	1.359E-02	0.0028	9.829E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.276E-04	0.0000
U-238	6.596E-02	0.0137	2.010E-03	0.0004	1.289E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.843E-03	0.0006
Total	4.600E+00	0.9541	4.266E-02	0.0088	2.799E-02	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.505E-01	0.0312

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	4.567E-02	0.0095
Pa-231	0.000E+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	7.707E-03	0.0016
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	1.147E-01	0.0238
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	4.525E+00	0.9384
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	3.884E-02	0.0081
U-234	0.000E+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	5.374E-03	0.0011
U-235	0.000E+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	1.381E-02	0.0029
U-238	0.000E+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	7.082E-02	0.0147
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	4.822E+00	1.0000

*Sum of all water independent and dependent pathways.

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-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	1.492E-03	0.0003	2.683E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.328E-04	0.0000
Pa-231	3.846E-02	0.0080	7.913E-03	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.030E-03	0.0010
Pb-210	1.410E-04	0.0000	1.102E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.871E-03	0.0010
Ra-226	4.289E+00	0.8896	4.614E-03	0.0010	2.680E-02	0.0056	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.183E-01	0.0245
Th-230	1.912E-01	0.0397	2.525E-02	0.0052	1.192E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.628E-02	0.0034
U-234	2.351E-04	0.0000	2.383E-03	0.0005	5.431E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.877E-03	0.0006
U-235	1.365E-02	0.0028	1.115E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.365E-04	0.0000
U-238	6.596E-02	0.0137	2.010E-03	0.0004	5.177E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.844E-03	0.0006
Total	4.600E+00	0.9541	4.266E-02	0.0088	2.799E-02	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.505E-01	0.0312

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	1.893E-03	0.0004
Pa-231	0.000E+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	5.140E-02	0.0107
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	5.122E-03	0.0011
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	4.439E+00	0.9207
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	2.339E-01	0.0485
U-234	0.000E+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	5.495E-03	0.0011
U-235	0.000E+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	1.390E-02	0.0029
U-238	0.000E+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	7.082E-02	0.0147
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	4.822E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+02
Ac-227+D	Ac-227+D	1.000E+00	4.190E-02	1.736E-03
Pa-231	Pa-231	1.000E+00	6.400E-03	6.387E-03
Pa-231	Ac-227+D	1.000E+00	6.705E-04	4.077E-02
Pa-231	∑DSR(j)		7.071E-03	4.716E-02
Pb-210+D	Pb-210+D	1.000E+00	4.838E-03	2.161E-04
Ra-226+D	Ra-226+D	1.000E+00	1.908E-01	1.828E-01
Ra-226+D	Pb-210+D	1.000E+00	7.556E-05	4.551E-03
Ra-226+D	∑DSR(j)		1.909E-01	1.873E-01
Th-230	Th-230	1.000E+00	1.597E-03	1.596E-03
Th-230	Ra-226+D	1.000E+00	4.134E-05	8.129E-03
Th-230	Pb-210+D	1.000E+00	1.094E-08	1.458E-04
Th-230	∑DSR(j)		1.639E-03	9.870E-03
U-234	U-234	1.000E+00	2.267E-04	2.267E-04
U-234	Th-230	1.000E+00	7.189E-09	1.444E-06
U-234	Ra-226+D	1.000E+00	1.241E-10	3.704E-06
U-234	Pb-210+D	1.000E+00	2.466E-14	5.310E-08
U-234	∑DSR(j)		2.267E-04	2.319E-04
U-235+D	U-235+D	1.000E+00	1.267E-02	1.267E-02
U-235+D	Pa-231	1.000E+00	6.771E-08	1.359E-05
U-235+D	Ac-227+D	1.000E+00	4.742E-09	6.333E-05
U-235+D	∑DSR(j)		1.267E-02	1.275E-02
U-238	U-238	5.400E-05	1.068E-08	1.068E-08
U-238+D	U-238+D	9.999E-01	2.988E-03	2.988E-03
U-238+D	U-234	9.999E-01	3.214E-10	6.459E-08
U-238+D	Th-230	9.999E-01	6.793E-15	2.058E-10
U-238+D	Ra-226+D	9.999E-01	8.792E-17	3.531E-10
U-238+D	Pb-210+D	9.999E-01	1.400E-20	4.244E-12
U-238+D	∑DSR(j)		2.988E-03	2.988E-03

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+02
Ac-227	5.966E+02	1.440E+04
Pa-231	3.536E+03	5.301E+02
Pb-210	5.168E+03	1.157E+05
Ra-226	1.309E+02	1.335E+02
Th-230	1.526E+04	2.533E+03
U-234	1.103E+05	1.078E+05
U-235	1.973E+03	1.961E+03
U-238	8.367E+03	8.367E+03

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 16.06 ± 0.03 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ac-227	1.090E+00	0.000E+00	4.190E-02	5.966E+02	2.513E-02	9.949E+02
Pa-231	1.090E+00	1.000E+02	4.716E-02	5.301E+02	2.384E-02	1.049E+03
Pb-210	2.370E+01	0.000E+00	4.838E-03	5.168E+03	2.936E-03	8.515E+03
Ra-226	2.370E+01	19.17 ± 0.04	1.915E-01	1.305E+02	1.915E-01	1.306E+02
Th-230	2.370E+01	1.000E+02	9.870E-03	2.533E+03	2.969E-03	8.419E+03
U-234	2.370E+01	1.000E+02	2.319E-04	1.078E+05	2.271E-04	1.101E+05
U-235	1.090E+00	1.000E+02	1.275E-02	1.961E+03	1.268E-02	1.972E+03
U-238	2.370E+01	1.000E+02	2.988E-03	8.367E+03	2.988E-03	8.367E+03

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+02
Ac-227	Ac-227	1.000E+00	4.567E-02	1.893E-03
Ac-227	Pa-231	1.000E+00	7.309E-04	4.444E-02
Ac-227	U-235	1.000E+00	5.168E-09	6.903E-05
Ac-227	∑DOSE(j)		4.641E-02	4.641E-02
Pa-231	Pa-231	1.000E+00	6.976E-03	6.961E-03
Pa-231	U-235	1.000E+00	7.380E-08	1.482E-05
Pa-231	∑DOSE(j)		6.976E-03	6.976E-03
Pb-210	Pb-210	1.000E+00	1.147E-01	5.122E-03
Pb-210	Ra-226	1.000E+00	1.791E-03	1.079E-01
Pb-210	Th-230	1.000E+00	2.593E-07	3.456E-03
Pb-210	U-234	1.000E+00	5.844E-13	1.259E-06
Pb-210	U-238	9.999E-01	3.317E-19	1.006E-10
Pb-210	∑DOSE(j)		1.164E-01	1.164E-01
Ra-226	Ra-226	1.000E+00	4.523E+00	4.331E+00
Ra-226	Th-230	1.000E+00	9.798E-04	1.926E-01
Ra-226	U-234	1.000E+00	2.940E-09	8.778E-05
Ra-226	U-238	9.999E-01	2.084E-15	8.367E-09
Ra-226	∑DOSE(j)		4.524E+00	4.524E+00
Th-230	Th-230	1.000E+00	3.786E-02	3.782E-02
Th-230	U-234	1.000E+00	1.704E-07	3.423E-05
Th-230	U-238	9.999E-01	1.610E-13	4.877E-09
Th-230	∑DOSE(j)		3.786E-02	3.786E-02
U-234	U-234	1.000E+00	5.374E-03	5.372E-03
U-234	U-238	9.999E-01	7.616E-09	1.531E-06
U-234	∑DOSE(j)		5.374E-03	5.374E-03
U-235	U-235	1.000E+00	1.381E-02	1.381E-02
U-238	U-238	5.400E-05	2.530E-07	2.530E-07
U-238	U-238	9.999E-01	7.082E-02	7.082E-02
U-238	∑DOSE(j)		7.082E-02	7.082E-02

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+02
Ac-227	Ac-227	1.000E+00	1.090E+00	4.517E-02
Ac-227	Pa-231	1.000E+00	0.000E+00	1.043E+00
Ac-227	U-235	1.000E+00	0.000E+00	1.610E-03
Ac-227	∑S(j):		1.090E+00	1.090E+00
Pa-231	Pa-231	1.000E+00	1.090E+00	1.088E+00
Pa-231	U-235	1.000E+00	0.000E+00	2.304E-03
Pa-231	∑S(j):		1.090E+00	1.090E+00
Pb-210	Pb-210	1.000E+00	2.370E+01	1.059E+00
Pb-210	Ra-226	1.000E+00	0.000E+00	2.194E+01
Pb-210	Th-230	1.000E+00	0.000E+00	6.987E-01
Pb-210	U-234	1.000E+00	0.000E+00	2.530E-04
Pb-210	U-238	9.999E-01	0.000E+00	2.011E-08
Pb-210	∑S(j):		2.370E+01	2.370E+01
Ra-226	Ra-226	1.000E+00	2.370E+01	2.270E+01
Ra-226	Th-230	1.000E+00	0.000E+00	1.004E+00
Ra-226	U-234	1.000E+00	0.000E+00	4.553E-04
Ra-226	U-238	9.999E-01	0.000E+00	4.319E-08
Ra-226	∑S(j):		2.370E+01	2.370E+01
Th-230	Th-230	1.000E+00	2.370E+01	2.368E+01
Th-230	U-234	1.000E+00	0.000E+00	2.132E-02
Th-230	U-238	9.999E-01	0.000E+00	3.023E-06
Th-230	∑S(j):		2.370E+01	2.370E+01
U-234	U-234	1.000E+00	2.370E+01	2.369E+01
U-234	U-238	9.999E-01	0.000E+00	6.718E-03
U-234	∑S(j):		2.370E+01	2.370E+01
U-235	U-235	1.000E+00	1.090E+00	1.090E+00
U-238	U-238	5.400E-05	1.280E-03	1.280E-03
U-238	U-238	9.999E-01	2.370E+01	2.370E+01
U-238	∑S(j):		2.370E+01	2.370E+01

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

RESCALC.EXE execution time = 0.50 seconds

ATTACHMENT 2:

JOINT FREQUENCY DATA FOR CAP88-PC ANALYSES

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ulp-10m

N	A	0.00255	0.00098	0.00000	0.00000	0.00000	0.00000
NNE	A	0.00145	0.00066	0.00000	0.00000	0.00000	0.00000
NE	A	0.00110	0.00047	0.00000	0.00000	0.00000	0.00000
ENE	A	0.00094	0.00043	0.00000	0.00000	0.00000	0.00000
E	A	0.00032	0.00031	0.00000	0.00000	0.00000	0.00000
ESE	A	0.00035	0.00012	0.00000	0.00000	0.00000	0.00000
SE	A	0.00020	0.00008	0.00000	0.00000	0.00000	0.00000
SSE	A	0.00024	0.00004	0.00000	0.00000	0.00000	0.00000
S	A	0.00032	0.00031	0.00000	0.00000	0.00000	0.00000
SSW	A	0.00031	0.00023	0.00000	0.00000	0.00000	0.00000
SW	A	0.00035	0.00039	0.00000	0.00000	0.00000	0.00000
WSW	A	0.00075	0.00055	0.00000	0.00000	0.00000	0.00000
W	A	0.00212	0.00094	0.00000	0.00000	0.00000	0.00000
WNW	A	0.00558	0.00277	0.00000	0.00000	0.00000	0.00000
NW	A	0.00589	0.00238	0.00000	0.00000	0.00000	0.00000
NNW	A	0.00310	0.00140	0.00000	0.00000	0.00000	0.00000
N	B	0.00511	0.00148	0.00082	0.00000	0.00000	0.00000
NNE	B	0.00462	0.00059	0.00023	0.00000	0.00000	0.00000
NE	B	0.00459	0.00066	0.00008	0.00000	0.00000	0.00000
ENE	B	0.00415	0.00070	0.00004	0.00000	0.00000	0.00000
E	B	0.00270	0.00055	0.00008	0.00000	0.00000	0.00000
ESE	B	0.00178	0.00031	0.00016	0.00000	0.00000	0.00000
SE	B	0.00122	0.00047	0.00016	0.00000	0.00000	0.00000
SSE	B	0.00136	0.00051	0.00031	0.00000	0.00000	0.00000
S	B	0.00136	0.00051	0.00105	0.00000	0.00000	0.00000
SSW	B	0.00161	0.00098	0.00332	0.00000	0.00000	0.00000
SW	B	0.00310	0.00148	0.00374	0.00000	0.00000	0.00000
WSW	B	0.00737	0.00172	0.00296	0.00000	0.00000	0.00000
W	B	0.01499	0.00238	0.00226	0.00000	0.00000	0.00000
WNW	B	0.03163	0.00452	0.00285	0.00000	0.00000	0.00000
NW	B	0.02282	0.00550	0.00328	0.00000	0.00000	0.00000
NNW	B	0.00939	0.00246	0.00215	0.00000	0.00000	0.00000
N	C	0.00000	0.00109	0.00094	0.00020	0.00004	0.00000
NNE	C	0.00000	0.00070	0.00031	0.00008	0.00000	0.00000
NE	C	0.00000	0.00074	0.00035	0.00000	0.00000	0.00000
ENE	C	0.00000	0.00117	0.00043	0.00008	0.00000	0.00000
E	C	0.00000	0.00144	0.00066	0.00004	0.00000	0.00000
ESE	C	0.00000	0.00121	0.00109	0.00004	0.00000	0.00000
SE	C	0.00000	0.00074	0.00066	0.00004	0.00000	0.00000
SSE	C	0.00000	0.00066	0.00179	0.00023	0.00004	0.00000
S	C	0.00000	0.00094	0.00296	0.00094	0.00012	0.00000
SSW	C	0.00000	0.00152	0.00698	0.00226	0.00000	0.00000
SW	C	0.00000	0.00172	0.00686	0.00304	0.00000	0.00000
WSW	C	0.00000	0.00187	0.00605	0.00179	0.00016	0.00000
W	C	0.00000	0.00265	0.00374	0.00137	0.00008	0.00000
WNW	C	0.00000	0.00636	0.00460	0.00055	0.00008	0.00000
NW	C	0.00000	0.00608	0.00589	0.00062	0.00000	0.00000
NNW	C	0.00000	0.00203	0.00351	0.00062	0.00000	0.00000
N	D	0.00091	0.00074	0.00152	0.00222	0.00008	0.00004
NNE	D	0.00059	0.00090	0.00164	0.00062	0.00004	0.00000
NE	D	0.00108	0.00074	0.00059	0.00035	0.00000	0.00000
ENE	D	0.00119	0.00117	0.00086	0.00020	0.00000	0.00000
E	D	0.00174	0.00222	0.00257	0.00101	0.00016	0.00000
ESE	D	0.00172	0.00527	0.00839	0.00363	0.00031	0.00004
SE	D	0.00231	0.00959	0.01591	0.00484	0.00055	0.00004
SSE	D	0.00157	0.00554	0.00792	0.00764	0.00144	0.00020
S	D	0.00129	0.00359	0.00975	0.01568	0.00429	0.00082
SSW	D	0.00161	0.00406	0.01022	0.01092	0.00207	0.00051
SW	D	0.00148	0.00402	0.01112	0.01018	0.00074	0.00012
WSW	D	0.00219	0.00421	0.01108	0.01229	0.00195	0.00043
W	D	0.00513	0.00558	0.00800	0.00624	0.00055	0.00004
WNW	D	0.00678	0.00909	0.00749	0.00608	0.00113	0.00012
NW	D	0.00229	0.00308	0.00675	0.00963	0.00172	0.00008

Page 1

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                                        ulp-10m
NNW D 0.001070.001370.003430.005190.000620.00008
  N E 0.000250.000200.000000.000000.000000.00000
NNE E 0.000290.000270.000000.000000.000000.00000
 NE E 0.000340.000430.000000.000000.000000.00000
ENE E 0.000260.000470.000000.000000.000000.00000
  E E 0.000390.000780.000000.000000.000000.00000
ESE E 0.000360.002220.000000.000000.000000.00000
 SE E 0.000590.005300.000000.000000.000000.00000
SSE E 0.000380.004950.000000.000000.000000.00000
  S E 0.000500.002610.000000.000000.000000.00000
SSW E 0.000600.002110.000000.000000.000000.00000
 SW E 0.000340.001640.000000.000000.000000.00000
WSW E 0.000780.002540.000000.000000.000000.00000
  W E 0.001260.005850.000000.000000.000000.00000
WNW E 0.001640.005150.000000.000000.000000.00000
 NW E 0.001060.001440.000000.000000.000000.00000
NNW E 0.000260.000470.000000.000000.000000.00000
  N F 0.002750.000080.000000.000000.000000.00000
NNE F 0.002850.000160.000000.000000.000000.00000
 NE F 0.003010.000120.000000.000000.000000.00000
ENE F 0.005130.000270.000000.000000.000000.00000
  E F 0.008050.000700.000000.000000.000000.00000
ESE F 0.012900.001170.000000.000000.000000.00000
 SE F 0.019330.002420.000000.000000.000000.00000
SSE F 0.027860.001950.000000.000000.000000.00000
  S F 0.030520.001560.000000.000000.000000.00000
SSW F 0.032520.001370.000000.000000.000000.00000
 SW F 0.035030.000780.000000.000000.000000.00000
WSW F 0.042660.001640.000000.000000.000000.00000
  W F 0.056490.003940.000000.000000.000000.00000
WNW F 0.031880.003590.000000.000000.000000.00000
 NW F 0.007830.000660.000000.000000.000000.00000
NNW F 0.004710.000310.000000.000000.000000.00000
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ATTACHMENT 3:

RADON WL, VERY LARGE WASTE-ROCK PILE, RESIDENT

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exlargRn

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Radon Individual Assessment
Dec 19, 2012 05:24 pm

Facility: ULP lease tract
Address:
City:
State: CO Zip:

Source Category: RESRAD radon flux output
Source Type: Area
Emission Year: 1995

Comments: Calculate WLs at downwind locations
Emissions of Rn from extra-large waste rock piles

Dataset Name: exlarge-rock-rn
Dataset Date: 12/19/2012 5:24:00 PM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Rn-222	G	0	0.00E+00	0.00E+00

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

DECAY CONSTANT (PER DAY) TRANSFER COEFFICIENT

Page 1

Nuclide	Radio-active (1)	Surface	Water	Milk (2)	Meat (3)
Rn-222	1.81E-01	5.48E-05	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES:

(1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Inhalation	Ingestion
Rn-222	0.00E+00	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES: (1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

DECAY CHAIN ACTIVITIES

Nuclide	Stack	Release Activity
Rn-222	1	5.2000E+01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE
Cubic centimeters/hr 9.17E+05

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SOIL PARAMETERS
     Effective surface density (kg/sq m, dry weight)
     (Assumes 15 cm plow layer)                          2.15E+02


BUILDUP TIMES
     For activity in soil (years)                        1.00E+02
     For radionuclides deposited on ground/water (days) 3.65E+02


DELAY TIMES
     Ingestion of pasture grass by animals (hr)          0.00E+00
     Ingestion of stored feed by animals (hr)            2.16E+03
     Ingestion of leafy vegetables by man (hr)           3.36E+02
     Ingestion of produce by man (hr)                    3.36E+02
     Transport time from animal feed-milk-man (day)      2.00E+00
     Time from slaughter to consumption (day)            2.00E+01


WEATHERING
     Removal rate constant for physical loss (per hr)   2.90E-03


CROP EXPOSURE DURATION
     Pasture grass (hr)                                  7.20E+02
     Crops/leafy vegetables (hr)                         1.44E+03


AGRICULTURAL PRODUCTIVITY
     Grass-cow-milk-man pathway (kg/sq m)                2.80E-01
     Produce/leafy veg for human consumption (kg/sq m)  7.16E-01


FALLOUT INTERCEPTION FRACTIONS
     Vegetables                                          2.00E-01
     Pasture                                             5.70E-01


GRAZING PARAMETERS
     Fraction of year animals graze on pasture           4.00E-01
     Fraction of daily feed that is pasture grass
     when animal grazes on pasture                       4.30E-01
```


VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

```
ANIMAL FEED CONSUMPTION FACTORS
     Contaminated feed/forage (kg/day, dry weight)       1.56E+01


DAIRY PRODUCTIVITY
     Milk production of cow (L/day)                      1.10E+01


