Assessment of Radiation in Surface Water at the Paducah Gaseous Diffusion Plant

Radiation Health Branch Division of Public Health Protection and Safety Department for Public Health Cabinet for Health and Family Services

Prepared by the University of Kentucky - Kentucky Water Resources Research Institute

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BACKGROUND

The Radiation Health Branch (RHB), Department for Public Health, Cabinet for Health and Family Services (Cabinet) by statutory mandate is the radiation control agency for the Commonwealth of Kentucky. The Cabinet's statutory mandate (KRS 211.842-211.852) is to establish programs to protect public health and safety, and welfare from ionizing radiation. Activities are directed toward licensing, registration, certification, inspection, waste disposal, environmental monitoring, environmental impact assessment, radiochemical analysis, dose evaluation, risk assessment, risk management, compliance, transportation of radioactive material, and emergency response relative to radioactive materials.

The RHB was the first state or federal agency to detect off-site radionuclide contamination in private drinking water wells in the vicinity of the U.S. Department of Energy's (DOE) Paducah Gaseous Diffusion Plant (PGDP) in 1988. The Cabinet funded the RHB's regular environmental sampling, monitoring, analysis, and assessment activities at PGDP from 1988 until 1991. In 1991 the RHB obtained funding under the Agreement in Principle (AIP) with DOE and the Kentucky Department of Environmental Protection, which acts as the lead agency for the AIP grant. Since 1994 the University of Kentucky has provided personnel for RHB's PGDP activities through a Program Administration Contract with the Cabinet.

The RHB is involved in sampling, monitoring, laboratory analysis, and assessment of off-site (outside DOE Property Boundary) and on-site (inside DOE Property Boundary) radionuclide contamination at PGDP. The RHB has been sampling and conducting environmental analyses at the PGDP since 1988. The RHB continues to collect and analyze surface water, sediment, groundwater, vegetation, and soil samples in order to characterize and assess impacts of the PGDP on public health.

The RHB's efforts at the PGDP have been directed toward radiological monitoring and oversight of DOE activities in order to ensure protection of public health. However, the RHB does not have regulatory authority on-site (within the DOE property boundary) at the PGDP assuming DOE has Exclusive Federal Jurisdiction. The DOE is selfregulating with regard to activities dealing with radiation

related to the uranium fuel cycle as established by the Atomic Energy Act.

The RHB collects, handles, and stores samples at the PGDP and transports the samples to the Radiation Control Laboratory (RCL) under a radioactive material license issued by the Cabinet. Samples collected for the RHB by the University of Kentucky Water Resources Research Institute (UK-KWRRI) are handled, transported, and shipped under the University of Kentucky's radioactive materials license.

The RHB collects samples and maintains monitoring equipment at the PGDP as outlined in the text and tables contained in the *Field Sampling and Analysis Plan for the PGDP* (FSAP, RHB, 2003). Health and safety procedures for environmental activities at the PGDP including the collection, handling, and transport of environmental samples are outlined in the *Health and Safety Plan for the PGDP* (HASP, RHB, 2003).

Once at the RCL, samples are analyzed for the parameters outlined in the FSAP utilizing analytical procedures defined in the *Laboratory Procedures Manual for the RCL* (RCL, 1996). The data is verified and validated to ensure accuracy, precision, reliability, reproducibility, comparability, and completeness of the RCL analytical results as outlined in the *Quality Assurance Program Plan* for the RCL (RHB, 2003).

The RCL conducts specific analyses on PGDP samples for uranium-234 (234 U), uranium-235 (235 U), uranium-238 (238 U), plutonium-238 (238 Pu), plutonium-239 (239 Pu), and technetium-99 (99 Tc). Samples are analyzed by gamma-spectroscopy to determine the presence of gamma-emitting radionuclides including thorium-234 (234 Th), protactinium-234m (234m Pa), protactinium-233 (233 Pa), cesium-237 (137 Cs), and americium-241 (241 Am).

The RHB's RCL functions as a regulatory laboratory and must maintain a high standard of quality in order to ensure protection of public health from ionizing radiation. To ensure the production of high quality analytical data the RCL conducts quality control analytical analyses. Quality control samples included standards, performance evaluation samples, and background analyses. Data verification is conducted by the RCL. Data validation is conducted by an independent third party.

Analytical results are screened against a number of criteria. The following is the sequence used to evaluate data produced by the RCL. The data is evaluated to determine if: (1) each sample has a sample-specific activity for each specific analysis; (2) each sample has a sample-specific counting uncertainty; (3) each result has a sample specific minimum detectable concentration (MDC); (4) the reported activity does or does not exceed the sample-specific MDC; (5) the sample-specific counting uncertainty does or does not exceed the sample-specific MDC; (5) the sample-specific counting uncertainty does or does not exceed the sample-specific MDC; (6) each set of data has appropriate quality control.

For this report, the RHB did not screen out data through the application of the above six (6) step approach. Therefore, all data was used to conduct the assessments presented in the report.

ISCO Automated Surface-Water Monitoring

The Cabinet's RHB maintains and operates eight (8) ISCO automated surface-water samplers in the vicinity of the Figure 1 shows the location of the RHB's ISCO PGDP. automated samplers. The RHB has automated samplers at the following locations: (1) ISCO A, at KPDES Outfall 001 weir; (2) ISCO B, at the Bayou Creek quarterly background surface-water sampling location BBCUG/R-249 upstream of the PGDP; (3) ISCO C, in Bayou Creek at sampling location BBCDG/R-151 downstream from PGDP outfalls; (4) ISCO D, at sampling location LBCDG/R-248 quarterly surface water downstream from the PGDP KPDES Outfalls to Little Bayou Creek and the North South Diversion Ditch confluence with Little Bayou Creek; (5) ISCO F, in Outfall 008 on the west side of the site; (6) ISCO G, in Little Bayou Creek at McCaw Road on the east side of the site: (7) ISCO DRUM1 (D1) in the south drain from the scrap yards outside the restricted area fence at the northwest corner of the site; and (8) ISCO DRUM2 (D2) in the north drain from the scrap yards outside the restricted area fence at the northwest corner of the site.

Each ISCO automated sampler operates continuously to automatically collect four (4) surface water samples per day at 6-hour intervals. As each of the daily water samples are collected, they are automatically combined into one (1) daily-composite sample. The sample collection cycle for the ISCO daily-composite samples averages

approximately 21 days depending on availability of RHB personnel to travel to the PGDP to collect and replace sample containers. Sets of daily-composite samples are combined into one 21-day composite sample. The 21-day composite sample is filtered and the filtrate is acidified to stabilize the sample. The acidified filtrate samples are analyzed for gross alpha/beta (α/β) activity, gamma (γ) activity, technetium-99 (⁹⁹Tc), and alpha emitting isotopes (uranium-234 (²³⁴U), uranium-235 (²³⁵U), uranium-238 (²³⁸U), plutonium-239 (²³⁹Pu).

The results of analyses for surface water samples from the ISCO sampler were assessed: (1) to ensure radionuclide discharges do not pose risks to public health; (2) to ensure the reliability of quarterly grab-sampling results; and (3) to identify temporal & spatial changes in radionuclide discharges due to past and present plant activities, hydrogeological factors, and meteorological events.

SURFACE WATER ISCOS - BAYOU CREEK, WEST DRAINAGE DITCHES AND OUTFALLS

On the west side of the Paducah Gaseous Diffusion Plant (PGDP) the Radiation Health Branch operates ISCO surface water monitors in Outfall 001, Outfall 008, the north (ISCO D2) and south (ISCO D1) drainage ditches from the scrap metal yards and SWMUs 7 and 30, upgradient of the west outfalls on Bayou Creek (ISCO B), and downgradient of the west outfalls on Bayou Creek (ISCO C)(Figure 2). Descriptive statistical parameters for key PGDP process radionuclides are provided in Table 1.

ISCO D2

ISCO D2, Figure 3, is located in the north drain of the northwest corner and receives runoff from the scrap yards and from the surface soils of SWMUs 7 and 30. The mean 238 U activity in surface water at ISCO D2 from 2001 to March 2005 is 18.58 picocuries per liter (pCi/l), Table 1. The mean 99 Tc, 235 U, 234 U, 238 Pu, and 239 Pu activity is also provided in Table 1.

Table 2 provides the annual mean activity for each of the isotopes as compared to their annual release limit as

established by 902 KAR 100:019, Section 44(7), Table II. Table 2 also lists the ratio of the mean activity to the established release limit.

The contaminants at location ISCO D2 do not exceed a ratio of one (1.0) and the sum of the fractions, Table 2, is less than one (1.0). This data indicates releases in the north drainage ditch from the scrap yards and SWMUs 7 and 30 falls within federal permitted releases. The regulation cited above would be an Applicable Relevant and Appropriate Requirements (ARAR) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Figure 4, provides a plot of the 238 U data (including counting uncertainty and detection limit) versus collection dates at ISCO D1. As see from the plot, the level of 238 U has been trending down during the period the sampler has been in place and 238 U releases now appear to be consistent with little fluctuation.

ISCO D1

ISCO D1, Figure 3, is located in the south drain of the northwest corner and receives runoff from the scrap yards and from the surface soils of SWMUs 7 and 30. The mean 238 U activity in surface water at ISCO D2 from 2001 to March 2005 is 255.30 pCi/l, Table 1. The mean 99 Tc, 235 U, 234 U, 238 Pu, and 239 Pu activity is also provided in Table 1.

Table 3 provides the annual mean activity for each of the isotopes as compared to their annual release limit as established by 902 KAR 100:019, Section 44(7), Table II. Table 3 also provides the ratio of the annual mean activity to the established release limit.

²³⁴U and ²³⁸U at location ISCO D1 exceeded a ratio of one (1.0) in 2001 but the ratio was less than one (1.0) for 2002, 2003, and 2004. ⁹⁹Tc, ²³⁵U, ²³⁸Pu, and ²³⁹Pu did not exceed a ratio of one (1.0) for all years. The sum of the fractions, Table 3, is also greater than one (1.0) for 2001. This data indicates releases in the south drainage ditch from the scrap yards and SWMUs 7 and 30 are greater than federal permitted releases for 2001 but fall below release limits for 2002, 2003, and 2004. The regulation cited above would be an Applicable Relevant and Appropriate Requirements (ARAR) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Figure 5, provides a plot of the 238 U data (including counting uncertainty and detection limit) versus collection dates at ISCO D1. As see from the plot, the levels of 238 U in surface water initially trended down during the period the sampler has been in place. Subsequent to the downward trend 238 U releases in surface water now show little trending but fluctuation with time.

ISCO A

ISCO A, Figure 3, is located in Outfall 001 at the KPDES 001 weir. The outfall drains surface water from approximately 203 acres in the northwest part of the PGDP. Internal ditches in the Outfall 001 watershed are approximately 20,420 feet in length, unlined, and approximately 0.5 to 12 feet deep (DOE, 2004).

The mean 238 U activity in Outfall 001 surface water discharges measured at ISCO A from 1999 to March 2005 is 2.77 pCi/l, Table 1. The mean 99 Tc, 235 U, 234 U, 238 Pu, and 239 Pu activity in Outfall 001 surface water is also provided in Table 1.

Table 4 provides the annual mean activity for each of the isotopes as compared to their annual release limit as established by 902 KAR 100:019, Section 44(7), Table II. Table 4 provides the ratio of the annual mean activity for the isotopes to their established release limit.

The contaminants at location ISCO A do not exceed a ratio of one (1.0) and the sum of the fractions, Table 4, is less than one (1.0). This data indicates releases to Outfall 001 are less than federal permitted releases.

Figure 6, provides a plot of 238 U in surface water (including counting uncertainty and detection limit) versus collection dates at ISCO A. As see from the plot, the levels of 238 U in surface water appear to trending downward and fluctuation with time.

ISCO F

ISCO F, Figure 3, is located in Outfall 008. The Outfall 008 watershed drains 90 acres in the southwest portion of the PGDP industrial area and presently receives effluent from a number of buildings including the C-400 building. Internal ditches in the Outfall 008 watershed are approximately 12,215 feet in length, unlined, and approximately 0.5 to 4 feet deep (DOE 2004).

The mean 238 U activity in surface water at ISCO F from 2002 to March 2005 is 1.42 pCi/l and the mean activity of 234 U is 2.83 pCi/l, Table 1. The ratio of 238 U/ 234 U activity is less than one (1.0) which is unique to Outfall 008 and indicates that discharges are impacted by plant process operations. The mean 99 Tc, 235 U, 234 U, 238 Pu, and 239 Pu activity at Outfall 008 is also provided in Table 1.

