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January 31, 2014

Peter J. Gorton
Panamerican Environmental, Inc.
2390 Clinton Street
Buffalo, NY 14227

Subject: Radiological Dose Assessment for 600 River Road Project

Dear Mr. Gorton,

This letter report provides the results of a radiological dose assessment conducted for the subject property in support of a Remedial Investigation Report dated January 22, 2014 and a subsequent Alternatives Analysis Report (AAR) that will be submitted upon receipt of comments on this dose assessment. All documentation is being generated per a Brownfield Cleanup Program (BCP) Agreement and corresponding requirements in 6NYCRR375.

The dose assessment report presents the following items:
(1) a brief background of the property including previous investigations,
(2) an introduction of the methodology utilized to complete the dose assessment, and
(3) the final results of the dose assessment including initial and proposed conditions.

Background

Numerous environmental investigations have been performed at 600 River Road since 2001 including a Phase I site assessment, two Phase II investigations, and the current BCP remedial investigation that was initiated with an approved work plan in May 2013. These previous investigations and knowledge of the historical use of the site has revealed that much of the property contains slag and slag-like material from industrial metallurgical operations. Recent history of similar material encountered throughout the Niagara Region has indicated the potential presence of naturally occurring radioactive material (NORM) contained within some of this slag-like waste.

As part of the BCP agreement, a surface and subsurface soil investigation and groundwater investigation were completed for the site that is to eventually be redeveloped with the construction of residential apartments. The BCP activities also included a radiological survey to examine the 6-acre site for the presence of NORM. The radiation survey efforts were performed during test pitting at 20 locations and included gamma radiation surveys, dose/exposure

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measurements, and sampling of excavated material. Five of the more radiologically elevated locations were sampled and the material was analyzed by gamma spectroscopy at an off-site laboratory. Results of this characterization effort were reported in an August 8, 2013 characterization document, which provided the data utilized for this dose assessment (see MJW – Interim Letter Report for 600 River Road Radiological Characterization).

Methodology

After communications with the NYSDEC, it was agreed that the following criteria would be addressed in the dose assessment for 600 River Road property:

- Dose assessment simulations are to address both initial conditions and alternative design conditions that will be proposed in the AAR.
- The alternative design condition chosen included the placement of 2 feet of soil over areas of the site not covered with asphalt, concrete or building foundations to adhere to the restricted residential use requirements within 6NYCRR375.
- The resident farmer scenario is to be utilized during simulations so that the most conservative exposure pathways are assessed.
- Assumptions, parameters, and default values entered into the dose model are to be clearly defined and described in the assessment.
- The most conservative annual dose criterion of 10 mrem was selected by the dose assessment team as a benchmark for comparing simulation results

A dose model was developed using the default values and pathways in RESRAD Version 6.5 with the modification of a few site-specific parameters that were conservatively selected. The baseline scenario of the resident farmer was simulated to include the following potential exposure pathways:

- External Gamma Radiation
- Inhalation
- Plant Ingestion from plants grown onsite
- Meat Ingestion from livestock raised onsite
- Milk Ingestion from milk cattle raised onsite
- Aquatic Foods from water life raised onsite
- Drinking Water from groundwater obtained from the site
- Soil Ingestion

This baseline scenario is highly conservative because the subject property will not be used for growing food, raising livestock, milking cows, fishing, or drinking water. In addition, it is unlikely that the future residents of 600 River Road will reside on the property 24 hours a day, seven days a week, and 52 weeks a year.

Radionuclide concentrations in soil were one of the more significant site-specific parameters entered into the dose model, and these values were obtained from the radiological

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characterization report cited previously. To maintain a high degree of conservatism throughout the modeling, the highest concentrations of radium-226, thorium-232, and uranium-238 for the 5 test pits sampled were utilized. Although these isotopes were selected as the primary "dose drivers", all daughter products in the natural decay chains contributing to dose are automatically utilized by RESRAD in the calculations. Refer to the characterization report for details on the selection of surrogate isotopes to represent Th-232 and U-238 that were not analyzed directly. The following table presents the site-specific parameters used in the dose model simulations.

Contaminated Zone Dimensions		
Area:	24,000	square meters
Thickness:	2	meters
Cover Depth:	0.37	meters

Initial Soil Concentrations (pCi/g)	
Ra-226	11.4
Th-232	2.65
U-238	11.4

The contaminated zone dimensions were also selected with significant conservatism. A 24,000 square meter area representing the footprint of the NORM in the subsurface is equivalent to the entire 6 acre property footprint; it is understood from the subsurface investigation that the impacted slag-like materials are not present throughout the site. Additionally, of the test pits that exhibited measurable Ra-226 concentrations above the EPA screening value of 5 pCi/g (i.e., #8, #14, and #17), test pit #8 possessed the thickest zone of contamination (i.e., 2 meters or 6.5 feet) and thinnest overburden depth (i.e., 0.37 meters or 1.5 feet); these were the factors selected to represent the entire property. In comparison, the average contaminated zone thickness was 4-feet and the average native overburden or cover depth was 2.8 feet for the test pits that possessed slag. The following table presents the test pit depth details.