MEAT ANIMAL SLAUGHTER PARAMETERS
     Muscle mass of animal at slaughter (kg)             2.00E+02
```

exlargRn

Fraction of herd slaughtered (per day)	3.81E-03

DECONTAMINATION

Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01

FRACTIONS GROWN IN GARDEN OF INTEREST

Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00

INGESTION RATIOS:

IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	7.00E-01
Meat	4.40E-01
Milk	4.00E-01

MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA
(Minimum fractions of food types from outside area listed below are actual fixed values.)

Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00

HUMAN FOOD UTILIZATION FACTORS

Produce ingestion (kg/y)	1.76E+02
Milk ingestion (L/y)	1.12E+02
Meat ingestion (kg/y)	8.50E+01
Leafy vegetable ingestion (kg/y)	1.80E+01

SWIMMING PARAMETERS

Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
N	500	1.291E-04	0.29	5.328E-05
N	1000	4.022E-05	0.31	1.787E-05
N	1500	2.142E-05	0.33	1.013E-05
N	2000	1.359E-05	0.35	6.776E-06
N	2500	9.513E-06	0.37	4.974E-06
N	3000	7.093E-06	0.38	3.871E-06
N	3500	5.773E-06	0.40	3.282E-06
N	4000	4.801E-06	0.41	2.839E-06
N	4500	4.080E-06	0.43	2.497E-06
N	5000	3.526E-06	0.44	2.231E-06

exlargRn

N	7500	2.008E-06	0.51	1.461E-06
N	10000	1.344E-06	0.57	1.087E-06
N	15000	8.382E-07	0.65	7.784E-07
N	20000	5.984E-07	0.70	5.967E-07
N	25000	4.597E-07	0.70	4.584E-07
N	30000	3.700E-07	0.70	3.689E-07
NNW	500	2.281E-04	0.29	9.418E-05
NNW	1000	6.987E-05	0.31	3.104E-05
NNW	1500	3.731E-05	0.33	1.764E-05
NNW	2000	2.371E-05	0.35	1.182E-05
NNW	2500	1.661E-05	0.37	8.686E-06
NNW	3000	1.240E-05	0.38	6.765E-06
NNW	3500	1.010E-05	0.40	5.745E-06
NNW	4000	8.412E-06	0.41	4.975E-06
NNW	4500	7.154E-06	0.43	4.380E-06
NNW	5000	6.188E-06	0.44	3.916E-06
NNW	7500	3.535E-06	0.51	2.571E-06
NNW	10000	2.371E-06	0.57	1.917E-06
NNW	15000	1.488E-06	0.65	1.382E-06
NNW	20000	1.066E-06	0.70	1.063E-06
NNW	25000	8.220E-07	0.70	8.196E-07
NNW	30000	6.632E-07	0.70	6.613E-07
NW	500	3.975E-04	0.29	1.641E-04
NW	1000	1.525E-04	0.31	6.778E-05
NW	1500	8.137E-05	0.33	3.848E-05
NW	2000	5.169E-05	0.35	2.577E-05
NW	2500	3.621E-05	0.37	1.893E-05
NW	3000	2.701E-05	0.38	1.474E-05
NW	3500	2.200E-05	0.40	1.251E-05
NW	4000	1.831E-05	0.41	1.083E-05
NW	4500	1.556E-05	0.43	9.528E-06
NW	5000	1.346E-05	0.44	8.517E-06
NW	7500	7.676E-06	0.51	5.585E-06
NW	10000	5.143E-06	0.57	4.158E-06
NW	15000	3.217E-06	0.65	2.987E-06

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NW	20000	2.301E-06	0.70	2.294E-06
NW	25000	1.770E-06	0.70	1.765E-06
NW	30000	1.426E-06	0.70	1.422E-06
WNW	500	3.417E-04	0.29	1.411E-04
WNW	1000	1.235E-04	0.31	5.489E-05
WNW	1500	6.563E-05	0.33	3.103E-05
WNW	2000	4.160E-05	0.35	2.074E-05
WNW	2500	2.909E-05	0.37	1.521E-05
WNW	3000	2.168E-05	0.38	1.183E-05
WNW	3500	1.762E-05	0.40	1.002E-05
WNW	4000	1.465E-05	0.41	8.662E-06
WNW	4500	1.244E-05	0.43	7.614E-06
WNW	5000	1.074E-05	0.44	6.800E-06

exlargRn

WNW	7500	6.108E-06	0.51	4.444E-06
WNW	10000	4.084E-06	0.57	3.302E-06
WNW	15000	2.541E-06	0.65	2.360E-06
WNW	20000	1.812E-06	0.70	1.806E-06
WNW	25000	1.391E-06	0.70	1.387E-06
WNW	30000	1.119E-06	0.70	1.116E-06
W	500	1.471E-04	0.29	6.071E-05
W	1000	3.959E-05	0.31	1.759E-05
W	1500	2.095E-05	0.33	9.904E-06
W	2000	1.324E-05	0.35	6.603E-06
W	2500	9.247E-06	0.37	4.835E-06
W	3000	6.883E-06	0.38	3.756E-06
W	3500	5.587E-06	0.40	3.176E-06
W	4000	4.637E-06	0.41	2.743E-06
W	4500	3.935E-06	0.43	2.408E-06
W	5000	3.396E-06	0.44	2.149E-06
W	7500	1.926E-06	0.51	1.401E-06
W	10000	1.286E-06	0.57	1.039E-06
W	15000	8.006E-07	0.65	7.435E-07
W	20000	5.710E-07	0.70	5.694E-07
W	25000	4.384E-07	0.70	4.372E-07
W	30000	3.526E-07	0.70	3.516E-07
WSW	500	6.155E-05	0.29	2.541E-05
WSW	1000	1.762E-05	0.31	7.828E-06
WSW	1500	9.295E-06	0.33	4.395E-06
WSW	2000	5.866E-06	0.35	2.925E-06
WSW	2500	4.091E-06	0.37	2.139E-06
WSW	3000	3.042E-06	0.38	1.660E-06
WSW	3500	2.467E-06	0.40	1.403E-06
WSW	4000	2.046E-06	0.41	1.210E-06
WSW	4500	1.735E-06	0.43	1.062E-06
WSW	5000	1.497E-06	0.44	9.473E-07

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
WSW	7500	8.478E-07	0.51	6.168E-07
WSW	10000	5.658E-07	0.57	4.575E-07
WSW	15000	3.534E-07	0.65	3.281E-07
WSW	20000	2.525E-07	0.70	2.518E-07
WSW	25000	1.941E-07	0.70	1.936E-07
WSW	30000	1.563E-07	0.70	1.559E-07
SW	500	4.211E-05	0.29	1.739E-05
SW	1000	1.419E-05	0.31	6.304E-06
SW	1500	7.486E-06	0.33	3.540E-06
SW	2000	4.724E-06	0.35	2.355E-06
SW	2500	3.294E-06	0.37	1.723E-06
SW	3000	2.450E-06	0.38	1.337E-06
SW	3500	1.986E-06	0.40	1.129E-06
SW	4000	1.648E-06	0.41	9.744E-07
SW	4500	1.397E-06	0.43	8.551E-07
SW	5000	1.205E-06	0.44	7.626E-07

SW	7500	6.824E-07	0.51	4.965E-07
SW	10000	4.555E-07	0.57	3.683E-07
SW	15000	2.844E-07	0.65	2.641E-07
SW	20000	2.032E-07	0.70	2.026E-07
SW	25000	1.562E-07	0.70	1.557E-07
SW	30000	1.257E-07	0.70	1.254E-07
SSW	500	3.279E-05	0.29	1.354E-05
SSW	1000	9.329E-06	0.31	4.145E-06
SSW	1500	4.857E-06	0.33	2.297E-06
SSW	2000	3.042E-06	0.35	1.516E-06
SSW	2500	2.110E-06	0.37	1.103E-06
SSW	3000	1.563E-06	0.38	8.528E-07
SSW	3500	1.261E-06	0.40	7.167E-07
SSW	4000	1.041E-06	0.41	6.159E-07
SSW	4500	8.801E-07	0.43	5.388E-07
SSW	5000	7.572E-07	0.44	4.792E-07
SSW	7500	4.254E-07	0.51	3.095E-07
SSW	10000	2.828E-07	0.57	2.287E-07
SSW	15000	1.768E-07	0.65	1.642E-07
SSW	20000	1.265E-07	0.70	1.261E-07
SSW	25000	9.734E-08	0.70	9.706E-08
SSW	30000	7.845E-08	0.70	7.823E-08
S	500	4.173E-05	0.29	1.723E-05
S	1000	1.292E-05	0.31	5.739E-06
S	1500	6.699E-06	0.33	3.168E-06
S	2000	4.186E-06	0.35	2.087E-06
S	2500	2.900E-06	0.37	1.516E-06
S	3000	2.146E-06	0.38	1.171E-06
S	3500	1.727E-06	0.40	9.816E-07

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
S	4000	1.424E-06	0.41	8.422E-07
S	4500	1.202E-06	0.43	7.357E-07
S	5000	1.033E-06	0.44	6.536E-07
S	7500	5.782E-07	0.51	4.206E-07
S	10000	3.838E-07	0.57	3.103E-07
S	15000	2.375E-07	0.65	2.205E-07
S	20000	1.688E-07	0.70	1.683E-07
S	25000	1.294E-07	0.70	1.290E-07
S	30000	1.040E-07	0.70	1.037E-07
SSE	500	6.300E-05	0.29	2.601E-05
SSE	1000	1.876E-05	0.31	8.336E-06
SSE	1500	9.685E-06	0.33	4.580E-06
SSE	2000	6.034E-06	0.35	3.008E-06
SSE	2500	4.171E-06	0.37	2.181E-06
SSE	3000	3.082E-06	0.38	1.682E-06
SSE	3500	2.473E-06	0.40	1.406E-06
SSE	4000	2.036E-06	0.41	1.204E-06
SSE	4500	1.716E-06	0.43	1.050E-06
SSE	5000	1.473E-06	0.44	9.320E-07

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SSE	7500	8.212E-07	0.51	5.974E-07
SSE	10000	5.438E-07	0.57	4.397E-07
SSE	15000	3.361E-07	0.65	3.121E-07
SSE	20000	2.387E-07	0.70	2.380E-07
SSE	25000	1.828E-07	0.70	1.823E-07
SSE	30000	1.468E-07	0.70	1.464E-07
SE	500	9.990E-05	0.29	4.125E-05
SE	1000	3.051E-05	0.31	1.355E-05
SE	1500	1.559E-05	0.33	7.372E-06
SE	2000	9.652E-06	0.35	4.812E-06
SE	2500	6.644E-06	0.37	3.474E-06
SE	3000	4.894E-06	0.38	2.671E-06
SE	3500	3.907E-06	0.40	2.222E-06
SE	4000	3.205E-06	0.41	1.896E-06
SE	4500	2.693E-06	0.43	1.648E-06
SE	5000	2.305E-06	0.44	1.458E-06
SE	7500	1.274E-06	0.51	9.269E-07
SE	10000	8.399E-07	0.57	6.791E-07
SE	15000	5.163E-07	0.65	4.794E-07
SE	20000	3.655E-07	0.70	3.644E-07
SE	25000	2.793E-07	0.70	2.785E-07
SE	30000	2.239E-07	0.70	2.233E-07
ESE	500	1.312E-04	0.29	5.418E-05
ESE	1000	4.414E-05	0.31	1.961E-05
ESE	1500	2.279E-05	0.33	1.078E-05
ESE	2000	1.420E-05	0.35	7.080E-06

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
ESE	2500	9.819E-06	0.37	5.134E-06
ESE	3000	7.256E-06	0.38	3.960E-06
ESE	3500	5.825E-06	0.40	3.312E-06
ESE	4000	4.798E-06	0.41	2.838E-06
ESE	4500	4.045E-06	0.43	2.476E-06
ESE	5000	3.472E-06	0.44	2.197E-06
ESE	7500	1.936E-06	0.51	1.409E-06
ESE	10000	1.282E-06	0.57	1.036E-06
ESE	15000	7.954E-07	0.65	7.385E-07
ESE	20000	5.665E-07	0.70	5.649E-07
ESE	25000	4.348E-07	0.70	4.336E-07
ESE	30000	3.499E-07	0.70	3.489E-07
E	500	1.211E-04	0.29	5.002E-05
E	1000	3.870E-05	0.31	1.719E-05
E	1500	2.016E-05	0.33	9.531E-06
E	2000	1.262E-05	0.35	6.294E-06
E	2500	8.760E-06	0.37	4.580E-06
E	3000	6.490E-06	0.38	3.542E-06
E	3500	5.231E-06	0.40	2.974E-06
E	4000	4.321E-06	0.41	2.556E-06
E	4500	3.651E-06	0.43	2.235E-06
E	5000	3.141E-06	0.44	1.988E-06

E	7500	1.762E-06	0.51	1.282E-06
E	10000	1.169E-06	0.57	9.451E-07
E	15000	7.276E-07	0.65	6.756E-07
E	20000	5.188E-07	0.70	5.173E-07
E	25000	3.984E-07	0.70	3.972E-07
E	30000	3.205E-07	0.70	3.196E-07
ENE	500	1.051E-04	0.29	4.340E-05
ENE	1000	3.379E-05	0.31	1.501E-05
ENE	1500	1.772E-05	0.33	8.377E-06
ENE	2000	1.114E-05	0.35	5.554E-06
ENE	2500	7.750E-06	0.37	4.052E-06
ENE	3000	5.753E-06	0.38	3.139E-06
ENE	3500	4.650E-06	0.40	2.644E-06
ENE	4000	3.849E-06	0.41	2.276E-06
ENE	4500	3.258E-06	0.43	1.994E-06
ENE	5000	2.806E-06	0.44	1.776E-06
ENE	7500	1.581E-06	0.51	1.150E-06
ENE	10000	1.052E-06	0.57	8.502E-07
ENE	15000	6.547E-07	0.65	6.080E-07
ENE	20000	4.669E-07	0.70	4.656E-07
ENE	25000	3.585E-07	0.70	3.575E-07
ENE	30000	2.884E-07	0.70	2.876E-07
NE	500	9.782E-05	0.29	4.039E-05

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NE	1000	3.137E-05	0.31	1.394E-05
NE	1500	1.654E-05	0.33	7.820E-06
NE	2000	1.043E-05	0.35	5.202E-06
NE	2500	7.275E-06	0.37	3.804E-06
NE	3000	5.409E-06	0.38	2.952E-06
NE	3500	4.380E-06	0.40	2.491E-06
NE	4000	3.631E-06	0.41	2.147E-06
NE	4500	3.076E-06	0.43	1.883E-06
NE	5000	2.652E-06	0.44	1.678E-06
NE	7500	1.498E-06	0.51	1.090E-06
NE	10000	9.976E-07	0.57	8.066E-07
NE	15000	6.165E-07	0.65	5.725E-07
NE	20000	4.377E-07	0.70	4.364E-07
NE	25000	3.350E-07	0.70	3.341E-07
NE	30000	2.689E-07	0.70	2.682E-07
NNE	500	1.041E-04	0.29	4.297E-05
NNE	1000	3.413E-05	0.31	1.517E-05
NNE	1500	1.806E-05	0.33	8.538E-06
NNE	2000	1.141E-05	0.35	5.691E-06
NNE	2500	7.969E-06	0.37	4.167E-06
NNE	3000	5.932E-06	0.38	3.237E-06
NNE	3500	4.810E-06	0.40	2.735E-06
NNE	4000	3.991E-06	0.41	2.360E-06
NNE	4500	3.384E-06	0.43	2.072E-06
NNE	5000	2.920E-06	0.44	1.848E-06

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NNE	7500	1.652E-06	0.51	1.202E-06
NNE	10000	1.102E-06	0.57	8.907E-07
NNE	15000	6.794E-07	0.65	6.309E-07
NNE	20000	4.817E-07	0.70	4.803E-07
NNE	25000	3.683E-07	0.70	3.672E-07
NNE	30000	2.953E-07	0.70	2.945E-07

ATTACHMENT 4:

CHI/Q OUTPUT, VERY LARGE WASTE-ROCK PILE, RESIDENT

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Dec 19, 2012 05:34 pm

Facility: ULP lease tracts
Address:
City:
State: CO Zip:

Source Category: Reg Guide 3.59 estimates
Source Type: Area
Emission Year: 1995

Comments: Calculate x/Qs at downwind locations
Emission of particles extra large waste rock piles

Dataset Name: exlarge-rock-par
Dataset Date: 12/19/2012 5:33:00 PM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: unspecified
SIZE: 1
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	500	1000	1500	2000	2500	3000	3500
N	1.068E-05	3.108E-06	1.574E-06	9.581E-07	6.538E-07	4.738E-07	3.729E-07
NNW	1.888E-05	5.391E-06	2.736E-06	1.667E-06	1.139E-06	8.257E-07	6.506E-07
NW	3.297E-05	1.188E-05	6.048E-06	3.697E-06	2.529E-06	1.838E-06	1.451E-06
WNW	2.840E-05	9.697E-06	4.936E-06	3.019E-06	2.067E-06	1.503E-06	1.187E-06
W	1.221E-05	3.088E-06	1.561E-06	9.507E-07	6.486E-07	4.704E-07	3.703E-07
WSW	5.091E-06	1.363E-06	6.849E-07	4.150E-07	2.822E-07	2.040E-07	1.600E-07
SW	3.481E-06	1.097E-06	5.507E-07	3.334E-07	2.267E-07	1.638E-07	1.284E-07

SSW	2.720E-06	7.290E-07	3.626E-07	2.185E-07	1.480E-07	1.067E-07	8.334E-08
S	3.477E-06	1.021E-06	5.087E-07	3.073E-07	2.085E-07	1.507E-07	1.179E-07
SSE	5.263E-06	1.489E-06	7.394E-07	4.459E-07	3.020E-07	2.181E-07	1.703E-07
SE	8.361E-06	2.450E-06	1.212E-06	7.298E-07	4.936E-07	3.566E-07	2.780E-07
ESE	1.095E-05	3.503E-06	1.741E-06	1.051E-06	7.121E-07	5.147E-07	4.022E-07
E	1.009E-05	3.055E-06	1.528E-06	9.254E-07	6.287E-07	4.549E-07	3.565E-07
ENE	8.748E-06	2.656E-06	1.334E-06	8.097E-07	5.510E-07	3.991E-07	3.132E-07
NE	8.140E-06	2.461E-06	1.242E-06	7.553E-07	5.150E-07	3.735E-07	2.936E-07
NNE	8.648E-06	2.671E-06	1.351E-06	8.229E-07	5.616E-07	4.076E-07	3.206E-07

Distance (meters)

Dir	4000	4500	5000	7500	10000	15000	20000
N	2.981E-07	2.485E-07	2.104E-07	1.055E-07	6.323E-08	3.617E-08	2.270E-08
NNW	5.204E-07	4.342E-07	3.679E-07	1.848E-07	1.108E-07	6.397E-08	4.036E-08
NW	1.164E-06	9.726E-07	8.251E-07	4.185E-07	2.532E-07	1.465E-07	9.320E-08
WNW	9.542E-07	7.973E-07	6.767E-07	3.453E-07	2.103E-07	1.215E-07	7.764E-08
W	2.965E-07	2.472E-07	2.093E-07	1.057E-07	6.379E-08	3.674E-08	2.333E-08
WSW	1.276E-07	1.062E-07	8.970E-08	4.477E-08	2.677E-08	1.539E-08	9.717E-09
SW	1.024E-07	8.510E-08	7.188E-08	3.580E-08	2.137E-08	1.227E-08	7.727E-09
SSW	6.632E-08	5.500E-08	4.637E-08	2.305E-08	1.379E-08	7.977E-09	5.083E-09
S	9.408E-08	7.808E-08	6.590E-08	3.318E-08	2.011E-08	1.156E-08	7.405E-09
SSE	1.359E-07	1.126E-07	9.498E-08	4.778E-08	2.899E-08	1.668E-08	1.072E-08
SE	2.220E-07	1.838E-07	1.549E-07	7.835E-08	4.790E-08	2.764E-08	1.794E-08
ESE	3.211E-07	2.664E-07	2.248E-07	1.132E-07	6.870E-08	3.980E-08	2.571E-08
E	2.850E-07	2.368E-07	2.001E-07	1.008E-07	6.101E-08	3.535E-08	2.272E-08
ENE	2.505E-07	2.085E-07	1.763E-07	8.885E-08	5.369E-08	3.100E-08	1.981E-08
NE	2.350E-07	1.957E-07	1.656E-07	8.363E-08	5.059E-08	2.884E-08	1.826E-08
NNE	2.568E-07	2.140E-07	1.812E-07	9.156E-08	5.538E-08	3.143E-08	1.982E-08

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: unspecified
SIZE: 1
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	25000	30000
N	1.234E-08	9.540E-09
NNW	2.184E-08	1.697E-08
NW	5.221E-08	4.060E-08
WNW	4.475E-08	3.478E-08
W	1.319E-08	1.023E-08
WSW	5.371E-09	4.166E-09
SW	4.243E-09	3.287E-09
SSW	2.884E-09	2.246E-09
S	4.373E-09	3.398E-09
SSE	6.436E-09	5.005E-09
SE	1.119E-08	8.709E-09

ESE	1.551E-08	1.209E-08
E	1.341E-08	1.044E-08
ENE	1.148E-08	8.924E-09
NE	1.047E-08	8.091E-09
NNE	1.126E-08	8.682E-09

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ATTACHMENT 5:

RADON RL, LARGE WASTE-ROCK PILE, RESIDENT

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largeRn

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Radon Individual Assessment
Sep 12, 2012 02:18 pm

Facility: ULP lease tract
Address:
City:
State: CO Zip:

Source Category: RESRAD Rn-222 flux output
Source Type: Area
Emission Year: 1995

Comments: Calculate WLs at downwind locations
Emission of Rn-222 from large waste rock piles

Dataset Name: large-rock-rn
Dataset Date: 9/12/2012 2:18:00 PM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

♀Sep 12, 2012 02:18 pm GENERAL
Page 1

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Rn-222	G	0	0.00E+00	0.00E+00

♀Sep 12, 2012 02:18 pm GENERAL
Page 2

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

DECAY CONSTANT (PER DAY) TRANSFER COEFFICIENT
Page 1

largeRn

Nuclide	Radio-active (1)	Surface	Water	Milk (2)	Meat (3)
Rn-222	1.81E-01	5.48E-05	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES:

(1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Inhalation	Ingestion
Rn-222	0.00E+00	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES: (1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

DECAY CHAIN ACTIVITIES

Nuclide	Stack	Release Activity
Rn-222	1	2.0800E+01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE
Cubic centimeters/hr 9.17E+05

largeRn

SOIL PARAMETERS	
Effective surface density (kg/sq m, dry weight) (Assumes 15 cm plow layer)	2.15E+02
BUILDUP TIMES	
For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+02
DELAY TIMES	
Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01
WEATHERING	
Removal rate constant for physical loss (per hr)	2.90E-03
CROP EXPOSURE DURATION	
Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03
AGRICULTURAL PRODUCTIVITY	
Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01
FALLOUT INTERCEPTION FRACTIONS	
Vegetables	2.00E-01
Pasture	5.70E-01
GRAZING PARAMETERS	
Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass when animal grazes on pasture	4.30E-01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS	
Contaminated feed/forage (kg/day, dry weight)	1.56E+01
DAIRY PRODUCTIVITY	
Milk production of cow (L/day)	1.10E+01
MEAT ANIMAL SLAUGHTER PARAMETERS	
Muscle mass of animal at slaughter (kg)	2.00E+02

largeRn

Fraction of herd slaughtered (per day)	3.81E-03

DECONTAMINATION

Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01

FRACTIONS GROWN IN GARDEN OF INTEREST

Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00

INGESTION RATIOS:

IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	7.00E-01
Meat	4.40E-01
Milk	4.00E-01

MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA
(Minimum fractions of food types from outside area listed below are actual fixed values.)

Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00

HUMAN FOOD UTILIZATION FACTORS

Produce ingestion (kg/y)	1.76E+02
Milk ingestion (L/y)	1.12E+02
Meat ingestion (kg/y)	8.50E+01
Leafy vegetable ingestion (kg/y)	1.80E+01

SWIMMING PARAMETERS

Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
N	500	1.629E-05	0.29	6.726E-06
N	1000	1.137E-05	0.31	5.051E-06
N	1500	6.949E-06	0.33	3.286E-06
N	2000	4.696E-06	0.35	2.341E-06
N	2500	3.406E-06	0.37	1.781E-06
N	3000	2.597E-06	0.38	1.417E-06
N	3500	2.131E-06	0.40	1.212E-06
N	4000	1.786E-06	0.41	1.056E-06
N	4500	1.526E-06	0.43	9.343E-07
N	5000	1.326E-06	0.44	8.390E-07

largeRn

N	7500	7.670E-07	0.51	5.580E-07
N	10000	5.179E-07	0.57	4.187E-07
N	15000	3.240E-07	0.65	3.008E-07
N	20000	2.317E-07	0.70	2.310E-07
N	25000	1.783E-07	0.70	1.778E-07
N	30000	1.436E-07	0.70	1.432E-07
NNW	500	2.560E-05	0.29	1.057E-05
NNW	1000	1.942E-05	0.31	8.628E-06
NNW	1500	1.200E-05	0.33	5.673E-06
NNW	2000	8.144E-06	0.35	4.060E-06
NNW	2500	5.922E-06	0.37	3.096E-06
NNW	3000	4.525E-06	0.38	2.469E-06
NNW	3500	3.719E-06	0.40	2.115E-06
NNW	4000	3.120E-06	0.41	1.845E-06
NNW	4500	2.670E-06	0.43	1.635E-06
NNW	5000	2.322E-06	0.44	1.469E-06
NNW	7500	1.348E-06	0.51	9.808E-07
NNW	10000	9.125E-07	0.57	7.378E-07
NNW	15000	5.745E-07	0.65	5.335E-07
NNW	20000	4.127E-07	0.70	4.115E-07
NNW	25000	3.185E-07	0.70	3.176E-07
NNW	30000	2.573E-07	0.70	2.566E-07
NW	500	6.022E-05	0.29	2.486E-05
NW	1000	4.299E-05	0.31	1.910E-05
NW	1500	2.637E-05	0.33	1.247E-05
NW	2000	1.785E-05	0.35	8.898E-06
NW	2500	1.296E-05	0.37	6.775E-06
NW	3000	9.889E-06	0.38	5.396E-06
NW	3500	8.120E-06	0.40	4.617E-06
NW	4000	6.808E-06	0.41	4.026E-06
NW	4500	5.823E-06	0.43	3.564E-06
NW	5000	5.060E-06	0.44	3.202E-06
NW	7500	2.933E-06	0.51	2.133E-06
NW	10000	1.982E-06	0.57	1.603E-06
NW	15000	1.244E-06	0.65	1.155E-06

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NW	20000	8.911E-07	0.70	8.885E-07
NW	25000	6.865E-07	0.70	6.845E-07
NW	30000	5.537E-07	0.70	5.521E-07
WNW	500	5.616E-05	0.29	2.319E-05
WNW	1000	3.573E-05	0.31	1.587E-05
WNW	1500	2.157E-05	0.33	1.020E-05
WNW	2000	1.450E-05	0.35	7.227E-06
WNW	2500	1.048E-05	0.37	5.481E-06
WNW	3000	7.980E-06	0.38	4.355E-06
WNW	3500	6.535E-06	0.40	3.716E-06
WNW	4000	5.469E-06	0.41	3.235E-06
WNW	4500	4.671E-06	0.43	2.859E-06
WNW	5000	4.054E-06	0.44	2.565E-06

largeRn

WNW	7500	2.339E-06	0.51	1.702E-06
WNW	10000	1.577E-06	0.57	1.275E-06
WNW	15000	9.839E-07	0.65	9.136E-07
WNW	20000	7.027E-07	0.70	7.007E-07
WNW	25000	5.402E-07	0.70	5.386E-07
WNW	30000	4.350E-07	0.70	4.338E-07
W	500	1.857E-05	0.29	7.668E-06
W	1000	1.148E-05	0.31	5.100E-06
W	1500	6.888E-06	0.33	3.257E-06
W	2000	4.615E-06	0.35	2.301E-06
W	2500	3.331E-06	0.37	1.742E-06
W	3000	2.532E-06	0.38	1.382E-06
W	3500	2.071E-06	0.40	1.177E-06
W	4000	1.731E-06	0.41	1.024E-06
W	4500	1.477E-06	0.43	9.040E-07
W	5000	1.281E-06	0.44	8.105E-07
W	7500	7.370E-07	0.51	5.362E-07
W	10000	4.961E-07	0.57	4.012E-07
W	15000	3.099E-07	0.65	2.877E-07
W	20000	2.214E-07	0.70	2.208E-07
W	25000	1.702E-07	0.70	1.697E-07
W	30000	1.371E-07	0.70	1.367E-07
WSW	500	8.401E-06	0.29	3.468E-06
WSW	1000	5.110E-06	0.31	2.270E-06
WSW	1500	3.054E-06	0.33	1.444E-06
WSW	2000	2.043E-06	0.35	1.018E-06
WSW	2500	1.473E-06	0.37	7.700E-07
WSW	3000	1.119E-06	0.38	6.104E-07
WSW	3500	9.138E-07	0.40	5.196E-07
WSW	4000	7.632E-07	0.41	4.514E-07
WSW	4500	6.508E-07	0.43	3.984E-07
WSW	5000	5.640E-07	0.44	3.570E-07

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
WSW	7500	3.243E-07	0.51	2.359E-07
WSW	10000	2.183E-07	0.57	1.765E-07
WSW	15000	1.367E-07	0.65	1.269E-07
WSW	20000	9.787E-08	0.70	9.759E-08
WSW	25000	7.535E-08	0.70	7.513E-08
WSW	30000	6.074E-08	0.70	6.057E-08
SW	500	6.723E-06	0.29	2.776E-06
SW	1000	4.108E-06	0.31	1.825E-06
SW	1500	2.458E-06	0.33	1.162E-06
SW	2000	1.644E-06	0.35	8.196E-07
SW	2500	1.185E-06	0.37	6.197E-07
SW	3000	9.004E-07	0.38	4.913E-07
SW	3500	7.355E-07	0.40	4.182E-07
SW	4000	6.143E-07	0.41	3.633E-07
SW	4500	5.238E-07	0.43	3.206E-07
SW	5000	4.540E-07	0.44	2.873E-07

largeRn

SW	7500	2.610E-07	0.51	1.899E-07
SW	10000	1.757E-07	0.57	1.420E-07
SW	15000	1.100E-07	0.65	1.022E-07
SW	20000	7.875E-08	0.70	7.852E-08
SW	25000	6.062E-08	0.70	6.044E-08
SW	30000	4.885E-08	0.70	4.871E-08
SSW	500	5.260E-06	0.29	2.171E-06
SSW	1000	2.782E-06	0.31	1.236E-06
SSW	1500	1.618E-06	0.33	7.650E-07
SSW	2000	1.068E-06	0.35	5.324E-07
SSW	2500	7.637E-07	0.37	3.993E-07
SSW	3000	5.769E-07	0.38	3.148E-07
SSW	3500	4.685E-07	0.40	2.664E-07
SSW	4000	3.895E-07	0.41	2.303E-07
SSW	4500	3.309E-07	0.43	2.025E-07
SSW	5000	2.859E-07	0.44	1.809E-07
SSW	7500	1.629E-07	0.51	1.185E-07
SSW	10000	1.092E-07	0.57	8.827E-08
SSW	15000	6.846E-08	0.65	6.357E-08
SSW	20000	4.906E-08	0.70	4.892E-08
SSW	25000	3.781E-08	0.70	3.770E-08
SSW	30000	3.050E-08	0.70	3.042E-08
S	500	8.265E-06	0.29	3.412E-06
S	1000	3.979E-06	0.31	1.768E-06
S	1500	2.274E-06	0.33	1.075E-06
S	2000	1.489E-06	0.35	7.424E-07
S	2500	1.060E-06	0.37	5.542E-07
S	3000	7.984E-07	0.38	4.357E-07
S	3500	6.462E-07	0.40	3.674E-07

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
S	4000	5.360E-07	0.41	3.170E-07
S	4500	4.544E-07	0.43	2.782E-07
S	5000	3.920E-07	0.44	2.481E-07
S	7500	2.223E-07	0.51	1.617E-07
S	10000	1.486E-07	0.57	1.202E-07
S	15000	9.217E-08	0.65	8.559E-08
S	20000	6.563E-08	0.70	6.544E-08
S	25000	5.036E-08	0.70	5.021E-08
S	30000	4.051E-08	0.70	4.039E-08
SSE	500	1.294E-05	0.29	5.341E-06
SSE	1000	5.884E-06	0.31	2.614E-06
SSE	1500	3.322E-06	0.33	1.571E-06
SSE	2000	2.161E-06	0.35	1.077E-06
SSE	2500	1.532E-06	0.37	8.013E-07
SSE	3000	1.151E-06	0.38	6.282E-07
SSE	3500	9.289E-07	0.40	5.282E-07
SSE	4000	7.689E-07	0.41	4.547E-07
SSE	4500	6.507E-07	0.43	3.983E-07
SSE	5000	5.604E-07	0.44	3.547E-07

largeRn

SSE	7500	3.163E-07	0.51	2.301E-07
SSE	10000	2.109E-07	0.57	1.705E-07
SSE	15000	1.306E-07	0.65	1.213E-07
SSE	20000	9.291E-08	0.70	9.265E-08
SSE	25000	7.124E-08	0.70	7.104E-08
SSE	30000	5.728E-08	0.70	5.711E-08
SE	500	2.402E-05	0.29	9.919E-06
SE	1000	9.902E-06	0.31	4.399E-06
SE	1500	5.454E-06	0.33	2.579E-06
SE	2000	3.504E-06	0.35	1.747E-06
SE	2500	2.466E-06	0.37	1.289E-06
SE	3000	1.843E-06	0.38	1.005E-06
SE	3500	1.478E-06	0.40	8.403E-07
SE	4000	1.218E-06	0.41	7.203E-07
SE	4500	1.027E-06	0.43	6.286E-07
SE	5000	8.816E-07	0.44	5.579E-07
SE	7500	4.926E-07	0.51	3.583E-07
SE	10000	3.267E-07	0.57	2.641E-07
SE	15000	2.012E-07	0.65	1.868E-07
SE	20000	1.426E-07	0.70	1.422E-07
SE	25000	1.091E-07	0.70	1.088E-07
SE	30000	8.753E-08	0.70	8.728E-08
ESE	500	3.025E-05	0.29	1.249E-05
ESE	1000	1.383E-05	0.31	6.143E-06
ESE	1500	7.810E-06	0.33	3.693E-06
ESE	2000	5.084E-06	0.35	2.535E-06

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
ESE	2500	3.606E-06	0.37	1.886E-06
ESE	3000	2.710E-06	0.38	1.479E-06
ESE	3500	2.187E-06	0.40	1.244E-06
ESE	4000	1.811E-06	0.41	1.071E-06
ESE	4500	1.533E-06	0.43	9.387E-07
ESE	5000	1.321E-06	0.44	8.361E-07
ESE	7500	7.456E-07	0.51	5.424E-07
ESE	10000	4.969E-07	0.57	4.018E-07
ESE	15000	3.091E-07	0.65	2.870E-07
ESE	20000	2.205E-07	0.70	2.199E-07
ESE	25000	1.695E-07	0.70	1.690E-07
ESE	30000	1.365E-07	0.70	1.361E-07
E	500	2.334E-05	0.29	9.637E-06
E	1000	1.177E-05	0.31	5.229E-06
E	1500	6.796E-06	0.33	3.213E-06
E	2000	4.471E-06	0.35	2.229E-06
E	2500	3.192E-06	0.37	1.669E-06
E	3000	2.409E-06	0.38	1.315E-06
E	3500	1.954E-06	0.40	1.111E-06
E	4000	1.623E-06	0.41	9.602E-07
E	4500	1.378E-06	0.43	8.438E-07
E	5000	1.191E-06	0.44	7.535E-07

largeRn

E	7500	6.766E-07	0.51	4.922E-07
E	10000	4.523E-07	0.57	3.657E-07
E	15000	2.822E-07	0.65	2.621E-07
E	20000	2.016E-07	0.70	2.010E-07
E	25000	1.550E-07	0.70	1.546E-07
E	30000	1.248E-07	0.70	1.245E-07
ENE	500	1.869E-05	0.29	7.716E-06
ENE	1000	1.010E-05	0.31	4.489E-06
ENE	1500	5.920E-06	0.33	2.799E-06
ENE	2000	3.922E-06	0.35	1.956E-06
ENE	2500	2.812E-06	0.37	1.470E-06
ENE	3000	2.129E-06	0.38	1.162E-06
ENE	3500	1.732E-06	0.40	9.848E-07
ENE	4000	1.443E-06	0.41	8.532E-07
ENE	4500	1.227E-06	0.43	7.513E-07
ENE	5000	1.062E-06	0.44	6.719E-07
ENE	7500	6.064E-07	0.51	4.412E-07
ENE	10000	4.065E-07	0.57	3.287E-07
ENE	15000	2.538E-07	0.65	2.357E-07
ENE	20000	1.813E-07	0.70	1.808E-07
ENE	25000	1.394E-07	0.70	1.390E-07
ENE	30000	1.123E-07	0.70	1.119E-07
NE	500	1.663E-05	0.29	6.866E-06

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NE	1000	9.329E-06	0.31	4.145E-06
NE	1500	5.515E-06	0.33	2.608E-06
NE	2000	3.670E-06	0.35	1.830E-06
NE	2500	2.639E-06	0.37	1.380E-06
NE	3000	2.001E-06	0.38	1.092E-06
NE	3500	1.632E-06	0.40	9.277E-07
NE	4000	1.361E-06	0.41	8.049E-07
NE	4500	1.159E-06	0.43	7.095E-07
NE	5000	1.004E-06	0.44	6.352E-07
NE	7500	5.748E-07	0.51	4.181E-07
NE	10000	3.858E-07	0.57	3.119E-07
NE	15000	2.390E-07	0.65	2.219E-07
NE	20000	1.699E-07	0.70	1.695E-07
NE	25000	1.303E-07	0.70	1.299E-07
NE	30000	1.047E-07	0.70	1.044E-07
NNE	500	1.725E-05	0.29	7.120E-06
NNE	1000	1.007E-05	0.31	4.473E-06
NNE	1500	5.997E-06	0.33	2.836E-06
NNE	2000	4.005E-06	0.35	1.997E-06
NNE	2500	2.886E-06	0.37	1.509E-06
NNE	3000	2.192E-06	0.38	1.196E-06
NNE	3500	1.790E-06	0.40	1.018E-06
NNE	4000	1.495E-06	0.41	8.840E-07
NNE	4500	1.274E-06	0.43	7.800E-07
NNE	5000	1.104E-06	0.44	6.988E-07

largeRn

NNE	7500	6.338E-07	0.51	4.611E-07
NNE	10000	4.259E-07	0.57	3.443E-07
NNE	15000	2.633E-07	0.65	2.445E-07
NNE	20000	1.870E-07	0.70	1.864E-07
NNE	25000	1.431E-07	0.70	1.427E-07
NNE	30000	1.149E-07	0.70	1.146E-07

ATTACHMENT 6:

CHI/Q OUTPUT, LARGE WASTE-ROCK PILE, RESIDENT

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largepar

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Sep 12, 2012 02:31 pm

Facility: ULP lease tract
Address:
City:
State: CO Zip:

Source Category: Reg Guide 3.59 estimates
Source Type: Area
Emission Year: 1995

Comments: Calculate x/Qs at downwind locations
Emission of particles from large waste rock piles

Dataset Name: large-rock-par
Dataset Date: 9/12/2012 2:31:00 PM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: unspecified
SIZE: 1
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	500	1000	1500	2000	2500	3000	3500
N	3.505E-06	2.369E-06	1.396E-06	9.112E-07	6.456E-07	4.796E-07	3.819E-07
NNW	5.505E-06	4.044E-06	2.407E-06	1.578E-06	1.121E-06	8.339E-07	6.651E-07
NW	1.295E-05	8.978E-06	5.322E-06	3.488E-06	2.478E-06	1.846E-06	1.474E-06
WNW	1.207E-05	7.477E-06	4.374E-06	2.855E-06	2.023E-06	1.506E-06	1.202E-06
W	3.979E-06	2.394E-06	1.390E-06	9.028E-07	6.379E-07	4.736E-07	3.768E-07
WSW	1.797E-06	1.063E-06	6.130E-07	3.964E-07	2.793E-07	2.067E-07	1.640E-07
SW	1.439E-06	8.543E-07	4.930E-07	3.187E-07	2.245E-07	1.661E-07	1.317E-07

SSW	1.125E-06	5.808E-07	3.269E-07	2.091E-07	1.463E-07	1.079E-07	8.516E-08
S	1.770E-06	8.336E-07	4.630E-07	2.949E-07	2.059E-07	1.518E-07	1.198E-07
SSE	2.772E-06	1.234E-06	6.779E-07	4.295E-07	2.989E-07	2.199E-07	1.732E-07
SE	5.146E-06	2.083E-06	1.121E-06	7.044E-07	4.877E-07	3.580E-07	2.813E-07
ESE	6.475E-06	2.898E-06	1.593E-06	1.010E-06	7.037E-07	5.181E-07	4.084E-07
E	5.000E-06	2.465E-06	1.382E-06	8.845E-07	6.194E-07	4.575E-07	3.619E-07
ENE	4.009E-06	2.114E-06	1.201E-06	7.729E-07	5.430E-07	4.018E-07	3.185E-07
NE	3.578E-06	1.954E-06	1.119E-06	7.225E-07	5.088E-07	3.770E-07	2.993E-07
NNE	3.713E-06	2.108E-06	1.215E-06	7.869E-07	5.551E-07	4.117E-07	3.273E-07

Distance (meters)

Dir	4000	4500	5000	7500	10000	15000	20000
N	3.090E-07	2.594E-07	2.209E-07	1.133E-07	6.879E-08	3.953E-08	2.489E-08
NNW	5.387E-07	4.527E-07	3.859E-07	1.985E-07	1.207E-07	6.996E-08	4.428E-08
NW	1.197E-06	1.007E-06	8.590E-07	4.456E-07	2.730E-07	1.586E-07	1.012E-07
WNW	9.769E-07	8.214E-07	7.009E-07	3.652E-07	2.249E-07	1.304E-07	8.358E-08
W	3.052E-07	2.560E-07	2.180E-07	1.125E-07	6.870E-08	3.972E-08	2.529E-08
WSW	1.323E-07	1.108E-07	9.415E-08	4.805E-08	2.910E-08	1.679E-08	1.063E-08
SW	1.062E-07	8.891E-08	7.553E-08	3.848E-08	2.327E-08	1.341E-08	8.466E-09
SSW	6.852E-08	5.719E-08	4.848E-08	2.463E-08	1.491E-08	8.654E-09	5.525E-09
S	9.660E-08	8.063E-08	6.838E-08	3.507E-08	2.147E-08	1.239E-08	7.950E-09
SSE	1.395E-07	1.162E-07	9.846E-08	5.041E-08	3.087E-08	1.782E-08	1.147E-08
SE	2.263E-07	1.883E-07	1.593E-07	8.184E-08	5.044E-08	2.919E-08	1.897E-08
ESE	3.291E-07	2.745E-07	2.327E-07	1.193E-07	7.308E-08	4.247E-08	2.746E-08
E	2.922E-07	2.442E-07	2.074E-07	1.066E-07	6.515E-08	3.787E-08	2.439E-08
ENE	2.575E-07	2.155E-07	1.832E-07	9.420E-08	5.755E-08	3.335E-08	2.136E-08
NE	2.421E-07	2.029E-07	1.726E-07	8.885E-08	5.431E-08	3.110E-08	1.973E-08
NNE	2.649E-07	2.221E-07	1.890E-07	9.742E-08	5.955E-08	3.395E-08	2.145E-08

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: unspecified
SIZE: 1
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	25000	30000
N	1.370E-08	1.061E-08
NNW	2.433E-08	1.893E-08
NW	5.737E-08	4.466E-08
WNW	4.865E-08	3.786E-08
W	1.445E-08	1.122E-08
WSW	5.941E-09	4.613E-09
SW	4.703E-09	3.648E-09
SSW	3.163E-09	2.465E-09
S	4.722E-09	3.672E-09
SSE	6.911E-09	5.378E-09
SE	1.186E-08	9.237E-09

ESE	1.664E-08	1.299E-08
E	1.448E-08	1.129E-08
ENE	1.247E-08	9.705E-09
NE	1.140E-08	8.817E-09
NNE	1.229E-08	9.482E-09

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ATTACHMENT 7:

RADON WL, MEDIUM WASTE-ROCK PILE, RESIDENT

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medRn

♀

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Radon Individual Assessment
Sep 12, 2012 01:49 pm

Facility: ULP lease tracts
Address:
City:
State: CO Zip:

Source Category: RESRAD radon flux output
Source Type: Area
Emission Year: 1995

Comments: Calculate WLs at downwind locations
Emission of Rn-222 from medium waste rock piles

Dataset Name: medium-rock-rn
Dataset Date: 9/12/2012 1:49:00 PM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

♀Sep 12, 2012 01:49 pm GENERAL
Page 1

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Rn-222	G	0	0.00E+00	0.00E+00

♀Sep 12, 2012 01:49 pm GENERAL
Page 2

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

DECAY CONSTANT (PER DAY) TRANSFER COEFFICIENT

Page 1

Nuclide	Radio-active (1)	Surface	Water	Milk (2)	Meat (3)
Rn-222	1.81E-01	5.48E-05	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES:

(1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Inhalation	Ingestion
Rn-222	0.00E+00	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES:

(1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

DECAY CHAIN ACTIVITIES

Nuclide	Stack	Release Activity
Rn-222	1	1.5600E+01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE
Cubic centimeters/hr 9.17E+05

SOIL PARAMETERS

Effective surface density (kg/sq m, dry weight) (Assumes 15 cm plow layer)	2.15E+02

BUILDUP TIMES

For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+02

DELAY TIMES

Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01

WEATHERING