Table 5 provides the annual mean activity for each of the isotopes as compared to their annual release limit as established by 902 KAR 100:019, Section 44(7), Table II. Table 5 also provides the ratio of the mean activity to the established release limit.

The contaminants at location ISCO F do not exceed a ratio of one (1.0) and the sum of the fractions, Table 5, is less than one (1.0). This data indicates releases to Outfall 001 are less than federal permitted releases.

Figure 7, provides a plot of 238 U in surface water (including counting uncertainty and detection limit) versus collection dates at ISCO F. The plot indicates that the levels of 238 U in surface water appear to be trending downward and appears to shows temporal fluctuations.

ISCO B & C

ISCO B is located upgradient of the west side drainage ditches and Outfalls and ISCO C is located downgradient of the west drainage ditches and Outfalls, Figure 2. The mean activity of 238 U in surface water at ISCO B is 0.12 pCi/l and is 1.15 pCi/l at ISCO C, Table 1. The mean 99 Tc, 235 U, 234 U, 238 Pu, and 239 Pu activity at ISCOs B and C is also provided in Table 1.

Figure 8, provides a plot of 238 U in surface water (including counting uncertainty and detection limit) versus collection dates for ISCO B. The activity trend for 238 U in surface water appears to be relatively flat and without significant fluctuation with time as would be anticipated for a background location.

Figure 9, illustrates the trend of 238 U in surface water (including counting uncertainty and detection limit) versus collection dates at ISCO C. The plot demonstrates that the trend of 238 U activity in surface water at ISCO C is relatively flat over time with temporal fluctuations.

West Side ISCOs Radiation Dose & Risk Assessment

Radiation dose and risk assessment for ISCOS B and C in Bayou Creek was conducted using *RESRAD BASELINE*, *Version* 2.2, 1996, Argonne National Laboratory. The only potential complete exposure pathway for both locations was incidental ingestion of surface water while swimming, wading, fishing, etc.

Based on the assumption that incidental ingestion of surface water is possible and using RESRAD BASELINE default input parameters (Appendix B), the potential radiation dose and risk for 2000, 2001, 2002, 2003, and 2004 for ISCOs B and C are given in Tables 6, 7, 8, 9, and 10. The hypothetical radiation dose at ISCOs B and C is less than the 25 mrem/yr radiation dose limit as established by 902 KAR 100:041, Section 2 for free release. The hypothetical radiation risk is also less than the 1 x 10^{-4} risk level proposed by the U.S. Environmental Protection Agency for radiation risks. The hypothetical radiation dose is also less than the negligible individual risk limit (NIRL) of 1 mrem/yr recommended by the "National Council on Radiation Protection and Measurements, Report Number 116 (NCRP 1993)." The NIRL was proposed as a level at which no further action was needed to protect health and safety.

SURFACE WATER ISCOS - LITTLE BAYOU CREEK

The RHB operates two (2) ISCO surface water monitors on the east side of the PGDP: (1) ISCO G downgradient of the east Outfalls 010, 011, 012, and 013, at Little Bayou Creek and McCaw Road; and (2) ISCO D downgradient of the intersection of the North South Diversion Ditch (NSDD) with Little Bayou Creek at Anderson Road, Figure 1. Descriptive statistical parameters for key PGDP process radionuclides are provided in Table 1 for ISCOs D and G.

ISCOs D & G

The location of ISCO G, downgradient of the east side Outfalls 010, 011, 012, and 013, and ISCO D, downgradient of the intersection of the NSDD with Little Bayou Creek at Anderson Road, are shown in Figure 10.

The mean 238 U activity in surface water at ISCO G is 2.53 pCi/l and at ISCO D is 1.54 pCi/l, Table 1. The mean 99 Tc, 235 U, 234 U, 238 Pu, and 239 Pu activity at ISCOS D and G is also provided in Table 1.

Figure 11 illustrates the trend of 238 U activity in surface water (including counting uncertainty and detection limit) versus collection dates at ISCO D. As seen from the plot, the 238 U trend at ISCO D in surface water is relatively flat and without temporal fluctuations.

Figure 12 illustrates the trend of 238 U activity in surface water (including counting uncertainty and detection limit) versus collection dates at ISCO G. The activity trend of 238 U in surface water is relatively flat but exhibits temporal fluctuations.

East Side ISCOs Radiation Dose & Risk Assessment

Radiation dose and risk assessment for ISCOS G and D in Little Bayou Creek was conducted using *RESRAD BASELINE*, *Version 2.2, 1996, Argonne National Laboratory*. The only potential complete exposure pathway for both locations was incidental ingestion of surface water while swimming, wading, fishing, etc.

Based on the hypothetical assumption that incidental ingestion of surface water is possible and using RESRAD BASELINE default input parameters (Appendix B), the potential radiation dose and risk for 2000, 2001, 2002, 2003, and 2004 for ISCO D are given in Tables 6, 7, 8, 9, 10. The potential radiation dose and risk for 2002, 2003, and 2004 for ISCO G are given in Tables 8, 9, 10.

The hypothetical radiation dose at ISCOs G and D are less than the 25 mrem/yr dose limit as established by 902 KAR 100:041, Section 2 for free release. The hypothetical radiation risk is also less than the 1 x 10^{-4} level proposed by the U.S. Environmental Protection Agency for radiation risks. The hypothetical radiation dose is also less than

the negligible individual risk limit (NIRL) of 1 mrem/yr recommended by the "National Council of Radiation Protection and Measurements, Report Number 116.(NRCP 1993)." The NIRL was proposed as a level at which no further action was needed to protect health and safety.

REFERENCES

- DOE 2004. Sampling and Analysis Plan for Site Investigation and Risk Assessment of the Surface Water Unit (On-Site) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/OR/07-2137&D2, December 2004
- 2. NCRP 1993. Report 116. Limitation of Exposure to Ionizing Radiation, NCRP Publications, Bethesda, MD

APPENDIX A - TABLES AND FIGURES

Table 1. Mean radiation activity of isotopes reported in picocuries/liter (pCi/l) in surface water from 1999 through March 2005 at Radiation Health Branch ISCO samplers. All values were included in the assessment. Data were not screened out against radiation counting uncertainty or detection limit. All reported data was used to calculated Mean, Maximum, Minimum, and Standard Deviation (STDev). All data used in the assessment was verified and validated.

Isotope		ISCO A	ISCO B	ISCO C	ISCO D	ISCO D1	ISCO D2	ISCO F	ISOC G
		pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l
Soluble	Mean	2.77	0.12	1.15	1.54	255.30	18.58	1.42	2.53
Uranium-238	Maximum	15.07	0.79	8.44	8.41	1102.00	124.50	6.24	5.77
	Minimum	0.18	-0.02	0.10	0.21	0.00	0.04	0.28	0.18
	SIDev	3.02	0.13	1.05	1.22	255.02	31.13	1.47	1.31
Soluble	Mean	0.12	0.02	0.06	0.06	13.70	0.55	0.15	0.09
Uranium-235	Maximum	0.67	0.14	0.33	0.23	176.10	3.91	0.60	0.30
	Minimum	-0.05	-0.04	-0.03	-0.05	-0.22	-0.04	-0.10	0.00
	SIDev	0.12	0.04	0.06	0.05	22.86	0.91	0.14	0.06
Soluble	Mean	1.61	0.10	0.84	0.51	146.98	7.75	2.83	0.99
Uranium-234	Maximum	8.01	0.23	5.41	2.68	652.50	50.93	9.95	4.61
	Minimum	0.19	0.00	0.08	0.04	-142.70	0.10	0.70	0.13
	SIDev	1.53	0.05	0.70	0.45	152.86	12.65	2.16	0.94
Soluble	Mean	8.89	1.32	3.88	4.36	120.30	17.39	5.67	3.00
Technetium-99	Maximum	37.92	9.50	14.43	30.24	903.59	132.68	19.75	19.72
	Minimum	2.36	-3.60	-3.90	-1.98	3.36	-0.40	-0.81	-2.73
	STDev	5.17	2.68	3.12	4.86	150.57	25.21	3.76	4.24
Total	Mean	31.87	0.43	4.29	4.59	80.31	12.02	11.07	3.91
Technetium-99	Maximum	75.55	7.61	15.80	17.25	228.07	67.24	33.13	22.56
	Minimum	9.72	-4.66	-47.62	-2.85	6.49	2.26	3.69	-2.77
	STDev	14.95	2.22	6.66	3.93	54.60	10.23	5.55	4.71
Soluble	Mean	0.02	0.03	0.00	0.03	0.13	0.06	0.01	0.02
Plutonium-239	Maximum	0.17	0.36	0.41	0.35	2.17	2.12	0.22	0.55
	Minimum	-0.05	-0.10	-0.12	-0.10	-0.96	-0.06	-0.09	-0.11
	STDev	0.04	0.07	0.07	0.07	0.48	0.27	0.06	0.10
Soluble	Mean	0.06	0.06	0.08	0.09	0.72	0.12	0.06	0.07
Plutonium-238	Maximum	0.70	0.35	0.48	1.07	5.30	0.30	0.46	0.33
	Minimum	-0.23	-0.16	-0.16	-0.13	-1.25	0.00	-0.13	-0.14
	SIDev	0.15	0.11	0.14	0.21	1.46	0.09	0.13	0.11

Table 2. ISCO D2 was installed by the Radiation Health Branch in the fall of 2000. Radiation activity of isotopes reported in picocuries/liter (pCi/l) in surface water from 2001 through 2004 for ISCO D2. All values were included in the assessment. Data were not screened out against radiation counting uncertainty or detection limit. All reported data was used to calculated annual mean activity. All data used in the assessment was verified and validated. Annual mean activity was used to calculate ratios and sum of the fractions relative to release limits.

	Moon	Polooco Limito	Potio	Sum of the					
	Mean	Release Limits	Ratio Moon Activity to	Fractions Bolative to					
Isotope	ISCO D2	Section 44(7)	Release Limits	Release Limits					
1001000	pCi/l	pCi/l							
	2001								
Soluble Uranium-238	58.3	300	0.19						
Soluble Uranium-235	1.7	300	0.006						
Soluble Uranium-234	23.6	300	0.08						
Technetium-99	46.1	60000	0.0007	0.28					
Soluble Plutonium-239	0.01	20	0.0005						
Soluble Plutonium-238	0.1	20	0.005						
		2002							
Soluble Uranium-238	27.3	300	0.09						
Soluble Uranium-235	0.7	300	0.002						
Soluble Uranium-234	11.2	300	0.04						
Technetium-99	12.4	60000	0.0002	0.13					
Soluble Plutonium-239	0.04	20	0.002						
Soluble Plutonium-238	-0.001	20	-0.00006						
		2003							
Soluble Uranium-238	0.7	300	0.002						
Soluble Uranium-235	0.05	300	0.0002						
Soluble Uranium-234	0.7	300	0.002						
Technetium-99	8.3	60000	0.0001	0.004					
Soluble Plutonium-239	0.01	20	0.0005						
Soluble Plutonium-238	-0.01	20	00005						
2004									
Soluble Uranium-238	0.5	300	0.002						
Soluble Uranium-235	0.04	300	0.0001						
Soluble Uranium-234	0.5	300	0.002						
Technetium-99	8.2	60000	0.0001	0.02					
Soluble Plutonium-239	0.04	20	0.002						
Soluble Plutonium-238	0.2	20	0.01						

Table 3. ISCO D1 was installed by the Radiation Health Branch in the fall of 2000. Radiation activity of isotopes reported in picocuries/liter (pCi/l) in surface water from 2001 through 2004 for ISCO D1. All values were included in the assessment. Data were not screened out against radiation counting uncertainty or detection limit. All reported data was used to calculated annual mean activity. All data used in the assessment was verified and validated. Annual mean activity was used to calculate ratios and sum of the fractions relative to release limits.