Test Pit Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Native Cover (ft.)	3.5	1.5	1.5	1.5	0.5	1.5	2	1.5	4	3.5	4	4.5	7	6.5	2.5	3	3	5.5	5.5	6
Slag/Cinder (ft.)	6.5	5	5	6.5	3.5	8.5	7	6.5	3	3.5	3	0.5	0	2.5	1	1.5	0.5	0	0	0

Results – Existing Conditions

The results of the dose modeling based on the current site conditions described above indicate that a resident farmer would receive a dose of approximately 40 mrem at the end of the first year. Exposure to the farmer would increase as time progressed due to erosional forces acting on the soil cover that would slowly expose the radioactive material without regular maintenance (i.e., 1 mm/yr. of erosion, which is the RESRAD default value). The existing conditions would not comply with the New York State DER-38 criterion of 10 mrem/yr. maximum dose (see table below).

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Total Dose TDOSE(t), mrem/yr. Basic Radiation Dose Limit = 10 mrem/yr.						
t(years):	1	3	10	30	100	300
TDOSE(t):	39.55	43.73	54.99	72.01	85.23	95.15

Results – Future Conditions

The design alternative/future conditions for the site include asphalt traffic areas, concrete structure pads, and a 2-foot layer of soil for open areas not covered with asphalt or concrete. The model was simulated for these future conditions very conservatively by only accounting for a 2-foot thick soil cover across the entire site and disregarding the additional shielding potential of the asphalt or concrete. The additional 2 feet of soil increases the total cover depth above the contaminated zone to 3.5 feet or 1.1 meters, and the other site-specific parameters remain the same are as listed in the following table.

Contaminated Zone Dimensions		
Area:	24,000	square meters
Thickness:	2	meters
Cover Depth:	1.1	meters

Initial Soil Concentrations (pCi/g)	
Ra-226	11.4
Th-232	2.65
U-238	11.4

The results of the dose modeling based on future conditions indicate that a resident farmer would receive a dose less than 1.0 mrem/year for over 100 years and less than 10 mrem/year for over 300 years. The significant decrease in the dose to the resident farmer is the result of a larger barrier between rooted plants and the subsurface radioactive material. Essentially, plants grown for food will not up-take the radioactive materials because of the additional soil cover. Again, the exposure to the resident farmer will slowly increase over time as the soil cover erodes at a rate of one millimeter per year. The future conditions as designed would clearly be in compliance with the NYSDEC DER-38 guidance of 10 mrem/year, as shown below.

Total Dose TDOSE(t), mrem/yr. Basic Radiation Dose Limit = 10 mrem/yr.						
t(years):	1	3	10	30	100	300
TDOSE(t):	0.000279	0.00033	0.000526	0.000808	0.001563	8.347

The RESRAD Summary Reports for current/existing conditions and future design conditions that include details on dose conversion factors, parameter and pathway selection, dose components, etc. are attached to this letter report.

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Should you have any questions or concerns regarding the work performed, please contact me at your convenience: 716 830 8636 or Jason@BrydgesE3.com. Thank you for the opportunity to work with you.

Sincerely,

Jason M. Brydges, PE
Brydges – environment, engineering, and energy (BE3)

cc: Dustin Miller, CHP

Att: RESRAD simulations

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ATTACHMENT 1

Simulation for Existing Conditions

Summary : 600 River Road
File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SITE SPECIFIC ORIGINAL.RAD

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : 600 River Road
File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SITE SPECIFIC ORIGINAL.RAD

Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(2)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(3)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(4)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(5)
A-1	Pa-234 (Source: FGR 12)	1.155E+01	1.155E+01	DCF1(6)
A-1	Pa-234m (Source: FGR 12)	8.967E-02	8.967E-02	DCF1(7)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(8)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(9)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(10)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(11)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(12)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(13)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(14)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(15)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(16)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(17)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(18)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(19)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(20)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(21)
A-1	Th-230 (Source: FGR 12)	1.209E-03	1.209E-03	DCF1(22)
A-1	Th-232 (Source: FGR 12)	5.212E-04	5.212E-04	DCF1(23)
A-1	Th-234 (Source: FGR 12)	2.410E-02	2.410E-02	DCF1(24)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(25)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(26)
A-1	U-234 (Source: FGR 12)	4.017E-04	4.017E-04	DCF1(27)
A-1	U-238 (Source: FGR 12)	1.031E-04	1.031E-04	DCF1(28)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(3)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(5)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(6)
B-1	U-234	1.320E-01	1.320E-01	DCF2(7)
B-1	U-238	1.180E-01	1.180E-01	DCF2(8)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(5)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(6)
D-1	U-234	2.830E-04	2.830E-04	DCF3(7)
D-1	U-238	2.550E-04	2.550E-04	DCF3(8)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-238+D	2.687E-04	2.550E-04	DCF3(9)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	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	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-234 , 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	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(3,2)
D-5				

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+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	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-234 , 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.