Removal rate constant for physical loss (per hr)	2.90E-03

CROP EXPOSURE DURATION

Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03

AGRICULTURAL PRODUCTIVITY

Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01

FALLOUT INTERCEPTION FRACTIONS

Vegetables	2.00E-01
Pasture	5.70E-01

GRAZING PARAMETERS

Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass when animal grazes on pasture	4.30E-01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS

Contaminated feed/forage (kg/day, dry weight)	1.56E+01

DAIRY PRODUCTIVITY

Milk production of cow (L/day)	1.10E+01

MEAT ANIMAL SLAUGHTER PARAMETERS

Muscle mass of animal at slaughter (kg)	2.00E+02

medRn

Fraction of herd slaughtered (per day)	3.81E-03

DECONTAMINATION

Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01

FRACTIONS GROWN IN GARDEN OF INTEREST

Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00

INGESTION RATIOS:

IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	7.00E-01
Meat	4.40E-01
Milk	4.00E-01

MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA
(Minimum fractions of food types from outside area listed below are actual fixed values.)

Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00

HUMAN FOOD UTILIZATION FACTORS

Produce ingestion (kg/y)	1.76E+02
Milk ingestion (L/y)	1.12E+02
Meat ingestion (kg/y)	8.50E+01
Leafy vegetable ingestion (kg/y)	1.80E+01

SWIMMING PARAMETERS

Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
N	500	2.521E-05	0.29	1.041E-05
N	1000	1.089E-05	0.31	4.839E-06
N	1500	6.043E-06	0.33	2.858E-06
N	2000	3.906E-06	0.35	1.948E-06
N	2500	2.763E-06	0.37	1.445E-06
N	3000	2.074E-06	0.38	1.132E-06
N	3500	1.692E-06	0.40	9.619E-07
N	4000	1.410E-06	0.41	8.340E-07
N	4500	1.200E-06	0.43	7.347E-07
N	5000	1.039E-06	0.44	6.575E-07

medRn

N	7500	5.943E-07	0.51	4.324E-07
N	10000	3.988E-07	0.57	3.225E-07
N	15000	2.490E-07	0.65	2.312E-07
N	20000	1.778E-07	0.70	1.773E-07
N	25000	1.367E-07	0.70	1.363E-07
N	30000	1.100E-07	0.70	1.097E-07
NNW	500	4.256E-05	0.29	1.757E-05
NNW	1000	1.884E-05	0.31	8.370E-06
NNW	1500	1.050E-05	0.33	4.966E-06
NNW	2000	6.804E-06	0.35	3.392E-06
NNW	2500	4.820E-06	0.37	2.520E-06
NNW	3000	3.621E-06	0.38	1.976E-06
NNW	3500	2.959E-06	0.40	1.682E-06
NNW	4000	2.469E-06	0.41	1.460E-06
NNW	4500	2.104E-06	0.43	1.288E-06
NNW	5000	1.822E-06	0.44	1.153E-06
NNW	7500	1.046E-06	0.51	7.608E-07
NNW	10000	7.033E-07	0.57	5.687E-07
NNW	15000	4.418E-07	0.65	4.102E-07
NNW	20000	3.169E-07	0.70	3.160E-07
NNW	25000	2.443E-07	0.70	2.436E-07
NNW	30000	1.972E-07	0.70	1.966E-07
NW	500	9.504E-05	0.29	3.924E-05
NW	1000	4.128E-05	0.31	1.834E-05
NW	1500	2.295E-05	0.33	1.085E-05
NW	2000	1.486E-05	0.35	7.406E-06
NW	2500	1.051E-05	0.37	5.498E-06
NW	3000	7.897E-06	0.38	4.310E-06
NW	3500	6.447E-06	0.40	3.665E-06
NW	4000	5.377E-06	0.41	3.180E-06
NW	4500	4.579E-06	0.43	2.803E-06
NW	5000	3.965E-06	0.44	2.510E-06
NW	7500	2.272E-06	0.51	1.653E-06
NW	10000	1.526E-06	0.57	1.234E-06
NW	15000	9.556E-07	0.65	8.873E-07

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NW	20000	6.838E-07	0.70	6.818E-07
NW	25000	5.262E-07	0.70	5.247E-07
NW	30000	4.241E-07	0.70	4.229E-07
WNW	500	8.045E-05	0.29	3.321E-05
WNW	1000	3.367E-05	0.31	1.496E-05
WNW	1500	1.859E-05	0.33	8.788E-06
WNW	2000	1.199E-05	0.35	5.976E-06
WNW	2500	8.466E-06	0.37	4.426E-06
WNW	3000	6.349E-06	0.38	3.465E-06
WNW	3500	5.171E-06	0.40	2.940E-06
WNW	4000	4.307E-06	0.41	2.547E-06
WNW	4500	3.663E-06	0.43	2.243E-06
WNW	5000	3.169E-06	0.44	2.006E-06

medRn

WNW	7500	1.809E-06	0.51	1.316E-06
WNW	10000	1.213E-06	0.57	9.805E-07
WNW	15000	7.552E-07	0.65	7.012E-07
WNW	20000	5.386E-07	0.70	5.371E-07
WNW	25000	4.137E-07	0.70	4.125E-07
WNW	30000	3.329E-07	0.70	3.319E-07
W	500	2.605E-05	0.29	1.075E-05
W	1000	1.079E-05	0.31	4.795E-06
W	1500	5.932E-06	0.33	2.805E-06
W	2000	3.816E-06	0.35	1.902E-06
W	2500	2.691E-06	0.37	1.407E-06
W	3000	2.015E-06	0.38	1.100E-06
W	3500	1.639E-06	0.40	9.320E-07
W	4000	1.363E-06	0.41	8.064E-07
W	4500	1.159E-06	0.43	7.093E-07
W	5000	1.001E-06	0.44	6.338E-07
W	7500	5.703E-07	0.51	4.149E-07
W	10000	3.817E-07	0.57	3.086E-07
W	15000	2.379E-07	0.65	2.209E-07
W	20000	1.698E-07	0.70	1.693E-07
W	25000	1.304E-07	0.70	1.300E-07
W	30000	1.049E-07	0.70	1.046E-07
WSW	500	1.166E-05	0.29	4.814E-06
WSW	1000	4.804E-06	0.31	2.134E-06
WSW	1500	2.632E-06	0.33	1.244E-06
WSW	2000	1.690E-06	0.35	8.425E-07
WSW	2500	1.190E-06	0.37	6.222E-07
WSW	3000	8.905E-07	0.38	4.860E-07
WSW	3500	7.237E-07	0.40	4.115E-07
WSW	4000	6.015E-07	0.41	3.557E-07
WSW	4500	5.108E-07	0.43	3.127E-07
WSW	5000	4.413E-07	0.44	2.793E-07

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
WSW	7500	2.510E-07	0.51	1.826E-07
WSW	10000	1.680E-07	0.57	1.358E-07
WSW	15000	1.050E-07	0.65	9.749E-08
WSW	20000	7.506E-08	0.70	7.484E-08
WSW	25000	5.773E-08	0.70	5.756E-08
WSW	30000	4.650E-08	0.70	4.637E-08
SW	500	9.369E-06	0.29	3.868E-06
SW	1000	3.867E-06	0.31	1.718E-06
SW	1500	2.119E-06	0.33	1.002E-06
SW	2000	1.361E-06	0.35	6.784E-07
SW	2500	9.582E-07	0.37	5.010E-07
SW	3000	7.170E-07	0.38	3.913E-07
SW	3500	5.827E-07	0.40	3.313E-07
SW	4000	4.842E-07	0.41	2.864E-07
SW	4500	4.113E-07	0.43	2.517E-07
SW	5000	3.553E-07	0.44	2.248E-07

medRn

SW	7500	2.021E-07	0.51	1.470E-07
SW	10000	1.352E-07	0.57	1.093E-07
SW	15000	8.450E-08	0.65	7.847E-08
SW	20000	6.040E-08	0.70	6.023E-08
SW	25000	4.645E-08	0.70	4.631E-08
SW	30000	3.740E-08	0.70	3.730E-08
SSW	500	6.559E-06	0.29	2.708E-06
SSW	1000	2.563E-06	0.31	1.139E-06
SSW	1500	1.380E-06	0.33	6.527E-07
SSW	2000	8.782E-07	0.35	4.378E-07
SSW	2500	6.147E-07	0.37	3.214E-07
SSW	3000	4.580E-07	0.38	2.499E-07
SSW	3500	3.701E-07	0.40	2.105E-07
SSW	4000	3.064E-07	0.41	1.812E-07
SSW	4500	2.593E-07	0.43	1.587E-07
SSW	5000	2.234E-07	0.44	1.414E-07
SSW	7500	1.260E-07	0.51	9.167E-08
SSW	10000	8.397E-08	0.57	6.789E-08
SSW	15000	5.255E-08	0.65	4.880E-08
SSW	20000	3.761E-08	0.70	3.750E-08
SSW	25000	2.895E-08	0.70	2.887E-08
SSW	30000	2.334E-08	0.70	2.328E-08
S	500	9.537E-06	0.29	3.937E-06
S	1000	3.581E-06	0.31	1.591E-06
S	1500	1.914E-06	0.33	9.052E-07
S	2000	1.213E-06	0.35	6.048E-07
S	2500	8.472E-07	0.37	4.430E-07
S	3000	6.302E-07	0.38	3.439E-07
S	3500	5.080E-07	0.40	2.888E-07

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
S	4000	4.197E-07	0.41	2.482E-07
S	4500	3.547E-07	0.43	2.171E-07
S	5000	3.051E-07	0.44	1.931E-07
S	7500	1.715E-07	0.51	1.247E-07
S	10000	1.140E-07	0.57	9.222E-08
S	15000	7.062E-08	0.65	6.557E-08
S	20000	5.022E-08	0.70	5.008E-08
S	25000	3.851E-08	0.70	3.840E-08
S	30000	3.095E-08	0.70	3.086E-08
SSE	500	1.431E-05	0.29	5.908E-06
SSE	1000	5.227E-06	0.31	2.322E-06
SSE	1500	2.775E-06	0.33	1.312E-06
SSE	2000	1.752E-06	0.35	8.735E-07
SSE	2500	1.220E-06	0.37	6.381E-07
SSE	3000	9.062E-07	0.38	4.945E-07
SSE	3500	7.284E-07	0.40	4.142E-07
SSE	4000	6.007E-07	0.41	3.553E-07
SSE	4500	5.068E-07	0.43	3.103E-07
SSE	5000	4.354E-07	0.44	2.756E-07

medRn

SSE	7500	2.436E-07	0.51	1.773E-07
SSE	10000	1.617E-07	0.57	1.307E-07
SSE	15000	9.998E-08	0.65	9.284E-08
SSE	20000	7.104E-08	0.70	7.084E-08
SSE	25000	5.443E-08	0.70	5.427E-08
SSE	30000	4.373E-08	0.70	4.361E-08
SE	500	2.470E-05	0.29	1.020E-05
SE	1000	8.584E-06	0.31	3.814E-06
SE	1500	4.493E-06	0.33	2.125E-06
SE	2000	2.814E-06	0.35	1.403E-06
SE	2500	1.950E-06	0.37	1.019E-06
SE	3000	1.442E-06	0.38	7.870E-07
SE	3500	1.153E-06	0.40	6.556E-07
SE	4000	9.472E-07	0.41	5.602E-07
SE	4500	7.966E-07	0.43	4.876E-07
SE	5000	6.824E-07	0.44	4.319E-07
SE	7500	3.785E-07	0.51	2.753E-07
SE	10000	2.499E-07	0.57	2.021E-07
SE	15000	1.537E-07	0.65	1.427E-07
SE	20000	1.089E-07	0.70	1.085E-07
SE	25000	8.320E-08	0.70	8.296E-08
SE	30000	6.672E-08	0.70	6.653E-08
ESE	500	3.363E-05	0.29	1.388E-05
ESE	1000	1.229E-05	0.31	5.462E-06
ESE	1500	6.530E-06	0.33	3.088E-06
ESE	2000	4.123E-06	0.35	2.056E-06

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
ESE	2500	2.873E-06	0.37	1.502E-06
ESE	3000	2.133E-06	0.38	1.164E-06
ESE	3500	1.716E-06	0.40	9.754E-07
ESE	4000	1.415E-06	0.41	8.370E-07
ESE	4500	1.195E-06	0.43	7.312E-07
ESE	5000	1.027E-06	0.44	6.497E-07
ESE	7500	5.745E-07	0.51	4.179E-07
ESE	10000	3.810E-07	0.57	3.081E-07
ESE	15000	2.366E-07	0.65	2.197E-07
ESE	20000	1.686E-07	0.70	1.681E-07
ESE	25000	1.295E-07	0.70	1.291E-07
ESE	30000	1.042E-07	0.70	1.039E-07
E	500	2.798E-05	0.29	1.155E-05
E	1000	1.069E-05	0.31	4.749E-06
E	1500	5.748E-06	0.33	2.718E-06
E	2000	3.654E-06	0.35	1.822E-06
E	2500	2.557E-06	0.37	1.337E-06
E	3000	1.905E-06	0.38	1.040E-06
E	3500	1.538E-06	0.40	8.746E-07
E	4000	1.273E-06	0.41	7.528E-07
E	4500	1.077E-06	0.43	6.593E-07
E	5000	9.276E-07	0.44	5.871E-07

E	7500	5.222E-07	0.51	3.799E-07
E	10000	3.473E-07	0.57	2.808E-07
E	15000	2.163E-07	0.65	2.009E-07
E	20000	1.543E-07	0.70	1.539E-07
E	25000	1.186E-07	0.70	1.182E-07
E	30000	9.541E-08	0.70	9.514E-08
ENE	500	2.362E-05	0.29	9.751E-06
ENE	1000	9.291E-06	0.31	4.128E-06
ENE	1500	5.040E-06	0.33	2.383E-06
ENE	2000	3.219E-06	0.35	1.605E-06
ENE	2500	2.260E-06	0.37	1.181E-06
ENE	3000	1.687E-06	0.38	9.206E-07
ENE	3500	1.366E-06	0.40	7.768E-07
ENE	4000	1.133E-06	0.41	6.700E-07
ENE	4500	9.603E-07	0.43	5.879E-07
ENE	5000	8.283E-07	0.44	5.242E-07
ENE	7500	4.685E-07	0.51	3.408E-07
ENE	10000	3.123E-07	0.57	2.525E-07
ENE	15000	1.946E-07	0.65	1.807E-07
ENE	20000	1.389E-07	0.70	1.385E-07
ENE	25000	1.067E-07	0.70	1.064E-07
ENE	30000	8.584E-08	0.70	8.560E-08
NE	500	2.152E-05	0.29	8.885E-06

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NE	1000	8.613E-06	0.31	3.827E-06
NE	1500	4.702E-06	0.33	2.223E-06
NE	2000	3.014E-06	0.35	1.503E-06
NE	2500	2.121E-06	0.37	1.109E-06
NE	3000	1.586E-06	0.38	8.656E-07
NE	3500	1.287E-06	0.40	7.318E-07
NE	4000	1.069E-06	0.41	6.321E-07
NE	4500	9.069E-07	0.43	5.552E-07
NE	5000	7.829E-07	0.44	4.955E-07
NE	7500	4.440E-07	0.51	3.230E-07
NE	10000	2.964E-07	0.57	2.396E-07
NE	15000	1.833E-07	0.65	1.702E-07
NE	20000	1.302E-07	0.70	1.298E-07
NE	25000	9.968E-08	0.70	9.940E-08
NE	30000	8.004E-08	0.70	7.981E-08
NNE	500	2.299E-05	0.29	9.491E-06
NNE	1000	9.350E-06	0.31	4.154E-06
NNE	1500	5.128E-06	0.33	2.425E-06
NNE	2000	3.295E-06	0.35	1.643E-06
NNE	2500	2.322E-06	0.37	1.214E-06
NNE	3000	1.739E-06	0.38	9.489E-07
NNE	3500	1.413E-06	0.40	8.034E-07
NNE	4000	1.175E-06	0.41	6.946E-07
NNE	4500	9.975E-07	0.43	6.106E-07
NNE	5000	8.617E-07	0.44	5.454E-07

		medRn		
NNE	7500	4.897E-07	0.51	3.562E-07
NNE	10000	3.272E-07	0.57	2.646E-07
NNE	15000	2.020E-07	0.65	1.875E-07
NNE	20000	1.432E-07	0.70	1.428E-07
NNE	25000	1.096E-07	0.70	1.092E-07
NNE	30000	8.788E-08	0.70	8.763E-08

ATTACHMENT 8:

CHI/Q OUTPUT, MEDIUM WASTE-ROCK PILE, RESIDENT

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medpar

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Sep 12, 2012 02:08 pm

Facility: ULP lease tract
Address:
City:
State: CO Zip:

Source Category: Reg Guide 3.59 estimates
Source Type: Area
Emission Year: 1995

Comments: Calculate x/Q at downwind locations
Emission of particles from medium waste rock piles

Dataset Name: med-rock-part
Dataset Date: 9/12/2012 2:08:00 PM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

♀Sep 12, 2012 02:08 pm CHIQ
Page 1

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: unspecified
SIZE: 1
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	500	1000	1500	2000	2500	3000	3500
N	7.124E-06	2.916E-06	1.545E-06	9.600E-07	6.623E-07	4.835E-07	3.818E-07
NNW	1.202E-05	5.037E-06	2.680E-06	1.669E-06	1.153E-06	8.422E-07	6.660E-07
NW	2.688E-05	1.110E-05	5.916E-06	3.691E-06	2.553E-06	1.869E-06	1.480E-06
WNW	2.277E-05	9.101E-06	4.831E-06	3.012E-06	2.083E-06	1.525E-06	1.209E-06
W	7.353E-06	2.904E-06	1.531E-06	9.504E-07	6.552E-07	4.784E-07	3.778E-07
WSW	3.285E-06	1.286E-06	6.735E-07	4.161E-07	2.859E-07	2.081E-07	1.638E-07
SW	2.640E-06	1.034E-06	5.417E-07	3.345E-07	2.298E-07	1.672E-07	1.315E-07

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SSW	1.852E-06	6.905E-07	3.568E-07	2.189E-07	1.497E-07	1.086E-07	8.514E-08
S	2.698E-06	9.720E-07	5.010E-07	3.075E-07	2.104E-07	1.530E-07	1.200E-07
SSE	4.051E-06	1.423E-06	7.293E-07	4.464E-07	3.048E-07	2.214E-07	1.733E-07
SE	7.001E-06	2.353E-06	1.196E-06	7.295E-07	4.969E-07	3.607E-07	2.819E-07
ESE	9.510E-06	3.345E-06	1.716E-06	1.051E-06	7.183E-07	5.220E-07	4.090E-07
E	7.912E-06	2.899E-06	1.503E-06	9.251E-07	6.342E-07	4.617E-07	3.628E-07
ENE	6.681E-06	2.513E-06	1.311E-06	8.098E-07	5.563E-07	4.055E-07	3.192E-07
NE	6.098E-06	2.329E-06	1.221E-06	7.562E-07	5.205E-07	3.799E-07	2.995E-07
NNE	6.514E-06	2.525E-06	1.329E-06	8.241E-07	5.679E-07	4.148E-07	3.273E-07

Distance (meters)

Dir	4000	4500	5000	7500	10000	15000	20000
N	3.063E-07	2.558E-07	2.170E-07	1.095E-07	6.587E-08	3.773E-08	2.370E-08
NNW	5.347E-07	4.471E-07	3.794E-07	1.919E-07	1.155E-07	6.678E-08	4.216E-08
NW	1.192E-06	9.977E-07	8.478E-07	4.328E-07	2.628E-07	1.522E-07	9.690E-08
WNW	9.744E-07	8.156E-07	6.933E-07	3.559E-07	2.174E-07	1.257E-07	8.042E-08
W	3.035E-07	2.535E-07	2.150E-07	1.092E-07	6.616E-08	3.815E-08	2.424E-08
WSW	1.311E-07	1.093E-07	9.247E-08	4.645E-08	2.788E-08	1.605E-08	1.013E-08
SW	1.052E-07	8.763E-08	7.414E-08	3.716E-08	2.227E-08	1.280E-08	8.064E-09
SSW	6.798E-08	5.648E-08	4.769E-08	2.386E-08	1.432E-08	8.293E-09	5.286E-09
S	9.606E-08	7.986E-08	6.750E-08	3.416E-08	2.076E-08	1.195E-08	7.656E-09
SSE	1.386E-07	1.151E-07	9.719E-08	4.914E-08	2.989E-08	1.722E-08	1.106E-08
SE	2.256E-07	1.870E-07	1.578E-07	8.019E-08	4.913E-08	2.837E-08	1.842E-08
ESE	3.274E-07	2.721E-07	2.299E-07	1.164E-07	7.080E-08	4.106E-08	2.652E-08
E	2.909E-07	2.422E-07	2.049E-07	1.038E-07	6.301E-08	3.654E-08	2.349E-08
ENE	2.561E-07	2.134E-07	1.808E-07	9.164E-08	5.554E-08	3.211E-08	2.053E-08
NE	2.404E-07	2.006E-07	1.700E-07	8.632E-08	5.236E-08	2.989E-08	1.894E-08
NNE	2.629E-07	2.195E-07	1.861E-07	9.457E-08	5.736E-08	3.260E-08	2.057E-08

GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: unspecified
SIZE: 1
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	25000	30000
N	1.292E-08	9.993E-09
NNW	2.290E-08	1.780E-08
NW	5.443E-08	4.234E-08
WNW	4.644E-08	3.611E-08
W	1.373E-08	1.066E-08
WSW	5.614E-09	4.355E-09
SW	4.439E-09	3.440E-09
SSW	3.003E-09	2.339E-09
S	4.523E-09	3.515E-09
SSE	6.640E-09	5.164E-09
SE	1.148E-08	8.937E-09

ESE	1.600E-08	1.248E-08
E	1.387E-08	1.081E-08
ENE	1.191E-08	9.259E-09
NE	1.087E-08	8.400E-09
NNE	1.170E-08	9.021E-09

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ATTACHMENT 9:

RADON WL, SMALL WASTE-ROCK PILE, RESIDENT

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Radon Individual Assessment
Sep 12, 2012 03:11 pm

Facility: ULP Lease Tracts
Address:
City:
State: CO Zip:

Source Category: RESRAD radon flux output
Source Type: Area
Emission Year: 1995

Comments: Calculate WLs at downwind locations
Rn emissions from small waste rock piles

Dataset Name: waste rock
Dataset Date: 9/12/2012 1:23:00 PM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Rn-222	G	0	0.00E+00	0.00E+00

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

DECAY CONSTANT (PER DAY) TRANSFER COEFFICIENT
Page 1

smallRn

Nuclide	Radio-active (1)	Surface	Water	Milk (2)	Meat (3)
Rn-222	1.81E-01	5.48E-05	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES:

(1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Inhalation	Ingestion
Rn-222	0.00E+00	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES: (1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

DECAY CHAIN ACTIVITIES

Nuclide	Stack	Release Activity
Rn-222	1	1.0400E+01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE
Cubic centimeters/hr 9.17E+05

SOIL PARAMETERS	
Effective surface density (kg/sq m, dry weight) (Assumes 15 cm plow layer)	2.15E+02
BUILDUP TIMES	
For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+02
DELAY TIMES	
Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01
WEATHERING	
Removal rate constant for physical loss (per hr)	2.90E-03
CROP EXPOSURE DURATION	
Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03
AGRICULTURAL PRODUCTIVITY	
Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01
FALLOUT INTERCEPTION FRACTIONS	
Vegetables	2.00E-01
Pasture	5.70E-01
GRAZING PARAMETERS	
Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass when animal grazes on pasture	4.30E-01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS	
Contaminated feed/forage (kg/day, dry weight)	1.56E+01
DAIRY PRODUCTIVITY	
Milk production of cow (L/day)	1.10E+01
MEAT ANIMAL SLAUGHTER PARAMETERS	
Muscle mass of animal at slaughter (kg)	2.00E+02

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Fraction of herd slaughtered (per day) 3.81E-03

DECONTAMINATION
Fraction of radioactivity retained after washing
for leafy vegetables and produce 5.00E-01

FRACTIONS GROWN IN GARDEN OF INTEREST
Produce ingested 1.00E+00
Leafy vegetables ingested 1.00E+00

INGESTION RATIOS:
IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA
Vegetables 7.00E-01
Meat 4.40E-01
Milk 4.00E-01

MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA
(Minimum fractions of food types from outside
area listed below are actual fixed values.)
Vegetables 0.00E+00
Meat 0.00E+00
Milk 0.00E+00

HUMAN FOOD UTILIZATION FACTORS
Produce ingestion (kg/y) 1.76E+02
Milk ingestion (L/y) 1.12E+02
Meat ingestion (kg/y) 8.50E+01
Leafy vegetable ingestion (kg/y) 1.80E+01

SWIMMING PARAMETERS
Fraction of time spent swimming 0.00E+00
Dilution factor for water (cm) 1.00E+00

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
N	500	2.244E-05	0.29	9.263E-06
N	1000	7.938E-06	0.31	3.527E-06
N	1500	4.250E-06	0.33	2.010E-06
N	2000	2.703E-06	0.35	1.348E-06
N	2500	1.895E-06	0.37	9.906E-07
N	3000	1.414E-06	0.38	7.716E-07
N	3500	1.151E-06	0.40	6.545E-07
N	4000	9.576E-07	0.41	5.663E-07
N	4500	8.139E-07	0.43	4.982E-07
N	5000	7.036E-07	0.44	4.452E-07

smallRn

N	7500	4.009E-07	0.51	2.916E-07
N	10000	2.684E-07	0.57	2.170E-07
N	15000	1.674E-07	0.65	1.555E-07
N	20000	1.195E-07	0.70	1.192E-07
N	25000	9.184E-08	0.70	9.158E-08
N	30000	7.391E-08	0.70	7.370E-08
NNW	500	3.855E-05	0.29	1.591E-05
NNW	1000	1.378E-05	0.31	6.124E-06
NNW	1500	7.401E-06	0.33	3.499E-06
NNW	2000	4.715E-06	0.35	2.351E-06
NNW	2500	3.308E-06	0.37	1.730E-06
NNW	3000	2.471E-06	0.38	1.348E-06
NNW	3500	2.015E-06	0.40	1.145E-06
NNW	4000	1.678E-06	0.41	9.922E-07
NNW	4500	1.427E-06	0.43	8.737E-07
NNW	5000	1.235E-06	0.44	7.814E-07
NNW	7500	7.057E-07	0.51	5.134E-07
NNW	10000	4.735E-07	0.57	3.828E-07
NNW	15000	2.972E-07	0.65	2.760E-07
NNW	20000	2.130E-07	0.70	2.124E-07
NNW	25000	1.642E-07	0.70	1.637E-07
NNW	30000	1.325E-07	0.70	1.321E-07
NW	500	8.490E-05	0.29	3.505E-05
NW	1000	3.011E-05	0.31	1.338E-05
NW	1500	1.615E-05	0.33	7.635E-06
NW	2000	1.028E-05	0.35	5.126E-06
NW	2500	7.211E-06	0.37	3.770E-06
NW	3000	5.385E-06	0.38	2.938E-06
NW	3500	4.386E-06	0.40	2.494E-06
NW	4000	3.651E-06	0.41	2.160E-06
NW	4500	3.105E-06	0.43	1.901E-06
NW	5000	2.685E-06	0.44	1.700E-06
NW	7500	1.533E-06	0.51	1.115E-06
NW	10000	1.027E-06	0.57	8.305E-07
NW	15000	6.426E-07	0.65	5.967E-07

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NW	20000	4.596E-07	0.70	4.583E-07
NW	25000	3.536E-07	0.70	3.526E-07
NW	30000	2.848E-07	0.70	2.840E-07
WNW	500	7.002E-05	0.29	2.891E-05
WNW	1000	2.440E-05	0.31	1.084E-05
WNW	1500	1.303E-05	0.33	6.161E-06
WNW	2000	8.276E-06	0.35	4.126E-06
WNW	2500	5.796E-06	0.37	3.030E-06
WNW	3000	4.323E-06	0.38	2.359E-06
WNW	3500	3.515E-06	0.40	1.998E-06
WNW	4000	2.922E-06	0.41	1.728E-06
WNW	4500	2.482E-06	0.43	1.519E-06
WNW	5000	2.144E-06	0.44	1.357E-06

smallRn

WNW	7500	1.220E-06	0.51	8.873E-07
WNW	10000	8.157E-07	0.57	6.596E-07
WNW	15000	5.076E-07	0.65	4.714E-07
WNW	20000	3.619E-07	0.70	3.609E-07
WNW	25000	2.779E-07	0.70	2.771E-07
WNW	30000	2.235E-07	0.70	2.229E-07
W	500	2.258E-05	0.29	9.321E-06
W	1000	7.820E-06	0.31	3.474E-06
W	1500	4.158E-06	0.33	1.966E-06
W	2000	2.635E-06	0.35	1.314E-06
W	2500	1.842E-06	0.37	9.632E-07
W	3000	1.372E-06	0.38	7.489E-07
W	3500	1.114E-06	0.40	6.335E-07
W	4000	9.251E-07	0.41	5.471E-07
W	4500	7.850E-07	0.43	4.806E-07
W	5000	6.777E-07	0.44	4.289E-07
W	7500	3.845E-07	0.51	2.797E-07
W	10000	2.568E-07	0.57	2.076E-07
W	15000	1.599E-07	0.65	1.485E-07
W	20000	1.141E-07	0.70	1.137E-07
W	25000	8.758E-08	0.70	8.733E-08
W	30000	7.045E-08	0.70	7.025E-08
WSW	500	1.009E-05	0.29	4.166E-06
WSW	1000	3.481E-06	0.31	1.546E-06
WSW	1500	1.845E-06	0.33	8.725E-07
WSW	2000	1.167E-06	0.35	5.819E-07
WSW	2500	8.150E-07	0.37	4.261E-07
WSW	3000	6.065E-07	0.38	3.310E-07
WSW	3500	4.920E-07	0.40	2.797E-07
WSW	4000	4.082E-07	0.41	2.414E-07
WSW	4500	3.462E-07	0.43	2.119E-07
WSW	5000	2.987E-07	0.44	1.890E-07

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
WSW	7500	1.693E-07	0.51	1.231E-07
WSW	10000	1.130E-07	0.57	9.138E-08
WSW	15000	7.059E-08	0.65	6.555E-08
WSW	20000	5.044E-08	0.70	5.029E-08
WSW	25000	3.878E-08	0.70	3.867E-08
WSW	30000	3.123E-08	0.70	3.114E-08
SW	500	8.119E-06	0.29	3.352E-06
SW	1000	2.803E-06	0.31	1.245E-06
SW	1500	1.486E-06	0.33	7.027E-07
SW	2000	9.399E-07	0.35	4.686E-07
SW	2500	6.563E-07	0.37	3.431E-07
SW	3000	4.884E-07	0.38	2.665E-07
SW	3500	3.961E-07	0.40	2.252E-07
SW	4000	3.286E-07	0.41	1.944E-07
SW	4500	2.787E-07	0.43	1.706E-07
SW	5000	2.405E-07	0.44	1.522E-07

smallRn

SW	7500	1.363E-07	0.51	9.913E-08
SW	10000	9.097E-08	0.57	7.355E-08
SW	15000	5.682E-08	0.65	5.276E-08
SW	20000	4.059E-08	0.70	4.048E-08
SW	25000	3.120E-08	0.70	3.111E-08
SW	30000	2.512E-08	0.70	2.505E-08
SSW	500	5.507E-06	0.29	2.274E-06
SSW	1000	1.845E-06	0.31	8.196E-07
SSW	1500	9.647E-07	0.33	4.562E-07
SSW	2000	6.053E-07	0.35	3.018E-07
SSW	2500	4.204E-07	0.37	2.198E-07
SSW	3000	3.116E-07	0.38	1.701E-07
SSW	3500	2.514E-07	0.40	1.430E-07
SSW	4000	2.078E-07	0.41	1.229E-07
SSW	4500	1.756E-07	0.43	1.075E-07
SSW	5000	1.511E-07	0.44	9.564E-08
SSW	7500	8.494E-08	0.51	6.179E-08
SSW	10000	5.648E-08	0.57	4.567E-08
SSW	15000	3.533E-08	0.65	3.280E-08
SSW	20000	2.527E-08	0.70	2.520E-08
SSW	25000	1.945E-08	0.70	1.939E-08
SSW	30000	1.567E-08	0.70	1.563E-08
S	500	7.782E-06	0.29	3.213E-06
S	1000	2.557E-06	0.31	1.136E-06
S	1500	1.331E-06	0.33	6.296E-07
S	2000	8.335E-07	0.35	4.155E-07
S	2500	5.780E-07	0.37	3.022E-07
S	3000	4.280E-07	0.38	2.336E-07
S	3500	3.444E-07	0.40	1.958E-07

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
S	4000	2.842E-07	0.41	1.681E-07
S	4500	2.399E-07	0.43	1.468E-07
S	5000	2.061E-07	0.44	1.305E-07
S	7500	1.155E-07	0.51	8.400E-08
S	10000	7.666E-08	0.57	6.199E-08
S	15000	4.744E-08	0.65	4.405E-08
S	20000	3.372E-08	0.70	3.363E-08
S	25000	2.585E-08	0.70	2.577E-08
S	30000	2.077E-08	0.70	2.071E-08
SSE	500	1.149E-05	0.29	4.743E-06
SSE	1000	3.717E-06	0.31	1.651E-06
SSE	1500	1.926E-06	0.33	9.106E-07
SSE	2000	1.202E-06	0.35	5.991E-07
SSE	2500	8.315E-07	0.37	4.348E-07
SSE	3000	6.148E-07	0.38	3.355E-07
SSE	3500	4.935E-07	0.40	2.806E-07
SSE	4000	4.064E-07	0.41	2.404E-07
SSE	4500	3.425E-07	0.43	2.097E-07
SSE	5000	2.940E-07	0.44	1.861E-07

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SSE	7500	1.640E-07	0.51	1.193E-07
SSE	10000	1.086E-07	0.57	8.785E-08
SSE	15000	6.714E-08	0.65	6.235E-08
SSE	20000	4.769E-08	0.70	4.755E-08
SSE	25000	3.653E-08	0.70	3.642E-08
SSE	30000	2.934E-08	0.70	2.926E-08
SE	500	1.925E-05	0.29	7.947E-06
SE	1000	6.051E-06	0.31	2.688E-06
SE	1500	3.102E-06	0.33	1.467E-06
SE	2000	1.923E-06	0.35	9.589E-07
SE	2500	1.325E-06	0.37	6.928E-07
SE	3000	9.765E-07	0.38	5.329E-07
SE	3500	7.798E-07	0.40	4.434E-07
SE	4000	6.398E-07	0.41	3.784E-07
SE	4500	5.375E-07	0.43	3.291E-07
SE	5000	4.601E-07	0.44	2.912E-07
SE	7500	2.545E-07	0.51	1.852E-07
SE	10000	1.678E-07	0.57	1.357E-07
SE	15000	1.032E-07	0.65	9.579E-08
SE	20000	7.303E-08	0.70	7.282E-08
SE	25000	5.580E-08	0.70	5.564E-08
SE	30000	4.474E-08	0.70	4.461E-08
ESE	500	2.703E-05	0.29	1.116E-05
ESE	1000	8.743E-06	0.31	3.884E-06
ESE	1500	4.531E-06	0.33	2.142E-06
ESE	2000	2.828E-06	0.35	1.410E-06

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
ESE	2500	1.957E-06	0.37	1.023E-06
ESE	3000	1.447E-06	0.38	7.899E-07
ESE	3500	1.162E-06	0.40	6.608E-07
ESE	4000	9.575E-07	0.41	5.663E-07
ESE	4500	8.073E-07	0.43	4.942E-07
ESE	5000	6.931E-07	0.44	4.387E-07
ESE	7500	3.867E-07	0.51	2.813E-07
ESE	10000	2.560E-07	0.57	2.070E-07
ESE	15000	1.589E-07	0.65	1.476E-07
ESE	20000	1.132E-07	0.70	1.129E-07
ESE	25000	8.688E-08	0.70	8.663E-08
ESE	30000	6.991E-08	0.70	6.971E-08
E	500	2.310E-05	0.29	9.539E-06
E	1000	7.657E-06	0.31	3.402E-06
E	1500	4.005E-06	0.33	1.894E-06
E	2000	2.513E-06	0.35	1.253E-06
E	2500	1.746E-06	0.37	9.128E-07
E	3000	1.294E-06	0.38	7.064E-07
E	3500	1.044E-06	0.40	5.933E-07
E	4000	8.622E-07	0.41	5.099E-07
E	4500	7.287E-07	0.43	4.461E-07
E	5000	6.269E-07	0.44	3.968E-07

smallRn

E	7500	3.518E-07	0.51	2.559E-07
E	10000	2.335E-07	0.57	1.888E-07
E	15000	1.453E-07	0.65	1.350E-07
E	20000	1.036E-07	0.70	1.034E-07
E	25000	7.959E-08	0.70	7.937E-08
E	30000	6.404E-08	0.70	6.386E-08
ENE	500	1.984E-05	0.29	8.191E-06
ENE	1000	6.683E-06	0.31	2.969E-06
ENE	1500	3.519E-06	0.33	1.664E-06
ENE	2000	2.217E-06	0.35	1.105E-06
ENE	2500	1.544E-06	0.37	8.074E-07
ENE	3000	1.147E-06	0.38	6.261E-07
ENE	3500	9.275E-07	0.40	5.273E-07
ENE	4000	7.679E-07	0.41	4.541E-07
ENE	4500	6.500E-07	0.43	3.979E-07
ENE	5000	5.601E-07	0.44	3.544E-07
ENE	7500	3.157E-07	0.51	2.296E-07
ENE	10000	2.100E-07	0.57	1.698E-07
ENE	15000	1.308E-07	0.65	1.215E-07
ENE	20000	9.328E-08	0.70	9.301E-08
ENE	25000	7.163E-08	0.70	7.142E-08
ENE	30000	5.763E-08	0.70	5.746E-08
NE	500	1.821E-05	0.29	7.516E-06

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NE	1000	6.203E-06	0.31	2.756E-06
NE	1500	3.285E-06	0.33	1.553E-06
NE	2000	2.077E-06	0.35	1.035E-06
NE	2500	1.450E-06	0.37	7.579E-07
NE	3000	1.079E-06	0.38	5.887E-07
NE	3500	8.738E-07	0.40	4.968E-07
NE	4000	7.243E-07	0.41	4.284E-07
NE	4500	6.139E-07	0.43	3.758E-07
NE	5000	5.293E-07	0.44	3.350E-07
NE	7500	2.991E-07	0.51	2.176E-07
NE	10000	1.993E-07	0.57	1.611E-07
NE	15000	1.232E-07	0.65	1.144E-07
NE	20000	8.744E-08	0.70	8.719E-08
NE	25000	6.694E-08	0.70	6.675E-08
NE	30000	5.373E-08	0.70	5.358E-08
NNE	500	1.962E-05	0.29	8.100E-06
NNE	1000	6.747E-06	0.31	2.998E-06
NNE	1500	3.586E-06	0.33	1.696E-06
NNE	2000	2.272E-06	0.35	1.133E-06
NNE	2500	1.588E-06	0.37	8.303E-07
NNE	3000	1.183E-06	0.38	6.455E-07
NNE	3500	9.595E-07	0.40	5.455E-07
NNE	4000	7.962E-07	0.41	4.709E-07
NNE	4500	6.753E-07	0.43	4.134E-07
NNE	5000	5.827E-07	0.44	3.688E-07

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NNE	7500	3.300E-07	0.51	2.400E-07
NNE	10000	2.200E-07	0.57	1.779E-07
NNE	15000	1.357E-07	0.65	1.260E-07
NNE	20000	9.622E-08	0.70	9.595E-08
NNE	25000	7.358E-08	0.70	7.337E-08
NNE	30000	5.900E-08	0.70	5.883E-08

ATTACHMENT 10:

CHI/Q OUTPUT, SMALL WASTE-ROCK PILE, RESIDENT

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

C H I / Q T A B L E S

Non-Radon Individual Assessment
Sep 12, 2012 01:22 pm

Facility: ULP lease tract
Address:
City:
State: CO Zip:

Source Category: Reg Guide 3.59 estimates
Source Type: Area
Emission Year: 1995

Comments: Calculate x/Q at downwind locations
Particulate emissions from small waste rock piles

Dataset Name: sm-rock-particle
Dataset Date: 9/12/2012 1:22:00 PM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

♀Sep 12, 2012 01:22 pm CHIQ
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GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: unspecified
SIZE: 1
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

	Distance (meters)						
Dir	500	1000	1500	2000	2500	3000	3500
N	9.320E-06	3.088E-06	1.573E-06	9.601E-07	6.562E-07	4.760E-07	3.747E-07
NNW	1.600E-05	5.355E-06	2.734E-06	1.671E-06	1.143E-06	8.294E-07	6.538E-07
NW	3.535E-05	1.180E-05	6.042E-06	3.702E-06	2.537E-06	1.845E-06	1.457E-06
WNW	2.923E-05	9.633E-06	4.930E-06	3.023E-06	2.072E-06	1.509E-06	1.192E-06
W	9.394E-06	3.068E-06	1.560E-06	9.523E-07	6.506E-07	4.723E-07	3.719E-07
WSW	4.185E-06	1.356E-06	6.847E-07	4.159E-07	2.832E-07	2.049E-07	1.608E-07
SW	3.367E-06	1.091E-06	5.506E-07	3.342E-07	2.275E-07	1.645E-07	1.290E-07

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SSW	2.293E-06	7.250E-07	3.624E-07	2.189E-07	1.484E-07	1.071E-07	8.372E-08
S	3.253E-06	1.016E-06	5.085E-07	3.078E-07	2.090E-07	1.512E-07	1.183E-07
SSE	4.810E-06	1.482E-06	7.391E-07	4.466E-07	3.028E-07	2.189E-07	1.709E-07
SE	8.086E-06	2.440E-06	1.211E-06	7.306E-07	4.946E-07	3.575E-07	2.788E-07
ESE	1.131E-05	3.487E-06	1.740E-06	1.052E-06	7.139E-07	5.163E-07	4.036E-07
E	9.654E-06	3.039E-06	1.527E-06	9.267E-07	6.303E-07	4.565E-07	3.578E-07
ENE	8.282E-06	2.641E-06	1.334E-06	8.110E-07	5.526E-07	4.005E-07	3.145E-07
NE	7.604E-06	2.447E-06	1.241E-06	7.567E-07	5.166E-07	3.749E-07	2.948E-07
NNE	8.189E-06	2.656E-06	1.350E-06	8.244E-07	5.634E-07	4.092E-07	3.220E-07

Distance (meters)

Dir	4000	4500	5000	7500	10000	15000	20000
N	2.997E-07	2.499E-07	2.116E-07	1.062E-07	6.368E-08	3.644E-08	2.288E-08
NNW	5.232E-07	4.367E-07	3.701E-07	1.860E-07	1.116E-07	6.446E-08	4.067E-08
NW	1.170E-06	9.776E-07	8.295E-07	4.211E-07	2.549E-07	1.475E-07	9.383E-08
WNW	9.584E-07	8.009E-07	6.799E-07	3.472E-07	2.115E-07	1.222E-07	7.812E-08
W	2.979E-07	2.484E-07	2.104E-07	1.063E-07	6.420E-08	3.698E-08	2.349E-08
WSW	1.283E-07	1.068E-07	9.023E-08	4.506E-08	2.696E-08	1.551E-08	9.788E-09
SW	1.029E-07	8.559E-08	7.231E-08	3.604E-08	2.153E-08	1.236E-08	7.784E-09
SSW	6.665E-08	5.529E-08	4.662E-08	2.320E-08	1.388E-08	8.031E-09	5.117E-09
S	9.448E-08	7.843E-08	6.621E-08	3.335E-08	2.022E-08	1.163E-08	7.448E-09
SSE	1.364E-07	1.131E-07	9.540E-08	4.802E-08	2.914E-08	1.677E-08	1.078E-08
SE	2.227E-07	1.844E-07	1.555E-07	7.868E-08	4.811E-08	2.777E-08	1.802E-08
ESE	3.224E-07	2.675E-07	2.258E-07	1.138E-07	6.907E-08	4.002E-08	2.584E-08
E	2.862E-07	2.379E-07	2.010E-07	1.014E-07	6.136E-08	3.556E-08	2.285E-08
ENE	2.516E-07	2.094E-07	1.771E-07	8.935E-08	5.401E-08	3.119E-08	1.993E-08
NE	2.361E-07	1.967E-07	1.665E-07	8.411E-08	5.089E-08	2.902E-08	1.838E-08
NNE	2.580E-07	2.151E-07	1.821E-07	9.209E-08	5.572E-08	3.163E-08	1.994E-08

♀Sep 12, 2012 01:22 pm CHIQ
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GROUND-LEVEL CHI/Q VALUES FOR U-238
SOLUBILITY: M
CHEMFORM: unspecified
SIZE: 1
CHI/Q TOWARD INDICATED DIRECTION (SEC/CUBIC METER)

Distance (meters)

Dir	25000	30000
N	1.244E-08	9.615E-09
NNW	2.202E-08	1.711E-08
NW	5.258E-08	4.089E-08
WNW	4.503E-08	3.500E-08
W	1.328E-08	1.030E-08
WSW	5.411E-09	4.197E-09
SW	4.275E-09	3.313E-09
SSW	2.904E-09	2.262E-09
S	4.398E-09	3.417E-09
SSE	6.470E-09	5.031E-09
SE	1.123E-08	8.747E-09

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ESE	1.559E-08	1.216E-08
E	1.348E-08	1.050E-08
ENE	1.155E-08	8.980E-09
NE	1.054E-08	8.143E-09
NNE	1.134E-08	8.738E-09

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ATTACHMENT 11:

RESIDENT, MEAT AND MILK INGESTION

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: ICRP 60)	4.485E-04	4.485E-04	DCF1(1)
A-1	At-218 (Source: ICRP 60)	4.878E-03	4.878E-03	DCF1(2)
A-1	Bi-210 (Source: ICRP 60)	5.476E-03	5.476E-03	DCF1(3)
A-1	Bi-211 (Source: ICRP 60)	2.373E-01	2.373E-01	DCF1(4)
A-1	Bi-214 (Source: ICRP 60)	9.325E+00	9.325E+00	DCF1(5)
A-1	Fr-223 (Source: ICRP 60)	1.813E-01	1.813E-01	DCF1(6)
A-1	Pa-231 (Source: ICRP 60)	1.762E-01	1.762E-01	DCF1(7)
A-1	Pa-234 (Source: ICRP 60)	1.088E+01	1.088E+01	DCF1(8)