				Sum of the		
	Mean	Release Limits	Ratio	Fractions		
	Activity	902 KAR 100:019,	Mean Activity to	Relative to		
Isotope	ISCO D1	Section 44(7)	Release Limits	Release Limits		
	pCi/l	pCi/l				
		2001				
Soluble Uranium-238	540.0	300	1.8			
Soluble Uranium-235	22.7	300	0.08			
Soluble Uranium-234	315.0	300	1.05			
Technetium-99	261.0	60000	0.004	2.98		
Soluble Plutonium-239	-0.01	20	-0.0005			
Soluble Plutonium-238	0.9	20	0.045			
		2002				
Soluble Uranium-238	159.0	300	0.5			
Soluble Uranium-235	6.2	300	0.02			
Soluble Uranium-234	94.0	300	0.3			
Technetium-99	74.5	60000	0.001	0.83		
Soluble Plutonium-239	0.2	20	0.01			
Soluble Plutonium-238	-0.03	20	-0.0015			
		2003				
Soluble Uranium-238	147.0	300	0.49			
Soluble Uranium-235	8.0	300	0.03			
Soluble Uranium-234	87.6	300	0.29			
Technetium-99	70.6	60000	0.001	0.80		
Soluble Plutonium-239	0.002	20	0.0001			
Soluble Plutonium-238	-0.2	20	-0.01			
2004						
Soluble Uranium-238	142.0	300	0.47			
Soluble Uranium-235	7.1	300	0.02			
Soluble Uranium-234	81.6	300	0.27			
Technetium-99	63.0	60000	0.001	0.86		
Soluble Plutonium-239	0.3	20	0.015			
Soluble Plutonium-238	1.6	20	0.08			

Table 4. ISCO A was installed by the Radiation Health Branch in the winter of 1999. Radiation activity of isotopes reported in picocuries/liter (pCi/l) in surface water from 1999 through March 2005 for ISCO A. All values were included in the assessment. Data were not screened out against radiation counting uncertainty or detection limit. All reported data was used to calculated annual mean activity. All data used in the assessment was verified and validated. Annual mean activity was used to calculate ratios and sum of the fractions relative to release limits.

Isotope				Sum of the					
	Mean	Release Limits	Ratio	Fractions					
	Activity	902 KAR 100:019,	Mean Activity to	Relative to					
	ISCO Á	Section 44(7)	Release Limits	Release Limits					
	pCi/l	pCi/l							
	2000								
Soluble Uranium-238	4.6	300	0.0153						
Soluble Uranium-235	0.3	300	0.0010						
Soluble Uranium-234	2.6	300	0.0086	0.028					
Technetium-99	25.5	60000	0.0004	0.020					
Soluble Plutonium-239	-0.03	20	-0.0015						
Soluble Plutonium-238	0.09	20	0.0040						
		2001							
Soluble Uranium-238	3.2	300	0.0107						
Soluble Uranium-235	0.1	300	0.0003						
Soluble Uranium-234	1.8	300	0.0060						
Technetium-99	35.7	60000	0.0006	0.022					
Soluble Plutonium-239	0.002	20	0.0001						
Soluble Plutonium-238	0.08	20	0.0040						
		2002							
Soluble Uranium-238	2.6	300	0.0090						
Soluble Uranium-235	0.1	300	0.0003						
Soluble Uranium-234	1.5	300	0.0050						
Technetium-99	26.4	60000	0.0004	0.018					
Soluble Plutonium-239	0.03	20	0.0020						
Soluble Plutonium-238	0.04	20	0.0020						
		2003							
Soluble Uranium-238	2.2	300	0.0073						
Soluble Uranium-235	0.1	300	0.0003						
Soluble Uranium-234	1.5	300	0.0050						
Technetium-99	30.4	60000	0.0005	0.012					
Soluble Plutonium-239	0.008	20	0.0004						
Soluble Plutonium-238	-0.03	20	-0.0015						
2004									
Soluble Uranium-238	1.4	300	0.0047						
Soluble Uranium-235	0.07	300	0.0002						
Soluble Uranium-234	1.0	300	0.0033						
Technetium-99	27.8	60000	0.0005	0.015					
Soluble Plutonium-239	0.03	20	0.0015						
Soluble Plutonium-238	0.1	20	0.0050						

Table 5. ISCO F was installed by the Radiation Health Branch in the winter of 2002. Radiation activity of isotopes reported in picocuries/liter (pCi/l) in surface water from 2002 through 2004 for ISCO F. All values were included in the assessment. Data were not screened out against radiation counting uncertainty or detection limit. All reported data was used to calculated annual mean activity. All data used in the assessment was verified and validated. Annual mean activity was used to calculate ratios and sum of the fractions relative to release limits.

Isotope				Sum of the			
	Mean	Release Limits	Ratio	Fractions Deleting to			
		902 KAR 100:019,	Mean Activity to	Relative to			
		Section 44(7)	Release Limits	Release Limits			
	рси	рси					
		2002					
Soluble Uranium-238	2.2	300	0.0073				
Soluble Uranium-235	0.2	300	0.0007				
Soluble Uranium-234	3.2	300	0.0107				
Technetium-99	9.4	60000	0.0002	0.019			
Soluble Plutonium-239	0.01	20	0.0005				
Soluble Plutonium-238	-0.003	20	-0.0002				
		2003					
Soluble Uranium-238	1.4	300	0.0047				
Soluble Uranium-235	0.15	300	0.0005				
Soluble Uranium-234	2.9	300	0.0097				
Technetium-99	11.9	60000	0.0002	0.015			
Soluble Plutonium-239	0.004	20	0.0002				
Soluble Plutonium-238	0.001	20	0.0001				
2004							
Soluble Uranium-238	0.9	300	0.0030				
Soluble Uranium-235	0.1	300	0.0003				
Soluble Uranium-234	2.4	300	0.0080				
Technetium-99	11.6	60000	0.0002	0.017			
Soluble Plutonium-239	0.02	20	0.0010				
Soluble Plutonium-238	0.1	20	0.0050				

Table 6. Radiation Dose and Risk for 2000 at ISCOs B, C, and D. All results were included in the calculation of annual mean activity. Data were not screened out against radiation counting uncertainty or detection limit. All reported data was used to calculated annual mean activity. All data used in the assessment was verified and validated. Dose and risk values were calculated using *RESRAD BASELINE for Windows, Version 2.2, February 1996, Argonne National Laboratory.*

	Isotope	Mean*		Risk (From Risk Dose	Risk (From Slope
Location	_	Activity	Dose	Conversion Factors)	Factors)
		pCi/l	mrem/yr		
	²³⁸ U	0.04			
	²³⁵ U	0.03			
ISCO B	²³⁴ U	0.05	2.978E-04	6.790E-09	9.028E-10
	⁹⁹ Tc	-0.30			
	²³⁹ Pu	0.02			
	²³⁸ Pu	0.07			
	²³⁸ U	1.20			
	²³⁵ U	0.07			
ISCO C	²³⁴ U	0.80			
	⁹⁹ Tc	5.60	5.631E-04	1.284E-08	3.407E-09
	²³⁹ Pu	-0.006			
	²³⁰ Pu	0.02			
	²³⁸ U	1.40			
	²³⁵ U	0.04			
ISCO D	²³⁴ U	0.25			
	⁹⁹ Tc	3.73	1.580E-03	3.603E-08	6.122E-09
	²³⁹ Pu	-0.002			
	²³⁸ Pu	0.4			

Table 7. Radiation Dose and Risk for 2001 at ISCOs B, C, and D. All results were included in the calculation of annual mean activity. Data were not screened out against radiation counting uncertainty or detection limit. All reported data was used to calculated annual mean activity. All data used in the assessment was verified and validated. Dose and risk values were calculated using *RESRAD BASELINE for Windows, Version 2.2, February 1996, Argonne National Laboratory.*

Location	Isotope	Mean* Activity	Dose	Risk (From Risk Dose Conversion Factors)	Risk (From Slope Factors)
		pCi/l	mrem/yr		
	²³⁸ U	0.12			
	²³⁵ U	0.02			
ISCO B	²³⁴ U	0.09	2.832E-04	6.456E-09	1.037E-09
	⁹⁹ Tc	1.94			
	²³⁹ Pu	0.006			
	²³⁸ Pu	0.07			
	²³⁸ U	0.95			
	²³⁵ U	0.05			
ISCO C	²³⁴ U	0.62			
	³³ TC	5.87	6.905E-04	1.574E-08	3.425E-09
	²⁰⁰ Pu	-0.004			
	Pu	0.10			
	²³⁸ U	1.25			
	²³⁵ U	0.05			
ISCO D	²³⁴ U	0.26			
	⁹⁹ Tc	5.34	5.344E-04	1.219E-08	3.094E-09
	²³⁹ Pu	0.008			
	²³⁸ Pu	0.04			

Table 8. Radiation Dose and Risk for 2002 at ISCOs B, C, D, and G. All results were included in the calculation of annual mean activity. Data were not screened out against radiation counting uncertainty or detection limit. All reported data was used to calculated annual mean activity. All data used in the assessment was verified and validated. Dose and risk values were calculated using *RESRAD BASELINE for Windows, Version 2.2, February 1996, Argonne National Laboratory.*

Location	Isotope	Mean*	Dose	Risk (From Risk Dose	Risk (From Slope
		Activity		Conversion Factors)	Factors)
		pCi/l	mrem/yr		
	²³⁸ U	0.14			
	²³⁵ U	0.007			
ISCO B	²³⁴ U	0.13	2.192E-04	4.998E-09	8.234E-10
	⁹⁹ Tc	0.39			
	²³⁹ Pu	0.04			
	²³⁸ Pu	0.007			
	²³⁸ U	0.71			
	²³⁵ U	0.033			
ISCO C	²³⁴ U	0.56			
	⁹⁹ Tc	4.07	5.122E-04	1.168E-08	2.571E-09
	²³⁹ Pu	0.029			
	²⁰⁰ Pu	0.030			
	²³⁸ U	1.34			
	²³⁵ U	0.05			
ISCO D	²³⁴ U	0.78			
	⁹⁹ Tc	2.97	6.872E-04	1.567E-08	3.780E-09
	²³⁹ Pu	0.008			
	²³⁸ Pu	0.04			
	²³⁸ U	3.13			
	²³⁵ U	0.11			
ISCO G	²³⁴ U	1.62			
	⁹⁹ Tc	1.22	1.193E-03	2.719E-08	7.382E-09
	²³⁹ Pu	-0.015			
	²³⁸ Pu	0.01			

Table 9. Radiation Dose and Risk for 2003 at ISCOs B, C, D, and G. All results were included in the calculation of annual mean activity. Data were not screened out against radiation counting uncertainty or detection limit. All reported data was used to calculated annual mean activity. All data used in the assessment was verified and validated. Dose and risk values were calculated using *RESRAD BASELINE for Windows, Version 2.2, February 1996, Argonne National Laboratory.*

Location	Isotope	Mean*	Dose	Risk (From Risk Dose	Risk (From Slope
		Activity		Conversion Factors)	Factors)
		pCi/l	mrem/yr		
	²³⁸ U	0.17			
	²³⁵ U	0.04			
ISCO B	²³⁴ U	0.28	3.148E-04	7.177E-09	1.227E-09
	⁹⁹ Tc	0.85			
	²³⁹ Pu	0.05			
	²³⁸ Pu	0.01			
	²³⁸ U	1.36			
	²³⁵ U	0.08			
ISCO C	²³⁴ U	1.15			
	⁹⁹ Tc	4.45	5.845E-04	1.333E-08	3.765E-09
	²⁰⁰ Pu 238p	-0.019			
	Pu	-0.003			
	²³⁸ U	1.19			
	²³⁵ U	0.08			
ISCO D	²³⁴ U	0.56			
	⁹⁹ Tc	5.01	4.909E-04	1.119E-08	3.063E-09
	²³⁹ Pu	0.0005			
	²³⁸ Pu	0.01			
	²³⁸ U	2.5			
	²³⁵ U	0.09			
ISCO G	²³⁴ U	1.07			
) and the second	2.97	1.004E-03	2.289E-08	5.997E-09
	²³⁹ Pu	0.01			
	²³⁸ Pu	0.02			

Table 10. Radiation Dose and Risk for 2004 at ISCOs B, C, D and G. All results were included in the calculation of annual mean activity. Data were not screened out against radiation counting uncertainty or detection limit. All reported data was used to calculated annual mean activity. All data used in the assessment was verified and validated. Dose and risk values were calculated using *RESRAD BASELINE for Windows, Version 2.2, February 1996, Argonne National Laboratory.*

Location	Isotope	Mean* Activity	Dose	Risk (From Risk Dose Conversion Factors)	Risk (From Slope Factors)
		pCi/l	mrem/yr		
	²³⁸ U 235	0.17			
	²³⁴ U	0.04			
ISCO B	99 T o	0.19	5.538E-04	1.263E-08	1.859E-09
	²³⁹ Du	0.94			
	²³⁸ Pu	0.03			
	²³⁸ U	1.24			
	²³⁵ U	0.07			
ISCO C	²³⁴ U	1.05			
	⁹⁹ Tc 239	3.59	1.016E-03	2.317E-08	4.765E-09
	²³⁸ Pu	0.013			
	Pu	0.13			
	²³⁸ U	1.48			
	²³⁵ U	0.06			
ISCO D	²³⁴ U	0.49			
	⁹⁹ Tc	6.94	1.001E-03	2.282E-08	4.807E-09
	²³⁹ Pu	0.007			
	²³⁸ Pu	0.16			
	²³⁸ U	2.06			
	²³⁵ U	0.07			
ISCO G	²³⁴ U	0.54			
) and the second	6.32	8.799E-04	2.006E-08	5.080E-09
	²³⁹ Pu	-0.061			
	²³⁸ Pu	0.14			

Figure 1. Radiation Health Branch's ISCO Automatic Samplers at Paducah Gaseous Diffusion Plant. ISCOs A, B, C, and D have been in operation since 1999. ISCOs D1 and D2 have been in operation since 2001. ISCOs F and G have been in operations since 2002.