Summary : 600 River Road
File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SITE SPECIFIC ORIGINAL.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+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)	1.000E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	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): Ra-226	1.140E+01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Th-232	2.650E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-238	1.140E+01	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	3.700E-01	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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 Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.374E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
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	3.319E-03	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.663E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.374E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter 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	2.778E-06	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter U-234				
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	3.319E-03	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.100E+01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.100E+01	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	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	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	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : 600 River Road
File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SITE SPECIFIC ORIGINAL.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	24000.00 square meters	Ra-226	1.140E+01
Thickness:	2.00 meters	Th-232	2.650E+00
Cover Depth:	0.37 meters	U-238	1.140E+01

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 1.000E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
TDOSE(t):	3.724E+01	3.955E+01	4.373E+01	5.499E+01	7.201E+01	8.523E+01	9.515E+01
M(t):	3.724E+00	3.955E+00	4.373E+00	5.499E+00	7.201E+00	8.523E+00	9.515E+00

Maximum TDOSE(t): 9.515E+01 mrem/yr at t = 3.000E+02 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.
Ra-226	9.758E-01	0.0262	0.000E+00	0.0000	0.000E+00	0.0000	3.162E+01	0.8490	1.571E+00	0.0422	1.813E+00	0.0487	0.000E+00	0.0000
Th-232	7.482E-03	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	8.006E-01	0.0215	1.751E-02	0.0005	2.080E-02	0.0006	0.000E+00	0.0000
U-238	5.424E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.921E-01	0.0105	6.566E-03	0.0002	1.368E-02	0.0004	0.000E+00	0.0000
Total	9.887E-01	0.0265	0.000E+00	0.0000	0.000E+00	0.0000	3.281E+01	0.8810	1.595E+00	0.0428	1.848E+00	0.0496	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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.598E+01	0.9661
Th-232	0.000E+00	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	8.464E-01	0.0227
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	4.178E-01	0.0112
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.724E+01	1.0000

*Sum of all water independent and dependent pathways.

Summary : 600 River Road
File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SITE SPECIFIC ORIGINAL.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+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.
Ra-226	9.842E-01	0.0249	0.000E+00	0.0000	0.000E+00	0.0000	3.289E+01	0.8316	1.624E+00	0.0411	1.835E+00	0.0464	0.000E+00	0.0000
Th-232	2.958E-02	0.0007	0.000E+00	0.0000	0.000E+00	0.0000	1.645E+00	0.0416	5.821E-02	0.0015	6.865E-02	0.0017	0.000E+00	0.0000
U-238	5.480E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.915E-01	0.0099	6.556E-03	0.0002	1.366E-02	0.0003	0.000E+00	0.0000
Total	1.019E+00	0.0258	0.000E+00	0.0000	0.000E+00	0.0000	3.493E+01	0.8830	1.689E+00	0.0427	1.918E+00	0.0485	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+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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.733E+01	0.9439
Th-232	0.000E+00	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	1.802E+00	0.0455
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	4.172E-01	0.0105
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.955E+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 = 3.000E+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.
Ra-226	1.001E+00	0.0229	0.000E+00	0.0000	0.000E+00	0.0000	3.527E+01	0.8066	1.718E+00	0.0393	1.875E+00	0.0429	0.000E+00	0.0000
Th-232	9.192E-02	0.0021	0.000E+00	0.0000	0.000E+00	0.0000	3.076E+00	0.0703	1.285E-01	0.0029	1.505E-01	0.0034	0.000E+00	0.0000
U-238	5.592E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.904E-01	0.0089	6.538E-03	0.0001	1.363E-02	0.0003	0.000E+00	0.0000
Total	1.099E+00	0.0251	0.000E+00	0.0000	0.000E+00	0.0000	3.874E+01	0.8859	1.853E+00	0.0424	2.039E+00	0.0466	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 = 3.000E+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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.987E+01	0.9117
Th-232	0.000E+00	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	3.447E+00	0.0788
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	4.162E-01	0.0095
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	4.373E+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+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.
Ra-226	1.063E+00	0.0193	0.000E+00	0.0000	0.000E+00	0.0000	4.248E+01	0.7726	1.999E+00	0.0364	1.992E+00	0.0362	0.000E+00	0.0000
Th-232	3.120E-01	0.0057	0.000E+00	0.0000	0.000E+00	0.0000	6.126E+00	0.1114	2.772E-01	0.0050	3.237E-01	0.0059	0.000E+00	0.0000
U-238	6.006E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.865E-01	0.0070	6.471E-03	0.0001	1.349E-02	0.0002	0.000E+00	0.0000
Total	1.381E+00	0.0251	0.000E+00	0.0000	0.000E+00	0.0000	4.899E+01	0.8910	2.283E+00	0.0415	2.329E+00	0.0424	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+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.
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	4.753E+01	0.8645
Th-232	0.000E+00	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	7.039E+00	0.1280
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	4.124E-01	0.0075
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	5.499E+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 = 3.000E+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.
Ra-226	1.261E+00	0.0175	0.000E+00	0.0000	0.000E+00	0.0000	5.574E+01	0.7740	2.515E+00	0.0349	2.199E+00	0.0305	0.000E+00	0.0000
Th-232	5.965E-01	0.0083	0.000E+00	0.0000	0.000E+00	0.0000	8.454E+00	0.1174	3.897E-01	0.0054	4.547E-01	0.0063	0.000E+00	0.0000
U-238	7.363E-03	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.750E-01	0.0052	6.280E-03	0.0001	1.309E-02	0.0002	0.000E+00	0.0000
Total	1.865E+00	0.0259	0.000E+00	0.0000	0.000E+00	0.0000	6.457E+01	0.8966	2.911E+00	0.0404	2.667E+00	0.0370	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 = 3.000E+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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.171E+01	0.8570
Th-232	0.000E+00	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	9.894E+00	0.1374
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	4.018E-01	0.0056
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.201E+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.
Ra-226	2.300E+00	0.0270	0.000E+00	0.0000	0.000E+00	0.0000	6.545E+01	0.7679	2.874E+00	0.0337	2.275E+00	0.0267	0.000E+00	0.0000
Th-232	1.265E+00	0.0148	0.000E+00	0.0000	0.000E+00	0.0000	9.729E+00	0.1141	4.490E-01	0.0053	5.239E-01	0.0061	0.000E+00	0.0000
U-238	1.504E-02	0.0002	0.000E+00	0.0000	0.000E+00	0.0000	3.345E-01	0.0039	5.601E-03	0.0001	1.167E-02	0.0001	0.000E+00	0.0000
Total	3.581E+00	0.0420	0.000E+00	0.0000	0.000E+00	0.0000	7.551E+01	0.8860	3.328E+00	0.0390	2.811E+00	0.0330	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.
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	7.290E+01	0.8553
Th-232	0.000E+00	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	1.197E+01	0.1404
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	3.668E-01	0.0043
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.523E+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 = 3.000E+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.
Ra-226	1.323E+01	0.1390	6.017E-03	0.0001	0.000E+00	0.0000	5.064E+01	0.5322	2.828E+00	0.0297	2.170E+00	0.0228	6.394E-01	0.0067
Th-232	1.057E+01	0.1111	1.972E-01	0.0021	0.000E+00	0.0000	1.281E+01	0.1346	6.705E-01	0.0070	7.834E-01	0.0082	1.921E-01	0.0020
U-238	1.214E-01	0.0013	1.865E-02	0.0002	0.000E+00	0.0000	2.271E-01	0.0024	1.030E-02	0.0001	2.468E-02	0.0003	1.661E-02	0.0002
Total	2.392E+01	0.2514	2.219E-01	0.0023	0.000E+00	0.0000	6.368E+01	0.6692	3.508E+00	0.0369	2.978E+00	0.0313	8.481E-01	0.0089