A-1	Pa-234m (Source: ICRP 60)	9.867E-02	9.867E-02	DCF1(9)
A-1	Pb-210 (Source: ICRP 60)	1.981E-03	1.981E-03	DCF1(10)
A-1	Pb-211 (Source: ICRP 60)	2.915E-01	2.915E-01	DCF1(11)
A-1	Pb-214 (Source: ICRP 60)	1.243E+00	1.243E+00	DCF1(12)
A-1	Po-210 (Source: ICRP 60)	4.934E-05	4.934E-05	DCF1(13)
A-1	Po-211 (Source: ICRP 60)	4.485E-02	4.485E-02	DCF1(14)
A-1	Po-214 (Source: ICRP 60)	4.840E-04	4.840E-04	DCF1(15)
A-1	Po-215 (Source: ICRP 60)	9.456E-04	9.456E-04	DCF1(16)
A-1	Po-218 (Source: ICRP 60)	5.326E-05	5.326E-05	DCF1(17)
A-1	Ra-223 (Source: ICRP 60)	5.532E-01	5.532E-01	DCF1(18)
A-1	Ra-226 (Source: ICRP 60)	2.915E-02	2.915E-02	DCF1(19)
A-1	Rn-219 (Source: ICRP 60)	2.859E-01	2.859E-01	DCF1(20)
A-1	Rn-222 (Source: ICRP 60)	2.186E-03	2.186E-03	DCF1(21)
A-1	Th-227 (Source: ICRP 60)	4.803E-01	4.803E-01	DCF1(22)
A-1	Th-230 (Source: ICRP 60)	1.071E-03	1.071E-03	DCF1(23)
A-1	Th-231 (Source: ICRP 60)	3.214E-02	3.214E-02	DCF1(24)
A-1	Th-234 (Source: ICRP 60)	2.130E-02	2.130E-02	DCF1(25)
A-1	Tl-207 (Source: ICRP 60)	2.299E-02	2.299E-02	DCF1(26)
A-1	Tl-210 (Source: ICRP 60)	1.661E+01	1.661E+01	DCF1(27)
A-1	U-234 (Source: ICRP 60)	3.439E-04	3.439E-04	DCF1(28)
A-1	U-235 (Source: ICRP 60)	6.597E-01	6.597E-01	DCF1(29)
A-1	U-238 (Source: ICRP 60)	7.961E-05	7.961E-05	DCF1(30)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	2.109E+00	2.035E+00	DCF2(1)
B-1	Pa-231	5.180E-01	5.180E-01	DCF2(2)
B-1	Pb-210+D	3.694E-02	2.072E-02	DCF2(3)
B-1	Ra-226+D	3.531E-02	3.515E-02	DCF2(4)
B-1	Th-230	3.700E-01	3.700E-01	DCF2(5)
B-1	U-234	3.480E-02	3.478E-02	DCF2(6)
B-1	U-235+D	3.150E-02	3.145E-02	DCF2(7)
B-1	U-238	2.960E-02	2.960E-02	DCF2(8)
B-1	U-238+D	2.963E-02	2.960E-02	DCF2(9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	4.473E-03	4.070E-03	DCF3(1)
D-1	Pa-231	2.630E-03	2.627E-03	DCF3(2)
D-1	Pb-210+D	6.995E-03	2.553E-03	DCF3(3)
D-1	Ra-226+D	1.041E-03	1.036E-03	DCF3(4)
D-1	Th-230	7.770E-04	7.770E-04	DCF3(5)
D-1	U-234	1.810E-04	1.813E-04	DCF3(6)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-235+D	1.753E-04	1.739E-04	DCF3(7)
D-1	U-238	1.670E-04	1.665E-04	DCF3(8)
D-1	U-238+D	1.796E-04	1.665E-04	DCF3(9)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(8,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(6,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.000E+06	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.000E-02	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	1.000E+02	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+02	1.000E+00	---	T(2)
R011	Times for calculations (yr)	not used	3.000E+00	---	T(3)
R011	Times for calculations (yr)	not used	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): Ac-227	1.090E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	1.090E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	2.370E+01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	2.370E+01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Th-230	2.370E+01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): U-234	2.370E+01	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.090E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	2.370E+01	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
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)	2.800E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	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)	2.722E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E-03	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	9.990E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
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	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
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	1	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)	1.500E+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)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.779E-09	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.132E-10	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.569E-10	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.097E-10	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.952E-13	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.132E-10	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.132E-10	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.132E-10	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
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	1.000E+00	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	not used	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	not used	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)

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)	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)	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)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
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	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	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	1.000E+00	-1	---	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)	1.500E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	0.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	0.000E+00	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)	1.100E+00	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)	8.000E-02	8.000E-02	---	TE(3)

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	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	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	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	2.500E-01	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	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
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	32	---	---	NPTS

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 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	active
5 -- milk ingestion	active
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	suppressed
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions

Area: 1000000.00 square meters
Thickness: 0.01 meters
Cover Depth: 0.00 meters

Initial Soil Concentrations, pCi/g

Ac-227	1.090E+00
Pa-231	1.090E+00
Pb-210	2.370E+01
Ra-226	2.370E+01
Th-230	2.370E+01
U-234	2.370E+01
U-235	1.090E+00
U-238	2.370E+01

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
TDOSE(t):	1.834E+00	1.835E+00
M(t):	7.334E-02	7.340E-02

Maximum TDOSE(t): 1.835E+00 mrem/yr at t = 6.08 ± 0.01 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 = 6.082E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.227E-04	0.0001	3.094E-04	0.0002	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.132E-02	0.0389	1.654E-04	0.0001	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.359E-01	0.2921	2.611E-01	0.1423	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	4.612E-01	0.2513	4.687E-01	0.2554	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	5.523E-03	0.0030	1.553E-03	0.0008	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.107E-03	0.0022	1.007E-02	0.0055	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.927E-04	0.0001	4.485E-04	0.0002	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.076E-03	0.0022	9.992E-03	0.0054	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	1.083E+00	0.5900	7.524E-01	0.4100	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 = 6.082E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	5.321E-04	0.0003
Pa-231	0.000E+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	7.148E-02	0.0390
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	7.970E-01	0.4344
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	9.299E-01	0.5068
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	7.076E-03	0.0039
U-234	0.000E+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	1.418E-02	0.0077
U-235	0.000E+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	6.411E-04	0.0003
U-238	0.000E+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	1.407E-02	0.0077
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	1.835E+00	1.0000

*Sum of all water independent and dependent pathways.

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-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.703E-04	0.0001	3.755E-04	0.0002	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.125E-02	0.0389	9.916E-05	0.0001	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.474E-01	0.3531	3.155E-01	0.1721	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	3.497E-01	0.1907	4.153E-01	0.2265	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	4.452E-03	0.0024	3.880E-04	0.0002	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.107E-03	0.0022	1.007E-02	0.0055	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.835E-04	0.0001	4.484E-04	0.0002	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.076E-03	0.0022	9.992E-03	0.0054	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	1.081E+00	0.5898	7.521E-01	0.4102	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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	6.458E-04	0.0004
Pa-231	0.000E+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	7.135E-02	0.0389
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	9.629E-01	0.5251
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	7.650E-01	0.4172
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	4.840E-03	0.0026
U-234	0.000E+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	1.418E-02	0.0077
U-235	0.000E+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	6.320E-04	0.0003
U-238	0.000E+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	1.407E-02	0.0077
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	1.834E+00	1.0000

*Sum of all water independent and dependent pathways.

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-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.120E-05	0.0000	1.556E-05	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.139E-02	0.0389	4.585E-04	0.0002	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.893E-02	0.0158	1.409E-02	0.0077	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	9.353E-01	0.5097	6.900E-01	0.3760	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	3.840E-02	0.0209	2.730E-02	0.0149	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.124E-03	0.0022	1.008E-02	0.0055	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.346E-04	0.0002	4.492E-04	0.0002	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.077E-03	0.0022	9.995E-03	0.0054	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	1.083E+00	0.5900	7.524E-01	0.4100	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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	2.676E-05	0.0000
Pa-231	0.000E+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	7.185E-02	0.0392
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	4.302E-02	0.0234
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	1.625E+00	0.8857
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	6.569E-02	0.0358
U-234	0.000E+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	1.420E-02	0.0077
U-235	0.000E+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	7.838E-04	0.0004
U-238	0.000E+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	1.407E-02	0.0077
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	1.835E+00	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+02
Ac-227+D	Ac-227+D	1.000E+00	5.924E-04	2.455E-05
Pa-231	Pa-231	1.000E+00	6.528E-02	6.514E-02
Pa-231	Ac-227+D	1.000E+00	1.754E-04	7.704E-04
Pa-231	∑DSR(j)		6.546E-02	6.591E-02
Pb-210+D	Pb-210+D	1.000E+00	4.063E-02	1.815E-03
Ra-226+D	Ra-226+D	1.000E+00	3.131E-02	2.999E-02
Ra-226+D	Pb-210+D	1.000E+00	9.647E-04	3.859E-02
Ra-226+D	∑DSR(j)		3.228E-02	6.858E-02
Th-230	Th-230	1.000E+00	1.988E-04	1.986E-04
Th-230	Ra-226+D	1.000E+00	5.333E-06	1.332E-03
Th-230	Pb-210+D	1.000E+00	1.471E-07	1.241E-03
Th-230	∑DSR(j)		2.042E-04	2.772E-03
U-234	U-234	1.000E+00	5.982E-04	5.980E-04
U-234	Th-230	1.000E+00	1.201E-09	1.801E-07
U-234	Ra-226+D	1.000E+00	1.389E-11	6.062E-07
U-234	Pb-210+D	1.000E+00	3.407E-13	4.535E-07
U-234	∑DSR(j)		5.982E-04	5.993E-04
U-235+D	U-235+D	1.000E+00	5.792E-04	5.792E-04
U-235+D	Pa-231	1.000E+00	5.661E-07	1.385E-04
U-235+D	Ac-227+D	1.000E+00	1.702E-09	1.308E-06
U-235+D	∑DSR(j)		5.798E-04	7.191E-04
U-238	U-238	5.400E-05	2.980E-08	2.980E-08
U-238+D	U-238+D	9.999E-01	5.935E-04	5.935E-04
U-238+D	U-234	9.999E-01	8.479E-10	1.704E-07
U-238+D	Th-230	9.999E-01	1.314E-15	2.571E-11
U-238+D	Ra-226+D	9.999E-01	8.719E-18	5.771E-11
U-238+D	Pb-210+D	9.999E-01	1.936E-19	3.636E-11
U-238+D	∑DSR(j)		5.936E-04	5.937E-04

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+02
Ac-227	4.220E+04	1.018E+06
Pa-231	3.819E+02	3.793E+02
Pb-210	6.153E+02	1.377E+04
Ra-226	7.745E+02	3.645E+02
Th-230	1.224E+05	9.019E+03
U-234	4.179E+04	4.172E+04
U-235	4.312E+04	3.477E+04
U-238	4.212E+04	4.211E+04

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 = 6.08 ± 0.01 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ac-227	1.090E+00	0.000E+00	5.924E-04	4.220E+04	4.882E-04	5.121E+04
Pa-231	1.090E+00	81.8 ± 0.2	6.592E-02	3.792E+02	6.558E-02	3.812E+02
Pb-210	2.370E+01	0.000E+00	4.063E-02	6.153E+02	3.363E-02	7.434E+02
Ra-226	2.370E+01	1.000E+02	6.858E-02	3.645E+02	3.924E-02	6.371E+02
Th-230	2.370E+01	1.000E+02	2.772E-03	9.019E+03	2.986E-04	8.374E+04
U-234	2.370E+01	1.000E+02	5.993E-04	4.172E+04	5.982E-04	4.179E+04
U-235	1.090E+00	1.000E+02	7.191E-04	3.477E+04	5.882E-04	4.250E+04
U-238	2.370E+01	1.000E+02	5.937E-04	4.211E+04	5.936E-04	4.212E+04

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+02
Ac-227	Ac-227	1.000E+00	6.458E-04	2.676E-05
Ac-227	Pa-231	1.000E+00	1.912E-04	8.397E-04
Ac-227	U-235	1.000E+00	1.856E-09	1.425E-06
Ac-227	∑DOSE(j)		8.370E-04	8.679E-04
Pa-231	Pa-231	1.000E+00	7.116E-02	7.101E-02
Pa-231	U-235	1.000E+00	6.171E-07	1.510E-04
Pa-231	∑DOSE(j)		7.116E-02	7.116E-02
Pb-210	Pb-210	1.000E+00	9.629E-01	4.302E-02
Pb-210	Ra-226	1.000E+00	2.286E-02	9.147E-01
Pb-210	Th-230	1.000E+00	3.486E-06	2.942E-02
Pb-210	U-234	1.000E+00	8.075E-12	1.075E-05
Pb-210	U-238	9.999E-01	4.588E-18	8.616E-10
Pb-210	∑DOSE(j)		9.858E-01	9.871E-01
Ra-226	Ra-226	1.000E+00	7.421E-01	7.107E-01
Ra-226	Th-230	1.000E+00	1.264E-04	3.157E-02
Ra-226	U-234	1.000E+00	3.291E-10	1.437E-05
Ra-226	U-238	9.999E-01	2.067E-16	1.368E-09
Ra-226	∑DOSE(j)		7.422E-01	7.422E-01
Th-230	Th-230	1.000E+00	4.710E-03	4.706E-03
Th-230	U-234	1.000E+00	2.847E-08	4.267E-06
Th-230	U-238	9.999E-01	3.115E-14	6.092E-10
Th-230	∑DOSE(j)		4.710E-03	4.710E-03
U-234	U-234	1.000E+00	1.418E-02	1.417E-02
U-234	U-238	9.999E-01	2.009E-08	4.038E-06
U-234	∑DOSE(j)		1.418E-02	1.418E-02
U-235	U-235	1.000E+00	6.313E-04	6.313E-04
U-238	U-238	5.400E-05	7.063E-07	7.063E-07
U-238	U-238	9.999E-01	1.407E-02	1.407E-02
U-238	∑DOSE(j)		1.407E-02	1.407E-02

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+02
Ac-227	Ac-227	1.000E+00	1.090E+00	4.517E-02
Ac-227	Pa-231	1.000E+00	0.000E+00	1.043E+00
Ac-227	U-235	1.000E+00	0.000E+00	1.610E-03
Ac-227	∑S(j):		1.090E+00	1.090E+00
Pa-231	Pa-231	1.000E+00	1.090E+00	1.088E+00
Pa-231	U-235	1.000E+00	0.000E+00	2.304E-03
Pa-231	∑S(j):		1.090E+00	1.090E+00
Pb-210	Pb-210	1.000E+00	2.370E+01	1.059E+00
Pb-210	Ra-226	1.000E+00	0.000E+00	2.194E+01
Pb-210	Th-230	1.000E+00	0.000E+00	6.987E-01
Pb-210	U-234	1.000E+00	0.000E+00	2.530E-04
Pb-210	U-238	9.999E-01	0.000E+00	2.011E-08
Pb-210	∑S(j):		2.370E+01	2.370E+01
Ra-226	Ra-226	1.000E+00	2.370E+01	2.270E+01
Ra-226	Th-230	1.000E+00	0.000E+00	1.004E+00
Ra-226	U-234	1.000E+00	0.000E+00	4.553E-04
Ra-226	U-238	9.999E-01	0.000E+00	4.319E-08
Ra-226	∑S(j):		2.370E+01	2.370E+01
Th-230	Th-230	1.000E+00	2.370E+01	2.368E+01
Th-230	U-234	1.000E+00	0.000E+00	2.132E-02
Th-230	U-238	9.999E-01	0.000E+00	3.023E-06
Th-230	∑S(j):		2.370E+01	2.370E+01
U-234	U-234	1.000E+00	2.370E+01	2.369E+01
U-234	U-238	9.999E-01	0.000E+00	6.718E-03
U-234	∑S(j):		2.370E+01	2.370E+01
U-235	U-235	1.000E+00	1.090E+00	1.090E+00
U-238	U-238	5.400E-05	1.280E-03	1.280E-03
U-238	U-238	9.999E-01	2.370E+01	2.370E+01
U-238	∑S(j):		2.370E+01	2.370E+01

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

RESCALC.EXE execution time = 0.48 seconds

ATTACHMENT 12:

RECREATIONIST, CAMPING, VERY LARGE WASTE-ROCK PILE

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: ICRP 60)	4.485E-04	4.485E-04	DCF1(1)
A-1	At-218 (Source: ICRP 60)	4.878E-03	4.878E-03	DCF1(2)
A-1	Bi-210 (Source: ICRP 60)	5.476E-03	5.476E-03	DCF1(3)
A-1	Bi-211 (Source: ICRP 60)	2.373E-01	2.373E-01	DCF1(4)
A-1	Bi-214 (Source: ICRP 60)	9.325E+00	9.325E+00	DCF1(5)
A-1	Fr-223 (Source: ICRP 60)	1.813E-01	1.813E-01	DCF1(6)
A-1	Pa-231 (Source: ICRP 60)	1.762E-01	1.762E-01	DCF1(7)
A-1	Pa-234 (Source: ICRP 60)	1.088E+01	1.088E+01	DCF1(8)
A-1	Pa-234m (Source: ICRP 60)	9.867E-02	9.867E-02	DCF1(9)
A-1	Pb-210 (Source: ICRP 60)	1.981E-03	1.981E-03	DCF1(10)
A-1	Pb-211 (Source: ICRP 60)	2.915E-01	2.915E-01	DCF1(11)
A-1	Pb-214 (Source: ICRP 60)	1.243E+00	1.243E+00	DCF1(12)
A-1	Po-210 (Source: ICRP 60)	4.934E-05	4.934E-05	DCF1(13)
A-1	Po-211 (Source: ICRP 60)	4.485E-02	4.485E-02	DCF1(14)
A-1	Po-214 (Source: ICRP 60)	4.840E-04	4.840E-04	DCF1(15)
A-1	Po-215 (Source: ICRP 60)	9.456E-04	9.456E-04	DCF1(16)
A-1	Po-218 (Source: ICRP 60)	5.326E-05	5.326E-05	DCF1(17)
A-1	Ra-223 (Source: ICRP 60)	5.532E-01	5.532E-01	DCF1(18)
A-1	Ra-226 (Source: ICRP 60)	2.915E-02	2.915E-02	DCF1(19)
A-1	Rn-219 (Source: ICRP 60)	2.859E-01	2.859E-01	DCF1(20)
A-1	Rn-222 (Source: ICRP 60)	2.186E-03	2.186E-03	DCF1(21)
A-1	Th-227 (Source: ICRP 60)	4.803E-01	4.803E-01	DCF1(22)
A-1	Th-230 (Source: ICRP 60)	1.071E-03	1.071E-03	DCF1(23)
A-1	Th-231 (Source: ICRP 60)	3.214E-02	3.214E-02	DCF1(24)
A-1	Th-234 (Source: ICRP 60)	2.130E-02	2.130E-02	DCF1(25)
A-1	Tl-207 (Source: ICRP 60)	2.299E-02	2.299E-02	DCF1(26)
A-1	Tl-210 (Source: ICRP 60)	1.661E+01	1.661E+01	DCF1(27)
A-1	U-234 (Source: ICRP 60)	3.439E-04	3.439E-04	DCF1(28)
A-1	U-235 (Source: ICRP 60)	6.597E-01	6.597E-01	DCF1(29)
A-1	U-238 (Source: ICRP 60)	7.961E-05	7.961E-05	DCF1(30)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	2.109E+00	2.035E+00	DCF2(1)
B-1	Pa-231	5.180E-01	5.180E-01	DCF2(2)
B-1	Pb-210+D	3.694E-02	2.072E-02	DCF2(3)
B-1	Ra-226+D	3.531E-02	3.515E-02	DCF2(4)
B-1	Th-230	3.700E-01	3.700E-01	DCF2(5)
B-1	U-234	3.480E-02	3.478E-02	DCF2(6)
B-1	U-235+D	3.150E-02	3.145E-02	DCF2(7)
B-1	U-238	2.960E-02	2.960E-02	DCF2(8)
B-1	U-238+D	2.963E-02	2.960E-02	DCF2(9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	4.473E-03	4.070E-03	DCF3(1)
D-1	Pa-231	2.630E-03	2.627E-03	DCF3(2)
D-1	Pb-210+D	6.995E-03	2.553E-03	DCF3(3)
D-1	Ra-226+D	1.041E-03	1.036E-03	DCF3(4)
D-1	Th-230	7.770E-04	7.770E-04	DCF3(5)
D-1	U-234	1.810E-04	1.813E-04	DCF3(6)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-235+D	1.753E-04	1.739E-04	DCF3(7)
D-1	U-238	1.670E-04	1.665E-04	DCF3(8)
D-1	U-238+D	1.796E-04	1.665E-04	DCF3(9)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(8,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(6,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	8.092E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.010E+00	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	1.000E+02	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+02	1.000E+00	---	T(2)
R011	Times for calculations (yr)	not used	3.000E+00	---	T(3)
R011	Times for calculations (yr)	not used	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): Ac-227	1.090E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	1.090E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	2.370E+01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	2.370E+01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Th-230	2.370E+01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): U-234	2.370E+01	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.090E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	2.370E+01	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
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)	2.800E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	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)	2.722E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E-03	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	9.990E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
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	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
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	1	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)	1.500E+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)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.961E-12	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.187E-12	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.938E-13	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.480E-13	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.904E-16	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.187E-12	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.187E-12	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.187E-12	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R017	Inhalation rate (m**3/yr)	8.000E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	3.000E+01	---	ED
R017	Shielding factor, inhalation	1.000E+00	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	1.000E+00	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	3.836E-02	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)	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)
R018	Soil ingestion rate (g/yr)	3.650E+01	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	0.000E+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	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
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)	1.500E-01	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	0.000E+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)

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	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
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	0.000E+00	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	0.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	0.000E+00	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	0.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	0.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	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	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	1.500E-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

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 dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions	
Area:	80920.00 square meters
Thickness:	6.01 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Ac-227	1.090E+00
Pa-231	1.090E+00
Pb-210	2.370E+01
Ra-226	2.370E+01
Th-230	2.370E+01
U-234	2.370E+01
U-235	1.090E+00
U-238	2.370E+01

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
TDOSE(t):	1.011E+01	1.011E+01
M(t):	4.043E-01	4.043E-01

Maximum TDOSE(t): 1.011E+01 mrem/yr at t = 4.432 ± 0.009 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 = 4.432E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	6.552E-02	0.0065	1.179E-02	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.835E-03	0.0006
Pa-231	1.836E-02	0.0018	5.390E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.005E-03	0.0005
Pb-210	5.764E-03	0.0006	4.506E-03	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.991E-01	0.0197
Ra-226	9.366E+00	0.9267	5.755E-03	0.0006	5.854E-02	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.741E-02	0.0067
Th-230	2.099E-02	0.0021	5.262E-02	0.0052	1.252E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.589E-02	0.0026
U-234	3.103E-04	0.0000	4.950E-03	0.0005	2.790E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.007E-03	0.0006
U-235	2.849E-02	0.0028	2.064E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.679E-04	0.0000
U-238	1.383E-01	0.0137	4.213E-03	0.0004	1.309E-14	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.960E-03	0.0006
Total	9.643E+00	0.9541	8.942E-02	0.0088	5.867E-02	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.155E-01	0.0312

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 4.432E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	8.314E-02	0.0082
Pa-231	0.000E+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	2.875E-02	0.0028
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	2.094E-01	0.0207
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	9.497E+00	0.9397
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	9.963E-02	0.0099
U-234	0.000E+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	1.127E-02	0.0011
U-235	0.000E+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	2.896E-02	0.0029
U-238	0.000E+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	1.484E-01	0.0147
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	1.011E+01	1.0000

*Sum of all water independent and dependent pathways.

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-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	7.545E-02	0.0075	1.357E-02	0.0013	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.719E-03	0.0007
Pa-231	8.430E-03	0.0008	3.604E-03	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.121E-03	0.0004
Pb-210	6.615E-03	0.0007	5.172E-03	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.285E-01	0.0226
Ra-226	9.383E+00	0.9284	5.100E-03	0.0005	5.866E-02	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.810E-02	0.0038
Th-230	2.995E-03	0.0003	5.261E-02	0.0052	1.271E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.579E-02	0.0026
U-234	3.099E-04	0.0000	4.948E-03	0.0005	3.813E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.006E-03	0.0006
U-235	2.848E-02	0.0028	2.060E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.675E-04	0.0000
U-238	1.383E-01	0.0137	4.213E-03	0.0004	2.702E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.960E-03	0.0006
Total	9.643E+00	0.9541	8.942E-02	0.0088	5.867E-02	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.155E-01	0.0312

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	9.574E-02	0.0095
Pa-231	0.000E+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	1.616E-02	0.0016
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	2.403E-01	0.0238
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	9.485E+00	0.9384
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	8.141E-02	0.0081
U-234	0.000E+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	1.126E-02	0.0011
U-235	0.000E+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	2.896E-02	0.0029
U-238	0.000E+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	1.484E-01	0.0147
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	1.011E+01	1.0000

*Sum of all water independent and dependent pathways.

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-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.127E-03	0.0003	5.624E-04	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.784E-04	0.0000
Pa-231	8.062E-02	0.0080	1.659E-02	0.0016	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.054E-02	0.0010
Pb-210	2.955E-04	0.0000	2.311E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.021E-02	0.0010
Ra-226	8.991E+00	0.8896	9.672E-03	0.0010	5.617E-02	0.0056	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.481E-01	0.0245
Th-230	4.008E-01	0.0397	5.293E-02	0.0052	2.498E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.412E-02	0.0034
U-234	4.928E-04	0.0000	4.994E-03	0.0005	1.138E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.031E-03	0.0006
U-235	2.861E-02	0.0028	2.337E-04	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.862E-04	0.0000
U-238	1.383E-01	0.0137	4.214E-03	0.0004	1.085E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.962E-03	0.0006
Total	9.643E+00	0.9541	8.942E-02	0.0088	5.867E-02	0.0058	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.155E-01	0.0312

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	3.967E-03	0.0004
Pa-231	0.000E+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	1.078E-01	0.0107
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	1.074E-02	0.0011
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	9.305E+00	0.9207
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	4.904E-01	0.0485
U-234	0.000E+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	1.152E-02	0.0011
U-235	0.000E+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	2.913E-02	0.0029
U-238	0.000E+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	1.484E-01	0.0147
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	1.011E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years 0.000E+00	1.000E+02
Ac-227+D	Ac-227+D	1.000E+00	8.784E-02	3.640E-03
Pa-231	Pa-231	1.000E+00	1.342E-02	1.339E-02
Pa-231	Ac-227+D	1.000E+00	1.406E-03	8.547E-02
Pa-231	∑DSR(j)		1.482E-02	9.886E-02
Pb-210+D	Pb-210+D	1.000E+00	1.014E-02	4.530E-04
Ra-226+D	Ra-226+D	1.000E+00	4.000E-01	3.831E-01
Ra-226+D	Pb-210+D	1.000E+00	1.584E-04	9.540E-03
Ra-226+D	∑DSR(j)		4.002E-01	3.926E-01
Th-230	Th-230	1.000E+00	3.348E-03	3.345E-03
Th-230	Ra-226+D	1.000E+00	8.666E-05	1.704E-02
Th-230	Pb-210+D	1.000E+00	2.293E-08	3.057E-04
Th-230	∑DSR(j)		3.435E-03	2.069E-02
U-234	U-234	1.000E+00	4.753E-04	4.751E-04
U-234	Th-230	1.000E+00	1.507E-08	3.027E-06
U-234	Ra-226+D	1.000E+00	2.600E-10	7.764E-06
U-234	Pb-210+D	1.000E+00	5.169E-14	1.113E-07
U-234	∑DSR(j)		4.753E-04	4.860E-04
U-235+D	U-235+D	1.000E+00	2.657E-02	2.657E-02
U-235+D	Pa-231	1.000E+00	1.419E-07	2.850E-05
U-235+D	Ac-227+D	1.000E+00	9.939E-09	1.328E-04
U-235+D	∑DSR(j)		2.657E-02	2.673E-02
U-238	U-238	5.400E-05	2.238E-08	2.238E-08
U-238+D	U-238+D	9.999E-01	6.263E-03	6.263E-03
U-238+D	U-234	9.999E-01	6.736E-10	1.354E-07
U-238+D	Th-230	9.999E-01	1.424E-14	4.313E-10
U-238+D	Ra-226+D	9.999E-01	1.843E-16	7.401E-10
U-238+D	Pb-210+D	9.999E-01	2.934E-20	8.897E-12
U-238+D	∑DSR(j)		6.263E-03	6.263E-03

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+02
Ac-227	2.846E+02	6.868E+03
Pa-231	1.687E+03	2.529E+02
Pb-210	2.465E+03	5.518E+04
Ra-226	6.247E+01	6.368E+01
Th-230	7.278E+03	1.208E+03
U-234	5.260E+04	5.144E+04
U-235	9.410E+02	9.354E+02
U-238	3.991E+03	3.991E+03

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 = 4.432 ± 0.009 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ac-227	1.090E+00	0.000E+00	8.784E-02	2.846E+02	7.628E-02	3.277E+02
Pa-231	1.090E+00	1.000E+02	9.886E-02	2.529E+02	2.638E-02	9.478E+02
Pb-210	2.370E+01	0.000E+00	1.014E-02	2.465E+03	8.836E-03	2.829E+03
Ra-226	2.370E+01	19.06 ± 0.04	4.014E-01	6.228E+01	4.007E-01	6.239E+01
Th-230	2.370E+01	1.000E+02	2.069E-02	1.208E+03	4.204E-03	5.947E+03
U-234	2.370E+01	1.000E+02	4.860E-04	5.144E+04	4.754E-04	5.258E+04
U-235	1.090E+00	1.000E+02	2.673E-02	9.354E+02	2.657E-02	9.410E+02
U-238	2.370E+01	1.000E+02	6.263E-03	3.991E+03	6.263E-03	3.991E+03