Figure 2. Radiation Health Branch's ISCO Automatic Surface Water Samplers at Paducah Gaseous Diffusion Plant. Locations of ISCOs A, B, C, D1, D2, and F on the west side of the Paducah Gaseous Diffusion.



Figure 3. Radiation Health Branch's ISCO Automatic Surface Water Samplers at Paducah Gaseous Diffusion Plant. Locations of ISCOs A, D1, and D2 in the Northwest Corner Outfall and Drainage Ditches. Location of ISCO F in Outfall 008. Location of ISCO C in Bayou Creek downgradient of the west Outfalls.



Figure 4. ISCO D2 ²³⁸U activity versus collection dates in the north drain from the scrap yards outside the restricted area fence at the northwest corner of the site.



Figure 5. ISCO D1 ²³⁸U activity versus collection dates in the south drain from the scrap yards outside the restricted area fence at the northwest corner of the site.





Figure 6. ISCO A ²³⁸U activity versus collection dates at KPDES Outfall 001 weir outside the restricted area fence at the northwest corner of the site.



Figure 7. ISCO F ²³⁸U activity versus collection dates at Outfall 008 outside the restricted area fence in the southwest corner of the site.

Figure 8. ISCO B ²³⁸U activity versus collection dates at the Bayou Creek quarterly background surface-water sampling location BBCUG/R-249 upgradient of west side Outfalls.





Figure 9. ISCO C ²³⁸U activity versus collection dates in Bayou Creek at sampling location BBCDG/R-151 downgradient of west side Outfalls.

Figure 10. Radiation Health Branch's ISCO Automatic Surface Water Samplers in Little Bayou Creek at Paducah Gaseous Diffusion Plant. ISCO G is at McCaw Road and Little Bayou Creek and ISOC D is at Anderson Road and Little Bayou Creek.



Figure 11. ISCO D ²³⁸U activity versus collection dates at quarterly surface water sampling location LBCDG/R-248 downgradient of east side Outfalls to Little Bayou Creek and the North South Diversion Ditch confluence with Little Bayou Creek.



Figure 12. ISCO G ²³⁸U activity versus collection dates in Little Bayou Creek at McCaw Road downgradient of east side Outfalls 010, 011, 012, and 013.



APPENDIX B - RESRAD INPUT PARAMETERS

Baseline Risk Assessment Program, Version 2.20 Page 2 01/04/07 17:39 Summary : RESRAD-BASELINE Sample Data File