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.951E+01	0.7305
Th-232	0.000E+00	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	2.522E+01	0.2651
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	4.187E-01	0.0044
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.515E+01	1.0000

*Sum of all water independent and dependent pathways.

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

Parent (i)	Product (j)	Thread Fraction	DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
Ra-226+D	Ra-226+D	1.000E+00	3.082E+00	3.080E+00	3.076E+00	3.062E+00	3.021E+00	2.891E+00	3.213E+00
Ra-226+D	Pb-210+D	1.000E+00	7.409E-02	1.950E-01	4.212E-01	1.108E+00	2.393E+00	3.503E+00	2.884E+00
Ra-226+D	∑DSR(j)		3.156E+00	3.275E+00	3.497E+00	4.170E+00	5.414E+00	6.395E+00	6.098E+00
Th-232	Th-232	1.000E+00	1.407E-01	1.410E-01	1.415E-01	1.434E-01	1.487E-01	1.672E-01	3.269E-01
Th-232	Ra-228+D	1.000E+00	1.763E-01	5.279E-01	1.122E+00	2.381E+00	3.341E+00	3.908E+00	6.424E+00
Th-232	Th-228+D	1.000E+00	2.362E-03	1.096E-02	3.731E-02	1.324E-01	2.440E-01	4.407E-01	2.767E+00
Th-232	∑DSR(j)		3.194E-01	6.799E-01	1.301E+00	2.656E+00	3.734E+00	4.516E+00	9.518E+00
U-238	U-238	5.400E-05	1.854E-06	1.851E-06	1.846E-06	1.827E-06	1.773E-06	1.581E-06	1.340E-06
U-238+D	U-238+D	9.999E-01	3.664E-02	3.660E-02	3.650E-02	3.617E-02	3.524E-02	3.216E-02	3.670E-02
U-238+D	U-234	9.999E-01	5.398E-08	1.617E-07	3.763E-07	1.118E-06	3.150E-06	9.254E-06	2.346E-05
U-238+D	Th-230	9.999E-01	1.391E-13	8.995E-13	4.576E-12	4.000E-11	3.324E-10	3.476E-09	3.997E-08
U-238+D	Ra-226+D	9.999E-01	1.198E-15	1.963E-14	2.393E-13	6.493E-12	1.594E-10	5.657E-09	1.867E-07
U-238+D	Pb-210+D	9.999E-01	1.668E-17	4.410E-16	9.802E-15	6.765E-13	4.117E-11	3.287E-09	1.214E-07
U-238+D	∑DSR(j)		3.664E-02	3.660E-02	3.650E-02	3.618E-02	3.524E-02	3.217E-02	3.673E-02

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 = 1.000E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
Ra-226	3.168E+00	3.053E+00	2.859E+00	2.398E+00	1.847E+00	1.564E+00	1.640E+00
Th-232	3.131E+01	1.471E+01	7.687E+00	3.765E+00	2.678E+00	2.214E+00	1.051E+00
U-238	2.729E+02	2.732E+02	2.739E+02	2.764E+02	2.837E+02	3.108E+02	2.723E+02

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 = 3.000E+02 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-226	1.140E+01	97.7 ± 0.2	6.395E+00	1.564E+00	6.098E+00	1.640E+00
Th-232	2.650E+00	3.000E+02	9.518E+00	1.051E+00	9.518E+00	1.051E+00
U-238	1.140E+01	3.000E+02	3.673E-02	2.723E+02	3.673E-02	2.723E+02