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+02
Ac-227	Ac-227	1.000E+00	9.574E-02	3.967E-03
Ac-227	Pa-231	1.000E+00	1.532E-03	9.316E-02
Ac-227	U-235	1.000E+00	1.083E-08	1.447E-04
Ac-227	∑DOSE(j)		9.727E-02	9.727E-02
Pa-231	Pa-231	1.000E+00	1.462E-02	1.459E-02
Pa-231	U-235	1.000E+00	1.547E-07	3.106E-05
Pa-231	∑DOSE(j)		1.462E-02	1.462E-02
Pb-210	Pb-210	1.000E+00	2.403E-01	1.074E-02
Pb-210	Ra-226	1.000E+00	3.754E-03	2.261E-01
Pb-210	Th-230	1.000E+00	5.435E-07	7.245E-03
Pb-210	U-234	1.000E+00	1.225E-12	2.638E-06
Pb-210	U-238	9.999E-01	6.954E-19	2.108E-10
Pb-210	∑DOSE(j)		2.441E-01	2.441E-01
Ra-226	Ra-226	1.000E+00	9.481E+00	9.079E+00
Ra-226	Th-230	1.000E+00	2.054E-03	4.038E-01
Ra-226	U-234	1.000E+00	6.163E-09	1.840E-04
Ra-226	U-238	9.999E-01	4.368E-15	1.754E-08
Ra-226	∑DOSE(j)		9.483E+00	9.483E+00
Th-230	Th-230	1.000E+00	7.935E-02	7.928E-02
Th-230	U-234	1.000E+00	3.572E-07	7.175E-05
Th-230	U-238	9.999E-01	3.375E-13	1.022E-08
Th-230	∑DOSE(j)		7.935E-02	7.935E-02
U-234	U-234	1.000E+00	1.126E-02	1.126E-02
U-234	U-238	9.999E-01	1.597E-08	3.209E-06
U-234	∑DOSE(j)		1.126E-02	1.126E-02
U-235	U-235	1.000E+00	2.896E-02	2.896E-02
U-238	U-238	5.400E-05	5.304E-07	5.304E-07
U-238	U-238	9.999E-01	1.484E-01	1.484E-01
U-238	∑DOSE(j)		1.484E-01	1.484E-01

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+02
Ac-227	Ac-227	1.000E+00	1.090E+00	4.517E-02
Ac-227	Pa-231	1.000E+00	0.000E+00	1.043E+00
Ac-227	U-235	1.000E+00	0.000E+00	1.610E-03
Ac-227	∑S(j):		1.090E+00	1.090E+00
Pa-231	Pa-231	1.000E+00	1.090E+00	1.088E+00
Pa-231	U-235	1.000E+00	0.000E+00	2.304E-03
Pa-231	∑S(j):		1.090E+00	1.090E+00
Pb-210	Pb-210	1.000E+00	2.370E+01	1.059E+00
Pb-210	Ra-226	1.000E+00	0.000E+00	2.194E+01
Pb-210	Th-230	1.000E+00	0.000E+00	6.987E-01
Pb-210	U-234	1.000E+00	0.000E+00	2.530E-04
Pb-210	U-238	9.999E-01	0.000E+00	2.011E-08
Pb-210	∑S(j):		2.370E+01	2.370E+01
Ra-226	Ra-226	1.000E+00	2.370E+01	2.270E+01
Ra-226	Th-230	1.000E+00	0.000E+00	1.004E+00
Ra-226	U-234	1.000E+00	0.000E+00	4.553E-04
Ra-226	U-238	9.999E-01	0.000E+00	4.319E-08
Ra-226	∑S(j):		2.370E+01	2.370E+01
Th-230	Th-230	1.000E+00	2.370E+01	2.368E+01
Th-230	U-234	1.000E+00	0.000E+00	2.132E-02
Th-230	U-238	9.999E-01	0.000E+00	3.023E-06
Th-230	∑S(j):		2.370E+01	2.370E+01
U-234	U-234	1.000E+00	2.370E+01	2.369E+01
U-234	U-238	9.999E-01	0.000E+00	6.718E-03
U-234	∑S(j):		2.370E+01	2.370E+01
U-235	U-235	1.000E+00	1.090E+00	1.090E+00
U-238	U-238	5.400E-05	1.280E-03	1.280E-03
U-238	U-238	9.999E-01	2.370E+01	2.370E+01
U-238	∑S(j):		2.370E+01	2.370E+01

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

RESCALC.EXE execution time = 0.43 seconds

ATTACHMENT 13:

RECREATIONIST, FOOD INGESTION

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: ICRP 60)	4.485E-04	4.485E-04	DCF1(1)
A-1	At-218 (Source: ICRP 60)	4.878E-03	4.878E-03	DCF1(2)
A-1	Bi-210 (Source: ICRP 60)	5.476E-03	5.476E-03	DCF1(3)
A-1	Bi-211 (Source: ICRP 60)	2.373E-01	2.373E-01	DCF1(4)
A-1	Bi-214 (Source: ICRP 60)	9.325E+00	9.325E+00	DCF1(5)
A-1	Fr-223 (Source: ICRP 60)	1.813E-01	1.813E-01	DCF1(6)
A-1	Pa-231 (Source: ICRP 60)	1.762E-01	1.762E-01	DCF1(7)
A-1	Pa-234 (Source: ICRP 60)	1.088E+01	1.088E+01	DCF1(8)
A-1	Pa-234m (Source: ICRP 60)	9.867E-02	9.867E-02	DCF1(9)
A-1	Pb-210 (Source: ICRP 60)	1.981E-03	1.981E-03	DCF1(10)
A-1	Pb-211 (Source: ICRP 60)	2.915E-01	2.915E-01	DCF1(11)
A-1	Pb-214 (Source: ICRP 60)	1.243E+00	1.243E+00	DCF1(12)
A-1	Po-210 (Source: ICRP 60)	4.934E-05	4.934E-05	DCF1(13)
A-1	Po-211 (Source: ICRP 60)	4.485E-02	4.485E-02	DCF1(14)
A-1	Po-214 (Source: ICRP 60)	4.840E-04	4.840E-04	DCF1(15)
A-1	Po-215 (Source: ICRP 60)	9.456E-04	9.456E-04	DCF1(16)
A-1	Po-218 (Source: ICRP 60)	5.326E-05	5.326E-05	DCF1(17)
A-1	Ra-223 (Source: ICRP 60)	5.532E-01	5.532E-01	DCF1(18)
A-1	Ra-226 (Source: ICRP 60)	2.915E-02	2.915E-02	DCF1(19)
A-1	Rn-219 (Source: ICRP 60)	2.859E-01	2.859E-01	DCF1(20)
A-1	Rn-222 (Source: ICRP 60)	2.186E-03	2.186E-03	DCF1(21)
A-1	Th-227 (Source: ICRP 60)	4.803E-01	4.803E-01	DCF1(22)
A-1	Th-230 (Source: ICRP 60)	1.071E-03	1.071E-03	DCF1(23)
A-1	Th-231 (Source: ICRP 60)	3.214E-02	3.214E-02	DCF1(24)
A-1	Th-234 (Source: ICRP 60)	2.130E-02	2.130E-02	DCF1(25)
A-1	Tl-207 (Source: ICRP 60)	2.299E-02	2.299E-02	DCF1(26)
A-1	Tl-210 (Source: ICRP 60)	1.661E+01	1.661E+01	DCF1(27)
A-1	U-234 (Source: ICRP 60)	3.439E-04	3.439E-04	DCF1(28)
A-1	U-235 (Source: ICRP 60)	6.597E-01	6.597E-01	DCF1(29)
A-1	U-238 (Source: ICRP 60)	7.961E-05	7.961E-05	DCF1(30)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	2.109E+00	2.035E+00	DCF2(1)
B-1	Pa-231	5.180E-01	5.180E-01	DCF2(2)
B-1	Pb-210+D	3.694E-02	2.072E-02	DCF2(3)
B-1	Ra-226+D	3.531E-02	3.515E-02	DCF2(4)
B-1	Th-230	3.700E-01	3.700E-01	DCF2(5)
B-1	U-234	3.480E-02	3.478E-02	DCF2(6)
B-1	U-235+D	3.150E-02	3.145E-02	DCF2(7)
B-1	U-238	2.960E-02	2.960E-02	DCF2(8)
B-1	U-238+D	2.963E-02	2.960E-02	DCF2(9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	4.473E-03	4.070E-03	DCF3(1)
D-1	Pa-231	2.630E-03	2.627E-03	DCF3(2)
D-1	Pb-210+D	6.995E-03	2.553E-03	DCF3(3)
D-1	Ra-226+D	1.041E-03	1.036E-03	DCF3(4)
D-1	Th-230	7.770E-04	7.770E-04	DCF3(5)
D-1	U-234	1.810E-04	1.813E-04	DCF3(6)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-235+D	1.753E-04	1.739E-04	DCF3(7)
D-1	U-238	1.670E-04	1.665E-04	DCF3(8)
D-1	U-238+D	1.796E-04	1.665E-04	DCF3(9)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(8,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(6,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	1.000E+06	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.000E-02	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	1.000E+02	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+02	1.000E+00	---	T(2)
R011	Times for calculations (yr)	not used	3.000E+00	---	T(3)
R011	Times for calculations (yr)	not used	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): Ac-227	1.090E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	1.090E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	2.370E+01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	2.370E+01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Th-230	2.370E+01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): U-234	2.370E+01	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.090E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	2.370E+01	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
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)	2.800E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	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)	2.722E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E-03	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	9.990E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
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	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
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	1	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)	1.500E+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)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.779E-09	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.132E-10	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.569E-10	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.097E-10	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.952E-13	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.132E-10	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.132E-10	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.132E-10	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
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	1.000E+00	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	not used	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	not used	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)

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)	4.540E-01	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	0.000E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	4.540E+01	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)
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	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	0.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	0.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	1.000E+00	-1	---	FPLANT
R018	Contamination fraction of meat	1.000E+00	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	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)	not used	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)	3.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	not used	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	0.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	0.000E+00	1.000E+00	---	FGWIR
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)

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	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
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	0.000E+00	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	0.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	0.000E+00	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	0.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	0.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	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	32	---	---	NPTS

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 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	active
4 -- meat ingestion	active
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	suppressed
9 -- radon	suppressed
Find peak pathway doses	active

Contaminated Zone Dimensions

Area: 1000000.00 square meters
Thickness: 0.01 meters
Cover Depth: 0.00 meters

Initial Soil Concentrations, pCi/g

Ac-227	1.090E+00
Pa-231	1.090E+00
Pb-210	2.370E+01
Ra-226	2.370E+01
Th-230	2.370E+01
U-234	2.370E+01
U-235	1.090E+00
U-238	2.370E+01

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
TDOSE(t):	5.624E-01	5.624E-01
M(t):	2.250E-02	2.250E-02

Maximum TDOSE(t): 5.624E-01 mrem/yr at t = 55.8 ± 0.1 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 = 5.578E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Nuclide														
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.078E-05	0.0001	2.880E-05	0.0001	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.872E-04	0.0010	3.656E-02	0.0650	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.364E-03	0.0078	5.867E-02	0.1043	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	3.499E-02	0.0622	4.100E-01	0.7289	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	9.588E-04	0.0017	1.062E-02	0.0189	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.627E-04	0.0003	2.587E-03	0.0046	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.869E-06	0.0000	1.586E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.612E-04	0.0003	2.565E-03	0.0046	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	4.126E-02	0.0734	5.212E-01	0.9266	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 = 5.578E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	5.958E-05	0.0001
Pa-231	0.000E+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	3.715E-02	0.0661
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	6.303E-02	0.1121
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	4.450E-01	0.7911
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	1.158E-02	0.0206
U-234	0.000E+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	2.750E-03	0.0049
U-235	0.000E+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	1.665E-04	0.0003
U-238	0.000E+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	2.726E-03	0.0048
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	5.624E-01	1.0000

*Sum of all water independent and dependent pathways.

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-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.817E-04	0.0003	1.701E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.368E-04	0.0008	3.646E-02	0.0648	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.471E-02	0.0439	3.322E-01	0.5906	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	1.532E-02	0.0272	1.441E-01	0.2562	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	2.827E-04	0.0005	3.010E-03	0.0054	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.625E-04	0.0003	2.585E-03	0.0046	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.240E-06	0.0000	1.155E-04	0.0002	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.612E-04	0.0003	2.565E-03	0.0046	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	4.126E-02	0.0734	5.212E-01	0.9266	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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	3.518E-04	0.0006
Pa-231	0.000E+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	3.690E-02	0.0656
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	3.569E-01	0.6346
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	1.594E-01	0.2834
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	3.293E-03	0.0059
U-234	0.000E+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	2.747E-03	0.0049
U-235	0.000E+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	1.227E-04	0.0002
U-238	0.000E+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	2.726E-03	0.0048
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	5.624E-01	1.0000

*Sum of all water independent and dependent pathways.

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-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.532E-06	0.0000	7.048E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pa-231	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.099E-04	0.0011	3.655E-02	0.0650	0.000E+00	0.0000	0.000E+00	0.0000
Pb-210	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.104E-03	0.0020	1.484E-02	0.0264	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	3.754E-02	0.0668	4.455E-01	0.7921	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	1.660E-03	0.0030	1.891E-02	0.0336	0.000E+00	0.0000	0.000E+00	0.0000
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.632E-04	0.0003	2.593E-03	0.0046	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.432E-06	0.0000	1.928E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.613E-04	0.0003	2.565E-03	0.0046	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	4.126E-02	0.0734	5.212E-01	0.9266	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

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	1.458E-05	0.0000
Pa-231	0.000E+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	3.716E-02	0.0661
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	1.595E-02	0.0284
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	4.831E-01	0.8589
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	2.057E-02	0.0366
U-234	0.000E+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	2.756E-03	0.0049
U-235	0.000E+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	2.012E-04	0.0004
U-238	0.000E+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	2.727E-03	0.0048
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	5.624E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+02
Ac-227+D	Ac-227+D	1.000E+00	3.228E-04	1.338E-05
Pa-231	Pa-231	1.000E+00	3.385E-02	3.378E-02
Pa-231	Ac-227+D	1.000E+00	5.165E-06	3.141E-04
Pa-231	∑DSR(j)		3.385E-02	3.409E-02
Pb-210+D	Pb-210+D	1.000E+00	1.506E-02	6.728E-04
Ra-226+D	Ra-226+D	1.000E+00	6.490E-03	6.215E-03
Ra-226+D	Pb-210+D	1.000E+00	2.352E-04	1.417E-02
Ra-226+D	∑DSR(j)		6.725E-03	2.038E-02
Th-230	Th-230	1.000E+00	1.375E-04	1.374E-04
Th-230	Ra-226+D	1.000E+00	1.406E-06	2.764E-04
Th-230	Pb-210+D	1.000E+00	3.405E-08	4.540E-04
Th-230	∑DSR(j)		1.389E-04	8.678E-04
U-234	U-234	1.000E+00	1.159E-04	1.159E-04
U-234	Th-230	1.000E+00	6.188E-10	1.243E-07
U-234	Ra-226+D	1.000E+00	4.219E-12	1.260E-07
U-234	Pb-210+D	1.000E+00	7.676E-14	1.653E-07
U-234	∑DSR(j)		1.159E-04	1.163E-04
U-235+D	U-235+D	1.000E+00	1.122E-04	1.122E-04
U-235+D	Pa-231	1.000E+00	3.581E-07	7.190E-05
U-235+D	Ac-227+D	1.000E+00	3.652E-11	4.879E-07
U-235+D	∑DSR(j)		1.126E-04	1.846E-04
U-238	U-238	5.400E-05	5.775E-09	5.775E-09
U-238+D	U-238+D	9.999E-01	1.150E-04	1.150E-04
U-238+D	U-234	9.999E-01	1.643E-10	3.302E-08
U-238+D	Th-230	9.999E-01	5.847E-16	1.771E-11
U-238+D	Ra-226+D	9.999E-01	2.990E-18	1.201E-11
U-238+D	Pb-210+D	9.999E-01	4.357E-20	1.321E-11
U-238+D	∑DSR(j)		1.150E-04	1.150E-04

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+02
Ac-227	7.745E+04	1.869E+06
Pa-231	7.384E+02	7.333E+02
Pb-210	1.660E+03	3.716E+04
Ra-226	3.717E+03	1.227E+03
Th-230	1.800E+05	2.881E+04
U-234	2.157E+05	2.150E+05
U-235	2.220E+05	1.354E+05
U-238	2.174E+05	2.173E+05

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 = 55.8 ± 0.1 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ac-227	1.090E+00	0.000E+00	3.228E-04	7.745E+04	5.466E-05	4.573E+05
Pa-231	1.090E+00	83.1 ± 0.2	3.409E-02	7.332E+02	3.408E-02	7.335E+02
Pb-210	2.370E+01	0.000E+00	1.506E-02	1.660E+03	2.660E-03	9.400E+03
Ra-226	2.370E+01	1.000E+02	2.038E-02	1.227E+03	1.877E-02	1.332E+03
Th-230	2.370E+01	1.000E+02	8.678E-04	2.881E+04	4.887E-04	5.116E+04
U-234	2.370E+01	1.000E+02	1.163E-04	2.150E+05	1.160E-04	2.154E+05
U-235	1.090E+00	1.000E+02	1.846E-04	1.354E+05	1.527E-04	1.637E+05
U-238	2.370E+01	1.000E+02	1.150E-04	2.173E+05	1.150E-04	2.173E+05

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+02
Ac-227	Ac-227	1.000E+00	3.518E-04	1.458E-05
Ac-227	Pa-231	1.000E+00	5.630E-06	3.423E-04
Ac-227	U-235	1.000E+00	3.981E-11	5.318E-07
Ac-227	∑DOSE(j)		3.575E-04	3.575E-04
Pa-231	Pa-231	1.000E+00	3.690E-02	3.682E-02
Pa-231	U-235	1.000E+00	3.903E-07	7.837E-05
Pa-231	∑DOSE(j)		3.690E-02	3.690E-02
Pb-210	Pb-210	1.000E+00	3.569E-01	1.595E-02
Pb-210	Ra-226	1.000E+00	5.575E-03	3.358E-01
Pb-210	Th-230	1.000E+00	8.071E-07	1.076E-02
Pb-210	U-234	1.000E+00	1.819E-12	3.918E-06
Pb-210	U-238	9.999E-01	1.033E-18	3.131E-10
Pb-210	∑DOSE(j)		3.625E-01	3.625E-01
Ra-226	Ra-226	1.000E+00	1.538E-01	1.473E-01
Ra-226	Th-230	1.000E+00	3.332E-05	6.552E-03
Ra-226	U-234	1.000E+00	9.999E-11	2.985E-06
Ra-226	U-238	9.999E-01	7.086E-17	2.846E-10
Ra-226	∑DOSE(j)		1.539E-01	1.539E-01
Th-230	Th-230	1.000E+00	3.258E-03	3.255E-03
Th-230	U-234	1.000E+00	1.467E-08	2.946E-06
Th-230	U-238	9.999E-01	1.386E-14	4.198E-10
Th-230	∑DOSE(j)		3.258E-03	3.258E-03
U-234	U-234	1.000E+00	2.747E-03	2.746E-03
U-234	U-238	9.999E-01	3.894E-09	7.825E-07
U-234	∑DOSE(j)		2.747E-03	2.747E-03
U-235	U-235	1.000E+00	1.223E-04	1.223E-04
U-238	U-238	5.400E-05	1.369E-07	1.369E-07
U-238	U-238	9.999E-01	2.726E-03	2.726E-03
U-238	∑DOSE(j)		2.726E-03	2.726E-03

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+02
Ac-227	Ac-227	1.000E+00	1.090E+00	4.517E-02
Ac-227	Pa-231	1.000E+00	0.000E+00	1.043E+00
Ac-227	U-235	1.000E+00	0.000E+00	1.610E-03
Ac-227	∑S(j):		1.090E+00	1.090E+00
Pa-231	Pa-231	1.000E+00	1.090E+00	1.088E+00
Pa-231	U-235	1.000E+00	0.000E+00	2.304E-03
Pa-231	∑S(j):		1.090E+00	1.090E+00
Pb-210	Pb-210	1.000E+00	2.370E+01	1.059E+00
Pb-210	Ra-226	1.000E+00	0.000E+00	2.194E+01
Pb-210	Th-230	1.000E+00	0.000E+00	6.987E-01
Pb-210	U-234	1.000E+00	0.000E+00	2.530E-04
Pb-210	U-238	9.999E-01	0.000E+00	2.011E-08
Pb-210	∑S(j):		2.370E+01	2.370E+01
Ra-226	Ra-226	1.000E+00	2.370E+01	2.270E+01
Ra-226	Th-230	1.000E+00	0.000E+00	1.004E+00
Ra-226	U-234	1.000E+00	0.000E+00	4.553E-04
Ra-226	U-238	9.999E-01	0.000E+00	4.319E-08
Ra-226	∑S(j):		2.370E+01	2.370E+01
Th-230	Th-230	1.000E+00	2.370E+01	2.368E+01
Th-230	U-234	1.000E+00	0.000E+00	2.132E-02
Th-230	U-238	9.999E-01	0.000E+00	3.023E-06
Th-230	∑S(j):		2.370E+01	2.370E+01
U-234	U-234	1.000E+00	2.370E+01	2.369E+01
U-234	U-238	9.999E-01	0.000E+00	6.718E-03
U-234	∑S(j):		2.370E+01	2.370E+01
U-235	U-235	1.000E+00	1.090E+00	1.090E+00
U-238	U-238	5.400E-05	1.280E-03	1.280E-03
U-238	U-238	9.999E-01	2.370E+01	2.370E+01
U-238	∑S(j):		2.370E+01	2.370E+01

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

RESCALC.EXE execution time = 0.39 seconds

ATTACHMENT 14:

MINE EXPLORATION WORKER

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Dose Conversion Factor (and Related) Parameter Summary
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-227 (Source: ICRP 60)	4.485E-04	4.485E-04	DCF1(1)
A-1	At-218 (Source: ICRP 60)	4.878E-03	4.878E-03	DCF1(2)
A-1	Bi-210 (Source: ICRP 60)	5.476E-03	5.476E-03	DCF1(3)
A-1	Bi-211 (Source: ICRP 60)	2.373E-01	2.373E-01	DCF1(4)
A-1	Bi-214 (Source: ICRP 60)	9.325E+00	9.325E+00	DCF1(5)
A-1	Fr-223 (Source: ICRP 60)	1.813E-01	1.813E-01	DCF1(6)
A-1	Pa-231 (Source: ICRP 60)	1.762E-01	1.762E-01	DCF1(7)
A-1	Pa-234 (Source: ICRP 60)	1.088E+01	1.088E+01	DCF1(8)
A-1	Pa-234m (Source: ICRP 60)	9.867E-02	9.867E-02	DCF1(9)
A-1	Pb-210 (Source: ICRP 60)	1.981E-03	1.981E-03	DCF1(10)
A-1	Pb-211 (Source: ICRP 60)	2.915E-01	2.915E-01	DCF1(11)
A-1	Pb-214 (Source: ICRP 60)	1.243E+00	1.243E+00	DCF1(12)
A-1	Po-210 (Source: ICRP 60)	4.934E-05	4.934E-05	DCF1(13)
A-1	Po-211 (Source: ICRP 60)	4.485E-02	4.485E-02	DCF1(14)
A-1	Po-214 (Source: ICRP 60)	4.840E-04	4.840E-04	DCF1(15)
A-1	Po-215 (Source: ICRP 60)	9.456E-04	9.456E-04	DCF1(16)
A-1	Po-218 (Source: ICRP 60)	5.326E-05	5.326E-05	DCF1(17)
A-1	Ra-223 (Source: ICRP 60)	5.532E-01	5.532E-01	DCF1(18)
A-1	Ra-226 (Source: ICRP 60)	2.915E-02	2.915E-02	DCF1(19)
A-1	Rn-219 (Source: ICRP 60)	2.859E-01	2.859E-01	DCF1(20)
A-1	Rn-222 (Source: ICRP 60)	2.186E-03	2.186E-03	DCF1(21)
A-1	Th-227 (Source: ICRP 60)	4.803E-01	4.803E-01	DCF1(22)
A-1	Th-230 (Source: ICRP 60)	1.071E-03	1.071E-03	DCF1(23)
A-1	Th-231 (Source: ICRP 60)	3.214E-02	3.214E-02	DCF1(24)
A-1	Th-234 (Source: ICRP 60)	2.130E-02	2.130E-02	DCF1(25)
A-1	Tl-207 (Source: ICRP 60)	2.299E-02	2.299E-02	DCF1(26)
A-1	Tl-210 (Source: ICRP 60)	1.661E+01	1.661E+01	DCF1(27)
A-1	U-234 (Source: ICRP 60)	3.439E-04	3.439E-04	DCF1(28)
A-1	U-235 (Source: ICRP 60)	6.597E-01	6.597E-01	DCF1(29)
A-1	U-238 (Source: ICRP 60)	7.961E-05	7.961E-05	DCF1(30)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	2.109E+00	2.035E+00	DCF2(1)
B-1	Pa-231	5.180E-01	5.180E-01	DCF2(2)
B-1	Pb-210+D	3.694E-02	2.072E-02	DCF2(3)
B-1	Ra-226+D	3.531E-02	3.515E-02	DCF2(4)
B-1	Th-230	3.700E-01	3.700E-01	DCF2(5)
B-1	U-234	3.480E-02	3.478E-02	DCF2(6)
B-1	U-235+D	3.150E-02	3.145E-02	DCF2(7)
B-1	U-238	2.960E-02	2.960E-02	DCF2(8)
B-1	U-238+D	2.963E-02	2.960E-02	DCF2(9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	4.473E-03	4.070E-03	DCF3(1)
D-1	Pa-231	2.630E-03	2.627E-03	DCF3(2)
D-1	Pb-210+D	6.995E-03	2.553E-03	DCF3(3)
D-1	Ra-226+D	1.041E-03	1.036E-03	DCF3(4)
D-1	Th-230	7.770E-04	7.770E-04	DCF3(5)
D-1	U-234	1.810E-04	1.813E-04	DCF3(6)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-235+D	1.753E-04	1.739E-04	DCF3(7)
D-1	U-238	1.670E-04	1.665E-04	DCF3(8)
D-1	U-238+D	1.796E-04	1.665E-04	DCF3(9)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)
D-34				
D-34	U-238 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(8,1)
D-34	U-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-34				
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(9,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(9,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(9,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: ICRP 60 & ICRP 72 (Adult)

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(6,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5				
D-5	U-238 , fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-238 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(9,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(9,2)

#For DCF1(xxx) only, factors are for infinite depth & area. See ETFG table in Ground Pathway of Detailed Report.
*Base Case means Default.Lib w/o Associate Nuclide contributions.

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)	9.000E+00	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	6.600E-01	2.000E+00	---	THICK0
R011	Fraction of contamination that is submerged	0.000E+00	0.000E+00	---	SUBMFRACT
R011	Length parallel to aquifer flow (m)	1.000E+02	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+02	1.000E+00	---	T(2)
R011	Times for calculations (yr)	not used	3.000E+00	---	T(3)
R011	Times for calculations (yr)	not used	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): Ac-227	1.090E+00	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Pa-231	1.090E+00	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Pb-210	2.370E+01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Ra-226	2.370E+01	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Th-230	2.370E+01	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): U-234	2.370E+01	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.090E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	2.370E+01	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): Ac-227	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Pa-231	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Pb-210	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Th-230	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
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)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	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)	2.722E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E-03	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	9.990E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
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	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone field capacity	2.000E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
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	1	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)	1.500E+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)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.017E-11	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.015E-11	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.009E-11	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.440E-11	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.683E-14	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.015E-11	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.015E-11	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.015E-11	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R017	Inhalation rate (m**3/yr)	8.000E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	1.000E+00	3.000E+01	---	ED
R017	Shielding factor, inhalation	1.000E+00	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	1.000E+00	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	9.130E-04	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)	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)
R018	Soil ingestion rate (g/yr)	3.650E+01	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	0.000E+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	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
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)	1.500E-01	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	0.000E+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)

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	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
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	0.000E+00	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	0.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	0.000E+00	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	0.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	0.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	0.000E+00	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	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

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 dose	17	---	---	LYMAX
TITL	Maximum number of integration points for risk	257	---	---	KYMAX

Summary of Pathway Selections

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

Contaminated Zone Dimensions

Area:	9.00 square meters
Thickness:	0.66 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g

Ac-227	1.090E+00
Pa-231	1.090E+00
Pb-210	2.370E+01
Ra-226	2.370E+01
Th-230	2.370E+01
U-234	2.370E+01
U-235	1.090E+00
U-238	2.370E+01

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
TDOSE(t):	1.029E-01	1.029E-01
M(t):	4.117E-03	4.117E-03

Maximum TDOSE(t): 1.029E-01 mrem/yr at t = 0.000E+00 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 = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	8.319E-04	0.0081	1.244E-04	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.439E-06	0.0000
Pa-231	9.277E-05	0.0009	3.304E-05	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.828E-07	0.0000
Pb-210	7.405E-05	0.0007	4.741E-05	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.896E-05	0.0005
Ra-226	9.918E-02	0.9637	4.675E-05	0.0005	7.556E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.162E-06	0.0001
Th-230	3.253E-05	0.0003	4.822E-04	0.0047	1.637E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.525E-06	0.0001
U-234	3.655E-06	0.0000	4.536E-05	0.0004	4.912E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.287E-06	0.0000
U-235	3.208E-04	0.0031	1.889E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.730E-08	0.0000
U-238	1.488E-03	0.0145	3.861E-05	0.0004	3.481E-24	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.277E-06	0.0000
Total	1.020E-01	0.9914	8.197E-04	0.0080	7.558E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.758E-05	0.0007

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	9.578E-04	0.0093
Pa-231	0.000E+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	1.267E-04	0.0012
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	1.704E-04	0.0017
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	9.924E-02	0.9643
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	5.203E-04	0.0051
U-234	0.000E+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	5.030E-05	0.0005
U-235	0.000E+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	3.227E-04	0.0031
U-238	0.000E+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	1.528E-03	0.0149
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	1.029E-01	1.0000

*Sum of all water independent and dependent pathways.

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-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	3.447E-05	0.0003	5.155E-06	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.964E-08	0.0000
Pa-231	8.888E-04	0.0086	1.520E-04	0.0015	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.258E-06	0.0000
Pb-210	3.309E-06	0.0000	2.118E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.187E-06	0.0000
Ra-226	9.505E-02	0.9235	8.866E-05	0.0009	7.236E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.314E-05	0.0005
Th-230	4.238E-03	0.0412	4.852E-04	0.0047	3.218E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.309E-06	0.0001
U-234	5.589E-06	0.0001	4.578E-05	0.0004	1.466E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.292E-06	0.0000
U-235	3.222E-04	0.0031	2.142E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.130E-08	0.0000