File : ISCOS.RAD

Dose and Risk Conversion Factor (and Related) Parameter Summary

Cancer risk/dose conversion factor (risk/arem) 7.6086-07 7.6086-07 RDCF b DCF1 Groundshine, surface DCF's, (arem/yr)/(pC1/cm**2): 3.250E-02 3.250E-02 0.271(1.1) s DCF1 0-234 1.940E-01 3.250E-02 0.271(1.1) s DCF1 0-234 1.940E-01 3.250E-02 0.271(1.1) s DCF1 0-234 8.740E-04 4.230E-04 4.230E-04 4.230E-04 0.271(1.1) s DCF1 TC-99 9.110E-05 9.110E-05 DCF1(1.4) s DCF1(1.4) s DCF1 U-235 solidensity = 1.6 g/cm*3 1.370E-01 DCF1(1.2) s DCF1 U-235 solidensity = 1.6 g/cm*3 1.266E-04 1.260E-04 DCF1(1.2) s DCF1 U-234 solidensity = 1.6 g/cm*3 1.510E-01 DCF1(1.2) s DCF1 U-234 solidensity = 1.6 g/cm*3 1.510E-01 DCF1(1.2) s DCF1 U-234 solidensity = 1.6 g/cm*3 1.510E-01 DCF1(1.2)	Menu	Parameter	Current Value	Default	Parameter Name	Source
DCF1 Groundshine, surface DCF*s, (mrem/yr)/(pC1/m**2): 3.2506-02 3.2506-02 DCF1 1.1) m DCF1 U-238-0 1.9408-01 NCF1 2.11 m DCF1 U-238 5.7408-04 B.7408-01 NCF1 3.1] m DCF1 U-238 5.7408-04 B.7408-01 NCF1 3.1] m DCF1 U-238 5.7408-04 B.7408-04 NCF1 3.1] m DCF1 U-238 9.7908-04 9.7908-04 B.7408-04 NCF1 5.1] m DCF1 Groundshine, volume DCF*s, (mrem/yr1/(pC1/cm*3): I I Intervention NCF1 4.2308-04 NCF1 5.2] m DCF1 Groundshine, volume DCF*s, (mrem/yr1/(pC1/cm*3): I Intervention NCF1 5.2] m DCF1 O-235 soll density = 1.6 g/cm*3 1.5002-04 INTERVention NCF1 4.2] m DCF1 U-238 soll density = 1.6 g/cm*3 I.5108-04 INTERVention NCF1 4.2] m DCF1 U-238 soll density = 1.6 g/cm*3 I.5108-04 INTERVention NCF1 4.2] m DCF1 U-238 s		Cancer risk/dose conversion factor (risk/mrem)	7.6002-07	7.600E-07	RDCF	l b
DCF1 0-238+D 1,3208-C2 2,5508-C2 CCF1 1,1 1 1 DCF1 0-234 1,9408-C0 1,2408-C0 CCF1 (2,1) 2 2 DCF1 TC-99 1,9408-C0 1,2408-C0 CCF1 (2,1) 2 2 DCF1 Fu-239 1,5208-C0 2,208-C4 CCF1 (5,1) 3 2 DCF1 Fu-239 1,3208-C4 3,7908-C4 CCF1 (5,1) 3 2 DCF1 Fu-239 1,3708-C0 1,3208-C4 CCF1 (5,1) 3 3 DCF1 C-234 b, soil density = 1.6 g/cm*3 1,3708-C0 7,5708-C0 DCF1 (2,2) 3 3 DCF1 C-234 s, soil density = 1.6 g/cm*3 1,2602-C4 4,208-C4 CCF1 (5,2) 3 3 DCF1 C-234 s, soil density = 1.6 g/cm*3 1,2508-C0 2,5908-C4 DCF1 (2,2) 3 3 DCF1 D-234 s, soil density = 1.6 g/cm*3 1,2508-C4 2,2908-C4 DCF1 (5,2) 3 3 DCF2 D-234 s, soil density = 1.6 g/cm*3 1,2108-C4 1,208-C4 DCF1 (2,2) 3 3 DCF2 D-234 s, soil density = 1.6 g/cm*3 1,2308-C1 1,208-C4 DCF1 (5,2) 3 3 DCF2 D-235 1,2308-C1 1,208-C4 DCF1 (3,2) 3 3 3 3 DCF2 D-234 1,2308-C1 DCF2 (1) 5 <	DCF1	Groundshine, surface DCF's, (mrem/yr)/(pCi/cm**2):	1			1
DP21 U=235 1.9408-01 1.9408-01 CPT(1, 2,1) a DP21 U=234 3.7408-04 4.2908-04 CPT(1, 2,1) a DP21 Fu-239 4.2908-04 4.2908-04 CPT(1, 4,1) a DP21 Fu-239 4.2908-04 LPT(1, 4,1) a DP21 Groundshine, volume DCF's, (mrem/yr)/(PC1/cm**3): 1.3708-01 DCT(1, 2,2) a DP21 Groundshine, volume DCF's, (mrem/yr)/(PC1/cm**3): 1.2608-04 DCT(1, 2,2) a DP21 O=235 , soil density = 1.6 g/cm**3 1.2608-04 DCT(1, 2,2) a DP11 U=238+0 , soil density = 1.6 g/cm**3 1.508-04 DCT(1, 2,2) a DP21 U=238+0 soil density = 1.6 g/cm**3 1.508-04 DCT(1, 2,2) a DP21 U=238 soil density = 1.6 g/cm**3 1.508-04 DCT(1, 2,2) a DP22 U=238 soil density = 1.6 g/cm**3 1.508-04 DCT(1, 2,2) a DP22 U=238 soil density = 1.6 g/cm**3 1.508-04 DCT(1, 0, 2)	DCF1	U-238+D	3.250E-02	3.250E-02	DCF1(1,1)	s
DCT1 0-234 5.7405-04 0.771 (3.1) 0 DCT1 To-99 5.1105-05 DCT1 (3.1) 0 DCT1 Pu-239 4.2905-04 4.2905-04 DCT1 (5.1) 0 DCT1 0-2380 9.7905-04 DCT1 (5.1) 0 0 DCT1 0-2380, soli density = 1.6 d/cm**3 1.3705-01 J.3705-01 DCT1 (1.2) 0 DCT1 0-238, soli density = 1.6 d/cm**3 1.3205-01 J.3705-01 DCT1 (1.2) 0 DCT1 D-238, soli density = 1.6 d/cm**3 1.2605-04 DCT1 (1.2) 0 DCT1 D-238, soli density = 1.6 d/cm**3 1.2605-04 DCT1 (1.2) 0 DCT1 D-238, soli density = 1.6 d/cm**3 1.2605-04 DCT1 (1.2) 0 DCT2 D-238-0 soli density = 1.6 d/cm**3 1.2605-01 DCT2 (1.2) 0 DCT2 D-238-0 solidensity = 1.6 d/cm**3 1.2005-01 DCT2 (1.2) 0 DCT2 D-238-0 DCT2 (1.2) solidensity = 1.6 d/cm**3 1.2005-01 DCT2 (1.2) solidensity = 1.6 d/cm**3 DCT2 D-238-0 Solidensity = 1.6 d/	DCF1	u-235	1.940E-01	1.940E-01	DCF1(2,1)	s
DCF1 TC-99 9.105-05 9.105-05 DCF1 Pu-239 DCF1 Pu-238 4.206-04 4.296-04 DCF1 (.1) s DCF1 U-238 (.206-04 9.790E-04 DCF1 (.1) s DCF1 U-238 (.206-04 9.790E-04 DCF1 (.2) s DCF1 U-238 (.206-04 0.271 (.2) s DCF1 U-238 (.206-04 0.271 (.2) s DCF1 U-238 (.206-04 0.071 (.2) s DCF2 Does conversion factors for dust inhalation, mrem/pC1: 1.1808-01 1.1808-01 0.072 (.1) s DCF2 U-238 1.308-01 0.072 (.1) s s s s s s DCF2 U-238 1.308-01 0.072 (.1) s s s s s s s DCF2	DCF1	U-234	8.740E-04	8.740E-04	DCF1(3,1)) s
DCF1 Pu-239 4.2906-04 0.42906-04 DCF1 0.7506-04 DCF1 1 DCF1 Groundshine, volume DCF's, (mrem/yr)/(pC1/cm**3): Image: DCF1 Image: D	DCF1	TC-99	9.110E-05	9.110E-05	DCF1(4,1)	s
DCF1 Pu-238 9.790E-04 9.790E-04 9.790E-04 DCF1 DC71 DC736 DC71 DC736 DC71 DC736 DC71 DC736 DC71 DC737 DC71 DC737 DC71 DC737 DC71 DC737 DC71 DC737 DC71 DC737 DC71 DC71 DC73 DC71 DC73 DC71 DC737 DC73 DC71 DC737 DC73 DC71 DC73 DC71 DC73 DC71 DC72 DC71 DC72 DC71 DC72 DC71 DC72 DC71 DC72 DC72 DC72 DC72 DC72 DC72 DC72 DC72 DC72 </td <td>DCF1</td> <td>Pu-239</td> <td>4.290E-04</td> <td>4.290E-04</td> <td>DCF1(5,1)</td> <td>s</td>	DCF1	Pu-239	4.290E-04	4.290E-04	DCF1(5,1)	s
DCF1 Groundshine, volume DCF's, (mrem/y1/(pCi/cm**3): Image: State Stat	DCF1	Pu-238	9.790E-04	9.790E-04	DCF1(6,1)	5
DCF1 U-2340. soil density = 1.6 g/cm**3 1.370E-01 DCF1 (1.200. DCF1 (2.2) s DCF1 U-233 soil density = 1.6 g/cm**3 7.50E-01 PCF1 (2.2) s DCF1 TC-99 soil density = 1.6 g/cm**3 1.260E-04 4.020E-04 DCF1 (3.2) s DCF1 TC-99 soil density = 1.6 g/cm**3 1.260E-04 1.260E-04 DCF1 (4.2) s DCF1 Fu-238 soil density = 1.6 g/cm**3 1.510E-04 1.510E-04 DCF1 (5.2) s DCF2 Dues conversion factors for dust inhalation, mrem/pC1: 1 1 1 1 DCF2 U-234 1.320E-01 1.320E-01 DCF2 (1) 0 1 DCF2 U-234 1.320E-01 1.320E-01 DCF2 (2) s DCF2 U-234 1.320E-01 0.272(4) s DCF2 U-234 3.90E-06 DCF2 (1) 1 DCF2 U-234 3.920E-01 3.920E-01 DCF2 (2) s DCF2 U-234 S.302E-06 DCF3 (1) s s s s s s	DCF1	Groundshine, volume DCF's, {mrem/yr)/(pCi/cm**3):	i i		1	l
DCF1 0-235 , solid density = 1.6 g/cm**3 7.5708-01 DCF1 (7.2,2) s DCF1 Tc-99 , solid density = 1.6 g/cm**3 1.260E-04 4.020E-04 DCF1 (7.2,2) s DCF1 Fu-239 , solid density = 1.6 g/cm**3 2.930E-04 2.290E-04 DCF1 (7.2,2) s DCF1 Fu-238 , solid density = 1.6 g/cm**3 2.930E-04 2.290E-04 DCF1 (7.2,2) s DCF1 Fu-238 , solid density = 1.6 g/cm**3 2.930E-04 1.250E-04 DCF1 (7.2,2) s DCF2 Dose conversion factors for dust inhalation, mrem/pC1: 1.180E-01 1.180E-01 DCF2 (1.238E-0) <t< td=""><td>DCF1</td><td>U-238+D , soil density = 1.6 g/cm**3</td><td>1.370E-01</td><td>1.370E-01</td><td>DCF1(1,2)</td><td>s</td></t<>	DCF1	U-238+D , soil density = 1.6 g/cm**3	1.370E-01	1.370E-01	DCF1(1,2)	s
DCP1 0-234 , solid density = 1.6 g/cm**3 4.0202-04 4.0202-04 0.0214-04 0.0214-04 0.0214-04 0.0224-04 0.0234-04 0.02	DCF1	U-235 , soil density = 1.6 g/cm**3	7.570E-01	7.5708-01	DCF1(2,2)	s
DCP1 Tc-99 , soil density = 1.6 g/cm**3 1.2602-04 1.2608-04 DCP1 (P1233 , soil density = 1.6 g/cm**3 DCP1 Fu-238 , soil density = 1.6 g/cm**3 1.510E-04 1.510E-04 DCP1 (F22) a DCP2 Duesc conversion factors for dust inhalation, mrem/pC1: 1 1 1.1808-01 DCP2 (I) a DCP2 U-236 1.1308-01 DCP2 (I) 3.308-06 DCP2 (I) a DCP2 U-235 1.1308-01 DCP2 (I) a a DCP2 U-236 1.3208-01 DCP2 (I) a DCP2 U-238 1.3208-01 DCP2 (I) a DCP3 Dose conversion factors for ingestion, mrem/pC1: 1 1 a DCP3 Dose conversion factors for ingestion, mrem/pC1: 2.6908-04 DCP3 (I) a DCP3 U-238 2.6908-04 2.6908-04 DCP3 (I) a DCP3 U-238 2.6908-04 2.6908-04 DCP3 (I) a DCP3 U-238 2.6908-04 2.6908-04 DCP3 (I) a DCP3 U-238	DCF1	U-234 , soil density = 1.6 g/cm**3	4.020E-04	4.020E-04	DCF1(3,2)	8
DCF1 Fu-239 soil density = 1.6 g/cm**3 2.950E+04 DCF1 (5,2) s DCF1 Pu-238 soil density = 1.6 g/cm**3 1.510E-04 1.510E-04 DCF1 (5,2) s DCF2 Doese conversion factors for dust inhalation, mrem/pC1: 1.180E-01 1.180E-01 DCF2 (1) s DCF2 U-238+D 1.180E-01 1.230E-01 1.230E-01 DCF2 (2) s DCF2 U-234 1.320E-01 1.320E-01 DCF2 (2) s DCF2 U-234 1.320E-01 1.320E-01 DCF2 (2) s DCF2 U-234 1.320E-01 1.320E-01 DCF2 (2) s DCF3 U-238 3.920E-01 1.320E-01 DCF2 (2) s DCF3 U-238+0 2.670E-04 DCF3 (1) s DCF3 U-238+0 2.670E-04 DCF3 (1) s DCF3 U-235 2.670E-04 DCF3 (2) s DCF3 U-234 2.670E-04 DCF3 (1) s DCF3 U-234 2.670E-04 DCF3 (1) s DCF4 V-234	DCF1	Tc-99 , soil density = 1.6 g/cm**3	1.260E-04	1,260E-04	DCF1(4,2)	1 5
DCF1 Pu-238 , soil density = 1.6 g/cm**3 1.510E-04	DCFI	Pu-239 , soil density = 1.6 g/cm**3	2.950E-04	2.950E-04	DCF1(5,2)	s
DCF2 Dose conversion factors for dust inhalation, mrem/pC1: 1.180E-01 DCF2(1) a DCF2 U-238+D 1.230E-01 1.820E-01 DCF2(2) s DCF2 U-235 1.320E-01 1.320E-01 DCF2(3) s DCF2 TC-99 1.320E-01 1.320E-01 DCF2(4) s DCF2 Pu-239 3.30E-06 8.330E-06 DCF2(4) s DCF2 Pu-239 3.30E-01 3.20E2(1) DCF2(5) s DCF3 U-238+D 2.690E-04 2.690E-04 DCF3(1) s DCF3 U-238+D 2.690E-04 2.690E-04 DCF3(2) s DCF3 U-238+D 2.690E-04 2.690E-04 DCF3(4) s DCF3 U-238+D 2.690E-04 DCF3(3) s s DCF3 U-238+D 1.460E-06 DCF3(4) s s DCF4 Air immersion DCF*s, (mrem/yr)/(pCI/m**3): Immersion 2.600E-04 DCF4(1) s DCF4 V-238+D 1.460E-07 B.9020E-07 DCF4(2) s DCF4	DCF1	Pu-238 , soil density = 1.6 g/cm**3	1.510E-04	1.510E-04	DCF1(6,2)	s
DCF2 U-238+D 1.1808-01 1.1808-01 DCF2 (1) 3 DCF2 U-235 1.2308-01 1.2308-01 DCF2 (2) 1 DCF2 U-234 1.3208-01 1.3208-01 DCF2 (3) 1 DCF2 U-234 1.3208-01 1.3208-01 DCF2 (3) 1 DCF2 Pu-239 1.3208-01 DCF2 (4) 1 1 DCF2 Pu-239 1.3208-01 DCF2 (5) 1 1 DCF3 Dose conversion factors for ingestion, mrem/pC1: 1 1 1 1 1 DCF3 U-234 2.6908-04 2.6908-04 DCF3 (2) 3 3 DCF3 U-234 2.6908-04 2.6908-04 DCF3 (2) 3 3 DCF3 U-234 2.6908-04 2.6908-04 DCF3 (2) 3 3 DCF3 U-235 2.6908-04 2.6908-04 DCF3 (3) 5 3 DCF4 U-234 DCF3 (3) S S 5.408-03 3.5408-03 DCF3 (5) 5 DCF4 Air immersion DCF*s, (mrem/yr)/(p	DCF2	Dose conversion factors for dust inhalation, mrem/pCi:	i I	1	1	i
DCF2 U-235 1.230E-01 1.230E-01 DCF2 (2) s DCF2 U-234 1.320E-01 1.320E-01 DCF2 (3) s DCF2 Tc-99 S.330E-06 DCF2 (4) s DCF2 Pu-239 4.290E-01 4.290E-01 DCF2 (5) s DCF3 Dose conversion factors for ingestion, mrem/pC1: 2.690E-04 2.690E-04 DCF3 (1) s DCF3 U-235 2.690E-04 2.690E-04 DCF3 (3) s DCF3 Fu-239 1.4608-05 1.4608-06 DCF3 (4) s DCF4 U-236 3.200E-03 J2.20E-03 DCF4 (1) s DCF4 U-236 9.020E-04 J2.60E-04 DCF4 (1) s DCF4 U-236	DCF2	U-236+D	1.180E-01	1.180E-01	DCF2(1)	1 0
DCR2 U-234 1.3202-01 DCR2(3) s DCR2 Tc-99 8.3302-06 8.3302-06 DCR2(4) s DCR2 Pu-239 4.2908-01 DCR2(5) s DCR2 Pu-239 3.9202-01 J.9202-01 DCR2(5) s DCR3 U-234 J.9202-01 J.9202-01 DCR2(5) s DCR3 U-234D I.12020-01 2.6902-04 DCR3(1) s DCR3 U-234D 2.6902-04 2.6902-04 DCR3(3) s DCR3 U-235 2.6902-04 DCR3(3) s DCR3 U-234 2.6902-04 DCR3(3) s DCR3 U-234 2.6902-04 DCR3(3) s DCR3 U-234 2.6902-04 DCR3(4) s DCR3 Pu-238 J.3502-03 J.2002-03 DCR3(4) s DCR4 U-234 DCP4(4) I.4602-04 DCR4(1) s DCR4 U-234 DCP4(4) I.4602-04 DCR4(1) s DCR4 U-234 DCP4(5) <td< td=""><td>DCF2</td><td>U-235</td><td>1.230E-01</td><td>1.230E-01</td><td>DCF2(2)</td><td>s</td></td<>	DCF2	U-235	1.230E-01	1.230E-01	DCF2(2)	s
DCF2 Tc-99 8.330E-06 9.330E-06 DCF2 (4) s DCF2 Pu-239 4.290E-01 4.290E-01 DCF2 (5) s DCF2 Pu-238 3.920E-01 3.920E-01 DCF2 (5) s DCF3 Dose conversion factors for ingestion, mrem/pCi: Image: Conversion factors for ingestion, mrem/pCi Image: Conversion factors for ingestion, mrem/	DCF2	u-234	1.320E-01	1.320E-01	DCF2(3)	5
DCF2 Pu-239 4.290E-01 4.290E-01 0CF2(5) 5 DCF2 Pu-238 3.920E-01 3.920E-01 0CF2(6) 5 DCF3 Dose conversion factors for ingestion, mrem/pC1: 1 1 1 DCF3 U-235 2.690E-04 2.690E-04 DCF3(1) 8 DCF3 U-235 2.690E-04 2.690E-04 DCF3(1) 8 DCF3 U-235 2.690E-04 2.690E-04 DCF3(2) 8 DCF3 Tc-99 1.460E-06 DCF3(3) 8 8 DCF4 Air immersion DCF*s, (mrem/yr)/(pCi/m**3): 1 1 1 1 1 DCF4 U-234 0.020E-03 3.540E-03 DCF3(4) 8 8 9 0.020E-04 DCF4(2) 8 DCF4 U-238 1.460E-04 DCF4(1) 8 9.020E-04 DCF4(2) 8 DCF4 U-234 1.460E-04 DCF4(1) 8 9.020E-04 DCF4(2) 8 DCF4 U-235 1.890E-07 DCF4(1) 8 9.020E-04 DCF4(2) 8<	DCF2	Tc-99	8.330E-06	8.3302-06	DCF2(4)	s