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

Nuclide (j)	Parent (i)	THF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
Ra-226	Ra-226	1.000E+00	3.513E+01	3.511E+01	3.507E+01	3.490E+01	3.444E+01	3.296E+01	3.663E+01
Ra-226	U-238	9.999E-01	1.365E-14	2.238E-13	2.728E-12	7.403E-11	1.818E-09	6.449E-08	2.129E-06
Ra-226	∑DOSE(j)		3.513E+01	3.511E+01	3.507E+01	3.490E+01	3.444E+01	3.296E+01	3.663E+01
Pb-210	Ra-226	1.000E+00	8.446E-01	2.223E+00	4.802E+00	1.263E+01	2.728E+01	3.993E+01	3.288E+01
Pb-210	U-238	9.999E-01	1.901E-16	5.027E-15	1.117E-13	7.712E-12	4.694E-10	3.747E-08	1.384E-06
Pb-210	∑DOSE(j)		8.446E-01	2.223E+00	4.802E+00	1.263E+01	2.728E+01	3.993E+01	3.288E+01
Th-232	Th-232	1.000E+00	3.729E-01	3.736E-01	3.750E-01	3.799E-01	3.940E-01	4.431E-01	8.662E-01
Ra-228	Th-232	1.000E+00	4.672E-01	1.399E+00	2.973E+00	6.308E+00	8.854E+00	1.036E+01	1.702E+01
Th-228	Th-232	1.000E+00	6.260E-03	2.905E-02	9.888E-02	3.510E-01	6.465E-01	1.168E+00	7.334E+00
U-238	U-238	5.400E-05	2.113E-05	2.110E-05	2.104E-05	2.083E-05	2.021E-05	1.802E-05	1.527E-05
U-238	U-238	9.999E-01	4.177E-01	4.172E-01	4.161E-01	4.124E-01	4.017E-01	3.667E-01	4.184E-01
U-238	∑DOSE(j)		4.178E-01	4.172E-01	4.162E-01	4.124E-01	4.017E-01	3.667E-01	4.184E-01
U-234	U-238	9.999E-01	6.154E-07	1.844E-06	4.290E-06	1.274E-05	3.591E-05	1.055E-04	2.675E-04
Th-230	U-238	9.999E-01	1.586E-12	1.025E-11	5.216E-11	4.560E-10	3.789E-09	3.963E-08	4.556E-07

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

Summary : 600 River Road
File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SITE SPECIFIC ORIGINAL.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
Ra-226	Ra-226	1.000E+00	1.140E+01	1.137E+01	1.130E+01	1.108E+01	1.048E+01	8.610E+00	4.911E+00
Ra-226	U-238	9.999E-01	0.000E+00	2.096E-14	5.631E-13	2.051E-11	5.284E-10	1.661E-08	2.840E-07
Ra-226	∑S(j):		1.140E+01	1.137E+01	1.130E+01	1.108E+01	1.048E+01	8.610E+00	4.911E+00
Pb-210	Ra-226	1.000E+00	0.000E+00	3.481E-01	1.008E+00	2.977E+00	6.448E+00	8.491E+00	5.098E+00
Pb-210	U-238	9.999E-01	0.000E+00	1.619E-16	1.289E-14	1.502E-12	1.037E-10	7.796E-09	2.130E-07
Pb-210	∑S(j):		0.000E+00	3.481E-01	1.008E+00	2.977E+00	6.448E+00	8.491E+00	5.098E+00
Th-232	Th-232	1.000E+00	2.650E+00	2.650E+00	2.650E+00	2.650E+00	2.650E+00	2.649E+00	2.648E+00
Ra-228	Th-232	1.000E+00	0.000E+00	3.006E-01	8.015E-01	1.839E+00	2.534E+00	2.598E+00	2.597E+00
Th-228	Th-232	1.000E+00	0.000E+00	4.937E-02	3.287E-01	1.484E+00	2.500E+00	2.598E+00	2.597E+00
U-238	U-238	5.400E-05	6.156E-04	6.136E-04	6.095E-04	5.955E-04	5.573E-04	4.417E-04	2.274E-04
U-238	U-238	9.999E-01	1.140E+01	1.136E+01	1.129E+01	1.103E+01	1.032E+01	8.180E+00	4.212E+00
U-238	∑S(j):		1.140E+01	1.136E+01	1.129E+01	1.103E+01	1.032E+01	8.180E+00	4.212E+00
U-234	U-238	9.999E-01	0.000E+00	3.221E-05	9.599E-05	3.126E-04	8.776E-04	2.319E-03	3.580E-03
Th-230	U-238	9.999E-01	0.000E+00	1.451E-10	1.300E-09	1.423E-08	1.225E-07	1.169E-06	6.925E-06

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

RESCALC.EXE execution time = 1.05 seconds

Brydges ■ environment ■ engineering ■ energy

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ATTACHMENT 2

Simulation for Design Conditions

Summary : 600 River Road Dose Assessment
File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SITE SPECIFIC WITH COVER.RAD

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Part I: Mixture Sums and Single Radionuclide Guidelines

Summary : 600 River Road Dose Assessment
File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SITE SPECIFIC WITH COVER.RAD