U-238	1.488E-03	0.0145	3.863E-05	0.0004	1.398E-17	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.277E-06	0.0000
Total	1.020E-01	0.9914	8.197E-04	0.0080	7.558E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.758E-05	0.0007

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-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Ac-227	0.000E+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	3.969E-05	0.0004
Pa-231	0.000E+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	1.043E-03	0.0101
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	7.614E-06	0.0001
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	9.519E-02	0.9249
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	4.730E-03	0.0460
U-234	0.000E+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	5.266E-05	0.0005
U-235	0.000E+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	3.244E-04	0.0032
U-238	0.000E+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	1.528E-03	0.0149
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	1.029E-01	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years 0.000E+00	1.000E+02	(mrem/yr)/(pCi/g)
Ac-227+D	Ac-227+D	1.000E+00	8.787E-04	3.641E-05	
Pa-231	Pa-231	1.000E+00	1.022E-04	1.020E-04	
Pa-231	Ac-227+D	1.000E+00	1.406E-05	8.550E-04	
Pa-231	∑DSR(j)		1.162E-04	9.570E-04	
Pb-210+D	Pb-210+D	1.000E+00	7.191E-06	3.213E-07	
Ra-226+D	Ra-226+D	1.000E+00	4.187E-03	4.010E-03	
Ra-226+D	Pb-210+D	1.000E+00	1.123E-07	6.765E-06	
Ra-226+D	∑DSR(j)		4.187E-03	4.016E-03	
Th-230	Th-230	1.000E+00	2.105E-05	2.103E-05	
Th-230	Ra-226+D	1.000E+00	9.070E-07	1.783E-04	
Th-230	Pb-210+D	1.000E+00	1.626E-11	2.168E-07	
Th-230	∑DSR(j)		2.195E-05	1.996E-04	
U-234	U-234	1.000E+00	2.122E-06	2.122E-06	
U-234	Th-230	1.000E+00	9.473E-11	1.903E-08	
U-234	Ra-226+D	1.000E+00	2.722E-12	8.126E-08	
U-234	Pb-210+D	1.000E+00	3.665E-17	7.893E-11	
U-234	∑DSR(j)		2.122E-06	2.222E-06	
U-235+D	U-235+D	1.000E+00	2.961E-04	2.961E-04	
U-235+D	Pa-231	1.000E+00	1.081E-09	2.170E-07	
U-235+D	Ac-227+D	1.000E+00	9.943E-11	1.328E-06	
U-235+D	∑DSR(j)		2.961E-04	2.976E-04	
U-238	U-238	5.400E-05	9.282E-11	9.282E-11	
U-238+D	U-238+D	9.999E-01	6.449E-05	6.449E-05	
U-238+D	U-234	9.999E-01	3.008E-12	6.045E-10	
U-238+D	Th-230	9.999E-01	8.951E-17	2.711E-12	
U-238+D	Ra-226+D	9.999E-01	1.929E-18	7.746E-12	
U-238+D	Pb-210+D	9.999E-01	2.081E-23	6.309E-15	
U-238+D	∑DSR(j)		6.449E-05	6.449E-05	

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+02
Ac-227	2.845E+04	6.866E+05
Pa-231	2.151E+05	2.612E+04
Pb-210	3.477E+06	7.782E+07
Ra-226	5.971E+03	6.225E+03
Th-230	1.139E+06	1.253E+05
U-234	1.178E+07	1.125E+07
U-235	8.444E+04	8.401E+04
U-238	*3.361E+05	*3.361E+05

*At specific activity limit

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 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)
Ac-227	1.090E+00	0.000E+00	8.787E-04	2.845E+04	8.787E-04	2.845E+04
Pa-231	1.090E+00	1.000E+02	9.570E-04	2.612E+04	1.162E-04	2.151E+05
Pb-210	2.370E+01	0.000E+00	7.191E-06	3.477E+06	7.191E-06	3.477E+06
Ra-226	2.370E+01	0.000E+00	4.187E-03	5.971E+03	4.187E-03	5.971E+03
Th-230	2.370E+01	1.000E+02	1.996E-04	1.253E+05	2.195E-05	1.139E+06
U-234	2.370E+01	1.000E+02	2.222E-06	1.125E+07	2.122E-06	1.178E+07
U-235	1.090E+00	1.000E+02	2.976E-04	8.401E+04	2.961E-04	8.444E+04
U-238	2.370E+01	1.000E+02	6.449E-05	*3.361E+05	6.449E-05	*3.361E+05

*At specific activity limit

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+02
Ac-227	Ac-227	1.000E+00	9.578E-04	3.969E-05
Ac-227	Pa-231	1.000E+00	1.533E-05	9.320E-04
Ac-227	U-235	1.000E+00	1.084E-10	1.448E-06
Ac-227	∑DOSE(j)		9.731E-04	9.731E-04
Pa-231	Pa-231	1.000E+00	1.114E-04	1.111E-04
Pa-231	U-235	1.000E+00	1.178E-09	2.366E-07
Pa-231	∑DOSE(j)		1.114E-04	1.114E-04
Pb-210	Pb-210	1.000E+00	1.704E-04	7.614E-06
Pb-210	Ra-226	1.000E+00	2.662E-06	1.603E-04
Pb-210	Th-230	1.000E+00	3.854E-10	5.137E-06
Pb-210	U-234	1.000E+00	8.687E-16	1.871E-09
Pb-210	U-238	9.999E-01	4.931E-22	1.495E-13
Pb-210	∑DOSE(j)		1.731E-04	1.731E-04
Ra-226	Ra-226	1.000E+00	9.923E-02	9.503E-02
Ra-226	Th-230	1.000E+00	2.150E-05	4.227E-03
Ra-226	U-234	1.000E+00	6.451E-11	1.926E-06
Ra-226	U-238	9.999E-01	4.572E-17	1.836E-10
Ra-226	∑DOSE(j)		9.926E-02	9.926E-02
Th-230	Th-230	1.000E+00	4.988E-04	4.983E-04
Th-230	U-234	1.000E+00	2.245E-09	4.510E-07
Th-230	U-238	9.999E-01	2.121E-15	6.425E-11
Th-230	∑DOSE(j)		4.988E-04	4.988E-04
U-234	U-234	1.000E+00	5.030E-05	5.028E-05
U-234	U-238	9.999E-01	7.129E-11	1.433E-08
U-234	∑DOSE(j)		5.030E-05	5.030E-05
U-235	U-235	1.000E+00	3.227E-04	3.227E-04
U-238	U-238	5.400E-05	2.200E-09	2.200E-09
U-238	U-238	9.999E-01	1.528E-03	1.528E-03
U-238	∑DOSE(j)		1.528E-03	1.528E-03

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+02
Ac-227	Ac-227	1.000E+00	1.090E+00	4.517E-02
Ac-227	Pa-231	1.000E+00	0.000E+00	1.043E+00
Ac-227	U-235	1.000E+00	0.000E+00	1.610E-03
Ac-227	∑S(j):		1.090E+00	1.090E+00
Pa-231	Pa-231	1.000E+00	1.090E+00	1.088E+00
Pa-231	U-235	1.000E+00	0.000E+00	2.304E-03
Pa-231	∑S(j):		1.090E+00	1.090E+00
Pb-210	Pb-210	1.000E+00	2.370E+01	1.059E+00
Pb-210	Ra-226	1.000E+00	0.000E+00	2.194E+01
Pb-210	Th-230	1.000E+00	0.000E+00	6.987E-01
Pb-210	U-234	1.000E+00	0.000E+00	2.530E-04
Pb-210	U-238	9.999E-01	0.000E+00	2.011E-08
Pb-210	∑S(j):		2.370E+01	2.370E+01
Ra-226	Ra-226	1.000E+00	2.370E+01	2.270E+01
Ra-226	Th-230	1.000E+00	0.000E+00	1.004E+00
Ra-226	U-234	1.000E+00	0.000E+00	4.553E-04
Ra-226	U-238	9.999E-01	0.000E+00	4.319E-08
Ra-226	∑S(j):		2.370E+01	2.370E+01
Th-230	Th-230	1.000E+00	2.370E+01	2.368E+01
Th-230	U-234	1.000E+00	0.000E+00	2.132E-02
Th-230	U-238	9.999E-01	0.000E+00	3.023E-06
Th-230	∑S(j):		2.370E+01	2.370E+01
U-234	U-234	1.000E+00	2.370E+01	2.369E+01
U-234	U-238	9.999E-01	0.000E+00	6.718E-03
U-234	∑S(j):		2.370E+01	2.370E+01
U-235	U-235	1.000E+00	1.090E+00	1.090E+00
U-238	U-238	5.400E-05	1.280E-03	1.280E-03
U-238	U-238	9.999E-01	2.370E+01	2.370E+01
U-238	∑S(j):		2.370E+01	2.370E+01

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

RESCALC.EXE execution time = 0.40 seconds

ATTACHMENT 15:

RADON WL, SMALL UNDERGROUND MINE, RESIDENT

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miningsm

♀

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Radon Individual Assessment
Sep 30, 2012 12:33 pm

Facility: Small undergroud mine
Address:
City:
State: CO Zip:

Source Category: stack
Source Type: Stack
Emission Year: 1995

Comments: To estimate the radon level (WL) at downwind locations from development of a small mine

Dataset Name: mining-small
Dataset Date: 9/30/2012 12:32:00 PM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Rn-222	G	0	0.00E+00	0.00E+00

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

DECAY CONSTANT (PER DAY) TRANSFER COEFFICIENT

Page 1

Nuclide	Radio-active (1)	Surface	Water	Milk (2)	Meat (3)
Rn-222	1.81E-01	5.48E-05	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES:

(1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

♀Sep 30, 2012 12:33 pm GENERAL
Page 3

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Inhalation	Ingestion
Rn-222	0.00E+00	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES: (1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

♀Sep 30, 2012 12:33 pm GENERAL
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DECAY CHAIN ACTIVITIES

Nuclide	Stack	Release Activity
Rn-222	1	5.2800E+02

♀Sep 30, 2012 12:33 pm GENERAL
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VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE
Cubic centimeters/hr 9.17E+05

SOIL PARAMETERS

Effective surface density (kg/sq m, dry weight) (Assumes 15 cm plow layer)	2.15E+02

BUILDUP TIMES

For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+02

DELAY TIMES

Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01

WEATHERING

Removal rate constant for physical loss (per hr)	2.90E-03

CROP EXPOSURE DURATION

Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03

AGRICULTURAL PRODUCTIVITY

Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01

FALLOUT INTERCEPTION FRACTIONS

Vegetables	2.00E-01
Pasture	5.70E-01

GRAZING PARAMETERS

Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass when animal grazes on pasture	4.30E-01

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS

Contaminated feed/forage (kg/day, dry weight)	1.56E+01

DAIRY PRODUCTIVITY

Milk production of cow (L/day)	1.10E+01

MEAT ANIMAL SLAUGHTER PARAMETERS

Muscle mass of animal at slaughter (kg)	2.00E+02

miningsm

Fraction of herd slaughtered (per day)	3.81E-03

DECONTAMINATION

Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01

FRACTIONS GROWN IN GARDEN OF INTEREST

Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00

INGESTION RATIOS:

IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	7.00E-01
Meat	4.40E-01
Milk	4.00E-01

MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA
(Minimum fractions of food types from outside area listed below are actual fixed values.)

Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00

HUMAN FOOD UTILIZATION FACTORS

Produce ingestion (kg/y)	1.76E+02
Milk ingestion (L/y)	1.12E+02
Meat ingestion (kg/y)	8.50E+01
Leafy vegetable ingestion (kg/y)	1.80E+01

SWIMMING PARAMETERS

Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
N	500	2.467E-04	0.29	1.019E-04
N	1000	2.106E-04	0.31	9.355E-05
N	1500	1.445E-04	0.33	6.833E-05
N	2000	1.034E-04	0.35	5.155E-05
N	2500	7.754E-05	0.37	4.054E-05
N	3000	6.044E-05	0.38	3.298E-05
N	3500	4.996E-05	0.40	2.841E-05
N	4000	4.216E-05	0.41	2.493E-05
N	4500	3.625E-05	0.43	2.219E-05
N	5000	3.163E-05	0.44	2.002E-05

N	7500	1.859E-05	0.51	1.352E-05
N	10000	1.266E-05	0.57	1.024E-05
N	15000	7.941E-06	0.65	7.374E-06
N	20000	5.691E-06	0.70	5.674E-06
N	25000	4.385E-06	0.70	4.372E-06
N	30000	3.537E-06	0.70	3.527E-06
NNW	500	3.936E-04	0.29	1.625E-04
NNW	1000	3.884E-04	0.31	1.726E-04
NNW	1500	2.628E-04	0.33	1.243E-04
NNW	2000	1.863E-04	0.35	9.288E-05
NNW	2500	1.389E-04	0.37	7.262E-05
NNW	3000	1.078E-04	0.38	5.884E-05
NNW	3500	8.913E-05	0.40	5.067E-05
NNW	4000	7.517E-05	0.41	4.446E-05
NNW	4500	6.461E-05	0.43	3.955E-05
NNW	5000	5.637E-05	0.44	3.567E-05
NNW	7500	3.310E-05	0.51	2.408E-05
NNW	10000	2.255E-05	0.57	1.823E-05
NNW	15000	1.423E-05	0.65	1.321E-05
NNW	20000	1.023E-05	0.70	1.020E-05
NNW	25000	7.907E-06	0.70	7.885E-06
NNW	30000	6.393E-06	0.70	6.375E-06
NW	500	1.279E-03	0.29	5.281E-04
NW	1000	9.842E-04	0.31	4.373E-04
NW	1500	6.273E-04	0.33	2.966E-04
NW	2000	4.325E-04	0.35	2.156E-04
NW	2500	3.175E-04	0.37	1.660E-04
NW	3000	2.440E-04	0.38	1.332E-04
NW	3500	2.008E-04	0.40	1.142E-04
NW	4000	1.688E-04	0.41	9.982E-05
NW	4500	1.446E-04	0.43	8.853E-05
NW	5000	1.259E-04	0.44	7.966E-05
NW	7500	7.332E-05	0.51	5.334E-05
NW	10000	4.970E-05	0.57	4.018E-05
NW	15000	3.121E-05	0.65	2.898E-05

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NW	20000	2.238E-05	0.70	2.231E-05
NW	25000	1.725E-05	0.70	1.720E-05
NW	30000	1.392E-05	0.70	1.388E-05
WNW	500	1.384E-03	0.29	5.716E-04
WNW	1000	8.669E-04	0.31	3.851E-04
WNW	1500	5.313E-04	0.33	2.512E-04
WNW	2000	3.600E-04	0.35	1.795E-04
WNW	2500	2.616E-04	0.37	1.368E-04
WNW	3000	1.998E-04	0.38	1.090E-04
WNW	3500	1.638E-04	0.40	9.313E-05
WNW	4000	1.372E-04	0.41	8.116E-05
WNW	4500	1.173E-04	0.43	7.180E-05
WNW	5000	1.019E-04	0.44	6.447E-05

WNW	7500	5.892E-05	0.51	4.287E-05
WNW	10000	3.978E-05	0.57	3.216E-05
WNW	15000	2.483E-05	0.65	2.305E-05
WNW	20000	1.774E-05	0.70	1.768E-05
WNW	25000	1.364E-05	0.70	1.360E-05
WNW	30000	1.098E-05	0.70	1.095E-05
W	500	3.955E-04	0.29	1.633E-04
W	1000	2.585E-04	0.31	1.148E-04
W	1500	1.618E-04	0.33	7.651E-05
W	2000	1.108E-04	0.35	5.524E-05
W	2500	8.101E-05	0.37	4.235E-05
W	3000	6.211E-05	0.38	3.389E-05
W	3500	5.093E-05	0.40	2.896E-05
W	4000	4.268E-05	0.41	2.524E-05
W	4500	3.650E-05	0.43	2.234E-05
W	5000	3.171E-05	0.44	2.007E-05
W	7500	1.836E-05	0.51	1.336E-05
W	10000	1.240E-05	0.57	1.003E-05
W	15000	7.754E-06	0.65	7.200E-06
W	20000	5.544E-06	0.70	5.528E-06
W	25000	4.265E-06	0.70	4.253E-06
W	30000	3.436E-06	0.70	3.426E-06
WSW	500	1.439E-04	0.29	5.940E-05
WSW	1000	9.782E-05	0.31	4.346E-05
WSW	1500	6.450E-05	0.33	3.050E-05
WSW	2000	4.540E-05	0.35	2.264E-05
WSW	2500	3.375E-05	0.37	1.764E-05
WSW	3000	2.615E-05	0.38	1.427E-05
WSW	3500	2.151E-05	0.40	1.223E-05
WSW	4000	1.808E-05	0.41	1.069E-05
WSW	4500	1.550E-05	0.43	9.489E-06
WSW	5000	1.350E-05	0.44	8.541E-06

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
WSW	7500	7.873E-06	0.51	5.728E-06
WSW	10000	5.342E-06	0.57	4.320E-06
WSW	15000	3.356E-06	0.65	3.116E-06
WSW	20000	2.407E-06	0.70	2.400E-06
WSW	25000	1.855E-06	0.70	1.850E-06
WSW	30000	1.497E-06	0.70	1.493E-06
SW	500	1.111E-04	0.29	4.586E-05
SW	1000	7.628E-05	0.31	3.389E-05
SW	1500	5.086E-05	0.33	2.405E-05
SW	2000	3.601E-05	0.35	1.795E-05
SW	2500	2.686E-05	0.37	1.404E-05
SW	3000	2.086E-05	0.38	1.138E-05
SW	3500	1.717E-05	0.40	9.763E-06
SW	4000	1.445E-05	0.41	8.544E-06
SW	4500	1.239E-05	0.43	7.584E-06
SW	5000	1.079E-05	0.44	6.830E-06

SW	7500	6.305E-06	0.51	4.587E-06
SW	10000	4.283E-06	0.57	3.463E-06
SW	15000	2.691E-06	0.65	2.498E-06
SW	20000	1.930E-06	0.70	1.924E-06
SW	25000	1.488E-06	0.70	1.484E-06
SW	30000	1.201E-06	0.70	1.197E-06
SSW	500	1.020E-04	0.29	4.212E-05
SSW	1000	5.669E-05	0.31	2.519E-05
SSW	1500	3.542E-05	0.33	1.675E-05
SSW	2000	2.432E-05	0.35	1.213E-05
SSW	2500	1.782E-05	0.37	9.318E-06
SSW	3000	1.368E-05	0.38	7.466E-06
SSW	3500	1.117E-05	0.40	6.349E-06
SSW	4000	9.332E-06	0.41	5.519E-06
SSW	4500	7.961E-06	0.43	4.873E-06
SSW	5000	6.904E-06	0.44	4.369E-06
SSW	7500	3.981E-06	0.51	2.896E-06
SSW	10000	2.686E-06	0.57	2.172E-06
SSW	15000	1.688E-06	0.65	1.568E-06
SSW	20000	1.212E-06	0.70	1.208E-06
SSW	25000	9.351E-07	0.70	9.324E-07
SSW	30000	7.552E-07	0.70	7.530E-07
S	500	1.872E-04	0.29	7.727E-05
S	1000	8.917E-05	0.31	3.962E-05
S	1500	5.293E-05	0.33	2.503E-05
S	2000	3.543E-05	0.35	1.766E-05
S	2500	2.558E-05	0.37	1.337E-05
S	3000	1.945E-05	0.38	1.061E-05
S	3500	1.579E-05	0.40	8.975E-06

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
S	4000	1.313E-05	0.41	7.767E-06
S	4500	1.116E-05	0.43	6.833E-06
S	5000	9.649E-06	0.44	6.106E-06
S	7500	5.510E-06	0.51	4.009E-06
S	10000	3.699E-06	0.57	2.991E-06
S	15000	2.297E-06	0.65	2.133E-06
S	20000	1.637E-06	0.70	1.632E-06
S	25000	1.257E-06	0.70	1.253E-06
S	30000	1.012E-06	0.70	1.009E-06
SSE	500	2.948E-04	0.29	1.217E-04
SSE	1000	1.297E-04	0.31	5.761E-05
SSE	1500	7.621E-05	0.33	3.604E-05
SSE	2000	5.083E-05	0.35	2.534E-05
SSE	2500	3.663E-05	0.37	1.915E-05
SSE	3000	2.782E-05	0.38	1.518E-05
SSE	3500	2.252E-05	0.40	1.281E-05
SSE	4000	1.871E-05	0.41	1.106E-05
SSE	4500	1.588E-05	0.43	9.720E-06
SSE	5000	1.371E-05	0.44	8.676E-06

SSE	7500	7.802E-06	0.51	5.676E-06
SSE	10000	5.228E-06	0.57	4.227E-06
SSE	15000	3.243E-06	0.65	3.011E-06
SSE	20000	2.309E-06	0.70	2.302E-06
SSE	25000	1.772E-06	0.70	1.767E-06
SSE	30000	1.425E-06	0.70	1.421E-06
SE	500	6.084E-04	0.29	2.512E-04
SE	1000	2.403E-04	0.31	1.068E-04
SE	1500	1.338E-04	0.33	6.326E-05
SE	2000	8.662E-05	0.35	4.318E-05
SE	2500	6.127E-05	0.37	3.204E-05
SE	3000	4.595E-05	0.38	2.508E-05
SE	3500	3.689E-05	0.40	2.097E-05
SE	4000	3.043E-05	0.41	1.800E-05
SE	4500	2.568E-05	0.43	1.572E-05
SE	5000	2.207E-05	0.44	1.397E-05
SE	7500	1.237E-05	0.51	8.996E-06
SE	10000	8.216E-06	0.57	6.643E-06
SE	15000	5.062E-06	0.65	4.701E-06
SE	20000	3.589E-06	0.70	3.579E-06
SE	25000	2.746E-06	0.70	2.738E-06
SE	30000	2.204E-06	0.70	2.198E-06
ESE	500	7.146E-04	0.29	2.950E-04
ESE	1000	3.180E-04	0.31	1.413E-04
ESE	1500	1.848E-04	0.33	8.739E-05
ESE	2000	1.224E-04	0.35	6.103E-05

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
ESE	2500	8.781E-05	0.37	4.591E-05
ESE	3000	6.648E-05	0.38	3.628E-05
ESE	3500	5.379E-05	0.40	3.058E-05
ESE	4000	4.464E-05	0.41	2.640E-05
ESE	4500	3.787E-05	0.43	2.318E-05
ESE	5000	3.269E-05	0.44	2.068E-05
ESE	7500	1.855E-05	0.51	1.350E-05
ESE	10000	1.241E-05	0.57	1.003E-05
ESE	15000	7.726E-06	0.65	7.174E-06
ESE	20000	5.515E-06	0.70	5.499E-06
ESE	25000	4.241E-06	0.70	4.229E-06
ESE	30000	3.417E-06	0.70	3.407E-06
E	500	5.473E-04	0.29	2.260E-04
E	1000	2.737E-04	0.31	1.216E-04
E	1500	1.624E-04	0.33	7.680E-05
E	2000	1.085E-04	0.35	5.411E-05
E	2500	7.825E-05	0.37	4.091E-05
E	3000	5.944E-05	0.38	3.244E-05
E	3500	4.831E-05	0.40	2.747E-05
E	4000	4.022E-05	0.41	2.379E-05
E	4500	3.421E-05	0.43	2.094E-05
E	5000	2.959E-05	0.44	1.873E-05

E	7500	1.690E-05	0.51	1.229E-05
E	10000	1.133E-05	0.57	9.160E-06
E	15000	7.076E-06	0.65	6.570E-06
E	20000	5.057E-06	0.70	5.043E-06
E	25000	3.890E-06	0.70	3.879E-06
E	30000	3.134E-06	0.70	3.125E-06
ENE	500	4.149E-04	0.29	1.713E-04
ENE	1000	2.273E-04	0.31	1.010E-04
ENE	1500	1.386E-04	0.33	6.552E-05
ENE	2000	9.382E-05	0.35	4.678E-05
ENE	2500	6.817E-05	0.37	3.564E-05
ENE	3000	5.205E-05	0.38	2.841E-05
ENE	3500	4.247E-05	0.40	2.415E-05
ENE	4000	3.548E-05	0.41	2.098E-05
ENE	4500	3.025E-05	0.43	1.852E-05
ENE	5000	2.622E-05	0.44	1.660E-05
ENE	7500	1.508E-05	0.51	1.097E-05
ENE	10000	1.014E-05	0.57	8.202E-06
ENE	15000	6.340E-06	0.65	5.887E-06
ENE	20000	4.533E-06	0.70	4.520E-06
ENE	25000	3.488E-06	0.70	3.478E-06
ENE	30000	2.810E-06	0.70	2.802E-06
NE	500	3.366E-04	0.29	1.390E-04

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NE	1000	1.904E-04	0.31	8.458E-05
NE	1500	1.209E-04	0.33	5.716E-05
NE	2000	8.367E-05	0.35	4.172E-05
NE	2500	6.163E-05	0.37	3.222E-05
NE	3000	4.749E-05	0.38	2.592E-05
NE	3500	3.893E-05	0.40	2.213E-05
NE	4000	3.264E-05	0.41	1.930E-05
NE	4500	2.792E-05	0.43	1.709E-05
NE	5000	2.426E-05	0.44	1.535E-05
NE	7500	1.406E-05	0.51	1.023E-05
NE	10000	9.498E-06	0.57	7.680E-06
NE	15000	5.895E-06	0.65	5.474E-06
NE	20000	4.197E-06	0.70	4.185E-06
NE	25000	3.220E-06	0.70	3.211E-06
NE	30000	2.590E-06	0.70	2.582E-06
NNE	500	3.325E-04	0.29	1.373E-04
NNE	1000	1.967E-04	0.31	8.741E-05
NNE	1500	1.278E-04	0.33	6.043E-05
NNE	2000	8.949E-05	0.35	4.462E-05
NNE	2500	6.636E-05	0.37	3.470E-05
NNE	3000	5.137E-05	0.38	2.803E-05
NNE	3500	4.222E-05	0.40	2.401E-05
NNE	4000	3.548E-05	0.41	2.098E-05
NNE	4500	3.040E-05	0.43	1.861E-05
NNE	5000	2.646E-05	0.44	1.674E-05

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NNE	7500	1.540E-05	0.51	1.120E-05
NNE	10000	1.043E-05	0.57	8.433E-06
NNE	15000	6.462E-06	0.65	6.000E-06
NNE	20000	4.596E-06	0.70	4.582E-06
NNE	25000	3.522E-06	0.70	3.512E-06
NNE	30000	2.830E-06	0.70	2.822E-06

ATTACHMENT 16:

RADON WL, VERY LARGE OPEN-PIT MINE, RESIDENT

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miningvl

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

G E N E R A L D A T A

Radon Individual Assessment
Sep 30, 2012 12:39 pm

Facility:
Address:
City:
State: CO Zip:

Source Category: Very large mine
Source Type: Area
Emission Year: 1995

Comments: To estimate the radon level (WL) at downwind locations from development of a very large mine

Dataset Name: mining-very larg
Dataset Date: 9/30/2012 12:39:00 PM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Rn-222	G	0	0.00E+00	0.00E+00

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

DECAY CONSTANT (PER DAY) TRANSFER COEFFICIENT
Page 1

Nuclide	Radio-active (1)	Surface	Water	Milk (2)	Meat (3)
Rn-222	1.81E-01	5.48E-05	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES:

(1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)

(2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
Nuclide	Forage (1)	Edible (2)	Inhalation	Ingestion
Rn-222	0.00E+00	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES: (1) Concentration factor for uptake of nuclide from soil for pasture and forage (in pCi/kg dry weight per pCi/kg dry soil)

(2) Concentration factor for uptake of nuclide from soil by edible parts of crops (in pCi/kg wet weight per pCi/kg dry soil)

DECAY CHAIN ACTIVITIES

Nuclide	Stack	Release Activity
Rn-222	1	6.0000E+02

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE
Cubic centimeters/hr 9.17E+05

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SOIL PARAMETERS
     Effective surface density (kg/sq m, dry weight)
     (Assumes 15 cm plow layer)                          2.15E+02


BUILDUP TIMES
     For activity in soil (years)                        1.00E+02
     For radionuclides deposited on ground/water (days) 3.65E+02


DELAY TIMES
     Ingestion of pasture grass by animals (hr)          0.00E+00
     Ingestion of stored feed by animals (hr)            2.16E+03
     Ingestion of leafy vegetables by man (hr)           3.36E+02
     Ingestion of produce by man (hr)                    3.36E+02
     Transport time from animal feed-milk-man (day)      2.00E+00
     Time from slaughter to consumption (day)            2.00E+01


WEATHERING
     Removal rate constant for physical loss (per hr)    2.90E-03


CROP EXPOSURE DURATION
     Pasture grass (hr)                                  7.20E+02
     Crops/leafy vegetables (hr)                         1.44E+03


AGRICULTURAL PRODUCTIVITY
     Grass-cow-milk-man pathway (kg/sq m)                2.80E-01
     Produce/leafy veg for human consumption (kg/sq m)  7.16E-01


FALLOUT INTERCEPTION FRACTIONS
     Vegetables                                          2.00E-01
     Pasture                                             5.70E-01


GRAZING PARAMETERS
     Fraction of year animals graze on pasture           4.00E-01
     Fraction of daily feed that is pasture grass
     when animal grazes on pasture                       4.30E-01
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VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

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ANIMAL FEED CONSUMPTION FACTORS
     Contaminated feed/forage (kg/day, dry weight)       1.56E+01


DAIRY PRODUCTIVITY
     Milk production of cow (L/day)                      1.10E+01


MEAT ANIMAL SLAUGHTER PARAMETERS
     Muscle mass of animal at slaughter (kg)             2.00E+02
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Fraction of herd slaughtered (per day)	3.81E-03

DECONTAMINATION

Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01

FRACTIONS GROWN IN GARDEN OF INTEREST

Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00

INGESTION RATIOS:

IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	7.00E-01
Meat	4.40E-01
Milk	4.00E-01

MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA

(Minimum fractions of food types from outside area listed below are actual fixed values.)	
Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00

HUMAN FOOD UTILIZATION FACTORS

Produce ingestion (kg/y)	1.76E+02
Milk ingestion (L/y)	1.12E+02
Meat ingestion (kg/y)	8.50E+01
Leafy vegetable ingestion (kg/y)	1.80E+01

SWIMMING PARAMETERS

Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
N	500	2.592E-03	0.29	1.070E-03
N	1000	5.789E-04	0.31	2.572E-04
N	1500	2.694E-04	0.33	1.274E-04
N	2000	1.634E-04	0.35	8.145E-05
N	2500	1.132E-04	0.37	5.919E-05
N	3000	8.388E-05	0.38	4.578E-05
N	3500	6.811E-05	0.40	3.873E-05
N	4000	5.653E-05	0.41	3.343E-05
N	4500	4.796E-05	0.43	2.936E-05
N	5000	4.139E-05	0.44	2.619E-05

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N	7500	2.347E-05	0.51	1.707E-05
N	10000	1.567E-05	0.57	1.267E-05
N	15000	9.765E-06	0.65	9.067E-06
N	20000	6.967E-06	0.70	6.947E-06
N	25000	5.350E-06	0.70	5.335E-06
N	30000	4.305E-06	0.70	4.292E-06
NNW	500	4.396E-03	0.29	1.815E-03
NNW	1000	1.038E-03	0.31	4.614E-04
NNW	1500	4.732E-04	0.33	2.238E-04
NNW	2000	2.855E-04	0.35	1.423E-04
NNW	2500	1.979E-04	0.37	1.035E-04
NNW	3000	1.467E-04	0.38	8.008E-05
NNW	3500	1.193E-04	0.40	6.784E-05
NNW	4000	9.912E-05	0.41	5.862E-05
NNW	4500	8.415E-05	0.43	5.151E-05
NNW	5000	7.269E-05	0.44	4.600E-05
NNW	7500	4.133E-05	0.51	3.006E-05
NNW	10000	2.765E-05	0.57	2.236E-05
NNW	15000	1.734E-05	0.65	1.610E-05
NNW	20000	1.242E-05	0.70	1.238E-05
NNW	25000	9.568E-06	0.70	9.541E-06
NNW	30000	7.718E-06	0.70	7.695E-06
NW	500	5.538E-03	0.29	2.287E-03
NW	1000	1.698E-03	0.31	7.545E-04
NW	1500	9.750E-04	0.33	4.610E-04
NW	2000	6.215E-04	0.35	3.098E-04
NW	2500	4.309E-04	0.37	2.253E-04
NW	3000	3.195E-04	0.38	1.743E-04
NW	3500	2.596E-04	0.40	1.476E-04
NW	4000	2.156E-04	0.41	1.275E-04
NW	4500	1.830E-04	0.43	1.120E-04
NW	5000	1.580E-04	0.44	9.998E-05
NW	7500	8.971E-05	0.51	6.527E-05
NW	10000	5.996E-05	0.57	4.848E-05
NW	15000	3.748E-05	0.65	3.480E-05

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NW	20000	2.678E-05	0.70	2.671E-05
NW	25000	2.060E-05	0.70	2.054E-05
NW	30000	1.659E-05	0.70	1.654E-05
WNW	500	5.073E-03	0.29	2.094E-03
WNW	1000	1.458E-03	0.31	6.476E-04
WNW	1500	7.926E-04	0.33	3.748E-04
WNW	2000	4.989E-04	0.35	2.487E-04
WNW	2500	3.457E-04	0.37	1.807E-04
WNW	3000	2.561E-04	0.38	1.397E-04
WNW	3500	2.077E-04	0.40	1.181E-04
WNW	4000	1.723E-04	0.41	1.019E-04
WNW	4500	1.461E-04	0.43	8.941E-05
WNW	5000	1.260E-04	0.44	7.975E-05

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WNW	7500	7.134E-05	0.51	5.190E-05
WNW	10000	4.759E-05	0.57	3.848E-05
WNW	15000	2.959E-05	0.65	2.748E-05
WNW	20000	2.108E-05	0.70	2.102E-05
WNW	25000	1.618E-05	0.70	1.613E-05
WNW	30000	1.301E-05	0.70	1.297E-05
W	500	3.114E-03	0.29	1.286E-03
W	1000	6.622E-04	0.31	2.942E-04
W	1500	2.721E-04	0.33	1.287E-04
W	2000	1.588E-04	0.35	7.920E-05
W	2500	1.099E-04	0.37	5.745E-05
W	3000	8.130E-05	0.38	4.437E-05
W	3500	6.584E-05	0.40	3.744E-05
W	4000	5.455E-05	0.41	3.226E-05
W	4500	4.621E-05	0.43	2.829E-05
W	5000	3.984E-05	0.44	2.521E-05
W	7500	2.249E-05	0.51	1.636E-05
W	10000	1.498E-05	0.57	1.211E-05
W	15000	9.323E-06	0.65	8.657E-06
W	20000	6.646E-06	0.70	6.627E-06
W	25000	5.101E-06	0.70	5.086E-06
W	30000	4.102E-06	0.70	4.090E-06
WSW	500	1.357E-03	0.29	5.602E-04
WSW	1000	2.724E-04	0.31	1.210E-04
WSW	1500	1.186E-04	0.33	5.607E-05
WSW	2000	7.038E-05	0.35	3.509E-05
WSW	2500	4.862E-05	0.37	2.542E-05
WSW	3000	3.594E-05	0.38	1.961E-05
WSW	3500	2.908E-05	0.40	1.653E-05
WSW	4000	2.408E-05	0.41	1.424E-05
WSW	4500	2.038E-05	0.43	1.248E-05
WSW	5000	1.756E-05	0.44	1.111E-05

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
WSW	7500	9.904E-06	0.51	7.205E-06
WSW	10000	6.595E-06	0.57	5.332E-06
WSW	15000	4.116E-06	0.65	3.822E-06
WSW	20000	2.939E-06	0.70	2.931E-06
WSW	25000	2.259E-06	0.70	2.252E-06
WSW	30000	1.818E-06	0.70	1.813E-06
SW	500	7.386E-04	0.29	3.049E-04
SW	1000	1.790E-04	0.31	7.953E-05
SW	1500	9.154E-05	0.33	4.328E-05
SW	2000	5.669E-05	0.35	2.826E-05
SW	2500	3.916E-05	0.37	2.047E-05
SW	3000	2.894E-05	0.38	1.579E-05
SW	3500	2.342E-05	0.40	1.332E-05
SW	4000	1.939E-05	0.41	1.147E-05
SW	4500	1.641E-05	0.43	1.005E-05
SW	5000	1.414E-05	0.44	8.948E-06

SW	7500	7.973E-06	0.51	5.801E-06
SW	10000	5.309E-06	0.57	4.293E-06
SW	15000	3.313E-06	0.65	3.076E-06
SW	20000	2.365E-06	0.70	2.358E-06
SW	25000	1.817E-06	0.70	1.812E-06
SW	30000	1.463E-06	0.70	1.458E-06
SSW	500	6.328E-04	0.29	2.613E-04
SSW	1000	1.399E-04	0.31	6.217E-05
SSW	1500	6.145E-05	0.33	2.906E-05
SSW	2000	3.641E-05	0.35	1.815E-05
SSW	2500	2.504E-05	0.37	1.309E-05
SSW	3000	1.844E-05	0.38	1.006E-05
SSW	3500	1.485E-05	0.40	8.442E-06
SSW	4000	1.224E-05	0.41	7.242E-06
SSW	4500	1.033E-05	0.43	6.325E-06
SSW	5000	8.879E-06	0.44	5.619E-06
SSW	7500	4.968E-06	0.51	3.614E-06
SSW	10000	3.296E-06	0.57	2.665E-06
SSW	15000	2.059E-06	0.65	1.912E-06
SSW	20000	1.472E-06	0.70	1.468E-06
SSW	25000	1.132E-06	0.70	1.129E-06
SSW	30000	9.123E-07	0.70	9.097E-07
S	500	7.144E-04	0.29	2.949E-04
S	1000	1.693E-04	0.31	7.520E-05
S	1500	8.208E-05	0.33	3.881E-05
S	2000	4.994E-05	0.35	2.490E-05
S	2500	3.432E-05	0.37	1.794E-05
S	3000	2.527E-05	0.38	1.379E-05
S	3500	2.030E-05	0.40	1.154E-05

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
S	4000	1.671E-05	0.41	9.885E-06
S	4500	1.409E-05	0.43	8.623E-06
S	5000	1.209E-05	0.44	7.653E-06
S	7500	6.746E-06	0.51	4.907E-06
S	10000	4.468E-06	0.57	3.613E-06
S	15000	2.763E-06	0.65	2.566E-06
S	20000	1.963E-06	0.70	1.958E-06
S	25000	1.504E-06	0.70	1.500E-06
S	30000	1.208E-06	0.70	1.205E-06
SSE	500	1.050E-03	0.29	4.336E-04
SSE	1000	2.505E-04	0.31	1.113E-04
SSE	1500	1.189E-04	0.33	5.622E-05
SSE	2000	7.185E-05	0.35	3.582E-05
SSE	2500	4.930E-05	0.37	2.578E-05
SSE	3000	3.625E-05	0.38	1.978E-05
SSE	3500	2.905E-05	0.40	1.652E-05
SSE	4000	2.388E-05	0.41	1.412E-05
SSE	4500	2.010E-05	0.43	1.230E-05
SSE	5000	1.723E-05	0.44	1.091E-05

SSE	7500	9.576E-06	0.51	6.966E-06
SSE	10000	6.330E-06	0.57	5.118E-06
SSE	15000	3.909E-06	0.65	3.630E-06
SSE	20000	2.775E-06	0.70	2.767E-06
SSE	25000	2.125E-06	0.70	2.119E-06
SSE	30000	1.706E-06	0.70	1.701E-06
SE	500	1.526E-03	0.29	6.302E-04
SE	1000	3.874E-04	0.31	1.721E-04
SE	1500	1.890E-04	0.33	8.935E-05
SE	2000	1.145E-04	0.35	5.709E-05
SE	2500	7.832E-05	0.37	4.095E-05
SE	3000	5.744E-05	0.38	3.135E-05
SE	3500	4.580E-05	0.40	2.604E-05
SE	4000	3.752E-05	0.41	2.219E-05
SE	4500	3.149E-05	0.43	1.927E-05
SE	5000	2.693E-05	0.44	1.704E-05
SE	7500	1.484E-05	0.51	1.080E-05
SE	10000	9.767E-06	0.57	7.897E-06
SE	15000	6.001E-06	0.65	5.572E-06
SE	20000	4.246E-06	0.70	4.234E-06
SE	25000	3.244E-06	0.70	3.234E-06
SE	30000	2.600E-06	0.70	2.593E-06
ESE	500	1.838E-03	0.29	7.589E-04
ESE	1000	5.112E-04	0.31	2.271E-04
ESE	1500	2.723E-04	0.33	1.288E-04
ESE	2000	1.691E-04	0.35	8.432E-05

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
ESE	2500	1.161E-04	0.37	6.068E-05
ESE	3000	8.536E-05	0.38	4.658E-05
ESE	3500	6.842E-05	0.40	3.890E-05
ESE	4000	5.627E-05	0.41	3.328E-05
ESE	4500	4.737E-05	0.43	2.900E-05
ESE	5000	4.063E-05	0.44	2.571E-05
ESE	7500	2.258E-05	0.51	1.643E-05
ESE	10000	1.492E-05	0.57	1.206E-05
ESE	15000	9.251E-06	0.65	8.590E-06
ESE	20000	6.586E-06	0.70	6.567E-06
ESE	25000	5.054E-06	0.70	5.039E-06
ESE	30000	4.065E-06	0.70	4.054E-06
E	500	1.912E-03	0.29	7.896E-04
E	1000	4.931E-04	0.31	2.191E-04
E	1500	2.459E-04	0.33	1.163E-04
E	2000	1.508E-04	0.35	7.518E-05
E	2500	1.038E-04	0.37	5.425E-05
E	3000	7.647E-05	0.38	4.173E-05
E	3500	6.153E-05	0.40	3.499E-05
E	4000	5.074E-05	0.41	3.001E-05
E	4500	4.282E-05	0.43	2.621E-05
E	5000	3.679E-05	0.44	2.328E-05

E	7500	2.056E-05	0.51	1.496E-05
E	10000	1.361E-05	0.57	1.101E-05
E	15000	8.467E-06	0.65	7.862E-06
E	20000	6.035E-06	0.70	6.017E-06
E	25000	4.632E-06	0.70	4.619E-06
E	30000	3.726E-06	0.70	3.715E-06
ENE	500	1.748E-03	0.29	7.217E-04
ENE	1000	4.374E-04	0.31	1.943E-04
ENE	1500	2.171E-04	0.33	1.027E-04
ENE	2000	1.333E-04	0.35	6.644E-05
ENE	2500	9.190E-05	0.37	4.805E-05
ENE	3000	6.785E-05	0.38	3.702E-05
ENE	3500	5.473E-05	0.40	3.112E-05
ENE	4000	4.522E-05	0.41	2.675E-05
ENE	4500	3.822E-05	0.43	2.340E-05
ENE	5000	3.288E-05	0.44	2.081E-05
ENE	7500	1.845E-05	0.51	1.342E-05
ENE	10000	1.225E-05	0.57	9.904E-06
ENE	15000	7.621E-06	0.65	7.077E-06
ENE	20000	5.432E-06	0.70	5.417E-06
ENE	25000	4.170E-06	0.70	4.158E-06
ENE	30000	3.353E-06	0.70	3.344E-06
NE	500	1.678E-03	0.29	6.928E-04

EXPOSURE LEVELS FOR SHORT-LIFE PROGENY OF RN-222
AT VARIOUS LOCATIONS IN THE ENVIRONMENT

Wind Toward	Distance (Meters)	Exposure Level (Person WL) (.7 EQF)	Adjusted Equilibrium Fraction	Adjusted Exposure Level
NE	1000	4.140E-04	0.31	1.839E-04
NE	1500	2.035E-04	0.33	9.622E-05
NE	2000	1.248E-04	0.35	6.224E-05
NE	2500	8.628E-05	0.37	4.511E-05
NE	3000	6.380E-05	0.38	3.482E-05
NE	3500	5.156E-05	0.40	2.932E-05
NE	4000	4.266E-05	0.41	2.523E-05