DCF2 Pu-238 3.920E-01 3.920E-01 CCF2 (6) s DCF3 Does conversion factors for ingestion, mrem/pCi: Image: Conversion factors for ingestion, factors for ingestion, factors for ingestingesticated for ingestingesticated for ingest	DCF2	Pu-239	4.290E-01	4.290E-01	DCF2(5)	s
DCF3 Dose conversion factors for ingestion, mrem/pC1: 2.690E-04 2.690E-04 DCF3 (1) s DCF3 U-235 2.670E-04 2.670E-04 DCF3 (2) s DCF3 U-234 2.830E-04 DCF3 (3) s DCF3 TC-99 1.460E-06 1.460E-06 DCF3 (4) s DCF3 Pu-239 3.540E-03 JCF3 (5) s DCF4 Air immersion DCF's, (mrem/yr)/(pC1/m**3): 1.460E-04 1.460E-04 DCF4 (1) s DCF4 U-238+D 9.02E-04 9.02E-04 DCF4 (2) s DCF4 U-238+D 1.460E-04 1.460E-04 DCF4 (1) s DCF4 U-234 9.02E-07 9.02E-07 DCF4 (2) s DCF4 U-234 9.02E-07 1.690E-07 DCF4 (2) s DCF4 U-234 1.890E-07 1.690E-07 DCF4 (3) s DCF4 U-236 5.700E-07 S.700E-07 DCF4 (4) s Sf-1 U-238+D 1.590E-08 1.590E-08 SLPP1 (1,1) s Sf-1 <	DCF2	Pu-238	3.920E-01	3.920E-01	DCF2(6)	s
DCF3 U-238+D 2.690E-04 DCF3(1) s DCF3 U-235 2.670E-04 DCF3(2) s DCF3 U-235 2.670E-04 DCF3(2) s DCF3 U-234 2.830E-04 DCF3(2) s DCF3 TC-99 1.460E-06 DCF3(3) s DCF3 Pu-239 3.540E-03 DCF3(5) s DCF4 Air immersion DCF*s, (mrem/yr)/(pC1/m**3): 1 1 1 1 DCF4 U-238+D 1.460E-04 DCF4(1) s DCF4 U-236+D 1.460E-04 DCF4(2) s DCF4 U-235 9.020E-04 DCF4(2) s DCF4 Fu-239 1.460E-07 BCF4(1) s DCF4 U-234 8.910E-07 DCF4(2) s DCF4 U-238 1.490E-07 DCF4(2) s DCF4 Pu-239 5.700E-07 DCF4(3) s Sf-1 U-236+D 1.890E-07 DCF4(1) s Sf-1 U-238+D 1.900E-07 DCF4(3) <t< td=""><td>0083</td><td> nose conversion factors for indestion, mrem/pCi:</td><td></td><td></td><td>1</td><td>i</td></t<>	0083	nose conversion factors for indestion, mrem/pCi:			1	i
DCF3 U-235 2.670E-04 2.670E-04 DCF3(2) s DCF3 U-234 2.830E-04 2.630E-04 DCF3(3) s DCF3 Tc-99 1.460E-06 DCF3(4) s DCF3 Pu-239 3.540E-03 DCF3(5) s DCF3 Pu-238 3.200E-04 DCF3(5) s DCF4 Air immersion DCF's, (mrem/yr)/(pCi/m**3): 1.460E-06 1.460E-04 DCF4(1) s DCF4 U-238+D 1.460E-04 DCF4(2) s DCF4 U-234 9.020E-04 DCF4(2) s DCF4 U-238+D 1.460E-04 DCF4(4) s DCF4 U-234 1.890E-07 DCF4(4) s DCF4 Pu-239 4.950E-07 DCF4(5) s Sf-1 Groundshine, surface SF's, 1/yr per (pC1/cm**2): 1.590E-08 SLPF1(1,1) s Sf-1 U-234 1.950E-07 SLPF1(4) s s Sf-1 U-234 1.160E-07 SLPF1(1,1) s Sf-1 U-234 1.900E-08 SLPF1(1,1) <td>DCF3</td> <td>U-238+D</td> <td>2.690E-04</td> <td>2.690E-04</td> <td>DCF3(1)</td> <td>l s</td>	DCF3	U-238+D	2.690E-04	2.690E-04	DCF3(1)	l s
DCF3 U-234 2.830E-04 2.630E-04 DCF3(3) s DCF3 Tc-99 1.460E-06 1.460E-06 DCF3(4) s DCF3 Pu-239 3.540E-03 3.540E-03 DCF3(6) s DCF3 Pu-239 3.200E-03 3.200E-03 DCF3(6) s DCF4 U-238 1.460E-04 1.460E-04 DCF4(1) s DCF4 U-238+0 1.460E-04 1.460E-04 DCF4(2) s DCF4 U-234 9.020E-04 9.020E-04 DCF4(2) s DCF4 U-234 1.460E-04 DCF4(2) s DCF4 U-234 1.460E-07 DCF4(3) s DCF4 U-234 1.890E-07 DCF4(4) s DCF4 Pu-239 4.950E-07 DCF4(4) s Sf-1 Groundshine, surface SF's, L/yr per (pC1/cm**2): I I I Sf-1 U-234 1.590E-08 SLPF1(1,1) s Sf-1 U-234 1.160E-07 SLPF1(2,1) s Sf-1 U-234 1.950E-10	DCF3	0-235	2.670E-04	2.670E-04	DCF3(2)	5
DCF3 Tc-99 1.460E-06 1.460E-06 DCF3 (4) s DCF3 Pu-239 3.540E-03 3.540E-03 DCF3 (5) s DCF4 Air immersion DCF*s, (mrem/yr)/(pCi/m**3): DCF4 U-238+D 1.460E-04 1.460E-04 DCF4 (1) s DCF4 U-238+D 1.460E-07 I.460E-04 DCF4 (2) s DCF4 U-235 9.020E-04 9.020E-04 DCF4 (2) s DCF4 U-234 1.460E-07 1.890E-07 DCF4 (3) s DCF4 U-234 1.890E-07 1.890E-07 DCF4 (4) s DCF4 Pu-239 4.950E-07 DCF4 (5) s DCF4 Pu-238 1.690E-07 DCF4 (5) s Sf-1 Groundshine, surface SF's, 1/yr per (pCi/cm**2): 1.590E-08 SLPF1 (1,1) s Sf-1 0-236 1.60E-07 I.160E-07 SLPF1 (2,1) s Sf-1<	DCF3	U-234	2.830E-04	2.830E-04	DCF3(3)	s
DCF3 Fu-239 3.540E-03 3.540E-03 DCF3(5) s DCF4 Pu-238 3.200E-03 3.200E-03 DCF3(6) s DCF4 Air immersion DCF's, (mrem/yr)/(pCi/m**3): 1 1 DCF4(1) s DCF4 U-238+D 1.460E-04 1.460E-04 DCF4(1) s DCF4 U-235 9.020E-04 9.020E-04 DCF4(2) s DCF4 U-234 8.910E-07 8.910E-07 DCF4(3) s DCF4 U-234 8.910E-07 1.690E-07 DCF4(4) s DCF4 Pu-239 1.890E-07 1.690E-07 DCF4(5) s DCF4 Pu-238 5.700E-07 5.700E-07 DCF4(6) s Sf-1 Groundshine, surface SF's, 1/yr per (pCi/cm**2): 1.590E-08 1.590E-08 SLPF1(1,1) s Sf-1 U-238+D 1.160E-07 1.160E-07 SLPF1(2,1) s Sf-1 U-234 4.180E-10 SLPF1(2,1) s Sf-1 U-234 4.180E-10 SLPF1(2,1) s Sf-1 U-234	DCF3	Tc-99	1.460E-06	1.460E-06	DCF3(4)	S
DCF3 Pu-238 3.200E-03 3.200E-03 DCF3(6) s DCF4 Air immersion DCF's, (mrem/yr)/(pCi/m**3): 1 1 1 1 1 1 DCF4 U-238+D 1.460E-04 1.460E-04 DCF4(1) s DCF4 U-235 9.020E-04 9.020E-04 DCF4(2) s DCF4 U-234 8.910E-07 8.910E-07 DCF4(4) s DCF4 U-234 8.910E-07 1.490E-07 DCF4(4) s DCF4 U-234 8.910E-07 1.690E-07 DCF4(4) s DCF4 Pu-239 1.890E-07 1.890E-07 DCF4(5) s DCF4 Pu-238 5.700E-07 5.700E-07 DCF4(5) s Sf-1 U-238+D 1.590E-08 1.590E-08 SLPF1(1,1) s Sf-1 U-234 1.160E-07 1.160E-07 SLPF1(2,1) s Sf-1 U-234 3.620E-13 3.620E-13 SLPF1(4,1) s Sf-1 Pu-238 1.950E-10 SLPF1(4,1) s Sf-1 P	DCF3	Pu-239	3.5405-03	3.540E-03	DCF3(5)	s
DCF4 Air immersion DCF's, (mrem/yr)/(pCi/m**3): 1.460E-04 1.460E-04 DCF4(1) s DCF4 U-238+D 9.020E-04 9.020E-04 9.020E-04 DCF4(2) s DCF4 U-235 8.910E-07 8.910E-07 DCF4(3) s DCF4 U-239 1.890E-07 1.890E-07 DCF4(4) s DCF4 Pu-239 4.950E-07 JCF4(6) s Sf-1 Groundshine, surface SF's, 1/yr per (pCi/cm**2): 1.590E-08 1.590E-08 SLPF1(1,1) s Sf-1 U-234 1.0234 4.180E-10 SLPF1(2,1) s Sf-1 U-234 3.620E-13 3.620E-13 SLPF1(5,1) s Sf-1 Pu-239 1.950E-10 1.950E-10 SLPF1(5,1) s Sf-1 U-234 4.180E-10 SLPF1(5,1) s Sf-1 Pu-239 3.620E-13 3.620E-13 SLPF1(5,1) s Sf-1 Pu-234 5.700E-06 SLPF1(5,1) s Sf-1 Pu-238 5.700E-08 SLPF1(5,1) s Sf-1 Fu-238	DCF3	Pu-238	3.200E-03	3.200E-03	DCF3(6)	5
DCF4 U-238+D 1.460E-04 DCF4(1) s DCF4 U-235 9.020E-04 9.020E-04 DCF4(2) s DCF4 U-235 8.910E-07 8.910E-07 DCF4(3) s DCF4 U-234 1.890E-07 DCF4(3) s DCF4 Tc-99 1.890E-07 DCF4(5) s DCF4 Pu-238 5.700E-07 DCF4(6) s Sf-1 Groundshine, surface SF's, 1/yr per (pCi/cm**2): 1.590E-08 SLPF1(1,1) s Sf-1 U-234 1.590E-07 SLPF1(2,1) s Sf-1 U-238+D 1.590E-08 SLPF1(2,1) s Sf-1 U-238+D 1.60E-07 SLPF1(2,1) s Sf-1 U-234 4.180E-10 SLPF1(2,1) s Sf-1 U-238 1.950E-10 SLPF1(3,1) s Sf-1 Pu-239 1.950E-10 SLPF1(4,1) s Sf-1 Pu-238 1.950E-10 SLPF1(4,1) s Sf-1 Pu-238 1.950E-10 SLPF1(5,1) s Sf-1	DCF4	<pre>Air immersion DCF's, (mrem/yr)/(pCi/m**3):</pre>	i I	1	1	i i
DCF4 U-235 9.020E-04 DCF4 (2) s DCF4 U-234 8.910E-07 8.910E-07 DCF4 (3) s DCF4 Tc-99 1.890E-07 1.890E-07 DCF4 (4) s DCF4 Pu-239 4.950E-07 DCF4 (5) s DCF4 Pu-238 5.700E-07 DCF4 (6) s Sf-1 U-238+D 1.590E-08 SLPF1 (1,1) s Sf-1 U-234 4.180E-10 SLPF1 (2,1) s Sf-1 U-234 4.180E-10 SLPF1 (2,1) s Sf-1 U-235 1.160E-07 SLPF1 (2,1) s Sf-1 U-234 4.180E-10 SLPF1 (2,1) s Sf-1 U-234 4.180E-10 SLPF1 (2,1) s Sf-1 Pu-239 3.620E-13 SLPF1 (4,1) s Sf-1 Pu-238 4.290E-10 SLPF1 (6,1) s Sf-1 Pu-238 5.700E-08 SLPF1 (6,1) s Sf-1 U-238+D 5.700E-08 SLPF1 (1,2) s	DCF4	U-238+D	1.460E-04	1.460E-04	DCF4(1)	s
DCF4 U-234 8.910E-07 8.910E-07 DCF4(3) s DCF4 Tc-99 1.890E-07 1.890E-07 DCF4(4) s DCF4 Pu-239 4.950E-07 DCF4(5) s DCF4 Pu-238 5.700E-07 DCF4(6) s Sf-1 Groundshine, surface SF's, 1/yr per (pC1/cm**2): 1.590E-08 SLPF1(1,1) s Sf-1 U-238+D 1.590E-08 SLPF1(2,1) s Sf-1 U-234 4.180E-10 SLPF1(2,1) s Sf-1 U-234 3.620E-13 SLPF1(3,1) s Sf-1 Pu-239 3.620E-13 SLPF1(4,1) s Sf-1 Pu-238 1.950E-10 SLPF1(4,1) s Sf-1 Pu-239 3.620E-13 SLPF1(4,1) s Sf-1 Pu-238 4.290E-10 SLPF1(6,1) s Sf-1 Groundshine, volume SF's, 1/yr per (pCi/g): 5.700E-08 SLPF1(1,2) s Sf-1 Groundshine, volume SF's, 1/yr per (pCi/g): 5.700E-08 SLPF1(1,2) s	DCF4	u-235	9.020E-04	9.020E-04	DCF4(2)	5
DCF4 Tc-99 1.890E-07 1.890E-07 DCF4 (4) s DCF4 Pu-239 4.950E-07 JCF4 (5) s DCF4 Pu-238 5.700E-07 DCF4 (6) s Sf-1 Groundshine, surface SF's, 1/yr per (pCi/cm**2): 5.700E-07 DCF4 (6) s Sf-1 U-238+D 1.590E-08 1.590E-08 SLPF1 (1,1) s Sf-1 U-234 1.160E-07 I.160E-07 SLPF1 (2,1) s Sf-1 U-234 4.180E-10 SLPF1 (2,1) s Sf-1 U-234 3.620E-13 SLPF1 (3,1) s Sf-1 Pu-239 3.620E-13 SLPF1 (4,1) s Sf-1 Pu-238 4.290E-10 SLPF1 (5,1) s Sf-1 Pu-238 4.290E-10 SLPF1 (6,1) s Sf-1 Groundshine, volume SF's, 1/yr per (pCi/g): 1 1 1 s Sf-1 U-238+D 5.700E-08 SLPF1 (1,2) s	DCF4	U-234	8.910E-07	8.910E-07	DCF4(3)	5
DCF4 Pu-239 4.950E-07 JCF4 (5) s DCF4 Pu-238 5.700E-07 DCF4 (6) s Sf-1 Groundshine, surface SF's, 1/yr per (pCi/cm**2): 1.590E-08 1.590E-08 SLPF1 (1,1) s Sf-1 U-238+D 1.590E-08 1.590E-08 SLPF1 (2,1) s Sf-1 U-235 1.160E-07 1.160E-07 SLPF1 (2,1) s Sf-1 U-234 4.180E-10 SLPF1 (2,1) s Sf-1 U-234 1.160E-07 SLPF1 (2,1) s Sf-1 U-234 1.160E-07 SLPF1 (2,1) s Sf-1 U-234 1.160E-07 SLPF1 (2,1) s Sf-1 Pu-239 3.620E-13 SLPF1 (3,1) s Sf-1 Pu-238 1.950E-10 SLPF1 (5,1) s Sf-1 Groundshine, volume SF's, 1/yr per (pCi/g): 4.290E-10 SLPF1 (6,1) s Sf-1 U-238+D 5.700E-08 SLPF1 (1,2) s	DCF4	Tc-99	1.890E-07	1.890E-07	DCF4(4)	5
DCF4 Pu-238 5.700E-07 DCF4 (6) s Sf-1 Groundshine, surface SF's, 1/yr per (pCi/cm**2): 1.590E-08 SLPF1 (1,1) s Sf-1 U-238+D 1.590E-08 SLPF1 (1,1) s Sf-1 U-235 1.160E-07 I.160E-07 SLPF1 (2,1) s Sf-1 U-234 4.180E-10 SLPF1 (2,1) s Sf-1 U-234 3.620E-13 SLPF1 (2,1) s Sf-1 Tc-99 3.620E-13 SLPF1 (3,1) s Sf-1 Pu-239 1.950E-10 SLPF1 (4,1) s Sf-1 Pu-238 4.290E-10 SLPF1 (5,1) s Sf-1 Groundshine, volume SF's, 1/yr per (pCi/g): 4.290E-10 SLPF1 (6,1) s Sf-1 U-238+D 5.700E-08 SLPF1 (1,2) s	DCF4	Pu-239	4.950E-07	4.950E-07	DCF4(5)	s
Sf-1 Groundshine, surface SF's, 1/yr per (pC1/cm**2): Sf-1 U-238+D Sf-1 U-235 Sf-1 U-234 Sf-1 U-234 Sf-1 Tc-99 Sf-1 Pu-239 Sf-1 Pu-238 Sf-1 Pu-238 Sf-1 U-238+D Sf-1 U-239 Sf-1 Pu-238 Sf-1 Pu-238 Sf-1 U-238+D Sf-1 U-238+D Sf-1 U-238+D Sf-1 U-238+D	DCF4	Pu-238	5.700E-07	5.700E-07	DCF4(6)	s
Sf-1 0-238+D 1.590E-08 SLPF1(1,1) s Sf-1 0-235 1.160E-07 1.160E-07 SLPF1(2,1) s Sf-1 0-234 4.180E-10 4.180E-10 SLPF1(3,1) s Sf-1 Tc-99 3.620E-13 3.620E-13 SLPF1(4,1) s Sf-1 Pu-239 1.950E-10 SLPF1(5,1) s Sf-1 Groundshine, volume SF's, 1/yr per (pCi/g): 4.290E-10 SLPF1(6,1) s Sf-1 U-238+D 5.700E-08 SLPF1(1,2) s	SF-1	 Groundshine, surface SF's, 1/yr per (pCi/cm**2):	1	1		ì –
Sf-1 U-235 1.160E-07 SLPF1 (2,1) s Sf-1 U-234 4.180E-10 SLPF1 (3,1) s Sf-1 Tc-99 3.620E-13 3.620E-13 SLPF1 (4,1) s Sf-1 Pu-239 1.950E-10 SLPF1 (5,1) s Sf-1 Pu-238 4.290E-10 SLPF1 (6,1) s Sf-1 Groundshine, volume SF's, 1/yr per (pCi/g): 1 5.700E-08 SLPF1 (1,2) s	SI-1	1 II-238+D	1.590E-08	1.590E-08	SLPF1(1,1)	s
Sf-1 U-234 4.180E-10 \$LPF1(3,1) \$ Sf-1 Tc-99 3.620E-13 \$LPF1(4,1) \$ Sf-1 Pu-239 1.950E-10 \$LPF1(4,1) \$ Sf-1 Pu-238 4.290E-10 \$LPF1(6,1) \$ Sf-1 Groundshine, volume SF's, 1/yr per (pCi/g): \$ \$ \$ Sf-1 U-238+D 5.700E-08 \$LPF1(1,2) \$	Sf-1	D=235	1.160E-07	1.160E-07	SLPF1(2,1)	s
Sf-1 Tc-99 3.620E-13 SLPF1(4,1) s Sf-1 Pu-239 1.950E-10 SLPF1(5,1) s Sf-1 Pu-238 4.290E-10 SLPF1(6,1) s Sf-1 Groundshine, volume SF's, 1/yr per (pCi/g): I I I I Sf-1 U-238+D 5.700E-08 5.700E-08 SLPF1(1,2) s	Sf-1	U-234	4.180E-10	4.180E-10	SLPF1(3,1)	5
Sf-1 Pu-239 1.950E-10 SLPF1{ 5,1} s Sf-1 Pu-238 4.290E-10 SLPF1{ 6,1} s Sf-1 Groundshine, volume SF's, 1/yr per (pCi/g): I I I I Sf-1 U-238+D 5.700E-08 5.700E-08 SLPF1{ 1,2} s	Sf-1	Tc-99	3.620E-13	3.620E-13	SLPF1(4,1)	s
Sf-1 Pu-238 4.290E-10 SLPF1(6,1) s Sf-1 Groundshine, volume SF's, 1/yr per (pCi/g): Sf-1 U-238+D 5.700E-08 5.700E-08 SLPF1(1,2) s	Sf-1	Pu-239	1.950E-10	1.950E-10	SLPF1(5,1)	s
Image: Start intervaluation intervaluatin intervaluation intervaluation interva	Sf-1	Pu-238	4.290E-10	4.290E-10	SLPF1(6,1)	S
Sf-1 U-238+D 5.700E-08 5.700E-08 SLPF1(1,2) s	CF 1] Groundshipe, volume SF's, l/vr per (pCi/g):		1	i	
pt-t [o roaio	51-1 5f-1	(1-238+D	5.700E-08	5.700E-08	SLPF1(1,2)	5
	51-1	[0.25070				