Dose Conversion Factor (and Related) Parameter Summary
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
A-1	DCF's for external ground radiation, (mrem/yr)/(pCi/g)			
A-1	Ac-228 (Source: FGR 12)	5.978E+00	5.978E+00	DCF1(1)
A-1	At-218 (Source: FGR 12)	5.847E-03	5.847E-03	DCF1(2)
A-1	Bi-210 (Source: FGR 12)	3.606E-03	3.606E-03	DCF1(3)
A-1	Bi-212 (Source: FGR 12)	1.171E+00	1.171E+00	DCF1(4)
A-1	Bi-214 (Source: FGR 12)	9.808E+00	9.808E+00	DCF1(5)
A-1	Pa-234 (Source: FGR 12)	1.155E+01	1.155E+01	DCF1(6)
A-1	Pa-234m (Source: FGR 12)	8.967E-02	8.967E-02	DCF1(7)
A-1	Pb-210 (Source: FGR 12)	2.447E-03	2.447E-03	DCF1(8)
A-1	Pb-212 (Source: FGR 12)	7.043E-01	7.043E-01	DCF1(9)
A-1	Pb-214 (Source: FGR 12)	1.341E+00	1.341E+00	DCF1(10)
A-1	Po-210 (Source: FGR 12)	5.231E-05	5.231E-05	DCF1(11)
A-1	Po-212 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(12)
A-1	Po-214 (Source: FGR 12)	5.138E-04	5.138E-04	DCF1(13)
A-1	Po-216 (Source: FGR 12)	1.042E-04	1.042E-04	DCF1(14)
A-1	Po-218 (Source: FGR 12)	5.642E-05	5.642E-05	DCF1(15)
A-1	Ra-224 (Source: FGR 12)	5.119E-02	5.119E-02	DCF1(16)
A-1	Ra-226 (Source: FGR 12)	3.176E-02	3.176E-02	DCF1(17)
A-1	Ra-228 (Source: FGR 12)	0.000E+00	0.000E+00	DCF1(18)
A-1	Rn-220 (Source: FGR 12)	2.298E-03	2.298E-03	DCF1(19)
A-1	Rn-222 (Source: FGR 12)	2.354E-03	2.354E-03	DCF1(20)
A-1	Th-228 (Source: FGR 12)	7.940E-03	7.940E-03	DCF1(21)
A-1	Th-230 (Source: FGR 12)	1.209E-03	1.209E-03	DCF1(22)
A-1	Th-232 (Source: FGR 12)	5.212E-04	5.212E-04	DCF1(23)
A-1	Th-234 (Source: FGR 12)	2.410E-02	2.410E-02	DCF1(24)
A-1	Tl-208 (Source: FGR 12)	2.298E+01	2.298E+01	DCF1(25)
A-1	Tl-210 (Source: no data)	0.000E+00	-2.000E+00	DCF1(26)
A-1	U-234 (Source: FGR 12)	4.017E-04	4.017E-04	DCF1(27)
A-1	U-238 (Source: FGR 12)	1.031E-04	1.031E-04	DCF1(28)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Pb-210+D	2.320E-02	1.360E-02	DCF2(1)
B-1	Ra-226+D	8.594E-03	8.580E-03	DCF2(2)
B-1	Ra-228+D	5.078E-03	4.770E-03	DCF2(3)
B-1	Th-228+D	3.454E-01	3.420E-01	DCF2(4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(5)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(6)
B-1	U-234	1.320E-01	1.320E-01	DCF2(7)
B-1	U-238	1.180E-01	1.180E-01	DCF2(8)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(9)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Pb-210+D	7.276E-03	5.370E-03	DCF3(1)
D-1	Ra-226+D	1.321E-03	1.320E-03	DCF3(2)
D-1	Ra-228+D	1.442E-03	1.440E-03	DCF3(3)
D-1	Th-228+D	8.086E-04	3.960E-04	DCF3(4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(5)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(6)
D-1	U-234	2.830E-04	2.830E-04	DCF3(7)
D-1	U-238	2.550E-04	2.550E-04	DCF3(8)

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-1	U-238+D	2.687E-04	2.550E-04	DCF3(9)
D-34	Food transfer factors:			
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(1,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(1,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(1,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(2,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(2,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(3,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(4,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(4,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	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	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(6,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(6,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(6,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-234 , 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	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(1,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(1,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(2,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(2,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(3,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(3,2)
D-5				

Dose Conversion Factor (and Related) Parameter Summary (continued)
Dose Library: FGR 12 & FGR 11

Menu	Parameter	Current Value#	Base Case*	Parameter Name
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(4,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+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	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(6,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(6,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-234 , 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.

Summary : 600 River Road Dose Assessment
File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SITE SPECIFIC WITH COVER.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.400E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	2.000E+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)	1.000E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	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): Ra-226	1.140E+01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Th-232	2.650E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-238	1.140E+01	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): Ra-226	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Th-232	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	1.100E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	1.500E+00	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	2.000E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	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

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
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 Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.374E-03	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Th-232				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
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	3.319E-03	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.663E-03	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.374E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.778E-06	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter 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	2.778E-06	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter U-234				
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	3.319E-03	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	5.100E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.100E+01	FMEAT
R018	Contamination fraction of milk	-1	-1	0.100E+01	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	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	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	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : 600 River Road Dose Assessment
File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SITE SPECIFIC WITH COVER.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	24000.00 square meters	Ra-226	1.140E+01
Thickness:	2.00 meters	Th-232	2.650E+00
Cover Depth:	1.10 meters	U-238	1.140E+01

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 1.000E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
TDOSE(t):	2.631E-04	2.786E-04	3.295E-04	5.256E-04	8.084E-04	1.563E-03	8.347E+00
M(t):	2.631E-05	2.786E-05	3.295E-05	5.256E-05	8.084E-05	1.563E-04	8.347E-01