NE	4500	3.609E-05	0.43	2.209E-05
NE	5000	3.108E-05	0.44	1.967E-05
NE	7500	1.748E-05	0.51	1.272E-05
NE	10000	1.162E-05	0.57	9.395E-06
NE	15000	7.176E-06	0.65	6.663E-06
NE	20000	5.092E-06	0.70	5.078E-06
NE	25000	3.897E-06	0.70	3.885E-06
NE	30000	3.127E-06	0.70	3.118E-06
NNE	500	1.830E-03	0.29	7.554E-04
NNE	1000	4.464E-04	0.31	1.983E-04
NNE	1500	2.219E-04	0.33	1.049E-04
NNE	2000	1.367E-04	0.35	6.813E-05
NNE	2500	9.456E-05	0.37	4.944E-05
NNE	3000	6.998E-05	0.38	3.819E-05
NNE	3500	5.664E-05	0.40	3.220E-05
NNE	4000	4.690E-05	0.41	2.774E-05
NNE	4500	3.971E-05	0.43	2.431E-05
NNE	5000	3.422E-05	0.44	2.166E-05

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NNE	7500	1.929E-05	0.51	1.403E-05
NNE	10000	1.283E-05	0.57	1.038E-05
NNE	15000	7.909E-06	0.65	7.344E-06
NNE	20000	5.604E-06	0.70	5.588E-06
NNE	25000	4.283E-06	0.70	4.271E-06
NNE	30000	3.434E-06	0.70	3.424E-06

ATTACHMENT 17:

POPULATION DISTRIBUTIONS

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Radius in Kilometers from Group 1 Centroid

Quadrant	Total in Quadrant	0.1	0.5	1	2	3	4	5	10	20	30	40	50	60	70	80
NNW-N	2,120	0	0	0	0	0	0	0	8	34	57	79	105	123	778	936
NW-NNW	594	0	0	0	0	0	0	0	8	34	64	145	211	44	41	47
WNW-NW	594	0	0	0	0	0	0	0	8	34	112	175	142	35	41	47
W-WNW	1,384	0	0	0	0	0	0	0	8	38	125	175	203	161	627	47
WSW-W	6,157	0	0	0	0	0	0	0	8	37	125	156	163	929	4,662	77
SW-WSW	437	0	0	0	0	0	0	0	8	34	58	43	55	67	80	92
SSW-SW	467	0	0	0	0	0	0	0	8	35	58	64	63	67	80	92
S-SSW	712	0	0	0	0	0	0	0	8	35	59	82	106	127	141	154
SSE-S	772	0	0	0	0	0	0	0	8	35	59	90	106	133	158	183
SE-SSE	1,174	0	0	0	0	0	0	0	8	35	69	207	268	200	199	188
ESE-SE	1,909	0	0	0	0	0	0	0	8	34	77	206	274	333	444	533
E-ESE	7,146	0	0	0	0	0	0	0	8	34	57	81	221	286	561	5,898
ENE-E	14,478	0	0	0	0	0	0	0	8	34	57	79	291	419	6,668	6,922
NE-ENE	3,135	0	0	0	0	0	0	0	8	34	57	79	322	1,106	927	602
NNE-NE	108,387	0	0	0	0	0	0	0	8	34	57	79	154	66,187	39,673	2,195
N-NNE	29,007	0	0	0	0	0	0	0	8	34	57	79	121	13,695	12,994	2,019
Total	178,473	0	0	0	0	0	0	0	128	555	1,148	1,819	2,805	83,912	68,074	20,032

Radius in Kilometers from Group 2 Centroid

Quadrant	Total in Quadrant	0.1	0.5	1	2	3	4	5	10	20	30	40	50	60	70	80
NNW-N	758	0	0	0	0	0	0	0	9	35	57	79	102	124	157	195
NW-NNW	1,084	0	0	0	0	0	0	0	9	35	57	85	163	250	314	171
WNW-NW	1,506	0	0	0	0	0	0	0	9	35	57	130	223	275	383	394
W-WNW	6,098	0	0	0	0	0	0	0	9	35	49	43	63	108	434	5,357
WSW-W	428	0	0	0	0	0	0	0	9	35	50	43	55	67	80	89
SW-WSW	1,783	0	0	0	0	0	0	0	9	35	58	50	55	67	80	1,429
SSW-SW	1,074	0	0	0	0	0	0	0	9	35	59	84	87	85	82	633
S-SSW	1,565	0	0	0	0	0	0	0	9	35	60	85	110	106	861	299
SSE-S	628	0	0	0	0	0	0	0	9	35	60	85	110	105	104	120
SE-SSE	735	0	0	0	0	0	0	0	9	38	59	85	110	132	130	172
ESE-SE	1,331	0	0	0	0	0	0	0	20	97	120	132	143	152	232	435
E-ESE	2,453	0	0	0	0	0	0	0	19	97	164	218	249	402	539	765
ENE-E	25,496	0	0	0	0	0	0	0	9	89	162	197	235	456	1,828	22,520
NE-ENE	13,170	0	0	0	0	0	0	0	9	62	101	96	212	351	904	11,435
NNE-NE	2,707	0	0	0	0	0	0	0	9	35	57	79	104	214	779	1,430
N-NNE	25,841	0	0	0	0	0	0	0	9	35	57	79	102	124	147	25,288
Total	86,657	0	0	0	0	0	0	0	165	768	1,227	1,570	2,123	3,018	7,054	70,732

Radius in Kilometers from Group 3 Centroid

Quadrant	Total in Quadrant	0.1	0.5	1	2	3	4	5	10	20	30	40	50	60	70	80
NNW-N	800	0	0	0	0	0	0	0	9	35	59	80	102	125	167	223
NW-NNW	1,254	0	0	0	0	0	0	0	9	35	59	76	158	261	325	331
WNW-NW	5,611	0	0	0	0	0	0	0	9	35	55	45	61	139	226	5,041
W-WNW	421	0	0	0	0	0	0	0	9	35	43	43	55	67	80	89
WSW-W	387	0	0	0	0	0	0	0	9	35	41	43	55	67	80	57
SW-WSW	2,389	0	0	0	0	0	0	0	9	36	55	45	55	180	1,925	84
SSW-SW	490	0	0	0	0	0	0	0	9	37	61	80	67	71	80	85
S-SSW	1,836	0	0	0	0	0	0	0	9	37	61	77	402	696	195	359
SSE-S	1,030	0	0	0	0	0	0	0	9	37	61	75	72	88	206	482
SE-SSE	692	0	0	0	0	0	0	0	9	37	61	85	88	89	104	219
ESE-SE	976	0	0	0	0	0	0	0	9	36	61	85	110	129	249	297
E-ESE	1,453	0	0	0	0	0	0	0	9	35	73	117	143	175	321	580
ENE-E	4,229	0	0	0	0	0	0	0	9	58	143	198	266	397	723	2,435
NE-ENE	3,362	0	0	0	0	0	0	0	9	82	165	227	232	287	416	1,944
NNE-NE	1,406	0	0	0	0	0	0	0	9	63	109	144	106	151	297	527
N-NNE	726	0	0	0	0	0	0	0	9	35	59	80	102	124	147	170
Total	27,062	0	0	0	0	0	0	0	144	668	1,166	1,500	2,074	3,046	5,541	12,923

Radius in Kilometers from Group 4 Centroid

Quadrant	Total in Quadrant	0.1	0.5	1	2	3	4	5	10	20	30	40	50	60	70	80
NNW-N	955	0	0	0	0	0	0	0	9	36	55	68	79	114	270	324
NW-NNW	1,235	0	0	0	0	0	0	0	9	26	31	43	55	67	149	855
WNW-NW	390	0	0	0	0	0	0	0	9	19	31	43	55	67	79	87
W-WNW	254	0	0	0	0	0	0	0	8	18	31	43	55	55	23	21
WSW-W	2,082	0	0	0	0	0	0	0	8	18	31	1,168	766	50	21	20
SW-WSW	4,491	0	0	0	0	0	0	0	9	19	31	174	55	860	3,323	20
SSW-SW	839	0	0	0	0	0	0	0	9	26	31	43	55	37	186	452
S-SSW	1,459	0	0	0	0	0	0	0	9	27	88	52	91	181	251	760
SSE-S	7,793	0	0	0	0	0	0	0	9	28	866	118	237	342	748	5,445
SE-SSE	7,681	0	0	0	0	0	0	0	9	30	40	56	103	297	760	6,386
ESE-SE	768	0	0	0	0	0	0	0	9	36	47	56	72	88	166	294
E-ESE	866	0	0	0	0	0	0	0	9	37	61	83	100	117	145	314
ENE-E	982	0	0	0	0	0	0	0	9	37	61	85	115	158	200	317
NE-ENE	1,548	0	0	0	0	0	0	0	9	37	60	83	204	307	405	443
NNE-NE	1,086	0	0	0	0	0	0	0	9	36	59	82	193	251	255	201
N-NNE	737	0	0	0	0	0	0	0	9	36	59	82	106	128	147	170
Total	33,166	0	0	0	0	0	0	0	142	466	1,582	2,279	2,341	3,119	7,128	16,109

ATTACHMENT 18:

COLLECTIVE RADON WL, UNDERGROUND MINES, GROUP 1, ALTERNATIVE 3

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Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Radon Population Assessment
Oct 1, 2012 09:54 amm

Facility: All underground mining
Address:
City:
State: CO Zip:

Source Category: All underground
Source Type: Stack
Emission Year: 1995

Comments: To estimate the collective person-WL from underground mining based on group 1 population

Dataset Name: pop-under-g1
Dataset Date: 10/1/2012 9:54:00 AM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

Population File: C:\CAP88PC-30\program files\Poplib\ulp-1.pop

♀

Oct 1, 2012 09:54 amm SUMMARY
Page 1

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)	Collective Population (person-rem/y)
INGESTION	0.00E+00	0.00E+00
INHALATION	3.16E+00	9.86E+00
AIR IMMERSION	2.86E-04	8.90E-04
GROUND SURFACE	0.00E+00	0.00E+00
INTERNAL	3.16E+00	9.86E+00
EXTERNAL	2.86E-04	8.90E-04

Page 1

TOTAL	3.16E+00	9.86E+00

Radon Decay Product Concentration (working level)

	7.54E-04	3.20E+00

No Ground Surface Concentration or Ingestion Rate
Exposures for RN-222

♀
Oct 1, 2012 09:54 amm SUMMARY
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Nuclides	Selected Individual (mrem/y)	Collective Population (person-rem/y)
Rn-222	3.16E+00	9.86E+00
TOTAL	3.16E+00	9.86E+00

Radon Decay Product Concentration (working level)

	7.54E-04	3.20E+00

♀
Oct 1, 2012 09:54 amm SUMMARY
Page 3

CANCER RISK SUMMARY

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	5.46E-02
Total Fatal Risk All Exposures	1.03E-03	5.60E-02

♀
Oct 1, 2012 09:54 amm SUMMARY
Page 4

PATHWAY RISK SUMMARY

	Selected Individual	Total Collective Population Fatal

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Pathway	Total Lifetime Fatal Cancer Risk	Cancer Risk (Deaths/y)
INGESTION	0.00E+00	0.00E+00
INHALATION	3.58E-05	1.12E-01
AIR IMMERSION	6.82E-09	2.13E-05
GROUND SURFACE	0.00E+00	0.00E+00
INTERNAL	3.58E-05	1.12E-01
EXTERNAL	6.82E-09	2.13E-05
TOTAL	3.59E-05	1.12E-01

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	5.46E-02
Total Fatal Risk All Exposures	1.03E-03	5.60E-02

♀
Oct 1, 2012 09:54 amm SUMMARY
Page 5

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk (Deaths/y)
Rn-222	3.59E-05	1.45E-03
TOTAL	3.59E-05	1.45E-03

♀
Oct 1, 2012 09:54 amm SUMMARY
Page 6

NUCLIDE RISK SUMMARY
(Continued)

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	5.46E-02
Total Fatal Risk All Exposures	1.03E-03	5.60E-02

♀
Oct 1, 2012 09:54 amm SUMMARY
Page 7

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-01
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.2E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.9E-01
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-01
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-01
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-01
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.3E-01
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-01
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E-01
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.5E-01
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.1E-01
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.7E-01

	Distance (m)						
Direction	15000	25000	35000	45000	55000	65000	75000
N	3.4E-01	1.9E-01	1.3E-01	9.4E-02	7.3E-02	5.9E-02	4.9E-02
NNW	6.1E-01	3.4E-01	2.3E-01	1.7E-01	1.3E-01	1.1E-01	9.1E-02
NW	1.3E+00	7.4E-01	5.0E-01	3.7E-01	2.9E-01	2.3E-01	1.9E-01
WNW	1.1E+00	5.9E-01	3.9E-01	2.9E-01	2.3E-01	1.8E-01	1.5E-01
W	3.3E-01	1.8E-01	1.2E-01	9.1E-02	7.1E-02	5.7E-02	4.8E-02
WSW	1.4E-01	8.0E-02	5.4E-02	4.0E-02	3.1E-02	2.5E-02	2.1E-02
SW	1.2E-01	6.4E-02	4.3E-02	3.2E-02	2.5E-02	2.0E-02	1.7E-02
SSW	7.3E-02	4.0E-02	2.7E-02	2.0E-02	1.6E-02	1.3E-02	1.1E-02
S	9.9E-02	5.4E-02	3.6E-02	2.7E-02	2.1E-02	1.7E-02	1.4E-02
SSE	1.4E-01	7.6E-02	5.1E-02	3.8E-02	2.9E-02	2.4E-02	2.0E-02
SE	2.2E-01	1.2E-01	7.9E-02	5.8E-02	4.5E-02	3.6E-02	3.0E-02
ESE	3.3E-01	1.8E-01	1.2E-01	9.0E-02	7.1E-02	5.7E-02	4.8E-02
E	3.0E-01	1.7E-01	1.1E-01	8.3E-02	6.5E-02	5.2E-02	4.4E-02
ENE	2.7E-01	1.5E-01	1.0E-01	7.4E-02	5.8E-02	4.7E-02	3.9E-02
NE	2.5E-01	1.4E-01	9.3E-02	6.8E-02	5.3E-02	4.3E-02	3.6E-02
NNE	2.8E-01	1.5E-01	1.0E-01	7.4E-02	5.8E-02	4.7E-02	3.9E-02

COLLECTIVE EFFECTIVE DOSE EQUIVALENT (person rem/y)
(All Radionuclides and Pathways)

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Direction	Distance (m) 250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.4E-03
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-02
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-02
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-02
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.3E-03
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-03
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-03
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-03
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-03
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-03
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.3E-03
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.4E-03
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.8E-03
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.2E-03
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.9E-03
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.3E-03

Direction	Distance (m) 15000	25000	35000	45000	55000	65000	75000
N	1.2E-02	1.1E-02	1.0E-02	9.8E-03	9.0E-03	4.6E-02	4.6E-02
NNW	2.1E-02	2.2E-02	3.3E-02	3.6E-02	5.9E-03	4.4E-03	4.3E-03
NW	4.6E-02	8.3E-02	8.7E-02	5.2E-02	1.0E-02	9.6E-03	9.1E-03
WNW	4.1E-02	7.3E-02	6.9E-02	5.9E-02	3.6E-02	1.2E-01	7.2E-03
W	1.2E-02	2.3E-02	1.9E-02	1.5E-02	6.6E-02	2.7E-01	3.7E-03
WSW	4.9E-03	4.6E-03	2.3E-03	2.2E-03	2.1E-03	2.0E-03	1.9E-03
SW	4.1E-03	3.7E-03	2.8E-03	2.0E-03	1.7E-03	1.6E-03	1.5E-03
SSW	2.5E-03	2.4E-03	2.2E-03	2.1E-03	2.0E-03	1.8E-03	1.6E-03
S	3.5E-03	3.2E-03	3.3E-03	2.8E-03	2.8E-03	2.7E-03	2.6E-03
SSE	4.9E-03	5.3E-03	1.1E-02	1.0E-02	5.9E-03	4.7E-03	3.7E-03
SE	7.4E-03	9.1E-03	1.6E-02	1.6E-02	1.5E-02	1.6E-02	1.6E-02
ESE	1.1E-02	1.0E-02	9.9E-03	2.0E-02	2.0E-02	3.2E-02	2.8E-01
E	1.0E-02	9.5E-03	8.9E-03	2.4E-02	2.7E-02	3.5E-01	3.0E-01
ENE	9.3E-03	8.6E-03	7.9E-03	2.4E-02	6.4E-02	4.4E-02	2.4E-02
NE	8.6E-03	7.9E-03	7.3E-03	1.0E-02	3.5E+00	1.7E+00	7.9E-02
NNE	9.5E-03	8.6E-03	8.0E-03	9.0E-03	7.9E-01	6.1E-01	7.9E-02

♀
Oct 1, 2012 09:54 amm SUMMARY
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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 250	750	1500	2500	3500	4500	7500

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N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.5E-04
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.9E-04
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-04
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-04
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.5E-05
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.4E-05
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.4E-05
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-04
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-04
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-04
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-04
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-04
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-04

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	1.4E-04	8.1E-05	5.4E-05	4.0E-05	3.1E-05	2.5E-05	2.1E-05
NNW	2.5E-04	1.5E-04	9.9E-05	7.3E-05	5.7E-05	4.7E-05	3.9E-05
NW	5.4E-04	3.2E-04	2.1E-04	1.6E-04	1.2E-04	1.0E-04	8.4E-05
WNW	4.3E-04	2.5E-04	1.7E-04	1.2E-04	9.7E-05	7.9E-05	6.6E-05
W	1.3E-04	7.9E-05	5.3E-05	3.9E-05	3.0E-05	2.5E-05	2.1E-05
WSW	5.8E-05	3.4E-05	2.3E-05	1.7E-05	1.3E-05	1.1E-05	9.0E-06
SW	4.6E-05	2.8E-05	1.8E-05	1.4E-05	1.1E-05	8.7E-06	7.2E-06
SSW	2.9E-05	1.7E-05	1.2E-05	8.6E-06	6.7E-06	5.5E-06	4.6E-06
S	4.0E-05	2.3E-05	1.6E-05	1.1E-05	8.9E-06	7.3E-06	6.1E-06
SSE	5.6E-05	3.3E-05	2.2E-05	1.6E-05	1.3E-05	1.0E-05	8.5E-06
SE	8.7E-05	5.1E-05	3.4E-05	2.5E-05	1.9E-05	1.6E-05	1.3E-05
ESE	1.3E-04	7.8E-05	5.2E-05	3.9E-05	3.0E-05	2.5E-05	2.1E-05
E	1.2E-04	7.2E-05	4.8E-05	3.5E-05	2.8E-05	2.3E-05	1.9E-05
ENE	1.1E-04	6.4E-05	4.3E-05	3.2E-05	2.5E-05	2.0E-05	1.7E-05
NE	1.0E-04	6.0E-05	4.0E-05	2.9E-05	2.3E-05	1.9E-05	1.5E-05
NNE	1.1E-04	6.5E-05	4.3E-05	3.2E-05	2.5E-05	2.0E-05	1.7E-05

COLLECTIVE FATAL CANCER RATE (deaths/y)
(All Radionuclides and Pathways)

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.6E-05
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.6E-05
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-04

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WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.2E-05
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.6E-05
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-05
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.9E-06
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.6E-06
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.7E-06
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-05
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-05
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.6E-05
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-05
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-05
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-05
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-05

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	6.0E-05	6.0E-05	5.6E-05	5.5E-05	5.0E-05	2.6E-04	2.6E-04
NNW	1.1E-04	1.2E-04	1.9E-04	2.0E-04	3.3E-05	2.5E-05	2.4E-05
NW	2.4E-04	4.6E-04	4.9E-04	2.9E-04	5.6E-05	5.3E-05	5.1E-05
WNW	2.1E-04	4.1E-04	3.8E-04	3.3E-04	2.0E-04	6.4E-04	4.0E-05
W	6.4E-05	1.3E-04	1.1E-04	8.2E-05	3.7E-04	1.5E-03	2.0E-05
WSW	2.5E-05	2.6E-05	1.3E-05	1.2E-05	1.2E-05	1.1E-05	1.1E-05
SW	2.1E-05	2.1E-05	1.5E-05	1.1E-05	9.3E-06	9.0E-06	8.6E-06
SSW	1.3E-05	1.3E-05	1.2E-05	1.2E-05	1.1E-05	1.0E-05	9.1E-06
S	1.8E-05	1.8E-05	1.8E-05	1.6E-05	1.5E-05	1.5E-05	1.4E-05
SSE	2.5E-05	2.9E-05	5.9E-05	5.6E-05	3.3E-05	2.6E-05	2.1E-05
SE	3.8E-05	5.1E-05	9.0E-05	8.8E-05	8.3E-05	9.0E-05	9.0E-05
ESE	5.9E-05	5.8E-05	5.5E-05	1.1E-04	1.1E-04	1.8E-04	1.6E-03
E	5.4E-05	5.3E-05	4.9E-05	1.3E-04	1.5E-04	1.9E-03	1.7E-03
ENE	4.8E-05	4.8E-05	4.4E-05	1.3E-04	3.6E-04	2.4E-04	1.3E-04
NE	4.5E-05	4.4E-05	4.1E-05	5.8E-05	2.0E-02	9.5E-03	4.4E-04
NNE	4.9E-05	4.8E-05	4.4E-05	5.0E-05	4.4E-03	3.4E-03	4.4E-04

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ATTACHMENT 19:

COLLECTIVE RADON WL, UNDERGROUND MINES, GROUP 2, ALTERNATIVE 3

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Radon Population Assessment
Oct 1, 2012 09:55 amm

Facility: Underground mines
Address:
City:
State: CO Zip:

Source Category: underground mines
Source Type: Stack
Emission Year: 1995

Comments: To estimate the collective person-WL from
underground mining based on group 2 population

Dataset Name: pop-under-g2
Dataset Date: 10/1/2012 9:55:00 AM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

Population File: C:\CAP88PC-30\program files\Poplib\ulp-2.pop

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PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)	Collective Population (person-rem/y)
INGESTION	0.00E+00	0.00E+00
INHALATION	3.16E+00	5.31E+00
AIR IMMERSION	2.86E-04	4.79E-04
GROUND SURFACE	0.00E+00	0.00E+00
INTERNAL	3.16E+00	5.31E+00
EXTERNAL	2.86E-04	4.79E-04

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TOTAL	3.16E+00	5.31E+00

Radon Decay Product Concentration (working level)

	7.54E-04	1.71E+00

No Ground Surface Concentration or Ingestion Rate Exposures for RN-222

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Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Nuclides	Selected Individual (mrem/y)	Collective Population (person-rem/y)
Rn-222	3.16E+00	5.31E+00
TOTAL	3.16E+00	5.31E+00

Radon Decay Product Concentration (working level)

	7.54E-04	1.71E+00

♀

Oct 1, 2012 09:55 amm SUMMARY
Page 3

CANCER RISK SUMMARY

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	2.92E-02
Total Fatal Risk All Exposures	1.03E-03	3.00E-02

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Oct 1, 2012 09:55 amm SUMMARY
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PATHWAY RISK SUMMARY

	Selected Individual	Total Collective Population Fatal

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Pathway	Total Lifetime Fatal Cancer Risk	Cancer Risk (Deaths/y)
INGESTION	0.00E+00	0.00E+00
INHALATION	3.58E-05	6.01E-02
AIR IMMERSION	6.82E-09	1.14E-05
GROUND SURFACE	0.00E+00	0.00E+00
INTERNAL	3.58E-05	6.01E-02
EXTERNAL	6.82E-09	1.14E-05
TOTAL	3.59E-05	6.01E-02

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	2.92E-02
Total Fatal Risk All Exposures	1.03E-03	3.00E-02

♀
Oct 1, 2012 09:55 amm SUMMARY
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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk (Deaths/y)
Rn-222	3.59E-05	7.79E-04
TOTAL	3.59E-05	7.79E-04

♀
Oct 1, 2012 09:55 amm SUMMARY
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NUCLIDE RISK SUMMARY
(Continued)

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	2.92E-02
Total Fatal Risk All Exposures	1.03E-03	3.00E-02

♀
Oct 1, 2012 09:55 amm SUMMARY
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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

Direction	Distance (m) 250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-01
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.2E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.9E-01
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-01
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-01
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-01
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.3E-01
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-01
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E-01
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.5E-01
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.1E-01
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.7E-01

Direction	Distance (m) 15000	25000	35000	45000	55000	65000	75000
N	3.4E-01	1.9E-01	1.3E-01	9.4E-02	7.3E-02	5.9E-02	4.9E-02
NNW	6.1E-01	3.4E-01	2.3E-01	1.7E-01	1.3E-01	1.1E-01	9.1E-02
NW	1.3E+00	7.4E-01	5.0E-01	3.7E-01	2.9E-01	2.3E-01	1.9E-01
WNW	1.1E+00	5.9E-01	3.9E-01	2.9E-01	2.3E-01	1.8E-01	1.5E-01
W	3.3E-01	1.8E-01	1.2E-01	9.1E-02	7.1E-02	5.7E-02	4.8E-02
WSW	1.4E-01	8.0E-02	5.4E-02	4.0E-02	3.1E-02	2.5E-02	2.1E-02
SW	1.2E-01	6.4E-02	4.3E-02	3.2E-02	2.5E-02	2.0E-02	1.7E-02
SSW	7.3E-02	4.0E-02	2.7E-02	2.0E-02	1.6E-02	1.3E-02	1.1E-02
S	9.9E-02	5.4E-02	3.6E-02	2.7E-02	2.1E-02	1.7E-02	1.4E-02
SSE	1.4E-01	7.6E-02	5.1E-02	3.8E-02	2.9E-02	2.4E-02	2.0E-02
SE	2.2E-01	1.2E-01	7.9E-02	5.8E-02	4.5E-02	3.6E-02	3.0E-02
ESE	3.3E-01	1.8E-01	1.2E-01	9.0E-02	7.1E-02	5.7E-02	4.8E-02
E	3.0E-01	1.7E-01	1.1E-01	8.3E-02	6.5E-02	5.2E-02	4.4E-02
ENE	2.7E-01	1.5E-01	1.0E-01	7.4E-02	5.8E-02	4.7E-02	3.9E-02
NE	2.5E-01	1.4E-01	9.3E-02	6.8E-02	5.3E-02	4.3E-02	3.6E-02
NNE	2.8E-01	1.5E-01	1.0E-01	7.4E-02	5.8E-02	4.7E-02	3.9E-02

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Oct 1, 2012 09:55 amm

SUMMARY
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COLLECTIVE EFFECTIVE DOSE EQUIVALENT (person rem/y)
(All Radionuclides and Pathways)

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Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.2E-03
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-02
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.8E-02
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-02
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.1E-03
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.1E-03
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-03
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-03
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-03
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.0E-03
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-02
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-02
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.6E-03
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.9E-03
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.5E-03
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.0E-03

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	1.2E-02	1.1E-02	1.0E-02	9.5E-03	9.1E-03	9.3E-03	9.6E-03
NNW	2.1E-02	1.9E-02	2.0E-02	2.8E-02	3.3E-02	3.4E-02	1.5E-02
NW	4.7E-02	4.2E-02	6.5E-02	8.2E-02	7.9E-02	8.9E-02	7.7E-02
WNW	3.7E-02	2.9E-02	1.7E-02	1.8E-02	2.4E-02	8.0E-02	8.2E-01
W	1.2E-02	9.2E-03	5.3E-03	5.0E-03	4.7E-03	4.6E-03	4.3E-03
WSW	5.1E-03	4.6E-03	2.7E-03	2.2E-03	2.1E-03	2.0E-03	3.0E-02
SW	4.1E-03	3.8E-03	3.6E-03	2.8E-03	2.1E-03	1.7E-03	1.1E-02
SSW	2.5E-03	2.4E-03	2.3E-03	2.2E-03	1.7E-03	1.1E-02	3.2E-03
S	3.5E-03	3.2E-03	3.1E-03	2.9E-03	2.2E-03	1.8E-03	1.7E-03
SSE	5.3E-03	4.5E-03	4.3E-03	4.1E-03	3.9E-03	3.1E-03	3.4E-03
SE	2.1E-02	1.4E-02	1.0E-02	8.2E-03	6.8E-03	8.5E-03	1.3E-02
ESE	3.2E-02	3.0E-02	2.7E-02	2.2E-02	2.8E-02	3.1E-02	3.7E-02
E	2.7E-02	2.7E-02	2.2E-02	1.9E-02	2.9E-02	9.6E-02	9.8E-01
ENE	1.7E-02	1.5E-02	9.6E-03	1.6E-02	2.0E-02	4.2E-02	4.5E-01
NE	8.9E-03	7.9E-03	7.3E-03	7.1E-03	1.1E-02	3.4E-02	5.1E-02
NNE	9.7E-03	8.6E-03	8.0E-03	7.6E-03	7.2E-03	6.9E-03	9.9E-01

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500

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N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.5E-04
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.9E-04
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-04
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-04
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.5E-05
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.4E-05
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.4E-05
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-04
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-04
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-04
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-04
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-04
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-04

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	1.4E-04	8.1E-05	5.4E-05	4.0E-05	3.1E-05	2.5E-05	2.1E-05
NNW	2.5E-04	1.5E-04	9.9E-05	7.3E-05	5.7E-05	4.7E-05	3.9E-05
NW	5.4E-04	3.2E-04	2.1E-04	1.6E-04	1.2E-04	1.0E-04	8.4E-05
WNW	4.3E-04	2.5E-04	1.7E-04	1.2E-04	9.7E-05	7.9E-05	6.6E-05
W	1.3E-04	7.9E-05	5.3E-05	3.9E-05	3.0E-05	2.5E-05	2.1E-05
WSW	5.8E-05	3.4E-05	2.3E-05	1.7E-05	1.3E-05	1.1E-05	9.0E-06
SW	4.6E-05	2.8E-05	1.8E-05	1.4E-05	1.1E-05	8.7E-06	7.2E-06
SSW	2.9E-05	1.7E-05	1.2E-05	8.6E-06	6.7E-06	5.5E-06	4.6E-06
S	4.0E-05	2.3E-05	1.6E-05	1.1E-05	8.9E-06	7.3E-06	6.1E-06
SSE	5.6E-05	3.3E-05	2.2E-05	1.6E-05	1.3E-05	1.0E-05	8.5E-06
SE	8.7E-05	5.1E-05	3.4E-05	2.5E-05	1.9E-05	1.6E-05	1.3E-05
ESE	1.3E-04	7.8E-05	5.2E-05	3.9E-05	3.0E-05	2.5E-05	2.1E-05
E	1.2E-04	7.2E-05	4.8E-05	3.5E-05	2.8E-05	2.3E-05	1.9E-05
ENE	1.1E-04	6.4E-05	4.3E-05	3.2E-05	2.5E-05	2.0E-05	1.7E-05
NE	1.0E-04	6.0E-05	4.0E-05	2.9E-05	2.3E-05	1.9E-05	1.5E-05
NNE	1.1E-04	6.5E-05	4.3E-05	3.2E-05	2.5E-05	2.0E-05	1.7E-05

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COLLECTIVE FATAL CANCER RATE (deaths/y)
(All Radionuclides and Pathways)

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-05
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.2E-05
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-04

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WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.3E-05
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-05
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-05
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-05
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.3E-06
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.7E-06
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-05
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.3E-05
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.2E-05
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-05
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-05
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-05
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-05

	Distance (m)						
Direction	15000	25000	35000	45000	55000	65000	75000
N	6.2E-05	6.0E-05	5.6E-05	5.3E-05	5.0E-05	5.2E-05	5.4E-05
NNW	1.1E-04	1.1E-04	1.1E-04	1.5E-04	1.9E-04	1.9E-04	8.6E-05
NW	2.4E-04	2.4E-04	3.6E-04	4.6E-04	4.4E-04	5.0E-04	4.3E-04
WNW	1.9E-04	1.6E-04	9.4E-05	1.0E-04	1.4E-04	4.4E-04	4.6E-03
W	6.1E-05	5.1E-05	2.9E-05	2.8E-05	2.6E-05	2.6E-05	2.4E-05
WSW	2.6E-05	2.6E-05	1.5E-05	1.2E-05	1.2E-05	1.1E-05	1.7E-04
SW	2.1E-05	2.1E-05	2.0E-05	1.5E-05	1.2E-05	9.2E-06	5.9E-05
SSW	1.3E-05	1.3E-05	1.3E-05	1.2E-05	9.2E-06	6.1E-05	1.8E-05
S	1.8E-05	1.8E-05	1.7E-05	1.6E-05	1.2E-05	9.8E-06	9.4E-06
SSE	2.7E-05	2.5E-05	2.4E-05	2.3E-05	2.2E-05	1.7E-05	1.9E-05
SE	1.1E-04	7.9E-05	5.8E-05	4.6E-05	3.8E-05	4.7E-05	7.4E-05
ESE	1.7E-04	1.7E-04	1.5E-04	1.2E-04	1.6E-04	1.7E-04	2.0E-04
E	1.4E-04	1.5E-04	1.2E-04	1.1E-04	1.6E-04	5.3E-04	5.5E-03
ENE	8.8E-05	8.4E-05	5.4E-05	8.7E-05	1.1E-04	2.4E-04	2.5E-03
NE	4.6E-05	4.4E-05	4.1E-05	3.9E-05	6.3E-05	1.9E-04	2.9E-04
NNE	5.0E-05	4.8E-05	4.4E-05	4.2E-05	4.0E-05	3.8E-05	5.5E-03

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ATTACHMENT 20:

COLLECTIVE RADON WL, UNDERGROUND MINES, GROUP 3, ALTERNATIVE 3

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Radon Population Assessment
Oct 1, 2012 09:56 amm

Facility: Underground mines
Address:
City:
State: CO Zip:

Source Category: underground mines
Source Type: Stack
Emission Year: 1995

Comments: To estimate the collective person-WL from underground mining based on group 3 population

Dataset Name: pop-under-g3
Dataset Date: 10/1/2012 9:56:00 AM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

Population File: C:\CAP88PC-30\program files\Poplib\ulp-3.pop

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PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)	Collective Population (person-rem/y)
INGESTION	0.00E+00	0.00E+00
INHALATION	3.16E+00	2.71E+00
AIR IMMERSION	2.86E-04	2.45E-04
GROUND SURFACE	0.00E+00	0.00E+00
INTERNAL	3.16E+00	2.71E+00
EXTERNAL	2.86E-04	2.45E-04

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TOTAL	3.16E+00	2.71E+00

Radon Decay Product Concentration (working level)

	7.54E-04	8.68E-01

No Ground Surface Concentration or Ingestion Rate Exposures for RN-222

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Nuclides	Selected Individual (mrem/y)	Collective Population (person-rem/y)
Rn-222	3.16E+00	2.71E+00
TOTAL	3.16E+00	2.71E+00

Radon Decay Product Concentration (working level)

	7.54E-04	8.68E-01

CANCER RISK SUMMARY

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	1.48E-02
Total Fatal Risk All Exposures	1.03E-03	1.52E-02

PATHWAY RISK SUMMARY

	Selected Individual	Total Collective Population Fatal

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Pathway	Total Lifetime Fatal Cancer Risk	Cancer Risk (Deaths/y)
INGESTION	0.00E+00	0.00E+00
INHALATION	3.58E-05	3.07E-02
AIR IMMERSION	6.82E-09	5.84E-06
GROUND SURFACE	0.00E+00	0.00E+00
INTERNAL	3.58E-05	3.07E-02
EXTERNAL	6.82E-09	5.84E-06
TOTAL	3.59E-05	3.07E-02

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	1.48E-02
Total Fatal Risk All Exposures	1.03E-03	1.52E-02

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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk (Deaths/y)
Rn-222	3.59E-05	3.97E-04
TOTAL	3.59E-05	3.97E-04

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NUCLIDE RISK SUMMARY
(Continued)

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	1.48E-02
Total Fatal Risk All Exposures	1.03E-03	1.52E-02

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Oct 1, 2012 09:56 amm SUMMARY
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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

Direction	Distance (m) 250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-01
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.2E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.9E-01
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-01
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-01
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-01
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.3E-01
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-01
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E-01
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.5E-01
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.1E-01
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.7E-01

Direction	Distance (m) 15000	25000	35000	45000	55000	65000	75000
N	3.4E-01	1.9E-01	1.3E-01	9.4E-02	7.3E-02	5.9E-02	4.9E-02
NNW	6.1E-01	3.4E-01	2.3E-01	1.7E-01	1.3E-01	1.1E-01	9.1E-02
NW	1.3E+00	7.4E-01	5.0E-01	3.7E-01	2.9E-01	2.3E-01	1.9E-01
WNW	1.1E+00	5.9E-01	3.9E-01	2.9E-01	2.3E-01	1.8E-01	1.5E-01
W	3.3E-01	1.8E-01	1.2E-01	9.1E-02	7.1E-02	5.7E-02	4.8E-02
WSW	1.4E-01	8.0E-02	5.4E-02	4.0E-02	3.1E-02	2.5E-02	2.1E-02
SW	1.2E-01	6.4E-02	4.3E-02	3.2E-02	2.5E-02	2.0E-02	1.7E-02
SSW	7.3E-02	4.0E-02	2.7E-02	2.0E-02	1.6E-02	1.3E-02	1.1E-02
S	9.9E-02	5.4E-02	3.6E-02	2.7E-02	2.1E-02	1.7E-02	1.4E-02
SSE	1.4E-01	7.6E-02	5.1E-02	3.8E-02	2.9E-02	2.4E-02	2.0E-02
SE	2.2E-01	1.2E-01	7.9E-02	5.8E-02	4.5E-02	3.6E-02	3.0E-02
ESE	3.3E-01	1.8E-01	1.2E-01	9.0E-02	7.1E-02	5.7E-02	4.8E-02
E	3.0E-01	1.7E-01	1.1E-01	8.3E-02	6.5E-02	5.2E-02	4.4E-02
ENE	2.7E-01	1.5E-01	1.0E-01	7.4E-02	5.8E-02	4.7E-02	3.9E-02
NE	2.5E-01	1.4E-01	9.3E-02	6.8E-02	5.3E-02	4.3E-02	3.6E-02