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Dose and Risk Conversion Factor (a	and Related)	Parameter	Summary	(continued)
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	I I I I I I I I I I I I I I I I I I I	Current	í I	Parameter	l
Menu	Parameter	Value	Default	Name	Source
Sf-1	υ-235	2.700E-07	2.700E-07	SLPF1(2,2)	l s
Sf-1	U-234	2.100E-11	2.100E-11	SLPF1(3,2)	s
Sf-1	Tc-99	6.200E-13	6.200E-13	SLPF1(4,2)	s
Sf-1	Pu-239	1.300E-11	1.300E-11	SLPF1(5,2)	s
Sf-1	Pu-238	1.900E-11	1.900E-11	SLPF1(6,2)	s
1	1		[1
Sf-2	Inhalation, slope factors, 1/(pCi):		[1
Sf-2	U-238+D	1.200E-08	1.200E-08	SLPF2(1)	s
Sf-2	U-235	1.300E-08	1.300E-08	SLPF2(2)	s
Sf-2	0-234	1.400E-08	1.400E-08	SLPF2(3)	s
Sf-2	Tc-99	2.900E-12	2.900E-12	SLPF2(4)	s
Sf-2	Pu-239	2.800E-08	2.800E-08	SLPF2(5)	s
Sf-2	Pu=238	2.700E-08	2.700E-08	SLPF2(6)	s
1					
51-3	Ingestion, slope factors, 1/(pCi):				1
Sf-3	U-238+D	6.200E-11	6.200E-11	SLPF3(1)	s
Sf-3	U-235	4.700E-11	4.700E-11	SLPF3(2)	s
Sf-3	U-234	4.400E-11	4.400E-11	SLPF3(3)	s
Sf-3	Tc-99	1.400E-12	1.400E-12	SLPF3(4)	s
Sf-3	Pu-239	3.200E-10	3.200E-10	SLPF3(5)	s
Sf-3	Pu-238	3.000E-10	3.000E-10	SLPF3(6)	s
Î		1			1
Sf-4	Air immersion, slope factors, 1/yr per (pCi/m**3):	1	I		1
Sf-4	U-238+D	7.440E-11	7.440E-11	SLPF4(1)	s
Sf-4	U-235	5.070E-10	5.070E-10	SLPF4(2)	s
Sf-4	U-234	4.180E-13	4.180E-13	SLPF4(3)	5
Sf-4	Tc-99	1.530E-15	1.530E-15	SLPF4(4)	s
Sf-4	Pu-239	2.330E-13	2.330E-13	SLPF4(5)	s
Sf-4	Pu-238	2.240E-13	2.240E-13	SLPF4(6)	3
		I	I		I
SfRn	Radon inhalation slope factors, 1/(pCi):	1			1
SfRn	Rn-222	1.800E-12	1.800E-12	SLPFRN(1,1)	b
SfRn	Po-218	3.700E-12	3.700E-12	SLPFRN(1,2)	5
SfRn	Pb-214	6.200E-12	6.200E-12	SLPFRN(1,3)	s
SfRn	Bi-214	1.500E-11	1.500E-11	SLPFRN(1,4)	ß
SfRn	Rn-220	1.900E-13	1.900E-13	SLPFRN(2,1)	s
SfRn	Po-216	3.0008-15	3.000E-15	SLPFRN(2,2)	5
SfRn	Pb-212	3.900E-11	3.900E-11	SLPFRN(2,3)	s
SfRn	Bi-212	3.700E-11	3.700E-11	SLPFRN(2,4)	s
					L