Maximum TDOSE(t): 8.347E+00 mrem/yr at t = 3.000E+02 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.
Ra-226	2.598E-04	0.9877	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.939E-06	0.0112	0.000E+00	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
U-238	2.882E-07	0.0011	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.631E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.598E-04	0.9877
Th-232	0.000E+00	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	2.939E-06	0.0112
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	2.882E-07	0.0011
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.631E-04	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+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.
Ra-226	2.620E-04	0.9405	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	1.628E-05	0.0584	0.000E+00	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
U-238	2.912E-07	0.0010	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	2.786E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.620E-04	0.9405
Th-232	0.000E+00	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	1.628E-05	0.0584
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	2.912E-07	0.0010
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.786E-04	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 = 3.000E+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.
Ra-226	2.665E-04	0.8088	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	6.270E-05	0.1903	0.000E+00	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
U-238	2.972E-07	0.0009	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	3.295E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.665E-04	0.8088
Th-232	0.000E+00	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	6.270E-05	0.1903
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	2.972E-07	0.0009
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.295E-04	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+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.
Ra-226	2.827E-04	0.5379	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	2.426E-04	0.4615	0.000E+00	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
U-238	3.190E-07	0.0006	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	5.256E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.827E-04	0.5379
Th-232	0.000E+00	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	2.426E-04	0.4615
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	3.190E-07	0.0006
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	5.256E-04	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 = 3.000E+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.
Ra-226	3.348E-04	0.4141	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	4.733E-04	0.5854	0.000E+00	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
U-238	3.908E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	8.084E-04	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.348E-04	0.4141
Th-232	0.000E+00	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	4.733E-04	0.5854
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	3.908E-07	0.0005
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.084E-04	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.
Ra-226	6.047E-04	0.3868	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Th-232	9.576E-04	0.6127	0.000E+00	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
U-238	7.953E-07	0.0005	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	1.563E-03	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

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

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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.047E-04	0.3868
Th-232	0.000E+00	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	9.576E-04	0.6127
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	7.953E-07	0.0005
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	1.563E-03	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 = 3.000E+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.
Ra-226	3.276E-03	0.0004	0.000E+00	0.0000	0.000E+00	0.0000	6.126E+00	0.7340	2.678E-01	0.0321	2.098E-01	0.0251	0.000E+00	0.0000
Th-232	6.545E-03	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	1.549E+00	0.1856	7.143E-02	0.0086	8.337E-02	0.0100	0.000E+00	0.0000
U-238	6.062E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.746E-02	0.0033	4.593E-04	0.0001	9.577E-04	0.0001	0.000E+00	0.0000
Total	9.828E-03	0.0012	0.000E+00	0.0000	0.000E+00	0.0000	7.703E+00	0.9229	3.397E-01	0.0407	2.941E-01	0.0352	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 = 3.000E+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.
Ra-226	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.607E+00	0.7916
Th-232	0.000E+00	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	1.711E+00	0.2050
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	2.888E-02	0.0035
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.347E+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+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
Ra-226+D	Ra-226+D	1.000E+00	2.279E-05	2.299E-05	2.338E-05	2.480E-05	2.937E-05	5.304E-05	2.447E-01
Ra-226+D	Pb-210+D	1.000E+00	1.689E-13	5.049E-13	1.169E-12	3.425E-12	9.487E-12	3.295E-11	3.348E-01
Ra-226+D	∑DSR(j)		2.279E-05	2.299E-05	2.338E-05	2.480E-05	2.937E-05	5.304E-05	5.796E-01
Th-232	Th-232	1.000E+00	3.222E-19	3.324E-19	3.538E-19	4.402E-19	8.215E-19	7.295E-18	2.663E-02
Th-232	Ra-228+D	1.000E+00	2.149E-07	6.179E-07	1.318E-06	2.983E-06	5.154E-06	1.262E-05	6.047E-01
Th-232	Th-228+D	1.000E+00	8.943E-07	5.527E-06	2.234E-05	8.855E-05	1.734E-04	3.488E-04	1.425E-02
Th-232	∑DSR(j)		1.109E-06	6.145E-06	2.366E-05	9.153E-05	1.786E-04	3.614E-04	6.456E-01
U-238	U-238	5.400E-05	2.103E-40	2.235E-40	2.526E-40	3.877E-40	1.318E-39	9.546E-38	1.297E-07
U-238+D	U-238+D	9.999E-01	2.528E-08	2.554E-08	2.607E-08	2.798E-08	3.428E-08	6.976E-08	2.531E-03
U-238+D	U-234	9.999E-01	3.151E-24	9.671E-24	2.374E-23	8.527E-23	4.147E-22	8.305E-21	2.270E-06
U-238+D	Th-230	9.999E-01	1.080E-28	7.732E-28	4.297E-27	4.602E-26	6.505E-25	4.320E-23	3.258E-09
U-238+D	Ra-226+D	9.999E-01	1.053E-20	1.591E-19	1.889E-18	5.328E-17	1.557E-15	1.039E-13	1.422E-08
U-238+D	Pb-210+D	9.999E-01	3.134E-29	9.760E-28	2.484E-26	2.019E-24	1.611E-22	3.078E-20	1.409E-08
U-238+D	∑DSR(j)		2.528E-08	2.554E-08	2.607E-08	2.798E-08	3.428E-08	6.976E-08	2.533E-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 = 1.000E+01 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
Ra-226	4.387E+05	4.350E+05	4.278E+05	4.032E+05	3.405E+05	1.885E+05	1.725E+01
Th-232	*1.097E+05	*1.097E+05	*1.097E+05	1.092E+05	5.600E+04	2.767E+04	1.549E+01
U-238	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	*3.361E+05	3.947E+03