NNE	2.8E-01	1.5E-01	1.0E-01	7.4E-02	5.8E-02	4.7E-02	3.9E-02

COLLECTIVE EFFECTIVE DOSE EQUIVALENT (person rem/y)
(All Radionuclides and Pathways)

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Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.2E-03
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-02
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.8E-02
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-02
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.1E-03
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.1E-03
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-03
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-03
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-03
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.0E-03
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.8E-03
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.2E-03
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.6E-03
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.9E-03
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.5E-03
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.0E-03

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	1.2E-02	1.1E-02	1.0E-02	9.5E-03	9.1E-03	9.9E-03	1.1E-02
NNW	2.1E-02	2.0E-02	1.7E-02	2.7E-02	3.5E-02	3.5E-02	3.0E-02
NW	4.7E-02	4.1E-02	2.2E-02	2.2E-02	4.0E-02	5.3E-02	9.8E-01
WNW	3.7E-02	2.5E-02	1.7E-02	1.6E-02	1.5E-02	1.5E-02	1.4E-02
W	1.2E-02	7.5E-03	5.3E-03	5.0E-03	4.7E-03	4.6E-03	2.7E-03
WSW	5.2E-03	4.4E-03	2.4E-03	2.2E-03	5.6E-03	4.8E-02	1.8E-03
SW	4.3E-03	3.9E-03	3.4E-03	2.1E-03	1.8E-03	1.6E-03	1.4E-03
SSW	2.7E-03	2.5E-03	2.1E-03	8.1E-03	1.1E-02	2.5E-03	3.8E-03
S	3.7E-03	3.3E-03	2.7E-03	1.9E-03	1.8E-03	3.5E-03	6.8E-03
SSE	5.2E-03	4.6E-03	4.3E-03	3.3E-03	2.6E-03	2.5E-03	4.4E-03
SE	7.8E-03	7.2E-03	6.7E-03	6.3E-03	5.8E-03	9.1E-03	9.0E-03
ESE	1.2E-02	1.3E-02	1.4E-02	1.3E-02	1.2E-02	1.8E-02	2.8E-02
E	1.8E-02	2.4E-02	2.2E-02	2.2E-02	2.6E-02	3.8E-02	1.1E-01
ENE	2.2E-02	2.5E-02	2.3E-02	1.7E-02	1.7E-02	2.0E-02	7.6E-02
NE	1.6E-02	1.5E-02	1.3E-02	7.2E-03	8.0E-03	1.3E-02	1.9E-02
NNE	9.7E-03	8.9E-03	8.1E-03	7.6E-03	7.2E-03	6.9E-03	6.6E-03

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Oct 1, 2012 09:56 amm

SUMMARY
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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500

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N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.5E-04
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.9E-04
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-04
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-04
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.5E-05
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.4E-05
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.4E-05
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-04
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-04
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-04
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-04
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-04
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-04

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	1.4E-04	8.1E-05	5.4E-05	4.0E-05	3.1E-05	2.5E-05	2.1E-05
NNW	2.5E-04	1.5E-04	9.9E-05	7.3E-05	5.7E-05	4.7E-05	3.9E-05
NW	5.4E-04	3.2E-04	2.1E-04	1.6E-04	1.2E-04	1.0E-04	8.4E-05
WNW	4.3E-04	2.5E-04	1.7E-04	1.2E-04	9.7E-05	7.9E-05	6.6E-05
W	1.3E-04	7.9E-05	5.3E-05	3.9E-05	3.0E-05	2.5E-05	2.1E-05
WSW	5.8E-05	3.4E-05	2.3E-05	1.7E-05	1.3E-05	1.1E-05	9.0E-06
SW	4.6E-05	2.8E-05	1.8E-05	1.4E-05	1.1E-05	8.7E-06	7.2E-06
SSW	2.9E-05	1.7E-05	1.2E-05	8.6E-06	6.7E-06	5.5E-06	4.6E-06
S	4.0E-05	2.3E-05	1.6E-05	1.1E-05	8.9E-06	7.3E-06	6.1E-06
SSE	5.6E-05	3.3E-05	2.2E-05	1.6E-05	1.3E-05	1.0E-05	8.5E-06
SE	8.7E-05	5.1E-05	3.4E-05	2.5E-05	1.9E-05	1.6E-05	1.3E-05
ESE	1.3E-04	7.8E-05	5.2E-05	3.9E-05	3.0E-05	2.5E-05	2.1E-05
E	1.2E-04	7.2E-05	4.8E-05	3.5E-05	2.8E-05	2.3E-05	1.9E-05
ENE	1.1E-04	6.4E-05	4.3E-05	3.2E-05	2.5E-05	2.0E-05	1.7E-05
NE	1.0E-04	6.0E-05	4.0E-05	2.9E-05	2.3E-05	1.9E-05	1.5E-05
NNE	1.1E-04	6.5E-05	4.3E-05	3.2E-05	2.5E-05	2.0E-05	1.7E-05

COLLECTIVE FATAL CANCER RATE (deaths/y)
(All Radionuclides and Pathways)

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-05
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.2E-05
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-04

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WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.3E-05
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-05
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-05
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-05
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.3E-06
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.7E-06
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-05
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-05
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-05
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-05
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-05
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-05
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-05

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	6.2E-05	6.2E-05	5.6E-05	5.3E-05	5.1E-05	5.5E-05	6.1E-05
NNW	1.1E-04	1.1E-04	9.7E-05	1.5E-04	1.9E-04	2.0E-04	1.7E-04
NW	2.4E-04	2.3E-04	1.2E-04	1.2E-04	2.2E-04	2.9E-04	5.5E-03
WNW	1.9E-04	1.4E-04	9.4E-05	8.9E-05	8.4E-05	8.2E-05	7.6E-05
W	6.1E-05	4.2E-05	2.9E-05	2.8E-05	2.6E-05	2.6E-05	1.5E-05
WSW	2.7E-05	2.4E-05	1.3E-05	1.2E-05	3.1E-05	2.7E-04	9.8E-06
SW	2.2E-05	2.2E-05	1.9E-05	1.2E-05	9.8E-06	9.0E-06	7.9E-06
SSW	1.4E-05	1.4E-05	1.2E-05	4.5E-05	6.1E-05	1.4E-05	2.1E-05
S	1.9E-05	1.8E-05	1.5E-05	1.1E-05	1.0E-05	1.9E-05	3.8E-05
SSE	2.7E-05	2.6E-05	2.4E-05	1.8E-05	1.5E-05	1.4E-05	2.4E-05
SE	4.1E-05	4.0E-05	3.7E-05	3.5E-05	3.2E-05	5.1E-05	5.0E-05
ESE	6.0E-05	7.4E-05	8.0E-05	7.2E-05	6.9E-05	1.0E-04	1.5E-04
E	9.1E-05	1.3E-04	1.2E-04	1.2E-04	1.4E-04	2.1E-04	5.9E-04
ENE	1.2E-04	1.4E-04	1.3E-04	9.6E-05	9.2E-05	1.1E-04	4.2E-04
NE	8.3E-05	8.4E-05	7.4E-05	4.0E-05	4.5E-05	7.1E-05	1.1E-04
NNE	5.0E-05	5.0E-05	4.5E-05	4.2E-05	4.0E-05	3.8E-05	3.7E-05

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ATTACHMENT 21:

COLLECTIVE RADON WL, UNDERGROUND MINES, GROUP 4, ALTERNATIVE 3

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Radon Population Assessment
Oct 1, 2012 09:57 amm

Facility: Underground
Address:
City:
State: CO Zip:

Source Category: underground mines
Source Type: Stack
Emission Year: 1995

Comments: To estimate the collective person-WL from underground mining based on group 4 population

Dataset Name: pop-under-g4
Dataset Date: 10/1/2012 9:57:00 AM
Wind File: C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

Population File: C:\CAP88PC-30\program files\Poplib\ulp-4.pop

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Oct 1, 2012 09:57 amm SUMMARY
Page 1

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)	Collective Population (person-rem/y)
INGESTION	0.00E+00	0.00E+00
INHALATION	3.16E+00	1.72E+00
AIR IMMERSION	2.86E-04	1.56E-04
GROUND SURFACE	0.00E+00	0.00E+00
INTERNAL	3.16E+00	1.72E+00
EXTERNAL	2.86E-04	1.56E-04

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TOTAL	3.16E+00	1.72E+00

Radon Decay Product Concentration (working level)

	7.54E-04	5.49E-01

No Ground Surface Concentration or Ingestion Rate
Exposures for RN-222

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Oct 1, 2012 09:57 amm SUMMARY
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NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Nuclides	Selected Individual (mrem/y)	Collective Population (person-rem/y)
Rn-222	3.16E+00	1.72E+00
TOTAL	3.16E+00	1.72E+00

Radon Decay Product Concentration (working level)

	7.54E-04	5.49E-01

♀
Oct 1, 2012 09:57 amm SUMMARY
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CANCER RISK SUMMARY

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	9.35E-03
Total Fatal Risk All Exposures	1.03E-03	9.60E-03

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Oct 1, 2012 09:57 amm SUMMARY
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PATHWAY RISK SUMMARY

	Selected Individual	Total Collective Population Fatal

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Pathway	Total Lifetime Fatal Cancer Risk	Cancer Risk (Deaths/y)
INGESTION	0.00E+00	0.00E+00
INHALATION	3.58E-05	1.95E-02
AIR IMMERSION	6.82E-09	3.72E-06
GROUND SURFACE	0.00E+00	0.00E+00
INTERNAL	3.58E-05	1.95E-02
EXTERNAL	6.82E-09	3.72E-06
TOTAL	3.59E-05	1.95E-02

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	9.35E-03
Total Fatal Risk All Exposures	1.03E-03	9.60E-03

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Oct 1, 2012 09:57 amm SUMMARY
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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk (Deaths/y)
Rn-222	3.59E-05	2.53E-04
TOTAL	3.59E-05	2.53E-04

♀
Oct 1, 2012 09:57 amm SUMMARY
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NUCLIDE RISK SUMMARY
(Continued)

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	9.91E-04	9.35E-03
Total Fatal Risk All Exposures	1.03E-03	9.60E-03

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Oct 1, 2012 09:57 amm SUMMARY
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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-01
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.2E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.9E-01
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-01
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-01
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-01
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.4E-01
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.3E-01
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-01
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.3E-01
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.5E-01
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.1E-01
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.7E-01

	Distance (m)						
Direction	15000	25000	35000	45000	55000	65000	75000
N	3.4E-01	1.9E-01	1.3E-01	9.4E-02	7.3E-02	5.9E-02	4.9E-02
NNW	6.1E-01	3.4E-01	2.3E-01	1.7E-01	1.3E-01	1.1E-01	9.1E-02
NW	1.3E+00	7.4E-01	5.0E-01	3.7E-01	2.9E-01	2.3E-01	1.9E-01
WNW	1.1E+00	5.9E-01	3.9E-01	2.9E-01	2.3E-01	1.8E-01	1.5E-01
W	3.3E-01	1.8E-01	1.2E-01	9.1E-02	7.1E-02	5.7E-02	4.8E-02
WSW	1.4E-01	8.0E-02	5.4E-02	4.0E-02	3.1E-02	2.5E-02	2.1E-02
SW	1.2E-01	6.4E-02	4.3E-02	3.2E-02	2.5E-02	2.0E-02	1.7E-02
SSW	7.3E-02	4.0E-02	2.7E-02	2.0E-02	1.6E-02	1.3E-02	1.1E-02
S	9.9E-02	5.4E-02	3.6E-02	2.7E-02	2.1E-02	1.7E-02	1.4E-02
SSE	1.4E-01	7.6E-02	5.1E-02	3.8E-02	2.9E-02	2.4E-02	2.0E-02
SE	2.2E-01	1.2E-01	7.9E-02	5.8E-02	4.5E-02	3.6E-02	3.0E-02
ESE	3.3E-01	1.8E-01	1.2E-01	9.0E-02	7.1E-02	5.7E-02	4.8E-02
E	3.0E-01	1.7E-01	1.1E-01	8.3E-02	6.5E-02	5.2E-02	4.4E-02
ENE	2.7E-01	1.5E-01	1.0E-01	7.4E-02	5.8E-02	4.7E-02	3.9E-02
NE	2.5E-01	1.4E-01	9.3E-02	6.8E-02	5.3E-02	4.3E-02	3.6E-02
NNE	2.8E-01	1.5E-01	1.0E-01	7.4E-02	5.8E-02	4.7E-02	3.9E-02

COLLECTIVE EFFECTIVE DOSE EQUIVALENT (person rem/y)
(All Radionuclides and Pathways)

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Direction	Distance (m) 250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.2E-03
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-02
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.8E-02
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-02
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.3E-03
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.1E-03
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-03
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-03
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-03
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.0E-03
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.8E-03
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.2E-03
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.6E-03
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.9E-03
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.5E-03
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.0E-03

Direction	Distance (m) 15000	25000	35000	45000	55000	65000	75000
N	1.2E-02	1.0E-02	8.6E-03	7.4E-03	8.3E-03	1.6E-02	1.6E-02
NNW	1.6E-02	1.1E-02	9.9E-03	9.4E-03	8.9E-03	1.6E-02	7.7E-02
NW	2.6E-02	2.3E-02	2.1E-02	2.0E-02	1.9E-02	1.8E-02	1.7E-02
WNW	1.9E-02	1.8E-02	1.7E-02	1.6E-02	1.2E-02	4.2E-03	3.2E-03
W	6.0E-03	5.7E-03	1.4E-01	6.9E-02	3.5E-03	1.2E-03	9.6E-04
WSW	2.7E-03	2.5E-03	9.3E-03	2.2E-03	2.7E-02	8.4E-02	4.2E-04
SW	3.0E-03	2.0E-03	1.9E-03	1.7E-03	9.2E-04	3.8E-03	7.6E-03
SSW	2.0E-03	3.5E-03	1.4E-03	1.8E-03	2.8E-03	3.2E-03	8.1E-03
S	2.8E-03	4.7E-02	4.3E-03	6.3E-03	7.1E-03	1.3E-02	7.7E-02
SSE	4.2E-03	3.0E-03	2.9E-03	3.9E-03	8.7E-03	1.8E-02	1.3E-01
SE	7.8E-03	5.5E-03	4.4E-03	4.1E-03	4.0E-03	6.1E-03	8.9E-03
ESE	1.2E-02	1.1E-02	1.0E-02	9.0E-03	8.3E-03	8.3E-03	1.5E-02
E	1.1E-02	1.0E-02	9.5E-03	9.5E-03	1.0E-02	1.0E-02	1.4E-02
ENE	1.0E-02	9.0E-03	8.3E-03	1.5E-02	1.8E-02	1.9E-02	1.7E-02
NE	9.1E-03	8.2E-03	7.6E-03	1.3E-02	1.3E-02	1.1E-02	7.2E-03
NNE	1.0E-02	8.9E-03	8.3E-03	7.9E-03	7.4E-03	6.9E-03	6.6E-03

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Oct 1, 2012 09:57 amm

SUMMARY
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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 250	750	1500	2500	3500	4500	7500

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N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.5E-04
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.9E-04
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-04
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-04
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.5E-05
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.4E-05
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.4E-05
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-04
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-04
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-04
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-04
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-04
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-04
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-04

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	1.4E-04	8.1E-05	5.4E-05	4.0E-05	3.1E-05	2.5E-05	2.1E-05
NNW	2.5E-04	1.5E-04	9.9E-05	7.3E-05	5.7E-05	4.7E-05	3.9E-05
NW	5.4E-04	3.2E-04	2.1E-04	1.6E-04	1.2E-04	1.0E-04	8.4E-05
WNW	4.3E-04	2.5E-04	1.7E-04	1.2E-04	9.7E-05	7.9E-05	6.6E-05
W	1.3E-04	7.9E-05	5.3E-05	3.9E-05	3.0E-05	2.5E-05	2.1E-05
WSW	5.8E-05	3.4E-05	2.3E-05	1.7E-05	1.3E-05	1.1E-05	9.0E-06
SW	4.6E-05	2.8E-05	1.8E-05	1.4E-05	1.1E-05	8.7E-06	7.2E-06
SSW	2.9E-05	1.7E-05	1.2E-05	8.6E-06	6.7E-06	5.5E-06	4.6E-06
S	4.0E-05	2.3E-05	1.6E-05	1.1E-05	8.9E-06	7.3E-06	6.1E-06
SSE	5.6E-05	3.3E-05	2.2E-05	1.6E-05	1.3E-05	1.0E-05	8.5E-06
SE	8.7E-05	5.1E-05	3.4E-05	2.5E-05	1.9E-05	1.6E-05	1.3E-05
ESE	1.3E-04	7.8E-05	5.2E-05	3.9E-05	3.0E-05	2.5E-05	2.1E-05
E	1.2E-04	7.2E-05	4.8E-05	3.5E-05	2.8E-05	2.3E-05	1.9E-05
ENE	1.1E-04	6.4E-05	4.3E-05	3.2E-05	2.5E-05	2.0E-05	1.7E-05
NE	1.0E-04	6.0E-05	4.0E-05	2.9E-05	2.3E-05	1.9E-05	1.5E-05
NNE	1.1E-04	6.5E-05	4.3E-05	3.2E-05	2.5E-05	2.0E-05	1.7E-05

COLLECTIVE FATAL CANCER RATE (deaths/y)
(All Radionuclides and Pathways)

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-05
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.2E-05
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-04

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WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.2E-05
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.6E-05
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-05
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-05
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.3E-06
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.7E-06
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.2E-05
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-05
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-05
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-05
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-05
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-05
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-05

	Distance (m)						
Direction	15000	25000	35000	45000	55000	65000	75000
N	6.4E-05	5.8E-05	4.8E-05	4.1E-05	4.6E-05	8.9E-05	8.9E-05
NNW	8.3E-05	5.9E-05	5.5E-05	5.2E-05	5.0E-05	9.0E-05	4.3E-04
NW	1.3E-04	1.3E-04	1.2E-04	1.1E-04	1.1E-04	1.0E-04	9.4E-05
WNW	1.0E-04	1.0E-04	9.4E-05	8.9E-05	6.9E-05	2.3E-05	1.8E-05
W	3.1E-05	3.2E-05	8.0E-04	3.9E-04	2.0E-05	6.7E-06	5.3E-06
WSW	1.4E-05	1.4E-05	5.2E-05	1.2E-05	1.5E-04	4.7E-04	2.3E-06
SW	1.6E-05	1.1E-05	1.0E-05	9.7E-06	5.1E-06	2.1E-05	4.2E-05
SSW	1.0E-05	2.0E-05	7.8E-06	1.0E-05	1.6E-05	1.8E-05	4.5E-05
S	1.4E-05	2.6E-04	2.4E-05	3.5E-05	4.0E-05	7.0E-05	4.3E-04
SSE	2.2E-05	1.7E-05	1.6E-05	2.1E-05	4.8E-05	1.0E-04	7.1E-04
SE	4.1E-05	3.1E-05	2.4E-05	2.3E-05	2.2E-05	3.4E-05	5.0E-05
ESE	6.4E-05	6.2E-05	5.6E-05	5.0E-05	4.6E-05	4.6E-05	8.4E-05
E	5.8E-05	5.7E-05	5.3E-05	5.3E-05	5.7E-05	5.8E-05	7.7E-05
ENE	5.2E-05	5.0E-05	4.6E-05	8.4E-05	9.9E-05	1.1E-04	9.6E-05
NE	4.7E-05	4.5E-05	4.2E-05	7.3E-05	7.4E-05	6.1E-05	4.0E-05
NNE	5.2E-05	5.0E-05	4.6E-05	4.4E-05	4.1E-05	3.8E-05	3.7E-05

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ATTACHMENT 22:

COLLECTIVE RADON WL, OPEN-PIT MINE, GROUP 3, ALTERNATIVE 3

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C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Radon Population Assessment
Oct 1, 2012 10:06 amm

Facility: Open-pit
Address:
City:
State: CO Zip:

Source Category: Open-pit mining
Source Type: Area
Emission Year: 1995

Comments: To estimate the collective person-WL from open-pit mining based on group 3 population

Dataset Name: pop-open-g3
Dataset Date: 10/1/2012 10:06:00 AM
Wind File: . C:\CAP88PC-30\program files\WindLib\ULP-10M.WND

Population File: C:\CAP88PC-30\program files\Poplib\ulp-3.pop

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PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)	Collective Population (person-rem/y)
INGESTION	0.00E+00	0.00E+00
INHALATION	2.74E-01	2.29E-01
AIR IMMERSION	2.47E-05	2.07E-05
GROUND SURFACE	0.00E+00	0.00E+00
INTERNAL	2.74E-01	2.29E-01
EXTERNAL	2.47E-05	2.07E-05

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TOTAL	2.74E-01	2.29E-01

Radon Decay Product Concentration (working level)

	6.53E-05	7.34E-02

No Ground Surface Concentration or Ingestion Rate
Exposures for RN-222

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Nuclides	Selected Individual (mrem/y)	Collective Population (person-rem/y)
Rn-222	2.74E-01	2.29E-01
TOTAL	2.74E-01	2.29E-01

Radon Decay Product Concentration (working level)

	6.53E-05	7.34E-02

CANCER RISK SUMMARY

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	8.58E-05	1.25E-03
Total Fatal Risk All Exposures	8.89E-05	1.28E-03

PATHWAY RISK SUMMARY

	Selected Individual	Total Collective Population Fatal

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Pathway	Total Lifetime Fatal Cancer Risk	Cancer Risk (Deaths/y)
INGESTION	0.00E+00	0.00E+00
INHALATION	3.10E-06	2.59E-03
AIR IMMERSION	5.91E-10	4.94E-07
GROUND SURFACE	0.00E+00	0.00E+00
INTERNAL	3.10E-06	2.59E-03
EXTERNAL	5.91E-10	4.94E-07
TOTAL	3.10E-06	2.59E-03

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	8.58E-05	1.25E-03
Total Fatal Risk All Exposures	8.89E-05	1.28E-03

♀
Oct 1, 2012 10:06 amm SUMMARY
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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk (Deaths/y)
Rn-222	3.10E-06	3.36E-05
TOTAL	3.10E-06	3.36E-05

♀
Oct 1, 2012 10:06 amm SUMMARY
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NUCLIDE RISK SUMMARY
(Continued)

	Selected Individual Cancer Risk	Collective Population Cancer Risk (Deaths/y)
Radon Decay Product Lung Exposure	8.58E-05	1.25E-03
Total Fatal Risk All Exposures	8.89E-05	1.28E-03

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Oct 1, 2012 10:06 amm SUMMARY
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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.2E-02
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.3E-01
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-01
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-01
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.9E-02
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.0E-02
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E-02
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-02
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-02
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-02
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.5E-02
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.9E-02
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.3E-02
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.6E-02
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.3E-02
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.9E-02

	Distance (m)						
Direction	15000	25000	35000	45000	55000	65000	75000
N	3.0E-02	1.6E-02	1.1E-02	8.0E-03	6.3E-03	5.1E-03	4.2E-03
NNW	5.3E-02	2.9E-02	2.0E-02	1.4E-02	1.1E-02	9.2E-03	7.7E-03
NW	1.1E-01	6.3E-02	4.2E-02	3.1E-02	2.4E-02	2.0E-02	1.6E-02
WNW	9.0E-02	4.9E-02	3.3E-02	2.4E-02	1.9E-02	1.5E-02	1.3E-02
W	2.8E-02	1.6E-02	1.0E-02	7.7E-03	6.0E-03	4.8E-03	4.0E-03
WSW	1.3E-02	6.9E-03	4.6E-03	3.4E-03	2.7E-03	2.1E-03	1.8E-03
SW	1.0E-02	5.6E-03	3.7E-03	2.7E-03	2.1E-03	1.7E-03	1.4E-03
SSW	6.3E-03	3.5E-03	2.3E-03	1.7E-03	1.3E-03	1.1E-03	9.0E-04
S	8.4E-03	4.6E-03	3.1E-03	2.3E-03	1.8E-03	1.4E-03	1.2E-03
SSE	1.2E-02	6.5E-03	4.3E-03	3.2E-03	2.5E-03	2.0E-03	1.7E-03
SE	1.8E-02	9.9E-03	6.6E-03	4.8E-03	3.8E-03	3.0E-03	2.5E-03
ESE	2.8E-02	1.5E-02	1.0E-02	7.6E-03	5.9E-03	4.8E-03	4.0E-03
E	2.6E-02	1.4E-02	9.5E-03	7.0E-03	5.4E-03	4.4E-03	3.7E-03
ENE	2.3E-02	1.3E-02	8.5E-03	6.3E-03	4.9E-03	4.0E-03	3.3E-03
NE	2.2E-02	1.2E-02	7.9E-03	5.8E-03	4.5E-03	3.7E-03	3.0E-03
NNE	2.4E-02	1.3E-02	8.7E-03	6.4E-03	5.0E-03	4.0E-03	3.3E-03

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Oct 1, 2012 10:06 amm

SUMMARY
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COLLECTIVE EFFECTIVE DOSE EQUIVALENT (person rem/y)
(All Radionuclides and Pathways)

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Distance (m)

Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.4E-04
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-03
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-03
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-03
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.2E-04
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.7E-04
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-04
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-04
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-04
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.6E-04
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.1E-04
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.2E-04
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.7E-04
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.1E-04
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.8E-04
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.3E-04

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	1.0E-03	9.6E-04	8.7E-04	8.2E-04	7.8E-04	8.5E-04	9.4E-04
NNW	1.9E-03	1.7E-03	1.5E-03	2.3E-03	3.0E-03	3.0E-03	2.5E-03
NW	4.0E-03	3.5E-03	1.9E-03	1.9E-03	3.4E-03	4.4E-03	8.2E-02
WNW	3.2E-03	2.1E-03	1.4E-03	1.3E-03	1.3E-03	1.2E-03	1.1E-03
W	1.0E-03	6.4E-04	4.5E-04	4.2E-04	4.0E-04	3.9E-04	2.3E-04
WSW	4.5E-04	3.8E-04	2.1E-04	1.9E-04	4.8E-04	4.1E-03	1.5E-04
SW	3.7E-04	3.4E-04	3.0E-04	1.8E-04	1.5E-04	1.4E-04	1.2E-04
SSW	2.3E-04	2.1E-04	1.8E-04	6.9E-04	9.3E-04	2.1E-04	3.2E-04
S	3.1E-04	2.8E-04	2.3E-04	1.6E-04	1.5E-04	2.9E-04	5.7E-04
SSE	4.4E-04	4.0E-04	3.7E-04	2.8E-04	2.2E-04	2.1E-04	3.7E-04
SE	6.6E-04	6.0E-04	5.6E-04	5.3E-04	4.8E-04	7.6E-04	7.5E-04
ESE	9.9E-04	1.1E-03	1.2E-03	1.1E-03	1.0E-03	1.6E-03	2.3E-03
E	1.5E-03	2.0E-03	1.9E-03	1.9E-03	2.2E-03	3.2E-03	8.9E-03
ENE	1.9E-03	2.1E-03	1.9E-03	1.5E-03	1.4E-03	1.6E-03	6.4E-03
NE	1.4E-03	1.3E-03	1.1E-03	6.2E-04	6.8E-04	1.1E-03	1.6E-03
NNE	8.5E-04	7.7E-04	6.9E-04	6.5E-04	6.1E-04	5.9E-04	5.7E-04

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Distance (m)

Direction	250	750	1500	2500	3500	4500	7500

N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-05
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.0E-05
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.6E-05
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.8E-05
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-05
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.5E-06
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.6E-06
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.8E-06
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.5E-06
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.2E-06
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.4E-05
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-05
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-05
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-05
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-05
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-05

	Distance (m)						
Direction	15000	25000	35000	45000	55000	65000	75000
N	1.2E-05	7.0E-06	4.7E-06	3.5E-06	2.7E-06	2.2E-06	1.8E-06
NNW	2.1E-05	1.3E-05	8.4E-06	6.2E-06	4.9E-06	4.0E-06	3.3E-06
NW	4.6E-05	2.7E-05	1.8E-05	1.3E-05	1.0E-05	8.4E-06	7.0E-06
WNW	3.6E-05	2.1E-05	1.4E-05	1.0E-05	8.1E-06	6.6E-06	5.5E-06
W	1.1E-05	6.7E-06	4.5E-06	3.3E-06	2.6E-06	2.1E-06	1.7E-06
WSW	5.0E-06	3.0E-06	2.0E-06	1.5E-06	1.1E-06	9.2E-07	7.7E-07
SW	4.0E-06	2.4E-06	1.6E-06	1.2E-06	9.1E-07	7.4E-07	6.2E-07
SSW	2.5E-06	1.5E-06	1.0E-06	7.3E-07	5.7E-07	4.7E-07	3.9E-07
S	3.4E-06	2.0E-06	1.3E-06	9.7E-07	7.6E-07	6.1E-07	5.1E-07
SSE	4.8E-06	2.8E-06	1.9E-06	1.4E-06	1.1E-06	8.6E-07	7.2E-07
SE	7.3E-06	4.3E-06	2.8E-06	2.1E-06	1.6E-06	1.3E-06	1.1E-06
ESE	1.1E-05	6.6E-06	4.4E-06	3.3E-06	2.6E-06	2.1E-06	1.7E-06
E	1.0E-05	6.1E-06	4.1E-06	3.0E-06	2.3E-06	1.9E-06	1.6E-06
ENE	9.3E-06	5.5E-06	3.7E-06	2.7E-06	2.1E-06	1.7E-06	1.4E-06
NE	8.8E-06	5.1E-06	3.4E-06	2.5E-06	1.9E-06	1.6E-06	1.3E-06
NNE	9.7E-06	5.6E-06	3.7E-06	2.7E-06	2.1E-06	1.7E-06	1.4E-06

COLLECTIVE FATAL CANCER RATE (deaths/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	250	750	1500	2500	3500	4500	7500
N	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.6E-06
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.6E-06
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E-05

pop_op_3

WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-06
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-06
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-06
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.9E-07
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.5E-07
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.5E-07
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E-06
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.7E-06
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-06
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.3E-06
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.1E-06
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.9E-06
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-06

Distance (m)

Direction	15000	25000	35000	45000	55000	65000	75000
N	5.4E-06	5.4E-06	4.9E-06	4.6E-06	4.4E-06	4.7E-06	5.2E-06
NNW	9.6E-06	9.6E-06	8.3E-06	1.3E-05	1.6E-05	1.7E-05	1.4E-05
NW	2.1E-05	1.9E-05	1.1E-05	1.1E-05	1.9E-05	2.5E-05	4.6E-04
WNW	1.6E-05	1.2E-05	7.9E-06	7.4E-06	7.1E-06	6.8E-06	6.3E-06
W	5.2E-06	3.6E-06	2.5E-06	2.3E-06	2.2E-06	2.1E-06	1.3E-06
WSW	2.3E-06	2.1E-06	1.2E-06	1.0E-06	2.7E-06	2.3E-05	8.4E-07
SW	1.9E-06	1.9E-06	1.7E-06	1.0E-06	8.4E-07	7.7E-07	6.8E-07
SSW	1.2E-06	1.2E-06	9.9E-07	3.8E-06	5.2E-06	1.2E-06	1.8E-06
S	1.6E-06	1.6E-06	1.3E-06	9.0E-07	8.6E-07	1.6E-06	3.2E-06
SSE	2.3E-06	2.2E-06	2.0E-06	1.6E-06	1.2E-06	1.2E-06	2.0E-06
SE	3.4E-06	3.4E-06	3.1E-06	3.0E-06	2.7E-06	4.2E-06	4.2E-06
ESE	5.1E-06	6.3E-06	6.7E-06	6.0E-06	5.8E-06	8.6E-06	1.3E-05
E	7.8E-06	1.1E-05	1.0E-05	1.0E-05	1.2E-05	1.8E-05	5.0E-05
ENE	9.9E-06	1.2E-05	1.1E-05	8.1E-06	7.8E-06	9.2E-06	3.6E-05
NE	7.2E-06	7.2E-06	6.3E-06	3.4E-06	3.8E-06	6.1E-06	8.9E-06
NNE	4.4E-06	4.3E-06	3.9E-06	3.6E-06	3.4E-06	3.3E-06	3.1E-06

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ATTACHMENT 23:

COMPLY-R, RADON DOSE, SMALL UNDERGROUND MINE, RESIDENT

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NEWTEST1

03/23/12 01:36

40 CFR Part 61
National Emission Standards
for Hazardous Air Pollutants

REPORT ON COMPLIANCE WITH

THE CLEAN AIR ACT LIMITS FOR RADIONUCLIDE EMISSIONS

FROM THE COMPLY-R CODE, VERSION 1.2

Prepared by:

Prepared for:

U.S. Environmental Protection Agency
Office of Radiation Programs
Washington, D.C. 20460

03/23/12 01:36

Stack	Release Rate (curies/YEAR)
1	5.280E+02

Release Height 1.00 meters.

Page 1

Vertical momentum present for vent 1

Vent diameter 1.80 meters.

Volumetric flow rate is 12.720 cu m/sec.

STACK DISTANCES, FILE: newdist1.dat

DIR	Distance (meters)
N	500.0
NNE	500.0
NE	500.0
ENE	500.0
E	500.0
ESE	500.0
SE	500.0
SSE	500.0
S	500.0
SSW	500.0
SW	500.0
WSW	500.0
W	500.0
WNW	500.0
NW	500.0
NNW	500.0

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WINDROSE DATA, FILE: newmet.dat

Source of wind rose data:
Dates of coverage:
Wind rose location:
Distance to facility:

Percent calm: 0.00

Wind FROM	Frequency	Speed (meters/s)
N	0.026	2.63
NNE	0.015	1.98
NE	0.015	1.53
ENE	0.018	1.43
E	0.040	1.70
ESE	0.137	2.16
SE	0.139	2.01
SSE	0.054	2.01
S	0.047	3.47
SSW	0.077	5.02
SW	0.070	4.54
WSW	0.061	3.10
W	0.070	2.58
WNW	0.094	2.41
NW	0.090	2.87
NNW	0.047	2.85

NOTES:

Default air temperature not used.
Air temperature 50.0 (degrees F).

Default vent temperature not used.
Vent temperature 50.0 (degrees F).

The receptor exposed to the highest concentration is located
500. meters to the NW.

Input parameters outside the "normal" range:

Windrose wind frequency is unusually LOW.

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RESULTS:

Effective dose equivalent: 35.7 (mrem/year).

Does NOT comply with emission standards.

*** This facility is NOT in COMPLIANCE ***

Please send this report to your regional EPA office.

You may contact your regional EPA office to determine further action.

********** END OF COMPLIANCE REPORT **********

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