Note: Radionuclides are Class A human carcinogens.

- (s) Dose conversion factors are taken from EPA FGR nos. 11 & 12.
 - Volume, inhalation and ingestion slope factors are taken from Heast (March 1994). except where noted. Air immersion and surface slope factors are taken from EPA 402-R-93-076, except where noted.
- (a) Values are calculated using DCF and risk coefficient (7.60e-4 cancer incidence risk/rem).
- (b) Values taken from EPA 402-R-93-076 (June 1994).
- (c) Value taken from individual radionuclides given in Heast (not from Pu-241+D).
- (d) DCF value was zero, slope factor was also assumed to be zero.
- (e) Slope factor from EPA report was unreasonably small, calculated from DCF and risk coefficient.
- (f) DCF value increased by 50% to account for dermal absorption of H-3 in vapor form.

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Site-Specific Parameter Summary

	1	User	1	Used by RESRAD-BASELINE	Parameter
Menu	Parameter	Input	Default	(If different from user input)	Name
		l			
R011	Surface concentration in soil (pCi/m**2):	1	1		
R011	U-238	not used	0.000E+00		NUCSLS(1)
R011	U-235	not used	0.000E+00		NUCSLS(2)
R011	U-234	not used	0.000E+00		NUCSES(3)
R011	Tc-99	not used	0.000E+00		NUCSLS(4)
R011	Pu-239	not used	0.000E+00		NUCSES(5)
ROIL	Fu-238	i not used	0.0005+00		
P011	Velume concentration in seil (pCi(d))	1	1		
R011	U-238	h not used	1 1 0 000E+00		NDCSLV(1)
R011	1-235	not used	0.000E+00		NUCSLV(2)
ROLL	II-234	not used	D.000E+00		NUCSLV(3)
R011	Tc-99	not used	0.000E+00		NUCSLV(4)
B011	Pu-239	not used	0.000E+00		NUCSLV(5)
R011	Pu-238	not used	D.000E+00		NUCSLV(6)
		I	1		1
R012	Indoor air concentration (pCi/m**3):	1	i	-	1
R012	U-238	not used	0.000E+00		NUCAIND(1
R012	U-235	not used	0.000E+00		NUCAIND (2)
R012	U~234	not used	0.000E+00		NUCAIND(3)
R012	Tc-99	not used	0.000E+00		NUCAIND (4)
R012	Pu-239	not used	0.000E+00		NUCAIND(5)
R012	Pu-238	not used	0.000E+00		NUCAIND(6)
		I	1	1	1
R012	Outdoor air concentration (pCi/m**3):		ł	1	1
R012	U~238	not used	0.000E+00		NUCAOTD (1)
R012	U~235	not used	0.000E+00		NUCAOTD { 2
R012	U~234	not used	0.000E+00		NUCAOTD(3)
R012	Tc-99	not used	0.000E+00		NUCAOTD(4)
R012	Pu-239	not used	0.000E+00		NUCAOTD (5)
R012	Pu-238	not used	0.000E+00		NUCAOTD (6)
		1	1		1
R013	Concentration in plant (pCi/kg):	1			
R013	0~238	not used	0.000E+00		NUCPLT(1)
R013	0-235	not used	0.000E+00		NUCPLT(2)
R013	0~234	not used	0.000E+00		NUCPLT (3)
RUI3	10-39	not used	0.0005+00		NUCPLI(4)
R013	Pu=239	not used	0.0002+00		NUCPLT(6)
1010	14 250	1 100 4004	1 010002.00		1
B013	Concentration in meat (pCi/kg):	1		1	l
B013	t1-238	not used	0.000E+00		NUCMT(1)
R013	U~235	not used	0.000E+00		NUCMT (2)
R013	U~234	not used	0.000E+00		NUCMT(3)
R013	Tc-99	not used	0.000E+00		NUCMT(4)
R013	Pu-239	not used	0.000E+00		NUCMT (5)
R013	Pu-238	not used	0.000E+00		NUCMT (6)
ĩ		1	1	1	1
R013	Concentration in milk (pCi/L):	I	1	1	1
R013	U-238	not used	D.000E+00		NUCMK(1)
R013	0~235	not used	0.000E+00		NUCMK(2)

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Site-Specific Parameter Summary (continued)

		User		Used by RESRAD-BASELINE	Paramet
Menu	Parameter	Input	Default	(If different from user input)	Name
R013	u-234	not used	0.000E+00	•••	NUCMR(3
R013	TC-99	not used	0.000E+00		NUCMK (4
R013	Pu-239	not used	0.000E+00		NUCMK (5
R013	Pu-238	not used	0.000E+00		NUCMK (6
R014	Concentration in fish (pCi/kg):	1			1
R014	II-238	not used	0.0002+00		NUCFSH (
R014	u-235	not used	0.000E+00		NUCFSH (
R014	0-234	not used	0.000E+00		NUCFSH (
R014	Tc-99	not used	0.000E+00		NUCFSH (
B014	Pu-239	not used	0.000E+00		NUCFSH (
R014	Pu-238	not used	0.000E+00		NUCFSH (
		1		1	1
R014	Concentration in shell fish (pCi/kg):	I		1	1
R014	U-238	not used	0.000E+00		NUCNFSH (
R014	U-235	not used	0.000E+00		NUCNFSH (
R014	U-234	not used	0.000E+00		NUCNFSH (
R014	Tc-99	not used	0.000E+00		NUCNFSH (
R014	Pu-239	not used	0.000E+00		NUCNFSH (
R014	Pu-238	not used	0.000E+00		NUCNFSH (
		1			I
R015	Concentration in drinking water (pCi/L):	1		1	1
R015	U-238	not used	0.000E+00		NUCDW(1
R015	U-235	not used	0.000E+00		NUCDW (2
R015	U-234	not used	0.000E+00		NUCDW (3
R015	TC-99	not used	0.000E+00		NUCDW (4
R015	Pu-239	not used	0.000E+00		NUCDW (5
R015	Pu-238	not used	0.000E+00		NUCDW(6
	1	I		1	1
R015	Concentration in pond water (pCi/L):	I		1	
R015	U-238	2.060E+00	0.000E+00		NUCPW(1
R015	U-235	7.000E-02	0.000E+00		NUCPW(2
R015	U-234	5.400E-01	0.000E+00		NUCPW(3
R015	Tc-99	6.320E+00	0.000E+00		NUCPW (4
R015	Pu-239	-6.100E-02	0.000E+00		NUCPW{ 5
R015	Pu-238	1,400E-01	0.000E+00		NUCPW(6
		1		1	ł
R016	Indoor Radon-222 concentration (pCi/m**3)	not used	0.000E+00		RN222(1)
R016	Outdoor Radon-222 concentration (pCi/m**3)	not used	0.000E+00		RN222(2)
R016	Indoor Radon-220 concentration (pCi/m**3)	not used	0.000E+00		RN220(1)
R016	Outdoor Radon-220 concentration (pCi/m**3)	not used	0.000E+00		RN220(2)
	1	1		1	
R016	Equilibrium fraction of Radon-222 daughters	not used	5.000E-01		EQ222
R016	Radon-222 daughter concentrations (pCi/m**3):	1		1	1
R016	Po-218, indoors	not used	0.000E+00	0.000E+00	PO218(1)
R016	Po-218, outdoors	not used	0,000E+00	0.000E+00	PO218(2)
R016	Pb-214, indoors	not used	0.000E+00	0.000E+00	PB214(1)
R016	Pb-214, outdoors	not used	0.000E+00	0.000E+00	PB214(2)
R016	Bi-214, indoors	not used	0.000E+00	0.000E+00	B1214(1)
R016	Bi-214, outdoors	not used	0.000E+00	0.000E+00	BI214(2)
		1		1	1

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Site-Specific Parameter Summary (continued)

1		User	I I	Used by RESRAD-BASELINE	Paramet
Menu	Parameter	Input	Default	(If different from user input)	Name
R016	Equilibrium fraction of Radon-220 daughters	not used	-1.000E+00		EQ220
R016	Radon-220 daughter concentrations (pCi/m**3):	1	I	i de la companya de l	1
R016	Po-216, indoors	not used	0.000E+00	0.000E+00	PO216(1)
R016	Po-216, outdoors	not used	0.000E+00	0.000E+00	PO216(2)
R016	Pb-212, indoors	not used	0.000E+00	0.000E+00	PB212(1)
R016	Pb-212, outdoors	not used	0.000E+00	0.000E+00	PB212(2)
R016	Bi-212, indoors	not used	0.000E+00	0.000E+00	BI212(1)
R016	Bi-212, outdoors	not used	0.000E+00	0.000E+00	BI212(2)
		1	1	I	1
B011	Density of soil (pCi/g)	not used	1.500E+00		DENSCZ
B011	Thickness of contaminated soil (m)	not used	1.000E+00		THICK
B011	Organic carbon content of soil	not used	2.000E-01		FOC
		1	I	1	
B012	Fruits, vegetables, and grain consumption (kg/d)	not used	5.000E-01	•••	DIET3
B012	Meat and poultry consumption (kg/d)	not used	2.500E-01		DIET4
B012	Milk consumption (L/d)	not used	1.700E-01		DIET5
B012	Fish consumption (kg/d)	not used	1.500E-02		DIET6(1)
B012	Other seafood consumption (kg/d)	not used	2.500E-03		DIET6(2)
B012	Drinking water intake (L/d)	not used	1.400E+00		DIET7
B012	Incidental water intake (swimming) (L/d)	1.300E-01	1.300E-01		DIET10
B012	Soil ingestion (child) (g/d)	not used	2.000E-01		DIET8(1)
B012	Soil ingestion (adult) (g/d)	not used	1.000E-01		DIET8(2)
		1	1	1	1
B013	Inhalation rate indoors (m**3/d)	not used	2.000E+01		INHALR (1
B013	Inhalation rate outdoors (m**3/d)	not used	2.000E+01		INHALR (2
B013	Time fraction outdoors	not used	3.300E-01		FOTD
B013	Shielding factor for groundshine	not used	7.000E-01		SHF1
в013	Exposure duration for child (yr)	not used	6.000E+00	1	ED(1)
B013	Total exposure duration (yr)	not used	3.000E+01		ED(2)
B013	Average body weight for child (kg)	not used	1.500E+01		BDWT (1)
B013	Average body weight for adult (kg)	not used	7.000E+01	[»	BDWT (2)
B013	Average life time (yr)	not used	7.000E+01		AVLF
		1	1	1	l .
B014	Contamination fractions:	1	1	1	1
B014	ingested plant	not used	5.000E-01		FRACT3
B014	ingested meat	not used	1.000E+00		FRACT4
B014	ingested milk	not used	1.000E+00	1	FRACT5
B014	ingested aquatic food	not used	5.000E-01	1	FRACT6
B014	ingested drinking water	not used	1.000E+00	1	FRACT7
B014	ingested soil	not used	1.000E+00	1	FRACT8
B014	incidentally(swimming) ingested water	1.000E+00	1.000E+00		FRACT10
B014	dermal absorption from swimming	1.000E+00	1.000E+00	1	FRACT12
B014	dermal absorption from shower water	not used	1.000E+00	1	FRACT13
B014	dermal absorption from soil contact	not used	1.000E+00	1	FRACT14
		1	1	1	1
B015	Exposure frequencies (d/yr):	1	1	1	1
B015	inhalation and external radiation	not used	3.500E+02	1	EXPF1
B015	plant ingestion	not used	3.500E+02	1	EXPF3
B015	meat ingestion	not used	3.500E+02	1	EXPF4
B015	milk ingestion	not used	3.500E+02	1	EXPF5
B015	aquatic food ingestion	not used	3.500E+02	1	EXPF6

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Parameter	User Input	Default	Used by RESRAD-BASELINE (If different from user input)	Parameter Name
drinking water ingestion	not used	3.500E+02		EXPF7
soil ingestion	not used	3.500E+02	1	EXPF8
incidental(swimming) water ingestion	7.000E+00	7.000E+00	1	EXPF10
dermal absorption from swimming	7.000E+00	7.000E+00	1	EXPF12
dermal absorption from shower water	not used	3.500£*02	1	EXPF13
dermal absorption from soil contact	not used	3.5002+02	1	EKPF14
	1	1	1	I
ermal absorption parameters:	L	L	1	ł
skin surface area for water contact (cm**2)	2.000E+04	2.000E+04	1	DAREAW
skin surface area for soil contact $(cm^{\star\star}2)$	not used	5.000E+03	1	DAREAS
soil to skin adherence (mg/cm**2-event)	2.000E-01	2.000E-01	1	ADHRF
duration for showering (min/event)	not used	1.000±+01	1	DURSH
duration for swimming (hr/event)	5.000E-01	5.000E-01	1	DURSM
duration for soil contact (hr/event)	not used	1.200E+01	1	DURSC

Site-Specific Parameter Summary (continued)

Summary of Pathway Selections

	Pathway	1	User Selection
1 1	groundshine (R)	i	suppressed
2	inhalation (B)	L	suppressed
3	plant ingestion (B)	ŀ	suppressed
4	meat ingestion (B)	t	suppressed
5 1	milk ingestion (B)	I.	suppressed
6 6	aquatic foods ingestion (B)	L	suppressed
7 1	drinking water ingestion (B)	Ē	suppressed
8 8	soil ingestion (B)	I.	suppressed
9 9	radon (R)	L	suppressed
10	incidental water ingestion (B)	L	active (R)
11	air immersion (R)	1	suppressed
12	dermal absorption from swimming (C)	L	active (R)
13 6	dermal absorption from shower water (C)	Ī.	suppressed
24 4	dermal absorption soil contact (C)	I.	suppressed

Note: (B), (C) and (R) under pathway denotes the applicability for both chemical and radiological, chemical, or radiological risk assessment, respectively.

(B), (C) and (R) under user selection denotes user's choice to conduct both chemical and radiological, chemical, or radiological risk assessment, respectively.