*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 = 3.000E+02 years

Nuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Ra-226	1.140E+01	3.000E+02	5.796E-01	1.725E+01	5.796E-01	1.725E+01
Th-232	2.650E+00	3.000E+02	6.456E-01	1.549E+01	6.456E-01	1.549E+01
U-238	1.140E+01	3.000E+02	2.534E-03	3.947E+03	2.534E-03	3.947E+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+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
Ra-226	Ra-226	1.000E+00	2.598E-04	2.620E-04	2.665E-04	2.827E-04	3.348E-04	6.047E-04	2.790E+00
Ra-226	U-238	9.999E-01	1.200E-19	1.814E-18	2.153E-17	6.074E-16	1.775E-14	1.185E-12	1.621E-07
Ra-226	∑DOSE(j)		2.598E-04	2.620E-04	2.665E-04	2.827E-04	3.348E-04	6.047E-04	2.790E+00
Pb-210	Ra-226	1.000E+00	1.925E-12	5.755E-12	1.333E-11	3.905E-11	1.081E-10	3.757E-10	3.817E+00
Pb-210	U-238	9.999E-01	3.573E-28	1.113E-26	2.832E-25	2.301E-23	1.836E-21	3.509E-19	1.606E-07
Pb-210	∑DOSE(j)		1.925E-12	5.755E-12	1.333E-11	3.905E-11	1.081E-10	3.757E-10	3.817E+00
Th-232	Th-232	1.000E+00	8.538E-19	8.809E-19	9.376E-19	1.166E-18	2.177E-18	1.933E-17	7.057E-02
Ra-228	Th-232	1.000E+00	5.694E-07	1.638E-06	3.491E-06	7.904E-06	1.366E-05	3.343E-05	1.602E+00
Th-228	Th-232	1.000E+00	2.370E-06	1.465E-05	5.921E-05	2.347E-04	4.596E-04	9.242E-04	3.776E-02
U-238	U-238	5.400E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.478E-06
U-238	U-238	9.999E-01	2.882E-07	2.912E-07	2.972E-07	3.190E-07	3.908E-07	7.952E-07	2.885E-02
U-238	∑DOSE(j)		2.882E-07	2.912E-07	2.972E-07	3.190E-07	3.908E-07	7.952E-07	2.886E-02
U-234	U-238	9.999E-01	3.592E-23	1.102E-22	2.706E-22	9.721E-22	4.728E-21	9.467E-20	2.587E-05
Th-230	U-238	9.999E-01	1.232E-27	8.814E-27	4.898E-26	5.247E-25	7.416E-24	4.925E-22	3.714E-08

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

Summary : 600 River Road Dose Assessment
File : C:\RESRAD_FAMILY\RESRAD\6.5\USERFILES\SITE SPECIFIC WITH COVER.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	THF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02
Ra-226	Ra-226	1.000E+00	1.140E+01	1.137E+01	1.130E+01	1.108E+01	1.048E+01	8.610E+00	4.911E+00
Ra-226	U-238	9.999E-01	0.000E+00	2.096E-14	5.631E-13	2.051E-11	5.284E-10	1.661E-08	2.840E-07
Ra-226	∑S(j):		1.140E+01	1.137E+01	1.130E+01	1.108E+01	1.048E+01	8.610E+00	4.911E+00
Pb-210	Ra-226	1.000E+00	0.000E+00	3.481E-01	1.008E+00	2.977E+00	6.448E+00	8.491E+00	5.098E+00
Pb-210	U-238	9.999E-01	0.000E+00	1.619E-16	1.289E-14	1.502E-12	1.037E-10	7.796E-09	2.130E-07
Pb-210	∑S(j):		0.000E+00	3.481E-01	1.008E+00	2.977E+00	6.448E+00	8.491E+00	5.098E+00
Th-232	Th-232	1.000E+00	2.650E+00	2.650E+00	2.650E+00	2.650E+00	2.650E+00	2.649E+00	2.648E+00
Ra-228	Th-232	1.000E+00	0.000E+00	3.006E-01	8.015E-01	1.839E+00	2.534E+00	2.598E+00	2.597E+00
Th-228	Th-232	1.000E+00	0.000E+00	4.937E-02	3.287E-01	1.484E+00	2.500E+00	2.598E+00	2.597E+00
U-238	U-238	5.400E-05	6.156E-04	6.136E-04	6.095E-04	5.955E-04	5.573E-04	4.417E-04	2.274E-04
U-238	U-238	9.999E-01	1.140E+01	1.136E+01	1.129E+01	1.103E+01	1.032E+01	8.180E+00	4.212E+00
U-238	∑S(j):		1.140E+01	1.136E+01	1.129E+01	1.103E+01	1.032E+01	8.180E+00	4.212E+00
U-234	U-238	9.999E-01	0.000E+00	3.221E-05	9.599E-05	3.126E-04	8.776E-04	2.319E-03	3.580E-03
Th-230	U-238	9.999E-01	0.000E+00	1.451E-10	1.300E-09	1.423E-08	1.225E-07	1.169E-06	6.925E-06

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

RESCALC.EXE execution time = 1.33 seconds